

**October 13-14, 2023**

**Ankara, Türkiye**

# **6. INTERNATIONAL ANKARA MULTIDISCIPLINARY STUDIES CONGRESS**

## **PROCEEDINGS BOOK**



**EDITED BY  
DR. NURLAN AKHMETOV**

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# 6. INTERNATIONAL ANKARA MULTIDISCIPLINARY STUDIES CONGRESS

*October 13-14, 2023  
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## **PROCEEDINGS BOOK**

*Edited by  
Dr. Nurlan AKHMETOV*

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## **CONGRESS ID**

**6. INTERNATIONAL ANKARA MULTIDISCIPLINARY STUDIES CONGRESS**

## **DATE-PLACE**

*October 13-14, 2023*

*Ankara, Türkiye*

## **EDITOR**

*Dr. Nurlan AKHMETOV*

## **EVALUATION PROCESS**

*All applications have undergone a double-blind peer review process*

**TOTAL NUMBER OF PAPERS: 369**

**THE NUMBER OF PAPERS FROM TÜRKİYE: 181**

**OTHER COUNTRIES: 188**

## **PARTICIPANT COUNTRIES (31):**

*Türkiye, Azerbaijan, Turkish Republic of Northern Cyprus, Iraq, Nigeria, Indonesia, Vietnam, Pakistan, Romania, Ukraine, Tunisia, Algeria, Serbia, India, Morocco, Kingdom of Saudi Arabia, Germany, Georgia, Brazil, China, Hungary, Bulgaria, Uzbekistan, Congo, Albania, Croatia, Benin, France, Argentina, Egypt, UK*

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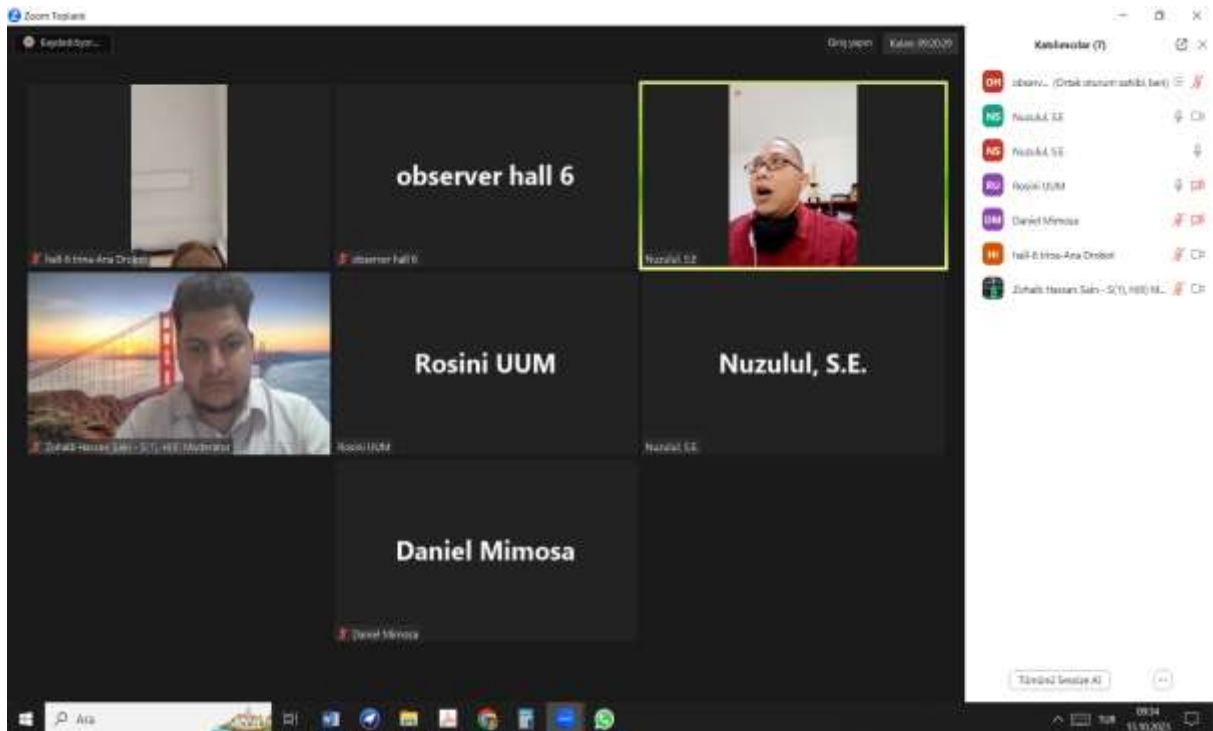
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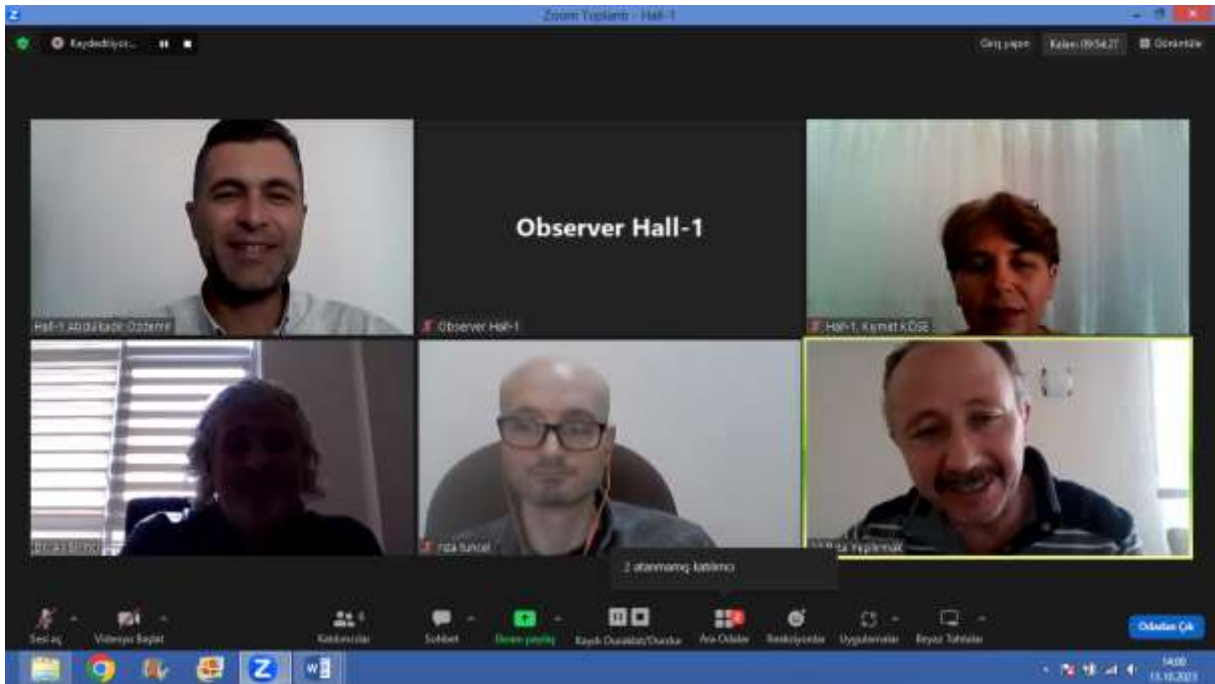
Alina AMANZHOLVA

# PHOTO GALLERY



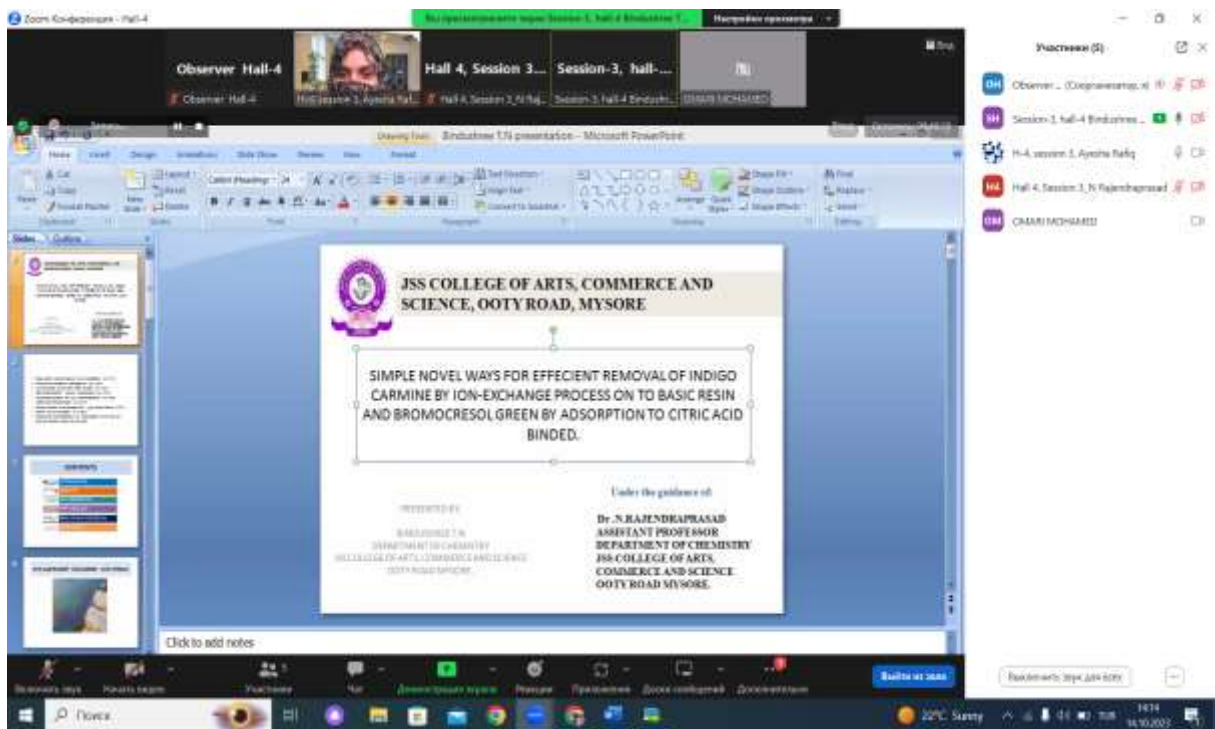














# VI. INTERNATIONAL ANKARA MULTIDISCIPLINARY STUDIES CONGRESS

October 13-14, 2023

Ankara, Türkiye

## CONGRESS PROGRAM



**Meeting ID: 859 7119 7642**

**Passcode: 131313**

**Join Zoom Meeting**

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### Önemli, Dikkatle Okuyunuz Lütfen

- ❖ Kongremizde Yazım Kurallarına uygun gönderilmiş ve bilim kurulundan geçen bildirimler için online (video konferans sistemi üzerinden) sunum imkanı sağlanmıştır.
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- ❖ Tüm kongre katılımcıları canlı bağlanarak tüm oturumları dinleyebilir.
- ❖ Moderatör – oturumdaki sunum ve bilimsel tartışma (soru-cevap) kısmından sorumludur.

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**exp. Hall-1, Seda BEYAZ**

Ankara





Session-1, Hall-1

13.10.2023

Moderator: Assist. Prof. Dr. H. Hale AYGÜN

Meeting ID: 859 7119 7642 / Passcode: 131313

Ankara Local Time: 09:00 – 11:00

Title	Author(s)	Affiliation
DETERMINATION OF THE NUMBER OF CUTS BY FINITE ELEMENT METHOD FOR CUTTING TOOL USED IN FABRIC CUTTING	Öznur BAĞ Lezgin KAYA	Serkon Tekstil Makina ve Ekipmanları Sanayi ve Ticaret Anonim Şirketi, İstanbul, Türkiye. Gaziosmanpaşa University, Tokat, Türkiye.
INVESTIGATING THE IMPACT OF TWIST COEFFICIENT VARIATION ON THE STRENGTH OF LYOCELL YARN	Merve Küçükali Öztürk	Istanbul Bilgi University, İstanbul, Türkiye.
AN INVESTIGATION INTO THE PERFORMANCE OF DIFFERENT FROTHERS IN THE FLOTATION OF YOZGAT/SORGUN LIGNITE COAL	Özlem KAYA Şaban ÖZÜTÜRKER	Sivas Cumhuriyet University, Sivas, Türkiye
REMOVAL OF REACTIVE ORANGE-122 DYE FROM WASTEWATER USING YAP POLYMER	Ilgın Yaren GÜVEN Petek BALCI Ali KARA	Bursa Uludağ University, Bursa, Türkiye
REACTIVE YELLOW 186 DYESTATE IN EAP POLYMER ADSORPTION	Ecenur KURTULAN Petek BALCI Ali KARA	Bursa Uludağ University, Bursa, Türkiye
MANUFACTURING OF PS/PVC/Bi <sub>2</sub> O <sub>3</sub> SURFACES: A COMPARATIVE STUDY ON SOLVENT CASTING AND ELECTROSPINNING METHODS	H. Hale AYGÜN	Kahramanmaraş Sütçü İmam University, Kahramanmaraş, Türkiye
EFFECT OF SILVER NANOPARTICLES OBTAINED BY BACTERIAL GREEN SYNTHESIS ON THE REMOVAL OF METHYLENE BLUE DYE	Sema YİYİT DOĞAN Seçil KAYA Eray YİĞİT	Gazi University, Ankara, Türkiye.
SYNTHESIS AND SWELLING STUDIES OF CARBOXYMETHYL CELLULOSE-SODIUM ALGINATE- <i>A.sativa</i> BASED HYDROGELS OPTIMIZED BY BOX-BEHNKEN RESPONSE SURFACE METHODOLOGY	Seçil KAYA Ebru KONDOLOT SOLAK Sema YIYIT DOGAN Berkan BARDAKÇI	Gazi University, Ankara, Türkiye.
SYTHESIS OF POLYDIALYLDIMETHYLAMMONIUM CHLORIDE (POLYDADMAC) AND INVESTIGATION OF ITS PERFORMANCE IN TEXTILE WASTEWATER TREATMENT	Gamze ŞENGÜL ÖZER Ömer Yunus GÜMÜŞ	Bursa Teknik University, Bursa, Türkiye.

All participants must join the conference 10 minutes before the session time.

Every presentation should last not longer than 10-12 minutes.

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Session-1, Hall-2

13.10.2023

**Moderator: Assist. Prof. Dr. Filiz GÜRER YÜCEL**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 09:00 – 11:00**

Title	Author(s)	Affiliation
AN ARTISTIC LOOK AT THE TRACES OF THE PAST; MARTYRS OF SARIKAMIŞ	Emine ERDOĞAN	Kafkas University, Türkiye
THE EFFECT OF THE SURREALISM ART MOVEMENT ON ELSA SCHIAPARELLI DESIGNS	Ahmet AÇIK	İstanbul Beykent University, İstanbul, Türkiye
POETIC REPRESENTATIONS OF THE CITY IN <i>WINGS OF DESIRE</i> (DER HIMMEL ÜBER BERLIN, 1987)	Zehra CERRAHOĞLU	Dokuz Eylül University, İzmir, Türkiye
AN EVALUATION OF STUDIES INVESTIGATING THE EFFECT OF DESIGN ON SOUND IN BAGLAMA ACOUSTICS	Filiz GÜRER YÜCEL	Ankara Müzik ve Güzel Sanatlar Üniversitesi, Ankara, Türkiye
AN EXAMINATION OF THE DIFFERENCES IN THE FORMAL ANALYSIS OF TURKISH MUSIC WORKS	Erhan ZETEROĞLU	Manisa Celal Bayar University, Manisa, Türkiye

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Session-1, Hall-3

13.10.2023

Moderator: Assist. Prof. Dr. Ayça ARSLAN

Meeting ID: 859 7119 7642 / Passcode: 131313

Ankara Local Time: 09:00 – 11:00

Title	Author(s)	Affiliation
A HOUSING REVIEW AT THE INTERSECTION OF ARCHITECTURE AND ARCHEOLOGY: <i>EPHESUS YAMAÇ HOUSES-2</i>	Ayça ARSLAN	Uşak University, Uşak, Türkiye
EVALUATION OF DISABLED ACCESSIBILITY: CASE OF BITLIS EREN UNIVERSITY FACULTY OF ENGINEERING AND ARCHITECTURE AND SURROUNDINGS	Arya BIÇEN	Bitlis Eren University, Bitlis, Türkiye
MEASURING CONSUMERS' RESPONSES TO PRODUCT DESIGN: A COMPARISON, PURIFICATION AND ADAPTATION OF PRODUCT DESIGN SCALES	Elif İdemen Mehmet Okan	İstanbul University, Türkiye Artvin Çoruh University, Artvin, Türkiye
INVESTIGATION OF THE SEISMIC INPUT ENERGY FOR HATAY PROVINCE DURING THE FEBRUARY 6, 2023 KAHRAMANMARAŞ/PAZARCIK EARTHQUAKE	Bilal BALUN	Bingöl University, Bingöl, Türkiye
ANALYSIS OF PERMEATION INJECTION, FRACTURING INJECTION, AND COMPACTION INJECTION METHODS IN TERMS OF CALCULATION AND DESIGN CRITERIA	Nuriye YAZICI Mürsel ŞERAFEDDİNOĞLU Ahmet Talha GEZGİN Adem DOĞANGÜN	Bursa Uludağ University, Bursa, Türkiye
THE SWELLING MECHANISM OF THE CLAY SOILS AND EVALOATION OF THE EMPIRIC APPROACHES WITH FEM MODELLIN SOFTWARE	Mürsel ŞERAFEDDİNOĞLU Nuriye YAZICI Ahmet Talha GEZGİN Adem DOĞANGÜN	Bursa Uludağ University, Bursa, Türkiye
OBJECT DETECTION FOR SEATBELT DETECTION: A COMPARISON OF YOLOv3 And YOLOv4	Şerife Gülsüm DEMİR Turan ARSLAN	Bursa Uludağ University, Bursa, Türkiye

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**Session-1, Hall-4**

**13.10.2023**

**Moderator: Assist. Prof. Dr. Pınar ÖZDEMİR**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 09:00 – 11:00**

Title	Author(s)	Affiliation
HAFIZ PROJECT IN IMAM HATIP SECONDARY SCHOOLS (BATMAN EXAMPLE)	Mehmet Nezir CEYLAN	Batman, Türkiye
A REVIEW ON THE IMPORTANCE OF MUSIC EDUCATION IN INDIVIDUALS WITH AUTISM SPECTRUM DISORDER	Gülce DENİZKURDU Suat OĞUZ Cevat EKER	Zonguldak Bülent Ecevit University, Zonguldak ,Türkiye Milli Eğitim Bakanlığı,Mehmet Torun Özel Eğitim Meslek Okulu, Bursa,Türkiye
AN INVESTIGATION OF UNIVERSITY STUDENTS' VIEWS ON MATE SELECTION IN THE 21ST CENTURY: A QUALITATIVE RESEARCH	Pınar ÖZDEMİR	Düzce University, Düzce, Türkiye
A BIBLIOMETRIC ANALYSIS ON MINDFULNESS	Pınar ÖZDEMİR	Düzce University, Düzce, Türkiye
ANALYSIS OF METHODS FOR IMPROVING THE TEACHING OF MACHINE DESIGN AND MECHANICAL TECHNOLOGIES	Safarova Tarana Qasim Ragimova Konul Elbrus	Azerbaijan State Economic University
A COMPARISON OF RUBRIC TYPES: HOLISTIC SCORING VS. ANALYTIC SCORING	Sait ÇÜM	Dokuz Eylül University, İzmir, Türkiye
AN EXAMPLE OF A MULTIDISCIPLINARY MODULE BASED ON AN INTERDISCIPLINARY TEACHING APPROACH IN SOCIAL STUDIES TEACHING: "IN THE FOOTSTEPS OF GÖBEKLITEPE"	Fidaye CİNCİL Ayşegül ŞEYİHOĞLU	Trabzon University, Trabzon, Türkiye

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**Session-1, Hall-5**

**13.10.2023**

**Moderator: Hendri Hermawan ADİNUGRAHA**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 09:00 – 11:00**

Title	Author(s)	Affiliation
FUNDRAISING STRATEGY OF ZAKAT, INFAQ, AND SADAQAH OF INDONESIAN PHILANTHROPIC INSTITUTIONS	Arini Minnataka	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
THE IMPACT OF DIGITAL INFLUENCER MARKETING ON THE DEVELOPMENT OF BUSINESS STRATEGY (A LITERATURE STUDY)	Anggun Rahadian Kusuma Dewi	UIN K.H. Abdurrahman Wahid Pekalongan
PRODUCTIVE UTILIZATION OF ZAKAT FOR POVERTY ALLEVIATION: CASE STUDY IN INDONESIA	Nurul ASROFIANA Hendri Hermawan ADİNUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan
THE IMPORTANCE OF PRODUCT QUALITY IN MAINTAINING CONSUMER LOYALTY IN THE BATIK INDUSTRY IN INDONESIA	Mita Melati Retno MANDALIN Hendri Hermawan ADİNUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan
THE CONCEPT OF MURABAHAH CONTRACT AT BANK SYARIAH INDONESIA KC PEKALONGAN PEMUDA	Mochamad Yusuf Hendri Hermawan Adinugraha	UIN K.H. Abdurrahman Wahid Pekalongan
THE ROLE OF PRODUCT INNOVATION IN IMPROVING THE MARKETING PERFORMANCE OF CULINARY BUSINESSES IN INDONESIA	Nur FADHILAH Hendri Hermawan ADİNUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
ANALYSIS OF HALAL PRODUCT CERTIFICATION AND LABELIZATION IN INDONESIA	Laila FITRIANI Hendri Hermawan ADİNUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
A BIBLIOMETRIC ANALYSIS: ANALYSIS OF THE CAUSES OF INEQUALITY IN INCOME DISTRIBUTION IN INDONESIA	Ardia Puspita DEWI	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
ULUSLARARASI ALANDA ARTAN KORUMACILIK	Salih ÖZTÜRK Muharrem YAŞAR	TNKÜ
ARTVİN YUSUFELİ BARAJININ TÜRKİYE EKONOMİSİNE MUHTEMEL	Salih ÖZTÜRK Suna YILDIZ	TNKÜ
TEKNOLOJİK GELİŞMELERİN, KÜRESELLEŞME BOYUTU, SOSYAL VE EKONOMİK ETKİLERİ	Salih ÖZTÜRK Birgöl PAŞAOĞLU	TNKÜ

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**Session-1, Hall-6**

**13.10.2023**

**Moderator: Zohaib Hassan Sain**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 09:00 – 11:00**

Title	Author(s)	Affiliation
CHAT GPT: A TECHNOLOGICAL SOLUTION OR DILEMMA FOR THE EDUCATION SYSTEM IN 2023	Zohaib Hassan Sain	Superior University, Faculty of Business & Management Sciences, Pakistan
REVIEWING THE ACADEMIC LANDSCAPE: THE IMPLEMENTATION OF ELEARNING INITIATIVES IN HIGHER EDUCATION	Zohaib Hassan Sain	Superior University, Faculty of Business & Management Sciences, Pakistan
COMPUTER LABORATORY OPTIMIZATION IN LEARNING: A LITERATURE STUDY	NUZULUL Hendri Hermawan ADINUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
THE ROLE OF THE FAMILY IN FOSTERING RESILIENCE FOR STUDENTS WITH SPECIAL EDUCATIONAL NEEDS IN THE MODERN INCLUSIVE CLASSROOM SETTINGS	Fr. Baiju Thomas	Ramakrishna Mission Vivekananda Educational and Research Institute
MOVING BEYOND TRADITIONAL ASSESSMENT: THE TYLER EXPANDED MODEL AND ITS RELEVANCE FOR MALAYSIAN HIGHER EDUCATION	Rosini Nawang Mustapen Zuliana Azwa Zulkifli Hartinee Abbas Noor Amalina Mat Yusof	Universiti Utara Malaysia
BUILDING PARTNERSHIPS TO ADDRESS POVERTY ALLEVIATION: A MULTISECTORAL APPROACH	Dr. Bushra Sumaiya	Integral University, India
HAIKU THERAPY: VARIOUS RELATED ISSUES	Irina-Ana DROBOT	Technical University of Civil Engineering Bucharest, Romania
TRADITIONAL BREAKFASTS AROUND THE WORLD: REASONS WHY THEY LOOK THE WAY THEY DO	Irina-Ana DROBOT	Technical University of Civil Engineering Bucharest, Romania
ATTITUDE OF UNDERGRADUATE STUDENTS OF SCHOOL OF AGRICULTURE TOWARDS AGRICULTURAL ACTIVITIES IN FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE, NIGERIA	Jibrin, S., N. T. Kolawole-Jimoh, Manta, I. B., Umaru, A., Adeyemi, G.	FUT Minna, Niger State, Nigeria. IBBU Lapai Extension

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**Session-1, Hall-7**

**13.10.2023**

**Moderator: Prof. Ass. Dr. Endirë Bushati**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 09:00 – 11:00**

Title	Author(s)	Affiliation
PROFLECTION OF CHRISTIAN RELIGIOUS EDUCATION MANAGEMENT AND THE PHILOSOPHY OF STATE LEADERS IN MINAHASA, INDONESIA	Charstar Arstilo Rumbay, Lince Sihombing, Elisamark Sitopu	Institute Agama Kristen Negri, Tarutung
DECOLONIZATION OF CONTRACT LAW: EMBRACING CULTURAL EMIC VALUES OF MINAHASAN'S TRADITION IN AN AGREEMENT	Charstar Arstilo Rumbay Herry Pasrani Mendrofa Saut Horas Tamba Freddy Yosia Tampubolon Dinda Wigrhalia Banurea Dila Sari Dirgayana Novy Saputra Ricki Pratama Putra	University of Bengkulu, Master of Law, Bengkulu, Indonesia
ASSESSING THE LEGAL FRAMEWORK FOR ENVIRONMENTAL PROTECTION IN ALBANIA: A CRITICAL ANALYSIS	Prof. Ass. Dr. Endirë Bushati Dr. Jonida Gjika	University of Tirana, Albania
IMPLEMENTATION OF REGIONAL EXPENDITURE IN CENTRAL JAVA PROVINCE IN INDONESIA	Sigit Pramono Hendri Hermawan Adinugraha	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
A QUALITATIVE INVESTIGATION OF TIME MANAGEMENT INTERVENTIONS FOR WORKING STUDENTS IN THE PHILIPPINES TO BALANCE ACADEMICS AND WORK	John Erwin Prado Pedroso Khathe Aponte Reyken Chiefe Willmi Grace Juanico	West Visayas State University
A STUDY ON EFFECT OF NOSTALGIA MARKETING ON CONSUMER'S PERCEPTION	Tejaswini M	Dayananda Sagar College of Engineering, Bangalore, India
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**Session-2, Hall-1**

**13.10.2023**

**Moderator: Assist. Prof. Dr. Semra NAVRUZ VARLI**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 11:30 – 13:30**

Title	Author(s)	Affiliation
EFFECTS OF FOOD SUPPLEMENTS ON SPORTS NUTRITION	Oznur OZTUNA TANER	Aksaray University, Aksaray, Turkey
MICROENCAPSULATION OF OLIVE OIL	Eda Elgin KILIÇ	Gaziantep University, Türkiye
EVALUATION OF KITCHEN STAFF'S COOKING PRACTICES AND RANGE HOOD USAGE	Semra NAVRUZ VARLI Saniye BİLİCİ	Gazi University, Ankara, Türkiye
DETECTION OF THE PRESENCE OF <i>Listeria monocytogenes</i> IN FROZEN VEGETABLES	Tolga UYANIK	Ondokuz Mayıs University, Türkiye
FOOD IMAGE OF TURKISH CUISINE: A REVIEW OF EMPIRICAL STUDIES	Elvan KESER	Aydın Adnan Menderes University, Aydın, Türkiye

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**Session-2, Hall-2**

**13.10.2023**

**Moderator: Dr. Amber Nawab**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 11:30 – 13:30**

Title	Author(s)	Affiliation
ACCESS TO HEALTH SERVICES IN KANREAPIA HAMLET, GOWA REGENCY, INDONESIA	Ranti Ekasari, Andi Susilawaty, Habibi, Rahmadil Ma'arif	Universitas Islam Negeri Alauddin Makassar, Indonesia
IN SILICO COMPUTATIONAL DRUG DISCOVERY: A MONTE CARLO APPROACH FOR DEVELOPING A NOVEL JAK3 INHIBITORS	Abdelmoujoud Faris, Ivana Cacciatore, Ibrahim M. Ibrahim, Mohammed H. AL Mughram, Hanine Hadni, Kamal Tabti, Menana Elhallaoui, Ghizlan EN-NABETY	Sidi Mohamed Ben Abdellah University, Morocco University "G. d'Annunzio" of Chieti-Pescara, Italy Cairo University, Egypt King Khalid University, Saudi Arabia Moulay Ismail University, Morocco
UNEARTHING FRESH ANTICANCER AGENTS FOR HUMAN BREAST CANCER CELL LINE: INVESTIGATING VIA QSAR AND MOLECULAR DOCKING ANALYSES	Khaoula Mkhayar, Kaouakeb El khattabi, Souad Elkhattabi	Sidi Mohamed Ben Abdellah-Fez University, Fez, Morocco. Hassan II University of Casablanca, B.P 7955, Casablanca, Morocco
RITONAVIR: AN ANTI HIV DRUG	Regunathar Sethupathy.R Dr.v.Rakshana	
REVOLUTIONIZING HEALTHCARE: UNVEILING THE PROS AND CONS OF TELEMEDICINE IN THE DIGITAL ERA	Jenifer Alat Stephen Mirkhamidova Sevara Mirmakhmudovna	Tashkent Medical Academy, Tashkent, Uzbekistan
DEVELOPMENT AND USE OF NONVERBAL COMMUNICATION IN CHILDREN WITH AUTISM SPECTRUM DISORDERS (ASD) AND THEIR PARENTS	Violeta Glogova	New Bulgarian Univesrity, Sofia, Bulgaria
ROLE OF PROBIOTICS AND PREBIOTICS IN HEALTH CARE	Habeeb Salman ISIAKA, Awawu Kewudoyin ABDUSSALAM, Bale Muritala ISSA	Kwara State University, Nigeria
AS A DIGITAL PHARMACEUTICAL TOOL, DIGITAL PILLS	T.THENMOZHI Dr.R.Srinivasan	Bharath Institute of Higher Education and Research, India
THE RELEVANCE OF THE DEVELOPMENT OF THE APPLICATION FORM OF PROTEOLYTIC AND ANTIBACTERIAL ACTION WITH CHITIZAN-CONTAINING COMPONENTS	Ushin Yussef, Konovalenko Ilona	National University of Pharmacy, Ukraine

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Session-2, Hall-3

13.10.2023

Moderator: Assoc. Prof. Dr. Bilge KARGA GÖLLÜ

Meeting ID: 859 7119 7642 / Passcode: 131313

Ankara Local Time: 11:30 – 13:30

Title	Author(s)	Affiliation
THE REFLECTION OF BERRY'S MODEL OF ACCULTURATION IN BRENTON AND ALI'S PLAY <i>IRANIAN NIGHTS</i>	Anıl BAYSAL	Sivas Cumhuriyet University, Sivas, Türkiye
İLHAN KEMAL POEMS IN THE LIGHT OF DIVAN POETRY TRADITION	Bilge KARGA GÖLLÜ	Çukurova University, Adana, Türkiye
NECİP MAHFUZ IN THE ADVENTURE OF THE WORLD NOVEL BY NECİP TOSUN	Ercan Baran	Bingöl University, Türkiye
PALESTINE IN ÂMÂL MESLİSÎ'S "(NACI EN PALASTİNA (NACI AND PALESTINE)" AND YASMIN LEVY'S "NACI EN ALAMO" SONGS	Ercan Baran	Bingöl University, Türkiye
LITERATURE AND WOMEN	Ahmet KAYA Azize GONCAGÜL	Harran University, Şanlıurfa, Türkiye
CULTURE IN YAŞAR KEMAL'S İNCE MEMED NOVELS	Ahmet KAYA	Harran University, Şanlıurfa, Türkiye
THE BELOVED FIGURE IN YAHYA KEMAL BEYATLI'S POETRY WITH PERSONAL AND NATIONAL SIGNIFICANCE	Emine Gözde ÖZGÜREL	Ankara University, Türkiye

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**Session-2, Hall-4**

**13.10.2023**

**Moderator: Dr. Samarjit ROY**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 11:30 – 13:30**

Title	Author(s)	Affiliation
AN IMPLEMENTATION OF PYTHON FOR DATA SCIENCE AND MACHINE LEARNING	Mrs. A. Rajeswari	G.Venkataswamy Naidu College, India
SENSOR-BASED DRONE	M. Keerthiga	RMK Engineering College
AN IMPLEMENTATION OF PYTHON FOR DATA SCIENCE AND MACHINE LEARNING	Mrs.A.Rajeswari	G.Venkataswamy Naidu College,Kovilpatti,Tamilnadu,India.
QUALITY OF EXPERIENCE IN INTERNET OF MUSIC THINGS	Dr. Samarjit ROY Prof. Dr. Debashis DE	Dr. Sudhir Chandra Sur Institute of Technology and Sports Complex Maulana Abul Kalam Azad University of Technology
DISCOVERING THE FRAMES OF BLOCKCHAIN IN THE PUBLIC DISCOURSE ON TWITTER: A MACHINE LEARNING APPROACH	Xiaoqun Zhang Suruthi Selvam	University of North Texas
BRAZILIAN WORKFORCE: BLACK WOMEN CHALLENGES	Panche Motta Ribeiro	Candido Mendes University, Rio de Janeiro, Brazil

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**Session-2, Hall-5**

**13.10.2023**

**Moderator: Assist. Prof. Dr. Fatma Altunbulak Aksu**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 11:30 – 13:30**

Title	Author(s)	Affiliation
POSITION CONTROL OF PMSM BASED ON LQR AND TORQUE OBSERVER	Bilal COŞKUN Muammer GÖKBULUT	Muş Alparslan University, Muş, TÜRKİYE Fırat University, Türkiye
CHARACTERIZING BINARY LINEAR CONSTANT WEIGHT CODES BY PERMUTATION AUTOMORPHISM GROUPS	Fatma Altunbulak Aksu	Mimar Sinan Güzel Sanatlar University, İstanbul, Türkiye
DOWNHOLE SEISMIC – CROSSHOLE TOMOGRAPHY METHOD	Abdulkadir GÜNER Metin AŞÇI	Kocaeli University, Kocaeli.
DECISION SUPPORT SYSTEMS FOR SMART INDUSTRIAL AUTOMATION	Halime ŞAHİN Merve ERKINAY ÖZDEMİR	İskenderun Teknik University, İskenderun, Türkiye
DEVELOPMENT OF TEST SYSTEM FOR ELECTRIC MOTORS	Sinan KIVRAK Emre TURAN Burak YENİPİNAR Zehra SEVER	OSTİM Teknik University, Ankara, Türkiye
ASSESSMENT OF QUITTER INTENTION BY GENERATIONS: A STUDY WITH GENERATIONS X, Y AND Z	Tolga GÜL	Isparta Uygulamalı Bilimler University, Türkiye

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**Session-2, Hall-6**

**13.10.2023**

**Moderator: Dr. Alerta Basha**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 11:30 – 13:30**

Title	Author(s)	Affiliation
MONITORING AND RESCHEDULING STRATEGY IN MINIMIZING PROBLEM FINANCING THROUGH IDAMAAN MOBILE APPLICATION AT PT AMAAN SEJAHTERA INDONESIA	Khoirum Rodhiatul Ifa , Hendri Hermawan Adinugrah	UIN K.H. Abdurrahman Wahid Pekalongan
THE IMPACT OF CRISIS MANAGEMENT IN TELE WORKING DURING THE PANDEMIC OUTBREAK -COVID-19	Dr. Alerta Basha	Agricultural University of Tirana, Albania
CLASSIFICATION OF SCIENCE FROM AN ISLAMIC PERSPECTIVE : A LITERATURE REVIEW	Lutfiyanti Rafi Prasodjo Angga Candra Winata Rafid Naufal Aqil Hendri Hermawan Adinugraha	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
INTERCONNECTION INTEGRATION APPROACH: A LITERATURE REVIEW	Kholimah M. Usman ARİFFIANTO M. Ariel RAMADHANİ Hendri Hermawan ADİNUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
INDONESIA NATIONAL BUDGET AS A VACCINE TO RESTORATION OF CONTRACTION IN NATIONAL TOURISM SECTOR	Laurensius Farel Dwi Putranto, Yuvensius Sri Susilo, Jonathan Ersten Herawan	Universitas Atma Jaya Yogyakarta
INDONESIAN CROWDFUNDING COOPERATIVE (IC COOP): INTEGRATION INITIATIVE COOPERATIVES FOR COLLECTIVE NATIONAL ECONOMIC RECOVERY	Jonathan Ersten Herawan, Laurensius Farel Dwi Putranto, Yuvensius Sri Susilo	Universitas Atma Jaya Yogyakarta
RELATIONSHIP BETWEEN ISLAM AND SCIENCE	Hilda Safitri RINA Tri Astuti Anggi Permatasari Triana Dani Maulana Hendri Hermawan Adinugraha	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
FUEL SHORTAGES IN LATIN AMERICA IN THE 21ST CENTURY, THE CUBA CASE	Pérez Gamón Carolina Margarita	Universidad del Nordeste- Facultad de Humanidades- Argentina
BORIS FROM KYIV, USURPER IN THE MEDIEVAL HUNGARIAN KINGDOM	Sándor FÖLDVÁRI	Debrecen University, Hungary
WHAT DOES A NEW BOOK ABOUT SAKARTVELO/ GEORGIA REPUBLIC/GURCISTAN BEING A MARITIME REPUBLIC SAY?	Dr. Natela Borisovna POPKHADZE	Head of Scholarly Information Center at Phassis Academy in Tbilisi

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**Session-2, Hall-7**

**13.10.2023**

**Moderator: Dr. Favour Chukwuemeka Uroko**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 11:30 – 13:30**

Title	Author(s)	Affiliation
IMPLEMENTATION OF ISLAMIC SCIENCE OR SCIENCE	ROFIYANA MOHAMMAD ROBBI MAULANA AGUNG Hendri Hermawan ADINUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
ISLAMIC SCIENTIFIC PARADIGM	Fikri Novrial AZHAR Muhammad Farhan AHNAF Elda PURWANTI Hendri Hermawan ADINUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
MUSLIM MATHEMATICIAN	Miko Ibnu Ibrahim Dwi Sintia Rahmawanti Rossidah Rihadatul Aisi Dwi Ayu Sepityani Hendri Hermawan ADINUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
THE CONTRIBUTION OF ISLAM IN DEVELOPMENT OF SCIENCE	Rossidah Rihadatul Aisi Dwi Sintia Rahmawanti Dwi Ayu Sepityani Miko Ibnu Ibrahim Hendri Hermawan ADINUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
THE FUTURE OF ISLAMIC SCIENCE: A LITERATUR REVIEW	Uswatun KHASANAH Rafiffi Ali Hanan SANTOSA Muhammad Mieftha ISMAIL Ibrahim Abdu SALAM Hendri Hermawan ADINUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
THE RELATIONSHIP OF SCIENCE AND RELIGION: TYPOLOGY OF CONFLICT	Ridwan Abu Djibran Riskafaiza Rafi Alkaf Asy Syafi Riema Ainun Nisa Hendri Hermawan ADINUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
PAULINE CONCEPT OF MINISTRY IN 2 CORINTHIANS 4:1-15 AND THE RELIGIOUS CELEBRITY SYNDROME IN THE NIGERIAN CHURCH	Dr. Favour Chukwuemeka Uroko Enobong Isaac Solomon Ukong Professor Ezichi Anya Ituma	University of Nigeria Nsukka

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Session-3, Hall-1

13.10.2023

Moderator: Assist. Prof. Dr. Abdülkadir ÖZDEMİR

Meeting ID: 859 7119 7642 / Passcode: 131313

Ankara Local Time: 14:00 – 16:00

Title	Author(s)	Affiliation
THE AIRCRAFTS THAT ARE PRODUCED BETWEEN 1926 AND 1942 IN AIRCRAFT FACTORY IN KAYSERİ AND THE DEVELOPMENT OF AIRCRAFT PRODUCTION	Ali Rıza Yeşilırmak	Süleyman Demirel University, Isparta, Türkiye
HUNTING TERMS IN HISTORICAL KIPCHAK LANGUAGE	Rıza TUNCEL	Tokat Gaziosmanpaşa University, Tokat, Türkiye
1918-Cİ İL HADİSƏLƏRİ MƏTBUATDA	Namiq Bağırli	Quba şəhəri "Soyqırımı Memorial Kompleksi"
POLITICAL AND ECONOMIC IMPORTANCE OF THE ZANGEZUR CORRIDOR FOR THE REGION	Zuriya Garayeva	Azərbaycan/Bakü, Azərbaycan Bilim Akademisi-Merkezi İlmi Kütüphanə/Cumhurbaşkanına bağlı Kamu Yönetimi Akademisi
ITALIAN OCCUPATION POLICY IN WESTERN ANATOLIA AND THE ATTITUDE OF ISPARTA	Kıymet KÖSE	Süleyman Demirel University, University, Isparta, Türkiye
UNUSUAL METHODS IN DETERMINING PRESIDENTS	Abdülkadir ÖZDEMİR	Erzincan Binali Yıldırım University, Erzincan, Türkiye
MAX WEBER'S THOUGHTS ON SOCIALISM AND RUSSIAN REVOLUTION OF 1917	Hasan AKSAKAL	İstanbul Sabahattin Zaim University, İstanbul, Türkiye
BIDEN ADMINISTRATION'S "FORCED" MIDDLE EAST POLICY IN THE FACE OF CHANGING REGIONAL DYNAMICS	Tamer Kaşıkçı	Eskisehir Osmangazi University, Türkiye
MORAL IDEOLOGIES OF TEACHERS SERVING IN IMAM HATIP SCHOOLS	Ali BİRİNCİ	Gümüşhane University, Gümüşhane, Türkiye

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**Session-3, Hall-2**

**13.10.2023**

**Moderator: Assist. Prof. Dr. Ayşegül DEDE**  
**Meeting ID: 859 7119 7642 / Passcode: 131313**  
**Ankara Local Time: 14:00 – 16:00**

Title	Author(s)	Affiliation
THE CONCEPT OF VIRTUE IN PLATO'S PROTAGORAS, GORGIAS AND STATE DIALOGUES	S.Hande Özçelik	Gazi University, Ankara, Türkiye
UNESCO'S CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS: ICTS IN SCIENCE AND EDUCATION	Leyla MURADZADE	Bakü Devlet Universitesi
CLUSTER ANALYSIS OF YÖK ATLAS DATA OF MANAGEMENT INFORMATION SYSTEMS DEPARTMENTS IN TÜRKİYE	Abdulkerim GÜLER Mesut POLATGİL	Sivas Cumhuriyet University, Sivas, Türkiye
EXAMINATION OF UNIVERSITY STUDENTS' ECOLOGICAL CITIZENSHIP LEVELS	Birgül ÇİÇEK Hande ŞAHİN Sibel ERKAL	Hacettepe University, Ankara, Türkiye Kırıkkale University, Kırıkkale, Türkiye
THE LEGACY OF HEYDAR ALIYEV IN THE CENTRAL SCIENTIFIC LIBRARY (CSL) OF THE AZERBAIJAN NATIONAL ACADEMY OF SCIENCES (ANAS)	Mammad ALIYEV	Azerbaycan Diller Üniversitesi Bakü, Azerbaycan.
TRANSITION TO HIGHER EDUCATION: STUDENT MOBILITY AND NIĞDE	Ayşegül DEDE	Niğde Ömer University, Niğde, Türkiye
THE RELATIONSHIP BETWEEN SCIENCE AND POLITICS IN THE PHILOSOPHY OF PAUL FEYERABEND	Bahar OK	Ankara Yıldırım Beyazıt University, Ankara, Türkiye
EXAMINING THE INDIVIDUAL'S STRUGGLE FOR RECOGNITION FROM CHARLES TAYLOR'S PERSPECTIVE: APPROACH TO CULTURES AND PRESUPPOSITION OF VALUE	Fatıma Zehra ALKAN	Türk-Alman University, İstanbul Türkiye

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**Session-3, Hall-3**

**13.10.2023**

**Moderator: Prof. Dr. Recep ARDOĞAN**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 14:00 – 16:00**

Title	Author(s)	Affiliation
THE PLACE OF ELMALILI IN THE ISSUE OF INTERPRETATION OF GOD'S KHABARI ATTRIBUTES MENTIONED IN THE QUR'AN	Prof. Dr. Recep ARDOĞAN	KSÜ, Türkiye
ECOLOGICAL UNDERSTANDING IN YUNUS EMRE	Prof. Dr. Recep ARDOĞAN	KSÜ, Türkiye
ISLAM'S ECOLOGICAL AWARENESS: THE ROLE AND RESPONSIBILITY OF RELIGIOUS EDUCATION	Muhammed Emin Şimşek	Sivas Cumhuriyet University, Türkiye
TAFSİR IN THE CONTEMPORARY PERIOD: THE EXPECTATIONS OF CONTEMPORARY ISLAMIC SOCIETIES AND THE CHANGING ROLE OF TAFSİR	Servet DEMİRBAŞ	Ankara Yıldırım Beyazıt University, Ankara, Türkiye
SURAH MUZAMMİL IN THE CONTEXT OF QIRAAT-I SEB'A	Mehmet KELEŞ	Ağrı İbrahim Çeçen University, Türkiye
SPIDER METAPHOR IN THE CONTEXT OF SÛRAT AL-'ANKABÛT	Metin ÇETİN	Ağrı İbrahim Çeçen Üniversitesi, Ağrı, Türkiye
POLITICAL TRACES OF THE BEYDILI TRIBE IN MEDIEVAL TURKISH ISLAMIC STATES	Derya Gürtaş DÜNDAR	Aydın Adnan Menderes University, Türkiye
SILENCE OF SHARİ'AH: A STUDY ON MAQASID AL-SHARİ'AH THROUGH KASHF	Mehmet CENGİZ	Şırnak University, Şırnak, Türkiye
THE VIRTUE OF "SERVANTHOOD" IN ISLAMIC MORAL PHILOSOPHY	İbrahim AKSU	Erzincan Binali Yıldırım University, Erzincan, Türkiye

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**Session-3, Hall-4**

**13.10.2023**

**Moderator: Moses Adeolu AGOI**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 14:00 – 16:00**

Title	Author(s)	Affiliation
AN EXPLICIT SURVEY ON THE EFFICACY OF DIGITAL SIGNATURE VERIFICATION SYSTEM (DSVS) AND ITS IMPORTANCE TO BANKING INDUSTRY	Moses Adeolu AGOI Hojajopi Gabriel SEMAKO Solomon Abraham UKPANA Oluwanifemi Opeyemi AGOI	Lagos State University of Education, Lagos Nigeria Obafemi Awolowo University, Osun Nigeria
DIGITAL MARKETING STRATEGY IN PROMOTING PRODUCT MS GLOW	Dwi Mukti ROSALITA Hendri Hermawan ADINUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
IMPACT OF FLOOD IN UJJAIN, MADHYA PRADESH, INDIA DURING SEPT 2023 AND ITS CONSEQUENCES IN THE MINDFULNESS OF THE LOCAL COMMUNITY OF UJJAIN	Dr. Satish Menon Dr. Senbagavalli M	Alliance University, India
ANALYSIS OF THE IMPACT OF GADGET USE ON CHILDRENS COGNITIVE DEVELOPMENT	Febby Febriyani KHARISMA Muhammad SHULTONI Hendri Hermawan ADINUGRAHA	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
MSME BUSINESS DEVELOPMENT IN MULYOOREJO VILLAGE	Mita Lusari Hendri Hermawan ADINUGRAHA Muhammad SHULTONI Ahmad ANAS	UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia
UZHAVAN APP – A DIGITAL APP UTILIZATION BY FARMERS OF TAMIL NADU IN INDIA	Arunkumar R, Dr. P.P.Murugan	Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu
SAFE BANKING MADE SIMPLE: QR ATM ACCESS	Tharani R, SRI SIVA KAVYA R, AKSHAYA S, Sreevarshan J, Adithya V	R.M.K Engineering college, Kavaraipettai-601206, India
THE INDONESIA GREEN POLICY: A REALISTIC SHIFTING INTO A GREEN BASED ENERGY INDUSTRY TO BOOST PUBLIC WELFARE	Yuvensius Sri Susilo, Matthew Kartawinata, Jonathan Ersten Herawan, Karin Kholia	Universitas Atma Jaya Yogyakarta

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**Session-3, Hall-5**

**13.10.2023**

**Moderator: Thanh-Dung Nguyen**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 14:00 – 16:00**

Title	Author(s)	Affiliation
ISOLATION OF ENDOGENOUS BACTERIA FROM Adenosma bracteosum Bonati IN TAY NINH PROVINCE WITH ANTIBACTERIAL ACTIVITY ON Staphylococcus aureus	Thanh-Dung Nguyen, Huu-Nghia Duong, Thuy-Trang Pham, Quoc-Bao Nguyen Tong, Thi-Pha Nguyen, Huu-Hiep Nguyen, Huu-Thanh Nguyen	Can Tho University, Can Tho, Vietnam; An Giang University, An Giang, Vietnam Ho Chi Minh City, Vietnam
ASSESSMENT OF HAZARD INDEX OF ORGANIC CHLORINE PESTICIDE (OCP) RESIDUES IN WATERMELON (Citrus lanatus) SOLD IN KAURA NAMODA, ZAMFARA STATE, NIGERIA	Momoh Shaibu, Samila, .A. Abdullahi, Ahmed A. Abbas	Federal Polytechnic, Kaura Namoda, Zamfara State, Nigeria
AMPHIBIAN DIVERSITY ON AGROFORESTRY LAND IN ULU BELU TANGGAMUS DISTRICT	Brilian Argha WIRATAMA Arief DARMAWAN Dian ISWANDARU Yulia Rahma FITRIANA	University of Lampung
ROLE OF BACTERIA-PRODUCED SHORT-CHAIN FATTY ACIDS ON HUMAN HOMEOSTASIS	Nino Kemashvili, Shorena Khetsuriani	Eberhard Karl University of Tübingen, Germany Tbilisi State Medical University, Georgia
A REVIEW OF THE PROTECTIVE PROPERTIES OF MEDICINAL PLANTS AGAINST DIABETES-RELATED HEART DISEASE	Omar BENAMARI, Hassan AMHAMDI	Abdelmalek Essaadi University, Al-Hoceima 32003, Morocco
HAZARD ANALYSIS AND CRITICAL CONTROL POINT ANALYSIS: A CASE OF GARI PRODUCTION IN OSARA GARI FACTORY	Adeboye, M. M., Sadiku, J. O., Usman, A. U.	Confluence University of Science and Technology, Osara, Kogi State, Nigeria
THE EFFECTS OF AQUEOUS SHOOT EXTRACT OF Chromolaena odorata ON THE GROWTH PARAMETERS AND YIELD OF Abelmoschus esculentus (OKRO) SEEDLINGS	Dare Abel Adesokan	Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria.
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**Session-3, Hall-6**

**13.10.2023**

**Moderator: EL MORABIT Yassmin**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 14:00 – 16:00**

Title	Author(s)	Affiliation
EVALUATING THE ANTI-INFLAMMATORY AND ANTIDIABETIC ACTIVITY OF SYZYGIUM POLYANTHUM BY MOLECULAR DOCKING	Marvel Reuben Suwitono, Martin Culbert Suwitono, Maria Charlottian Suwitono, Titin Sulastri	Universitas Advent Indonesia ChongQing Medical University Universitas Udayana
MYSTERY WITH SOME HISTIDINE KINASES OF AMBORELLA TRICHOPODA IN THE PUBLIC DATABASES AND AVAILABLE RESOURCES	Andrey Popatanasov	Bulgarian Academy of Sciences, Sofia, Bulgaria
MAPPING TOURISM OBJECTS AND ATTRACTIONS IN ECOTOURISM DEVELOPMENT COMMUNITY BASED IN PESAWARAN REGENCY, PROVINCE LAMPUNG, INDONESIA	Rusita, Nuril Atmajaya, Surnayanti, Machya Kartika Tsani, Sugeng P Harianto, Trio Santoso, Mirza Wistary	University of Lampung, Indonesia
ASSESSMENT OF ANTIMICROBIAL ACTIVITY OF THREE COMMERCIAL HAND SANITIZERS AGAINST MICROORGANISMS ISOLATED FROM THE HUMAN HAND	HASSAN MUSA KAWATA, OMAJASOLA, P.F, TITILAYO ELIZABETH ADESOKAN	Kwara State University, Nigeria University of Ilorin, Nigeria
ANTISEIZURE AND ANTIOXIDANT PROPERTIES OF ETHANOL FRACTION OF AERIAL PART OF <i>Borerria ocymoides</i> ON ISONIAZID-INDUCED SEIZURE IN RAT MODELS	Obiora Celestine Ugwu, Prof. Chioma Asumputa Anosike, Maduabuchi, Raymond Okonkwo, Ogbonna, Raymond Offiah	University of Science and Technology Agbani Nigeria
VERIFICATION OF THE AUTHENTICITY OF OLIVE OIL	Doç. EL MORABIT Yassmin, Prof. AHARI M'hamed, Dr. EL MAADOUDI Mohammed	Abdelmalek Esaadi University

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**Session-3, Hall-7**

**13.10.2023**

**Moderator: Dr. Bindu Bharathi**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 14:00 – 16:00**

Title	Author(s)	Affiliation
CHARACTER STRENGTHS AND THE ADOLESCENT JOURNEY TO WELL-BEING: A THEORETICAL LENS	Stenny Anto K Dr. Shinto Thomas	CHRIST University, Bangalore
KINEMATICS OF THE DRIVE CONVEYOR OF PAD PRINTING MACHINE	Dmytro Hrytsenko	National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine
AUTOMATIC DRUG DISPENSER	Sreevarshan J, V. Adithya, T Hemachandiran, Shiyam M, Sai Aravind K, Sandeep Krishna M	R.M.K Engineering college, Kavaraipettai-601206, India
COVID-19 DETECTION WITH DEEP LEARNING TECHNIQUES USING 3D CT SCAN IMAGES	Mrs. S. Sivasakthi	G. Venkataswamy Naidu College, Kovilpatti, Tamilnadu, India
DIABETES MELLITUS – CHRONIC DISEASE	MK.VIJAYALAKSHMI, J. NADHIYA	Bharath Institute Of Science And Technology
DESCRIPTIVE STUDY TO ASSESS THE PREVALENCE OF OBESITY AMONG FEMALE BACHELOR NURSING SCIENCE STUDENTS OF NORTHERN BORDER UNIVERSITY	Dr. Bindu Bharathi, Wesam Menwer, Wajd Nawaf, Rayana Fayez, Amjad Ayed	Northern Border University, Saudi Arabia
HYDROCARBON PIPELINE LEAK DETECTION USING MACHINE LEARNING MODELS	Amadi Oko Amadi, Okpo Charles Nnanna, Osuji Chibuike Tobias, Uduak Godwin Etokakpan, Patience James Oden, Onuoha Raymond Udochukwu	Akanu Ibiam Federal Polytechnic Unwana-Ebonyi state

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**Session-4, Hall-1**

**13.10.2023**

**Moderator: Assist. Prof. Dr. Mehmet Sedat UĞUR**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 16:30 – 18:30**

Title	Author(s)	Affiliation
THE NONLINEAR RELATIONSHIP BETWEEN EXPORT COMPLEXITY AND ECONOMIC DEVELOPMENT	Adem TÜRKMEN	Erzurum Teknik University, Erzurum, Türkiye
ON THE PARAMETER STABILITY FOR MONEY DEMAND FUNCTION IN TURKISH ECONOMY	Almıla BURGAÇ ÇİL	Çukurova University, Adana, Türkiye
DETERMINATION OF MACROECONOMIC FACTORS AFFECTING PROFITABILITY IN PARTICIPATION BANKS	Güven GÜNEY Eda BOZKURT	Açık ve Uzaktan Öğretim Fakültesi, Bankacılık ve Sigortacılık, Erzurum, Türkiye Atatürk University, Erzurum, Türkiye
TAX BURDEN IN TÜRKİYE COMPARED TO OECD COUNTRIES	Nihat AKBULUT	Yıldırım Beyazıt University, Ankara, Türkiye
AN EXPLORATORY STUDY ON THE POTENTIAL OF ACADEMIC PODCASTS AS EFFECTIVE MARKETING TOOLS FOR SCIENCE COMMUNICATION	Didem Gamze Işıksal	Koç University, Türkiye
HEALTH TOURISM, HEALTH SERVICES PRICES AND EXCHANGE RATE RELATIONSHIP: THE CASE OF TURKEY WITH GRANGER CAUSALITY ANALYSIS	Nurbay SEY	Bolu Abant İzzet Baysal University, Türkiye
USAGE OF BEHAVIORAL PUBLIC RELATIONS MODEL TO RAISE PUBLIC AWARENESS: ACTIVITIES CONDUCTED WITHIN THE SCOPE OF TOBACCO CONTROL	Gülnur KAPLAN ESEN	Çukurova University, Adana, Türkiye
THE ROLE OF WOMEN IN REGIONAL DEVELOPMENT AND INVESTIGATING THE IMPACTS OF WOMEN'S ENTREPRENEURSHIP PRACTICES IN TURKEY	Mehmet Sedat UĞUR	Çankırı Karatekin University, Çankırı, Türkiye

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**Session-4, Hall-2**

**13.10.2023**

**Moderator: Assoc. Prof. Dr. Vedat BEYYAVAŞ**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 16:30 – 18:30**

Title	Author(s)	Affiliation
DOWNHOLE SEISMIC - CROSSHOLE TOMOGRAPHY METHOD	Abdulkadir GÜNER Metin AŞÇI	Kocaeli University, Kocaeli, Türkiye
DETERMINING THE MOST SUITABLE AIRCRAFT CONSIDERING AIR POLLUTION IN THE MOST POLLUTED CITY IN EUROPE	Uğur KILIÇ	Erzincan Binali Yıldırım University, Erzincan, Türkiye
GENOTOXIC EFFECTS OF COPPER NANOPARTICLE ON <i>VICIA PANNONICA</i> CRANTZ. ROOT MERISTEM CELLS	Neslihan TAŞAR	Munzur University, Türkiye
EFFECT OF IRRIGATION WATER APPLIED AT DIFFERENT RATES ON OIL CONTENT AND FATTY ACID COMPOSITIONS IN COTTON ( <i>GOSSYPIUM HIRSUTUM</i> L.) PLANT	Cevher İlhan CEVHERİ Suat CUN Vedat BEYYAVAŞ	Harran University, Şanlıurfa, Türkiye
DEFOLIANT APPLICATION EFFECT ON YIELD AND YIELD COMPONENTS IN COTTON ( <i>GOSSYPIUM HIRSUTUM</i> L.) PLANT	Vedat BEYYAVAŞ	Harran University, Şanlıurfa, Türkiye
BIOACTIVITY OF LOTUS CORNICULATUS L. FLOWER	Zeynep Merve ABACI Ayşe YILMAZ Ülkühan BAĞIŞ Sibel ULUATA Gökhan DURMAZ İhsan KARABULUT	İnönü University, Malatya, Türkiye Yozgat Bozok University, Yozgat, Türkiye
EXPLORING THE GENETIC DIVERSITY AND POPULATION STRUCTURE OF SUNFLOWER THROUGH SSR MARKERS: A REVIEW OF LITERATURE STUDY	Nurettin BARAN Muhammad Azhar NADEEM	Mus Alparslan University, Mus, Türkiye Sivas Bilim Ve Teknoloji University, Sivas, Türkiye

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**Session-4, Hall-3**

**13.10.2023**

**Moderator: Assist. Prof. Dr. Özmen İSTEK**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 16:30 – 18:30**

Title	Author(s)	Affiliation
ROBOTIC SURGERY APPLICATIONS IN VETERINARY SURGERY	Özmen İSTEK	Muş Alparslan University, Muş, Türkiye
IMPORTANT RESPIRATORY SYSTEM DISEASES IN HORSES	Derya KARATAŞ YENİ Yavuzkan PAKSOY	Necmettin Erbakan University, Konya, Türkiye
EVALUATION OF TRANSFERABLE EMBRYO RATES AFTER USING CONVENTIONAL AND SEXED SEMEN: A RETROSPECTIVE STUDY	Nail Tekin ÖNDER Selim ALÇAY	Kafkas University, Kars, Türkiye Bursa Uludağ University, Bursa, Türkiye.
DISTINGUISHING <i>CYPRINION MACROSTOMUS</i> AND <i>CYPRINION KAIS</i> FROM THEIR SCALES BY USING GEOMETRIC MORPHOMETRIC METHODS	Serbest BİLİCİ	Şırnak University, Şırnak, Türkiye
A PRACTICAL AND SHORT-STEP SYNTHESIS OF NEW DOPAMINE ANALOGUES VIA ACYLATION AND METHYLATION	Aytekin KÖSE	Aksaray University, Aksaray, Turkey

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**Session-4, Hall-4**

**13.10.2023**

**Moderator: Maliha Gohar**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 16:30 – 18:30**

Title	Author(s)	Affiliation
CLASSIFICATION OF SECOND ORDER ORDINARY DIFFERENTIAL EQUATIONS USING LAMBDA SYMMETRIES	Maliha Gohar	Kohat University of Science and Technology (KUST) Kohat KPK Pakistan
DETERMINATION OF OPTIMAL PERFORMANCE FOR THE QUEUING SYSTEM AT INDEPENDENT NATIONAL ELECTORAL COMMISSION (INEC) OFFICE MAIKUNKELE, MINNA	Omonayin I.O., Ngutor N., Adedayo O.A., Akande S.A, Mustapha A.	Federal University of Technology Minna, Nigeria
MODELLING OF UNSTEADY HYDROMAGNETIC COUETTE FLOW THROUGH A POUROUS CHANNEL WITH TRANSVERSE MAGNETIC FIELD	T. J. Akintaro, A. B. Zhiri	Federal University of Technology Minna, Nigeria
MATHEMATICAL MODELLING OF TRANSIENT MIXED CONVECTION FLOW UNDER THE THERMAL BOUNDARY CONDITION	T. J. Akintaro, A. B. Zhiri	Federal University of Technology Minna, Nigeria
CHARACTERIZATION OF LACUNARY I-CONVERGENT SEQUENCES IN CREDIBILITY SPACE	Mousami Das, Binod Chandra Tripathy, Omer Kisi	Tripura University, India Bartın University, Turkey

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**Session-4, Hall-5**

**13.10.2023**

**Moderator: Dr. Ivan Pavlovic**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 16:30 – 18:30**

Title	Author(s)	Affiliation
COCCIDIOSIS OF SHEEP IN SOUT PART OF SERBIA	Ivan Pavlovic Violeta Caro-Petrovic Aleksandra Tasic Marija Pavlovic	Scientific Institute of Veterinarz Medicine of Serbia Institute for Animal Husbandry, Belgrade-Zemun,Serbia
REVOLUTIONARY THERAPEUTIC APPROACHES IN ERADICATING PARASITES THROUGH NANOTECHNOLOGY	Mehroz Latif, Muhammad Adnan Sabir Mughal, Haseeb Ashraf, Muhammad Numair Ahmad, Irtaza Hussain	Bahauddin Zakariya University, Multan, Pakistan University of Agriculture, Faisalabad, Pakistan
MOLECULAR EPIDEMIOLOGY OF LEISHMANIA SPECIES IN CAMELS OF SELECTED DISTRICTS OF BALOCHISTAN	Muhammad Adnan Sabir Mughal, Muhammad Kasib Khan, Ammara Shad, Mehroz Latif, Abdullah Azeem, Zohaib Saeed	University of Agriculture, Faisalabad, Pakistan Bahauddin Zakariyya University, Multan, Pakistan
SENSOR-BASED APPLICATIONS IN ASSESSING HEAT STRESS RESPONSE IN GRAZING ANIMALS	Deepika, A., Yamini, S., Abarna, R., Kalaignazhal, G., Silpa, M.V., Sejian, V	Rajiv Gandhi Institute of Veterinary Education and Research, India Institute of Animal Breeding and Genetics, Germany
ADVANCED NON-INVASIVE METHODS TO QUANTIFY HEAT STRESS RESPONSE IN FARM ANIMALS	Yamini, S., Deepika, A., Abarna, R., Kalaignazhal, G., Silpa, M.V., Sejian, V.	Rajiv Gandhi Institute of Veterinary Education and Research, India Institute of Animal Breeding and Genetics, Germany
MODELLING PUNDING AND DOPAMINE DYSREGULATION SYNDROME IN PARKINSONISM ANIMAL MODEL	Dr. Esra Ozkan	Edinburgh University, UK Dementia Research Institute

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**Session-4, Hall-6**

**13.10.2023**

**Moderator: Rehman Khan**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 16:30 – 18:30**

Title	Author(s)	Affiliation
A CRITICAL EXPLORATION OF THE FORMS OF VIOLENT PROTESTS IN LAGOS, NIGERIA	Abdulmalik Abdulwoli, Calistus Ayegba	Federal University of Technology, Minna
SYNTHESIS OF PURE GISMONDINE-NAP ZEOLITE FROM BENTONITE FRACTION >2 µM	Rafik Abdelkrim Boudia, Mehdi Adjdir, Miloud Mohamed Mazari	University Oran1 Ahmed Ben Bella, Algeria University of Saida Dr. Tahar Moulay, Algeria
ADVANCED COATING METHODS: TITANIUM CARBIDE DEPOSITION ON STEEL VIA INDIRECT PROCESSES	Baali Selma, Benarioua Younes	Med Boudiaf University, Algeria University of M'sila, M'sila 28000, Algeria
THE REVIEW OF INFRASTRUCTURE REQUIREMENTS FOR ELECTRIC AUTOMOTIVE	MOHAMMED ALAA ALWAFIAE BELA KOVACS	The University of Miskolc, Hungary
APPLICATION OF A NEW APPROACH TO ASSESSING THE PERFORMANCE OF A COMPLEX TECHNICAL SYSTEM	Alexandrov V.S.	Kazan National Research Technical University named after A.N. Tupolev
HAND GESTURE-CONTROLLED ELECTRONIC CAR	Rehman Khan Khawar shafique Mubashir Asif Abbas Ahmad	University of Engineering and Technology, Pakistan
ADVANCING PATIENT CARE WITH THE INTRAVENOUS DRIP CONTROLLER	Tharani.R, Sowmiya.S, Vinodha.A, Haritha.V, Sri Siva Kavya.R, Akshaya.S	R.M.K Engineering college, Kavaraipettai-601206, India
KINETIC MODELLING OF POWDER-PACK BORONIZED 4CR5MOSIV1 STEEL BY THE DIMENSIONAL ANALYSIS	Katia Benyakoub, Mourad Keddam, Brahim Boumaali, Michał Kulka	Université des sciences et de la technologie Hourii Boumediene, Algeria Institute of Materials Science and Engineering, Poznan University of Technology, Poland
SIMULATION AND COMPARISON OF P&O AND INC MPPT CONTROL FOR SMALL WIND PMSG TURBINE SYSTEMS	Ahmed Marouane Ghodbane, Mohamed Chebaani, Ghilani abd elmoumen, Benchouia Med Toufik	Biskra University, Algeria.

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**Session-4, Hall-7**

**13.10.2023**

**Moderator: Dr. Alketa Caushi**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 16:30 – 18:30**

Title	Author(s)	Affiliation
CONTEMPORARY AND TRADITIONAL METHODS AND TECHNIQUES THEIR ROLE FOR EFFECTIVE LEARNING IN THE LOWER CYCLE	Dr. Alketa Caushi Mcs Reinaldo Gjerazi	Sports University of Tirana
GREEN LOGISTICS ACTIVITIES' INFLUENCE ON CONSUMER BUYING DECISIONS: EVIDENCE FROM CROATIA	Ivana Tonković Pražić Kristina Devčić Ivana Crnković	Polytechnic Nikola Tesla in Gospić Croatia
PORTRAYAL OF MALE IMPOTENCE AND STERILITY IN SELECTED NIGERIAN CONTEMPORARY FEMALE NOVELS: A WOMANIST PERSPECTIVE	Dr. Akinola Monday ALLAGBE Dr. (MA) Ayodele Adebayo ALLAGBE Dr. (MA)Théophile HOUNDJO	Université d'Abomey-Calavi (UAC), République du Benin Université André Salifou (UAS) de Zinder, République du Niger Université d'Abomey-Calavi (UAC), République du Benin
RELATIONSHIP BETWEEN LINGUISTICS AND LITERATURE: A NEW CONFIGURATION	LAMAAZI Fatima Zohra ABOUTARIK ABDELMAJID	Ibn Zohr University, Morocco
THE FOREIGN LANGUAGE TEACHER AND CULTURAL DIVERSITY	BELABBES Nour El Houda AIT OMAR Brahim	Ibn Zohr University, Morocco
SELF -CONCEPT, MISTRUST AND ANTI-SOCIAL BEHAVIOR IN WORKPLACE INDIVIDUALS: A CORRELATIONAL STUDY	Adeena Zakir, Aiman Shahzad	University of Management and Technology, Lahore
A REVIEW ON JERUSALEM ARTICHOKE	Punithavalli , Vijitha, Rufina Delphine	
EXPRESSION OF MENTAL RESILIENCE AMONG WRESTLERS OF YOUTH AND JUNIOR AGE	Ignas Kriksciunas Romualdas Malinauskas	Lithuanian Sports University, Kaunas, Lithuania
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**Session-1, Hall-1**

**14.10.2023**

**Moderator: Assoc. Prof. Dr. Aybike Tuba Özden**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 09:00 – 11:00**

Title	Author(s)	Affiliation
TECHNIQUES FOR MAKING DIGITAL SALES BY WORKING IN VIRTUAL OFFICES IN THE METAVERSE UNIVERSE	Kemal Gökhan NALBANT Sevgi AYDIN Beyza ERYILMAZ	İstanbul Beykent University, İstanbul, Türkiye
WHAT ARE THE DETERMINANTS OF HAPPINESS? EVIDENCE FROM TURKEY	Mehmet POLAT	Iğdır University, Iğdır, Türkiye
INVESTIGATION OF CONSUMER ARROGANCE AND DEMOGRAPHIC VARIABLES	Aybike Tuba Özden	Ondokuz Mayıs University, Samsun, Türkiye
ECONOMIC SITUATION OF FARMS IN EUROPEAN UNION	Fethi Şaban ÖZBEK	Türkiye İstatistik Kurumu, Ankara, Türkiye
STRATEGIC ECO-TOURISM MANAGEMENT FOR ADAPTATION TO CLIMATE CHANGE: CUSTOMER PORTFOLIO APPROACH	Hamdi Ayyıldız Büşra Pur	Kahramanmaraş Sütçü İmam University, Türkiye
CAN OLEOTOURISM BE A SAVIOUR IN BIOCULTURAL HERITAGE?	Hamdi Ayyıldız Büşra Pur	Kahramanmaraş University, Türkiye
CONSIDERATION OF PUBLIC SPACE IN THE THOUGHTS OF REPUBLICANISM AND LIBERALISM	Veysel Ergüç	Muş Alparslan University, Muş, Türkiye
USING ELECTROENCEPHALOGRAPHY (EEG) AS A WAY TO UNDERSTAND CONSUMER BEHAVIOR	Buse Nur SÜMER Selami Varol ÜLKER	Üsküdar University, İstanbul, Türkiye

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**Session-1, Hall-2**

**14.10.2023**

**Moderator: Assist. Prof. Dr. Kübra ÖZARSLAN**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 09:00 – 11:00**

Title	Author(s)	Affiliation
INTELLIGENCE PROBLEM IN TRANSLATION: HUMAN OR ARTIFICIAL INTELLIGENCE?	Gülfem KURT	Ankara Hacı Bayram Veli University, Ankara, Türkiye
DESTINATION MARKETING RESEARCH THROUGH SOCIAL MEDIA DATA: UNCOVERING THE WORLD'S MOST TAGGED COUNTRIES	Kübra ÖZARSLAN	Erzincan Binali Yıldırım University, Erzincan
EXAMINATION OF WEBSITE INTERFACE DESIGNS OF SOCIAL CONTENT PLATFORMS FOR EASE OF USE FOR USERS: USAGE ANALYSIS OF ONEDIO AND BUZZFEED SITES	Mustafa Üsâme AKGÜN Mustafa İNCE	Karabük University, Karabük, Türkiye.
EXERGY ANALYSIS AND ENERGY PRODUCTIVITY OF LOW GREENHOUSE GAS EMISSIONS THERMOSIPHON	Mehmet Akif KARTAL	Bandırma Onyediy Eylül University, Balıkesir, Türkiye.
COMPARISON OF NEW PARTNERS IN SECURITY COOPERATION WITH AFRICA: RUSSIA, CHINA AND TURKEY WITH THEIR DIFFERENT APPROACHES	Murat YİĞİT	Milli Savunma Üniversitesi / Hava Harp Enstitüsü / Strateji ve Güvenlik ABD
HOW COVID-19 IS CHANGING CONSUMER BEHAVIOR? FROM THE PERSPECTIVES OF ENVIRONMENTAL AWARENESS, SUSTAINABLE CONSUMPTION, SOCIAL RESPONSIBILITY, AND CORPORATE PHILANTHROPY	Fatih Cansız Pelin BAYRAM	Girne American University European University of Lefke
ANALYSIS OF THE DETERMINANTS OF FOREIGN TRADE IN TURKEY	Ferid ÖNDER	Kahramanmaraş Sütçü İmam University,
FOR ADOLESCENT STUDENTS; DEVELOPMENT OF TRAINING CURRICULUM FOR PREPAREDNESS FOR CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR THREATS	Halil İbrahim KURTOĞLU İrem ULUŞIŞIK Aysun Güzel	İskenderun Teknik University,, Hatay, TÜRKİYE Burdur Mehmet Akif Ersoy University, Burdur, TÜRKİYE

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**Session-1, Hall-3**

**14.10.2023**

**Moderator: Assist. Prof. Dr. Şeyda KOÇAK KURT**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 09:00 – 11:00**

Title	Author(s)	Affiliation
THE ROLE OF CULTURAL VALUES İN BUILDING A COMPETITIVE ECONOMY	Aysel Aşırılı	İktisat Enstitüsü, BBakü, Azerbaycan
THE EFFECT OF CARBON FOOTPRINT ON BUSINESS SENSITIVITY	Cihat KARTAL Rabia RABİA Vildan İŞCAN Esmâ Ebru ŞENTÜRK	Kırıkkale University,Kırıkkale, Türkiye Hitit University, Çorum, Türkiye
A NEW FORM OF BEHAVIOUR CREATED BY INSECURITY IN WORKING LIFE: QUIET QUITTING	Aytül GÜNEŞER DEMİRCİ	Mersin Ü University,Mersin, Türkiye
DEATHS WHILE CONSTRUCTING IDENTITY WITH SELFIE, THE 'IMAGE' FACE OF SOCIAL MEDIA	İkram Alpsoy Ragıp Bingöl	Ağrı İbrahim Çeçen University, Ağrı, Türkiye Özelleştirme İdaresi Başkanlığı, Ankara, Türkiye
FACTORS AFFECTING THE CAPITAL STRUCTURE: PANEL DATA ANALYSIS ON COMPANIES TRADING IN BORSA İSTANBUL IN THE CONTEXT OF FOREIGN PARTNERSHIP	Ahmet Gökhan SÖKMEN Edip ÖZÇELİK	Baüımsız Araştırmacı
WHY AND HOW KENAN AND NALAN CHANGED?: ON THE CINEMA ADAPTATIONS OF KERİME NADİR'S 'HIÇKIRIK'	Şeyda KOÇAK KURT	Ankara Hacı Bayram Veli University, Türkiye
RELATIONSHIP OF ULUS BRAND VALUE INDEX AND ECONOMIC FREEDOM INDEX	Ali KOSAT	Kütahya Dumlupınar University, Türkiye

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Session-1, Hall-4

14.10.2023

Moderator: Assist. Prof. Dr. Merve KOLCU

Meeting ID: 859 7119 7642 / Passcode: 131313

Ankara Local Time: 09:00 – 11:00

Title	Author(s)	Affiliation
POOLING SAMPLES TO INCREASE SARS-CoV-2 RT-qPCR CAPACITY	Burcu GÜNER GİRAY	Yalova University, Yalova Türkiye / Ankara İl Sağlık Müdürlüğü
RELATIONSHIP BETWEEN DIABETES AND OMEGA FATTY ACIDS: IS OMEGA 3/OMEGA 6 BALANCE IMPORTANT?	Zeynep İrem AYDIN Aynur TÜREYEN	Ege University, İzmir, Türkiye
OXIDATIVE STRESS AND ANTIOXIDANTS ROLE IN DIABETES	Hasan KARAGEÇİLİ Filiz YILDIRIM	Siirt University, Siirt, Turkey Polatlı Duatepe State Hospital, Ankara, Turkey
EVALUATION OF HEAT AND ENZYME-MEDIATED ANTIGEN RETRIEVAL METHODS FOR IMMUNOHISTOCHEMICAL REACTIONS IN ROUTINELY PROCESSED PARAFFIN BONE TISSUE SECTIONS	Azibe Yıldız	İnönü University, Malatya, Türkiye
DETERMINATION OF FACTORS AFFECTING HEALTH LITERACY IN ELDERLY INDIVIDUALS WITH TYPE 2 DIABETES	Selda ÇELİK Merve KOLCU	University of Health Sciences- Turkey, Istanbul, Turkey
IN ELDERLY INDIVIDUALS WITH TYPE 2 DIABETES INVESTIGATION OF SUCCESSFUL AGING AND RELATED FACTORS	Selda ÇELİK Merve KOLCU	University of Health Sciences- Turkey, Istanbul, Turkey

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**Session-1, Hall-5**

**14.10.2023**

**Moderator: Panche Motta Ribeiro**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 09:00 – 11:00**

Title	Author(s)	Affiliation
CAUSES AND EFFECT OF UNETHICAL PROFESSIONAL PRACTICES ON THE MANAGEMENT OF CONSTRUCTION PROJECTS IN THE NORTH CENTRAL PART OF NIGERIA	Mohammed Tijjani, Makinde Joseph Kolawole	Federal University of Technology Minna, Nigeria
INTERNATIONAL ORGANIZATIONAL COMMUNICATION IN DIGITAL AGE	OUBRAIM Ibtissam EL ACHMIT Jamal	Ibn Zohr university, Faculty of Letter and Human Sciences, Agadir, Morocco
COMPARATIVE ANALYSIS OF METHODS FOR EVALUATING SOIL SETTLEMENT IN GEOTECHNICAL ENGINEERING (AZAOKA AND TRADITIONAL, BASED ON OEDOMETRY MEASUREMENTS)	Brahim Meziani, Hamid Gadouri, Ilyes Sellami	Khemis Miliana University, Algeria
SAND MINING IN WATARI RIVER: NEXUS ENVIRONMENT, ECONOMIC AND SOCIAL IMPLICATIONS	Ahmad Said Abubakar, Nafeesat Hussaini Hassan, Ali Hussain, Nura Isyaku Bello	Aminu Kano College of Islamic and Legal Studies, Aliko Dangote University of Science and Technology, Wudil
CHATBOT FOR TEENAGERS	Niraimathi M Ponmani S Pratthika A T Priyadharshini D	
MONETARY AND FISCAL POLICIES' EFFECTS ON AGGREGATE DEMAND IN NIGERIA: A SIMULATION APPROACH	Yunana, Titus Wuyah	Nigeria Police Academy, Wudil- Kano
BRAZILIAN WORKFORCE: BLACK WOMEN CHALLENGES	Panche Motta Ribeiro	Candido Mendes University, Rio de Janeiro, Brazil

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**Session-1, Hall-6**

**14.10.2023**

**Moderator: Dr. Vaibhav Kant Singh**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 09:00 – 11:00**

Title	Author(s)	Affiliation
UTILIZING MACHINE LEARNING IN CRYPTOCURRENCY MARKET ANALYSIS	Farah Muhammed Sakran SAKRAN Fuat TÜRK	Çankırı karatekin University, Çankırı, TURKEY Kırıkkale University, Kırıkkale Yozgat Bozok University, Yozgat
ADVANCEMENTS IN SENTIMENT ANALYSIS FOR E-COMMERCE: A COMPARATIVE STUDY OF BERT, CONV-BERT, AND ELECTRA MODELS USING VIVENSE CUSTOMER REVIEWS	Mehmet Yiğit Özgenç H. Şebnem Arlı M. Fatih Akay	Vivense, Technology Department, İstanbul, Turkey Cukurova University, Adana, Turkey
ENHANCING BREAST CANCER IMAGE QUALITY: NOISE DETECTION USING DEEP AUTOENCODERS	Yakubu Ibrahim Dr. Audu Musa Mabu	Yobe State University, Damaturu, Nigeria
A UNIQUE HIGHLIGHT DETECTION SYSTEM USING MULTIMODAL TRANSFORMER	Vaibhav Kant Singh	Central University, India
A CNN AND LSTM BASED ACTIVITY DETECTION SYSTEM TAKING VIDEO INPUT	Vaibhav Kant Singh, Kapil Kumar Nagwanshi, Satyendra Singh Thakur	Central University, India
MANOEUVRING THE CONVENTIONAL ROUTING PROTOCOL FOR VANET	Vaibhav Kant Singh	Central University, India
A SIGN LANGUAGE SYSTEM INCORPORATING HAND GESTURE FOR THE PURPOSE OF RECOGNITION	Vaibhav Kant Singh	Central University, India

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**Session-2, Hall-1**

**14.10.2023**

**Moderator: Assoc. Prof. Dr. Recep Sinan ARSLAN**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 11:30 – 13:30**

Title	Author(s)	Affiliation
THE INFLUENCE OF INTERNET OF BEHAVIOR PARADIGM ON RECENT INNOVATIONS IN DIGITAL MARKETING	Busra OZDENIZCI KOSE	Gebze Technical University, Türkiye
CRIME CLASSIFICATION USING CATEGORICAL FEATURE ENGINEERING AND MACHINE LEARNING	Recep Sinan ARSLAN, Burak DÜLGEROĞLU	Kayseri University, Kayseri, Türkiye
CREATION OF A NOISE MAP OF KONYA /EREĞLI AND ITS EFFECTS ON HEALTH	Mustafa ÇAYIR Yasemin GÜNDOĞDU	Selçuk University, Konya, Türkiye
USE OF ARTIFICIAL INTELLIGENCE IN NURSING EDUCATION: CHATGPT STORM	Ümit Ak Hale Sezer Hande Yağcan	İzmir Bakırçay University, İzmir, Türkiye Dokuz Eylül University,
AUTO-COMPLETING TELE-RADIOLOGY TEXT DATA	Emre GÜLERYÜZ	FLO Teknoloji A.Ş. , Veri Bilimi, İstanbul, Türkiye

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**Session-2, Hall-2**

**14.10.2023**

**Moderator: Assist. Prof. Dr. Kadriye Filiz BALBAL**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 11:30 – 13:30**

Title	Author(s)	Affiliation
ILLEGAL ITEM DETECTION IN X-RAY SCANS USING CORNER DETECTION - A THEORETICAL MODEL	Önder Şahinaslan Ömer Tuna Tosun	Maltepe University, İstanbul, Türkiye Acarkent Doğa Anadolu Lisesi, İstanbul, Türkiye
LSTM-BASED SOLAR POWER FORECASTING	Kadriye Filiz BALBAL, Sebahattin İKİKARDEŞ Özge ÇELİK	Dokuz Eylül University, İzmir, Türkiye Balıkesir University, Balıkesir, Türkiye
PREDICTION OF OIL PRICE USING MARINE PREDATORS ALGORITHM AND FEED FORWARD NEURAL NETWORK	Ceren BAŞTEMUR KAYA	Nevşehir Hacı Bektas Veli University, Nevşehir, Türkiye
A WEB BASED SUPPORT SYSTEM FOR FARMERS	Emre BOLAT Yiğit ALTUNDAĞ Yağmur ARIKAN YILDIZ	Sivas Cumhuriyet University, Sivas, Türkiye
OBTAINING OF OBJECT BOUNDARIES WITH EDGE DETECTION ALGORITHMS	Mehmet Fatih GÜRBÜZ Hakan KARABÖRK Nurdan BAYKAN	Tapu Kadastro Genel Müdürlüğü, Ankara, TÜRKİYE Konya Teknik University, Konya, Türkiye

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**Session-2, Hall-3**

**14.10.2023**

**Moderator: Assist. Prof. Dr. Erman AYDIN**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 11:30 – 13:30**

Title	Author(s)	Affiliation
INVESTIGATION OF CUTTING TOOL GEOMETRY AND COATING IN DRILLING AA7075-T6 AEROSPACE ALLOY BY FINITE ELEMENT METHOD	Erman AYDIN Kutay AYDIN	Aydın Adnan Menderes Üniversitesi, Aydın, Türkiye Amasya Üniversitesi, Amasya, Türkiye
IMPROVEMENT OF MICROPROCESSOR CENTRALIZATION SYSTEMS FOR ARROWS AND SIGNALS BASED ON DIGITALIZATION OF MODULAR INTERACTION USING EXPERIMENTAL METHODS	Nazila Ragimova Kamenieva Nina Almammadova Mehriban	Azerbaijan State Oil and Industry University Ukrainian State University of Railway Transport
LEAN INTERNAL LOGISTICS AND AN APPLICATION IN THE FOOD INDUSTRY	Ayşe UÇAR Betül TURANOĞLU ŞİRİN	Atatürk Üniversitesi, Erzurum, Türkiye
EXAMINING AND IMPROVEMENT EFFORTS FOR PREMATURE OPENING ISSUE IN COOLING SYSTEM SAFETY VALVES UNDER HIGH TEMPERATURES	Kasım Karataş Emin Yiğit Umur Mertcan Sebetçi Vehbi Can Eryazar	VALF SANAYİİ A.Ş., Manisa, Türkiye Ege Üniversitesi, İzmir, Türkiye
ADSORPTION OF 19 REACTIVE BLUE DYE ON BAP POLYMER	Büşra ÖZDEMİR Petek BALCI Ali KARA	Uludağ University, Bursa, Türkiye

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Session-2, Hall-4

14.10.2023

Moderator: Assist. Prof. Dr. Hazen Sarıtaş

Meeting ID: 859 7119 7642 / Passcode: 131313

Ankara Local Time: 11:30 – 13:30

Title	Author(s)	Affiliation
DESIGNING A VIDEO LARYNGOSCOPE TO ENABLE FACE-TO-FACE INTUBATION IN TRAPPED IN-VEHICLE ACCIDENTS	İlker Kızılođlu	Bakırçay University, İzmir, Türkiye
ADULT GITELMAN SYNDROME DIAGNOSED WITH EPILEPTIC SEIZURE:CASE REPORT	Hazen Sarıtaş	Aksaray University, Aksaray, Türkiye
THE ROLE OF ENDOSCOPIC INTRAGASTIC BOTULINUM TOXIN-A AND GASTRIC BALLOON IN OBESITY TREATMENT	Özhan ÇETİNDAG	Özel Muayahane, İzmir, TÜRKİYE
DETERMINATION OF THE RELATIONSHIP BETWEEN DEATHS FROM COMMUNICABLE DISEASE OUTBREAKS AROUND THE WORLD BETWEEN 2010 AND 2021 AND THE HUMAN DEVELOPMENT INDEX	Elif Nur YILDIRIM ÖZTÜRK Mehmet UYAR	Ankara University, Ankara, Türkiye Necmettin Erbakan University, Konya, Türkiye
EFFECT OF HEAD CIRCUMFERENCE SIZE AND BODY MASS INDEX ON AUDITORY BRAINSTEM RESPONSES OBTAINED WITH LS CE-CHIRP STIMULUS	Yeter SAÇLI Yeter SAÇLI Gökçe GÜLTEKİN Elifnur TAŞDEMİR ER Busemnaz AVŞAR Didem ŞAHİN CEYLAN	Üsküdar University, İstanbul, Türkiye
UTERINE TUMOR SIMILAR TO OVARIAN SEX CORD STROMAL TUMOR: CASE REPORT	Fazıl Avcı Çetin Çelik Murat Çelik Havva Hande KESER ŞAHİN	Selçuk University, Konya, Türkiye Hitit University, Çorum, Türkiye

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**Session-2, Hall-5**  
**14.10.2023**  
**Moderator: Dr.R.Srinivasan**  
**Meeting ID: 859 7119 7642 / Passcode: 131313**  
**Ankara Local Time: 11:30 – 13:30**

Title	Author(s)	Affiliation
ASSESSING INTERLEUKIN-6 EXPRESSION LEVEL AND SOME LABORATORY BIOMARKERS UPON COVID-19 INFECTION IN IRAQI PATIENTS	Halah Jabbar Kadhim, Abdulameer M. Ghareeb	University Of Baghdad, Baghdad, Iraq
ABILITY TO ASSESS PAIN AMONG CHILDREN WITH INTELLECTUAL DEVELOPMENT DISORDER AND THE INTELLECTUALLY ABLE CHILDREN	Dr. Atallah Alenezi Khadiga Abd-Elgied Gomea Hassan Dr. Ramon Perley M. Pandaan	Shaqra University, KSA
LIMITATIONS OF SYNTHETIC POLYMERS IN NOVEL DRUG DELIVERY SYSTEMS	Shakthivel K, Jayaramakani N, Dr.R.Srinivasan	Bharath Institute of Higher education and Research - Faculty of Pharmacy
TARGETED DRUG DELIVERY SYSTEMS FOR CANCER THERAPY: RECENT ADVANCES	M.K. Vijayalakshmi	Faculty of Pharmacy, Bharath Institute of Higher Education and Research
FORMULATION AND EVALUATION OF DIRECTLY COMPRESSIBLE AGGLOMERATES OF TELMISARTAN	D.Jeslin M.K. Vijayalakshmi	Bharath Institute of Higher Education and Research
THE BURDEN OF HOSPITAL-ACQUIRED BLOOD STREAM INFECTIONS IN SOUTH-TUNISIAN UNIVERSITY HOSPITALS	Nouha Ketata, Maissa Ben Jmaa, Wissal Ghamgui, Yosra Mejdoub, Jihene Trabelsi, Sourour Yaich, Jamel Damak	Hedi Chaker University Hospital
HEALTHCARE ASSOCIATED INFECTIONS IN HIGH RISK WARDS: PREVALENCE AND ASSOCIATED FACTORS	Nouha Ketata, Maissa Ben Jmaa, Wissal Ghamgui, Yosra Mejdoub, Jihene Trabelsi, Sourour Yaich, Jamel Damak	Hedi Chaker University Hospital
OCCURRENCE OF ESCHERICHIA COLI AND KLEBSIELLA SPECIES IN THE URINE OF UTI PATIENTS ATTENDING BARAU DIKKO TEACHING HOSPITAL, KADUNA	Ahmad Imam Idris, Fatima Mohammed Musa	Kaduna State University
H2O2 GENERATING CHEMODYNAMIC AGENTS FOR THE THERAPY OF CANCER	Gupta Swati Sanjaykumar, Rishabha Malviya	Galgotias University, India
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**Session-2, Hall-6**

**14.10.2023**

**Moderator: Dr. Amber Nawab**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 11:30 – 13:30**

Title	Author(s)	Affiliation
ASPERGILLUS INFECTION AMONG HIV/ALDS PATIENTS ATTENDING GENERAL HOSPITAL, MINNA, NIGER STATE, NIGERIA	Ibiloye A.S., Galadima, M.	Federal University of Technology
IN SILICO ADME- TOX PREDICTION IN EARLY DRUG DISCOVERY	M.Mohamed Ashik Ali, R.Devi , Dr.R.Srinivasan,A.Aswin ,M.Akash.	Bharath Institute Of Higher Education And Research, Faculty Of Pharmacy
UNDERSTANDING VARICOSE VEINS - DIAGNOSIS,TREATMENT AND PREVENTION	J.Jayadurka, E.Elavarasi, Dr.R.Srinivasan	Bharath Institute Of Higher Education And Research, Chennai,India
BIODEGRADABLE MAGNESIUM MMC FOR BIOMEDICAL IMPLANTS: A REVIEW	Er. Himanshu Khanna Dr. Harish Pungotra Dr. Sandeep Gandotra	Sardar Beant Singh State University, India
STRONG MOMS, FRAGILE BONES: OSTEOPOROSIS IN PREGNANCY	Dr. Amber Nawab, Dr. Javeria Rafiq Sheikh, Fakhra Mehar, Nuzhat Naimatullah	Jinnah University for Women
ENHANCING PERIPHERAL NERVE REGENERATION THROUGH ELECTRICAL STIMULATION AND EXERCISE	Ghulam Murtaza, Dr. Razia Kausar, Muhammad Adil, Dr. Farrah Deebea. Muhammad Shafeeq, Zohaib Saeed	University of Agriculture, Faisalabad, 38040, Pakistan.
PRECISION MEDICINE IN DRUG DEVELOPMENT	S.Showbharnikhaa, M.K Vijayalakshmi	Faculty of Pharmacy, Bharath Institute of Higher Education and Research Tambaram Selaiyur Chennai 600073
UNMASKING BACTERIAL DEFENDERS: CUTTING-EDGE ANTIMICROBIAL RESISTANCE DETECTION INNOVATIONS	Muhammad Adil, Zohaib Saeed, Dr. Farrah Deebea, Muhammad Shafeeq, Dr. Razia Kausar, Ghulam Murtaza	University of Agriculture, Pakistan
UNVEILING THE MARVELS AND MYSTERIES OF NANO MEDICINE	Dr. Farrah Deebea, Muhammad Adil, Zohaib Saeed, Muhammad Shafeeq, Dr. Razia Kausar, Ghulam Murtaza, Bushra Zaidi	University of Agriculture, Pakistan

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**Session-3, Hall-1**

**14.10.2023**

**Moderator: Assist. Prof. Dr. Nazlı Deniz ÖZ**  
**Meeting ID: 859 7119 7642 / Passcode: 131313**  
**Ankara Local Time: 14:00 – 16:00**

Title	Author(s)	Affiliation
PROBLEMS FACED IN THE TAXATION OF E-COMMERCE IN TERMS OF TAX LEGISLATION	Esra Uygun	Tokat Gaziosmanpaşa University, Tokat, Türkiye
A RESEARCH ON FOMO, COVID-19 AND REMOTE WORKING RELATIONSHIP	Benan Kurt Yılmaz	Sinop University, Sinop, Türkiye
CULTURE AND ARTS JOURNALISM: AN EVALUATION ON NEWSPAPER NEWS	Harun DAĞ	Süleyman Demirel University, Isparta, Türkiye
ONLINE PLATFORM FATIGUE IN UNIVERSITY STUDENTS AFTER THE COVID-19 PANDEMIC PERIOD: A QUALITATIVE STUDY	Mustafa ALTINTAŞ	Yozgat Bozok University, Yozgat, Türkiye
INDUSTRY 5.0	İsmail Yoşumaz	Kütahya Dumlupınar University, Kütahya, Türkiye
THE VIRTUAL WORLD OF SOCIAL RELATIONS; AN INVESTIGATION OF METAVERSE AND RECREATIONAL ACTIVITIES	Nazlı Deniz ÖZ	Selçuk University, Konya, Türkiye
SOCIO-SPATIAL EFFECTS OF THE EARTHQUAKE: THE TRANSFORMATION OF A MIDDLE-CLASS NEIGHBOURHOOD IN ISTANBUL	Esra Kaya-Erdoğan	İstanbul Yeni Yüzyıl University, İstanbul, Türkiye
THE SIGNIFICANCE OF SPIRITUAL COUNSELING SERVICES IN THE PROCESS OF DEATH	Merve Erdoğan Yıldız	T.C. Kütahya Dumlupınar University, Türkiye
OBSERVATION OF VISITORS' PREFERENCES IN AN URBAN PARK THROUGH BEHAVIORAL MAPPING	Burçin Burcu DOĞMUŞÖZ	İzmir Katip Çelebi University, İzmir, Türkiye

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**Session-3, Hall-2**

**14.10.2023**

**Moderator: Assoc. Prof. Dr. Meliha UZUN**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 14:00 – 16:00**

Title	Author(s)	Affiliation
THE EFFECT OF FAMILY PARTICIPATED PHYSICAL ACTIVITIES ON THE PHYSICAL ACTIVITY LEVEL OF STUDENTS IN EARLY CHILDHOOD: A PILOT STUDY	Uğur AYDEMİR Erkan YARIMKAYA	Bayburt University, Bayburt, Türkiye
THE EFFECT OF 8 WEEKS RESISTANCE EXERCISES WITH ELASTIC BANDS APPLIED TO THE LOWER EXTREMITY ON THE VERTICAL JUMP AND SPEED PERFORMANCE OF 14-16 YEARS OLD FEMALE VOLLEYBALL PLAYERS	Özgür AKTÜRK Murat TUTAR	İstanbul Nişantaşı University, İstanbul, Türkiye
COMPARISON OF BASIC BIOMOTORIC CHARACTERISTICS OF ATHLETES NEW TO VOLLEYBALL	Serkan KIZILCA	Bitlis Eren University, Bitlis, Türkiye
THE RELATIONSHIP BETWEEN SPORTS COMMITMENT AND LIFE SATISFACTION: A RESEARCH ON INDIVIDUALS PLAYING SPORTS	Meliha UZUN	Şırnak University, Şırnak, Türkiye

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**Session-3, Hall-3**

**14.10.2023**

**Moderator: Assoc. Prof. Dr. İsmail DÖNMEZ**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 14:00 – 16:00**

Title	Author(s)	Affiliation
INVESTIGATION OF THE RELATIONSHIP BETWEEN ADOLESCENTS' LIFE SATISFACTION AND THE QUALITY OF THEIR EMOTIONAL RELATIONSHIP	Asiye Dursun	Kütahya Dumlupınar University, Kütahya, Türkiye,
A RESEARCH ON THE EARLY LITERACY SKILLS OF CHILDREN ATTENDING SUMMER KINDERGARTEN	Pınar POLAT	Mardin Artuklu University, Mardin, Türkiye
A STUDY ON CHILD DEVELOPMENT STUDENTS' PERCEPTIONS OF LITERACY AND THEIR OWN LITERACY STATUS	İsmail DÖNMEZ Salih GÜLEN	Muş Alparslan University, Muş, Türkiye
COVID-19 COINFECTION WITH LEISHMANIASIS S DURING PANDEMIC	Gül BAYRAM	Mersin University, Mersin, Türkiye.
USE OF BACTERIOPHAGES AS ANTIBACTERIAL AGENTS IN TURKIYE	Gül BAYRAM	Mersin University, Mersin, Türkiye.

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**Session-3, Hall-4**

**14.10.2023**

**Moderator: Momoh Shaibu**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 14:00 – 16:00**

Title	Author(s)	Affiliation
ASSESSMENT OF ANTIFUNGAL ACTIVITIES OF SILVER NANO PARTICLES ON CANDIDIASIS AMONG FEMALE STUDENTS OF FEDERAL POLYTECHNIC KAURA NAMODA, ZAMFARA STATE	Momoh Shaibu, Samaila A. Abdullahi, Saidu R. Saidu, Odenigbo C. Clifford	Federal Polytechnic, Nigeria
PALLADIUM-CATALYZED C7 ARYLATION OF 4-EWG-1H-INDAZOLES USING OXIDATIVE ARYLATION	Chaimae Ouazzani Chahdi, Dr. Khalid Boujdi, Prof. Nabil El Brahmi, Prof. Monique Mathé-Allainmat, Hachim Mouhi Eddine, Prof. Mohamed Akssira, Prof. Gérald Guillaumet, Prof. Jacques Lebreton, Prof. Jamal Koubachi, Prof. Saïd El Kazzouli	University of Fes (UEMF), Morocco
ASSESSING THE EFFECTIVENESS OF ORGANIC INHIBITORS IN PREVENTING IRON CORROSION IN HYDROCHLORIC ACID ENVIRONMENT: A DFT INVESTIGATION	M. Omari, M. El idrissi, A. Tounsi	Sultan Moulay Slimane University, Beni-Mellal, Morocco
SYNTHETIC STRATEGIES TO DEVELOP PIPERAZINE-BASED ACETANILIDE DERIVATIVES & THEIR MEDICINAL IMPORTANCE	Ayesha Rafiq Prof. Dr. Matloob Ahmad	Government College University Faisalabad, Pakistan
ADSORPTION STUDY OF RHODAMINE B ONTO GROUNDNUT SHELL ADSORBENT	James Akoji	Bayero University Kano, Kano State Nigeria
METRONIDAZOLE: AN UPDATE ON METABOLISM, STRUCTURE-CYTOTOXICITY AND RESISTANCE MECHANISMS	A.Vivek, Dr. VRakshana, Dr. R.Srinivasan	Bharath Institute Of Higher Education And Resarch, Selaiyur
SYNTHESIS, CHARACTERIZATION, AND EFFICIENT APPLICATION OF Cu/Bt-C PHOTOCATALYST FOR SUSTAINABLE WATER REMEDIATION	Bouchra Mekidiche, Mounir Mekidiche, Khadidja Khaldi, Ilhem Rekkab-Hammoumraoui	University of Tlemcen. Algeria Center of Scientific Research and Technique in Physicochemical Analysis (CRAPC), Algeria
SIMPLE NOVEL WAYS FOR EFFICIENT REMOVAL OF INDIGO CARMINE BY ION-EXCHANGE PROCESS ONTO BASIC RESIN AND BROMOCRESOL GREEN BY ADSORPTION TO CITRIC ACID BINDED	Bindushree T N, Rajendraprasad N	University of Mysore, India



HYACINTH BEAN HUSK: CHROMATOGRAPHIC ELUTION APPROACH		
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**Session-3, Hall-5**

**14.10.2023**

**Moderator: Khaoula Mkhayar**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 14:00 – 16:00**

Title	Author(s)	Affiliation
EXPLORING THE COMPUTATIONAL ANALYSIS OF FLAVONE DERIVATIVES FOR SARS-CoV-2 PROTEIN INHIBITION	Merzouki Mohammed A, Bouammali Boufelja A, Challioui Allal A	Mohammed I University, Morocco
SYNTHESIS AND CHARACTERIZATION OF NEW HYBRID CATALYST BY IRON COMPLEX MODIFICATION OF MONTMORILLONITE K-10 CLAY FOR THE DEGRADATION OF CONGO RED DYE	MEKIDICHE Mounir, KHALDI Khadidja, CHOUKCHOU-BRAHAM Abderrahim	University of Tlemcen, Algeria Center for Scientific and Technical Research in Physico-chemical Analyzes CRAPC, Algeria
IN-SILICO AND RETROSYNTHESIS APPROCHE FOR 1,2,3-TRIAZOLE-QUINOLINE AS POTENTIAL INHIBITORS AGAINST SARS-COV-2 VIRUS	Yassine Koubi, Youness Moukhliiss, Halima Hajji, Oumayma Abdessadak, Marwa Alaqarbeh, Mohammed Aziz Ajana, Hamid Maghat, Tahar Lakhlifi, Mohammed Bouachrine	
ESTIMATION OF GLOBAL SOLAR RADIATION USING FIVE SUNSHINE BASED MODELS FOR ILORIN, NORTH-CENTRAL NIGERIA	Ibrahim B. B, Usman A	Kwara State Polytechnic, Ilorin
THE SYNTHESIS OF HETERO-ANNULATED QUINOLONES AND THE BIOLOGICAL ACTIVITIES OF THESE COMPOUNDS	Ayoub El-mrabet, Youssef Kandri Rodi, Ahmed Mazzah, Amal Haoudi	University of Sidi Mohamed Ben Abdellah, Morocco University of Lille, France
BIOSORPTION OF Ni <sup>2+</sup> AND Pb <sup>2+</sup> FROM WASTE WATER USING DOUM PALM NUT SHELL ACTIVATED CARBON	Sulaiman S.Y., Hafsat M.	Umaru Musa Yar'adua University, Nigeria
UNEARTHING FRESH ANTICANCER AGENTS FOR HUMAN BREAST CANCER CELL LINE: INVESTIGATING VIA QSAR AND MOLECULAR DOCKING ANALYSES	Khaoula Mkhayar, Kaouakeb El khattabi, Souad Elkhattabi	Sidi Mohamed Ben Abdellah- Fez University, Fez, Morocco. Hassan II University of Casablanca, B.P 7955, Casablanca, Morocco
SYNTHESIS AND CHARACTERIZATION OF METAL MOLYBDATE CATALYSTS AND ITS APPLICATION IN THE REDUCTION REACTION OF THE THREE ISOMERS OF NITROPHENOL	Yousra Taoudi, Hicham Oudghiri Hassani, Souad Rakass, Mohammed Lachkara	Sidi Mohamed Ben Abdellah University, Morocco

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**Session-3, Hall-6**

**14.10.2023**

**Moderator: Dr. Namrata Kumari**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 14:00 – 16:00**

Title	Author(s)	Affiliation
GENOME WIDE ANALYSIS OF UBIQUITIN CARBOXYL TERMINAL HYDROLASES IN RICE: THEIR ROLE IN GROWTH AND STRESS RESPONSE	Chippala Naga Swapna, K. Harika, M. Vani & K Gnaneswari	Sri Padmavati Mahila Visvavidyalam, Tirupati
ASSESSING THE INFLUENCE OF CLIMATE CHANGE ON MOROCCO'S RESERVE RESOURCES FOR DURUM WHEAT LAND	SAGHOURI EL IDRISSE Imane, KETTANI Rajae, KHALFI Chemsdoha, FERRAHI Moha, EL FECHTALI Mohamed, ZIRI Rabea, BRHADDA Najiba	National Institute of Agronomic Research (INRA), Morocco University of Ibn Tofail, Morocco.
SOIL STABILIZATION WITH AERATED CEMENTED CLAY- FA SUPPLANT	CHODAVARAPU GIRIDHAR KUMAR, SADHU RENUKA, POLAMARASETTI JAGADEESWAR	
ANALYSIS AND DESIGN OF PRESTRESSED CONCRETE SLEEPERS WITH PARTIAL REPLACEMENT OF FLYASH IN CONCRETE	Chodavarapu Giridhar Kumar, MADDILA SASIKALA, DUSARI PRANEETHBABU	
ECOLOGY OF JAPANESE ENCEPHALITIS DISEASE	Dr. Namrata Kumari	Gauhati University, Assam, India
PROGRAMMING WATER USE OF GRAIN CORN IN THE COLD STEPPE ZONE USING INFORMATION TECHNOLOGIES	Dr. Pavlo LYKHOVYD Viktor SHARII	Institute of Climate-Smart Agriculture of NAAS, Ukraine
MODELING POTENTIAL WAVE ENERGY CONVERTER CASES FOR MOROCCO: EXPLORING ENERGY CONVERSION OPPORTUNITIES	SOUFIANE EL BOUJI NOUREDDINE KAMIL ZITOUNI BEIDOURI	Hassan II University of Casablanca, Morocco

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Session-4, Hall-1

14.10.2023

Moderator: Assist. Prof. Dr. Ayşen Çakır

Meeting ID: 859 7119 7642 / Passcode: 131313

Ankara Local Time: 16:30 – 18:30

Title	Author(s)	Affiliation
POSSIBLE EFFECT OF URIDINE IN PREMATURE OVARIAN FAILURE	Ayşen Çakır	Bursa Uludağ University, Bursa, Türkiye
THYMOQUINONE MAY REGULATE ALTERED MMP-9 AND VEGF IMMUNOREACTIVITIES IN CISPLATIN-INDUCED NEPHROTOXICITY	Tuba YALÇIN Sercan KAYA	Batman University, Batman, Türkiye
ALPHA-LIPOIC ACID'S IMPACT ON PROSTATE CANCER CELLS	Halil Mahir Kaplan Perçin Pazarcı	Çukurova University, Adana, Türkiye
TRAUMATIC THORACIC PSEUDOMENINGOCELE: A RARE CASE REPORT AND LITERATURE REVIEW	Burak GEZER	Selçuk University, Türkiye
EXPOSURE OF MIDWIFERY STUDENTS TO MOBBING IN CLINICAL PRACTICES: EXAMPLE OF AEGEAN REGION	Aytül HADIMLI Gonca ERDEMEN Beyzanur TÜRK	Ege University, İzmir, Türkiye
THE EFFECT OF MIRROR TREATMENT ON HAND FUNCTIONS IN HEMIPARETIC CHILDREN	Yasemin SALKIN Fatma KARANTAY MUTLUAY	Mersin University, Mersin, Türkiye İstanbul Medipol University, İstanbul, Türkiye
EXAMINATION OF PI3K/Akt/ mTOR PATHWAY IN TERMS OF TARGETED THERAPY IN BREAST CANCER TREATMENT	Büşra DEMİR ÇETİNKAYA	Erzincan Binali Yıldırım University, Erzincan, Türkiye
THE EFFECT OF URIC ACID/ALBUMIN RATIO ON PROGNOSIS OF PATIENTS FOLLOWED UP WITH COVID-19 DIAGNOSIS	Başak ÇAKIR GÜNEY	Sağlık Bilimleri Üniversitesi, İstanbul, Türkiye

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Session-4, Hall-2

14.10.2023

**Moderator: Assist. Prof. Dr. Sibel KORUNUR**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 16:30 – 18:30**

Title	Author(s)	Affiliation
ANALYSIS OF SPACE HARMONICS OF BLDC MOTOR USING DISCRETE HARTLEY TRANSFORM	Adem DALCALI Emre ÇELİK	Bandırma Onyedi Eylül University, Balıkesir, Türkiye Düzce University, Düzce, Türkiye
EFFECT OF THE NUMBER OF SLOTS OF A DOUBLE CAGE INDUCTION MOTOR ON THE MOTOR STARTING TORQUE	Adem DALCALI Emre ÇELİK	Bandırma Onyedi Eylül University, Balıkesir, Türkiye Düzce University, Düzce, Türkiye
DETERMINATION OF PID CONTROLLER PARAMETERS OF A MAGNETIC LEVITATION SYSTEM USING STOCHASTIC FRACTAL SEARCH ALGORITHM	Diñçer Maden	Düzce University, Düzce, Türkiye
SPEED CONTROL OF AN INDUSTRIAL DC MOTOR USING FULL STATE FEEDBACK METHOD	Diñçer Maden	Düzce University, Düzce, Türkiye
MÖLLER ENERGY MOMENTUM LOCALIZATION IN GMGHS BLACKHOLE WITH RAINBOW GRAVITY	Sibel KORUNUR	Munzur University, Tunceli, Türkiye
SNAKE SEARCH ALGORITHM BASED CASCADE PD-PI CONTROLLER DESIGN FOR PERFORMANCE ENHANCEMENT OF A STANDALONE AUTOMATIC VOLTAGE REGULATOR SYSTEM	Emre Çelik Adem Dalcalı	Düzce University, Düzce, Türkiye Bandırma Onyedi Eylül University, Balıkesir, Türkiye
DESIGN OF FUZZY PID CONTROLLER FOR ENHANCING FREQUENCY REGULATION IN TWO-AREA MULTI-SOURCE ELECTRIC POWER SYSTEMS	Emre Çelik Adem Dalcalı	Düzce University, Düzce, Türkiye Bandırma Onyedi Eylül University, Balıkesir, Türkiye

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Session-4, Hall-3

14.10.2023

**Moderator: Assist. Prof. Dr. Burçin AKÇAY**  
**Meeting ID: 859 7119 7642 / Passcode: 131313**  
**Ankara Local Time: 16:30 – 18:30**

Title	Author(s)	Affiliation
THE ROLE OF NEPHROMETRY SCORING SYSTEMS IN PREDICTING TUMOUR AGGRESSIVITY IN RENAL CELL CARCINOMA	Arif ÖZKAN Memduh AYDIN	Koç University, İstanbul, Türkiye Taksim Eğitim ve Araştırma Hastanesi, İstanbul, Türkiye
AN IN VITRO INVESTIGATION OF THE EFFECTS OF HUMAN UMBILICAL CORD MESENCHYMAL STEM CELL-DERIVED EXOSOMES ON THE VIABILITY OF PERIPHERAL BLOOD MONONUCLEAR CELLS (PBMCS) IN CATS WITH FELINE INFECTIOUS PERITONITIS (FIP)	Tolga AKKOÇ	TUBITAK Marmara Research Center, Kocaeli, Türkiye
EXPLORATION OF THE POTENTIAL OF CANINE OVARY-DERIVED MESENCHYMAL STEM CELL EXOSOMES (COMS-EXO) IN ENHANCING EPITHELIAL BARRIER FUNCTION	Tolga AKKOÇ	TUBITAK Marmara Research Center, Kocaeli, Türkiye
PERCUTANEOUS PERITONEAL ASCITES DRAINAGE WITH THE TROCAR TECHNIQUE: A SINGLE CENTER EXPERIENCE	Hakan Yılmaz	VM Medicalpark Kocaeli Hastanesi, Kocaeli, Türkiye
EFFECTIVENESS OF SCHROTH BEST PRACTICE EXERCISES IN EARLY ONSET IDIOPATHIC SCOLIOSIS: A CASE REPORT	Burçin AKÇAY	Bandırma Onyediy Eylül University, Balıkesir, Türkiye
EFFECT OF POLYMORPHISMS OF MinK S38G AND ACE GENE ON THE SUCCESS OF RADIOFREQUENCY ABLATION WITH SERUM IRRIGATION APPLIED TO VALVE PATIENTS WITH ATRIAL FIBRILLATION	Cem ATİK	Osmaniye Özel Yeni Hayat Hastanesi, Türkiye
CHILDAIDITI SIGN: RARE INCIDENTAL FINDING	Hüseyin ŞAHİN	Tekirdağ Namık Kemal University, Tekirdağ, Turkey

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**Session-4, Hall-4**

**14.10.2023**

**Moderator: Dr. Abdul Ghaffar**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 16:30 – 18:30**

Title	Author(s)	Affiliation
AN ESTIMATED DROOP CONTROLLER FOR AN EFFECTIVE TRANSFER IN MICROGRID OPERATION	Ali Aillane, Karim Dahech, Aissa Chouder, Tarak Damak	University of Sfax, Sfax, Tunisia University Mohamed Boudiaf of M'sila, Algeria.
COMPUTATIONAL PLATFORMS-GUIDES GENOME MINING TO UNLEASH POTENTIAL OF STREPTOMYCES MK37H STRAIN	Prof. Dr. Ömer Andac Mohammed Alsamarai	Ondokuz Mayıs University, Fen faculty, Nanotechnology department, Samsun, Turkey
NUMERICAL STUDY USING A DOUBLE GRID TO MODEL THE EFFECT OF THE GROOVES OF A VERTICAL WALL IN A HEATED CAVITY ON THE NATURAL CONVECTION OF A NANOFUID	Zakaria LAFDAILI, Hamid HAMID, Sakina El-Hamdani	Mohammed V University in Rabat, Morocco Ibn Zohr University, Agadir, Morocco
BISMUTH OXIDE DOPED WITH CHITOSAN/POLYVINYLPIRROLIDONE FOR ANTIBACTERIAL AND CATALYTIC DYE DEGRADATION PURPOSES	Dr. Abdul Ghaffar	Government College University, Lahore, 54000 Pakistan
AN ESTIMATED DROOP CONTROLLER FOR AN EFFECTIVE TRANSFER IN MICROGRID OPERATION	Ali Aillane, Karim Dahech, Aissa Chouder, Tarak Damak	University of Sfax, Sfax, Tunisia University Mohamed Boudiaf of M'sila, Algeria
A COMPARATIVE STUDY BETWEEN PID AND SMC CONTROLLER IN SENSORLESS DTC CONTROL FOR BLDC MOTOR	ALILI Zakaria Ghadban Ismail Bouzidi Riad	University of Msila , Faculty of since and technology , DepartmentofElectrical Engineering, Msila , Algeria
IMPROVING THE EFFICIENCY OF PHOTOVOLTAIC PANEL-BASED ENERGY PRODUCTION SYSTEMS	Samira Boumous, Zouhir Boumous	Ahras, university,Algeria
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**Session-4, Hall-5**

**14.10.2023**

**Moderator: Aboubaker Essaddiq MAZOUZ**  
**Meeting ID: 859 7119 7642 / Passcode: 131313**  
**Ankara Local Time: 16:30 – 18:30**

Title	Author(s)	Affiliation
ECONOMIC AND ENVIRONMENTAL FEASIBILITY OF LANDFILL GAS TO ENERGY PROJECT IN OUM AZZA LANDFILL, MOROCCO	Roukaya Bouyaxhsass, Salah Souabi, Soukaina Bouaouda, Abdeslam Taleb, Tonni Agustiono Kurniawan, Xue Liang, Hui Hwang Goh, Abdelkader Anouzla	Hassan II University, Morocco Xiamen University, China Guangxi University, China
FAULT-TOLERANT CONTROL OF A WIND ENERGY CONVERSION SYSTEM USING A MATRIX CONVERTER	Aboubaker Essaddiq MAZOUZ, Said HASSAINE, Abdelhamid BOUMEDIENE	University of Tiaret, Algeria
BACKSTEPPING CONTROL FOR VARIABLE SPEED WIND TURBINE BASED ON DOUBLY FED INDUCTION GENERATOR UTILIZING MATRIX CONVERTER	Aboubaker Essaddiq MAZOUZ, Said HASSAINE, Abdelhamid BOUMEDIENE	University of Tiaret, Algeria
MODELING, SIMULATION AND CONTROL OF WIND TURBINE DRIVEN DOUBLY-FED INDUCTION GENERATOR WITH MATRIX CONVERTER	Oussama MOUSSA, Lallouani HELLALI, Aboubaker Essadiq MAZOUZ, Ali BOUZIDI, Ali AKK	University of M'sila, Algeria University of Tiaret, Algeria
ROBUST NONLINEAR CONTROL OF A THREE-PHASE SHUNT ACTIVE POWER FILTER IN THE PRESENCE OF UNCERTAINTIES	Oussama MOUSSA, Lallouani HELLALI, Aboubaker Essadiq MAZOUZ, Ali BOUZIDI, Ali AKKA	University of M'sila, Algeria University of Tiaret, Algeria
3D-QSAR, ADME-TOX IN SILICO PREDICTION AND MOLECULAR DOCKING STUDIES FOR MODELING THE ANALGESIC ACTIVITY AGAINST NEUROPATHIC PAIN OF NOVEL NR2B-SELECTIVE NMDA RECEPTOR ANTAGONISTS	Mohamed El fadili, Mohammed Er-raiy, Hamada Imtara, Mohammed Kara, Sara Zarougui, Najla Altwaijry, Omkulthom M. Al kamaly, Aisha Al Sfouk and Menana Elhallaoui	Sidi Mohamed Ben Abdellah University, Fez, Morocco
CROSS-CULTURAL ADAPTATION AND PSYCHOMETRIC VALIDATION OF THE BSAQ « BOARD SELF ASSESSMENT QUESTIONNAIRE » SCALE	Yasmine Mourajid, Fassi Fihri Chaimaa, Mohamed Chahboune, Abderraouf Hilali	Hassan First University of Settat

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**Session-4, Hall-6**

**14.10.2023**

**Moderator: Rehman Khan**

**Meeting ID: 859 7119 7642 / Passcode: 131313**

**Ankara Local Time: 16:30 – 18:30**

Title	Author(s)	Affiliation
ELECTRONIC PROPERTIES AND OPTICAL ABSORPTION SPECTRA OF DYE-SENSITIZED SOLAR CELLS (DSSCS) BASED ON CYANO-FUNCTIONAL SMALL MOLECULES:DFT AND TD-DFT STUDIES	A. Arif, A. Aboulouard, M.K. Atouailaa, M. Boulghalat1, M. El idrissi	Sultan Moulay Slimane University, Beni-Mellal, Morocco Izmir KatipCelebi University, Izmir, Turkey.
DESIGN AND FABRICATION OF SHELL AND TUBE HEAT EXCHANGER	Rehman Khan Mamoon Ur Rasheed Hamza Malik	UET taxila, Punjab Pakistan
REDUCTION OF HOTSPOT IN SAND CASTING	Rehman Khan Hasnain Saleem	Swedish College of Engineering and Technology Wah Cantt, Punjab Pakistan
DESIGN AND FABRICATION OF DIE FOR INJECTION MOLDING MACHINE	Engr. Mubashir Asif Rehman Khan	University of Engineering and Technology Taxila, Punjab Pakistan
DESIGN AND FABRICATION OF ELECTROMAGNETIC BRAKING SYSTEM	Hanan Wali, Rehman khan	UET taxila, Punjab Pakistan
AN EXPERIMENTAL INVESTIGATION OF EFFECT OF MAXIMUM AGGREGATE SIZE ON MODE-1 FRACTURE PARAMETERS OF STEEL FIBRE REINFORCED NORMAL STRENGTH CONCRETE	Chodavarapu Giridhar Kumar, Adda Hinduja, Vemulamada Mani Jagannadh	College of Engineering Vizianagaram, JNTUG Vizianagaram
KINEMATICS OF THE DRIVE CONVEYOR OF PAD PRINTING MACHINE	Dmytro Hrytsenko	National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine
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## CONTENT

CONGRESS ID	1
SCIENTIFIC COMMITTEE	2
PHOTO GALLERY	3
PROGRAM	4
CONTENT	5

## PROCEEDINGS BOOK

<b>Zakaria LAFDAILI &amp; Hamid HAMID, Sakina El-Hamdani</b> <i>NUMERICAL STUDY USING A DOUBLE GRID TO MODEL THE EFFECT OF THE GROOVES OF A VERTICAL WALL IN A HEATED CAVITY ON THE NATURAL CONVECTION OF A NANOFLUID</i>	1
<b>John Erwin Prado Pedroso, Khate Aponte &amp; Reyken Chiefe, Willmi Grace Juanico</b> <i>A QUALITATIVE INVESTIGATION OF TIME MANAGEMENT INTERVENTIONS FOR WORKING STUDENTS IN THE PHILIPPINES TO BALANCE ACADEMICS AND WORK</i>	2
<b>SOUFIANE EL BOUJI, NOUREDDINE KAMIL &amp; ZITOUNI BEIDOURI</b> <i>MODELING POTENTIAL WAVE ENERGY CONVERTER CASES FOR MOROCCO: EXPLORING ENERGY CONVERSION OPPORTUNITIES</i>	3
<b>Gamze ŞENGÜL ÖZER &amp; Ömer Yunus GÜMÜŞ</b> <i>SYTHESIS OF POLYDIALLDIMETHYLAMMONIUM CHLORIDE (POLYDADMAC) AND INVESTIGATION OF ITS TEXTILE WASTEWATER TREATMENT PERFORMANCE</i>	4
<b>Abdul Ghaffar</b> <i>BISMUTH OXIDE DOPED WITH CHITOSAN/POLYVINYLPIRROLIDONE FOR ANTIBACTERIAL AND CATALYTIC DYE DEGRADATION PURPOSES</i>	5
<b>Ceren BAŞTEMUR KAYA</b> <i>PREDICTION OF OIL PRICE USING MARINE PREDATORS ALGORITHM AND FEED FORWARD NEURAL NETWORK</i>	6
<b>Stenny Anto K &amp; Shinto Thomas</b> <i>CHARACTER STRENGTHS AND THE ADOLESCENT JOURNEY TO WELL-BEING: A THEORETICAL LENS</i>	7
<b>Shakthivel K, Jayaramakani N, Dr.R.Srinivasan</b> <i>LIMITATIONS OF SYNTHETIC POLYMERS IN NOVEL DRUG DELIVERY SYSTEMS</i>	8
<b>Brilian Argha WIRATAMA, Arief DARMAWAN &amp; Dian ISWANDARU, Yulia Rahma FITRIANA</b> <i>AMPHIBIAN DIVERSITY ON AGROFORESTRY LAND IN ULU BELU TANGGAMUS DISTRICT</i>	9
<b>Ignas Kriksciunas &amp; Romualdas Malinauskas</b> <i>EXPRESSION OF MENTAL RESILIENCE AMONG WRESTLERS OF YOUTH AND JUNIOR AGE</i>	10
<b>Tejaswini M</b> <i>A STUDY ON EFFECT OF NOSTALGIA MARKETING ON CONSUMER'S PERCEPTION</i>	11

<b>Chaimae Ouazzani Chahdi, Khalid Boujdi, Nabil El Brahmi, Monique Mathé-Allainmat, Hachim Mouhi Eddine &amp; Mohamed Akssira, Gérald Guillaumet, Jacques Lebreton, Jamal Koubachi, Saïd El Kazzouli</b> <b><i>PALLADIUM-CATALYZED C7 ARYLATION OF 4-EWG-1H-INDAZOLES USING OXIDATIVE ARYLATION</i></b>	<b>12</b>
<b>Elvan KESER</b> <b><i>FOOD IMAGE OF TURKISH CUISINE: A REVIEW OF EMPRICAL STUDIES</i></b>	<b>13</b>
<b>A.Rajeswari</b> <b><i>AN IMPLEMENTATION OF PYTHON FOR DATA SCIENCE AND MACHINE LEARNING</i></b>	<b>14</b>
<b>Fatih Cansız &amp; Pelin BAYRAM</b> <b><i>HOW COVID-19 IS CHANGING CONSUMER BEHAVIOR? FROM THE PERSPECTIVES OF ENVIRONMENTAL AWARENESS, SUSTAINABLE CONSUMPTION, SOCIAL RESPONSIBILITY, AND CORPORATE PHILANTHROPY</i></b>	<b>15</b>
<b>M. Omari, M. El idrissi &amp; A. Tounsi</b> <b><i>ASSESSING THE EFFECTIVENESS OF ORGANIC INHIBITORS IN PREVENTING IRON CORROSION IN HYDROCHLORIC ACID ENVIRONMENT: A DFT INVESTIGATION</i></b>	<b>16</b>
<b>Rafik Abdelkrim Boudia, Mehdi Adjdir &amp; Miloud Mohamed Mazari</b> <b><i>SYNTHESIS OF PURE GISMONDINE-NAP ZEOLITE FROM BENTONITE FRACTION &gt;2 μM</i></b>	<b>17</b>
<b>Dwi Mukti ROSALITA &amp; Hendri Hermawan ADİNUGRAHA</b> <b><i>DIGITAL MARKETING STRATEGY IN PROMOTING PRODUCT MS GLOW</i></b>	<b>19</b>
<b>Fikri Novrial AZHAR, Muhammad Farhan AHNAF &amp; Elda PURWANTI, Hendri Hermawan ADİNUGRAHA</b> <b><i>ISLAMIC SCIENTIFIC PARADIGM</i></b>	<b>20</b>
<b>Ushin Yussef &amp; Konovalenko Iona</b> <b><i>THE RELEVANCE OF THE DEVELOPMENT OF THE APPLICATION FORM OF PROTEOLYTIC AND ANTIBACTERIAL ACTION WITH CHITOZAN-CONTAINING COMPONENTS</i></b>	<b>21</b>
<b>Miko Ibnu Ibrahim, Dwi Sintia Rahmawanti &amp; Rossidah Rihadatul Aisi, Dwi Ayu Sepityani, Hendri Hermawan ADİNUGRAHA</b> <b><i>MUSLIM MATHEMATICIAN</i></b>	<b>22</b>
<b>Rossidah Rihadatul Aisi, Dwi Sintia Rahmawanti, Dwi Ayu Sepityani &amp; Miko Ibnu Ibrahim, Hendri Hermawan ADİNUGRAHA</b> <b><i>THE CONTRIBUTION OF ISLAM IN DEVELOPMENT OF SCIENCE</i></b>	<b>23</b>
<b>Uswatun KHASANAH, Raffi Ali Hanan SANTOSA, Muhammad Mieftha ISMAIL &amp; Ibrahim Abdu SALAM, Hendri Hermawan ADİNUGRAHA</b> <b><i>THE FUTURE OF ISLAMIC SCIENCE: A LITERATUR REVIEW</i></b>	<b>24</b>
<b>Ridwan Abu Djibran, Riskafaiza &amp; Rafi Alkaf Asy Syafi, Riema Ainun Nisa, Hendri Hermawan ADİNUGRAHA</b> <b><i>THE RELATIONSHIP OF SCIENCE AND RELIGION: TYPOLOGY OF CONFLICT</i></b>	<b>25</b>
<b>Nino Kemashvili &amp; Shorena Khetsuriani</b> <b><i>ROLE OF BACTERIA-PRODUCED SHORT-CHAIN FATTY ACIDS ON HUMAN HOMEOSTASIS</i></b>	<b>26</b>
<b>Yakubu Ibrahim &amp; Audu Musa Mabu</b> <b><i>ENHANCING BREAST CANCER IMAGE QUALITY: NOISE DETECTION USING DEEP AUTOENCODERS</i></b>	<b>27</b>

<b>Mita Lusari, Hendri Hermawan ADINUGRAHA &amp; Muhammad SHULTHONI, Ahmad ANAS</b> <i>MSME BUSINESS DEVELOPMENT IN MULYOREJO VILLAGE</i>	<b>28</b>
<b>Febby Febriyani KHARISMA &amp; Muhammad SHULTHONI, Hendri Hermawan ADINUGRAHA</b> <i>ANALYSIS OF THE IMPACT OF GADGET USE ON CHILDRENS COGNITIVE DEVELOPMENT</i>	<b>29</b>
<b>Adeboye, M. M., Sadiku, J. O. &amp; Usman, A. U.</b> <i>HAZARD ANALYSIS AND CRITICAL CONTROL POINT ANALYSIS: A CASE OF GARI PRODUCTION IN OSARA GARI FACTORY</i>	<b>30</b>
<b>Ali Aillane, Karim Dahech &amp; Aissa Chouder, Tarak Damak</b> <i>AN ESTIMATED DROOP CONTROLLER FOR AN EFFECTIVE TRANSFER IN MICROGRID OPERATION</i>	<b>31</b>
<b>ALILI Zakaria, Ghadban Ismail &amp; Bouzidi Riad</b> <i>A COMPARATIVE STUDY BETWEEN PID AND SMC CONTROLLER IN SENSORLESS DTC CONTROL FOR BLDC MOTOR</i>	<b>32</b>
<b>Elif IDEMEN &amp; Mehmet OKAN</b> <i>MEASURING CONSUMERS' RESPONSES TO PRODUCT DESIGN: A COMPARISON, PURIFICATION AND ADAPTATION OF PRODUCT DESIGN SCALES</i>	<b>33</b>
<b>Omar BENAMARI &amp; Hassan AMHAMDI</b> <i>A REVIEW OF THE PROTECTIVE PROPERTIES OF MEDICINAL PLANTS AGAINST DIABETES-RELATED HEART DISEASE</i>	<b>34</b>
<b>Samira Boumous &amp; Zouhir Boumous</b> <i>IMPROVING THE EFFICIENCY OF PHOTOVOLTAIC PANEL-BASED ENERGY PRODUCTION SYSTEMS</i>	<b>35</b>
<b>Panche Motta Ribeiro</b> <i>BRAZILIAN WORKFORCE: BLACK WOMEN CHALLENGES</i>	<b>36</b>
<b>Ayesha Rafiq &amp; Matloob Ahmad</b> <i>SPECTRUM OF CONGENITAL ANOMALIES IN TERTIARY CARE HOSPITAL OF PAKISTAN</i>	<b>37</b>
<b>Yunana, Titus Wuyah</b> <i>MONETARY AND FISCAL POLICIES' EFFECTS ON AGGREGATE DEMAND IN NIGERIA: A SIMULATION APPROACH</i>	<b>38</b>
<b>Dare Abel Adesokan</b> <i>THE EFFECTS OF AQUEOUS SHOOT EXTRACT OF <i>Chromolaena odorata</i> ON THE GROWTH PARAMETERS AND YIELD OF <i>Abelmoschus esculentus</i> (OKRO) SEEDLINGS</i>	<b>39</b>
<b>T.Thenmozhi &amp; R.Srinivasan</b> <i>AS A DIGITAL PHARMACEUTICAL TOOL, DIGITAL PILLS</i>	<b>40</b>
<b>Satish Menon &amp; Senbagavalli M</b> <i>IMPACT OF FLOOD IN UJJAIN, MADHYA PRADESH, INDIA DURING SEPT 2023 AND ITS CONSEQUENCES IN THE MINDFULNESS OF THE LOCAL COMMUNITY OF UJJAIN</i>	<b>41</b>
<b>Roukaya Bouyakhass, Salah Souabi, Soukaina Bouaouda, Abdeslam Taleb &amp; Tonni Agustiono Kurniawan, Xue Liang, Hui Hwang Goh, Abdelkader Anouzla</b> <i>ECONOMIC AND ENVIRONMENTAL FEASIBILITY OF LANDFILL GAS TO ENERGY PROJECT IN OUM AZZA LANDFILL, MOROCCO</i>	<b>42</b>
<b>Marvel Reuben Suwitono, Martin Culbert Suwitono &amp; Maria Charlottian Suwitono, Titin Sulastri</b> <i>EVALUATING THE ANTI-INFLAMMATORY AND ANTIDIABETIC ACTIVITY</i>	<b>43</b>

<b><i>OF SYZYGIUM POLYANTHUM BY MOLECULAR DOCKING</i></b>	
<b>Xiaoqun Zhang &amp; Suruthi Selvam</b>	
<b><i>DISCOVERING THE FRAMES OF BLOCKCHAIN IN THE PUBLIC DISCOURSE ON TWITTER: A MACHINE LEARNING APPROACH</i></b>	<b>44</b>
<b>Sándor FÖLDVÁRI</b>	
<b><i>BORIS FROM KYIV, USURPER IN THE MEDIEVAL HUNGARIAN KINGDOM</i></b>	<b>49</b>
<b>Violeta Glogova</b>	
<b><i>DEVELOPMENT AND USE OF NONVERBAL COMMUNICATION IN CHILDREN WITH AUTISM SPECTRUM DISORDERS (ASD) AND THEIR PARENTS</i></b>	<b>50</b>
<b>Ivan PAVLOVIĆ, Violeta CARO-PETROVIĆ &amp; Aleksandra TASIĆ, Marija PAVLOVIĆ</b>	
<b><i>COCCIDIOSIS OF SHEEP IN SOUT PART OF SERBIA</i></b>	<b>51</b>
<b>James Akoji</b>	
<b><i>ADSORPTION STUDY OF RHODAMINE B ONTO GROUNDNUT SHELL ADSORBENT</i></b>	<b>52</b>
<b>Jenifer Alat Stephen &amp; Mirkhamidova Sevara Mirmakhmudovna</b>	
<b><i>REVOLUTIONIZING HEALTHCARE: UNVEILING THE PROS AND CONS OF TELEMEDICINE IN THE DIGITAL ERA</i></b>	<b>53</b>
<b>A.Vivek, VRakshana, R.Srinivasan</b>	
<b><i>METRONIDAZOLE: AN UPDATE ON METABOLISM, STRUCTURE-CYTOTOXICITY AND RESISTANCE MECHANISMS</i></b>	<b>54</b>
<b>Khoirum Rodhiatul Ifa &amp; Hendri Hermawan Adinugraha</b>	
<b><i>MONITORING AND RESCHEDULING STRATEGY IN MINIMIZING PROBLEM FINANCING THROUGH IDAMAAN MOBILE APPLICATION AT PT AMAAN SEJAHTERA INDONESIA</i></b>	<b>55</b>
<b>Namrata Kumari</b>	
<b><i>ECOLOGY OF JAPANESE ENCEPHALITIS DISEASE</i></b>	<b>62</b>
<b>Aboubaker Essaddiq MAZOUZ &amp; Said HASSAINE, Abdelhamid BOUMEDIENE</b>	
<b><i>FAULT-TOLERANT CONTROL OF A WIND ENERGY CONVERSION SYSTEM USING A MATRIX CONVERTER</i></b>	<b>63</b>
<b>Aboubaker Essaddiq MAZOUZ, Said HASSAINE &amp; Abdelhamid BOUMEDIENE</b>	
<b><i>BACKSTEPPING CONTROL FOR VARIABLE SPEED WIND TURBINE BASED ON DOUBLY FED INDUCTION GENERATOR UTILIZING MATRIX CONVERTER</i></b>	<b>64</b>
<b>Oussama MOUSSA, Lallouani HELLALI, Aboubaker Essadiq MAZOUZ &amp; Ali BOUZIDI, Ali AKKA</b>	
<b><i>MODELING, SIMULATION AND CONTROL OF WIND TURBINE DRIVEN DOUBLY-FED INDUCTION GENERATOR WITH MATRIX CONVERTER</i></b>	<b>65</b>
<b>Vaibhav Kant Singh</b>	
<b><i>A UNIQUE HIGHLIGHT DETECTION SYSTEM USING MULTIMODAL TRANSFORMER</i></b>	<b>66</b>
<b>Vaibhav Kant Singh &amp; Kapil Kumar Nagwanshi, Satyendra Singh Thakur</b>	
<b><i>A CNN AND LSTM BASED ACTIVITY DETECTION SYSTEM TAKING VIDEO INPUT</i></b>	<b>67</b>
<b>Vaibhav Kant Singh</b>	
<b><i>MANOEUVRING THE CONVENTIONAL ROUTING PROTOCOL FOR VANET</i></b>	<b>68</b>
<b>Vaibhav Kant Singh</b>	
<b><i>A SIGN LANGUAGE SYSTEM INCORPORATING HAND GESTURE FOR THE</i></b>	<b>69</b>

<b>PURPOSE OF RECOGNITION</b>	
<b>Regunathar Sethupathy.R &amp; v.Rakshana</b> <b>RITONAVIR: AN ANTI HIV DRUG</b>	<b>70</b>
<b>Oussama MOUSSA, Lallouani HELLALI, Aboubaker Essadiq MAZOUZ &amp; Ali BOUZIDI, Ali AKKA</b> <b>ROBUST NONLINEAR CONTROL OF A THREE-PHASE SHUNT ACTIVE POWER FILTER IN THE PRESENCE OF UNCERTAINTIES</b>	<b>71</b>
<b>Paarthan, Sai Vishnu &amp; Prahmodh, Sanja</b> <b>STEM EDUCATION</b>	<b>72</b>
<b>Baali Selma &amp; Benarioua Younes</b> <b>ADVANCED COATING METHODS: TITANIUM CARBIDE DEPOSITION ON STEEL VIA INDIRECT PROCESSES</b>	<b>73</b>
<b>MOHAMMED ALAA ALWAFIAIE &amp; BELA KOVACS</b> <b>THE REVIEW OF INFRASTRUCTURE REQUIREMENTS FOR ELECTRIC AUTOMOTIVE</b>	<b>74</b>
<b>Armel MBON</b> <b>THE THEME OF 'ESCAPE': INTERTEXTUALITY AND COMPOSITIONAL CONTRAST IN SOMERSET MAUGHAM'S SELECTED SHORT STORIES</b>	<b>78</b>
<b>Alexandrov V.S.</b> <b>APPLICATION OF A NEW APPROACH TO ASSESSING THE PERFORMANCE OF A COMPLEX TECHNICAL SYSTEM</b>	<b>79</b>
<b>Arunkumar R, P.P.Murugan</b> <b>UZHAVAN APP – A DIGITAL APP UTILIZATION BY FARMERS OF TAMIL NADU IN INDIA</b>	<b>80</b>
<b>Bouchra Mekidiche, Mounir Mekidiche &amp; Khadidja Khaldi, Ilhem Rekkab-Hammoumraoui</b> <b>DETERMINATION OF TRACE METALS IN THE LEAVES EXTRACT OF HIBISCUS SABDARIFFA L.</b>	<b>81</b>
<b>Bindushree T N &amp; Rajendraprasad N</b> <b>SIMPLE NOVEL WAYS FOR EFFICIENT REMOVAL OF INDIGO CARMINE BY ION EXCHANGE PROCESS ONTO BASIC RESIN AND BROMOCRESOL GREEN BY ADSORPTION TO CITRIC ACID BINDED HYACINTH BEAN HUSK: CHROMATOGRAPHIC ELUTION APPROACH</b>	<b>82</b>
<b>Punithavalli, Vijitha, Rufina Delphine</b> <b>A REVIEW ON JERUSALEM ARTICHOKE</b>	<b>83</b>
<b>Hüseyin ŞAHİN</b> <b>CHILADITI SIGN: RARE INCIDENTAL FINDING</b>	<b>84</b>
<b>M.K. Vijayalakshmi</b> <b>TARGETED DRUG DELIVERY SYSTEMS FOR CANCER THERAPY: RECENT ADVANCES</b>	<b>85</b>
<b>Mehroz Latif, Muhammad Adnan Sabir Mughal, Haseeb Ashraf, Muhammad Numair Ahmad &amp; Irtaza Hussain</b> <b>REVOLUTIONARY THERAPEUTIC APPROACHES IN ERADICATING PARASITES THROUGH NANOTECHNOLOGY</b>	<b>86</b>
<b>D.Jeslin &amp; M.K. Vijayalakshmi</b> <b>FORMULATION AND EVALUATION OF DIRECTLY COMPRESSIBLE AGGLOMERATES OF TELMISARTAN</b>	<b>87</b>
<b>Niraimathi M, Ponmani S &amp; Pratthika A T, Priyadharshini D</b> <b>CHATBOT FOR TEENAGERS</b>	<b>88</b>



<b>Ahmad Said Abubakar, Nafeesat Hussaini Hassan &amp; Ali Hussain, Nura Isyaku Bello</b> <b><i>SAND MINING IN WATARI RIVER: NEXUS ENVIRONMENT, ECONOMIC AND SOCIAL IMPLICATIONS</i></b>	<b>89</b>
<b>Merzouki Mohammed A, Bouammali Boufelja A &amp; Challioui Allal</b> <b><i>EXPLORING THE COMPUTATIONAL ANALYSIS OF FLAVONE DERIVATIVES FOR SARS-CoV-2 PROTEIN INHIBITION</i></b>	<b>90</b>
<b>Muhammad Adnan Sabir Mughal, Muhammad Kasib Khan, Ammara Shad &amp; Mehroz Latif, Abdullah Azeem, Zohaib Saeed</b> <b><i>MOLECULAR EPIDEMIOLOGY OF LEISHMANIA SPECIES IN CAMELS OF SELECTED DISTRICTS OF BALOCHISTAN</i></b>	<b>91</b>
<b>Tharani.R, Sowmiya.S, Vinodha.A, Haritha.V &amp; Sri Siva Kavya.R, Akshaya.S</b> <b><i>ADVANCING PATIENT CARE WITH THE INTRAVENOUS DRIP CONTROLLER</i></b>	<b>92</b>
<b>Katia Benyakoub, Mourad Keddam &amp; Brahim Boumaali, Michal Kulka</b> <b><i>KINETIC MODELLING OF POWDER-PACK BORONIZED 4CR5MOSIV1 STEEL BY THE DIMENSIONAL ANALYSIS</i></b>	<b>93</b>
<b>Ahmed Marouane Ghodbane, Mohamed Chebaani &amp; Ghilani abd elmoumen</b> <b><i>SIMULATION AND COMPARISON OF P&amp;O AND INC MPPT CONTROL FOR SMALL WIND PMSG TURBINE SYSTEMS</i></b>	<b>94</b>
<b>Nouha Ketata, Maissa Ben Jmaa, Wissal Ghamgui, Yosra Mejdoub, Jihene Trabelsi, Sourour Yaich, Jamel Damak</b> <b><i>HEALTHCARE ASSOCIATED INFECTIONS IN HIGH RISK WARDS: PREVALENCE AND ASSOCIATED FACTORS</i></b>	<b>95</b>
<b>Nouha Ketata, Maissa Ben Jmaa, Wissal Ghamgui &amp; Yosra Mejdoub, Jihene Trabelsi, Sourour Yaich, Jamel Damak</b> <b><i>THE BURDEN OF HOSPITAL-ACQUIRED BLOOD STREAM INFECTIONS IN SOUTH TUNISIAN UNIVERSITY HOSPITALS</i></b>	<b>96</b>
<b>Dmytro Hrytsenko</b> <b><i>KINEMATICS OF THE DRIVE CONVEYOR OF PAD PRINTING MACHINE</i></b>	<b>97</b>
<b>MEKIDICHE Mounir, KHALDI Khadidj &amp; CHOUKCHOU-BRAHAM Abderrahim</b> <b><i>SYNTHESIS AND CHARACTERIZATION OF NEW HYBRID CATALYST BY IRON COMPLEX MODIFICATION OF MONTMORILLONITE K-10 CLAY FOR THE DEGRADATION OF CONGO RED DYE</i></b>	<b>98</b>
<b>Ahmad Imam Idris, Fatima Mohammed Musa</b> <b><i>OCCURRENCE OF ESCHERICHIA COLI AND KLEBSIELLA SPECIES IN THE URINE OF UTI PATIENTS ATTENDING BARAU DIKKO TEACHING HOSPITAL, KADUNA</i></b>	<b>99</b>
<b>Gupta Swati Sanjaykumar &amp; Rishabha Malviya</b> <b><i>H2O2 GENERATING CHEMODYNAMIC AGENTS FOR THE THERAPY OF CANCER</i></b>	<b>100</b>
<b>Maliha Gohar</b> <b><i>CLASSIFICATION OF SECOND ORDER ORDINARY DIFFERENTIAL EQUATIONS USING LAMBDA SYMMETRIES</i></b>	<b>101</b>
<b>Alketa Caushi &amp; Kürşat ÇAVUŞOĞLU</b> <b><i>CONTEMPORARY AND TRADITIONAL METHODS AND TECHNIQUES THEIR ROLE FOR EFFECTIVE LEARNING IN THE LOWER CYCLE</i></b>	<b>102</b>
<b>Fatma ALTUNBULAK AKSU</b> <b><i>CHARACTERIZING BINARY LINEAR CODES BY PERMUTATION AUTOMORPHISM GROUPS</i></b>	<b>103</b>



<b>Alerta Basha</b> <i>THE IMPACT OF CRISIS MANAGEMENT IN TELE WORKING DURING THE PANDEMIC OUTBREAK -COVID-19</i>	<b>104</b>
<b>Lutfiyanti, Rafi Prasodjo, Angga Candra Winata &amp; Rafid Naufal Aqil, Hendri Hermawan Adinugraha</b> <i>CLASSIFICATION OF SCIENCE FROM AN ISLAMIC PERSPECTIVE : A LITERATURE REVIEW</i>	<b>105</b>
<b>Hakan YILMAZ</b> <i>PERCUTANEOUS PERITONEAL ASCITES DRAINAGE with THE TROCAR TECHNIQUE: A SINGLE CENTER EXPERIENCE</i>	<b>106</b>
<b>Kholimah, M. Usman ARIFĪANTO &amp; M. Ariel RAMADHANĪ, Hendri Hermawan ADĪNUGRAHA</b> <i>INTERCONNECTION INTEGRATION APPROACH: A LITERATURE REVIEW</i>	<b>107</b>
<b>Yassine Koubi, Youness Moukhliiss, Halima Hajji, Oumayma Abdessadak, Marwa Alaqarbeh &amp; Mohammed Aziz Ajana, Hamid Maghat, Tahar Lakhlifi, Mohammed Bouachrine</b> <i>IN-SILICO AND RETROSYNTHESIS APPROCHE FOR 1,2,3-TRIAZOLE-QUINOLINE AS POTENTIAL INHIBITORS AGAINST SARS-COV-2 VIRUS</i>	<b>108</b>
<b>Mousami Das, Binod Chandra Tripathy &amp; Omer Kisi</b> <i>CHARACTERIZATION OF LACUNARY <math>\mathcal{J}</math>-CONVERGENT SEQUENCES IN CREDIBILITY SPACE</i>	<b>109</b>
<b>M. Keerthiga</b> <i>SENSOR-BASED DRONE</i>	<b>110</b>
<b>Akinola Monday ALLAGBE, (MA) Ayodele Adebayo ALLAGBE &amp; (MA)Théophile HOUNDJO</b> <i>PORTRAYAL OF MALE IMPOTENCE AND STERILITY IN SELECTED NIGERIAN CONTEMPORARY FEMALE NOVELS: A WOMANIST PERSPECTIVE</i>	<b>111</b>
<b>Mrs. A. Rajeswari</b> <i>AN IMPLEMENTATION OF PYTHON FOR DATA SCIENCE AND MACHINE LEARNING</i>	<b>112</b>
<b>Sreevarshan. J, V. Adithya, T. Hemachandiran, Shiyam. M, Sai Aravind. K, Sandeep Krishna. M</b> <i>AUTOMATIC DRUG DISPENSER</i>	<b>113</b>
<b>Natela Borisovna POPKHADZE</b> <i>WHAT DOES A NEW BOOK ABOUT SAKARTVELO/ GEORGIA REPUBLIC/GURCISTAN BEING A MARITIME REPUBLIC SAY?</i>	<b>114</b>
<b>Tharani.R, SRI SIVA KAVYA.R &amp; AKSHAYA.S</b> <i>SAFE BANKING MADE SIMPLE: QR ATM ACCESS</i>	<b>115</b>
<b>Ibrahib B. B, Usman A</b> <i>ESTIMATION OF GLOBAL SOLAR RADIATION USING FIVE SUNSHINE BASED MODELS FOR ILORIN, NORTH-CENTRAL NIGERIA</i>	<b>116</b>
<b>Mrs. S. Sivasakthi</b> <i>COVID-19 DETECTION WITH DEEP LEARNING TECHNIQUES USING 3D CT SCAN IMAGES</i>	<b>117</b>
<b>Deepika, A., Yamini, S., Abarna, R., Kalaignazhal, G., Silpa, M.V., Sejian, V.</b> <i>SENSOR-BASED APPLICATIONS IN ASSESSING HEAT STRESS RESPONSE IN GRAZING ANIMALS</i>	<b>118</b>
<b>Mubashir Asif &amp; Rehman Khan</b> <i>DESIGN AND FABRICATION OF DIE FOR INJECTION MOLDING MACHINE</i>	<b>119</b>

<b>Burçin AKÇAY</b> <i>EFFECTIVENESS OF SCHROTH BEST PRACTICE EXERCISES IN EARLY ONSET IDIOPATHIC SCOLIOSIS: A CASE REPORT</i>	<b>136</b>
<b>Bindu Bharathi, Wesam Menwer, Wajd Nawaf &amp; Rayana Fayez, Amjad Ayed</b> <i>DESCRIPTIVE STUDY TO ASSESS THE PREVALENCE OF OBESITY AMONG FEMALE BACHELOR NURSING SCIENCE STUDENTS OF NORTHERN BORDER UNIVERSITY</i>	<b>137</b>
<b>Ayoub El-mrabe, Youssef Kandri Rodi, Ahmed Mazzah, Amal Haoudi</b> <i>THE SYNTHESIS OF HETERO-ANNULATED QUINOLONES AND THE BIOLOGICAL ACTIVITIES OF THESE COMPOUNDS</i>	<b>138</b>
<b>Favour Chukwuemeka Uroko &amp; Enobong Isaac Solomon Ukong, Ezichi Anya Ituma</b> <i>PAULINE CONCEPT OF MINISTRY IN 2 CORINTHIANS 4:1-15 AND THE RELIGIOUS CELEBRITY SYNDROME IN THE NIGERIAN CHURCH</i>	<b>139</b>
<b>Pérez Gamón Carolina Margarita</b> <i>FUEL SHORTAGES IN LATIN AMERICA IN THE 21ST CENTURY, THE CUBA CASE</i>	<b>140</b>
<b>Sibel KORUNUR</b> <i>MÖLLER ENERGY MOMENTUM LOCALIZATION IN GMGHS BLACKHOLE WITH RAINBOW GRAVITY</i>	<b>141</b>
<b>Ibiloye A.S. &amp; Galadima, M</b> <i>ASPERGILLUS INFECTION AMONG HIV/AIDS PATIENTS ATTENDING GENERAL HOSPITAL, MINNA, NIGER STATE, NIGERIA</i>	<b>142</b>
<b>Sulaiman S.Y. &amp; Hafsat M.</b> <i>BIOSORPTION OF Ni<sup>2+</sup> AND Pb<sup>2+</sup> FROM WASTE WATER USING DOUM PALM NUT SHELL ACTIVATED CARBON</i>	<b>143</b>
<b>M.Mohamed Ashik Ali, R.Devi, R.Srinivasan, A.Aswin, M.Akash</b> <i>IN SILICO ADME- TOX PREDICTION IN EARLY DRUG DISCOVERY</i>	<b>144</b>
<b>Laurensius Farel Dwi Putranto, Yuvensius Sri Susilo, Jonathan Ersten Herawan</b> <i>INDONESIA NATIONAL BUDGET AS A VACCINE TO RESTORATION OF CONTRACTION IN NATIONAL TOURISM SECTOR</i>	<b>147</b>
<b>Jonathan Ersten Herawan, Laurensius Farel Dwi Putranto, Yuvensius Sri Susilo</b> <i>INDONESIAN CROWDFUNDING COOPERATIVE (IC COOP): INTEGRATION INITIATIVE COOPERATIVES FOR COLLECTIVE NATIONAL ECONOMIC RECOVERY</i>	<b>148</b>
<b>J.Jayadurka, E.Elavarasi, R.Srinivasan</b> <i>UNDERSTANDING VARICOSE VEINS – DIAGNOSIS, TREATMENT AND PREVENTION</i>	<b>149</b>
<b>Derya KARATAŞ YENİ &amp; Yavuzkan PAKSOY</b> <i>IMPORTANT RESPIRATORY SYSTEM DISEASES IN HORSES</i>	<b>150</b>
<b>Brahim Meziani, Hamid Gadouri, Ilyes Sellami</b> <i>COMPARATIVE ANALYSIS OF METHODS FOR EVALUATING SOIL SETTLEMENT IN GEOTECHNICAL ENGINEERING (AZAOKA AND TRADITIONAL, BASED ON OEDOMETRY MEASUREMENTS)</i>	<b>151</b>
<b>Himanshu Khanna, Harish Pungotra &amp; Sandeep Gandotra</b> <i>BIODEGRADABLE MAGNESIUM MMC FOR BIOMEDICAL IMPLANTS: A REVIEW</i>	<b>152</b>
<b>Rosini Nawang Mustapen, Zuliana Azwa Zulkifli &amp; Hartinee Abbas, Noor Amalina Mat Yusof</b> <i>MOVING BEYOND TRADITIONAL ASSESSMENT: THE TYLER EXPANDED MODEL AND ITS RELEVANCE FOR MALAYSIAN HIGHER EDUCATION</i>	<b>153</b>

<b>Amber Nawab, Javeria Rafiq Sheikh, Fakhra Mehar, Nuzhat Naimatullah</b> <b><i>STRONG MOMS, FRAGILE BONES: OSTEOPOROSIS IN PREGNANCY</i></b>	<b>154</b>
<b>Ghulam Murtaza, Razia Kausar, Muhammad Adil, Farrah Deeba, Muhammad Shafeeq, Zohaib Saeed</b> <b><i>ENHANCING PERIPHERAL NERVE REGENERATION THROUGH ELECTRICAL STIMULATION AND EXERCISE</i></b>	<b>155</b>
<b>Ali Aillane, Karim Dahech &amp; Aissa Chouder, Tarak Damak</b> <b><i>AN ESTIMATED DROOP CONTROLLER FOR AN EFFECTIVE TRANSFER IN MICROGRID OPERATION</i></b>	<b>156</b>
<b>Başak ÇAKIR GÜNEY</b> <b><i>THE EFFECT OF URIC ACID/ALBUMIN RATIO ON PROGNOSIS OF PATIENTS FOLLOWED UP WITH COVID-19 DIAGNOSIS</i></b>	<b>157</b>
<b>Hilda Safitri, RINA Tri Astuti, Anggi Permatasari &amp; Triana Dani Maulana, Hendri Hermawan Adinugraha</b> <b><i>RELATIONSHIP BETWEEN ISLAM AND SCIENCE</i></b>	<b>158</b>
<b>ROFIYANA, MOHAMMAD ROBBI MAULANA &amp; AGUNG, HENDRI HERMAWAN</b> <b><i>IMPLEMENTATION OF ISLAMIC SCIENCE OR SCIENCE</i></b>	<b>159</b>
<b>Adeena Zakir &amp; Aiman Shahzad</b> <b><i>SELF -CONCEPT, MISTRUST AND ANTI-SOCIAL BEHAVIOR IN WORKPLACE INDIVIDUALS: A CORRELATIONAL STUDY</i></b>	<b>160</b>
<b>Samarjit ROY &amp; Debashis DE</b> <b><i>QUALITY OF EXPERIENCE IN INTERNET OF MUSIC THINGS</i></b>	<b>161</b>
<b>Sigit Pramono &amp; Hendri Hermawan Adinugraha</b> <b><i>IMPLEMENTATION OF REGIONAL EXPENDITURE IN CENTRAL JAVA PROVINCE IN INDONESIA</i></b>	<b>163</b>
<b>Rusita, Nuril Atmajaya, Surnayanti, Machya Kartika Tsani, Sugeng P Harianto, Trio Santoso, Mirza Wistary</b> <b><i>MAPPING TOURISM OBJECTS AND ATTRACTIONS IN ECOTOURISM DEVELOPMENT COMMUNITY BASED IN PESAWARAN REGENCY, PROVINCE LAMPUNG, INDONESIA</i></b>	<b>164</b>
<b>Yuvensius Sri Susilo, Matthew Kartawinata, Jonathan Ersten Herawan, Karin Kholia</b> <b><i>THE INDONESIA GREEN POLICY: A REALISTIC SHIFTING INTO A GREEN BASED ENERGY INDUSTRY TO BOOST PUBLIC WELFARE</i></b>	<b>166</b>
<b>Muhammad Adil, Zohaib Saeed, Farrah Deeba, Muhammad Shafeeq, Razia Kausar, Ghulam Murtaza</b> <b><i>UNMASKING BACTERIAL DEFENDERS: CUTTING-EDGE ANTIMICROBIAL RESISTANCE DETECTION INNOVATIONS</i></b>	<b>167</b>
<b>Farrah Deeba, Muhammad Adil, Zohaib Saeed, Muhammad Shafeeq &amp; Razia Kausar, Ghulam Murtaza, Bushra Zaidi</b> <b><i>UNVEILING THE MARVELS AND MYSTERIES OF NANO MEDICINE</i></b>	<b>168</b>
<b>Yamini, S., Deepika, A., Abarna, R., Kalaignazhal, G., Silpa, M.V., Sejian, V.</b> <b><i>ADVANCED NON-INVASIVE METHODS TO QUANTIFY HEAT STRESS RESPONSE IN FARM ANIMALS</i></b>	<b>169</b>
<b>Khaoula Mkhayar, Kaouakeb El khattabi, Souad Elkhattabi</b> <b><i>UNEARTHING FRESH ANTICANCER AGENTS FOR HUMAN BREAST CANCER CELL LINE: INVESTIGATING VIA QSAR AND MOLECULAR DOCKING ANALYSES</i></b>	<b>170</b>
<b>Ranti Ekasari, Andi Susilawaty, Habibi, Rahmadil Ma'arif</b> <b><i>ACCESS TO HEALTH SERVICES IN KANREAPIA HAMLET, GOWA</i></b>	<b>171</b>

<b>REGENCY, INDONESIA</b>	
<b>Abdelmoujoud Faris, Ivana Cacciatore, Ibrahim M. Ibrahim, Mohammed H. AL Mughram, Hanine Hadni, Kamal Tabti, Menana Elhallaoui, Ghizlan EN-NABETY</b>	<b>172</b>
<b><i>IN SILICO COMPUTATIONAL DRUG DISCOVERY: A MONTE CARLO APPROACH FOR DEVELOPING A NOVEL JAK3 INHIBITORS</i></b>	
<b>LAMAAZI Fatima Zohra &amp; BOUTARIK ABDELMAJID</b>	<b>173</b>
<b><i>RELATIONSHIP BETWEEN LINGUISTICS AND LITERATURE: A NEW CONFIGURATION</i></b>	
<b>Obiora Celestine Ugwu, Chioma Asumputa Anosike, Maduabuchi, Raymond Okonkwo, Ogbonna, Raymond Offiah</b>	<b>174</b>
<b><i>ANTISEIZURE AND ANTIOXIDANT PROPERTIES OF ETHANOL FRACTION OF AERIAL PART OF <i>Borerria ocymoides</i> ON ISONIAZID-INDUCED SEIZURE IN RAT MODELS</i></b>	
<b>Yousra Taoudi, Hicham Oudghiri Hassani, Souad Rakassb &amp; Mohammed Lachkar</b>	<b>175</b>
<b><i>SYNTHESIS AND CHARACTERIZATION OF METAL MOLYBDATE CATALYSTS AND ITS APPLICATION IN THE REDUCTION REACTION OF THE THREE ISOMERS OF NITROPHENOL</i></b>	
<b>BELABBES Nour El Houda, AIT OMAR Brahim</b>	<b>176</b>
<b><i>THE FOREIGN LANGUAGE TEACHER AND CULTURAL DIVERSITY</i></b>	
<b>SAGHOURI EL IDRISSE Imane, KETTANI Rajae, KHALFI Chemsdoha, FERRAHI Moha, EL FECHTALI Mohamed, ZIRI Rabea, BRHADDA Najiba</b>	<b>177</b>
<b><i>ASSESSING THE INFLUENCE OF CLIMATE CHANGE ON MOROCCO'S RESERVE RESOURCES FOR DURUM WHEAT LAND</i></b>	
<b>Khaoula Mkhayar, Kaouakeb El khattabi, Souad Elkhattabi</b>	<b>178</b>
<b><i>UNEARTHING FRESH ANTICANCER AGENTS FOR HUMAN BREAST CANCER CELL LINE: INVESTIGATING VIA QSAR AND MOLECULAR DOCKING ANALYSES</i></b>	
<b>A. Arif, A. Aboulouard, M.K. Atouailaa, M. Boulghalat, M. El idrissi</b>	<b>179</b>
<b><i>ELECTRONIC PROPERTIES AND OPTICAL ABSORPTION SPECTRA OF DYE SENSITIZED SOLAR CELLS (DSSCS) BASED ON CYANO-FUNCTIONAL SMALL MOLECULES:DFT AND TD-DFT STUDIES</i></b>	
<b>Mohammed Tijjani &amp; Makinde Joseph Kolawole</b>	<b>180</b>
<b><i>CAUSES AND EFFECT OF UNETHICAL PROFESSIONAL PRACTICES ON THE MANAGEMENT OF CONSTRUCTION PROJECTS IN THE NORTH CENTRAL PART OF NIGERIA</i></b>	
<b>OUBRAIM Ibtissam &amp; EL ACHMIT Jamal</b>	<b>181</b>
<b><i>INTERNATIONAL ORGANIZATIONAL COMMUNICATION IN DIGITAL AGE</i></b>	
<b>OUBRAIM Ibtissam &amp; EL ACHMIT Jamal</b>	<b>182</b>
<b><i>LA COMMUNICATION INTERNE DES ORGANISATIONS A L'ERE DU DIGITAL</i></b>	
<b>Chippala Naga Swapna, K. Harika, M. Vani &amp; K Gnaneswari</b>	<b>183</b>
<b><i>GENOME WIDE ANALYSIS OF UBIQUITIN CARBOXYL TERMINAL HYDROLASES IN RICE: THEIR ROLE IN GROWTH AND STRESS RESPONSE</i></b>	
<b>Mohamed El fadili, Mohammed Er-rajy, Hamada Imtara, Mohammed Kara, Sara Zarougui, Najla Altwaijry, Omkulthom M. Al kamaly, Aisha Al Sfouk and Menana Elhallaoui</b>	<b>184</b>
<b><i>3D-QSAR, ADME-TOX IN SILICO PREDICTION AND MOLECULAR DOCKING STUDIES FOR MODELING THE ANALGESIC ACTIVITY AGAINST NEUROPATHIC PAIN OF NOVEL NR2B-SELECTIVE NMDA RECEPTOR</i></b>	



<b>ANTAGONISTS</b>	
<b>Yassmine Mourajid, Fassi Fihri Chaimaa, Mohamed Chahboune, Abderraouf Hilali</b>	<b>185</b>
<b><i>CROSS-CULTURAL ADAPTATION AND PSYCHOMETRIC VALIDATION OF THE BSAQ «BOARD SELF ASSESSMENT QUESTIONNAIRE» SCALE</i></b>	
<b>EL MORABIT Yassmin &amp; AHARI M'hamed, EL MAADOUDI Mohammed</b>	<b>186</b>
<b><i>VERIFICATION OF THE AUTHENTICITY OF OLIVE OIL</i></b>	
<b>Amadi Oko Amadi, Okpo Charles Nnanna, Osuji Chibuiké Tobias, Uduak Godwin Etokakpan, Patience James Oden &amp; Onuoha Raymond Udochukwu</b>	<b>187</b>
<b><i>HYDROCARBON PIPELINE LEAK DETECTION USING MACHINE LEARNING MODELS</i></b>	
<b>Bushra Sumaiya</b>	<b>188</b>
<b><i>BUILDING PARTNERSHIPS TO ADDRESS POVERTY ALLEVIATION: A MULTISECTORAL APPROACH</i></b>	
<b>Charstar Arstilo Rumbay, Lince Sihombing, Elisamark Sitopu</b>	<b>189</b>
<b><i>PROFLECTION OF CHRISTIAN RELIGIOUS EDUCATION MANAGEMENT AND THE PHILOSOPHY OF STATE LEADERS IN MINAHASA, INDONESIA</i></b>	
<b>Charstar Arstilo Rumbay, Herry Pasrani Mendrofa, Saut Horas Tamba, Freddy Yosia Tampubolon, Dinda Wigrhalia Banurea, Dila Sari Dirgayana, Novy Saputra, Ricki Pratama Putra</b>	<b>197</b>
<b><i>DECOLONIZATION OF CONTRACT LAW: EMBRACING CULTURAL EMIC VALUES OF MINAHASAN'S TRADITION IN AN AGREEMENT</i></b>	
<b>Mehmet Nezir CEYLAN</b>	<b>198</b>
<b><i>HAFIZ PROJECT IN IMAM HATIP SECONDARY SCHOOLS (BATMAN EXAMPLE)</i></b>	
<b>Ali Rıza YEŞİLIRMAK</b>	<b>207</b>
<b><i>THE AIRCRAFTS THAT ARE PRODUCED BETWEEN 1926 AND 1942 IN AIRCRAFT FACTORY IN KAYSERİ AND THE DEVELOPMENT OF AIRCRAFT PRODUCTION</i></b>	
<b>Mehmet POLAT</b>	<b>219</b>
<b><i>WHAT ARE THE DETERMINANTS OF HAPPINESS? EVIDENCE FROM TURKEY</i></b>	
<b>Busra OZDENIZCI KOSE</b>	<b>230</b>
<b><i>THE INFLUENCE OF INTERNET OF BEHAVIOR PARADIGM ON RECENT INNOVATIONS IN DIGITAL MARKETING</i></b>	
<b>Aybike Tuba ÖZDEN</b>	<b>240</b>
<b><i>INVESTIGATION OF CONSUMER ARROGANCE AND DEMOGRAPHIC VARIABLES</i></b>	
<b>Riza TUNCEL</b>	<b>253</b>
<b><i>HUNTING TERMS IN HISTORICAL KIPCHAK LANGUAGE</i></b>	
<b>Kemal Gökhan NALBANT &amp; Sevgi AYDIN, Beyza ERYILMAZ</b>	<b>276</b>
<b><i>TECHNIQUES FOR MAKING DIGITAL SALES BY WORKING IN VIRTUAL OFFICES IN THE METAVERSE UNIVERSE</i></b>	
<b>Ayça ARSLAN</b>	<b>282</b>
<b><i>A HOUSING REVIEW AT THE INTERSECTION OF ARCHITECTURE AND ARCHEOLOGY: EPHESUS YAMAÇ HOUSES-2</i></b>	
<b>Burak GEZER</b>	<b>300</b>
<b><i>TRAUMATIC THORACIC PSEUDOMENINGOCELE: A RARE CASE REPORT AND LITERATURE REVIEW</i></b>	

<b>Erman AYDIN &amp; Kutay AYDIN</b> <i>INVESTIGATION OF CUTTING TOOL GEOMETRY AND COATING IN DRILLING AA7075-T6 AEROSPACE ALLOY BY FINITE ELEMENT METHOD</i>	<b>304</b>
<b>Yasemin SALKIN &amp; Fatma KARANTAY MUTLUAY</b> <i>THE EFFECT OF MIRROR TREATMENT ON HAND FUNCTIONS IN HEMIPARETIC CHILDREN</i>	<b>314</b>
<b>Hamdi Ayyıldız &amp; Büşra Pur</b> <i>STRATEGIC ECO-TOURISM MANAGEMENT FOR ADAPTATION TO CLIMATE CHANGE: CUSTOMER PORTFOLIO APPROACH</i>	<b>324</b>
<b>İbrahim AKSU</b> <i>THE VIRTUE OF "SERVANTHOOD" IN ISLAMIC MORAL PHILOSOPHY</i>	<b>333</b>
<b>Mustafa ÇAYIR &amp; Yasemin GÜNDOĞDU</b> <i>CREATION OF A NOISE MAP OF KONYA /EREĞLI AND ITS EFFECTS ON HEALTH</i>	<b>341</b>
<b>Büşra DEMİR ÇETİNKAYA</b> <i>EXAMINATION OF PI3K/AKT/mTOR PATHWAY IN TERMS OF TARGETED THERAPY IN BREAST CANCER TREATMENT</i>	<b>351</b>
<b>Uğur AYDEMİR &amp; Erkan YARIMKAYA</b> <i>THE EFFECT OF FAMILY PARTICIPATED PHYSICAL ACTIVITIES ON THE PHYSICAL ACTIVITY LEVEL OF STUDENTS IN EARLY CHILDHOOD: A PILOT STUDY</i>	<b>357</b>
<b>Farah Muhammed Sakran SAKRAN &amp; Fuat TÜRK</b> <i>UTILIZING MACHINE LEARNING IN CRYPTOCURRENCY MARKET ANALYSIS</i>	<b>363</b>
<b>Mustafa ALTINTAŞ</b> <i>ONLINE PLATFORM FATIGUE IN UNIVERSITY STUDENTS AFTER THE COVID-19 PANDEMIC PERIOD: A QUALITATIVE STUDY</i>	<b>369</b>
<b>Mehmet Yiğit Özgenç &amp; H. Şebnem Arlı, M. Fatih Akay</b> <i>ADVANCEMENTS IN SENTIMENT ANALYSIS FOR E-COMMERCE: A COMPARATIVE STUDY OF BERT, CONV-BERT, AND ELECTRA MODELS USING VIVENSE CUSTOMER REVIEWS</i>	<b>379</b>
<b>Irina-Ana DROBOT</b> <i>TRADITIONAL BREAKFASTS AROUND THE WORLD: REASONS WHY THEY LOOK THE WAY THEY DO</i>	<b>384</b>
<b>Irina-Ana DROBOT</b> <i>HAIKU THERAPY: VARIOUS RELATED ISSUES</i>	<b>390</b>
<b>Nazila Ragimova &amp; Kamenieva Nina, Almammadova Mehriban</b> <i>IMPROVEMENT OF MICROPROCESSOR CENTRALIZATION SYSTEMS FOR ARROWS AND SIGNALS BASED ON DIGITALIZATION OF MODULAR INTERACTION USING EXPERIMENTAL METHODS</i>	<b>395</b>
<b>Arif ÖZKAN &amp; Memduh AYDIN</b> <i>THE ROLE OF NEPHROMETRY SCORING SYSTEMS IN PREDICTING TUMOUR AGGRESSIVITY IN RENAL CELL CARCINOMA</i>	<b>399</b>
<b>Bahar OK</b> <i>THE RELATIONSHIP BETWEEN SCIENCE AND POLITICS IN THE PHILOSOPHY OF PAUL FEYERABEND</i>	<b>407</b>
<b>Zuriya GARAYEVA</b> <i>POLITICAL AND ECONOMIC IMPORTANCE OF THE ZANGEZUR CORRIDOR FOR THE REGION</i>	<b>415</b>



<b>Merve KÜÇÜKALİ ÖZTÜRK</b> <i>INVESTIGATING THE IMPACT OF TWIST COEFFICIENT VARIATION ON THE STRENGTH OF LYOCELL YARN</i>	<b>419</b>
<b>Semra NAVRUZ VARLI &amp; Saniye BİLİCİ</b> <i>EVALUATION OF KITCHEN STAFF'S COOKING PRACTICES AND RANGE HOOD USAGE</i>	<b>423</b>
<b>Ayşe UÇAR &amp; Betül TURANOĞLU ŞİRİN</b> <i>LEAN INTERNAL LOGISTICS AND AN APPLICATION IN THE FOOD INDUSTRY</i>	<b>426</b>
<b>Bilal COŞKUN &amp; Muammer GÖKBULUT</b> <i>POSITION CONTROL OF PMSM BASED ON LQR AND TORQUE OBSERVER</i>	<b>434</b>
<b>Safarova Tarana Qasim &amp; Ragimova Konul Elbrus</b> <i>ANALYSIS OF METHODS FOR IMPROVING THE TEACHING OF MACHINE DESIGN AND MECHANICAL TECHNOLOGIES</i>	<b>446</b>
<b>Bilge KARGA GÖLLÜ</b> <i>GELENEĞİN IŞIĞINDA İLHAN KEMAL ŞİİRLERİ</i>	<b>452</b>
<b>İsmail Yoşumaz</b> <i>INDUSTRY 5.0</i>	<b>462</b>
<b>Özlem KAYA &amp; Şaban ÖZÜTÜRKER</b> <i>AN INVESTIGATION INTO THE PERFORMANCE OF DIFFERENT FROTHERS IN THE FLOTATION OF YOZGAT/SORGUN LIGNITE COAL</i>	<b>469</b>
<b>Büşra ÖZDEMİR &amp; Petek BALCI, Ali KARA</b> <i>ADSORPTION OF REACTIVE BLUE 19 DYE ON BAP POLYMER</i>	<b>475</b>
<b>İlgin Yaren GÜVEN &amp; Petek BALCI, Ali KARA</b> <i>REMOVAL OF REACTIVE ORANGE-122 DYE FROM WASTEWATER USING POLYMER</i>	<b>489</b>
<b>Ecenur KURTULAN &amp; Petek BALCI, Ali KARA</b> <i>REACTIVE YELLOW 186 DYESTATE IN EAP POLYMER ADSORPTION</i>	<b>497</b>
<b>Hayriye Hale AYGÜN</b> <i>MANUFACTURING OF PS/PVC/Bi2O3 COMPOSITE SURFACES: A COMPARATIVE STUDY ON SOLVENT CASTING AND ELECTROSPINNING METHODS</i>	<b>508</b>
<b>Sait ÇÜM</b> <i>A COMPARISON OF RUBRIC TYPES: HOLISTIC SCORING VS. ANALYTIC SCORING</i>	<b>516</b>
<b>Nail Tekin ÖNDER &amp; Selim ALÇAY</b> <i>EVALUATION OF TRANSFERABLE EMBRYO RATES AFTER USING CONVENTIONAL AND SEXED SEMEN: A RETROSPECTIVE STUDY</i>	<b>522</b>
<b>Kasım KARATAŞ, Emin Yiğit UMUR &amp; Mertcan SEBETÇİ, Vehbi Can ERYAZAR</b> <i>INVESTIGATION AND IMPROVEMENT STUDIES OF THE EARLY OPENING PROBLEMS IN REFRIGERATION SYSTEM SAFETY VALVES AT HIGH TEMPERATURES</i>	<b>526</b>
<b>Gülfem KURT</b> <i>INTELLIGENCE PROBLEM IN TRANSLATION: HUMAN OR ARTIFICIAL INTELLIGENCE?</i>	<b>552</b>
<b>Emre ÇELİK &amp; Adem DALCALI</b> <i>DESIGN OF FUZZY PID CONTROLLER FOR ENHANCING FREQUENCY REGULATION IN TWO-AREA MULTI-SOURCE ELECTRIC POWER SYSTEMS</i>	<b>559</b>

<b>Cem Atik</b> <i>EFFECT OF POLYMORPHISMS OF MINK S38G AND ACE GENE ON THE SUCCESS OF RADIOFREQUENCY ABLASION WITH SERUM IRRIGATION APPLIED TO VALVE PATIENTS WITH ATRIAL FIBRILLATION</i>	<b>569</b>
<b>Veysel ERGÜÇ</b> <i>CONSIDERATION OF PUBLIC SPACE IN THE THOUGHTS OF REPUBLICANISM AND LIBERALISM</i>	<b>576</b>
<b>İlhan CEVHERİ &amp; Suat CUN, Vedat BEYYAVAŞ</b> <i>EFFECT OF IRRIGATION WATER APPLIED AT DIFFERENT RATES ON OIL CONTENT AND FATTY ACID COMPOSITIONS IN COTTON (GOSSYPIUM HIRSUTUM L.) PLANT</i>	<b>582</b>
<b>Vedat BEYYAVAŞ</b> <i>DEFOLIANT APPLICATION EFFECT ON YIELD AND YIELD COMPONENTS IN COTTON (GOSSYPIUM HIRSUTUM L.) PLANT</i>	<b>590</b>
<b>Thi-Hoang-Anh TRAN</b> <i>DESTINATION MARKETING RESEARCH THROUGH SOCIAL MEDIA DATA: UNCOVERING THE WORLD'S MOST TAGGED COUNTRIES</i>	<b>601</b>
<b>Fazıl Avcı, Çetin Çelik &amp; Murat Çelik, Havva Hande KESER ŞAHİN</b> <i>UTERINE TUMOR SIMILAR TO OVARIAN SEX CORD STROMAL TUMOR: CASE REPORT</i>	<b>608</b>
<b>Ahmet KAYA &amp; Azize GONCAGÜL</b> <i>LITERATURE AND WOMEN</i>	<b>613</b>
<b>Ahmet KAYA</b> <i>CULTURE IN YAŞAR KEMAL'S İNCE MEMED NOVELS</i>	<b>636</b>
<b>Buse Nur SÜMER &amp; Selami Varol ÜLKER</b> <i>USING ELECTROENCEPHALOGRAPHY (EEG) AS A WAY TO UNDERSTAND CONSUMER BEHAVIOR</i>	<b>647</b>
<b>Diñer MADEN</b> <i>SPEED CONTROL OF AN INDUSTRIAL DC MOTOR USING FULL STATE FEEDBACK METHOD</i>	<b>656</b>
<b>Diñer MADEN</b> <i>DETERMINATION OF PID CONTROLLER PARAMETERS OF A MAGNETIC LEVITATION SYSTEM USING STOCHASTIC FRACTAL SEARCH ALGORITHM</i>	<b>664</b>
<b>Sema YİYİT DOĞAN &amp; Seçil KAYA, Eray YİĞİT</b> <i>WEAVINGS EFFECT OF SILVER NANOPARTICLES OBTAINED BY BACTERIAL GREEN SYNTHESIS ON THE REMOVAL OF METHYLENE BLUE DYE</i>	<b>672</b>
<b>Mustafa Üsâme AKGÜN &amp; Mustafa İNCE</b> <i>EXAMINATION OF WEBSITE INTERFACE DESIGNS OF SOCIAL CONTENT PLATFORMS FOR EASE OF USE FOR USERS: USAGE ANALYSIS OF ONEDIO AND BUZZFEED SITES</i>	<b>682</b>
<b>Seçil KAYA, Berkan BARDAKÇI &amp; Ebru KONDOLOT SOLAK, Sema YİYİT DOĞAN</b> <i>SYNTHESIS AND SWELLING STUDIES OF CARBOXYMETHYL CELLULOSE-SODIUM ALGINATE-A.sativa BASED HYDROGELS OPTIMIZED BY BOX-BEHNKEN RESPONSE SURFACE METHODOLOGY</i>	<b>697</b>
<b>Emre GÜLERYÜZ</b> <i>AUTO-COMPLETING TELE-RADIOLOGY TEXT DATA</i>	<b>706</b>
<b>Adem DALCALI &amp; Emre ÇELİK</b> <i>ANALYSIS OF SPACE HARMONICS OF BLDC MOTOR USING DISCRETE HARTLEY TRANSFORM</i>	<b>714</b>

<b>Adem DALCALI &amp; Emre ÇELİK</b> <i>EFFECT OF THE NUMBER OF SLOTS OF A DOUBLE CAGE INDUCTION MOTOR ON THE MOTOR STARTING TORQUE</i>	<b>721</b>
<b>Filiz GÜRER YÜCEL</b> <i>AN EVALUATION OF STUDIES INVESTIGATING THE EFFECT OF DESIGN ON SOUND IN BAGLAMA ACOUSTICS</i>	<b>728</b>
<b>Metin ÇETİN</b> <i>SPIDER METAPHOR IN THE CONTEXT OF SŪRAT AL-‘ANKABŪT</i>	<b>737</b>
<b>Mehmet Akif KARTAL</b> <i>EXERGY ANALYSIS AND ENERGY PRODUCTIVITY OF LOW GREENHOUSE GAS EMISSIONS THERMOSIPHON</i>	<b>744</b>
<b>Elif Nur YILDIRIM ÖZTÜRK &amp; Mehmet UYAR</b> <i>DETERMINATION OF THE RELATIONSHIP BETWEEN DEATHS FROM COMMUNICABLE DISEASE OUTBREAKS AROUND THE WORLD BETWEEN 2010 AND 2021 AND THE HUMAN DEVELOPMENT INDEX</i>	<b>753</b>
<b>Harun DAĞ</b> <i>CULTURE AND ARTS JOURNALISM: AN EVALUATION ON NEWSPAPER NEWS</i>	<b>760</b>
<b>Mehmet KELEŞ</b> <i>SURAH MUZAMMİL İN THE CONTEXT OF QIRAAT-I SEB'A</i>	<b>764</b>
<b>Abdulkadir GÜNER &amp; Metin AŞCI</b> <i>DOWNHOLE SEISMIC – CROSSHOLE TOMOGRAPHY METHOD</i>	<b>769</b>
<b>Güven GÜNEY &amp; Eda BOZKURT</b> <i>DETERMINATION OF MACROECONOMIC FACTORS AFFECTING PROFITABILITY IN PARTICIPATION BANKS</i>	<b>777</b>
<b>Nazlı Deniz ÖZ</b> <i>THE VIRTUAL WORLD OF SOCIAL RELATIONS; AN INVESTIGATION OF METAVERSE AND RECREATIONAL ACTIVITIES</i>	<b>785</b>
<b>Esra Kaya Erdoğan</b> <i>SOCIO-SPATIAL EFFECTS OF THE EARTHQUAKE: THE TRANSFORMATION OF A MIDDLE-CLASS NEIGHBOURHOOD IN ISTANBUL</i>	<b>787</b>
<b>Arya BİÇEN</b> <i>EVALUATION OF DISABLED ACCESSIBILITY: CASE OF BITLIS EREN UNIVERSITY FACULTY OF ENGINEERING ARCHITECTURE AND SURROUNDINGS</i>	<b>794</b>
<b>Ferid ÖNDER</b> <i>ANALYSIS of the DETERMINANTS of FOREIGN TREADE in TURKEY</i>	<b>810</b>
<b>Leyla MURADZADE</b> <i>UNESCO'S CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS: ICTS IN SCIENCE AND EDUCATION</i>	<b>811</b>
<b>Abdulkerim GÜLER &amp; Mesut POLATGİL</b> <i>CLUSTER ANALYSIS OF YÖK ATLAS DATA OF MANAGEMENT INFORMATION SYSTEMS DEPARTMENTS IN TÜRKİYE</i>	<b>815</b>
<b>Serbest BİLİCİ</b> <i>DISCRIMINATION OF CYPRINION MACROSTOMUS AND CYPRINION KAIS FROM THEIR SCALES BY GEOMETRIC MORPHOMETRIC METHODS</i>	<b>822</b>
<b>Fr. Baiju Thomas</b> <i>THE ROLE OF THE FAMILY IN FOSTERING RESILIENCE FOR STUDENTS WITH SPECIAL EDUCATIONAL NEEDS IN THE MODERN INCLUSIVE CLASSROOM SETTINGS</i>	<b>831</b>

<b>Derya GÜRTAŞ DÜNDAR</b> <i>POLITICAL TRACES OF THE BEYDILI TRIBE IN MEDIEVAL TURKISH ISLAMIC STATES</i>	<b>838</b>
<b>Nuriye YAZICI, Mürsel ŞERAFEDDİNOĞLU &amp; Ahmet Talha GEZGİN, Adem DOĞANGÜN</b> <i>ANALYSIS OF PERMEATION INJECTION, FRACTURING INJECTION, AND COMPACTION INJECTION METHODS IN TERMS OF CALCULATION AND DESIGN CRITERIA</i>	<b>849</b>
<b>Mürsel ŞERAFEDDİNOĞLU, Nuriye YAZICI &amp; Ahmet Talha GEZGİN, Adem DOĞANGÜN</b> <i>THE SWELLING MECHANISM OF THE CLAY SOILS AND EVALUATION OF THE EMPIRICAL APPROACHES WITH FEM MODELLING SOFTWARE</i>	<b>856</b>
<b>Merve ERDOĞAN YILDIZ</b> <i>THE SIGNIFICANCE OF SPIRITUAL COUNSELING SERVICES IN THE PROCESS OF DEATH</i>	<b>867</b>
<b>Halime ŞAHİN &amp; Merve ERKINAY ÖZDEMİR</b> <i>DECISION SUPPORT SYSTEMS FOR SMART INDUSTRIAL AUTOMATION</i>	<b>876</b>
<b>Emre BOLAT &amp; Yiğit ALTUNDAĞ, Yağmur ARIKAN YILDIZ</b> <i>A WEB BASED SUPPORT SYSTEM FOR FARMERS</i>	<b>886</b>
<b>Birgül ÇİÇEK &amp; Hande ŞAHİN, Sibel ERKAL</b> <i>EXAMINATION OF UNIVERSITY STUDENTS' ECOLOGICAL CITIZENSHIP LEVELS</i>	<b>892</b>
<b>Selda ÇELİK &amp; Merve KOLCU</b> <i>IN ELDERLY INDIVIDUALS WITH TYPE 2 DIABETES INVESTIGATION OF SUCCESSFUL AGING AND RELATED FACTORS</i>	<b>906</b>
<b>Selda ÇELİK &amp; Merve KOLCU</b> <i>DETERMINATION OF FACTORS AFFECTING HEALTH LITERACY IN ELDERLY INDIVIDUALS WITH TYPE 2 DIABETES</i>	<b>913</b>
<b>Atallah Alenezi &amp; Khadiga Abd-Elgied Gomea Hassan, Ramon Perley M. Pandaan</b> <i>ABILITY TO ASSESS PAIN AMONG CHILDREN WITH INTELLECTUAL DEVELOPMENT DISORDER AND THE INTELLECTUALLY ABLE CHILDREN</i>	<b>920</b>
<b>Abdulmalik Abdulwoli &amp; Calistus Ayegba</b> <i>A CRITICAL EXPLORATION OF THE FORMS OF VIOLENT PROTESTS IN LAGOS, NIGERIA</i>	<b>926</b>
<b>Omonayin I.O., Ngutor N., Adedayo O.A. &amp; Akande S.A, Mustapha A</b> <i>DETERMINATION OF OPTIMAL PERFORMANCE FOR THE QUEUING SYSTEM AT INDEPENDENT NATIONAL ELECTORAL COMMISSION (INEC) OFFICE MAIKUNKELE, MINNA</i>	<b>934</b>
<b>T. J. Akintaro &amp; A. B. Zhiri</b> <i>MODELLING OF UNSTEADY HYDROMAGNETIC COUETTE FLOW THROUGH A POUROUS CHANNEL WITH TRANSVERSE MAGNETIC FIELD</i>	<b>943</b>
<b>T. J. Akintaro &amp; A. B. Zhiri</b> <i>MATHEMATICAL MODELLING OF TRANSIENT MIXED CONVECTION FLOW UNDER THE THERMAL BOUNDARY CONDITION</i>	<b>952</b>
<b>Jibrin, S., N. T. Kolawole-Jimoh &amp; Manta, I. B., Umaru, A., Adeyemi, G</b> <i>ATTITUDE OF UNDERGRADUATE STUDENTS OF SCHOOL OF AGRICULTURE TOWARDS AGRICULTURAL ACTIVITIES IN FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE, NIGERIA</i>	<b>960</b>



<b>Habeeb Salman ISIAKA, Awawu Kewudoyin ABDUSSALAM &amp; Bale Muritala ISSA</b> <b><i>ROLE OF PROBIOTICS AND PREBIOTICS IN HEALTH CARE</i></b>	<b>966</b>
<b>Rehman Khan, Khawar shafique &amp; Mubashir Asif, Abbas Ahmad</b> <b><i>HAND GESTURE-CONTROLLED ELECTRONIC CAR</i></b>	<b>980</b>
<b>Andrey Popatanasov</b> <b><i>MYSTERY WITH SOME HISTIDINE KINASES OF AMBORELLA TRICHOPODA IN THE PUBLIC DATABASES AND AVAILABLE RESOURCES</i></b>	<b>989</b>
<b>Endirë Bushati &amp; Jonida Gjika</b> <b><i>ASSESSING THE LEGAL FRAMEWORK FOR ENVIRONMENTAL PROTECTION IN ALBANIA: A CRITICAL ANALYSIS</i></b>	<b>997</b>
<b>Chodavarapu Giridhar Kumar, Adda Hinduja, Vemulamada Mani Jagannadh</b> <b><i>AN EXPERIMENTAL INVESTIGATION OF EFFECT OF MAXIMUM AGGREGATE SIZE ON MODE-1 FRACTURE PARAMETERS OF STEEL FIBRE REINFORCED NORMAL STRENGTH CONCRETE</i></b>	<b>1005</b>
<b>Ivana Tonković Pražić, Kristina Devčić &amp; Ivana Crnković</b> <b><i>GREEN LOGISTICS ACTIVITIES' INFLUENCE ON CONSUMER BUYING DECISIONS: EVIDENCE FROM CROATIA</i></b>	<b>1016</b>
<b>Mubashir Asif &amp; Rehman Khan</b> <b><i>DESIGN AND FABRICATION OF DIE FOR INJECTION MOLDING MACHINE</i></b>	<b>1022</b>
<b>Hanan Wali &amp; Rehman Khan</b> <b><i>DESIGN AND FABRICATION OF ELECTROMAGNETIC BRAKING SYSTEM</i></b>	<b>1039</b>
<b>Nadhiya.J, S. Showbharnikhaa, K. Snega, T. Akshaya, M.K Vijayalakshmi</b> <b><i>DIABETES MELLITUS – CHRONIC DISEASE</i></b>	<b>1051</b>
<b>Rehman Khan &amp; Hasnain Saleem, Abbas Ahmad</b> <b><i>REDUCTION OF HOTSPOT IN SAND CASTING</i></b>	<b>1057</b>
<b>Rehman Khan, Mamoon Ur Rasheed &amp; Hamza Malik</b> <b><i>DESIGN AND FABRICATION OF SHELL AND TUBE HEAT EXCHANGER</i></b>	<b>1068</b>
<b>S.Showbharnikhaa, M.K Vijayalakshmi</b> <b><i>PRECISION MEDICINE IN DRUG DEVELOPMENT</i></b>	<b>1079</b>
<b>Chodavarapu Giridhar Kumar, MADDILA SASIKALA, DUSARI PRANEETHBABU</b> <b><i>ANALYSIS AND DESIGN OF PRESTRESSED CONCRETE SLEEPERS WITH PARTIAL REPLACEMENT OF FLYASH IN CONCRETE</i></b>	<b>1090</b>
<b>Chodavarapu Giridhar Kumar, Sadhu Renuka, Polamarasetti Jagadeeswar</b> <b><i>SOIL STABILIZATION WITH AERATED CEMENTED CLAY- FA SUPPLANT</i></b>	<b>1101</b>
<b>Hassan Musa Kawata, Omajasola, P.F &amp; Titilayo Elizabeth Adesokan</b> <b><i>ASSESSMENT OF ANTIMICROBIAL ACTIVITY OF THREE COMMERCIAL HAND SANITIZERS AGAINST MICROORGANISMS ISOLATED FROM THE HUMAN HAND</i></b>	<b>1120</b>
<b>Halil İbrahim KURTOĞLU &amp; İrem ULUIŞIK YILMAZ, Aysun GÜZEL</b> <b><i>FOR ADOLESCENT STUDENTS; DEVELOPMENT OF TRAINING CURRICULUM FOR PREPAREDNESS FOR CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR THREATS</i></b>	<b>1126</b>
<b>Şerife Gülsüm DEMİR &amp; Turan ARSLAN</b> <b><i>OBJECT DETECTION FOR SEATBELT DETECTION: A COMPARISON OF YOLOv3 AND YOLOv4</i></b>	<b>1143</b>
<b>Kamal Kouhi &amp; Yunus Fayind</b> <b><i>USAGE OF BEHAVIORAL PUBLIC RELATIONS MODEL TO RAISE PUBLIC AWARENESS: ACTIVITIES CONDUCTED WITHIN THE SCOPE OF</i></b>	<b>1151</b>

<b>TOBACCO CONTROL</b>	
<b>Önder ŞAHİNASLAN &amp; Önder ŞAHİNASLAN</b> <b>ILLEGAL ITEM DETECTION IN X-RAY SCANS USING CORNER DETECTION - A THEORETICAL MODEL</b>	<b>1154</b>
<b>Gül BAYRAM</b> <b>COVID-19 COINFECTION WITH LEISHMANIASIS SPECIES DURING PANDEMIC</b>	<b>1163</b>
<b>Gül BAYRAM</b> <b>USE OF BACTERIOPHAGES AS ANTIBACTERIAL AGENTS IN TURKIYE</b>	<b>1167</b>
<b>Zeynep Merve ABACI, Ayşe YILMAZ, Ülkühan BAĞIŞ &amp; Sibel ULUATA, Gökhan DURMAZ, İhsan KARABULUT</b> <b>BIOACTIVITY OF LOTUS CORNICULATUS L. FLOWER</b>	<b>1171</b>
<b>Aysel AŞIRLI</b> <b>THE ROLE OF CULTURAL VALUES IN BUILDING A COMPETITIVE ECONOMY</b>	<b>1176</b>
<b>Rabia Vildan İŞCAN, Cihat KARTAL, Esmâ Ebru ŞENTÜRK</b> <b>THE EFFECT OF CARBON FOOTPRINT ON BUSINESS SENSITIVITY</b>	<b>1183</b>
<b>Erhan ZETEROĞLU</b> <b>AN EXAMINATION OF THE DIFFERENCES IN THE FORMAL ANALYSIS OF TURKISH MUSIC WORKS</b>	<b>1193</b>
<b>Nurettin BARAN &amp; Muhammad Azhar NADEEM</b> <b>EXPLORING THE GENETIC DIVERSITY OF SUNFLOWER THROUGH SSR MARKERS: A REVIEW OF LITERATURE STUDY</b>	<b>1200</b>
<b>Ahmet Gökhan SÖKMEN &amp; Edip ÖZÇELİK</b> <b>FACTORS AFFECTING THE CAPITAL STRUCTURE: PANEL DATA ANALYSIS ON COMPANIES TRADING IN BORSA ISTANBUL IN THE CONTEXT OF FOREIGN PARTNERSHIP</b>	<b>1204</b>
<b>İsmail DÖNMEZ &amp; Salih GÜLEN</b> <b>A STUDY ON CHILD DEVELOPMENT STUDENTS' PERCEPTIONS OF LITERACY AND THEIR OWN LITERACY STATUS</b>	<b>1215</b>
<b>Serkan KIZILCA</b> <b>COMPARISON OF BASIC BIOMOTORIC CHARACTERISTICS OF ATHLETES NEW TO VOLLEYBALL</b>	<b>1221</b>
<b>Meliha UZUN</b> <b>THE RELATIONSHIP BETWEEN SPORTS COMMITMENT AND LIFE SATISFACTION: A RESEARCH ON INDIVIDUALS PLAYING SPORTS</b>	<b>1226</b>
<b>Ali KOSAT</b> <b>RELATIONSHIP OF NATION BRAND VALUE INDEX AND ECONOMIC FREEDOM INDEX</b>	<b>1236</b>
<b>Esra Özkan</b> <b>MODELING PUNDING AND DOPAMINE DYSREGULATION SYNDROME IN PARKINSONISM ANIMAL MODEL</b>	<b>1252</b>
<b>Emre ÇELİK &amp; Adem DALCALI</b> <b>SNAKE SEARCH ALGORITHM BASED CASCADE PD-PI CONTROLLER DESIGN FOR PERFORMANCE ENHANCEMENT OF A STANDALONE AUTOMATIC VOLTAGE REGULATOR SYSTEM</b>	<b>1261</b>
<b>Oznur Oztuna Taner</b> <b>EFFECTS OF FOOD SUPPLEMENTS ON SPORTS NUTRITION</b>	<b>1271</b>
<b>Tuba YALÇIN &amp; Sercan KAYA</b>	<b>1272</b>



<b><i>THYMOQUINONE MAY REGULATE ALTERED MMP-9 AND VEGF IMMUNOREACTIVITIES IN CISPLATIN-INDUCED NEPHROTOXICITY</i></b>	
<b>Anıl BAYSAL</b>	
<b><i>THE REFLECTION OF BERRY'S MODEL OF ACCULTURATION IN BRENTON AND ALI'S PLAY IRANIAN NIGHTS</i></b>	<b>1274</b>
<b>Ahmet AÇIK</b>	
<b><i>THE EFFECT OF THE SURREALISM ART MOVEMENT ON ELSA SCHIAPARELLI DESIGNS</i></b>	<b>1275</b>
<b>Halah Jabbar Kadhim &amp; Abdulameer M. Ghareeb</b>	
<b><i>ASSESSING INTERLEUKIN-6 EXPRESSION LEVEL AND SOME LABORATORY BIOMARKERS UPON COVID-19 INFECTION IN IRAQI PATIENTS</i></b>	<b>1277</b>
<b>Gülce DENİZKURDU &amp; Suat OĞUZ, Cevat EKER</b>	
<b><i>A REVIEW ON THE IMPORTANCE OF MUSIC EDUCATION IN INDIVIDUALS WITH AUTISM SPECTRUM DISORDER</i></b>	<b>1278</b>
<b>Halil Mahir KAPLAN &amp; Perçin PAZARCI</b>	
<b><i>ALPHA-LIPOIC ACID'S IMPACT ON PROSTATE CANCER CELLS</i></b>	<b>1280</b>
<b>Recep Sinan ARSLAN &amp; Burak DÜLGEROĞLU</b>	
<b><i>CRIME CLASSIFICATION USING CATEGORICAL FEATURE ENGINEERING AND MACHINE LEARNING</i></b>	<b>1282</b>
<b>Momoh Shaibu, Samaila A. Abdullahi, Saidu R. Saidu, Odenigbo C. Clifford</b>	
<b><i>ASSESSMENT OF ANTIFUNGAL ACTIVITIES OF SILVER NANO PARTICLES ON CANDIDIASIS AMONG FEMALE STUDENTS OF FEDERAL POLYTECHNIC KAURA NAMODA, ZAMFARA STATE</i></b>	<b>1290</b>
<b>Eda Elgin KILIÇ</b>	
<b><i>MİCROENCAPSULATION OF OLIVE OIL</i></b>	<b>1291</b>
<b>Aytül HADIMLI &amp; Gonca ERDEMEN, Beyzanur TÜRK</b>	
<b><i>EXPOSURE OF MIDWIFERY STUDENTS TO MOBBING IN CLINICAL PRACTICES: EXAMPLE OF AEGEAN REGION</i></b>	<b>1292</b>
<b>Arini Minnataka</b>	
<b><i>FUNDRAISING STRATEGY OF ZAKAT, INFAQ, AND SADAQAH OF INDONESIAN PHILANTHROPIC INSTITUTIONS</i></b>	<b>1294</b>
<b>Anggun Rahadian Kusuma Dewi</b>	
<b><i>THE IMPACT OF DIGITAL INFLUENCER MARKETING ON THE DEVELOPMENT OF BUSINESS STRATEGY (A LITERATURE STUDY)</i></b>	<b>1295</b>
<b>Nurul ASROFIANA &amp; Hendri Hermawan ADİNUGRAHA</b>	
<b><i>PRODUCTIVE UTILIZATION OF ZAKAT FOR POVERTY ALLEVIATION: CASE STUDY IN INDONESIA</i></b>	<b>1296</b>
<b>Mita Melati Retno MANDALIN &amp; Hendri Hermawan ADİNUGRAHA</b>	
<b><i>THE IMPORTANCE OF PRODUCT QUALITY IN MAINTAINING CONSUMER LOYALTY IN THE BATIK INDUSTRY IN INDONESIA</i></b>	<b>1297</b>
<b>Mochamad Yusuf &amp; Hendri Hermawan ADİNUGRAHA</b>	
<b><i>THE CONCEPT OF MURABAHAH CONTRACT AT BANK SYARIAH INDONESIA KC PEKALONGAN PEMUDA</i></b>	<b>1298</b>
<b>Fethi Şaban ÖZBEK</b>	
<b><i>ECONOMIC SITUATION OF FARMS IN EUROPEAN UNION</i></b>	<b>1299</b>
<b>Hamdi Ayyıldız &amp; Büşra Pur</b>	
<b><i>CAN OLEOTOURISM BE A SAVIOUR IN BIOCULTURAL HERITAGE?</i></b>	<b>1301</b>
<b>Nur FADHILAH &amp; Hendri Hermawan ADİNUGRAHA</b>	
<b><i>THE ROLE OF PRODUCT INNOVATION IN IMPROVING THE MARKETING PERFORMANCE OF CULINARY BUSINESSES IN INDONESIA</i></b>	<b>1302</b>

<b>Laila FITRIANI &amp; Hendri Hermawan ADİNUGRAHA</b> <i>ANALYSIS OF HALAL PRODUCT CERTIFICATION AND LABELIZATION IN INDONESIA</i>	<b>1303</b>
<b>Ardia Puspita DEWI</b> <i>A BIBLIOMETRIC ANALYSIS: ANALYSIS OF THE CAUSES OF INEQUALITY IN INCOME DISTRIBUTION IN INDONESIA</i>	<b>1304</b>
<b>Thanh-Dung Nguyen, HUU-Nghia Duong, Thuy-Trang Pham, Quoc-Bao Nguyen Tong &amp; Thi Pha Nguyen, HUU-Hiep Nguyen, HUU-Thanh Nguy</b> <i>ISOLATION OF ENDOGENOUS BACTERIA FROM Adenosma bracteosum Bonati IN TAY NINH PROVINCE WITH ANTIBACTERIAL ACTIVITY ON Staphylococcus aureus</i>	<b>1305</b>
<b>NUZULUL&amp; Hendri Hermawan ADİNUGRAHA</b> <i>COMPUTER LABORATORY OPTIMIZATION IN LEARNING: A LITERATURE STUDY</i>	<b>1306</b>
<b>Zohaib Hassan Sain</b> <i>CHAT GPT: A TECHNOLOGICAL SOLUTION OR DILEMMA FOR THE EDUCATION SYSTEM IN 2023</i>	<b>1307</b>
<b>Zohaib Hassan Sain</b> <i>REVIEWING THE ACADEMIC LANDSCAPE: THE IMPLEMENTATION OF ELEARNING INITIATIVES IN HIGHER EDUCATION</i>	<b>1308</b>
<b>Ömer Andac &amp; Mohammed Alsamarai</b> <i>COMPUTATIONAL PLATFORMS-GUIDES GENOME MINING TO UNLEASH POTENTIAL OF STREPTOMYCES MK37H STRAIN</i>	<b>1309</b>
<b>Pınar ÖZDEMİR</b> <i>AN INVESTIGATION OF UNIVERSITY STUDENTS' VIEWS ON MATE SELECTION IN THE 21ST CENTURY: A QUALITATIVE RESEARCH</i>	<b>1311</b>
<b>Farah Muhammed Sakran SAKRAN &amp; Fuat TÜRK</b> <i>UTILIZING MACHINE LEARNING IN CRYPTOCURRENCY MARKET ANALYSIS</i>	<b>1313</b>
<b>Bilal BALUN</b> <i>INVESTIGATION OF THE SEISMIC INPUT ENERGY FOR HATAY PROVINCE DURING THE FEBRUARY 6, 2023 KAHRAMANMARAŞ/PAZARCIK EARTHQUAKE</i>	<b>1315</b>
<b>Neslihan TAŞAR</b> <i>GENOTOXIC EFFECTS OF COPPER NANOPARTICLE ON VICIA PANNONICA CRANTZ ROOT MERISTEM CELLS</i>	<b>1325</b>
<b>Momoh Shaibu, Samila. A. Abdullahi, Ahmed A. Abbas</b> <i>ASSESSMENT OF HAZARD INDEX OF ORGANIC CHLORINE PESTICIDE (OCP) RESIDUES IN WATERMELON (Citrus lanatus) SOLD IN KAURA NAMODA, ZAMFARA STATE, NIGERIA</i>	<b>1327</b>
<b>Tolga AKKOÇ</b> <i>EXPLORATION OF THE POTENTIAL OF CANINE OVARY-DERIVED MESENCHYMAL STEM CELL EXOSOMES (COMS-EXO) IN ENHANCING EPITHELIAL BARRIER FUNCTION</i>	<b>1328</b>
<b>Tolga AKKOÇ</b> <i>AN IN VITRO INVESTIGATION OF THE EFFECTS OF HUMAN UMBILICAL CORD MESENCHYMAL STEM CELL-DERIVED EXOSOMES ON THE VIABILITY OF PERIPHERAL BLOOD MONONUCLEAR CELLS (PBMCS) IN CATS WITH FELINE INFECTIOUS PERITONITIS (FIP)</i>	<b>1330</b>
<b>Ümit AK &amp; Hale SEZER, Hande YAĞCAN</b>	<b>1332</b>

<b>USE OF ARTIFICIAL INTELLIGENCE IN NURSING EDUCATION: CHATGPT STORM</b>	
<b>Fatıma Zehra ALKAN</b> <i>EXAMINING THE INDIVIDUAL'S STRUGGLE FOR RECOGNITION FROM CHARLES TAYLOR'S PERSPECTIVE: APPROACH TO CULTURES AND PRESUPPOSITION OF VALUE</i>	1334
<b>Uğur KILIÇ</b> <i>DETERMINING THE MOST SUITABLE AIRCRAFT CONSIDERING AIR POLLUTION IN THE MOST POLLUTED CITY IN EUROPE</i>	1336
<b>Özmen İSTEK</b> <i>ROBOTIC SURGERY APPLICATIONS IN VETERINARY SURGERY</i>	1338
<b>Ali BİRİNCİ</b> <i>MORAL IDEOLOGIES OF TEACHERS SERVING IN IMAM HATIP SCHOOLS</i>	1340
<b>Kıymet KÖSE</b> <i>ITALIAN OCCUPATION POLICY IN WESTERN ANATOLIA AND THE ATTITUDE OF ISPARTA</i>	1342
<b>Asiye DURSUN</b> <i>INVESTIGATION OF THE RELATIONSHIP BETWEEN ADOLESCENTS' LIFE SATISFACTION AND THE QUALITY OF THEIR EMOTIONAL RELATIONSHIP</i>	1344
<b>Recep ARDOĞAN</b> <i>THE PLACE OF ELMALILI IN THE ISSUE OF INTERPRETATION OF GOD'S KHABARI ATTRIBUTES MENTIONED IN THE QUR'AN</i>	1346
<b>Recep ARDOĞAN</b> <i>ECOLOGICAL UNDERSTANDING IN YUNUS EMRE</i>	1348
<b>Özgür AKTÜRK, Murat TUTAR</b> <i>THE EFFECT OF 8 WEEKS RESISTANCE EXERCISES WITH ELASTIC BANDS APPLIED TO THE LOWER EXTREMITY ON THE VERTICAL JUMP AND SPEED PERFORMANCE OF 14-16 YEARS OLD FEMALE VOLLEYBALL PLAYERS</i>	1350
<b>Muhammed Emin ŞİMŞEK</b> <i>ISLAM'S ECOLOGICAL AWARENESS: THE ROLE AND RESPONSIBILITY OF RELIGIOUS EDUCATION</i>	1352
<b>Ercan Baran</b> <i>PALESTINE IN ÂMÂL MESLİSÎ'S "(NACI EN PALASTİNA (NACI AND PALESTINE))" AND YASMIN LEVY'S "NACI EN ALAMO" SONGS</i>	1354
<b>Ercan Baran</b> <i>NECİP MAHFUZ IN THE ADVENTURE OF THE WORLD NOVEL BY NECİP TOSUN</i>	1362
<b>Abdülkadir ÖZDEMİR</b> <i>UNUSUAL METHODS IN DETERMINING PRESIDENTS</i>	1368
<b>Fidaye CİNCİL &amp; Ayşegül ŞEYHOĞLU</b> <i>AN EXAMPLE OF A MULTIDISCIPLINARY MODULE BASED ON AN INTERDISCIPLINARY TEACHING APPROACH IN SOCIAL STUDIES TEACHING: "IN THE FOOTSTEPS OF GÖBEKLITEPE"</i>	1370
<b>Servet DEMİRBAŞ</b> <i>TAFSİR IN THE CONTEMPORARY PERIOD: THE EXPECTATIONS OF CONTEMPORARY ISLAMIC SOCIETIES AND THE CHANGING ROLE OF TAFSİR</i>	1372
<b>Öznur BAĞ &amp; Lezgin KAYA</b> <i>DETERMINATION OF THE NUMBER OF CUTS BY FINITE ELEMENT</i>	1374

<b>METHOD FOR CUTTING TOOL USED IN FABRIC CUTTING</b>	
<b>Ayşen ÇAKIR</b>	
<b>POSSIBLE EFFECT OF URIDINE IN PREMATURE OVARIAN FAILURE</b>	<b>1376</b>
<b>Emine ERDOĞAN</b>	
<b>AN ARTISTIC LOOK AT THE TRACES OF THE PAST; MARTYRS OF SARIKAMIŞ</b>	<b>1379</b>
<b>S.Hande ÖZÇELİK</b>	
<b>THE CONCEPT OF VIRTUE IN PLATO'S PROTAGORAS, GORGIAS AND STATE DIALOGUES</b>	<b>1381</b>
<b>Esra UYGUN</b>	
<b>PROBLEMS FACED IN THE TAXATION OF E-COMMERCE IN TERMS OF TAX LEGISLATION</b>	<b>1383</b>
<b>Yeter SAÇLI, Yeter SAÇLI, Gökçe GÜLTEKİN &amp; Elifnur TAŞDEMİR ER, Busemnaz AVŞAR, Didem ŞAHİN CEYLAN</b>	
<b>EFFECT OF HEAD CIRCUMFERENCE SIZE AND BODY MASS INDEX ON AUDITORY BRAINSTEM RESPONSES OBTAINED WITH LS CE-CHIRP STIMULUS</b>	<b>1385</b>
<b>Emine Gözde ÖZGÜREL</b>	
<b>THE BELOVED FIGURE IN YAHYA KEMAL BEYATLI'S POETRY WITH PERSONAL AND NATIONAL SIGNIFICANCE</b>	<b>1387</b>
<b>Adem TÜRKMEN</b>	
<b>THE NONLINEAR RELATIONSHIP BETWEEN EXPORT COMPLEXITY AND ECONOMIC DEVELOPMENT</b>	<b>1389</b>
<b>Benan KURT YILMAZ</b>	
<b>A RESEARCH ON FOMO, COVID-19 AND REMOTE WORKING RELATIONSHIP</b>	<b>1391</b>
<b>Murat YİĞİT</b>	
<b>COMPARISON OF NEW PARTNERS IN SECURITY COOPERATION WITH AFRICA: RUSSIA, CHINA AND TURKEY WITH THEIR DIFFERENT APPROACHES</b>	<b>1393</b>
<b>Almila BURGAÇ ÇİL</b>	
<b>ON THE PARAMETER STABILITY FOR MONEY DEMAND FUNCTION IN TURKISH ECONOMY</b>	<b>1395</b>
<b>Tolga UYANIK</b>	
<b>DETECTION OF THE PRESENCE OF <i>Listeria monocytogenes</i> IN FROZEN VEGETABLES</b>	<b>1397</b>
<b>Özhan Çetindağ</b>	
<b>THE ROLE OF ENDOSCOPIC INTRAGASTIC BOTULINUM TOXIN-A AND GASTRIC BALLOON IN OBESITY TREATMENT</b>	<b>1398</b>
<b>Pınar POLAT</b>	
<b>A RESEARCH ON THE EARLY LITERACY SKILLS OF CHILDREN ATTENDING SUMMER KINDERGARTEN</b>	<b>1399</b>
<b>Hazen SARITAŞ</b>	
<b>ADULT GITELMAN SYNDROME DIAGNOSED WITH EPILEPTIC SEIZURE: CASE REPORT</b>	<b>1401</b>
<b>Aytekin KÖSE</b>	
<b>A PRACTICAL AND SHORT-STEP SYNTHESIS OF NEW DOPAMINE ANALOGUES VIA ACYLATION AND METHYLATION</b>	<b>1403</b>
<b>Mehmet Fatih GÜRBÜZ, Hakan KARABÖRK &amp; Nurdan BAYKAN</b>	
<b>OBTAINING OF OBJECT BOUNDARIES WITH EDGE DETECTION ALGORITHMS</b>	<b>1407</b>



<b>Mammad ALİYEV</b> <i>THE LEGACY OF HEYDAR ALIYEV IN THE CENTRAL SCIENTIFIC LIBRARY (CSL) OF THE AZERBAIJAN NATIONAL ACADEMY OF SCIENCES (ANAS)</i>	<b>1409</b>
<b>İlker Kızılođlu</b> <i>DESIGNING A VIDEO LARYNGOSCOPE TO ENABLE FACE-TO-FACE INTUBATION IN TRAPPED IN-VEHICLE ACCIDENTS</i>	<b>1411</b>
<b>Ayşegül DEDE</b> <i>TRANSITION TO HIGHER EDUCATION: STUDENT MOBILITY and NİĞDE</i>	<b>1417</b>
<b>Hasan AKSAKAL</b> <i>MAX WEBER'S THOUGHTS ON SOCIALISM AND RUSSIAN REVOLUTION OF 1917</i>	<b>1419</b>
<b>Nihat AKBULUT</b> <i>TAX BURDEN IN TÜRKİYE COMPARED TO OECD COUNTRIES</i>	<b>1421</b>
<b>Azibe YILDIZ</b> <i>EVALUATION OF HEAT AND ENZYME-MEDIATED ANTIGEN RETRIEVAL METHODS FOR IMMUNOHISTOCHEMICAL REACTIONS IN ROUTINELY PROCESSED PARAFFIN BONE TISSUE SECTIONS</i>	<b>1423</b>
<b>Tamer KAŞIKCI</b> <i>BIDEN ADMINISTRATION'S "FORCED" MIDDLE EAST POLICY IN THE FACE OF CHANGING REGIONAL DYNAMICS</i>	<b>1425</b>
<b>Didem Gamze İŞIKSAL</b> <i>AN EXPLORATORY STUDY ON THE POTENTIAL OF ACADEMIC PODCASTS AS EFFECTIVE MARKETING TOOLS FOR SCIENCE COMMUNICATION</i>	<b>1427</b>
<b>Sinan KIVRAK, Emre TURAN &amp; Burak YENİPİNAR, Zehra SEVER</b> <i>DEVELOPMENT OF TEST SYSTEM FOR ELECTRIC MOTORS</i>	<b>1429</b>
<b>Nurbay SEY</b> <i>HEALTH TOURISM, HEALTH SERVICES PRICES AND EXCHANGE RATE RELATIONSHIP: THE CASE OF TURKEY WITH GRANGER CAUSALITY ANALYSIS</i>	<b>1431</b>
<b>Hasan KARAGEÇİLİ &amp; Filiz YILDIRIM</b> <i>OXIDATIVE STRESS AND ANTIOXIDANTS ROLE IN DIABETES</i>	<b>1439</b>
<b>Gölnur KAPLAN ESEN</b> <i>USAGE OF BEHAVIORAL PUBLIC RELATIONS MODEL TO RAISE PUBLIC AWARENESS: ACTIVITIES CONDUCTED WITHIN THE SCOPE OF TOBACCO CONTROL</i>	<b>1441</b>
<b>Kadriye Filiz BALBAL &amp; Sebahattin İKİKARDEŞ, Özge ÇELİK</b> <i>LSTM-BASED SOLAR POWER FORECASTING</i>	<b>1444</b>
<b>Zeynep İrem AYDIN &amp; Aynur TÜREYEN</b> <i>RELATIONSHIP BETWEEN DIABETES AND OMEGA FATTY ACIDS: IS OMEGA 3/OMEGA 6 BALANCE IMPORTANT?</i>	<b>1446</b>
<b>Tolga GÜL</b> <i>ASSESSMENT OF QUITTER INTENTION BY GENERATIONS: A STUDY WITH GENERATIONS X, Y AND Z</i>	<b>1448</b>
<b>Mehmet Sedat UĞUR</b> <i>THE ROLE OF WOMEN IN REGIONAL DEVELOPMENT AND INVESTIGATING THE IMPACTS OF WOMEN'S ENTREPRENEURSHIP PRACTICES IN TURKEY</i>	<b>1450</b>
<b>Aytül GÜNEŞER DEMİRCİ</b> <i>A NEW FORM OF BEHAVIOUR CREATED BY INSECURITY IN WORKING</i>	<b>1452</b>

<b><i>LIFE: QUIET QUITTING</i></b>	
<b>İkram ALPSOY, Ragıp BİNGÖL</b> <b><i>DEATHS WHILE CONSTRUCTING IDENTITY WITH SELFIE, THE 'IMAGE' FACE OF SOCIAL MEDIA</i></b>	<b>1454</b>
<b>Mehmet CENGİZ</b> <b><i>SILENCE OF SHARI'AH: A STUDY ON MAQASID AL-SHARI'AH THROUGH KASHF</i></b>	<b>1456</b>
<b>Burcu GÜRER GİRAY</b> <b><i>POOLING SAMPLES TO INCREASE SARS-CoV-2 RT-qPCR CAPACITY</i></b>	<b>1458</b>
<b>Şeyda KOÇAK KURT</b> <b><i>WHY AND HOW KENAN AND NALAN CHANGED?: ON THE CINEMA ADAPTATIONS OF KERİME NADİR'S 'HIÇKIRIK'</i></b>	<b>1460</b>
<b>Pavlo LYKHOVYD &amp; Viktor SHARII</b> <b><i>PROGRAMMING WATER USE OF GRAIN CORN IN THE COLD STEPPE ZONE USING INFORMATION TECHNOLOGIES</i></b>	<b>1462</b>
<b>Zehra CERRAHOĞLU</b> <b><i>POETIC REPRESENTATIONS OF THE CITY IN WINGS OF DESIRE (DER HIMMEL ÜBER BERLIN, 1987)</i></b>	<b>1463</b>
<b>Moses Adeolu AGOI, Hojapoji Gabriel SEMAKO &amp; Solomon Abraham UKPANAHA, Oluwanifemi Opeyemi AGOI</b> <b><i>AN EXPLICIT SURVEY ON THE EFFICACY OF DIGITAL SIGNATURE VERIFICATION SYSTEM (DSVS) AND ITS IMPORTANCE TO BANKING INDUSTRY</i></b>	<b>1465</b>
<b>Salih ÖZTÜRK &amp; Muharrem YAŞAR</b> <b><i>ULUSLARARASI ALANDA ARTAN KORUMACILIK</i></b>	<b>1471</b>
<b>Salih ÖZTÜRK &amp; Suna YILDIZ</b> <b><i>ARTVİN YUSUFELİ BARAJININ TÜRKİYE EKONOMİSİNE MUHTEMEL</i></b>	<b>1485</b>
<b>Salih ÖZTÜRK &amp; Muharrem YAŞAR</b> <b><i>TEKNOLOJİK GELİŞMELERİN, KÜRESELLEŞME BOYUTU, SOSYAL VE EKONOMİK ETKİLERİ</i></b>	<b>1494</b>



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## NUMERICAL STUDY USING A DOUBLE GRID TO MODEL THE EFFECT OF THE GROOVES OF A VERTICAL WALL IN A HEATED CAVITY ON THE NATURAL CONVECTION OF A NANOFUID

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### ABSTRACT

In this work we study numerically the natural convection of a carbon-based nanofluid (water + C<sub>60</sub>) in a differentially heated square cavity. One of the vertical walls of the cavity is grooved and maintained at a high temperature. The purpose of this work is to compare the effect of the macrostructural aspect of the grooves and the effect of the addition of fullerene nanoparticles (C<sub>60</sub>) to pure water on the heat exchange by natural convection in this type of geometry. To better quantify the convective heat exchange numerically near the grooves we used a refined grid with two non-conforming blocks at the hot wall level. The governing equations were discretized by the finite volume method using a power law scheme which offers a good stability characteristic in this type of flow. A numerical code was designed and produced in this context to use numerical simulation as an investigative tool.

The results are represented in the form of streamlines and isothermal fields. The variation in the mean Nusselt number of the cold wall to the right of the cavity is calculated as a function of the volume fractions of the nanoparticles ( $0 \leq \Phi \leq 0.06$ ) for different numbers and sizes of the grooves and for different Rayleigh numbers ( $10^3 \leq Ra \leq 10^6$ ).

**Keywords:** Numerical, convection, double refined grid, nanofluid.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## A QUALITATIVE INVESTIGATION OF TIME MANAGEMENT INTERVENTIONS FOR WORKING STUDENTS IN THE PHILIPPINES TO BALANCE ACADEMICS AND WORK

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### ABSTRACT

Time management has been the problem of the students most especially for those who work at the same time, where they are loaded with responsibilities needed to be accomplished both in school and in their workplace. This descriptive-qualitative study aimed to explore the time management interventions of working students in their workplace. Using the inclusion criteria, the researchers have purposely chosen six (6) working students from a public state university. Google form was utilized to gather data, which the researchers sent to the informants through Facebook messenger and email, and researchers also utilized messenger for further clarifications and follow-up from the informants. Thematic analysis was used in analyzing the data gathered. The results revealed two themes such as (1) internal efforts and (2) external environment adaptations. Moreover, the researchers generated four (4) categories from the analyzed data. It implied that working students' time management interventions are (1) development of organized approaches and (2) reduction of potential barriers. In addition, they also adapt from their external environment, wherein they (3) promote workplace flexibility and lastly (4) practice effective designation. Thus, the demand in both school and workplace made way for the working students to have time management interventions in their workplace to successfully accomplish their tasks and to avoid procrastination.

**Keywords:** Time Management, Working Student, Intervention, Public State University

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## MODELING POTENTIAL WAVE ENERGY CONVERTER CASES FOR MOROCCO: EXPLORING ENERGY CONVERSION OPPORTUNITIES

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### ABSTRACT

This research investigates potential wave energy converter models tailored to the distinctive coastal features of Morocco. Understanding and addressing the specific energy conversion requirements and opportunities in Morocco's coastal regions are pivotal for developing effective and sustainable solutions. Our objective is to identify feasible wave energy technologies, evaluate their viability, and propose optimized models aligned with Morocco's energy goals and environmental priorities. By focusing on potential wave energy converter scenarios, our aim is to provide valuable insights to advance the sustainable energy transition in Morocco and effectively utilize the considerable wave energy potential along its coastlines.

The analysis of our results reveals that a combination of  $H_s=1\text{m}$  and  $T_e=6\text{s}$  produces the lowest power output, ranging from 15707.78 W to 5044.367 W for various lengths of air chamber ( $L_w$ ). This suggests that this specific combination of wave heights and periods may not be optimal for efficient energy production.

In contrast, we found that the combination of  $H_s=5\text{m}$  and  $T_e=16\text{s}$  generates the maximum power output, varying between 2.89.1010 W and 7.27.1008 W for different lengths of air chamber. These findings underscore the potential for higher waves and longer periods to significantly enhance energy generation. These insights can guide future endeavors in wave energy conversion and its application in Morocco's coastal energy strategy.

**Keywords:** Oscillating water column device, Wave power Efficiency, Morocco

POLİDİALİLDİMETİLAMONYUM KLORÜR (POLİDADMAC) SENTEZİ VE TEKSTİL  
ATIKSUYU ARITIM PERFORMANSININ ARAŞTIRILMASI

SYNTHESIS OF POLYDIALLYLDIMETHYLAMMONIUM CHLORIDE (POLYDADMAC)  
AND INVESTIGATION OF ITS TEXTILE WASTEWATER TREATMENT  
PERFORMANCE

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**ÖZET**

Endüstriyel süreçlerde suyun kullanımı kaçınılmazdır. Bunun sonucu olarak hem temiz su kaynakları tükenmekte hem de endüstriyel süreçlerde kirlenen su çevresel sorunlara neden olmaktadır. Bu nedenle endüstriyel atık suların temizlenmesi büyük önem arz etmektedir. Suyu en fazla kullanan sanayi kuruluşların başında tekstil endüstrisi gelmektedir. Türüne ve özelliklerine bağlı olarak bir kilogram tekstil üretimi için 95 litre ile 400 litre arasında su tüketilmektedir. Bu çalışmada katyonik bir polimer olan polidialildimetilamonyum klorür (poliDADMAC) serbes radikalik yöntemle sentezlenmiş ve tekstil atık suyunda renk giderim performansı araştırılmıştır. Bunun için başlangıç renk değeri 443 Pt/Co olan tekstil atık suyuna 150 ppm poliDADMAC dozajlanmış, pH değeri 8-10 aralığına ayarlanmış ve 320 saniye karıştırma sonrasında renk değeri UV spektrofotometre ile ölçülmüştür. Sonuçlardan atık su renginin poliDADMAC ile muamelesinden sonra 69 Pt/Co seviyesine düştüğü ve %84,4 oranında renk giderimi elde edildiği görülmüştür. İleri çalışmalarda dozajlama miktarı, pH değeri ve karıştırma süresi optimize edilerek daha yüksek renk giderim oranına ulaşılabileceği öngörülmektedir.

**Anahtar Kelimeler:** PoliDADMAC, atık su arıtımı, renk giderimi, katyonik polimer, flokülasyon

**ABSTRACT**

The use of water is inevitable in industrial processes. As a result, clean water resources are depleted and water polluted in industrial processes causes environmental problems. Therefore, industrial wastewater treatment is of great importance. The textile industry is one of the industrial organizations that use water the most. Depending on its type and properties, between 95 liters and 400 liters of water are consumed to produce one kilogram of textile. In this study, polydiallyldimethylammonium chloride (polyDADMAC), a cationic polymer, was synthesized by the free radical method and its dye removal performance in textile wastewater was investigated. For this, 150 ppm polyDADMAC was dosed into textile wastewater with an initial color value of 443 Pt/Co, the pH value was adjusted to the range of 8-10, and after 320 seconds of mixing, the color value was measured with a UV spectrophotometer. The results showed that the wastewater color decreased to 69 Pt/Co level after treatment with polyDADMAC and 84.4% color removal was achieved. It is predicted that a higher color removal rate can be achieved by optimizing the dosing amount, pH value and mixing time in further studies.

**Keywords:** PolyDADMAC, wastewater treatment, decolorization, cationic polymer, flocculation

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## BISMUTH OXIDE DOPED WITH CHITOSAN/POLYVINYLPIRROLIDONE FOR ANTIBACTERIAL AND CATALYTIC DYE DEGRADATION PURPOSES

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### ABSTRACT

At a nanoscale, the effect of doping can induce physical and chemical changes in the host material that can be revealed in terms of their application. Bismuth oxide ( $\text{Bi}_2\text{O}_3$ ) doped with polyvinylpyrrolidone (PVP) was further processed to incorporate chitosan was synthesized using the co-precipitation method. Standard characterizations confirm the desired materials with certain physical attributes. Chitosan and PVP-doped  $\text{Bi}_2\text{O}_3$  showed catalytic activity of 99%. Also, antibacterial potential of the prepared nanomaterial was checked against *E. coli* and *S. aureus*.

### Article reference:

A. Bari, et al., Evaluation of bactericidal potential and catalytic dye degradation of multiple morphology based chitosan/polyvinylpyrrolidone-doped bismuth oxide nanostructures, **Nanoscale Adv.** **4** (2022) 2713-2728.  
**DOI.** <https://doi.org/10.1039/D2NA00105E>

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## PREDICTION OF OIL PRICE USING MARINE PREDATORS ALGORITHM AND FEED FORWARD NEURAL NETWORK

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### ABSTRACT

One of the important artificial intelligence techniques used for oil price prediction is artificial neural networks (ANNs). When the literature is examined, it is seen that there are many ANN-based studies for oil price prediction. One of the most important processes in ANNs is the training process. Meta-heuristic algorithms are used extensively in the training processes of ANNs. In this study, marine predators algorithm (MPA), one of the important meta-heuristic algorithms and feed forward neural network (FFNN) were used to predict the oil price. The weights of FFNN were adjusted using MPA. Within the scope of the study, daily oil prices belonging to 2022 were used. In order for this data to be applied to FFNN, it was converted into a data set containing two inputs and one output. 80% of the data set was used in the training process. The remaining data is reserved for the testing process. The network structure of FFNN may affect performance. Therefore, results were obtained for different network structures. In applications, both the solution quality and convergence speed of MPA were evaluated. At the same time, mean squared error (MSE) was used as the error metric. The performance of MPA was compared with some meta-heuristic algorithms to solve the relevant problem. The results showed that FFNN training performed with MPA is successful for short-term oil price forecasting.

**Keywords:** Marine Predators Algorithm, Swarm Intelligence, Meta-heuristic Algorithm, Feed Forward Neural Network, Oil Price Prediction.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## CHARACTER STRENGTHS AND THE ADOLESCENT JOURNEY TO WELL-BEING: A THEORETICAL LENS

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### ABSTRACT

The period of adolescence is a profound and transformative stage in human development, marked by significant changes in the body, mind, and emotions. Navigating this crucial phase successfully hinges on understanding how character strength and well-being are intertwined in teenagers. This study delves into this intricate connection through the lens of various psychological theories. We aim to unravel the contributions of character traits to the overall well-being of teenagers, drawing upon the foundational principles of positive psychology.

Positive psychology, pioneered by Martin Seligman, forms the cornerstone of our exploration. It underscores the pivotal role of cultivating character qualities in enhancing well-being. While positive psychology provides a robust framework, its tenets are reinforced by a constellation of complementary psychological theories. Self-determination theory posits that autonomy, competence, and relatedness, which are closely linked to character strengths, are essential for fostering well-being. Well-being theory emphasizes the holistic nature of well-being, encompassing hedonic and eudaimonic aspects, both of which are influenced by character strengths. Resilience theory highlights how character strengths act as protective factors during adversity, Social cognitive theory elucidates how observational learning and role modelling play a vital role in the development and expression of character strengths.

Our study synthesizes these diverse theoretical perspectives to offer a comprehensive understanding of the intricate relationship between character strength and well-being in teenagers. By intertwining these theories, we aim to shed light on how character strengths contribute to positive emotions, a sense of purpose, resilience, and personal growth—all of which are fundamental components of well-being.

Beyond theoretical exploration, our research holds practical implications of great significance. We anticipate that our findings will inform the design of interventions and educational strategies tailored to nurture character strengths in adolescents. In sum, our study advances a holistic perspective on adolescent development, underscoring the pivotal role of character strengths in promoting their well-being.

**Keywords:** adolescence, character strength, well-being, positive psychology

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## LIMITATIONS OF SYNTHETIC POLYMERS IN NOVEL DRUG DELIVERY SYSTEMS

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### ABSTRACT

Synthetic polymers have long been a cornerstone in the development of innovative drug delivery systems, offering a wide range of tunable properties and controlled-release mechanisms. However, this abstract delves into the multifaceted limitations that synthetic polymers present within the context of novel drug delivery systems. These constraints span areas such as biocompatibility, toxicity, degradation, and precision in drug release kinetics. One of the primary limitations of synthetic polymers is their biocompatibility. While some polymers have demonstrated excellent biocompatibility, others can elicit immune responses or cause adverse reactions in the host organism. Addressing these biocompatibility issues is crucial to ensure the safety and effectiveness of drug delivery systems. Toxicity is another critical concern. Some synthetic polymers and their degradation by-products can be toxic to cells and tissues. This raises questions about the long-term safety of polymer-based drug carriers and emphasizes the need for rigorous toxicity testing. Degradation, or lack thereof, is a significant limitation. Many synthetic polymers used in drug delivery systems exhibit limited biodegradability, leading to concerns about their accumulation in the body over time. Biodegradable alternatives are sought after to mitigate this issue. Precision in drug release remains a challenge. Achieving site-specific targeting and controlled release at the desired rate often requires sophisticated engineering and formulation techniques. Ensuring that drugs are delivered precisely where and when they are needed is pivotal for maximizing therapeutic efficacy and minimizing side effects. This abstract underscores the importance of acknowledging these limitations and the necessity of exploring alternative materials and strategies to overcome them. Researchers are increasingly turning to natural polymers, nanoparticles, and innovative delivery techniques to address these challenges and enhance the performance of drug delivery systems.

**Keywords:** synthetic polymers, drug delivery systems, biocompatibility, toxicity, degradation, precision drug release.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## AMPHIBIAN DIVERSITY ON AGROFORESTRY LAND IN ULU BELU TANGGAMUS DISTRICT

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### ABSTRACT

Amphibians are one of the constituent elements of the ecosystem which have an important role as bio-indicators of environmental damage. This research aims to determine the diversity of amphibian species in agroforestry locations in forest areas in Ulubelu, Tanggamus Regency. The research was carried out on agroforestry land, where this location is a habitat for amphibian species. The method used in collecting amphibian data is VES (Visual Encounter Survey) with data collection based on 5 different locations, each using 20 minutes, then doing three repetitions, namely evening-morning and evening (MPM). The time distribution at each habitat location is divided into two data collection times, namely morning time (05.30-07.30) and evening time (19.00-21.00). Identification is carried out using the field disembarkation guide book. Data analysis was carried out descriptively and quantitatively to calculate the species diversity index (Shannon Wiener), species richness index, dominance index (Simpson's Index), species evenness index. During observations carried out in Penantian Village and Sinar Banten Village, a total of 25 individuals consisting of 9 species were found. This species consists of 4 families, with Ranidae being the most numerous family. The species found were the green tree frog (*Rhacoporus reinwardti*), the striped tree frog (*Polypedates leucomystax*), the rice field frog (*Fajervarya cancrivora*), the rock frog (*Limnonectes macrodon*), the dwarf frog (*Limnonectes microdiscus*), the horned frog (*Megophrys montana*), the bullfrog (*Bufo asper*), river bullfrog (*Bufo asper*), and moor frog (*Fajervarya limnocharis*). Diversity on agroforestry land is categorized as moderate, with a diversity value of  $H' = 1.099$ .

**Keywords:** Amphibian, biodiversity, habitat, KPHL Batutegi

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## EXPRESSION OF MENTAL RESILIENCE AMONG WRESTLERS OF YOUTH AND JUNIOR AGE

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### ABSTRACT

Purpose and background: Mental resilience refers to the athlete's capacity to bounce back from setbacks, manage external pressures effectively, and surmount unforeseen challenges. It's worth emphasizing that psychological attributes like mental resilience play a vital role in enabling individuals to attain success within the realm of sports. Sports psychologists support research that empowers martial arts athletes, including wrestlers. Wrestlers ought to exhibit considerable mental resilience, making wrestling an optimal domain for research in the field of sport psychology. The aim of the study was to explore the expression of mental resilience among wrestlers of youth and junior age. Methods and organization of the study: For the evaluation of mental resilience skills, the Psychological Performance Inventory-Alternative was selected. This inventory comprises 14 statements and encompasses four dimensions (factors): the determination factor includes 3 statements, the visualization factor consists of 4 statements, the positive cognition scale also consists of 4 statements, and the self-belief scale includes 3 inventory statements. There were 49 wrestlers tested in the youth group and 48 wrestlers tested in the junior group. Results: When comparing the mental resilience skills of wrestlers assessed in the youth group and those evaluated in the junior group, it is evident that youth athletes demonstrated superior scores in determination ( $p < 0.05$ ) and visualization ( $p < 0.05$ ). It was established that there were no statistically significant differences in positive cognition and self-belief ( $p > 0.05$ ). Conclusions: The focus of enhancement in determination and visualization should be directed toward junior wrestlers, as athletes in this age group exhibit lower levels of these resilience skills.

**Keywords:** Mental resilience, youth and junior age, sport.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## A STUDY ON EFFECT OF NOSTALGIA MARKETING ON CONSUMER'S PERCEPTION

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### ABSTRACT

In today's competitive marketplace, marketers are increasingly turning to nostalgia as a strategic tool to influence consumer perceptions. This study investigates the dynamic relationship between nostalgia marketing and consumer perception, aiming to elucidate the effects of invoking nostalgia in advertising on consumer attitudes, behavior, and brand perception. The research commences by delineating the concept of nostalgia marketing, tracing its historical evolution, and elucidating the psychological foundations that underlie its potency. Emphasizing the capacity of nostalgia to evoke warm, sentimental emotions and create a sense of connection with the past, the study delves into how these emotional triggers can be harnessed to shape consumer perceptions. An intrinsic element of this research is the examination of how different demographic groups respond to nostalgia marketing. By analyzing consumer segments across diverse age groups, the study discerns whether nostalgia holds universal appeal or if its effectiveness varies among generations. These insights are invaluable for marketers seeking to tailor their campaigns to resonate with specific target audiences. Methodologically, the study employs a mixed-methods approach, incorporating qualitative interviews, focus groups, and quantitative surveys. The combination of these methods facilitates a comprehensive understanding of consumer responses to nostalgia marketing. Qualitative insights provide a deeper exploration of the emotional and cognitive processes at play, while quantitative data allow for generalizable findings. Preliminary findings suggest that nostalgia marketing exerts a notable positive influence on consumer perception, fostering brand affection and heightened purchase intent. However, the authenticity and resonance of the nostalgic elements employed in marketing campaigns significantly impact these outcomes. Transparency emerges as a crucial factor, as consumer's value honesty and genuine connections with the past. The study have some potential drawbacks associated with nostalgia marketing, such as the risk of appearing inauthentic or failing to align with a brand's identity. In sum, this study contributes to the burgeoning literature on advertising and consumer behavior by shedding light on the multifaceted interplay between nostalgia marketing and consumer perception. Its insights are indispensable for marketers aiming to harness nostalgia effectively, providing them with a roadmap to forge meaningful connections with consumers while mitigating potential pitfalls. As the consumer landscape continues to evolve, this research offers invaluable guidance to businesses seeking to navigate the power of nostalgia in their marketing endeavors.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## PALLADIUM-CATALYZED C7 ARYLATION OF 4-EWG-1H-INDAZOLES USING OXIDATIVE ARYLATION

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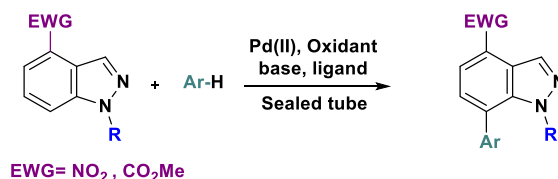
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### ABSTRACT



We present a highly efficient and site-selective palladium-catalyzed oxidative arylation of substituted 1H-indazoles with a diverse array of arenes and heteroarenes as coupling partners. The key to the success of this method lies in the strategic placement of electron-withdrawing groups (EWG) at the C4 position of the 1H-indazole, which enables precise C7 arylation. Our approach delivers the desired products in moderate to good yields, capitalizing on 4-NO<sub>2</sub> or 4-CO<sub>2</sub>Me substituted 1H-indazoles in conjunction with various (hetero)aryls as coupling partners.

The catalytic system comprises Pd(OAc)<sub>2</sub> as the catalyst, phenanthroline as the ligand, Ag<sub>2</sub>CO<sub>3</sub> as the oxidant, and NaOH as the base. Notably, this method exhibits excellent regioselectivity, resulting in the exclusive arylation at the C7 position of 1H-indazole.

To further elucidate the underlying reaction mechanism, we conducted density functional theory calculations, enhancing our comprehension of this transformation. Overall, our methodology offers a highly effective, direct, and atom-economical approach for the construction of C7-(hetero)arylated 1H-indazole compounds. This innovation in selective C7 functionalization of 1H-indazole provides a valuable tool for the synthesis of diverse and biologically relevant molecules, with potential applications in drug discovery and material science.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## TÜRK MUTFAĞININ YEMEK İMAJİ: DENEYSSEL ÇALIŞMALAR ÜZERİNE BİR İNCELEME

### FOOD IMAGE OF TURKISH CUISINE: A REVIEW OF EMPRICAL STUDIES

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#### ABSTRACT

Besides being crucial to attract and retain tourists, a distinctive and consistent image is an ultimate goal for destination marketers. Destination brand image is a perception shaped by the qualities and the attributes of a destination such as accommodation and entertainment facilities, cultural and natural attractions along with the local cuisine. Building and retaining a favorable food and cuisine image is expected to enhance the competitiveness of the destination by distinguishing its genuineness. Korea, Hong Kong, Tunisia, Japan, France, Italy, Mexico, Serbia, Jordan, Ukraine are just a few countries which successfully strive to legitimize their traditional food and cuisine as an intangible cultural heritage under UNESCO. This study addresses the current state of the food image research of Turkish cuisine and attempts to direct the future research by pointing out the gap in food and cuisine image in destination branding literature. Four different electronic databases; Science Direct, Emerald Insight, Taylor & Francis and Google Scholar were used to reach the peer-reviewed researches by using “Turkish food image”, “Turkish food and food image”, “destination image and food image” as keywords both in English and Turkish summed up to sixteen original papers. A systematic review of the articles reveals the scarcity of attention in the Turkish food image literature from destination marketers’, host communities’ and visitors’ perspective despite the fact that there are efforts of drawing few local food images for culinary destinations with an unclear theoretical and conceptual framework.

**Key words:** Destination food image, destination brand image, food destinations

#### ÖZET

Destinasyon pazarlamacıları için turistleri çekmenin ve elde tutabilmenin yanı sıra, farklılaştırılmış ve tutarlı olarak algılanabilen bir imajı yaratabilmek, ulaşılmak istenen nihai bir hedef olarak görülmektedir. Destinasyon marka imajı, bir destinasyonun konaklama ve eğlence olanakları, kültürel ve doğal çekicilikleri ile yerel mutfağı gibi özellikleri ve nitelikleriyle şekillenen bir algıdır. Olumlu bir yemek ve mutfak imajının oluşturulması ve sürdürülmesinin, destinasyonun özgünlüğünü öne çıkararak rekabet gücünü artırması beklenmektedir. Kore, Hong Kong, Tunus, Japonya, Fransa, İtalya, Meksika, Sırbistan, Ürdün, Ukrayna, geleneksel yemeklerini ve mutfaklarını UNESCO kapsamında somut olmayan kültürel miras olarak tanıtımına katkı yapmaya çalışan ülkelerden sadece birkaçıdır. Bu çalışma, Türk mutfağının yemek imajı araştırmalarının mevcut durumunu ele almakta ve destinasyonların markalaşması ile ilgili literatürde yemek ve mutfak imajı konusundaki boşluğa dikkat çekerek gelecekteki araştırmalara yön vermeye çalışmaktadır. Dört farklı elektronik veri tabanı; Science Direct, Emerald Insight, Taylor & Francis ve Google Akademik, hakemli dergilerde yayınlanmış araştırmalara ulaşmak için hem İngilizce hem de Türkçe olarak “Türk yemeği imajı”, “Türk yemeği ve yemek imajı”, “destinasyon imajı ve yemek imajı” anahtar kelimeler kullanılarak taranmıştır. On altı orijinal makalenin sistematik incelemesi, yemek destinasyonlarına ait imaj çalışmalarının teorik ve kavramsal çerçevelerinin yetersizliğinin yanısıra destinasyon pazarlamacılarının, yerel halkın ve ziyaretçilerin bakış açılarından inlenmesi gerekliliğini ortaya koymaktadır.

**Anahtar Kelimeler:** Destinasyon yemek imajı, destinasyon marka imajı, yemek destinasyonları.

**INTERNATIONAL ANKARA CONGRESS ON  
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**AN IMPLEMENTATION OF PYTHON FOR DATA SCIENCE AND MACHINE LEARNING**

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**ABSTRACT**

Python is a scriptable and interpreted language for both learning and real-world programming. Python is a powerful, high-level language developed by Guido van Rossum. In this paper, we will provide an introduction to the main Python programming software tools used for data science and machine learning techniques. Briefly, this paper will first introduce Python as a language, give an introduction to data science and machine learning, and then describe packages that are popular in the data science and machine learning sectors, such as NumPy, SciPy, TensorFlow, Keras, Matplotlib,Matplotlib etc. From there, we will move on to show the importance of Python for building data science applications. We will use different code examples throughout. To aid the learning experience, execute the following examples contained in this paper interactively using Jupiter notebooks.

**Keywords:** Machine learning · Data Science · Tools · Languages · Python

**INTERNATIONAL ANKARA CONGRESS ON  
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**HOW COVID-19 IS CHANGING CONSUMER BEHAVIOR? FROM THE PERSPECTIVES  
OF ENVIRONMENTAL AWARENESS, SUSTAINABLE CONSUMPTION, SOCIAL  
RESPONSIBILITY, AND CORPORATE PHILANTHROPY**

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**ABSTRACT**

**Purpose** – This study aims to understand the various changes in consumer behaviors from the perspective of environmental awareness, sustainable consumption, social responsibility, and corporate philanthropy during the COVID-19 pandemic. Furthermore, the research attempts to investigate the moderating effect of genders and generations.

**Design/methodology/approach** – This research has used quantitative research techniques. Data was collected from 531 participants in Turkey and structural equation modelling was employed to test the hypothesis.

**Findings** – Findings revealed that COVID-19 has changed consumer perspectives on environmental issues such as air pollution, natural resources, sustainable consumption, and social responsibility. Pandemic restrictions helped people to witness the environmental recovery. The current study proved that consumers are highly aware of this recovery and changing their behaviors as well as their social responsibilities. Furthermore, genders and generations have not moderated the relationship between COVID-19 and the constructs of the study.

**Research limitations/implications** – Our study has some limitations. Primarily, the survey research was carried out online on social media platforms via a questionnaire link. Then, the findings' generalizability to other consumer intentions could be hampered by external validity.

**Keywords:** Covid-19, consumer behavior, environmental awareness, sustainable consumption, social responsibility, corporate philanthropy.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ASSESSING THE EFFECTIVENESS OF ORGANIC INHIBITORS IN PREVENTING IRON CORROSION IN HYDROCHLORIC ACID ENVIRONMENT: A DFT INVESTIGATION

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### ABSTRACT

This study focuses on inhibiting iron corrosion in a 1M hydrochloric acid solution using two organic inhibitors: 2,5-bis(2-thienyl)-1,3,4-thiadiazole (2-TTH) and 2,5-bis(3-thienyl)-1,3,4-thiadiazole (3-TTH). Utilizing DFT/B3LYP/6-311(d,p) calculations, we assessed the corrosion inhibiting properties of these organic inhibitors. The results reveal a strong correlation between inhibitory efficiency (IE%) and quantum chemical parameters, as well as reactivity descriptors derived from DFT. Furthermore, we investigated the interactions between these inhibitory molecules and the metal surface through molecular dynamics simulations and Monte Carlo (MC) simulations. Our findings indicate that these organic compounds form robust interactions with the metal surface, making them highly effective in predicting inhibition against metal corrosion. In conclusion, both corrosion inhibitors exhibit superior inhibitory efficiency and can be employed to reduce the rate of metal corrosion.

**Keywords:** Corrosion inhibitor; DFT, Monte Carlo Simulation, Molecular dynamics.

SYNTHESIS OF PURE GISMONDINE-NAP ZEOLITE FROM BENTONITE FRACTION  $>2$   
 $\mu\text{M}$

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**ABSTRACT**

In this study, Si et al. investigated the production of monophasic gismondine-Na zeolite (GIS-NaP) of type P from a natural bentonite fraction  $>2$   $\mu\text{m}$  ( $\text{Cf} > 2$   $\mu\text{m}$ ). The goal was to develop a cost-effective method for large-scale production of zeolites in the industry. The raw  $\text{Cf} > 2$   $\mu\text{m}$  was initially activated through alkaline fusion at 750 °C in a 1:1.2 ratio of  $\text{Cf} > 2$   $\mu\text{m}$ : NaOH. Subsequently, the crystalline pure GIS-NaP zeolite was successfully synthesized in a one-step hydrothermal activation process using the supernatant obtained from the Na-Cf fusion-water treatment at a 1:4 ratio of Na-Cf  $> 2$   $\mu\text{m}$ :H<sub>2</sub>O. The presence of  $\text{Cf} > 2$   $\mu\text{m}$  was confirmed using X-ray diffraction (XRD), while the supernatant was analyzed using inductively coupled plasma optical emission spectrometry (ICP-OES). The synthetic products were characterized through XRD, scanning electron microscopy (SEM), energy-dispersive spectroscopy (EDS), and Fourier-transform infrared spectroscopy (FT-IR). The study found that a high-order crystallinity polymorph P1 was formed under Si/Al ratio of 1.47 within 18 hours of hydrothermal treatment. The content of Na-P1 zeolite significantly increased with the extension of the hydrothermal time from 18 to 36 hours, reaching its peak crystallization at 36 hours with a Si/Al ratio of 1.34. The N<sub>2</sub> adsorption data indicated a mesoporous nature of Na-P1 at its climax, exhibiting a BET surface area and pore size of 41.76 m<sup>2</sup>.g<sup>-1</sup> and 8.2 nm, respectively. Additionally, a polymorph P2 with a Si/Al ratio of approximately 1.81 was spontaneously formed after 6 days of crystallization (interzeolite transformation) from the same supernatant. These findings provide an experimental basis for utilizing the clay fraction  $>2$   $\mu\text{m}$  in the synthesis of P-type zeolites, which could prove valuable for future applications.

**Keywords:** Bentonite fraction  $> 2$   $\mu\text{m}$ ; Hydrothermal; Gismondine; Zeolite Na-P1; Polymorph P2; Interzeolite transformation

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DIGITAL MARKETING STRATEGY IN PROMOTING PRODUCT MS GLOW

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### ABSTRACT

This research aims to examine MS Glow's digital marketing in entering global marketing. This research is library research with a qualitative approach. The data sources used in this research come from various literature journal articles that are relevant to the research topic. The data analysis method used is content analysis of the literature sources used in the research. As the MS Glow business does, they don't just market their products online. However, combine it with other marketing techniques offline through a network of resellers spread across various regions. An omnichannel marketing strategy like this makes it possible to reach more customers. Customers can also feel more satisfied with the services provided, and can achieve maximum profits. In this case, MS Glow utilizes various social media for promotional platforms. Starting from Instagram, Twitter, TikTok, and YouTube. This way of promoting business is very effective attract customers. Because, the digital era allows every community to have access to online platforms. In entering the global market, MS GLOW implements very good and structured strategies, so that the products they sell sell well and can be known throughout the world. And also MS GLOW provides facial care for all ages so it is in great demand and its purchasing power has also increased in the market because it can be used by various ages.

**Keywords:** Digital marketing, MS Glow, and literature review.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ISLAMIC SCIENTIFIC PARADIGM

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### ABSTRACT

This research intends to explain about Islamic scientific paradigm. The Islamic perspective on science based on the source of the Qur'an which is believed to be true. Recently there has been a dichotomy between religious science and general science. Religious science talks about the relationship between humans and God and the relationship between humans and humans, while general science talks a lot about the universe. The relationship between religious knowledge and general science is a topic that is still relevant to study. Because there are still many people who think that religious knowledge and general knowledge conflict with each other. In fact, this relationship can be harmonized by changing the paradigm that religious knowledge is not only a matter of humans and their God or humans and each other but for all aspects of human life. The research method uses a type of qualitative research with a library research approach. This study concludes that the Islamic scientific paradigm is a study that is closely related to the point of view in understanding the problems that occur. The emergence of a paradigm is the result of scientific research carried out in depth until finally something new is discovered and a new paradigm emerges regarding that matter.

**Keywords:** paradigm, science, and knowledge.

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October 13-14, 2023

## THE RELEVANCE OF THE DEVELOPMENT OF THE APPLICATION FORM OF PROTEOLYTIC AND ANTIBACTERIAL ACTION WITH CHITOZAN-CONTAINING COMPONENTS

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### ABSTRACT

One of the directions in the search for an effective method of treating such wounds is the development of combined drugs of multifunctional action for external use, containing several active substances in their composition, which have complex therapeutic activity against the main substrates of complex, long-lasting wounds.

The purpose of the research is to develop the composition of a gel with a pharmaceutical composition based on innovative substances - the chitosan complex, which exhibits proteolytic, osmotic, antibacterial and wound-healing effects, to study the relevance and prospects of creating a new drug.

The development of an innovative multi-functional medicinal preparation for external use in the form of a gel containing active substances with complex therapeutic activity in relation to the main pathophysiological processes of a complex long-term unhealed wound, in particular, capable of cleaning the wound surface from purulent-necrotic masses, providing antimicrobial action, to reduce the pain syndrome and, ultimately, to heal the wound in a short time, is an urgent task of modern pharmacy, determined by the needs of practical health care.

Pharmaceutical substances based on chitosan, included in the medicinal product as an active substance, are original in composition. In the available patent and literature sources, no data were found on the preparation.

Thus, it can be concluded that the search and study of application drugs with proteolytic, antibacterial and reparative activity in the modern pharmaceutical science of Ukraine, and taking into account the relevance of the current realities of military operations, is a promising direction of development among scientists and doctors.

**Keywords:** gel base, carbopol, acrilates, chitosan.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## MUSLIM MATHEMATICIAN

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### ABSTRACT

Sayyidina Ali : I am the city of knowledge and Ali is the door). Ali bin Abi Talib ra was a friend of Rasulullah SAW who was known to be intelligent, honest and broad-minded. Many histories tell of his skills in mathematics. The findings of Ali bin Abi Talib r.a which have been explained above regarding the prevalence of multiples which are now known as KPK (Least Common Multiples), are useful in the operations of adding and subtracting fractions, by equating the denominators. This inheritance law (faraidh) is also used. Al-Khwarizmi was a Muslim scientist who was very concerned with the development of mathematics. He contributed many ideas in the field of algebra. The full name of this Muslim scientist is Abu Jafar Muhammad bin Musa alKhwarizmi. The writing method uses library research or literature reviews soSSurced from journals and e-books regarding the harmony of science and religion. The results of this study conclude that the persistence and intelligence of this Muslim scientist also This has directly provided motivation for the West to develop their culture or ancient Roman culture which was later called the Renaissance. So throughout the 12th century and part of the 13th century, Muslim works in various fields were successfully translated into Latin, especially into Spanish.

**Keywords:** Mathematicians, Muslim scientists, culture

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## THE CONTRIBUTION OF ISLAM IN DEVELOPMENT OF SCIENCE

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### ABSTRACT

This research aims to determine the contribution of Islam in the development of science and the growth of science in the past. The writing method uses library research or literature reviews sourced from journals and e-books regarding the harmonization of science and religion. The results of this research state that history has proven that the progress of science in the modern world is an indisputable historical fact, many even argue that science began in the Islamic world which then experienced transmission (spread) and proliferation (development) to the previously Western world. The Western world was hit by the dark ages so that an era of enlightenment emerged in Europe. In the 12th century, Islamic civilization was the highest of all previous years so that many books on science and philosophy written by Muslim experts and philosophers were translated into European languages. At this time, apart from being recorded as the highest achievement ever achieved by Muslims, it was also recorded as The early period of the decline of Muslims, while in the West began to resound with awareness and attention of Western people towards science by translating books by Muslim scholars until finally creating a pattern of changing the direction of knowledge from previously oriented towards Islamic civilization to oriented towards Western civilization which until now now it feels good enough. Islam was also present in the midst of the harsh Jahiliyah civilization in the Arabian Peninsula so that it was able to change the Jahiliyah civilization that existed in the Arabian Peninsula at that time, so from a historical perspective Islam has played a significant role in the development of several aspects of world civilization.

**Keywords:** History, Science, Islamic , progress of sciences

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## THE FUTURE OF ISLAMIC SCIENCE: A LITERATUR REVIEW

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### ABSTRACT

The purpose of writing this article is to describe the Future of Islamic Science. This research is library research with a qualitative approach. The data sources used in this research come from various literature journal articles that are relevant to the research topic. The data analysis method used is content analysis of the literature sources used in the research. Science or knowledge has a very broad meaning in the Islamic tradition. Science includes ratios and also metaphysical dimensions contained in the Koran and Sunnah. To see the future of Islamic science we have to look at the activities of Islamic science in the Muslim world, what Muslims are doing in relation to science. The relationship between Islam and science can be understood from many points of view. Both of these have an influence on humans, including: Islam and Science both provide strength, science gives humans tools and accelerates the rate of progress, Islam sets the goals of human efforts and at the same time directs these efforts. Science brings an outer (material) revolution, Islam brings an inner (spiritual) revolution. Science beautifies the mind and mind, Islam beautifies the soul and feelings. Science protects humans from disease, floods, storms and other natural disasters. Islam protects humans from worry, anxiety and discomfort. Science harmonizes the world with humans and Islam harmonizes with itself. The result of separating the two has brought irreparable losses. Religion must be understood with the development of science, so that religious renewal can occur from the grip of myths. Religion without science ends in stagnation. So if religion without science will only be used as a tool for hypocrites to achieve their goals

**Keywords:** Future, Science, and Islam



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## THE RELATIONSHIP OF SCIENCE AND RELIGION: TYPOLOGY OF CONFLICT

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### ABSTRACT

The relationship between science and religion which are often considered to be opposites in looking at a problem. The conflict between science and religion began to emerge in the Middle Ages, when church authorities condemned Galileo Galilei in 1633. However, several historical changes show that this was highly optical and alternative views about the relationship between science and religion were widely held throughout the period. centuries. The war of popular science against religion was sharpened by the media because the controversy between scientific materialism and biblical literalism was much more popular with audiences from moderate positions. The theological spectrum can be mapped as follows: naturalism (including materialism), pantheism, liberalism, neoorthodoxy, traditionalism, conservatism, and biblical literalism (or fundamentalism). Barbour places these two extremes in conflict—two views that seem mutually exclusive. However, several studies show that science and religion can complement each other and contribute to each other in understanding the world and life.

**Key words:** science, religion, relationships, conflict, science, philosophy, relationships, methodology.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ROLE OF BACTERIA-PRODUCED SHORT-CHAIN FATTY ACIDS ON HUMAN HOMEOSTASIS

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### ABSTRACT

The complex functions of the intestinal microbiota must be coordinated between different bacterial organisms and the host. By producing a large number of metabolites, the intestinal bacteria contribute to host physiology and homeostasis. This organization is achieved by various chemicals such as signaling molecules or metabolites required for metabolic reactions. Metabolites produced by bacteria are available to host cells and thus affect physiological processes both locally and systemically. They contribute to the metabolic phenotype of the host and thus may influence disease risk. Nutrients of the human organism are essential for bacteria. In turn, bacteria participate in the catabolizing of non-digestible carbohydrates and form short-chain fatty acids, which are essential for a number of physiological processes and also regulate immune responses. Among many microbial metabolites, short-chain fatty acids (butyric, acetic, and propionic acids) are the main metabolites of intestinal bacteria. Their direct function is to lower intestinal pH and increase mucin production, which reduces the growth and adhesion of pathogens, improves epithelial integrity, and enhances host systemic immunity.

**Key words:** short-chain fatty acids, bacteria, metabolites, homeostasis.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ENHANCING BREAST CANCER IMAGE QUALITY: NOISE DETECTION USING DEEP AUTOENCODERS

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### ABSTRACT

Breast cancer remains a significant global health challenge, with early and accurate diagnosis being of paramount importance. This research presents an innovative approach to enhance the quality of breast cancer images through noise detection using deep auto encoders.

Our proposed deep auto encoder model is designed to address the pervasive issue of noise in breast cancer images acquired through various medical imaging modalities. By employing a diverse dataset of breast cancer images, both noisy and clean, we have trained our model to identify and reduce noise while preserving diagnostically relevant information.

The deep auto encoder architecture leverages an encoder-decoder framework, where the encoder learns to extract essential features from noisy breast cancer images, and the decoder reconstructs high-quality, denoised images. A critical aspect of our model is its ability to distinguish between clinically significant structures and image artifacts caused by noise.

Preliminary results demonstrate the effectiveness of our deep auto encoder in noise detection and image enhancement for breast cancer images. The model's capacity to improve image quality while retaining diagnostically relevant features holds great promise for radiologists and healthcare professionals.

By enhancing the interpretability of breast cancer images and reducing the impact of noise, our approach contributes to more accurate diagnoses and, consequently, better patient outcomes. This research underscores the potential of deep auto encoders in revolutionizing breast cancer imaging and diagnosis.

**Keywords:** Breast cancer, image quality enhancement, noise detection, deep auto encoders, medical imaging, diagnostic accuracy.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## MSME BUSINESS DEVELOPMENT IN MULYOREJO VILLAGE

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### ABSTRACT

Micro business development in Mulyorejo village can be done in several ways, such as conducting surveys and observing potential places, improving relationships with other people, using technology, marketing products via social media, and building structured management. However, micro businesses in Mulyorejo village also face several challenges, such as limited access to capital, intense competition, limited sales systems, lack of innovation/motivation, limited digital readiness, and poor administrative and organizational management, such as budget costs in tourism. Mulyorejo mangroves receive little attention and traders who experience losses will lose enthusiasm due to reduced capital and motivation. To overcome this challenge, Mulyorejo village has implemented various programs to support micro, small and medium enterprises (MSMEs). By holding outreach to the community in Mulyorejo village about MSME businesses and providing direction, motivation and tricks on how to trade well and correctly. With adequate support and resources, micro businesses in Mulyorejo village can develop and contribute to the national economy. Micro businesses are productive businesses owned by individuals or individual business entities that meet the criteria for micro, small and medium enterprises (MSMEs). The development of micro businesses among the community is important because it can help improve the economy and empower the community. Micro, small and medium enterprises (MSMEs) are a good forum for job creation which is planned by the government, private sector and individual entrepreneurs. The aim of this research is to determine the growth and correlation of micro, small and medium enterprises which influence economic growth.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ANALYSIS OF THE IMPACT OF GADGET USE ON CHILDRENS COGNITIVE DEVELOPMENT

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### ABSTRACT

The use of gadgets, including smartphones and tablets, has become an integral part of everyday life, including among children. A gadget is a small electronic device that has a variety of special functions. The presence of radiation waves on gadgets emits various impacts that can be harmful to the human organ system. The research method used in this research is literature study. Data collection is obtained from journals, scientific articles that are directly related to the research object. The results of this research show that excessive use of gadgets will result in the emission of blue light affecting brain development. Where this can greatly influence the child's motoric development and brain or cognitive development. Using gadgets too often and excessively can have a negative impact on children's motor and cognitive development. And the positive impact is that it is easier for children to gain new knowledge, such as acquiring new vocabulary and imitating movements and songs. The conclusions of this research are important for parents, educators and society to understand the negative impacts that may arise due to excessive use of gadgets on children. Awareness and appropriate actions are required, such as managing the time of gadget use.

**Key words:** Gadget Use, Cognitive Development, Children, Digital Technology.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## HAZARD ANALYSIS AND CRITICAL CONTROL POINT ANALYSIS: A CASE OF GARI PRODUCTION IN OSARA GARI FACTORY

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### ABSTRACT

This article is an analysis of the gari production in Osara production factory with little interview in the production process in line with the HACCP guideline. Cassava (*Manihot esculenta*) is a known tuber crop converted to varieties of food in different forms consumed by both poor and rich. Microbial contamination such as high bacteria load and fungi presence especially the threat consequences of mycotoxin from fungal has been known worldwide to be of great health challenge once the mycotoxin exceed the permissible limit in food. The gari process began with peeling, washing, grinding, pressing and fermenting, frying, packaging and storage. Microbial contamination of susceptible commodities does happen due to factor like environmental conditions in the pre-harvest field and improper harvesting, transportation, storage and processing operations. Hazard Analysis Critical Control Point (HACCP) programmes is advocated in managing the risks associated with potential contamination of food products with pathogenic micro-organisms. Specific processing and physical method of eliminating damaged, microbial infected cassava play a role in getting rid of microbes in the final product as Gari. Conclusively, there is need to implement and maintain the HACCP principle for safe food consumption as it surround the three quadrant of manufacturing practices, good quality and food safety..

**Keywords:** *Manihot esculanta*, Gari, HACCP, Bacteria, and Fungal Mycotoxin



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## AN ESTIMATED DROOP CONTROLLER FOR AN EFFECTIVE TRANSFER IN MICROGRID OPERATION

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### ABSTRACT

In the realm of microgrid (MG) inverters, the intricate challenge lies in orchestrating a seamless transition from the conventional grid-connected (GC) mode to the autonomous stand-alone (SA) operation mode. This transition requires a delicate balance to maintain the inverter's frequency and voltage parameters within specified tolerances, especially in islanded grid configurations. A precise and adaptive frequency and voltage droop control mechanism are crucial to address this challenge. The proposed control methodology consists of two essential components, finely tuned for a smooth GC to SA transition. First, a fixed voltage reference generation algorithm, inspired by the well-established droop technique, ensures compatibility with all operational modes, enabling seamless shifts between grid-connected and stand-alone operation. Second, an innovative modified voltage-current controller incorporates a Luenberger observer for real-time voltage reference estimations during SA mode, crucial for maintaining stability. A comprehensive evaluation, focusing on current measurement at the point of common coupling (PCC), assesses system feasibility and effectiveness across various scenarios. The study unequivocally validates the efficiency and robustness of the proposed control strategy across microgrid inverter operations, bolstering the reliability and resilience of microgrid systems.

**Key words:** Microgrid; Droop controller; Grid-connected; Stand-alone; Observer.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## A COMPARATIVE STUDY BETWEEN PID AND SMC CONTROLLER IN SENSORLESS DTC CONTROL FOR BLDC MOTOR

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### ABSTRACT

This brief paper provides a comprehensive summary of the application of direct torque control (DTC) in the context of a brushless DC (BLDC) three-phase motor. The Direct Torque Control (DTC) technique is a sophisticated control approach that facilitates accurate regulation of torque and flux in brushless direct current (BLDC) motors, eliminating the necessity for a rotor position sensor. This study examines the fundamentals of direct torque control (DTC) and emphasises its benefits in relation to rapid dynamic response, little torque ripple, and effective operational performance. The primary objective is to examine the utilisation of direct torque control (DTC) as a means to enhance motor performance and energy economy, rendering it a viable option for a wide range of industrial and automotive uses.

The observer method was employed initially to determine the buck-EMF value, which subsequently allowed for the calculation of torque. Additionally, the flux value was determined by considering the current and tension values. Subsequently, the effectiveness of direct torque control (DTC) was demonstrated across a range of speeds, including both high and low speeds. The system is simulated using Simulink in MATLAB.

In order to assess potential disparities in performance, we conducted tests employing both a proportional-integral-Derivative (PID) controller and a sliding mode control (SMC) controller. The SMC controller has demonstrated its efficacy and superiority in terms of stability, particularly in response to variations in the reference speed. This is evident from the simulation results obtained.

**Keywords:** Sensorless, BLDC motor, buck-EMF , SMC , PID .

**INTERNATIONAL ANKARA CONGRESS ON  
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**MEASURING CONSUMERS' RESPONSES TO PRODUCT DESIGN: A COMPARISON,  
PURIFICATION AND ADAPTATION OF PRODUCT DESIGN SCALES**

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**ABSTRACT**

Product design provides a critical competitive advantage to companies by differentiating their products in the marketplace, communicating their value, and increasing their functionality (Bloch, 1995). Therefore, studies that measure consumers' responses to product design have increased in the design, marketing, and ergonomics fields. Accordingly, measuring design has come into prominence in recent years. Several product design scales were introduced to the literature (e.g., Homburg et al., 2015; Moon et al., 2015; Gilal et al., 2018; El Amri and Akrouf; 2020; Sample et al., 2023). However, although these scales are intended to measure different characteristics of product design (e.g., newness, innovativeness, communication), the content of these scales have some similarities and overlaps (Sample et al., 2023). In this study, we aim (1) to compare the dimensions and items of each scale (2) to purify the scales based on item-level comparisons and expert opinions, and (3) to develop a Turkish version of the product design scale. We followed the procedures and standards suggested by Hinken (1995; 1998), and Nunnally and Bernstein (1994) to develop and adapt a purified version of the product design scale. First, we pooled all the items used in previous scales. Then, a team that consisted of three marketing experts and an industrial design expert evaluated the overlaps between items and dimensions. The same experts also assessed the adaptability of the items to the Turkish context. Finally, iterative translation (Douglas and Craig, 2007) and back-translation approaches were applied to translate all the items in the pool. A professional translator helped with the back-translation process and independently evaluated the accuracy of translated items. According to our comparison, the new product design scale of Homburg et al. (2015); the innovative product design scale of Moon et al. (2015), and the four-factor scale of Gilal et al., (2018) had quite similarities in terms of dimensionality and expressions. On the other hand, After the elimination of overlapping items, the final item pool consists of 32 items that manifest 4 product design dimensions, which are functionality, aesthetics, ergonomomy, and symbolism.

**Keywords:** product design, scale development, functionality, aesthetics

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## A REVIEW OF THE PROTECTIVE PROPERTIES OF MEDICINAL PLANTS AGAINST DIABETES-RELATED HEART DISEASE

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### ABSTRACT

Since the beginning of time, humans have used many medicinal plants as a popular medicine to cure many human and livestock health problems, such as diabetes and cardiovascular disorders. In the Rif region of northern Morocco, as in all rural areas of the world, these plants have always held an important place in traditional medicine due to the low socio-economic situation in these areas, where people prefer to rely on traditional medicine rather than modern medicine.

Diabetes-related heart disease is a significant health burden with increasing prevalence. It remains the most common cause of morbidity and mortality worldwide.

This work aims to describe the mechanisms of action of some medicinal herbs that have been shown to have cardioprotective effects in diabetes.

Literature searching was performed using Google Scholar, PubMed, ScienceDirect, and Scopus. The keywords used for the search include: folk medicine, herbal medicine, diabetic problems, heart disorders, and cardiovascular diseases. After screening through the 14 English articles from 2010 to date, a total of seven medicinal plants have been reported to be used as traditional herbal medicines that would reduce risk factors associated with diabetes and cardiovascular diseases.

**Keywords:** Medicinal plants, Traditional medicine, Diabetes, Cardioprotective, Cardiovascular.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## IMPROVING THE EFFICIENCY OF PHOTOVOLTAIC PANEL-BASED ENERGY PRODUCTION SYSTEMS

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### ABSTRACT

Improving the efficiency of photovoltaic (PV) panel-based energy production systems is crucial for advancing renewable energy adoption and reducing our reliance on fossil fuels. Higher efficiency means that PV systems can convert more sunlight into electricity, resulting in greater energy output for the same amount of sunlight. In present research several strategies and technologies to enhance the efficiency of PV systems. High-efficiency solar panels, tracking systems, optimal panel orientation and Tilt, cleanliness and maintenance, improved materials and coatings, inverter efficiency, MPPT (Maximum Power Point Tracking), energy storage, smart Grid Integration and cooling Systems, advanced tracking algorithms, hybrid systems, local conditions monitoring, energy-efficient appliances and government incentives. the choice of efficiency-enhancing measures will depend on factors like budget, location, and specific energy needs. A combination of these strategies can help maximize the efficiency of photovoltaic panel-based energy production systems and make them more competitive with conventional energy sources. Simulations play a crucial role in optimizing the efficiency of photovoltaic (PV) systems, there are a most simulation methods and tools to enhance the efficiency of PV system, system modeling software: Utilize specialized PV system modeling software like PVsyst, SAM (System Advisor Model), or HOMER to simulate and optimize the performance of your PV system. These tools consider various factors such as panel specifications, weather data, shading, and electrical components to provide accurate predictions, weather data sources: Use high-quality local weather data or historical weather databases to input realistic meteorological conditions into your simulations. Accurate weather data ensures more precise results and shading analysis: Incorporate shading analysis tools like Solmetric SunEye or PVSyst's shading calculator to identify and mitigate shading issues that can impact PV panel efficiency. In present paper, a simulation of micro grid based on photovoltaic panel ys presented, and the results are discuted.

**Key words:** Efficiency, photovoltaic panel, energy, simulation.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## BRAZILIAN WORKFORCE: BLACK WOMEN CHALLENGES

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### ABSTRACT

This paper aims to investigate the causes and economical impacts of non-completion of English Language courses by Brazilian black women. The relation between structural racism and inequality (Gonçalves, 2018) in the country, as well as the studies on social mobility through education (IBGE, 2013) are concerns of recent academic debate that this paper tries to resume. Based on studies in inequalities (Almeida, 2019) and the social question discussion in Brazil (Moura, 1988), considering that the formation of the Brazilian society took place on the basis of a slavery system, where policies to deny black citizens access to the Welfare State, we argue that white and black women have different opportunities to participate in the wealth distribution. In order to develop our ideas, we will analyse the employment vacancies published by companies that have the proficiency in English as a requirement. Also, based on the intersectionality of the analyses where women of colour stand, we shall analyse narratives to acquire the factors which cause black women to dropout the English courses, and study what could be done in order to stimulate their course completion. By these means, it is expected to conclude that among black women, when compared to other sectors of society, we find lower income and underemployment placement due to the lack of access to education, specially the non-completion in the English language courses, making them lower in the competitive labour market and, therefore, maintaining their position of reserve of the reserve army.

**Key words:** workforce, social issue, black women



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SYNTHETIC STRATEGIES TO DEVELOP PIPERAZINE-BASED ACETANILIDE DERIVATIVES & THEIR MEDICINAL IMPORTANCE

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### ABSTRACT

Piperazine and acetanilide moieties are emerging as primary scaffolds to enhance the drug-like properties of the molecules in the rational drug design process. Due to this innate quality, since long they have been used in the development of various classes of pharmacologically active compounds. Piperazine is a dinitrogen-containing heterocycle that spans many applications, including anticancer, anticonvulsant, antidepressant, antimicrobial, antimalarial, antiviral, antitubercular, anti-inflammatory, activities. In a similar fashion, the second moiety, i.e., acetanilide, an N-phenylacetamide, also executed a large number of bioactivities, which included anticancer, antileishmanial, antipyretic, analgesic, antidiabetic, antiviral potential, etc. These moieties show a plethora of biological applications, e.g., anti-COVID, anticancer, antidiabetic, antibacterial, antifungal, antipsychotic, antidepressant, analgesics, anti-inflammatory, antitubercular, antiarrhythmic, etc. Various synthetic methods have been developed for the synthesis of piperazine-based acetanilide and its derivatives. In this review, we have addressed different synthetic strategies that have been reported in the past.

**Keyword:** Piperazine, N-phenyl acetamide, synthesis, anticancer, antibacterial, antidepressant

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
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**MONETARY AND FISCAL POLICIES' EFFECTS ON AGGREGATE DEMAND IN  
NIGERIA: A SIMULATION APPROACH**

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**ABSTRACT**

The study examined monetary and fiscal policies' effects on aggregate demand in Nigeria using time series annual data from 1986-2017. The study used secondary data obtained from the Central Bank of Nigerian (CBN) Annual Statistical Bulletin, National Bureau of Statistics (NBS), and World Bank Financial Report. The study constructs simple structural macroeconomic models made up of three blocks: consumption, investment, and export-import sector that contain 21 variables. The variables are linked to one another through 8 behavioural equations and 4 identities. The models were estimated and analyzed using Two Stage Least Square methods and a simulation experiment was also conducted on the simple structural macroeconomics models. The study finds that broad money supply, interest rate, government expenditure, taxation and public debt have significant influence on aggregated demand in Nigeria during the period under investigation. The baseline simulation demonstrates good tracking power of the actual from the baseline simulation as the nature of the oscillation suggested. The study, therefore, recommends that the government should encourage expansionary monetary and fiscal policies by lowering interest rate in order to encourage investors to borrow for investment, increase money supply in the economy, increase government expenditure channeled to infrastructure and other productive sectors of the economy such as agriculture and manufacturing; reduction in both direct and indirect taxes as it improve the purchasing power of the people which stimulate aggregate demand and growth. The government should encourage proper interaction between monetary and fiscal authorities for effective implementation through committee that will comprise of both members.

**Keywords:** Monetary Policy, Fiscal Policy, Aggregate Demand, Simulation

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## THE EFFECTS OF AQUEOUS SHOOT EXTRACT OF *Chromolaena odorata* ON THE GROWTH PARAMETERS AND YIELD OF *Abelmoschus esculentus* (OKRO) SEEDLINGS

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### ABSTRACT

*Chromolaena odorata* King and Rob (Syn. *Eupatorium odoratum* Linn.) is a known toxic weed that is widespread over many parts of the world including Nigeria. *Chromolaena odorata* is considered an invasive weed of field crops in its introduced range. The invasive nature had been attributed to the presence of various allelochemicals in the plant, in various proportions. In this study, the effect of aqueous extract from shoot of *Chromolaena odorata* was investigated on the germination, growth and yield of Okro (*Abelmoschus esculentus*) — the only vegetable crop of significance in the Malvaceae family. Seeds of *A. esculentus* were planted in buckets and the effect of the application of aqueous shoot extract of *C. odorata* was observed over various densities of *A. esculentus*. Growth and yield parameters of the *A. esculentus* seedlings were observed and recorded over the two months. Results indicated that the aqueous shoot extract of *C. odorata* had a significant reduction ( $P < 0.05$ ) on the growth parameters like leaf areas, leaf numbers and shoot heights. Significant reduction ( $P < 0.05$ ) was observed in yield parameters like dry shoots weight, dry leaves weight and dry roots weight. Effect was also more pronounced among *A. esculentus* plants present in higher densities than in lower densities. Overall, results suggest that allelochemicals from the aqueous shoot extract of *C. odorata* inhibits the growth of *A. esculentus* in all the densities observed. Degree of inhibition however varies with densities; higher degree was observed in higher densities and lower degree for lower densities.

**Keywords:** Weed, *Chromolaena odorata*, Okro, Allelochemicals

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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AS A DIGITAL PHARMACEUTICAL TOOL, DIGITAL PILLS

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## ABSTRACT

The use of digital tools for the delivery of medical treatment is one of the areas of improving health. The use of digital medicines and care products is designed to decrease risks and uncertainties while accelerating information interchange within the system of medical care quality control. By giving a clinician access to fast, accurate information support and boosting patient adherence to treatment, digital pills with ingestible sensors are an efficient instrument for arranging the delivery of high-quality medical care. With the aid of the software on gadgets like tablets and smartphones, digital pills with built-in sensors can monitor the success of pharmacotherapy. Such monitoring is crucial since low patient compliance (medication opt-out) is a substantial hurdle for all areas of medicine. This review will provide comprehensive information on digital pills.

**Key Words:** Digital tools, Digital pills, Online medication, Pharmaceutical tool

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## IMPACT OF FLOOD IN UJJAIN, MADHYA PRADESH, INDIA DURING SEPT 2023 AND ITS CONSEQUENCES IN THE MINDFULNESS OF THE LOCAL COMMUNITY OF UJJAIN

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### ABSTRACT

Effect of Flood in Ujjain during Sept 2023 and its consequences in the Mindfulness of the local community of Ujjain.

Mindfulness is the practice of being aware of your body, mind, and feelings in the present moment, thought to create a feeling of calm.

This study aimed at bringing the situation of flood in Sept 2023 in Ujjain and to show how people practiced mindfulness in uncertain conditions caused by mother nature.

The study focused first on the real-life scenario of the flood situation in Sept 2023 where it concentrated on the devastation caused by the flood to the life of human beings and the properties and other assets of the public.

It also emphasizes the help given by the local community of Ujjain to the public and how the public has sustained themselves for a couple of days without power and other necessary infrastructure.

The next part focused on how the emergency services were responding to the calls from several people and how they were trying to answer and keep the public calm for all the messages and calls for flood-related issues. It also focuses on the ambulatory services, Police services for their swift action.

The last part focused on mindset and the mindfulness people practiced resulting in becoming calmer and more composed by the people of Ujjain.

**Keywords:** Flood, Water logging, Traffic Jam, Emergency

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ECONOMIC AND ENVIRONMENTAL FEASIBILITY OF LANDFILL GAS TO ENERGY PROJECT IN OUM AZZA LANDFILL, MOROCCO

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### ABSTRACT

In the context of waste management, an increasingly prevalent approach involves harnessing the potential of biogas production resulting from the burial of waste in public landfills. As organic waste decomposes under anaerobic conditions in these landfill sites, it generates a mixture of gases, primarily methane and carbon dioxide, collectively known as biogas. This biogas, a valuable energy resource, holds the potential to not only alleviate the strain of waste accumulation but also offer a sustainable alternative to conventional fossil fuels.

The landfill gas-to-energy project in Oum Azza Landfill showcases robust economic potential. With a positive net present value, the initiative carries a Total Life Cycle Cost of 59.04 million USD, based on a Levelized Cost of Energy of 0.05 USD/kWh, yielding an estimated payback period of 11.45 years. The project's most significant impact, however, lies in its environmental contributions.

By harnessing landfill gas for energy production, the project is poised to slash global methane emissions by an impressive 79.1% compared to a scenario where the landfill operates without biogas recovery. This substantial reduction in greenhouse gas emissions underscores its vital role in addressing climate change concerns.

The outcomes of this preliminary analysis hold noteworthy implications for potential investors and governmental bodies. The study's insights serve as a valuable roadmap for effectively introducing this pioneering technology across Morocco. Furthermore, the project aligns with the nation's strategies for climate change adaptation.

**Keywords:** Landfill Gas-to-Energy, Economic Viability, Methane Emissions, Environmental Sustainability



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## EVALUATING THE ANTI-INFLAMMATORY AND ANTIDIABETIC ACTIVITY OF SYZYGIUM POLYANTHUM BY MOLECULAR DOCKING

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### ABSTRACT

*Syzygium polyanthum*, commonly known as "daun salam" or Indonesian bay leaf, has been traditionally used for culinary and medicinal purposes. This research seeks to explore the therapeutic potential of *S. polyanthum* as an anti-inflammatory and antidiabetic agent, shedding light on its ability to mitigate inflammation and manage diabetes mellitus, which is in the 3<sup>rd</sup> position among non-communicable diseases in the world. causing est. 6.7 million deaths in 2021. Utilizing in silico techniques with PyRx and AutoDock Vina, the anti-inflammatory activity of *S. polyanthum* was evaluated based on its 27 ligands fetched from NCBI. The results demonstrated significant inhibition of pro-inflammatory mediators, suggesting its potential as an anti-inflammatory agent. Moreover, this study assessed the ability of *S. polyanthum* compounds to regulate obesity and diabetes as well as improve insulin sensitivity, reduce dyslipidemia, and reverse central obesity. Beta-sitosterol in *S. polyanthum* seems to be the compound that gives the best results to each receptor, for both as an anti-inflammatory and an antidiabetic agent. These findings present compelling evidence for the potential therapeutic promise of *S. polyanthum* as a natural remedy for inflammation and diabetes management. In conclusion, the multifaceted therapeutic properties of *S. polyanthum* makes it a promising candidate for future drug development efforts and offers opportunities to harness the benefits of traditional herbal medicine in modern healthcare approaches focused on inflammation and diabetes management.

**Keywords:** *Syzygium polyanthum*, Indonesian bay leaf, in silico, anti-inflammatory, antidiabetic

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## DISCOVERING THE FRAMES OF BLOCKCHAIN IN THE PUBLIC DISCOURSE ON TWITTER: A MACHINE LEARNING APPROACH

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### ABSTRACT

Blockchain is a disruptive innovation that has been diffused rapidly in various industries. This research project aims at identifying the major frames in the public discourse on Twitter and exploring the connections among these frames and the major factors in diffusion of innovation theory (DOI) and technology acceptance model (TAM). A state-of-the-art machine learning approach is applied in identifying the frames. The findings reveal the links between media framing theory and DOI/TAM and suggest the potential of theoretical advance in media effect research.

### Introduction

Blockchain is a decentralized and distributed digital ledger that is used to record and store data in a secure and transparent manner. It is a technology that enables a network of computers to maintain a continuously growing list of records, called blocks, that are linked and secured using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data. Once a block is added to the blockchain, it cannot be altered or deleted without affecting the entire chain, making it tamper-proof and providing a high level of security.

Blockchain technology has been rapidly applied in various fields such as telecommunication, finance, supply chain management, and healthcare. In telecommunication industry, the major telecom companies in many countries have adopted blockchain technology. For example, AT&T, the largest telecom company in the United States, has adopted blockchain technology for supply chain management and to enhance its identity management and verification processes. Telefonica, a major Spanish telecom company, has adopted blockchain technology to offer secure and transparent transactions to its customers. Vodafone, a major England based telecom company has partnered with blockchain startups to explore the potential of blockchain in areas such as identity management, supply chain management, and digital identity.

As a disruptive technology that may transform many industries, blockchain has attracted the attention of researchers. They conducted research to explore the driving forces for their rapid adoptions and diffusions (e.g., Agi & Jha, 2022; Grover et al., 2019; Helliari et al., 2020; Liu & Ye, 2021; Perdana et al., 2021). Two well-established theoretical frameworks —diffusion of innovations theory (DOI) and technology acceptance model (TAM) — have been applied in their investigations of how blockchain has been adopted by various people in different industries.

On the other hand, blockchain has quickly gained the popularity on public discourse (Perdana et al., 2021). Many people discussed it on various traditional and social media platforms. According to the propositions of media effects theories, such as media framing theory, the frames in media affect people's perceptions of and attitudes toward entities/issues (e.g., Entman, 1993). Media framing theory has been widely applied in the areas of political communication, health communication, and public opinion

research, but rarely applied in the adoption and diffusion of innovations. The purpose of this study is to find the connections between the major frames in the public discourse and the factors in DOI and TAM, and the theoretical implications of these connections for DOI, TAM, and media framing theory.

### Literature Review

#### Diffusion of Innovations Theory (DOI)

DOI defines the rate of innovation adoption as the relative speed with which an innovation is adopted by members of a social system, and it is usually measured by the members of a system who adopt an innovation in a given time period (Rogers, 1962). This theory presumes that if the cumulative number of adopters is plotted over time, an s-shaped curve will be obtained. This s-shape curve portrays the trajectory of the innovation diffusion process. Rogers (2003) noted that “there is a variation in the slope of the “s” from innovation to innovation” (p. 23). Some slopes of the s-shape curves are steep while others are flat. The s-shape curves of the same innovation also exhibit different patterns in different social systems.

DOI also provides a classical framework that consists of five major characteristics of innovations: relative advantage, compatibility, complexity, trialability, and observability. Rogers (2003) also stated that other factors — such as communication channels and the characteristics of social system — also influence the adoption rate. Barnett (2011) incorporated these characteristics into the coefficients of the mathematical models that reflect the complexity of the diffusion of innovations.

#### Technology Acceptance Model (TAM)

TAM posits that two instrumental attributes — the perceived ease of use (PEOU) and the perceived usefulness (PU) — influence people’s intentions to adopt innovations (Davis, 1989; Davis et al., 1989). PEOU refers to the amount of effort required to use the innovations. PU refers to the subjective evaluation of the utilities of the innovations. TAM approach focuses on the psychological aspects and emphasizes the influence of various attitudes and intentions on the technology adoptions.

The original TAM applies an individualistic perspective and neglects the impacts of social systems. To overcome this shortcoming, several scholars extended the original TAM model and incorporated social factors into it. For instance, Venkatesh et al. (2003) proposed the Unified Theory of Acceptance and Use of Technology theory (UTAUT). According to this theory, an individual’s intention and adoption of innovations are influenced by four factors: effort expectancy, performance expectancy, social influence and facilitating conditions.

#### The Application of DOI and TAM in the diffusion and adoption of blockchain

There are a number of studies that used DOI to conduct empirical research on the diffusion of blockchain in various contexts. For example, Grover et al. (2019) applied DOI to explore the blockchain technology diffusion in different industries through a combination of academic literature and Twitter. Helliar et al. (2020) explored the barriers and drivers of the diffusion associated with two types of different blockchain technologies — permissionless and permissioned blockchains — based on DOI framework. Other researchers developed theoretical frameworks based on DOI to facilitate the empirical research on the diffusion of blockchain. Agi and Jha (2022), For example, developed a comprehensive framework based on DOI and other theories for blockchain adoption in the supply chain by identifying the enablers and their impacts on adoption.

TAM is another major theoretical framework that has been applied in the study of the adoption of blockchain. For example, Liu and Ye (2021) explored the driving forces such as trust and information quality of the blockchain adoption based on TAM. The modified TAM models, such as UTAUT model, have been also applied in the research. Queiroz et al. (2021), for example, applied UTAUT model to investigate the adoption behavior and possible barriers of blockchain. Likewise, Jain et al. (2022) identified and analyzed the antecedents to blockchain-enabled e-commerce platform adoption in secondhand apparel retailing market using UTAUT model.

Several researchers used both DOI and TAM in their research on the diffusion and adoption of blockchain. For example, Ullah et al. (2021) developed an expanded model by integrating the DOI and TAM and explored the key factors affecting the intentions of educational institutions to use blockchain

technology for e-learning. Perdana et al. (2021) investigated the media's coverage on blockchain technology and how media coverage affected the adoption of it based on DOI and TAM.

### Media framing theory

Communication scholars have developed multiple theoretical frameworks to investigate the influence of media content on people's perceptions and attitudes. Media framing theory is one of the well-established media effects frameworks that have been tested and applied in various circumstances. This theory basically posits media outlets actively construct frames through the use of language, images, and other visual cues. These frames then shape the way in which the people interpret the story and its meaning (Reese, Gandy, & Grant, 2001).

Although media framing theory has been widely used in political communication, health communication, and public opinion research, it has seldomly been applied in the study of the diffusion and adoption of innovative technologies. Rogers (2003) argued that communication channel is one of the factors that influence the diffusion of innovations. Nevertheless, there is no strong connection between DOI/TAM and media framing theory in the literature. To fill this gap in the literature, this study identifies the attributes and frames in the public discourse of blockchain in social media, and investigates the possible connections between the DOI/TAM and media framing theory.

Based on the literature review, the following research questions are proposed:

*RQ1: What frames people used to discuss blockchain in the public discourse of social media?*

*RQ2: Which frames people discussed more positively or negatively in the public discourse of social media?*

*RQ3: What are the connections between these frames and the major variables in DOI and TAM?*

*RQ4: What are the implications of these connections to DOI, TAM, and media framing theory?*

### Research Methods and Progress

Twitter was selected as the representative of social media because Twitter has increased its dominance in public discourse (Jones-Jang et al., 2020). The authors collected Twitter data using Twitter's Application Programming Interface (API), which enables researchers to access Twitter data in unique ways. We applied full-archive endpoint app with an academic research project account. Using this endpoint, the authors extracted 2000 tweets regarding blockchain each day on Twitter.

The authors used a state-of-the-art machine learning approach — the Bidirectional Encoder Representations from Transformers (BERT) model — to analyze Twitter data. BERT was proposed by Devlin et al. (2019) as the architecture to conduct natural language processing (NLP) tasks. The authors used BERT-based models to extract attributes and frames regarding blockchain and conduct sentiment analysis on these attributes/frames. To extract attributes and frames, the authors used a topic model proposed by Grootendorst (2020). This model is based on a novel algorithm for generating topics using state-of-the-art embeddings. Moreover, this model uses multiple pre-trained models/packages. For the embedding package, this model uses sentence-transformers package which typically works well for document-level embeddings. To classify the documents, this model uses several other packages a class-based variant of TF-IDF (c-TF-IDF), which is the proxy of information density and defined by the following equation:

$$c\text{-TF-IDF}_i = \frac{t_i}{w_i} \times \log \frac{m}{\sum_j^n t_j}$$

Where the frequency of each word  $t$  is extracted for each class  $i$ ,  $w$  is the total number of words,  $m$  is the number of documents,  $n$  is number of classes.

To create a topic representation, a number of top words are selected per topic based on their c-TF-IDF scores. The higher the score a word has, the more representative it should be of its topic. Usually, a large number of topics can be obtained from a large number of documents. To reduce the number of topics, this model compares the c-TF-IDF vectors among topics, merges the most similar ones, and then recalculates the c-TF-IDF vectors to update the representation of the topics.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

The authors have already downloaded the data of the first three months of 2023, and conducted preliminary analysis. The remaining work will be downloading more data to the date of June 2023, and conduct machine learning analysis on these data. The full paper will be completed by the end of July 2023.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## BORIS FROM KYIV, USURPER IN THE MEDIEVAL HUNGARIAN KINGDOM

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### ABSTRACT

There was a single usurper in the history of the Hungarian Kingdom. Boris, the pretender to the throne, whose action highlights the complex ties between the Byzantine and Western authorities in the history of Central Europe. Dynastic ties of Hungarian Kings in the Middle Ages with the Eastern Slavic princes were frequent, and the Hungarian king Coloman “The Learned” (1070-1095-1116) married Euphemia of Kyiv, who was the daughter of Grand Duke Vladimir II of Kyiv and the second wife of the Hungarian King. The marriage did not turn out to be a happy one. Euphemia got into a sexual with a soldier of the king. That man was beheaded, albeit the lady was sent back to Kyiv. She was pregnant, and she gave birth to a son later at home, in the principality of Kiev. Although probably that son (named “Boris”) was from the young soldier, by no means from the sick elderly king, Boris was brought up as a real son of the Hungarian king. Then, when other kings came to the throne in the Hungarian Kingdom, Boris appeared and demanded the throne of Hungary for himself. He asked for the help of the Byzantine Emperor in Constantinople, where the Orthodox “prince” was gladly received. He was supported by Byzantine troops, too. Of course, no one was interested in the question of Boris's lawless origin, as long as he could act supported by the Kiev and even more so by the Byzantine states. Neither the Eastern Slavs nor the Byzantines looked at the natural fact that Boris was the son of a soldier with whom his mother, the queen, slept because King Coloman himself knew well that he did not beget a son to that wife. Contrary to the Byzantine warriors, when Boris as an adult pretender to the throne appeared in the Hungarian Kingdom, the new generation of Hungarians did not want to accept the illegitimate son of the former king, since no one in Hungary wanted political ties with either Byzantium or the Eastern Slavs, while the Germans intervened in the Hungarian throne conflicts — the Byzantine wars under the Orthodox Slavic illegal pretender were not needed. — The report gives a brief overview of the political relations between the authorities of Eastern and Southern Europe of the XVII century and the competition between the Roman Catholic and Orthodox-Byzantine authorities for Central Europe.

**Keywords:** Hungarian\_Kingdom, Kyivan\_Rus, Byzantium, usurper, Boris, King\_Coloman\_The\_Learned.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DEVELOPMENT AND USE OF NONVERBAL COMMUNICATION IN CHILDREN WITH AUTISM SPECTRUM DISORDERS (ASD) AND THEIR PARENTS

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### ABSTRACT

The purpose of this publication is based on a literature review to highlight the main aspects of nonverbal communication and its application to create a stronger lasting "parent-child" relationship and in the education of children with ASD. The main approaches to teaching children with ASD are reviewed- learning through games, videomovies, through their peers with typical behavior, through art. In all these, albeit diverse, approaches to learning, several common and important features stand out: 1. Reciprocity in activities - the child with ASD must feel the care and special attention and attitude towards him; 2. Encouragement to creativity, stimulation and integration of personal skills; 3. Absence of stress factors and the therapist's desire to build an environment and relationships with an atmosphere of calm and safety. 4. Nonverbal communication is the basis of each of the learning approaches. 5. The listed approaches can be applied in an integrated manner.

**Key words:** autism, disorders, nonverbal communication, children, parents, therapy

COCCIDIOSIS OF SHEEP IN SOUT PART OF SERBIA

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**ABSTRACT**

Coccidian protozoa of the genus *Eimeria* are common in sheep around the world. *Coccidia* have a very complicated life cycle, with many stages of development. The egg-like structure of *coccidia* is called an oocyte. It is passed in the feces of infected sheep and goats. When first passed, the oocyst is not infective. It must undergo a period of development called sporulation (hatching). Sporulation requires oxygen and moisture. When a sheep ingests a sporulated oocyst, sporozoites are released and enter the cells lining the small intestines. Lambs between the ages of 1 and 6 months are most commonly affected by *coccidia*. During our examination, 4 to 8 week old lambs were the most likely to be affected and 4 week old lambs were the most vulnerable to clinical disease. Many disease outbreaks occur shortly after weaning, as this is a very stressful period in the lamb young life. Typical signs include diarrhea, dysentery, dehydration and loss of appetite and body condition. Sheep can usually tolerate small burdens of *coccidia*, but if parasite numbers become large, for example as a result of an environment heavily contaminated with viable infective oocysts, or other stressors affecting the sheep, disease can result. During our examination performed in period 2017-2019 in sheep herds in south part of Serbia *coccidiosis* were occurred at 37.92%. We usually occurred mixed infection with 3-4 *coccidia* species. At sheep most abundant species were *E. ovina* found at 76.7%, followed by *E. ovinoidalis* (63%), *E. faurei* (42%), *E. ahsata* (37%), *E. granulosa* (28%), *E. intricata* (15%), and *E. pallida* (3%). Oocyst were found at adult and young animals, but clinical sign of disease were present only at young animals. The number of excreted oocysts was higher in lambs (26625±23993 OPG) than in adult sheep (19974±11353 OPG).

**Keywords:** *coccidiosis*, sheep, south Serbia

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**ADSORPTION STUDY OF RHODAMINE B ONTO GROUNDNUT SHELL ADSORBENT**

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**ABSTRACT**

The potential of groundnut shell, for the removal of Rhodamine B dye from aqueous solution was studied. The adsorbent was ground, wash with distilled water, dried at room temperature sieved to obtained particle size the result adsorbent was stored in an air tight for future use. Adsorption studied were conducted and various parameters such as contact time, adsorbent dosage, initial dye concentration, adsorption isotherm and kinetics were studied to observe their effects in the dye adsorption process. The optimum condition for the adsorption of Rhodamine B onto the adsorbent was found to be at 47 mins. The experimental equilibrium adsorption data was best and well fitted to the Langmuir isotherm model for the dye adsorption. The maximum adsorption capacity was found to be 94.348mg/g for the adsorption of Rhodamine B. dye. The optimum adsorption of RB dye was found at pH 10. The kinetic data obeyed to the pseudosecond-order kinetic model.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## REVOLUTIONIZING HEALTHCARE: UNVEILING THE PROS AND CONS OF TELEMEDICINE IN THE DIGITAL ERA

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### ABSTRACT

In recent years, telemedicine—the use of technology to deliver medical treatment remotely—has attracted a lot of interest. This abstract thoroughly analyzes the merits and drawbacks of telemedicine in the healthcare industry, showing its potential advantages and difficulties. Telemedicine has several benefits. First, it expands accessibility to healthcare by removing geographical boundaries and enhancing convenience, especially for people living in rural or underserved areas. Patients may speak with doctors, get diagnoses, and even get treatment in the convenience of their own homes. Second, by doing away with in-person appointments, travel fees, and hospital stays, telemedicine lowers healthcare costs. Additionally, it reduces production losses brought on by travel time and clinic wait times. Furthermore, telemedicine provides a platform for remote patient monitoring, making it possible to observe vital signs and the development of diseases in real-time, resulting in early intervention and better health outcomes. In addition, telemedicine enables effective teamwork and communication among medical specialists, facilitating on-time consultations and decreasing referral wait times. Telemedicine does, however, come with certain difficulties. One major worry is the possible absence of a physical examination, which might make it difficult to correctly diagnose some disorders that need a hands-on approach. Aside from these factors, telemedicine services' dependability and quality may also be impacted by concerns over patient privacy, data security, and the possibility of technological difficulties or connectivity issues. Also, not all medical illnesses may be treated by telemedicine since complicated situations sometimes require in-person exams, treatments, or operations. The digital gap, which includes differences in access to technology and digital skills, may also make it difficult for underprivileged communities to use telemedicine fairly. In conclusion, telemedicine has several benefits for the provision of healthcare, including increased accessibility, cost-effectiveness, remote patient monitoring, and greater teamwork. However, it is important to take into account equitable issues, technical difficulties, privacy issues, and constraints on physical examinations. To maintain the best patient outcomes and equitable access to healthcare for everyone, it is crucial to find a balance between in-person treatment and remote services as telemedicine continues to develop.

**Keywords:** Telemedicine, Healthcare, Remote Care, Access To Healthcare, Cost-Effectiveness, Patient Monitoring, Challenges, Digital Divide, Patient Outcomes.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## METRONIDAZOLE: AN UPDATE ON METABOLISM, STRUCTURE–CYTOTOXICITY AND RESISTANCE MECHANISMS

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### ABSTRACT

Metronidazole, a nitroimidazole, remains a front-line choice for treatment of infections related to inflammatory disorders of the gastrointestinal tract including colitis linked to *Clostridium difficile*. Despite >60 years of research, the metabolism of metronidazole and associated cytotoxicity is not definitively characterized. Nitroimidazoles are prodrugs that are reductively activated (the nitro group is reduced) under low oxygen tension, leading to imidazole fragmentation and cytotoxicity. It remains unclear if nitroimidazole reduction (activation) contributes to the cytotoxicity profile, or whether subsequent fragmentation of the imidazole ring and formed metabolites alone mediate cytotoxicity. A molecular mechanism underpinning high level (>256 mg/L) bacterial resistance to metronidazole also remains elusive. Considering the widespread use of metronidazole and other nitroimidazoles, this review was undertaken to emphasize the structure–cytotoxicity profile of the numerous metabolites of metronidazole in human and murine models and to examine conflicting reports regarding metabolite–DNA interactions. An alternative hypothesis, that DNA synthesis and repair of existing DNA is indirectly inhibited by metronidazole is proposed. Prokaryotic metabolism of metronidazole is detailed to discuss new resistance mechanisms. Additionally, the review contextualizes the history and current use of metronidazole, rates of metronidazole resistance including metronidazole MDR as well as the biosynthesis of azomycin, the natural precursor of metronidazole. Changes in the gastrointestinal microbiome and the host after metronidazole administration are also reviewed. Finally, novel nitroimidazoles and new antibiotic strategies are discussed.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## MONITORING AND RESCHEDULING STRATEGY IN MINIMIZING PROBLEM FINANCING THROUGH IDAMAAN MOBILE APPLICATION AT PT AMAAN SEJAHTERA INDONESIA

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### ABSTRACT

This research focuses on monitoring and rescheduling at PT Amaan Sejahtera Indonesia to reduce non-performing financing using the Idamaan mobile application. Although some financial members experience delays in payments. Therefore, PT Amaan Sejahtera Indonesia can overcome these problems well. The writing method used in the preparation of this thesis is descriptive qualitative research method. Information was obtained from observation, documents and direct interviews. Data analysis techniques with interactive models. The results of this study concluded that: the implementation of monitoring and rescheduling, in minimizing financial problems at PT Amaan Sejahtera Indonesia. Monitoring by directly checking the location of the customer's business. 2. rescheduling especially by extending the financing period. The positive impact of monitoring and rescheduling is that the number of non-performing financing is reduced and customers become more compliant, while the negative impact is reduced efficiency and business performance if not resolved immediately.

### INTRODUCTION

In this era of globalization, economic activities are growing rapidly. Many financial institutions are needed by the community to finance their needs. Financial institutions are one of the things that influence the development of economic growth in Indonesia. One of the largest funding businesses in financial institutions is financing. This financing is needed by the community for consumer needs and business capital.(Kharis Fadlullah Hana & Raunaqa, 2022)

Financing is the source of funding expended to support planned investments. Persons involved in sponsorship activities must follow reasonable financial procedures, including financial approval procedures, administrative procedures and financial supervision procedures. The sponsorship approval of each customer must be done through an objective evaluation process of various aspects related to the different sponsorship objects. This is intended to ensure all parties involved that the customer can fulfill all its obligations according to the agreed terms and timeframe.(Gazali & Usman, 2010)

The distribution of financial institution financing has two consequences, namely: first, the customer returns the money on time and brings profit to the financial institution, second, the customer does not return the money on time according to the initial agreement, resulting in funding becoming non-existent. Thus causing the risk of non-performing financing and can hamper the operations of financial institutions.(Alfani & Solihin, 2023)

In the current era there are often bad and problematic loans. Non-performing financing is financing where the customer is unable to pay the financing in accordance with the specified time.(Kharis Fadlullah Hana & Raunaqa, 2022) Thus, financing risks arise related to personal and unexpected conditions. Personal risks can arise when customers do not maintain the trust given by the sponsor, and at the same time unexpected risks such as accidents and natural disasters that lead to financial difficulties arise.(Alfani & Solihin, 2023)

This situation requires financial institutions to implement internal controls, including conducting pre-and post-financing monitoring of existing financial resources to anticipate risks that will arise. At the same time, the establishment of a post-financing monitoring mechanism aims to maintain the current quality of the financial resources. (Dian Pramana Putra, dkk 2023)

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

This situation requires financial institutions to implement internal controls, including conducting pre- and post-financing monitoring of existing financial resources to anticipate risks that will arise. At the same time, the establishment of a post-financing monitoring mechanism aims to maintain the current quality of the financial resources. (Dhani, Suhartono, & Noranita, 2012)

One of the Fintech companies involved in sharia digital finance is PT Amaan Indonesia Sejahtera, which offers financing services for MSME business owners with sharia digital applications. To increase family income, PT Amaan Indonesia Sejahtera also provides access to business capital financing without collateral. PT Amaan Indonesia Sejahtera concentrates mainly on the financial industry in managing its operations, particularly financing with the Sharia model. However, while being a financing provider institution, it is not without obstacles. Many problems arise, especially bad credit or financial problems.

Strategies can be applied to minimize problematic financial problems applied in PT Amaan Indonesia Sejahtera, namely by monitoring and rescheduling so that customers do not feel pressured by late payments that benefit, but feel helped by monitoring, changing payment schedules, changing the planned payment period. Monitoring and rescheduling can be an effective way because it does not force the situation and performance of the customer or customer according to the needs of the customer or the customer's own topic without any obstacles. Supervision and financial restructuring carried out by PT Amaan Indonesia Sejahtera aims to provide support to problematic customers or financial customers in order to pay off their obligations without seeming burdensome and in accordance with their abilities.

Therefore it is important for PT Amaan Indonesia Sejahtera to carry out financial monitoring or supervision to fix existing financial problems. Based on this background, this research was compiled with the title Monitoring and Rescheduling Strategies in Minimizing Problem Financing through the Idamaan Mobile Application at PT Amaan Sejahtera Indonesia.

## METHOD

This research uses qualitative methods. The purpose of this research is to describe and analyze systematically, factually, and accurately about matters relating to current events. In addition to interview transcripts, field notes, pictures, personal documents, memos, and other official recordings, the information collected is also in the form of words or tables rather than numerical data. (Emzir, 2012) Data collection methods are the first step in carrying out research, because the purpose of research is to obtain valid data. Without using these data collection methods, we will not get data that meets the standards set. (Sugiyono, 2020) The data collection techniques used in this research are interviews, observation and documentation.

The data obtained is then analyzed with the aim of simplifying the data into a form that is easier to read and interpret. In addition, the data is translated and utilized so that it can be used to answer the problems posed in the research. (Moleong & J, 2005) The data analysis method is a process of systematically searching and compiling data obtained from interviews, field notes, and other materials, so that it can be easily understood, and the findings can be informed to others. (Sugiyono, 2012) In this study, researchers used an interactive model data analysis technique, where this interactive model of data reduction and data presentation paid attention to the results of the data collected, then in the process of drawing conclusions and verification. (Soekanto & Soerjono, 1984)

## RESULTS AND DISCUSSION

Factors Causing Problem Financing at PT Amaan Sejahtera Indonesia

Non-performing financing is when a debtor or customer of a lending institution is in a situation where they are no longer able to make installment payments or repayments on time in accordance with the terms of the submission agreement that has been submitted. This situation can arise due to deliberate debtor behavior or due to extenuating circumstances that were not initially anticipated. (Subagyo, 2015)

Based on the results of interviews with employees of the CMP or collection department at PT Amaan, there are several loans that are considered to be starting to be problematic, including substandard loans, loans that are in arrears in principal payments, loans that are not yet due, and loans that have matured. Bad debts are loans that do not meet the criteria of substandard and doubtful and meet the criteria of

doubtful because there has been no repayment for 12 (twelve) months since the credit was classified as doubtful.

In addition to the explanation given by the employees regarding the causes of non-performing loans, an interview was also conducted with the debtor or customer named Mrs. Ainun Jariyah, a customer who had experienced non-performing loans at Amaan where she said that the non-performing loan was experienced because of her uncertain income as a tailor whose turnover per day was uncertain so that it could not be collected to pay credit for several months and then sold assets owned to meet her needs. Now he has changed jobs as a seller of cilok and ice drinks but the results are also uncertain, causing his credit to become problematic. (Interview on Thursday, September 7, 2023 at 13.00 WIB)

Credit is likely to become problematic influenced by several things as the results of the interviews described above. The findings from the interview results described above are only one of the factors that cause bad credit. Actually, from the debtor or customer side, they have good intentions to explain the reasons why the customer cannot pay their debts on time, honestly, and in accordance with their ability to pay, so that employees can solve problems regarding credit settlement in non-litigation through negotiation instead of litigation.

Monitoring and Rescheduling Strategy in Minimizing Problem Financing through Idamaan Mobile Application at PT Amaan Sejahtera Indonesia

There must be a possibility of problematic financing, regardless of how well the financing analysis analyzes the financing application. This is caused by more or less two things: the institution's analysis is inaccurate, or the financing analyst and the debtor or customer conspire to conduct the analysis subjectively. Customer carelessness is the second component that contributes to bad debts due to intentional or unintentional circumstances. (Alfani & Solihin, 2023)

There must be a possibility of problematic financing, regardless of how well the financing analysis analyzes the financing application. This is caused by more or less two things: the institution's analysis is inaccurate, or the financing analyst and the debtor or customer conspire to conduct the analysis subjectively. Customer carelessness is the second component that contributes to bad debts due to intentional or unintentional circumstances. (Djamil, 2014)

### **Monitoring**

Lukman Dandawijaya, monitoring or supervision is the practice of overseeing how all organizational actions are carried out to ensure that everything done is in accordance with a previously decided plan. (Alfani & Solihin, 2023)

To maintain that the financing provided to customers can run in accordance with the agreement, banks need to monitor the financing. Monitoring is carried out to avoid unwanted possibilities for both the ongoing financing and the possible risks arising from the provision of such financing. (Listiyani, 2018)

Monitoring is one of the management activities or functions related to other functions such as planning, organizing, leading, determining and implementing decisions. (Sinn, Abu, & Ibrahim, 2006) Monitoring can be a control tool to know that the provision of financing has been carried out in accordance with the provisions and plans that have been determined in the financing section. (K. F Hana & Andriani, 2022)

The implementation of financing monitoring carried out by PT Amaan Indonesia Sejahtera there are 2 ways, namely:

1. Direct Monitoring

In-person monitoring is field monitoring where officers monitor the customer's location directly in the field to determine if there are any bottlenecks in the customer's business journey. If there are, the officer will utilize this information to remove the bottleneck as soon as possible. Building strong relationships with customers through effective communication is another reason to go to the field by officers to the customer's place with the aim of directly monitoring the customer's business whether there are obstacles or not, if there are obstacles then the officer will use this information to overcome the problem as early as possible. Another goal of going to the field is to build good communication with customers so as to create a good relationship between the two parties.

2. Follow-up Monitoring

This monitoring is monitoring carried out when there are customers who need special attention, namely financing that is not going well. The effort made by the officer is to give a warning and make continuous billing to the customer. If reprimands and billing have been made but still have not paid installments, the financing marketing officer will visit the customer's home to analyze the problem and provide solutions. If the effort is still not paying and there is no good faith from the customer, the officer will visit regularly.

Financing monitoring, if noted, is interrelated between one goal and another so that it can facilitate financial institutions, especially at PT Amaan Indonesia Sejahtera, to anticipate any irregularities that may result in a financing risk in the future. Of course, both parties must be able to work well together in accordance with the procedures that have been determined so that the level of effectiveness of the financing monitoring carried out can be achieved properly.

**Rescheduling**

It is an effort made by PT Amaan Indonesia Sejahtera in rescuing non-performing financing. Because in handling problematic financing does not recognize fines. Instead, it provides relief and leeway. This policy applies only to customers who are really struggling in their business and there is no element of intentionality. The author views that the settlement of problematic financing at PT Amaan Indonesia Sejahtera is in accordance with sharia principles. Islam teaches to provide relief in terms of payment maturity until the customer is free from difficulties and provides relief in payment.

Rescheduling or rescheduling is a change in the schedule for making payments, as for the factors that support the provision of these actions, there is marketing from the debtor who is still good. (Kharis Fadlullah Hana & Raunaqa, 2022)

Rescheduling at PT Amaan Indonesia Sejahtera is by increasing the installment period for customers who experience problematic financing. So that with the extension of time for payment, the number of installments will decrease. With the extension of time, it is hoped that customers will be able to pay off their financing.

**Constraints and Solutions in Monitoring and Rescheduling at PT Amaan Indonesia Sejahtera**

Constraints and Solutions in Monitoring and Rescheduling at PT Amaan Indonesia Sejahtera:

1. The existence of customers or customers who are not in good faith where they deliberately do not fulfill their obligations in resolving their financing problems, besides that the economic constraints faced by customers or customers can also be an obstacle in resolving financing problems
2. Customers are not honest in reporting the chronology of the consequences of problem financing. Many people say they are no longer working, but in reality they still have other businesses outside the city and are not reported

In addition to constraints, there are also solutions that support the implementation of Monitoring and Rescheduling at PT Amaan Indonesia Sejahtera including the following:

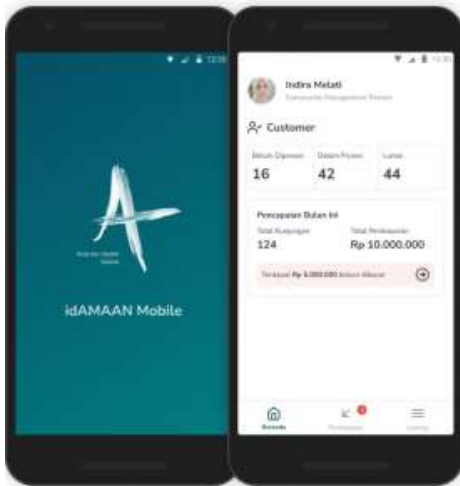
1. Marketing parties who always supervise customers regularly. In the case of problematic financing after supervision, customers must continue to monitor their progress. This can make the resolution of problematic financing quickly resolved.
2. There is awareness and goodwill of the customer to pay. With this, customers who feel that they have been given facilities that alleviate their obligations and encourage them to make installment payments on time. Some customers are also aware that poor or non-performing financing quality will affect the realization of financing in the future.

**Idamaan Mobile Application at PT Amaan Sejahtera Indonesia**

Idamaan Mobile application is an android application intended for daily activities used in collecting customer installments. Fitur Idamaan Mobile terdiri dari menu login, beranda, daftar customer, Riwayat aktivitas, form laporan aktivitas, dan pembayaran.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023



Versi saat ini adalah versi 1.0

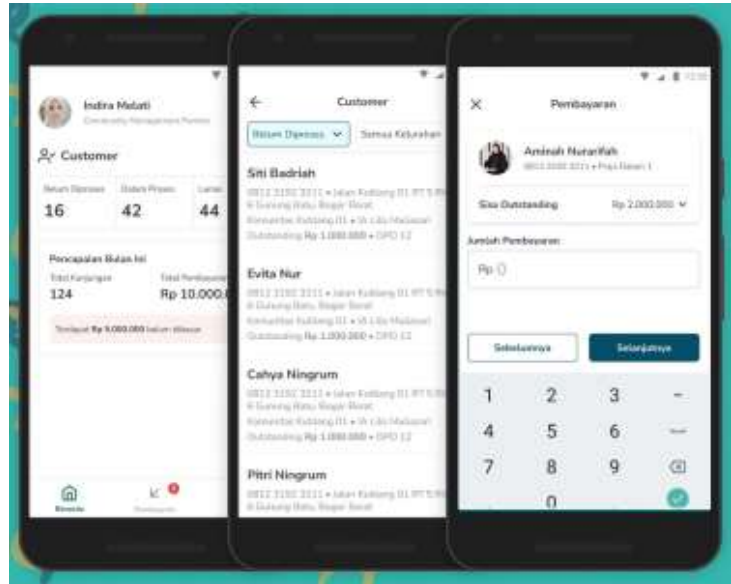


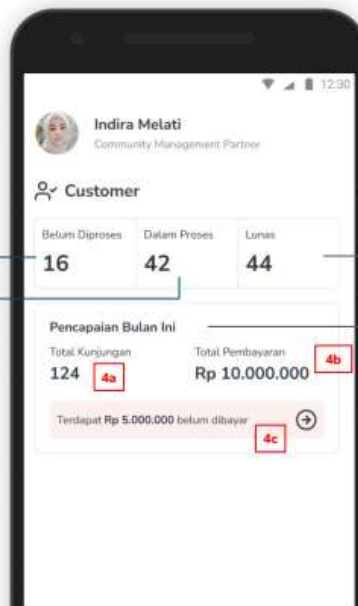
Image of the Idamaan Mobile App

## Home Screen

Beranda akan menampilkan pencapaian Petugas pada **bulan ini** (bulan yang sedang berlangsung)

**1**  
**Belum Diproses**  
Bagian ini merupakan angka dari customer yang belum diproses oleh Petugas yang login.  
**Diproses** = telah dijadwalkan aktivitas atau telah melakukan aktivitas di bulan itu

**2**  
**Dalam Proses**  
Merupakan angka dari customer yang telah diproses oleh Petugas yang login



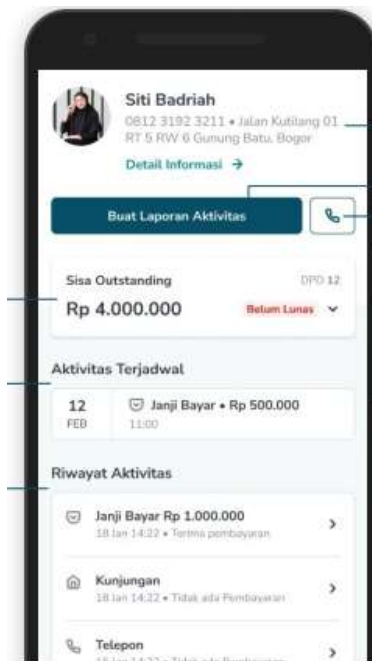
**3**  
**Lunas**  
Angka dari customer yang telah melakukan pelunasan di bulan itu  
**Lunas** = Sudah dinyatakan lunas oleh kantor pusat AMAAN

**4**  
**Pencapaian Bulan Ini**  
a. **Total Kunjungan** = total aktivitas yang sudah dilakukan oleh Petugas di bulan ini  
b. **Total Pembayaran** = total pembayaran yang sudah disetorkan ke gerai/VA oleh Petugas di bulan ini  
c. **Belum dibayar** = Jika ada titipan pembayaran dari customer yang belum disetorkan ke gerai/VA, maka akan muncul di bagian ini.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## Customer Main Detail Home Page



## CONCLUSION

Based on the results of the research and discussion that has been stated in the previous chapters, it can be concluded that:

1. The implementation of monitoring conducted by PT Amaan Indonesia Sejahtera is by conducting direct monitoring and follow-up. Direct monitoring is direct monitoring to the field by officers to the customer's place of business. While the follow-up monitoring is that the officer gives a warning and makes continuous billing to the customer. If a warning and billing has been made but still has not paid the installment, the financing marketing officer will visit the customer's home to analyze the problems and provide solutions.

The implementation of Rescheduling carried out by PT Amaan Indonesia Sejahtera is to increase the installment period for customers so that customers are able to pay off their financing.

2. The impact after the implementation of monitoring and rescheduling in overcoming PT Amaan Indonesia Sejahtera's problematic financing. The positive impact is that the amount of problematic financing is reduced and members become more compliant and punctual in making installment payments from financing and if there is problematic financing the company is able to handle the problem properly. While the negative impact requires human resources who are experts in their fields. Because if there are no experts, it will reduce performance and achievement and will have a negative impact on cooperative finances.

3. The impact after the implementation of monitoring and rescheduling in overcoming PT Amaan Indonesia Sejahtera's problematic financing. The positive impact is that the amount of problematic financing is reduced and members become more compliant and punctual in making installment payments from financing and if there is problematic financing the company is able to handle the problem properly. While the negative impact requires human resources who are experts in their fields. Because if there are no experts, it will reduce performance and achievement and will have a negative impact on cooperative finances.

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October 13-14, 2023

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**ECOLOGY OF JAPANESE ENCEPHALITIS DISEASE**

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In Japan, the first case of the Japanese encephalitis virus disease (JE) was reported in 1871. The Japanese encephalitis (JE) virus has a strong propensity to spread and has recently expanded its geographic distribution throughout much of southeastern Asia. The Japanese encephalitis virus (JEV) is a key contributor to human neurological illness. India has a high frequency of JEV, with major outbreaks during the monsoon season concentrating in the northeast and to a lesser extent in the southwest. The main JEV vector in Asia, *Culex tritaeniorhynchus* also plays a significant role in transmission in India.

The virus is a member of the family Flaviviridae and possesses a positive sense RNA genome within a membrane produced by the host. In a natural cycle involving birds and some cattle species, it is spread by mosquitoes, notably those of the genus *Culex*, like many flaviviruses. Pigs frequently serve as a major amplifying host during outbreaks in human populations, despite the fact that ardeid-wading birds like egrets and herons are the natural reservoir of JEV.

To understand the overall ecology it is necessary to study the targeted animals for novel health of JEV surveillance in India. So identification of species may play the role of amplification and maintenance.

**Keywords:** Ecology, Encephalitis, Vector ,Host

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## FAULT-TOLERANT CONTROL OF A WIND ENERGY CONVERSION SYSTEM USING A MATRIX CONVERTER

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### ABSTRACT

As wind energy continues to play a pivotal role in the transition towards sustainable power generation, ensuring the reliability and efficiency of wind energy conversion systems (WECS) becomes paramount. This paper introduces a novel approach to enhance the fault tolerance of WECS through the implementation of a matrix converter-based control system. The inherent variability of wind conditions can pose challenges to the stable operation of WECS. Unpredictable faults and disturbances may further exacerbate these challenges. In response, this research presents a comprehensive fault-tolerant control strategy that leverages the capabilities of a matrix converter. By utilizing the matrix converter's ability to establish direct connections between input and output voltages, the system gains enhanced flexibility and resilience in the face of faults. The study outlines the design and implementation of the fault-tolerant control scheme, including fault detection and isolation strategies. Simulations and experimental results demonstrate the system's ability to continue operating efficiently even in the presence of component failures or grid disturbances. Furthermore, the proposed approach offers improved fault tolerance without compromising overall system performance. This research contributes to the advancement of sustainable energy generation by addressing the critical issue of reliability in wind energy conversion systems. The findings not only enhance the robustness of these systems but also facilitate their integration into the broader energy grid, thus promoting the adoption of renewable energy sources on a larger scale.

**Keywords:** Wind Energy Conversion System (WECS), Fault-Tolerant Control, matrix converter, Fault Detection, DFIG, Wind Turbine

**BACKSTEPPING CONTROL FOR VARIABLE SPEED WIND TURBINE BASED ON  
DOUBLY FED INDUCTION GENERATOR UTILIZING MATRIX CONVERTER**

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**ABSTRACT**

In the pursuit of sustainable energy sources, variable speed wind turbines play a pivotal role in harnessing the power of wind resources efficiently. This research delves into the application of Backstepping Control as a robust control strategy for optimizing the performance of variable speed wind turbines equipped with Doubly Fed Induction Generators (DFIG) and utilizing Matrix Converters (MC). The Backstepping Control method, known for its effectiveness in complex dynamic systems, is applied to regulate the operation of DFIG in wind turbines. By systematically designing local controllers that address the unique dynamics of each component within the system, a global controller is synthesized, ultimately enhancing the turbine's ability to track variable wind speeds while ensuring stable and efficient power generation. The integration of Matrix Converters further elevates the system's performance by enabling precise and flexible power conversion. Matrix Converters, with their matrix-based signal transformations, provide a versatile platform for adapting to varying wind conditions and grid requirements. This research explores the seamless integration of Matrix Converters into the control architecture, emphasizing their role in enhancing grid compatibility and overall system efficiency. Our study encompasses theoretical analysis, simulation studies, and experimental validation, demonstrating the effectiveness of the proposed Backstepping Control strategy and the advantages of employing Matrix Converters in the context of variable speed wind turbines. Results showcase improved energy capture, grid stability, and fault tolerance, highlighting the potential for this integrated approach in advancing renewable energy technology. In summary, this research contributes to the growing body of knowledge in wind turbine control strategies and underscores the potential of Backstepping Control and Matrix Converters as key enablers for optimizing the performance and reliability of variable speed wind turbines in a sustainable energy landscape.

**Keywords:** backstepping control, DFIG, wind turbine, vector control, active and reactive power, matrix converter, MPPT.

MODELING, SIMULATION AND CONTROL OF WIND TURBINE DRIVEN DOUBLY-FED  
INDUCTION GENERATOR WITH MATRIX CONVERTER

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ABSTRACT

This paper delves into a wind energy conversion system featuring a variable-speed wind turbine equipped with a doubly fed induction generator (DFIG) and powered by a matrix converter. The wind turbine's stator connects directly to the grid, while the rotor links via slip-rings to the matrix converter's output. This converter draws power from the grid and replaces the traditional pair of back-to-back converters used for DFIG control. DFIG, known for its exceptional performance, has gained prominence in wind energy due to its ability to independently control the rotor and grid-side power. This study places a significant emphasis on the control strategy within the matrix converter. A robust control scheme is devised to ensure seamless power transfer between the rotor and grid while addressing fault tolerance and grid code compliance. Controller performance undergoes rigorous evaluation through simulation experiments and, where applicable, practical validation. The addition of a matrix converter on the rotor side further enhances system flexibility and efficiency. This research aims to provide valuable insights into the design and operation of advanced wind energy systems. The system's modeling encompasses both super-synchronous and sub-synchronous operating conditions, enabled by the matrix converter. To efficiently separate active and reactive power, stator field-oriented control is employed. For optimal wind energy extraction, a speed mode control strategy considers wind speed and turbine pitch angle at each sampling interval. Additionally, a 2-D lookup table is introduced to calculate the reference speed through interpolation/extrapolation. Concurrently, reactive power control ensures that stator reactive power remains at zero. The study presents promising simulation results, demonstrating the wind energy conversion system's control performance.

**Keywords:** Wind energy, Matrix converter, doubly fed induction generator, vector control, active and reactive power, back-to-back converter.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**A UNIQUE HIGHLIGHT DETECTION SYSTEM USING MULTIMODAL TRANSFORMER**

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**ABSTRACT**

With the explosive magnification of online video content, there is an incrementing desideratum for implements that can efficiently identify and extract highlights from videos. However, doing so accurately and expeditiously predicated on everyday language queries can be a challenging task, as highlight detection itself is a relatively incipient research area. In replication to this challenge, this project proposes an incipient scheme for performing and optimizing the task of highlight detection. The authors compare their method to subsisting approaches and test it on the YouTube Highlights public datasets, demonstrating that their method is highly efficacious, superior, and flexible across a range of different scenarios. The proposed scheme leverages a cumulation of natural language processing and computer vision techniques to identify and extract pertinent highlights from videos predicated on utilizer queries. Concretely, the authors utilize an attention-predicated mechanism to identify the most informative segments of the video that correspond to the utilizer's query, and then employ feature extraction and homogeneous attribute metrics to rank and retrieve the most germane highlights. In integration to demonstrating the efficacy of their approach, the authors withal highlight the flexibility and scalability of their method, which can be acclimated to different video domains and datasets. They argue that their method has the potential to significantly ameliorate the efficiency and precision of highlight detection in a variety of applications, from video search and recommendation systems to sports analysis and broadcasting. Overall, this report presents a valuable contribution to the emerging field of highlight detection, showcasing the potential of natural language processing and computer vision techniques to solve this conundrum. By providing a comprehensive evaluation of their approach and demonstrating its preponderation over subsisting methods, the authors offer a promising avenue for future research in this area.

**Keywords:** Multimodal, Transformer, Online, Highlight, Detection.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## A CNN AND LSTM BASED ACTIVITY DETECTION SYSTEM TAKING VIDEO INPUT

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### ABSTRACT

The project aims to develop an action apperception model utilizing an amalgamation of Convolutional Neural Network (CNN) and Long Short- Term Recollection (LSTM) to relegate human actions from video footage. The CNN is utilized to extract spatial features from the video frames, while the LSTM is utilized to capture the temporal dynamics of the actions. The model is trained and tested on astronomically immense-scale datasets, such as UCF101, HMDB51, and Kinetics, and evaluated predicated on precision, precision, recall, and F1 score. The project has potential applications in surveillance, sports analysis, and human-computer interaction, where the faculty to agnize and understand human actions from video footage is crucial. The project aims to develop a system for apperceiving human actions from video utilizing an amalgamation of Convolutional Neural Networks (CNNs) and Long Short-Term Recollection (LSTM) networks. The system takes a video sequence as input and utilizes a CNN to extract spatiotemporal features from the frames. These features are then victualled into an LSTM network to capture the temporal dependencies between the frames and relegate the action being performed. The system is trained and evaluated on a publicly available dataset, and its performance is compared with other state-of- the-art methods for action apperception. The ultimate goal of the project is to develop a robust and efficient system for genuine-world applications such as video surveillance, human-robot interaction, and sports analysis.

**Keywords:** Python, CNN, LSTM, UCF101, HMDB51.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## MANOEUVRING THE CONVENTIONAL ROUTING PROTOCOL FOR VANET

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### ABSTRACT

Vehicular Ad-Hoc Networks (VANETs) are a type of wireless communication network that enables conveyances to exchange information with each other and with roadside infrastructure to ameliorate road safety, traffic efficiency, and driving experience. Routing protocols play a crucial role in VANETs by determining the best path for data transmission among conveyances. However, the dynamic nature of vehicular networks, characterized by high mobility, intermittent connectivity, and varying network conditions, presents significant challenges for efficient routing. In this research paper, we propose an enhanced routing protocol for VANETs that addresses the constraints of subsisting protocols. Our protocol incorporates advanced techniques to amend the reliability, efficiency, and security of data transmission in VANETs. Categorically, we integrate predictive mobility model that anticipates conveyance forms of kineticism to proactively establish stable routes, minimizing packet loss and truncating end-to-end delay. Moreover, we employ a multi-objective optimization approach to optimize routing decisions predicated on multiple metrics, such as reliability, delay, and energy consumption, for ameliorated performance. Furthermore, we integrate a secure authentication mechanism to bulwark against malevolent attacks and ascertain data integrity. To evaluate the performance of our proposed routing protocol, we conducted extensive simulations utilizing an authentic vehicular mobility trace. Our results demonstrate that our protocol outperforms subsisting protocols in terms of packet distribution ratio, end-to-end delay, and energy efficiency, while maintaining a high caliber of security. Our research contributes to the field of VANETS by providing an enhanced routing protocol that addresses the unique challenges of vehicular networks, and can be potentially deployed in authentic-world vehicular communication systems to ameliorate the reliability and efficiency of data transmission, leading to safer and more efficient vehicular communication networks.

**Keywords:** VANET, wireless, communication, network, Ad-Hoc.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## A SIGN LANGUAGE SYSTEM INCORPORATING HAND GESTURE FOR THE PURPOSE OF RECOGNITION

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### ABSTRACT

Hand gesture apperception accomodates as a key role for surmounting many difficulties and providing accomodation for human life. One categorical field of interest is 'dactylology apperception'. Dactylology is a mean of communication among the auditorily impaired and incoherent people. The faculty of machines to understand human activities and their designation can be utilized in an astronomical array of applications. Machine learning techniques can be acclimated to engender interactive inculcative implements or to avail a auricularly discerning-impaired person communicate more efficaciously with someone who doesn't ken dactylology. The proposed study aims to develop a system that will agnize static sign gestures and convert them into text. A vision-predicated approach utilizing a web camera is introduced to obtain the data from the signer. The proponents provided a white background and a categorical location for image processing of the hand, thus, ameliorating the precision of the system and used Convolutional Neural Network (CNN) as the recognizer of the system. We apperceive the gesture shown by the utilizer utilizing Deep Learning methods and then give a text output of it. There are 27 gestures pre-built that includes all the alphabets and blank space.

**Keywords:** ML, DL, CV, CNN, Data.

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**ABSTRACT**

Ritonavir, a potent antiretroviral medication, has played a pivotal role in the treatment of HIV (Human Immunodeficiency Virus) since its introduction. This abstract provides an overview of Ritonavir as an anti-HIV drug.

Ritonavir, initially developed as a protease inhibitor, has been a cornerstone in the management of HIV infection. Its mechanism of action involves inhibiting the protease enzyme, crucial for the replication of the virus. This inhibition disrupts the HIV life cycle, reducing viral replication and slowing disease progression.

One of Ritonavir's unique features is its use as a booster for other protease inhibitors. When used in combination therapy, it enhances the effectiveness of other antiretroviral drugs, ensuring lower viral loads and improved immunological outcomes.

Furthermore, Ritonavir has demonstrated efficacy in the prevention of mother-to-child transmission of HIV, making it a valuable tool in reducing the global HIV burden.

Despite its therapeutic benefits, Ritonavir is not without challenges, as it can interact with various medications and has side effects. However, its impact on HIV treatment and prevention remains significant.

In conclusion, Ritonavir, as an anti-HIV drug, exemplifies the progress made in HIV/AIDS management. Its role in combination therapy and its contributions to reducing transmission rates underscore its importance in the ongoing fight against HIV. Further research and development may lead to even more effective treatments and strategies for combating this global health challenge.

**ROBUST NONLINEAR CONTROL OF A THREE-PHASE SHUNT ACTIVE POWER  
FILTER IN THE PRESENCE OF UNCERTAINTIES**

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**ABSTRACT**

This paper presents a robust nonlinear control strategy for a Three-Phase Shunt Active Power Filter (SAPF) designed to mitigate harmonic distortion and reactive power fluctuations in electrical distribution systems. The presence of uncertainties, such as varying load profiles, grid voltage disturbances, and parameter variations, poses significant challenges for effective SAPF operation. To address these challenges, we propose a control approach based on robust nonlinear control techniques. The core of our proposed control scheme is a robust controller designed to handle uncertainties and disturbances while ensuring stable and accurate compensation of harmonics and reactive power. The controller leverages a mathematical model of the SAPF system, augmented with an uncertainty description that characterizes the variations in system parameters and external disturbances. By utilizing Lyapunov stability theory and robust control methods, the proposed approach ensures the convergence of the SAPF system to a desired operating point in the presence of uncertainties. Furthermore, the control strategy incorporates a nonlinear compensation algorithm that adapts to changing operating conditions, enhancing the SAPF's performance under varying load profiles and grid voltage disturbances. Simulation results and experimental validations on a real-world SAPF system demonstrate the effectiveness of the proposed control strategy in terms of harmonic mitigation, reactive power compensation, and robustness to uncertainties. In summary, this research contributes to the development of robust control techniques for Three-Phase Shunt Active Power Filters, making them more resilient in the face of uncertainties and disturbances commonly encountered in practical electrical distribution systems. The proposed approach holds promise for improving the quality of power delivered to sensitive loads and reducing the impact of nonlinear loads on the grid.

**Keywords:** Shunt active power filter, feedback linearization adaptive nonlinear control, and harmonic current compensation.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## STEM EDUCATION

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### ABSTRACT

Nowadays the Expectations of Industries of the Freshers are increasing a lot. They expect the freshers to be well knowledge and know minimum of 2 to 3 programming languages at their skills. Bio-background students suffer a lot at the first year of their engineering studies to cope up with coding. Not only bio-background students suffer all the students find engineering to be tough. So it's necessary to train them to meet with industrial expectations. STEM stands for Science, Engineering, Mathematics, Technology. Instead of training the students with unwanted subjects in their schooling schools may train the students with these subjects so that it could be easy for them to cope up in their engineering studies later. It is important to train them from the middle school itself, so that they can learn advance things in engineering. The platforms like Byjus, Vedantu, Unacademy, just provide recorded videos and a mentor support for each students. But it's not actually for each students a mentor may have 15-20 students under them so it would not possible for them to keep an eye on all 20. This model has the recorded by their own teacher who teaches the in their school so that they can understand clearly and clear their doubts on the following day. It's not recorded videos these are recorded videos with an chain interactive session. These can develop students according industrial expectaions from their school itself in a good manner



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ADVANCED COATING METHODS: TITANIUM CARBIDE DEPOSITION ON STEEL VIA INDIRECT PROCESSES

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### ABSTRACT

The quest to enhance the performance and durability of steel components has led to innovative coating techniques. This study focuses on the application of advanced coating methods for depositing titanium carbide (TiC) onto steel substrates. The indirect deposition process used in this research offers a promising avenue for precisely and controllably tailoring the surface properties of steel.

In this investigation, we delve into the intricate details of the indirect deposition technique, elucidating the underlying mechanisms and key parameters that influence the composition, microstructure, and mechanical properties of the TiC coating. Through a systematic experimental approach, we explore the impact of deposition parameters such as temperature, gas composition, and deposition time on the resulting TiC coatings.

Our findings reveal the exceptional potential of indirect deposition in achieving uniform and adherent TiC coatings on steel surfaces, offering improvements in hardness, wear resistance, and corrosion protection. Furthermore, the study addresses the challenges and opportunities associated with scaling up this method for practical applications in industries ranging from automotive to aerospace.

This research not only contributes to the advancement of coating technologies but also expands the horizons of materials engineering for improved performance and longevity of steel components in demanding environments. The knowledge gained from this investigation holds promise for the development of next-generation, high-performance steel materials.

**Keywords:** Titanium Carbide, Steel, Indirect Deposition, Coating Methods, Surface Engineering

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## THE REVIEW OF INFRASTRUCTURE REQUIREMENTS FOR ELECTRIC AUTOMOTIVE

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### ABSTRACT

The field of economics and business administration pertaining to electric cars encompasses a range of elements, such as market analysis, consumer behavior, supply chain management, business models, financing and investment, and infrastructure development. Among these elements, infrastructure development is of utmost importance for the growth and sustainability of the electric car industry. It involves the establishment of networks of charging stations, advancements in battery technology, and the integration of smart grid systems. These three components, which we will define and explore as the latest technology in this field evolves, play a critical role in ensuring the success of electric cars as a practical alternative to gasoline-powered vehicles. The availability of charging stations, advancements in battery technology, and the integration of smart grid systems contribute to increased convenience and practicality of electric cars, reduced ownership costs, and enhanced sustainability within the industry.

**Keywords-** Electric cars, Infrastructure development, Charging station networks, Advancements in battery technology, Sustainability.

### Introduction

Infrastructure development plays a crucial role in the electric car ecosystem, enabling the widespread adoption and effective operation of electric vehicles (EVs). It encompasses several key components, including the establishment of charging station networks, advancements in battery technology, and the integration of smart grid systems.

#### 1. charging stations

It play a pivotal role in supporting the usability and practicality of electric cars by providing a reliable and convenient means of recharging. They are an essential component of the infrastructure necessary for the widespread adoption and success of electric vehicles because facilities or points where electric vehicles (EVs) can be charged.

##### 1.1 Types of Charging Stations:

Charging stations come in different forms and charging capabilities, catering to various needs and charging speeds. Here are some common types:

###### 1.1.1 Level 1 Charging:

This is the simplest and slowest form of charging, typically using a standard household electrical outlet (120 volts AC). Level 1 chargers are portable and come with most electric vehicles. However, they provide the slowest charging rate and are best suited for overnight charging at home.

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### 1.1.2 Level 2 Charging:

Level 2 chargers operate at higher power levels (240 volts AC) and provide faster charging compared to Level 1. They require specialized charging equipment and are commonly installed in public locations, workplaces, and residential areas. Level 2 chargers can fully charge an electric vehicle in a few hours, depending on the battery capacity.

### 1.1.3 DC Fast Charging:

DC fast chargers, also known as Level 3 chargers, offer the fastest charging speeds for electric cars. They operate at much higher power levels (typically 400 volts or higher) and can charge an EV to 80% or more in around 30 minutes. DC fast chargers are commonly found along highways, commercial areas, and EV charging networks.

## 1.2 Charging Station Components:

### 1.2.1 Charging Unit:

The charging unit is the main component of a charging station. It contains the necessary hardware and software to provide electricity to the electric vehicle's battery.

### 1.2.2 Connector:

We have several type :

- ❖ **J1772 Connector:** The J1772 connector is the standard connector for Level 1 and Level 2 charging in North America. It features a plug and socket design, allowing for the safe and secure connection between the charging station and the electric vehicle.
- ❖ **CCS (Combined Charging System) Connector:** CCS connectors are used for DC fast charging and are widely adopted in Europe and North America. They combine the AC charging pins of the J1772 connector with additional DC charging pins for high-speed charging.
- ❖ **CHAdeMO Connector:** CHAdeMO connectors are primarily used for DC fast charging and are common in Asian markets. They have a distinct plug design and enable high-power charging for compatible electric vehicles.
- ❖ **Tesla Supercharger Connector:** Tesla vehicles use their proprietary connector for high-speed charging at Tesla Supercharger stations. Tesla vehicles also come with an adapter that allows them to be charged using other charging connectors.

### 1.2.3 Display and Payment System:

Charging stations often feature a display panel that provides information such as charging status, energy consumption, and sometimes payment options. Payment systems can include credit card readers, mobile payment apps, or RFID cards.

### 1.2.4 Networking and Communication:

Many charging stations are connected to a network, allowing for remote monitoring, maintenance, and payment processing. Networked charging stations provide real-time information on availability, usage, and charging rates.

## 2. Examples of smart grid systems being integrated with electric car infrastructure

Integrating smart grid systems with electric car infrastructure is an important step towards optimizing the charging process, managing energy flow, and enhancing the overall efficiency of the electric grid. Here are some examples of how smart grid systems can be integrated with electric car infrastructure:

1. **Demand Response Programs:** Smart grid systems can enable demand response programs, where charging stations can adjust their charging rates or schedules based on the grid's supply and demand conditions. This allows for better load management and can help prevent grid congestion during peak periods.

2. **Vehicle-to-Grid (V2G) Technology:** V2G technology enables bidirectional energy flow between electric vehicles and the grid. Electric vehicles can not only draw electricity from the grid but also send excess energy back to the grid when needed. This capability can help balance the grid, support renewable energy integration, and provide grid services such as frequency regulation.

3. **Smart Charging Management:** Smart grid systems can facilitate intelligent charging management, allowing for optimized and coordinated charging of electric vehicles. Charging stations can communicate with the grid to determine the best charging times, considering factors such as electricity prices, grid load, and renewable energy availability.

4. **Grid-Friendly Charging Infrastructure:** Smart grid systems can enable the development of grid-friendly charging infrastructure. This includes features such as load balancing, where charging stations distribute the load evenly across the grid to prevent localized overloads. It can also include the capability to communicate with the grid to receive real-time grid status updates and adjust charging accordingly.

5. **Grid Integration with Renewable Energy Sources:** Smart grid systems can integrate electric vehicle charging with renewable energy sources. Charging stations can prioritize charging when renewable energy generation is high, promoting clean energy utilization and reducing the reliance on fossil fuel-based power generation.

### **3. Advancements in battery technology:**

The potential to significantly improve the efficiency and range of electric vehicles (EVs) in several ways:

1. **Increased Energy Density:** Battery technology advancements can lead to higher energy density, allowing for more energy storage within the same physical size or weight of the battery pack. This means that EVs can store more energy, resulting in longer driving ranges without the need for frequent recharging.

2. **Improved Energy Efficiency:** Enhanced battery technology can improve the overall energy efficiency of EVs. This includes reducing energy losses during charging and discharging processes, minimizing internal resistance within the battery cells, and optimizing the battery management system. By improving efficiency, more energy can be effectively used to propel the vehicle, resulting in longer ranges for the same amount of stored energy.

3. **Rapid Charging Capability:** Advancements in battery technology can enable faster charging times. This includes the development of fast-charging technologies and the ability to handle higher charging currents without negatively impacting battery life. Rapid charging capabilities reduce the time required to recharge an EV, making them more convenient and comparable to refueling a gasoline-powered vehicle.

4. **Longer Battery Lifespan:** Battery technology advancements can improve the durability and longevity of EV batteries. This includes advancements in electrode materials, cell chemistry, and thermal management systems. Longer battery lifespan reduces the need for frequent battery replacements, lowering the overall cost of ownership and improving the practicality of EVs.

5. **Enhanced Thermal Management:** Efficient thermal management systems for batteries can prevent overheating and thermal degradation, ensuring optimal battery performance and longevity. Improved cooling and heating mechanisms can maintain the battery within an optimal temperature range, maximizing its efficiency and extending its lifespan.

6. **Solid-State Batteries:** The development of solid-state batteries, which replace the liquid electrolyte with a solid-state electrolyte, shows promise for higher energy density, improved safety, and faster charging times. Solid-state batteries have the potential to revolutionize EVs by addressing current limitations and unlocking even greater efficiency and range.

### **Conclusion**

The field of economics and business administration related to electric cars encompasses various elements, including market analysis, consumer behavior, supply chain management, business models, financing and investment, and infrastructure development. Infrastructure development, particularly the

establishment of charging station networks, advancements in battery technology, and integration of smart grid systems, is crucial for the growth and sustainability of the electric car industry.

The availability of charging stations ensures that electric car owners have convenient access to charging facilities, addressing concerns about range anxiety and promoting widespread adoption. Advancements in battery technology improve the efficiency, range, and charging capabilities of electric vehicles, making them more practical and comparable to traditional gasoline-powered cars. Integration of smart grid systems allows for intelligent management of energy flow and optimization of charging processes, enhancing the overall efficiency and sustainability of the electric car ecosystem.

By focusing on these three components, the electric car industry can achieve increased convenience, reduced ownership costs, and improved sustainability. Continued research and technological advancements will undoubtedly shape the future of electric cars, making them a viable and attractive alternative to conventional vehicles.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## THE THEME OF 'ESCAPE': INTERTEXTUALITY AND COMPOSITIONAL CONTRAST IN SOMERSET MAUGHAM'S SELECTED SHORT STORIES

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### ABSTRACT

This work analyses the contrast created in William Somerset Maugham's literary composition, with reference to the theme of 'Escape'. Escape is, indeed, a recurrent theme in such Maugham's short stories as 'The Escape', 'Mabel', 'A Friend in Need,' 'The Taipan', 'The Verger', and others. The analysis thereof unfolds through the scrutiny of two samples of these short stories videlicet 'The Escape' and 'Mabel'. In real life, it happens to us to escape either from a country, a nightmare, a delicate financial situation, a mediocre existence, or else. Likewise, in fiction, Roger Charing and George escape from Ruth Barlow and Mabel, the ladies they are engaged to before the wedding days respectively in 'The Escape' and 'Mabel'. This escape, an interconnection between these stories, is prompted by their sudden falling out of love, which is inexplicable in the narrators' words, because as Blaise Pascal thinks, the heart has reasons that reason itself knows nothing about. Apart from this common denominator, the two stories contrast sharply at different levels of their components as setting, characters... To investigate this contrast, owing to the economy and simplicity of the storytelling that characterise a short story, these stories require close scrutiny and textual approach.

**Key words:** escape, intertextuality, contrast, components, short story.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## APPLICATION OF A NEW APPROACH TO ASSESSING THE PERFORMANCE OF A COMPLEX TECHNICAL SYSTEM

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### ABSTRACT

Nowadays, the solution of the problem of monitoring and diagnostics of complex technical objects at all stages of its functioning is one of the main tasks in the theory of information and the construction of measuring systems. It is important to foresee possible malfunctions at the planning stage of the device model and minimize them during its operation.

Embedded systems have been widely developed today, since they allow analyzing the parameters of a certain measuring system without the necessary removal of measuring devices and sensors from the object. Most of them are built of some kind of measuring system with a set of sensors and microprocessor systems that control the macroscopic parameters of the device with a given degree of accuracy and with the required polling frequency.

At the same time, it is important to ensure the synchronicity of the sensor polling procedure, as well as to calibrate them in accordance with the mode in which they operate. It is impossible to exclude the fact that there are always probabilities of false alarm errors and missing a goal. The main task is to minimize these deviations, since they can make a significant error in the measurement results. It is worth considering the fact that when building an information and measurement system, the accuracy of each subsequent block should be no worse than the previous one.

**Key words:** technical system, data processing, correlation.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## UZHAVAN APP – A DIGITAL APP UTILIZATION BY FARMERS OF TAMIL NADU IN INDIA

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### ABSTRACT

The spread of mobile technologies, remote-sensing services and distributed computing are already improving smallholders' access to information, inputs and markets, increasing production and productivity, streamlining supply chains and reducing operational costs. The digital agriculture technologies in worldwide are Agricultural Stress Index System (ASIS), Water Productivity Open Access Portal (WaPOR), Food Price Monitoring and Analysis (FPMA), Information Network on Post-harvest Operations (INPhO) and so on. PM-Kisan, mKisan, Kisan Sarathi, Kisan Suvidha are some of the initiatives developed by the Government of India. Some of the Tamil Nadu Government initiatives are Grain, Engirunthum Ennerathilum, Agrisnet, Uzhavan App etc. Uzhavan app is a Tamil Nadu Initiative and it is very useful to the farmers to know the agriculture related information up-to-date. The Uzhavan app provides detailed information about subsidy scheme available for all agricultural inputs, crop insurance notified for crops in specific villages, also provides tractor and farm equipment services to farmers at low cost through custom hiring center in Tamil Nadu. Dharmapuri district was selected because of more number of uzhavan app users in that district in Tamil Nadu. 60 respondents were selected into two categories as 30 uzhavan app users and 30 non-uzhavan app users to study their utilization and constraints on utilization of Uzhavan App in Dharmapuri District of Tamil Nadu. The main reason for using uzhavan app by users was easy to access the app and foremost constraint was lack of market price information for all location. Lack of contact with other users was the major constraint specified by non-users of uzhavan app.

**Keywords:** Digital Agriculture, Uzhavan App, Utilization, Constraints and Tamil Nadu.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SYNTHESIS, CHARACTERIZATION, AND EFFICIENT APPLICATION OF Cu/Bt-C PHOTOCATALYST FOR SUSTAINABLE WATER REMEDIATION

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### ABSTRACT

Water pollution remains a pressing global issue, especially due to the persistence of industrial dyes in water bodies. Heterogeneous advanced oxidation processes (AOPs) offer a promising solution, and clay-based catalysts, particularly Bentonite (Bt) clay modified with cellulose and copper (Cu/Bt-C), have emerged as effective tools in this endeavor. This study investigates the synthesis and characterization of the Cu/Bt-C catalyst and its application in the degradation of organic Cogo Red dye by various AOPs. The catalyst is prepared through Two user-friendly methods (DPU method and ion exchange-impregnation method). Characterization techniques including FTIR, XRD, and AAS were used. The catalyst demonstrates excellent efficiency in degrading organic azo dyes, signifying its potential in environmental remediation.

**Keywords:** Heterogenous AOPs, Bentonite clay, Cu/Bt-C Photocatalyst, dye degradation.

SIMPLE NOVEL WAYS FOR EFFICIENT REMOVAL OF INDIGO CARMINE BY ION-  
EXCHANGE PROCESS ONTO BASIC RESIN AND BROMOCRESOL GREEN BY  
ADSORPTION TO CITRIC ACID BINDED HYACINTH BEAN HUSK:  
CHROMATOGRAPHIC ELUTION APPROACH

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**ABSTRACT**

Indigo carmine (IC) and bromocresol green (BCG) are two sulfonephthalein dyes used widely in textile and food industries and also as tracking agents for DNA agarose gel electrophoresis and sol gel matrices. Post usage delivery of these dyes to water bodies certainly create the harmful situation to aquatic lives and thus the removal of even their little quantities play significant role. Simple column chromatographic method has been employed to remove IC by ion-exchange and BCG by adsorption mechanism. A basic anion exchange resin has been evolved out as the most selective and appropriate exchanger for IC. Whereas, the BCG has been effectively demonstrated for its removal using citric acid binded haysinth bean husk as an adsorbent. The scanning electron microscopic images (SEM) have confirmed the citric acid binding and dye adsorption onto the adsorbent surface. Experimentally it has been found that at room temperature 1 g of resin showed removal of > 95% of IC up to 150 µg/mL at the pH range from 9 to 10; 0.25g of husk showed removal of 96.6% BCG at pH 2-3 under 1 mL/minute flow rate. The ion-exchange capacity has been determined and reported for wet resin. Experimental parameters like effect of initial dye concentration, thermodynamic studies, contact time, flow rate have been optimized. The thermodynamic aspects viz, the change in Gibbs free energy, enthalpy and entropy of the exchange and adsorption have been calculated and reported. The isothermal studies indicated efficient exchange of IC over the studied concentrations of IC. The reversibility of the exchange process has been ascertained using neutral sodium nitrite. The experimental kinetic isotherm models have also been studied and results reported.

**Keywords:** Ion exchange, adsorption, dye removal, column chromatography, indigocarmine, Hyacinth bean husk.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**A REVIEW ON JERUSALEM ARTICHOKE**

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**ABSTRACT**

Jerusalem artichoke (*Helianthus tuberosus*), often referred to as “sunroot” or “earth apple,” is a unique and versatile plant that has been cultivated for centuries. This abstract provides an overview of Jerusalem artichoke, covering its history, characteristics, culinary uses, nutritional value, and potential benefits. Jerusalem artichoke is a member of the sunflower family and is native to North America. It was a staple food for Native American tribes long before European settlers arrived. Early European explorers brought this hardy plant back to their homelands, introducing it to the broader world. This plant is known for its distinctive tuberous roots, which resemble knobby, irregularly shaped potatoes. These tubers are the primary edible part of the Jerusalem artichoke and have a crisp texture and a slightly nutty, sweet flavor. They can be prepared in various culinary applications, such as roasting, sautéing, mashing, or even consumed raw in salads. Nutritionally, Jerusalem artichokes are a valuable source of dietary fiber, vitamin C, and various minerals, including potassium and iron. They are also low in calories and fat, making them a healthy addition to a balanced diet. One of the most notable characteristics of Jerusalem artichoke is its high inulin content, a type of carbohydrate that is not digested in the upper gastrointestinal tract. Instead, it serves as a prebiotic, nourishing beneficial gut bacteria and promoting digestive health. Beyond their culinary uses, Jerusalem artichokes have been explored for potential health benefits. Some studies suggest that inulin-rich foods like Jerusalem artichokes may help regulate blood sugar levels, support weight management, and improve gut health. However, further research is needed to confirm these potential advantages conclusively. In summary, Jerusalem artichoke is a unique and nutritious plant with a rich history. Its tuberous roots offer culinary versatility, and its nutritional composition makes it a healthy addition to various dishes. Additionally, its high inulin content holds promise for potential health benefits, making Jerusalem artichoke a fascinating and valuable component of both culinary and dietary landscapes.

**CHILAITITI SIGN: RARE INCIDENTAL FINDING**

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**Introduction:**

A relatively uncommon clinical illness called Chilaiditi's syndrome affects the colon's hepatic flexure, which is situated between the liver and the diaphragm. The presence of free air under the diaphragm on simple abdomen radiographs is known as the Chilaiditi's sign. It is an accidental discovery and often has no symptoms. When vomiting or other symptoms like stomach discomfort are present, it is known as Chilaiditi's syndrome. Report an incident to the emergency department.

**Case:**

A 30-year-old man who was experiencing epigastric and central abdominal discomfort arrived at the emergency room. No prior medical history was present. On examination, there was a rebound and diffuse abdominal discomfort. A pneumoperitoneum was visible on a chest radiograph. There was subdiaphragmatic free air and an elevated right hemidiaphragm. The results of the usual laboratory testing were normal. To treat a possible perforated gastrointestinal tract, the patient was referred to the surgical team. There were no unexpected medical crises. After receiving emergency department care and hydration support, the patient was released from the hospital.

**Discussion:**

Transposition of the colon's hepatic flexure between the liver's surface and the diaphragm's dome causes Chilaiditi's syndrome. In a small number of cases, about 3-5%, the small bowel is out of position. There might be a wide range of symptoms, including nausea, bloating, constipation, and stomach discomfort. An emergency surgical exploration may be indicated if the x-ray reveals open air under the diaphragm. However, there can be other causes for such a result that don't necessitate such an immediate response. The pneumoperitoneum may be confused for Chilaiditi's sign, leading to an unnecessary exploratory laparotomy. Thus, additional research should be done on this straightforward radiological discovery.

**Keywords:** chilaiditi, colon, free air, abdominal pain



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## TARGETED DRUG DELIVERY SYSTEMS FOR CANCER THERAPY: RECENT ADVANCES

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### ABSTRACT

Cancer stem cells (CSCs) are a subpopulation of cancer cells with functions similar to those of normal stem cells. Although few in number, they are capable of self-renewal, unlimited proliferation, and multi-directional differentiation potential. CSCs have the ability to escape immune surveillance. Thus, they play an important role in the occurrence and development of tumors, and they are closely related to tumor invasion, metastasis, drug resistance, and recurrence after treatment. Therefore, specific targeting of CSCs may improve the efficiency of cancer therapy. Targeted drug delivery systems for cancer therapy have made significant advances in recent years, offering the promise of more effective and less toxic treatments for cancer patients. These systems aim to deliver therapeutic agents directly to cancer cells while sparing healthy tissue, thereby improving treatment outcomes and minimizing side effects.

**Key Words:** Cancer stem cells, Targeting strategies, Drug delivery systems, Cancer treatment

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## REVOLUTIONARY THERAPEUTIC APPROACHES IN ERADICATING PARASITES THROUGH NANOTECHNOLOGY

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### ABSTRACT

The use of nanoparticles in physical and biological systems comes under the heading of nanotechnology. In underdeveloped and developing countries, where conventional treatment methods have drawbacks, nanotechnology offers a potentially effective response to the problem of parasitism. Nanoparticles have the potential for vaccine development, improved drug delivery, and decreased toxicity. They can target infected cells, increase treatment efficacy, and reduce the likelihood of drug resistance. Various types of nanoparticles show promise in treating parasitic diseases including polymeric nanoparticles, dendrimers, metal-based, silica-based, carbon-based, and lipid-based nanoparticles. Numerous pathogen-fighting techniques used by nanoparticles include membrane rupture, blocking of communication channels, improved medication effectiveness, targeted drug administration, immunological modulation, and production of reactive oxygen species (ROS). Nanoparticles, especially those made of silver and gold, exhibit a wide range of anti-parasitic properties. Gold nanoparticles (AuNPs) show promise against protozoan infections, including *Plasmodium*, *Leishmania*, and *Toxoplasma*. AuNPs improve drug delivery, promote angiogenesis, and have the potential for diagnostics. Additionally, silver nanoparticles (AgNPs) show effectiveness against diseases like *Plasmodium* and *Leishmania* as well as vectors like mosquitoes. The challenges of treating parasite infections can be assisted by nanotechnology. The limits of traditional approaches are brought on by drug resistance and delivery issues. Nanoparticles offer enhanced drug delivery to target sites, improved drug solubility, resistance mitigation through combination therapies, and reduced side effects through targeted and triggered drug release. Applying nanotechnology to parasitic disease treatment presents challenges. Parasite complexity and varying host immune responses demand adaptable nanoparticle interventions. Targeted drug delivery faces hurdles due to biological barriers, while high production costs and safety concerns can hinder accessibility. The wide range of nanoparticles and their potential toxicity emphasize the need for in-depth safety analyses. In areas with poor access to healthcare, this technology might revolutionize therapeutics.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
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**FORMULATION AND EVALUATION OF DIRECTLY COMPRESSIBLE  
AGGLOMERATES OF TELMISARTAN**

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**ABSTRACT**

The aim of the work is to formulate spherical agglomerates and enhance the micromeritic properties, solubility and dissolution rate of Telmisartan, a poorly water soluble anti-hypertensive drug. The poor water solubility and poor micromeritic properties of Telmisartan lead to low dissolution rate and poor flow during tableting. Telmisartan spherical agglomerates were prepared by spherical agglomeration techniques using a quasi emulsion solvent diffusion method consisting of chloroform and water as good solvent and bad solvent respectively. PVP K30 and PEG6000 in different concentration were used as hydrophilic polymers in agglomeration process.

**Key words:** Telmistratan, micromeritic properties, solubility, dissolution rate

CHATBOT FOR TEENAGERS

*Niraimathi M*

*Ponmani S*

*Pratthika A T*

*Priyadharshini D*

**ABSTRACT**

In our rapidly evolving digital age, one of the most pressing challenges we face is the growing chasm between generations, particularly between teenagers and their elders. With mobile devices becoming ubiquitous, children increasingly find themselves engrossed in screens, disconnecting from meaningful face-to-face conversations with parents and guardians. This troubling trend often extends into adolescence, creating a significant barrier for teenagers when it comes to sharing their life experiences and seeking guidance from the very people who care about them the most – their parents.

To address this critical issue and foster stronger intergenerational bonds, we propose the creation of a Chatbot for Teenagers. It represents a groundbreaking, AI-driven conversational platform meticulously designed to facilitate open, meaningful, and ethical communication between teenagers and their parents or trusted adults.

The proposed Chatbot for Teenagers represents an unprecedented and compassionate response to the challenge of intergenerational disconnection exacerbated by the pervasive use of mobile devices. By nurturing open communication, providing sound guidance, and cultivating understanding between teenagers and their parents, it seeks to fortify familial bonds, support healthy adolescent development, and cultivate more connected and empathetic generations. This visionary project leverages the capabilities of AI technology to construct bridges of understanding and compassion within families, fostering healthier, happier relationships between teenagers and their parents or guardians. Crucially, it stands as an unwavering guardian of ethical conduct, ensuring that it never guides teenagers down harmful or inappropriate paths, instead offering a steadfast source of support, guidance, and connection.

**Keywords:** Intergenerational communication, Teenagers, AI-driven conversational platform, Trust-Building, Unwavering Guardian, Ethical Conduct.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SAND MINING IN WATARI RIVER: NEXUS ENVIRONMENT, ECONOMIC AND SOCIAL IMPLICATIONS

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### ABSTRACT

The study aimed at assessing the implication of sand mining on environment and socioeconomic activities along Watari River. The study utilizes mixed method; where both qualitative and quantitative methods were used. Both primary and secondary sources of data were used. On the other hand, multi-stage sampling technique was used for this research. Descriptive Statistics (Univariate description) was used for data analysis where tabulation, percentage, bar chart and so on were used. On the other hand, the study reveals that majority of the respondents believed that they receive social benefit from sand mining activities, but all of them stated that they do not benefit from sand mining activity environmentally. Though, economically, majority of the respondent believed that they earn some income through engaging in sand mining activity. It is also identified that the most common social challenge that people face in the study area is death because of falling into some gullies or having accident as a result bad terrain they are having because of sand mining activity. The study recommended that It is recommended that the government should intervene directly into sand mining business by regulating the amount of sand should be mined every year in order to minimize the effect of creating gullies. Government should also enforce the compliance with environmental agencies in order to protect the environment and life of people living in the area.

**Keywords:** Sand Mining, Environmental Implication, River Watari

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## EXPLORING THE COMPUTATIONAL ANALYSIS OF FLAVONE DERIVATIVES FOR SARS-CoV-2 PROTEIN INHIBITION

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### ABSTRACT

**Background.** This study aims to identify prospective targets for SARS-CoV-2 RdRp for novel therapeutic natural medicines derived from aromatic and medicinal plants, which are present in various food kinds.

**Methods.** In this research article, we created a library of five compounds of Flavone derivatives that exist naturally (4a, 4b, 4c, 4d and 4e) and standard favipiravir- RTP were examined through an in-silico approach which requires several important processes, including (a) Lipinski's rule of five and ADMET parameters, (b) molecular docking analysis, and (c) molecular dynamics simulation for 100 ns.

**Results.** Based on the outcomes presented above, the five compounds displayed a superior pharmacological response compared to the standard, with promising findings and no limitations. As a result, two flavone derivatives (4d and 4e) were selected as they exhibited stronger binding energies than the reference molecule, having binding affinities of -7.036 kcal/mol and -7.141 kcal/mol. Lastly, the stability of the two best compounds bound with SARS-CoV-2 RdRp was confirmed by subjecting them to molecular dynamics (MD) simulations, which showed that they had a stable trajectory (RMSD, RMSF) and consistent interaction profiles with desirable molecular properties.

**Conclusion.** Several compounds derived from aromatic and medicinal plants have been shown in the current analysis to have in silico potential against SARS-CoV-2 RdRp, making them feasible candidates for in vitro and in vivo testing in the treatment of COVID-19 patients.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## MOLECULAR EPIDEMIOLOGY OF *LEISHMANIA* SPECIES IN CAMELS OF SELECTED DISTRICTS OF BALOCHISTAN

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### ABSTRACT

Leishmaniasis is a vector-borne parasitic disease. The etiological agent, *Leishmania*, is known to infect a wide range of hosts including domestic and wild animals and being transmitted by sand fly. It is one of the most devastating neglected tropical diseases in the world. Pakistan has more than one million camel population which are highly susceptible to parasitic infections. In Pakistan, no published data is available regarding molecular prevalence of *Leishmania* in camels. Therefore, present study was proposed to investigate the molecular epidemiology of leishmaniasis in camels. Briefly, 384 blood samples were collected from camel population of four districts of Zhob division i.e., Musakhel, Barkhan, Loralai and Zhob in Balochistan using simple random sampling method. The information regarding gender, age, living habitat, feeding pattern and managerial conditions were inquired from farmers on a pre-designed questionnaire. DNA was extracted from the collected blood samples using Wiz Prep gDNA kit and then samples were screened by PCR using genus specific primers. The obtained data was interpreted through odd ratio and multiple logistic regression. The overall prevalence noted for *Leishmania* species in Zhob division of Balochistan was 17.18%. *Leishmania* infection was found higher in Zhob (21.29%), followed by Musakhel (19.58%), Barkhan (13.68%) and Loralai (13.09%) district in decreasing order, respectively. Infection was found higher in females, and animals more than 5 years of age. *Leishmania* prevalence was found higher in rainy season as compared to dry season. Animals living in larger herd size (>20 animals) were found more prone to infection as compared to animals living in smaller herd size (<20 animals).

**Keywords:** *Leishmania*, Epidemiology, Camel, Balochistan

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ADVANCING PATIENT CARE WITH THE INTRAVENOUS DRIP CONTROLLER

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### ABSTRACT

Intravenous (IV) therapy is a cornerstone of modern healthcare, demanding precise fluid and medication delivery. Our innovative Intravenous Drip Controller (IDC) offers a solution to common challenges associated with traditional IV administration. The IDC features a digital interface for accurate and convenient flow rate adjustments, reducing the potential for human errors and enhancing patient safety. Moreover, the system integrates smart sensors and continuous monitoring capabilities, ensuring real-time assessment of patient vital signs and fluid requirements. This dynamic feedback mechanism enables automatic adjustment of the infusion rate, guaranteeing that patients receive the optimal treatment at all times, particularly crucial in critical care scenarios. The IDC prioritizes both healthcare providers and patients, offering an intuitive interface for medical professionals and peace of mind for patients. This advancement promises to revolutionize IV therapy management, improving patient care, reducing healthcare provider workload, and contributing to better medical outcomes. This paper outlines the IDC's key features and benefits, highlighting its potential to transform the realm of intravenous therapy.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## KINETIC MODELLING OF POWDER-PACK BORONIZED 4CR5MOSIV1 STEEL BY THE DIMENSIONAL ANALYSIS

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### ABSTRACT

The aim of this work is to analyze the boronizing kinetics of 4Cr5MoSiV1 steel within the temperature interval of 1173-1323 K. The employed approach is based on the application of dimensional analysis. Two dimensionless groups were derived during the establishment of this kinetic model to simulate the layer thicknesses of both FeB and Fe<sub>2</sub>B whose values were concordant with the experimental results taken from the literature. The experimental results were fitted according to the power laws to express the interdependence of the two dimensionless parameters

**Keywords:** boronizing, iron borides, diffusion, dimensional analysis, activation energy.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SIMULATION AND COMPARISON OF P&O AND INC MPPT CONTROL FOR SMALL WIND PMSG TURBINE SYSTEMS

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### ABSTRACT

This work show a comparison between two Maximum Power Point Tracking (MPPT) methods that aims to achieve optimal power operation for a small grid-connected wind turbine. The MPPT algorithm adjusts the duty cycle of a boost converter in response to changes in the DC link power and DC link voltage in order to achieve maximum power production across all wind speeds. Both MPPT methods under consideration was evaluated using MATLAB/Simulink. The system under consideration comprised a Permanent Magnet Synchronous Generator (PMSG) that was operated by a Small Wind Turbine ( 4,5 KW ). This PMSG combination was connected to the the grid DC/AC converter. This work provides a comprehensive comparison between perturb and observe ( P&O) method and incremental conductance ( INC ) under different wind conditions.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## HEALTHCARE ASSOCIATED INFECTIONS IN HIGH RISK WARDS: PREVALENCE AND ASSOCIATED FACTORS

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### Introduction

Patients in high risk wards (HRW) are highly exposed to healthcare associated infections (HAI) due to the high prevalence of invasive procedures and devices, induced immunosuppression and comorbidities. In this context, this study aimed to determine the prevalence of HAI at HRW and to identify their associated factors.

### Methods

It was a point prevalence study conducted in the two university hospitals of Southern Tunisia in February 2023. All patients hospitalized for at least 48 hours were included in this study. High risk wards consist of wards with the following specialties: Hematology, Oncology, Burns, Transplantation, and Infectious Diseases.

### Results

We recorded 14 HAI among 70 patients surveyed at HRW, giving a HAI prevalence of 20%. The sex ratio (M/F) was 1. Bloodstream infections were the most frequent HAI (n=8; 57.1%), followed by respiratory HAI (n=4; 28.5%). We noted a single case of urinary tract HAI and of digestive tract HAI (7.1%). The median age of infected patients was 47 years, IQR= [27-62] years. The median length of hospital stay was 8 days IQR= [2-23] days. The most common diagnosis at admission were oncological diseases (n=31; 44.2%) followed by infectious diseases (n=13; 18.5%). Hypertension (23.7% VS 6.5%; OR=1.7; p=0.04) and neutropenia (41.7% VS 15.5%; OR=3.8; p=0.03) were statistically associated with high prevalence of HAI in HRW. The HAI were microbiologically documented in 35.7% of cases (n=5), among whom, 3 were caused by multidrug resistant germs (60%). Identified germs were *pseudomonas aeruginosa* (2 cases; 40%) *Klebsiella Spp* (2 cases; 40%), and *enterococcus* (1 case; 20%).

### Conclusion

Our findings illustrated alarming prevalence of HAI in South Tunisian HRW. Therefore, general guidance in enhancing hygiene conditions may reduce HAI rates and especially outbreaks in HRW admitting particular patients.

**Keywords:** Health-care associated infections; High risk wards; Prevalence; Associated Factors.

**THE BURDEN OF HOSPITAL-ACQUIRED BLOOD STREAM INFECTIONS IN SOUTH-TUNISIAN UNIVERSITY HOSPITALS**

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**Introduction**

Hospital-Acquired Blood Stream Infections (HABSI) are major causes of morbidity and mortality all over the world. Most studies of HABSI were carried out in developed countries and, there are few data providing the specificities of these infections from developing countries of the world. We therefore conducted this survey to describe the epidemiological, clinical and bacteriological features of HABSI in South-Tunisian university hospitals.

**Methods**

We included all patients admitted in the two university hospitals of Sfax, Southern Tunisia, for at least 48 hours in February 2023. An adapted protocol derived from the second national HAI prevalence survey “NOSOTUN 2012”, the “WHO Methodology for Point Prevalence Survey on healthcare-associated infections in Hospitals 2018”, and the European Centre for Disease Prevention and Control (ECDC) was used. HABSI were defined according to the CDC/NHSN case definitions.

**Results**

A total of 1028 hospitalized patients were included in this study. The prevalence of healthcare associated infection was 8.4% (n=86). Of whom, 21 cases (24.4%) had HABSI giving a global HABSI prevalence of 2% (95% CI= [1.3-3.2]). Diagnoses at admission of patients with HABSI were lower respiratory tract infection, catheter related infection (n=3; 14.2%), and urinary tract infection in 2 cases (9.5%). The highest prevalence of HABSI was noted in adult medical wards (n=10; 47.6%) followed by intensive care units (n=8; 38.1%). The sex-ratio was of 0.75. The median age was 43 years old with interquartile range (IQR)= [28-63] years. The median length of stay was 23 days with IQR= [9.5-30] days. The McCabe index was  $\geq 1$  in 7 cases (33.3%). Diabetes was the most frequent associated comorbidity in 5 cases (23.8%), followed by hypertension (n=3; 14.3%), neutropenia (n=2; 9.5%) and dyslipidemia (n=2; 9.5%). Eight patients (38.1%) were immunocompromised and 6 cases (28.6%) had undergone surgery since admission. Suggestive symptoms for HABSI were fever in 9 patients (42.9%) and hypotension in 3 patients (14.3%). A blood culture was requested in 13 cases (62%) and pathogens were recognized in 8 cases (61.5%), of whom 4 were multidrug resistant (MDR) germs (50%). *Pseudomonas aeruginosa*, *Klebsiella spp*, and *proteus mirabilis* were the main isolated germs in 2 cases for each one (25%).

**Conclusion**

In conclusion, HABSI was associated with a substantial burden of hospitalization in South-Tunisian hospitals with high rate of MDR germs. Lower respiratory tract infection and catheter related infection were likely to be the main sources of infection leading to HABSI. Thus, attention should be paid to these patients with underlying conditions to avoid occurrence of such burden.

**Keywords:** Hospital-acquired blood stream infection; Health-care associated infection; Prevalence; Multidrug resistant germs



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## KINEMATICS OF THE DRIVE CONVEYOR OF PAD PRINTING MACHINE

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### ABSTRACT

Nowadays, pad printing machines have become widespread, making it possible to decorate industrial products of three-dimensional shape using printing methods. Various conveying devices are used to feed products into the printing contact zone. Among them are carousel and conveyor type devices (for example, in a block processing unit).

Taking into account the specifics of pad printing, when printing takes place during the idle period, plate-type conveyors are used, where a device for fixing a printed product is placed on the plate and serves as a support surface during printing. The features of the structure of construction of such conveyors were analyzed and calculation of such conveyors was conducted. The conducted analysis of existing mechanisms of periodic rotary motion shows that it is reasonable to use cam mechanisms of periodic rotation to drive the conveyor.

We propose a device for periodic rotational movement of the driven link, containing a housing, a drive shaft with a cam mounted on it, a main gear connected to the driven link shaft, rollers mounted on it interacting with the cam, a balancing mechanism including an elastic element and an additional gear, interacting with the main gear, wherein one end of the elastic element is connected to an eccentrically mounted pin on the additional gear, and the other end is connected to an eccentrically mounted pin on the cam, the working profile of the cam is made open along the minimum radius vectors. The advantage of such a mechanism is the possibility of any ratio between the working and idle strokes, which is important for versatility when printing products of various dimensions on pad printing machines.

To sum up, this study considers the method of synthesis of the cam mechanism and power calculation of the conveyor for pad printing machines. The construction structure and kinematics of the drive conveyor of pad printing machines is analyzed. The synthesis of the cam gear of periodic rotation for the drive conveyor is conducted.

**Keywords:** pad printing, printing machine, rotary motion, periodic motion, cam mechanism.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SYNTHESIS AND CHARACTERIZATION OF NEW HYBRID CATALYST BY IRON COMPLEX MODIFICATION OF MONTMORILLONITE K-10 CLAY FOR THE DEGRADATION OF CONGO RED DYE

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### ABSTRACT

Clay has many unique characteristics that can be used to make many types of catalysts; its large surface area and cation exchange capability allow it to bind a wide range of organic molecules.

3-aminopropyltriethoxysilane (APTES) molecule is a widely used chemical agent as a grafting bridge for the functionalization of many molecules on the clay support. The addition of ligands on the amine APTES end is necessary to install metals in the form of complexes. The use of these organic molecules on the clay surface allows the development of catalysts for the degradation of organic pollutants release in water sources.

This study concerns the preparation of a hybrid catalyst based on montmorillonite K10 modified with 3-aminopropyltriethoxysilane (APTES), followed by the immobilisation of the triglycine peptide (3Gly) and finally the immobilised peptide is complexed with iron ions. The success of each synthesis step was proven by the different characterisation methods (FTIR, BET, DRX, ATG). The final product was examined in the degradation of Congo Red azo dye by three advanced oxidation processes, namely: Fenton, photocatalysis and photo-Fenton. The results obtained after the catalytic tests show that the prepared catalyst is efficient for the degradation of Congo Red by the Photo-Fenton process, this was concluded thanks to the good yield obtained (96%). Also, the reusability of the catalyst shows that the activity is maintained for three catalytic cycles.

**Keywords:** clay, iron, functionalization, ligands, photo-Fenton.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## OCCURRENCE OF *ESCHERICHIA COLI* AND *KLEBSIELLA* SPECIES IN THE URINE OF UTI PATIENTS ATTENDING BARAU DIKKO TEACHING HOSPITAL, KADUNA

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### ABSTRACT

Urinary tract infections (UTIs) constitute a significant global health concern due to their widespread and contagious nature. These infections often target vital human organs such as the bladder, ureters, and urethra, leading to severe complications. Left untreated, asymptomatic bacteriuria can progress into cystitis or pyelonephritis, resulting in increased treatment costs and morbidity. The absence of a comprehensive national antibiotic resistance surveillance system, coupled with non-evidence-based prescriptions and insufficient data, has hampered effective intervention strategies. This study focuses on assessing the prevalence of *Escherichia coli* and *Klebsiella* species within the urinary tracts of patients receiving care at Barau Dikko Teaching Hospital, Kaduna. Urine samples from 132 individuals suspected of UTIs were analyzed, with 98 (74.24%) being female and 79 (59.85%) males. Notably, the 21-30 age group exhibited the highest prevalence, accounting for 37 (37.37%) of the 79 (79.80%) specimens within the group. Among the 61 (30.50%) isolated pathogens, *Escherichia coli* emerged as the predominant uropathogen, comprising 29 (14.50%) isolates, followed by *Klebsiella* species with 16 (8.00%) isolates. Notably, these pathogens exhibited resistance to common antimicrobials such as Amoxicillin, Ampicillin, Ciprofloxacin, Cefixime, Cefuroxime, Ceftriaxone, Co-Trimoxazole, and Doxycycline, while displaying sensitivity to Amikacin, Nitrofurantoin, and Imipenem. This study underscores the prevalence of UTIs caused by *Escherichia coli* and *Klebsiella* species, encompassing both Gram-positive and Gram-negative bacteria. The alarmingly high resistance rates of these infections to commonly used antimicrobials pose a significant challenge for clinicians, limiting available empirical treatment options. Addressing this challenge requires a multifaceted approach, including robust surveillance systems, evidence-based prescribing practices, and judicious use of antimicrobials.

**Keywords:** Antibiotics, *Escherichia coli*, *Klebsiella*, Urinary Tract Infection.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## H<sub>2</sub>O<sub>2</sub> GENERATING CHEMODYNAMIC AGENTS FOR THE THERAPY OF CANCER

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### **Abstract**

With 1.2 million fatalities in 2020, carcinoma was the second most common cause of death, accounting for 23.0% of all fatalities. Due to the great selectivity, chemodynamic treatment (CDT), which uses Fenton-Fenton like catalysts for transforming hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) into hazardous hydroxyl radicals (OH) to destroy cancer cells, has a lot of potential for tumour therapy. The most important aspect of Chemodynamic Therapy (CDT) is the application of Fenton chemistry in the tumour microenvironment (TME) for treatment for cancer. The advantages of CDT include good selectivity and few side effects because to the particular properties (weak acidity and high H<sub>2</sub>O<sub>2</sub> level) found in the tumor microenvironment. The anticancer impact of CDT is directly correlated with the catalytic performance of Fenton nanocatalysts (F-NCs). However, due to the low concentration of endogenous H<sub>2</sub>O<sub>2</sub>, the effectiveness in combating cancer is inadequate.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**CLASSIFICATION OF SECOND ORDER ORDINARY DIFFERENTIAL EQUATIONS  
USING LAMBDA SYMMETRIES**

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**ABSTRACT**

This research investigates the application of differential equations (DEs) in modeling dynamic phenomena across scientific domains. Nonlinear DEs, common in natural processes, pose significant challenges, but Lie symmetries offer effective solutions by transcending order, linearity, and homogeneity constraints. Identifying symmetries simplifies both partial and ordinary DEs, streamlining problem-solving. The study also delves into  $\lambda$ -symmetries, which extend Lie symmetries and provide new avenues for tackling nonlinear ODEs and PDEs. It conducts a comparative analysis of Lie and  $\lambda$ -symmetries, focusing on categorizing second-order linear and nonlinear ODEs through symmetry identification. By solving equations using both approaches, the research enhances our understanding of the interplay between Lie and  $\lambda$ -symmetries in solving complex differential equations.

**Keywords:** Lie symmetries; Lambda Symmetries; Nonlinear Dynamics; Classification.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## CONTEMPORARY AND TRADITIONAL METHODS AND TECHNIQUES THEIR ROLE FOR EFFECTIVE LEARNING IN THE LOWER CYCLE

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### ABSTRACT

The purpose of this study is to ascertain how much modern methods and techniques take place in relation to the teacher's students. Identify the most useful methods in a lesson.

The most effective evidenced in a lesson as well as the contemporary impact in these methods of thinking methods, communication skills, research, independent, creative thinking, problem solving, initiative, etc.

For the realization of the study, the use of quantitative (questionnaire) and qualitative (interviews, conversations) methods. For the needs of the study in the application of two questionnaires (questionnaire 1 for teachers and questionnaires 2 for students), the interview carried out by the right structures of the schools, unstructured interviews, conversations with the teachers of the students of the schools taken in the study. Finally, 100 students were collected for questionnaire 1 and 15 teachers for questionnaire 2. Interviews were conducted with 3 principals of the schools included in the study, as well as unstructured interviews with the teacher of primary school students.

Where the study was carried out in 3 9-year schools in the city of Tirana, namely "Emin Duraku", "Edit'h Durham" and "Skënder Luarasi" schools. The study population is students of the fourth to fifth grades, the teacher who exercises their activity in the primary cycle classes as well as the principals of these schools.

From the collected data we come to the conclusion that: Contemporary teaching methods bring important and significant changes in learning, as a result of the improvement of teachers for their teaching. Contemporary methods aim to put the teaching and learning process on a contemporary basis, as well as the timely improvement of the teaching and learning process. The implementation of student-centered learning models is a necessity for contemporary and quality learning. These true positive facts about contemporary teaching – knowledge in education saying the hypothesis created.

Contemporary methods are practiced in our schools, but we must not forget that our teachers, especially those with many years of work in education, are still a little traditional in the classroom. While for new teachers, more trainings, talks, open subject lessons should be organized so that Basque methods should remain 100% and learning for students should be a desire of the department within, not only.

**Keywords:** contemporary method, traditional method, quality in education, cooperation.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## CHARACTERIZING BINARY LINEAR CODES BY PERMUTATION AUTOMORPHISM GROUPS

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### ABSTRACT

A binary linear code  $C$  of length  $n$  is a subspace of a finite dimensional vector space  $(F_2)^n$ . The Hamming weight of a codeword  $c$  in  $C$  is the number of non-zero coordinates of  $c$ . The code  $C$  is called constant weight code if each non-zero codeword in  $C$  has the same Hamming weight. This specific family of codes has many applications in design theory. One can approach the problems in coding theory by using group theory, representations of groups and ring theory. The connection between these subjects starts with the action of symmetric groups on finite dimensional vector spaces. The symmetric group  $S_n$  acts on the vector space  $(F_2)^n$  by permuting the coordinates of vectors. The stabilizer of  $C$  under this action is called the permutation automorphism group of  $C$  and denoted by  $\text{PAut}(C)$ . For a linear code  $C$  whenever  $\text{PAut}(C)$  is nontrivial we get many algebraic properties of  $C$  such as being  $F_2G$ -module where  $G$  is a non-trivial subgroup of  $\text{PAut}(C)$  or being a group code or being a quasi group code. Whenever the parameters of  $C$  is getting larger, determining the structure of  $\text{PAut}(C)$  is getting complicated. In this talk, for a binary constant weight code  $C$ , I will give a complete formula for the order of  $\text{PAut}(C)$  in terms of parameters of  $C$ . For the order of  $\text{PAut}(C)$ , such formulas in terms of parameters of the code is not common. As an application of this formula, we calculate  $\text{PAut}(C)$  for some specific infinite families of constant weight codes. These results are a part of the paper [Altunbulak M., Altunbulak Aksu F., On the binary linear constant weight codes and their automorphism groups, [2208.10267.pdf \(arxiv.org\)](#)]

**Keywords:** binary linear codes, constant weight codes, symmetric groups, permutation automorphism groups



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## THE IMPACT OF CRISIS MANAGEMENT IN TELE WORKING DURING THE PANDEMIC OUTBREAK -COVID-19

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### ABSTRACT

The pandemic outbreak began in Wuhan, Hubei province, China in 2019, and then spread to almost the rest of the world (W.H.O, 2020). The spread of the virus very quickly encouraged social distancing, reflected next with the closure of borders, the cancellation of flights, the closure of financial markets, corporations, businesses, institutions, universities, schools, also quarantine at home. Covid-19 influenced lifestyle, human health, and above all, a considerable impact on the global economy. The crisis is affecting how and where we work, it has led to a sharp drop in employment and hours worked and it affects workers' incomes, job security and job prospects for young people arriving on the labor market (ILO 2020i). The different trends in the Covid-19 effects are partially explained by the ability of businesses to go digitalization<sup>1</sup>. This research is focused on the outbreak of the pandemic, its impact on the economy, industry, medicine, agriculture, tourism, etc., the challenges and opportunities of teleworking, how to develop work online from home in the future. Understanding the value of working online is to increase the development of businesses towards digitalization, more employment opportunities, increase income and minimize the cost of living. However, there are several practical challenges and associated risks of valuing teleworking that affect its application in practice.

To reach this overall objective, the specific objectives will be:

- Framing the valuations problems in the context of crisis management at the government level, including administration, businesses.
- To evaluate the effectiveness of online work (degree of accomplishment of employment functions, degree, and quality of performance of tasks, possibility, and effectiveness of online communication), limiting / promotional factors.
- An assessment of the development of sectors, the degree of continuity or stay in the online system, as a framework of measures that must be implementing (who, what, when, how?). To promote or keep employment online and in the future.

**Keys words:** Pandemic outbreak, Teleworking, Crisis management, Covid-19

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<sup>1</sup>Impacts of the COVID-19 pandemic on EU industries, Policy Department for Economic, Scientific and Quality of Life Policies Directorate General for Internal Policies Authors: Jan Maarten DE VET, Daniel NIGOHOSYAN, Jorge NÚÑEZ FERRER, Ann-Kristin GROSS, Silvia KUEHL, and Michael FLICKENSCHILD PE 662.903 - March 2021

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## CLASSIFICATION OF SCIENCE FROM AN ISLAMIC PERSPECTIVE : A LITERATURE REVIEW

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### ABSTRACT

Science cannot be separated from human life. The human mind was created to think, as mentioned by Him in the Koran. The purpose of writing this paper is to explain the classification of science from an Islamic perspective. This writing method uses a literature review sourced from online journals regarding the classification of Islamic sciences. The definition and meaning of science is the result of interpretation by Muslim thinkers in interpreting the word in question based on their respective perspectives. The absence of specific mention of the concept, definition, meaning or nature of science in the Qur'an is caused by several things. First, that the word science had become a word that could be understood by the Arab community when the Koran was revealed to the point that it no longer needed to specifically mention its meaning in the Koran. According to Islamic philosophers such as al-Kindi, al-Farabi, Ibnu Sina, Al-Ghazali, and Ibn Khaldun, the classification and hierarchy of sciences adhere to the Al-Qur'an and Hadith, namely in choosing between basic or main sciences and those that are not main or not main. The nature of Islamic perspective science is holistic or Rabbani. It means in line with Islamic philosophy regarding natural and human issues, especially regarding issues of natural science as well as social and humanitarian knowledge. Science is comprehensive and integrated in an effort to explain issues between the natural and supernatural realms, namely between the physical and metaphysical realms, or between issues of the world and the hereafter (religion). So from an Islamic perspective, the nature of science takes into account the role of religion or the role of God.

**Key words:** classification, science, and Islam

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**PERCUTANEOUS PERITONEAL ASCITES DRAINAGE with THE TROCAR TECHNIQUE:  
A SINGLE CENTER EXPERIENCE**

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**ABSTRACT**

**Background and aim:** Peritoneal fluid increase is common in benign and malignant diseases called ascites. Drainage of the existing fluid may be necessary for diagnosis, treatment, and palliation. For this purpose, the catheter procedure can be performed using the Seldinger or Trocar technique. This study aims to evaluate the efficacy and safety of percutaneous ascite drainage using the Trocar technique.

**Material and methods:** A total of 40 patients who were inserted percutaneous ascites drainage catheter using the Trocar technique in our center between January 2021 and August 2023 were included in the study. The procedure was performed under the guidance of ultrasonography, under standard sterile conditions, and local anesthesia.

**Results:** The mean age of the patients was 62±9.5. 18 patients (45%) were male, and 22 (55%) were female. An 8F catheter was inserted in 28 patients (70%), and a 10F catheter was inserted in 12 patients (30%). There was malignant effusion in 35 patients (87.5%) and benign effusion in 5 patients (12.5%). The procedure was performed in 6 patients using an antiaggregant (15%). The nature of the effusion was serous in 25 patients (62.5%), and hemorrhagic in 15 patients (27.5%). No major complications developed in any of the patients. Minor complications were present in 2 patients (5%). There was leakage around the catheter in 1 patient, and an infection developed around the catheter in 1 patient.

**Conclusion:** Percutaneous ascites drainage with the Trocar technique is effective and safe for both malignant and benign diseases.

**Keywords:** ascites, catheter, trocar technique.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**INTERCONNECTION INTEGRATION APPROACH: A LITERATURE REVIEW**

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**ABSTRACT**

This research aims to examine the integration-interconnection approach. This research is library research with a qualitative approach. The data sources used in this research come from various literature journal articles that are relevant to the research topic. The data analysis method used is content analysis of the literature sources used in the research. The result of this research is that the unification of science is based on four approaches. First, the conflict approach is a belief that basically science and religion cannot be reconciled. Religion relies on wild imagination, while science relies on observed facts. Second, the contrast approach is a statement that there is no real conflict because religion and science respond to very different problems. Many scientists and theologians do not find any contradiction between the two valid even though the limits of the scope of their own investigations are clear. Third, the contact approach, an approach that seeks dialogue, interaction and the possibility of adjustments between science and religion, especially seeking ways in which science influences religious and theological understanding. This approach believes that without interfering with the methods typical of a scientist, religious beliefs thrive alongside science, so that they can produce a shared meaning, a meaning that is brighter than the meaning that can be given by either of them. Fourth, the confirmation approach is a quiet but very important perspective, this perspective highlights the ways in which religion at a deep level supports and animates all scientific activity. The universe is a finite, coherent, rational and orderly totality.

**Keywords:** Integration, interconnection, and literature review.

IN-SILICO AND RETROSYNTHESIS APPROCHE FOR 1,2,3-TRIAZOLE-QUINOLINE AS  
POTENTIAL INHIBITORS AGAINST SARS-COV-2 VIRUS

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**ABSTRACT**

Sars-Cove-2 has become a serious problem that motivates researchers to find new antiviral drugs as effective therapies. A computational study was carried out for disubstituted 1,2,3-triazole-quinoline molecules as Sars-Cov-2 inhibitors, where 3D-QSAR approach investigated the quantitative structure-biological activity as Mpro protease inhibitors. The study of the 3D-QSAR approach was performed for Comparative Molecular Field Analysis (CoMFA) and Comparative Molecular Similarity Index Analysis (CoMSIA), where CoMFA model values ( $Q^2 = 0.53$ ;  $R^2 = 0.97$ ) and the best values of the CoMSIA model ( $Q^2 = 0.67$ ;  $R^2 = 0.93$ ).

Molecular docking and a molecular dynamics analysis were carried out to study the stability of the ligands inside the biological Mpro active site, and an insilico ADMET study explored the pharmacological and physicochemical properties of the proposed molecules as a new anti-viral agent. These exploits good predictability. Subsequently, the CoMFA and CoMSIA models were evaluated by an external validation using the creditors of A. Goldparikh and A. Tropsha. A molecular docking study was carried out for the 18 derivatives of 1,2,3-triazole-quinoline and the five new candidates proposed with the biological target Mpro. MD molecular dynamics assess the reliability of this proposition and ADMET physicochemical properties and drug similarity.

A retrosynthesis routes was suggessted using two online platforms to show the possible synthesis route. The results help researchers to synthesize new candidates against Sars-Cove-2.

**Keywords:** Sars-Cove-2, Retrosynthesis, Molecular Docking, ADMET, Molecular Dynamics

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
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**CHARACTERIZATION OF LACUNARY  $\mathcal{J}$ -CONVERGENT SEQUENCES IN  
CREDIBILITY SPACE**

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**ABSTRACT**

This research paper aims to introduce the concept of lacunary ideal Cauchy sequences of fuzzy variables in a credibility space. We establish the interrelationships between this notion with lacunary ideal convergent sequences in the same structure from several aspects of credibility. Also, we investigate the ideas of strongly lacunary Cauchy, strongly  $\mathcal{J}$ -lacunary Cauchy and strongly  $\mathcal{J}$ -lacunary Cauchy sequences of fuzzy variables in credibility and look into the relationship among them.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**SENSOR-BASED DRONE**

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**ABSTRACT**

A sensor-based drone is a cutting-edge technology that utilises various sensors to enhance its capabilities and functionality. These sensors can include, but are not limited to, GPS, cameras, LiDAR, thermal imaging, and obstacle detection sensors. By integrating these sensors into the drone's system, we can operate this drone without human intervention. This sensor-based drone can be used in many areas, like agriculture and video recording, etc. A person cannot always pilot a drone. A person operating a drone can't cover the events properly; there may be ups and downs. Having a sensor-based drone eliminates the need for constant human supervision and allows for autonomous operation. So, by using sensors in the drone and setting the boundaries, it enables the drone to move around the given area and record the events. This is not only saving time and effort but also ensures that no important moments are missed. Additionally, the sensor-based drone can be programmed to follow specific patterns or paths, providing consistent and accurate footage or data collection. It can be programmed to follow a predetermined route during a sports event, capturing all the action from different angles. This feature is particularly useful in situations where a single camera angle may not be sufficient to capture all the important moments. By autonomously navigating through the designated area, the sensor-based drone can provide a comprehensive view of the event, ensuring that every vital moment is recorded. Moreover, the drone's ability to follow specific patterns or paths also allows for efficient data collection in various fields. For example, in agriculture, the drone can be programmed to fly over fields, collecting data on crop health and growth.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## PORTRAYAL OF MALE IMPOTENCE AND STERILITY IN SELECTED NIGERIAN CONTEMPORARY FEMALE NOVELS: A WOMANIST PERSPECTIVE

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### ABSTRACT

This study aims to examine how two contemporary female writers, Lola Shoneyi and Ayobami Adebayo portray the social phenomenon of male sexual impotence and sterility in their novels entitled respectively *The Secret Lives of Baba Segi's Wives* (2010) and *Stay With Me* (2017). Drawing its theoretical insights from womanism, the Hallidayan Transitivity theory and the qualitative research method, the study intends to unravel the Yoruba worldview with regard to male impotence and sterility; i.e. how the Yoruba society apprehends and treats male impotence and sterility. It also foregrounds the female writers' perception of this phenomenon, which is considered as a male secret or taboo and their attitudes towards it. The findings reveal, for instance, that the Yoruba society does not consider male sexual problem as a major problem in a marital home but it ontologically encourages men and women to find a solution to it. In fact, as this analysis indicates, the two female writers under study here have captured some approaches of solution to male impotence and sterility. These approaches are undergirded and marked by secret keeping, dialoguing, deconstructing some Yoruba beliefs referring to the female gender as being incapable of keeping secrets, and complementarity or gregarious way of life, as cornerstones, to the interaction between married men and women in the society.

**Keywords:** Female writers; male impotence and sterility; womanism; Transitivity theory; Yoruba ideologies.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

AN IMPLEMENTATION OF PYTHON FOR DATA SCIENCE AND MACHINE LEARNING

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## ABSTRACT

Python is a scriptable and interpreted language for both learning and real-world programming. Python is a powerful, high-level language developed by Guido van Rossum. In this paper, we will provide an introduction to the main Python programming software tools used for data science and machine learning techniques. Briefly, this paper will first introduce Python as a language, give an introduction to data science and machine learning, and then describe packages that are popular in the data science and machine learning sectors, such as NumPy, SciPy, TensorFlow, Keras, Matplotlib, Matplotlib etc. From there, we will move on to show the importance of Python for building data science applications. We will use different code examples throughout. To aid the learning experience, execute the following examples contained in this paper interactively using Jupiter notebooks.

**Keywords:** Machine learning · Data Science · Tools · Languages · Python

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## AUTOMATIC DRUG DISPENSER

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### ABSTRACT

Our innovative project aims to revolutionize the healthcare industry by introducing an Automatic Drug Dispenser system designed for hospitals and clinics. Recognizing the common challenges faced by patients, including long queues and wait times to purchase essential medications, we have developed a solution that leverages cutting-edge technology to streamline the entire process. Each patient is assigned a unique QR code containing comprehensive prescription data. When presented to our Automatic Drug Dispenser, the QR code is swiftly scanned, triggering the display of a confirmation screen on an LED interface, providing patients with assurance and clarity regarding their prescription. With a simple touch or scan on the same LED display, patients can proceed to collect their medications, eliminating the need for lengthy waits and cumbersome manual interactions. Payment for the medications is seamlessly integrated into the process, as patients can conveniently settle their bills by scanning the QR code displayed on the LED screen. This system not only enhances the patient experience by reducing queue times but also minimizes the risk of errors associated with manual dispensing. Moreover, it promotes contactless transactions, contributing to overall safety, particularly in the context of healthcare. Our Automatic Drug Dispenser represents a significant advancement in patient care, efficiency, and convenience, offering a promising solution for healthcare facilities seeking to enhance their service delivery.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## WHAT DOES A NEW BOOK ABOUT SAKARTVELO/ GEORGIA REPUBLIC/GURCISTAN BEING A MARITIME REPUBLIC SAY?

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### ABSTRACT

I shall talk about what I like mostly in the huge new book written, compiled and published by Merab ADEISHVILI in Tbilisi in 2022. He thanks over twelve persons for aiding him in preparation of that book. I like most the title of that book. Secondly, I like the layout of that book. I shall talk about the historical overview of the maritime activity of our nation in Sakartvelo/Georgia Republic as rendered in that book and compare it with another book published by Emeritus Professor Mose Giorgievich Janashvili that died in 1934 and is buried at the Pantheon on the Mtatsminda hill in Tbilisi. Professor Merab Adeishvili was the Transport Minister of Sakartvelo/Georgia Republic for several years and was deeply involved in the idea of making a mega port Anaklia near Poti at the Sea. With my background of decades of the critical investigation of most publications concerning the historical geography of the area for which I learned the ancient languages Sumerian, Akkadian, Luvian and Kimet language (*Kimet* was the name of the country/land ruled by the pharao in the lowland area of the river Nylos in Africa at the Javakhishvili University in Tbilisi I can say that M. Janashvili's publications *Chrdiloet Sakartvelo* (Northern part of Sakartvelo- written to be published in 1916 in Tbilisi and M. Janashvili's book *Istoria Sakartvelosi uudzvelesi droidan* published in 1906 -both in the Kartuli language- are necessary materials to anyone overiewing the topic what is Aia-Kolkheti that is officially called Georgia Republic nowadays. In my opinion, the historical overview printed in Merab Adeishvili's book is badly written and needs to be improved. In my opinion, it is better to return lands with seashore in the north that were historically Aia-kolkheti and that would mean that the port called now Novorossiisk will be part of Aia-kolkheti called now Georgia Republic in English. M. Adeishvili's book considers that there is the Abkhaz ethnicity and we- the Qartvels//the Georgians must be reconciled with the Abkhaz ethnicity. Contrary to that supposition, I am of the opinion that the creation of the so-called Abkhaz ethnicity was distortion of the reality and the truth must be rehabilitated. Having all these facts in mind, I may conclude that it is good that Merab Adeishvili partly wrote, partly compiled the book entitled- *Sakartvelo sazghvao kveqhanaa* ( in English it means that Sakartvelo is a maritime republic), but there are ideas reprinted from other persons' publications that contain mistakes and incorrect suppositions that distort the truth and are bad to readers.

**Keywords:** Sakartvelo, Georgia , Maritime Republic, Anaklia port.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## SAFE BANKING MADE SIMPLE: QR ATM ACCESS

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### ABSTRACT

Traditional ATM systems relying on physical ATM cards pose significant challenges, including card theft risks, physical contact with machines, and the need for frequent card replacements due to wear and tear. In response to these challenges, we propose an innovative ATM system designed to enhance both transaction safety and convenience. This paper outlines the core features and security measures of our proposed system while emphasizing user-friendliness and accessibility. To ensure that only authorized account holders can use the system, we implement a two-step verification process. Users are required to scan a QR code displayed on the ATM screen using their bank's mobile app, effectively verifying their identity and eliminating the need for physical cards. This approach streamlines transactions, making them touchless and secure. To enhance security further, we incorporate device location verification, comparing the user's device location with that of the ATM. This additional layer of protection prevents fraudulent attempts originating from remote locations, reinforcing the system's overall security. Furthermore, we employ a One Time Password (OTP) sent to the user's mobile device to confirm their identity and bolster security during transactions. The OTP mechanism ensures that only authentic account holders can complete transactions, providing an additional layer of protection against unauthorized access. Our primary objective is to seamlessly integrate these security measures while giving top priority to user-friendliness. We are dedicated to creating an inclusive and accessible system that accommodates users without smartphones, ensuring that all customers can enjoy the benefits of a touchless and secure ATM experience. By addressing these challenges and incorporating these innovations, we aim to develop an ATM system that is both highly secure and user-friendly. This system has the potential to significantly enhance the overall banking experience for customers while mitigating the risks associated with traditional ATM card-based transactions.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ESTIMATION OF GLOBAL SOLAR RADIATION USING FIVE SUNSHINE BASED MODELS FOR ILORIN, NORTH-CENTRAL NIGERIA

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### ABSTRACT

Estimation of global solar radiation using five sunshine hour models in Ilorin, north-central, Nigeria (8.54°N, 4.54°E) was developed using the Angstrom type regression equation. The solar radiation ( $W/m^2$ ), hours of bright sunshine were collected from achieve of Nigeria Metrological Centre, Oshodi, Lagos, for a period from (1992-2022). The constants of the Angstrom-type regression equation (Models) were determined by plotting the clearness index ( $H/H_0$ ) against the fraction of sunshine hours ( $n/N$ ) to obtain the line of best fit. The result of the correlation were also tested for error using statistic test methods of the mean biased error, MBE, root mean square error, RMSE, and mean percentage error, MPE to assess the performance of the models. It was observed that out of all models used, modes III and IV gave the best prediction for global solar radiation using sunshine hour.

**Key words:** Solar Energy, Solar radiation, statistical indicator, Regression Analysis

**COVID-19 DETECTION WITH DEEP LEARNING TECHNIQUES USING 3D CT SCAN  
IMAGES**

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**ABSTRACT**

The COVID-19 pandemic has posed an unprecedented global health challenge, necessitating rapid and accurate diagnostic methods. Computed Tomography (CT) imaging has emerged as a valuable tool for detecting COVID-19 due to its ability to reveal characteristic pulmonary abnormalities associated with the disease. This paper presents an innovative approach for COVID-19 detection using deep learning techniques applied to 3D CT scan images. We leverage the power of convolutional neural networks (CNNs) and three-dimensional image processing to develop a robust and efficient COVID-19 detection system. The proposed model is trained on a large and diverse dataset of 3D CT scan images, including samples from COVID-19 positive and negative cases, to ensure its generalization across different populations and imaging systems. Our deep learning architecture incorporates three key components: feature extraction, feature fusion, and classification. Feature extraction is achieved through a combination of 3D convolutional layers, which capture spatial patterns within the CT scans. Feature fusion combines information from multiple scales to enhance the network's ability to discriminate COVID-19-related abnormalities from other lung conditions. Finally, a softmax classifier is employed to make the binary classification decision of COVID-19 positive or negative. Extensive experimental results demonstrate the superiority of our proposed approach compared to traditional methods and other state-of-the-art deep learning models. The system exhibits high accuracy, sensitivity, and specificity in COVID-19 detection, even in cases with subtle radiological features. Furthermore, it demonstrates robustness across different CT scanners and imaging protocols, making it suitable for widespread clinical adoption. The implementation of our deep learning-based COVID-19 detection system holds significant promise for expediting diagnosis and reducing the risk of disease transmission. With its ability to rapidly and accurately identify COVID-19 cases using 3D CT scan images, it can complement existing testing methods and aid healthcare professionals in making informed decisions for patient care and resource allocation during the ongoing pandemic and potential future outbreaks.

**Keywords:** COVID-19 detection, Image processing, Deep Learning, CNN, Feature Extraction, Feature Fusion, Classification



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SENSOR-BASED APPLICATIONS IN ASSESSING HEAT STRESS RESPONSE IN GRAZING ANIMALS

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### ABSTRACT

In the changing climatic scenario, livestock are subjected to different kinds of stress which affects their production, health, and reproduction. Among them, heat stress is the most detrimental factor hampering the livestock production on a major scale. Therefore, it is of paramount importance to accurately quantify the heat stress response in livestock for defining suitable and accurate amelioration strategies to sustain their production. Non-invasive methods of detecting heat stress magnitude for livestock are gaining momentum especially the real-time automated measurement of physiological and behavioural traits using sensor-based technologies is the new arena to explore for researchers across the globe. These promising technologies allows to closely monitor the vital variables in animals and aids in the early prediction of heat stress and diseases without human interference, keeping animal welfare standards at the highest level. Various remote sensing technologies such as ear canal sensors, rumen or reticular boluses, rectal and vaginal probes, infrared thermography (IRT) or thermal imaging and implantable microchips can be employed in grazing animals to assess the heat stress. Behavioural responses and activity alterations to heat stress can be monitored using accelerometers, Global Positioning Systems (GPS), or Global Navigation Satellite Systems (GNSS). Thus, sensor-based technologies aim to provide the accurate and real-time measurement of grazing animal's behavioural and physiological alterations to heat stress. These technologies are non-invasive and provide precise, continuous, remote, and real-time data. Animal welfare takes the highest priority in these approaches, as handling and restraining is negligible while applying these technologies at the farm level. However, these technologies are mostly adopted in developed countries and it is necessary to extend their usage in developing countries as they host the major proportion of livestock population and are more prone to the adverse environmental challenges. These pools of sensor-based technologies along with automation and big data analytics are the future perspectives of quantifying heat stress response in farm animals.

**Keywords:** Animal welfare; Heat stress; Non-invasive; Sensors

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DESIGN AND FABRICATION OF DIE FOR INJECTION MOLDING MACHINE

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### ABSTRACT

PVC pipe clips are essential components used in various industries to securely fasten and organize PVC pipes. This project aimed to develop a cost-effective and efficient manufacturing process to produce high-quality PVC pipe clips with consistent dimensions and superior performance. This research initially focused on understanding the requirements and specifications of the PVC pipe clips and analyzing existing molds used for similar purposes. Design and fabrication of injection molding molds play a crucial role in modern manufacturing processes, enabling the mass production of intricate plastic components used in various industries. My research study presents a comprehensive investigation into the design and fabrication of an injection molding mold, focusing on optimizing its performance, efficiency, and quality. So, the initial phase of the study involved an in-depth analysis of the requirements and specifications of the target plastic component. Through computer-aided design (CAD) software, a precise and innovative mold design was developed, considering factors like material compatibility, part geometry, and mold complexity. Special attention was given to the selection of appropriate materials for the mold to ensure durability and longevity under the demanding conditions of the injection molding process. The fabrication process employed advanced machining techniques, such as computer numerical control (CNC) machining, to manufacture the mold components with high precision and accuracy. The use of modern manufacturing technologies allowed for the rapid production of complex mold geometries, reducing lead times and enhancing overall production efficiency. Investigated various aspects of mold design and fabrication, including cooling system optimization, venting solutions, and surface treatments, to minimize defects and improve the quality of molded parts. The researchers also explored the integration of conformal cooling channels to enhance heat dissipation outcomes of this research contribute to the advancement of injection molding technology by providing insights into the best practices for mold design and fabrication. The developed methodologies and findings can serve as valuable guidelines for manufacturers seeking to optimize their production processes, improve product quality, and reduce production costs and reduce cycle times.

### Introduction

Injection molding is a widely used manufacturing process for plastic components, and the mold for the injection molding machine is its core element. This introduction highlights the mold's significance and key factors in design and operation. The mold shapes molten plastic into the desired form, consisting of cavity and core halves precisely machined to create the product's negative impression. Proper mold design considers geometry, materials, cooling systems, and gate placement to ensure smooth filling and minimal defects. Material selection involves using steel or aluminum to withstand high pressures and temperatures. Different mold types accommodate varying production needs, from single-cavity molds for low volume to multi-cavity and family molds for higher output. Regular maintenance and innovative technologies, such as CAD/CAM, contribute to enhancing mold performance and prolonging its lifespan, enabling the production of high-quality plastic products efficiently. **Aims and objectives** To design and manufacture the PVC drainage cover die.

For making of PVC pipe holding clip die will be designed by first we have to know the peak pressure and temperature of the injection molding machine on the basis of temperature and pressure the material selection will be done by testing all calculation in Ansys software so that in result all the percentages and composition of materials will be clarified with precautions. **Historical Background**

Die is believed to have had its humble birth sometime during the middle of the 19th century. According to records, the first die equipment was invented in 1838 with the sole purpose of manufacturing parts for the moveable type machines responsible for the printing industry. Now a day the die is installed in the injection molding machine so that that speeds up the process and no man power is used during this process.

### **Design Components**

The design components of an injection molding machine mold can vary depending on the specific requirements of the product being manufactured. However, here are some essential design components commonly found in injection molding machine molds:

#### **Cavity and Core:**

These are the main components that form the shape of the final product. The cavity is the female part of the mold, and the core is the male part. When the mold is closed, the cavity and core come together to create the desired shape of the product.

#### **Runner System:**

The runner system is responsible for guiding the molten plastic from the injection nozzle into the cavities. It consists of channels and gates that distribute the plastic evenly to each cavity.

#### **Gating System:**

The gating system includes the sprue, runners, and gates that direct the flow of molten plastic from the injection machine nozzle to the cavity. The design of the gating system affects the flow, cooling, and quality of the molded part.

#### **Ejector System:**

The ejector system is used to push the finished part out of the mold after it has cooled and solidified. It typically consists of ejector pins or plates that move the part away from the core.

#### **Cooling System:**

Efficient cooling is crucial in the injection molding process to ensure proper solidification and minimize cycle time. Cooling channels are incorporated into the mold to remove heat from the molten plastic and the mold itself. **Venting System:**

To prevent air traps and ensure complete filling of the mold, vents are included in the design. These vents allow air and gases to escape during the injection process.

#### **Guiding and Alignment Mechanisms:**

These components ensure precise alignment and proper closure of the mold during the injection process. They help maintain the correct position of the cavity and core.

#### **Ejector Pin Retainers:**

These components hold the ejector pins in place during the molding process and allow for easy replacement if needed. **Sprue Puller System:**

The sprue puller is a mechanical device that helps to separate the sprue (the excess material connected to the runners) from the molded part.

#### **Heating System:**

Some molds, especially for certain types of materials, may include a heating system to aid in maintaining proper mold temperature and optimize the molding process.

**Mold Base:**

The mold base is the main structural support for all the components and provides the interface to the injection molding machine.

**Ventilation System:**

The ventilation system allows for proper air circulation during cooling and can also aid in exhaust management.

**Overflows and Parting Lines:**

These are essential features in the mold design that account for material shrinkage during cooling and enable easy removal of the finished part from the mold.

**Methodology**

**Theoretical Studies**

Acquiring dimensions-The dimensions of the existing die were acquired by manually by measuring with a scale and Vernier scale. Also, more accurate dimensions were acquired by scanning with a CMM at Accurate.

**Experimental Setup**

Creating a CAD model of existing die - By using the dimensions we obtained we could create a CAD model using software like CATIA, Creo, Solid Works, etc.

If the product is scanned by a CMM we would obtain a CMM data sheet which contains the coordinate points plotted in a 3D plane with the help of a computer integrated software like Arco software or other assistant software. By using laser scanner, we could directly generate a 3D CAD model of the product as it is scanned.

**Material Selection for die**

A suitable material is selected under the guidance of guide, research papers and support from a local injection company. The below comparison helps us to select the material for die based upon our requirements. As per our requirement.

**Design of CAD model for new product**

A design of product is modeled using a modelling software such as CATIA using the constraints obtained after measuring the dimensions of existing die and molding machine.

**RESEARCH PAPERS Practical applications of taguchi method for optimization of processing parameters for plastic injection molding: a retrospective review** NgChina Fei,Nik Mizamzul Mehat, Shahrul (2013)

This paper presents a review of research in the optimization of processing parameters for injection moulding. A number of research works based on standalone Taguchi method and the integration of Taguchi method with various approaches, including numerical simulation, grey relational analysis (GRA), principal component analysis (PCA), artificial neural network (ANN), and genetic algorithm (GA), have been discussed. In a volatile and fiercely competitive global market, the practice of the trial-and-error approach which relies heavily on the experience of the moulding personnel is no longer sufficient to meet the challenges of globalization especially at the point where the disadvantages outweigh its advantages. (1)

**Productivity enhancement in dies and molds manufacturing by the use of C1 tool path** M Boujelbene, A Moisan, N Tounsi, B Brenier (2004)

The challenge of die and mold milling is to achieve the specified dimensional and geometrical accuracy, and improve the surface roughness, in order to minimize polishing operations, still necessary to meet the tight tolerances required by the automotive industry and the plastic injection sector. Surface finish analysis given by 3D measurements and data processing techniques shows that microgeometrical defects generated by C<sup>1</sup> continuous tool path are definitely less serious than those obtained by classical tool

paths driven via linear interpolation. Also, polishing time saving is more than 30%. Thus, a substantial productivity enhancement is achieved in dies and molds manufacturing. (3)

**Modern machining of die and mold tools. J mater process technol**

Krajanik P, Kopac J (2004)

Modern production of die and mold tools is quite different in comparison with conventional machining. The basic theory of cutting process and cutting geometry is similar, but the techniques and technology is quite different. High-speed cutting (HSC) principles are not applicable with conventional machinetools. Difference between conventional and high-speed cutting velocity is analyzed on chip formation. The comparison between EDM and HSM has been made and shows great HSC benefits. Usage of modern software (CAM) optimizes tool production and helps us to save unnecessary additional machining time and costs. (4)

**Investigating the cutting phenomena in free-form milling using a ball-end cutting tool for die and mold manufacturing**

Adriano Fagali de Souza, Anselmo Eduardo Diniz, Alessandro Roger Rodrigues & Reginaldo Teixeira Coelho

(2014)

This paper presents an investigation of no planar tool-work piece interactions in free-form milling using a ballend cutting tool, a technique that is widely applied in the manufacturing of dies and molds. The influence of the cutting speed on the cutting forces, surface quality of the work piece, and chip formation was evaluated by considering the specific alterations of the contact between tool-surface along the cutting time. The experimental results demonstrated the negative effect of the engagement of the tool tip into the cut on machining performance. The length of this engagement depends on the tool and work piece curvature radii and stock material. When the tool tip center is in the cut region, the material is removed by shearing together with plastic deformation. Such conditions increase the cutting force and surface roughness and lead to an unstable machining process, what was also confirmed by the chips collected. (5)

**Application of Taguchi method in the optimization of injection molding parameters for manufacturing products from plastic blend** S. Kamaruddin, Zahid A. Khan and S. H. Foong (2010)

This paper presents a study in which an attempt has been made to improve the quality characteristic (shrinkage) of an injection molding product (plastic tray) made from blends plastic (75% polypropylene (PP) and 25% low density polyethylene (LDPE)) by optimizing the injection molding parameters using the Taguchi method. The analysis of the results shows that the optimal combination for low shrinkage are low melting temperature, high injection pressure, low holding pressure, long holding time and long cooling time. Using Taguchi method for design of experiment (DOE), other significant effects such as interaction among injection molding parameters are also investigated. (6)

**A CAD/CAE-integrated injection mold design system for plastic products**

Ivan Matin, Miodrag Hadzistevic, Janko Hodolic, Djordje Vukelic & Dejan Lukic (2012)

Mold design is a knowledge-intensive process. This paper describes a knowledge-based oriented, parametric, modular and feature-based integrated computer-aided design/computer-aided engineering (CAD/CAE) system for mold design. Development of CAx systems for numerical simulation of plastic injection molding and mold design has opened new possibilities of product analysis during the mold design. The proposed system integrates Pro/ENGINEER system with the specially developed module for the calculation of injection molding parameters, mold design, and selection of mold elements. The system interface uses parametric and CAD/CAE feature-based database to streamline the process of design, editing, and reviewing. Also presented are general structure and part of output results from the proposed CAD/CAEintegrated injection mold designs. (7)

**Shear viscosity measurements of polymer melts using injection molding machine with adjustable slit die** Johanna Aho Seppo Syrjala (2011)

Rheological properties of polymer melts were studied using a slit die attached to an injection molding machine. The die has three exchangeable inserts to set the slit height to 0.75, 1.0, or 1.5 mm. The modular design eases the die cleaning, and measurements with variable slit heights enable the detection of possible wall slip. This suggests that a simple slit die construction can be used as an inexpensive rheometer to measure rheological properties of polymer melts for processing purposes. The thermomechanical history of the investigated melt in the in-line slit die experiments resembles that in actual melt processing and, therefore, determination of rheological properties under true processing conditions is possible. (8)

**Quality monitoring of micro-shrinkage defects in thick-walled injection molded components**

Jian-Yu Chena Jia-Xiang Zhuangb Ming-Shyan Huangb (2019)

Sink mark defects are commonly observed in thick-walled injection molded components as a result of underpacking in the hot-spot areas and an insufficient compensation of the polymer melt as the plastic begins to cool. These defects degrade the surface quality of the molded parts and are a reliable indicator of excessive volume shrinkage during the molding process. The experimental results obtained under various values of the holding pressure show that the five injection molding process quality indexes are all highly correlated with the microshrinkage. The correlation is particularly strong for the pressure-based quality indexes and hence, it is suggested that these indexes provide a viable means of predicting the formation of sink mark defects and excessive microshrinkage in thick-walled injection molded component. (9)

**A framework for analyzing energy efficient injection-molding die design**

J. Mattis; P. Sheng; W. DiScipio; K. Leong (1996)

Significant part of the development of electronics products is the design of injection molded thermoplastic parts ranging from chassis panels and enclosures (I/O connectors). While much effort has been spent on analyzing the end-of-life issues associated with thermoplastic parts, such as disassembly, separation, and recycling, a primary driver for design-for-environment of plastic parts is the energy expended in the forming process. As well as process parameters selection on the process energy efficiency through a framework that integrates a 3-d solid modeling environment, numerical analysis of the filling and postfilling behavior, and an energy-based process model. The process model that is presented describes the modes of energy utilization in injection molding processes as they relate to design-for-environment concerns. Case studies are performed on a center-gated plastic disk, and a small plastic enclosure to illustrate the use of this framework (10)

**Determination of process parameters based on cavity pressure characteristics to enhance quality uniformity in injection molding**

Jian-Yu Chena Ping-Han Hung b Ming-Shyan Huangb (2021)

An appropriate choice of the process parameters is essential to ensure the precision and uniformity of the molded parts. The flow length-to-wall thickness ( $l/t$ ) ratio for most molded components lies in the range of 100-200. For higher values of the  $l/t$  ratio, the flow resistance increases dramatically at the end of the molded part and the injection pressure propagates less easily through the mold cavity. Consequently, the geometric dimensions of the molded parts in the near-gate region are frequently different from those in the far-from-gate region as well as resulting in lower uniformity molded components. With a large  $l/t$  ratio, the  $v/p$  switchover point should be determined based on the quality requirement for the part in the far-from-gate region in order to avoid insufficient (1)



**DESIGN AND FABRICATION      List of Components**

- Ejector pin
- Ejector retaining plate
- Ejector plate
- Mold core
- Ejector box
- Support plate
- Guiding pins
- Locating ring
- Springs
- Clamping plates (fixed plate)
- Cooling channels

**Components Detail    Ejector Pin**

Ejector pins are vital in creating parts. They are an integral component of the ejection system in mold, which determines the final outcome of products in an injection molding process. Injection molding is a manufacturing process that involves injecting molten plastic in a metal mold to assume the shape of the mold.

**Ejector Pin 3D Model**



*Figure 3: Ejector Pin 3D Model*

**Ejector Retaining Plate**

An ejector retainer plate holds the heads of ejector pins in place. The main function of this plate is to lock the heads of the pins so they don't come out during the injection molding process. The ejector bar plate has almost the same role as an ejector retainer plate. **Ejector Retaining Plate 3D Model**



*Figure 5: Ejector Retaining Plate 3D Model*



**Ejector Plate**

In an ejection system in mold, ejector plates function alongside the ejector pins. It holds the head of the pins to prevent them from coming out during the ejector pins injection molding process.

**Ejector Plate 3D Model**



*Figure 7:*

*Ejector Plate 3D Model*

**Mold Core**

The Mold Core & Cavity are the shaped sections in either half of the mold tool which give the plastic product its final shape. The hot molten material is injected into the core & cavity and then sets hard into shape. The design of the core & cavity is essential in the correct formation of the product.

**Mold Core 3D Model**



*Figure 9: Mold core 3D Model*

**Support Plate**

The backup plate or support plate is used to support the cavity plate, attach the hole for the return pin's spring, and cooling channel when in cavity plate cannot make it.

**Support Plate 3D Model**

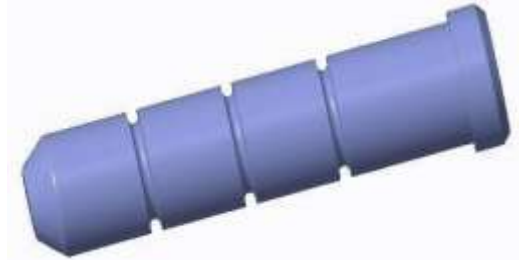


*Figure10: Support Plate 3D Model*

**Guiding pins**

Guide pins are cylindrical rods used in an assembly to align components. The mechanical fastener may help ensure stability, limit contact damage, and maintain precise positioning

**Guiding Pin 3D Model**



*Figure 13: Guiding Pin 3D Model*

**Locating Ring**

A locating ring is a circular member fitted on to the front face of the mold over the sprue bush. Its purpose is to register (or locate) the mold in the correct position on the injection machine, to ensure proper alignment between the nozzle and the sprue bush, thereby eliminating leakage



*Figure 15: Locating Ring 3D Model*

**Spacer Block**

Spacer Block is mounted between the movable clamping plate and the movable cavity plate to give space and allow the ejector plate to move when ejecting the part.

**Spacer Block 3D Model**



*Figure 17: Spacer Block 3D Model*

### Springs

A spring is a device consisting of an elastic but largely rigid material (typically metal) bent or molded into a form (especially a coil) that can return into shape after being compressed or extended. The most common use of springs in an injection mold is to retract the ejector plates. **Springs 3D Model**



Figure 18: Springs 3D Model

### Cavity Unit Assembly CAD Model

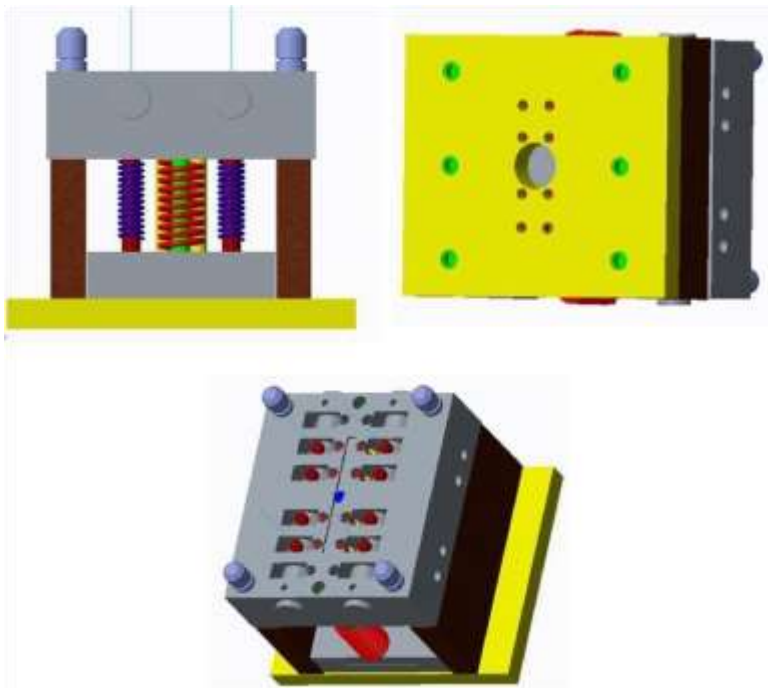


Figure 20: Moving Unit Assembly CAD Model

Fixed Plate Unit Assembly

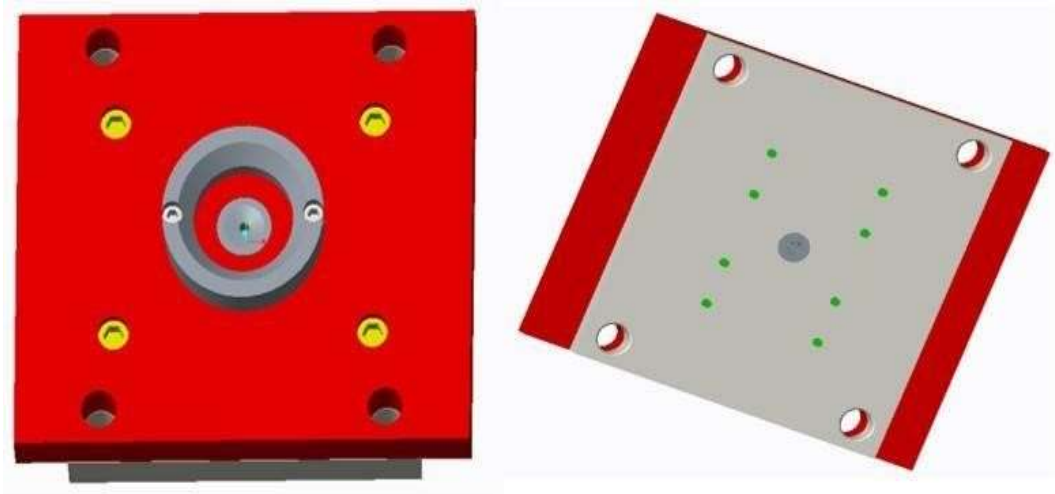


Figure 21: Fixed Plate Unit

Final Die Assembly CAD Model

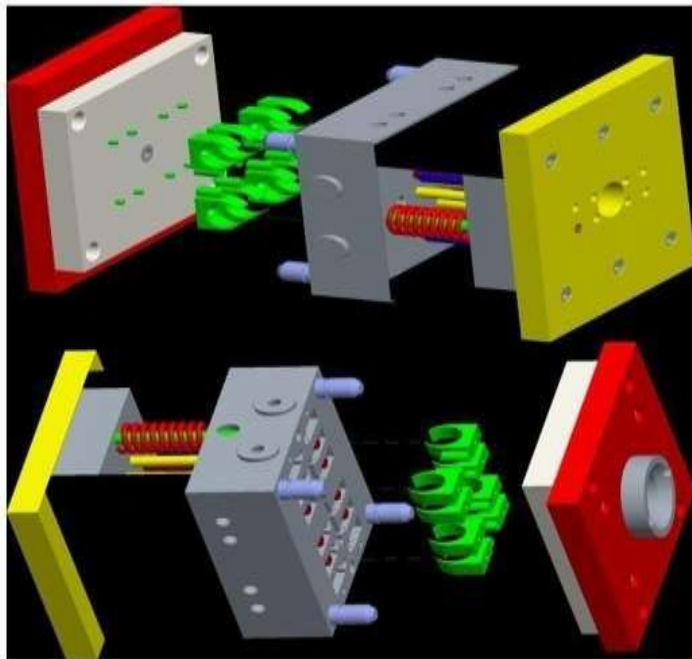
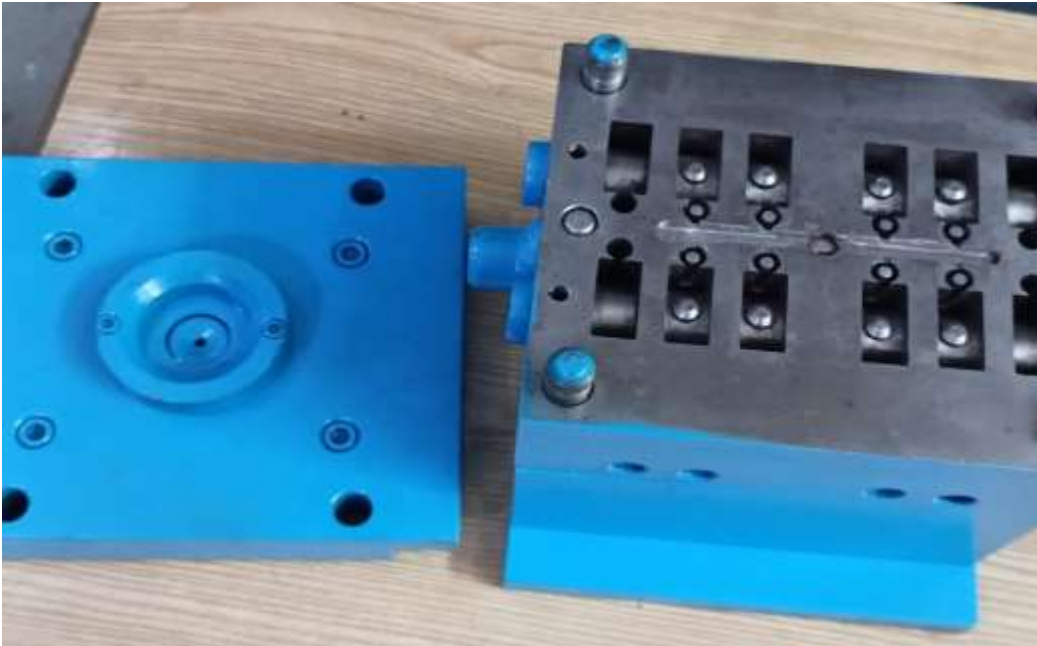


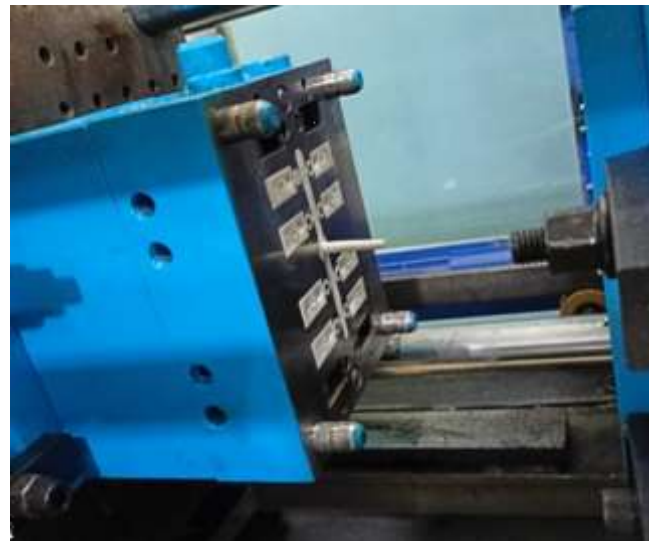
Figure 22: Final Assembly CAD Model

**RESULTS**

**MANUFACTURED DIE**



**EXPERIMENTATION OF MANUFACTURED DIE WHEN INSTALLED IN INJECTION MOLDING MACHINE**



Product 1





## PRODUCT AFTER EXPERIMENTATION OF DIE PVC PIPE CLIPS



### Conclusion & Future Recommendation

#### Future Recommendations

##### Industry 4.0 Integration:

Injection molding machines and molds may become more interconnected with Industry 4.0 technologies, enabling real-time data collection, process optimization, and predictive maintenance to enhance productivity and reduce downtime.

##### Sustainable Molding Solutions:

As sustainability becomes a more prominent concern, there might be a push towards eco-friendly molding processes and biodegradable or recycled plastics, leading to greener plastic products.

##### Precision and Micro-Molding:

The demand for smaller and more intricate plastic parts may drive the development of precision and micro molding technologies, requiring highly specialized molds and machines.

##### Multi-Material and Hybrid Molding:

Advancements in multi-material injection molding and hybrid molding techniques may lead to the production of more complex and functional plastic products, requiring molds capable of handling multiple materials.

##### Additive Manufacturing for Molds:

The adoption of additive manufacturing for mold-making could enable more design flexibility, faster prototyping, and cost-effective production of custom molds.

##### Smart and Functional Plastic Products:

Future plastic products may incorporate smart functionalities, such as sensors, actuators, and communication capabilities, opening up new applications and markets.

### **Improved Part Quality and Consistency:**

Continuous advancements in mold design, process control, and material technology could result in higher part quality, tighter tolerances, and greater consistency across production runs.

### **Reduced Waste and Energy Consumption:**

Innovations in injection molding processes and mold designs may help reduce material waste and energy consumption, contributing to a more sustainable and efficient manufacturing industry.

### **Advanced Mold Materials:**

Advancements in materials science may lead to the development of new mold materials with improved durability, thermal conductivity, and wear resistance. These materials could result in longer mold lifetimes and better part quality.

### **Innovative Cooling Solutions:**

Further research into conformal cooling, advanced cooling channel designs, and the integration of cooling technologies like micro-fluidics could significantly reduce cycle times and improve part quality.

### **Conclusion**

#### **Quality Assurance:**

A well-designed and precisely engineered injection machine mold is essential for ensuring high-quality plastic parts. Proper mold design, material selection, and fabrication techniques contribute to achieving consistent and accurate part dimensions and surface finishes.

#### **Productivity and Efficiency:**

Optimal mold design and efficient cooling systems can significantly reduce cycle times, resulting in increased productivity and cost savings. Mold designs with advanced cooling solutions, such as conformal cooling, can enhance heat dissipation and shorten the overall production time.

#### **Versatility and Complexity:**

Modern injection machine molds are increasingly capable of handling complex geometries, multi materials, and over-molding processes. This adaptability opens up opportunities for producing diverse and innovative plastic products.

#### **Sustainability:**

Emphasis on sustainable manufacturing practices has led to the development of eco-friendly mold materials and processes. Sustainable molds contribute to reduced waste generation and energy consumption, aligning with environmental goals.

#### **Integration and Automation:**

Injection machine molds are becoming more integrated with Industry 4.0 technologies, enabling real time monitoring, data analytics, and predictive maintenance. Increased automation in mold handling and setup enhances operational efficiency and reduces human errors.

#### **Precision and Miniaturization:**

Advancements in mold-making technologies support precision molding and micro-molding, catering to the demand for smaller, intricate plastic components used in various industries, including medical and electronics.

#### **Customization and Rapid Prototyping:**

Additive manufacturing (3D printing) is increasingly utilized for mold prototyping, offering faster iterations and customization options. This capability accelerates the product development cycle and facilitates the testing of various design iterations.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## Continuous Innovation:

The injection machine mold industry continues to evolve, driven by ongoing research, material advancements, and customer requirements. Mold designers and manufacturers must remain open to innovation and adopt new techniques to stay competitive in the market.

## Low Production Cost

Scrap material is used for the production of plastic parts that reduces production cost.

In conclusion, the injection machine mold serves as the backbone of the injection molding process, impacting the quality, productivity, and versatility of plastic product manufacturing. By embracing technological advancements, sustainable practices, and innovative designs, the injection machine mold industry will continue to shape the future of manufacturing, contributing to the development of efficient, high-quality, and environmentally conscious plastic products.

## Safety Precautions

- **Personal Protective Equipment (PPE):** Wear appropriate PPE, such as safety glasses or goggles, face shields, gloves, and protective clothing, to protect against potential hazards like molten plastic, flying debris, or chemical exposure.
- **Machine Safety:** Familiarize yourself with the specific safety features and procedures of the injection machine. Ensure that emergency stop buttons, safety interlocks, and guards are in place and functioning correctly. Follow lockout/tagout procedures when performing maintenance or servicing the machine. **Training and Knowledge:** Receive proper training on the operation, maintenance, and safety procedures of injection machine molds. Understand the potential risks and hazards associated with the process, as well as the safe handling of materials, tools, and equipment.
- **Material Handling:** Handle plastic resins and additives safely. Follow proper storage and handling guidelines to prevent exposure to hazardous chemicals or substances. Be aware of the potential for fires or explosions in case of mishandling or overheating of materials.
- **Mold Inspection:** Regularly inspect the injection machine mold for any signs of damage, wear, or defects. Replace or repair any damaged parts promptly to avoid potential hazards during operation. **Tool and Equipment Safety:** Use tools and equipment properly and safely. Ensure that they are in good working condition and appropriate for the task at hand. Avoid using damaged or malfunctioning tools and equipment.
- **Heating and Cooling Systems:** Take precautions when dealing with the heating and cooling systems of the injection machine mold. Follow the manufacturer's guidelines for proper temperature control, and be cautious of hot surfaces or fluids to avoid burns or scalds.
- **Housekeeping:** Maintain a clean and organized work area to minimize tripping hazards and prevent clutter around the injection machine. Clean up any spills or debris promptly to maintain a safe working environment.
- **Ventilation:** Ensure adequate ventilation in the work area to prevent the accumulation of fumes or gases that may be released during the injection molding process.
- **Emergency Preparedness:** Know the location and proper use of emergency equipment, such as fire extinguishers and first aid kits. Be familiar with emergency procedures and evacuation routes.

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MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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ERKEN BAŞLANGIÇLI İDİYO PATİK SKOLYOZDA SCHROTH BEST PRACTİCE  
EGZERSİZLERİNİN ETKİNLİĞİ: OLGU SUNUMU  
EFFECTIVENESS OF SCHROTH BEST PRACTICE EXERCISES IN EARLY ONSET  
IDIOPATHIC SCOLIOSIS: A CASE REPORT

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**ÖZET**

**Amaç:** Bu çalışmanın amacı erken başlangıçlı idiyopatik skolyozda Schroth Best Practice (SBP) egzersizlerinin etkinliğini belirlemektir.

**Yöntem:** 6 yaşında idiyopatik skolyoz tanısı almış erkek hasta fizyoterapist süpervizörlüğünde uygulanan SBP egzersizleri ile 2020-2023 tarihleri arasında üç yıl boyunca takip edilmiştir. Hekim tarafından yapılan rutin kontrollerinde röntgen çekilmiştir. Cobb açısı ve gövde rotasyon derecesi (ATR) değerleri kaydedilmiştir.

**Bulgular:** Üç yıl boyunca Cobb açısı değişimi sırası ile 9°, 9°, 8°, 19°, 9°, 10°, ATR değeri değişimi ise 6°, 5°, 6°, 6°, 4°, 4°'dir. Üç yıllık takip boyunca eğrilik paterninde değişiklikler gözlenmekle birlikte sonuçta Cobb açısında 1° artma, ATR değerinde 2° azalma gözlenmiştir.

**Sonuç:** Erken başlangıçlı idiyopatik skolyozda Schroth Best Practice egzersizleri eğriliğin progresyonunu azaltmada etkili olabilir. Erken başlangıçlı skolyozda geniş örneklem grubunun dahil edilerek Schroth Best Practice egzersizlerinin uzun dönem etkilerinin incelendiği çalışmalara ihtiyaç vardır.

**Anahtar kelimeler:** Skolyoz, erken başlangıçlı skolyoz, egzersiz, konservatif tedavi

**ABSTRACT**

**Purpose:** The aim of this study was to determine the effectiveness of Schroth Best Practice (SBP) exercises in early onset idiopathic scoliosis.

**Methods:** A 6-year-old male patient diagnosed with idiopathic scoliosis was followed up for three years between 2020 and 2023 with SBP exercises performed under the supervision of a physiotherapist. X-rays were taken at routine controls performed by the physician. Cobb angle and trunk rotation degree (ATR) values were recorded.

**Results:** Cobb angle changes during three years were 9°, 9°, 8°, 19°, 9°, 10°, ATR value changes were 6°, 5°, 6°, 6°, 4°, 4°, respectively. Although changes in the curvature pattern were observed during the three-year follow-up, a 1° increase in Cobb angle and a 2° decrease in ATR value were observed.

**Conclusion:** Schroth Best Practice exercises may be effective in reducing the progression of curvature in early-onset idiopathic scoliosis. There is a need for studies including a large sample group and examining the long-term effects of Schroth Best Practice exercises in early-onset scoliosis.

**Key words:** Scoliosis, early onset scoliosis, exercise, conservative treatment

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DESCRIPTIVE STUDY TO ASSESS THE PREVALENCE OF OBESITY AMONG FEMALE BACHELOR NURSING SCIENCE STUDENTS OF NORTHERN BORDER UNIVERSITY

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### ABSTRACT

**Background of the Study:** Obesity is an abnormal or excessive fat accumulation that presents a risk to the health. Over the past decades, Saudi Arabia is becoming more and more westernized and is now one of the highest peaks of the prevalence of obesity and overweight. Obesity is now a global crisis that affects 650 million people worldwide. Overweight and obesity are linked to more deaths worldwide than underweight (WHO, 2022).

**Aim** of the study was to assess the prevalence of obesity among Female Bachelor Nursing Science Students of Northern Border University (NBU). An objective of this study was to assess the socio-personal variables, and to assess the Prevalence of Obesity among Bachelor Nursing Science Students of NBU.

**Materials and Methods:** Quantitative research approach with Descriptive Survey Design was used in this study. Stratified Random Sampling Techniques was the sampling technique used for this study. College of Nursing, Female section, NBU were the Setting of this Study. All Bachelor Saudi Nursing Science Students of College of Nursing, (Female Section) NBU were the sample, with the sample size of 220.

**Data Collection Process:** Ethical Consideration: The researchers obtained written Consent from the participants of the study. Structured questionnaire was the research tool used for data collection.

**Results:** 63.2% of the subjects were having Normal Body Mass Index (BMI), but the prevalence rate of over weight is 17.3 % and obesity I and II contribute to 14.8%. Majority (88%) of the participants were having the family history of obesity. About 27.3 percent of the subjects were not doing any physical activity. Majority of the participants were having the habit of taking normal intake of food and water, whereas most of them are always taking fast food (74%) and they are always watching TV or using smart phone (87.4%). About 91% of the participants were between the age group of 18-23 years and 66.7% of the participants were from the province of Arar. More than fifty (58.6%) percent of the subjects were single, but 16.4 percent of them were married.

**Conclusions:** This study influenced the clarification of the effects of obesity and work on educating students in the College of Nursing about the need to be careful in eating food and drinks that cause obesity, in addition to enriching the research on the reality of university life, which has a great impact on the quality of food and how to follow the instructions that contribute to reduce the effects of obesity and its repercussions. Making a change in our lifestyle that you have lived with for many years may be difficult. Therefore, you must change the activities and the way you eat, and you must avoid the temptations that contribute to weight gain and that contribute to losing weight. Make sure they understand how important weight loss is to your health. You may also want to join a weight loss support group.

**Recommendations:** Constantly following the weight and working to lose weight; stay away from fast food and follow a balanced diet; Stay away from drinks that contain sugars; and work on conducting sports activities.

**Key words:** Descriptive Study; Prevalence; Obesity



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## THE SYNTHESIS OF HETERO-ANNULATED QUINOLONES AND THE BIOLOGICAL ACTIVITIES OF THESE COMPOUNDS

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### ABSTRACT

The quinoline scaffold has become an important construction motif for the development of new drugs. The quinolones and their heteroannulated derivatives have high importance due to their diverse spectrum of biological activities as antifungal, anti-inflammatory, anti-diabetes, anti-Alzheimer's disease, antioxidant and diuretic activities. This review summarizes the various new, efficient and convenient synthetic approaches to synthesize diverse quinolone-based scaffolds and their biological activities. We also dealt with the important mechanism, the route and type of reactions of the obtained products. The biological activities of some heteroannulated quinolones were also discussed.

**Keywords:** Pyrroloquinolones · Thienoquinolones · Oxazoloquinolones · Pyranoquinolones · Furoquinolones · Heteroannulation · Biological activities.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## PAULINE CONCEPT OF MINISTRY IN 2 CORINTHIANS 4:1-15 AND THE RELIGIOUS CELEBRITY SYNDROME IN THE NIGERIAN CHURCH

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### ABSTRACT

The general aim of this study is to examine the Pauline concept of ministry in 2 Corinthians 4:1-15 and the religious celebrity in the Nigerian Church. The phenomenon of celebrity has become intricately woven into the cultural tapestry of Nigerian society. The ideal of becoming rich and famous has risen to dimensions that can rightly be termed a syndrome. The level of frustration in society occasioned by the privileges and regard that the rich and wealthy, the famous and the celebrated enjoy vis-à-vis the contempt accorded the ordinary people has heightened the desire for the status image by whatever means. In Corinth, Paul came in contact with a society that was adapted to class and status distinction. There were the Romans, the freed men and slaves. This status consciousness found incursions into the community of believers. The gulf between the rich and the poor was noticeable in the community. In contemporary times, Christian ministry in Nigeria has become the platform for seeking popularity and fame. Methods and techniques that are alien to Biblical approach to ministry have been employed in the promotion of this invading trend and the church seems to be helpless in the circumstance. The pericope analyzed in this study was profoundly critical in handling the problem of the quest for celebrity among Christian ministers and the tendencies that promote its incursions in Christian ministry. The perspective developed in this study argued that the inability of Christian (religious) ministers to extricate (themselves) itself from celebrity (celebrity mindset) in ministry has resulted to a distorted view of Christian ministry both within the church and in the society at large.

**Keywords:** corruption, 2 Corinthians 4:1-15, Religious Celebrity Syndrome, Nigeria, Ministry

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## FUEL SHORTAGES IN LATIN AMERICA IN THE 21ST CENTURY, THE CUBA CASE

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### ABSTRACT

In this work we recreate the situation that part of the region is going through due to fuel shortages. Regarding the decline of Venezuela, the president of Cuba Díaz Canel heads to Mexico and Russia in search of oil. We propose to investigate the causes and consequences that led the Cuban regime to this situation and how it affects society. It is interesting to be able to identify the elements that lead to scarcity, since oil is undoubtedly an important natural resource in the industrialized world in which we live, hence its relevance, which is why it is called Black Gold. The first findings, the Cubans, date back to the 1990s, with the fall of the Soviet Union, when the island went through an economic crisis known as the Special Period. Conclusion The most reasonable scenarios indicate that a lot of oil will still be consumed in the coming years. Therefore, the countries that will be able to continue producing and making the business profitable are those that manage to be more efficient by reducing production costs and reducing the intensity of greenhouse gases. Meanwhile, the political measures taken by governments and in particular Cuba must look for the common good of the citizenry.

**Keywords.** Fuels, Latin America, Cuba, Government, society

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## GÖKKUŞAĞI KÜTLEÇEKİM KURAMINDA GMGHS KARA DELİK MODELİNİN MÖLLER ENERJİ MOMENTUM YERELLEŞMESİ MÖLLER ENERGY MOMENTUM LOCALIZATION IN GMGHS BLACKHOLE WITH RAINBOW GRAVITY

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### ÖZET

Kuramsal fizikçilerin en büyük hayallerinden bir tanesi tam olarak çalışan kuantize olmuş kütle çekim kuramını oluşturmaktır. Genel görelilik kuramının kuantize edilmesiyle kütleçekim, elektromanyetik, güçlü ve zayıf etkileşmelerin tek bir kuram ile ifadesi yolunda önemli bir engel ortadan kalkacaktır. Einstein tarafından oluşturulan elektromanyetik etkileşmeler ile kütleçekimsel etkilerin etkileşimlerini açıklayan mutlak paralelizm kuramını genel görelilik kuramına alternatif bir kuram olmuştur. Hem Einstein genel görelilik kuramı hem de mutlak paralelizm kuramsal fizikte pek çok problemin çözümü noktasında bilim insanlarına ışık tutmuştur. Öte yandan evrenimizin ivmeli genişliğinin anlaşılması, kütleçekimsel dalgaların varlığının keşfi sonucunda genel görelilik kuramının bazı noktalarının eksik kaldığı görülmektedir. Kuramsal fizikçiler genel göreliliğin bize sunduğu sağlam temellerden kaçmak yerine genel göreliliği modifiye etmeyi tercih ettiler. Bu bağlamda son zamanlarda kuantum gravite kuramlarından biri olan kütleçekimin gökkuşağı formalizmi önem kazanmıştır. Bu formalizmde ele alınan test parçacığının enerjisi uzay-zamanın dokusunda bir etki yaratmaktadır. Dolayısıyla uzay zamanı betimleyen metrik tensör yazıldığında test parçacığının enerjisini niteleyen gökkuşağı fonksiyonları adı verilen fonksiyonlar ile modifiye edilmelidir. Bu çalışmada Gibbons-Maeda-Garfinkle-Horowitz-Strominger (GMGHS) kara delik modeli için Möller enerji momentum gösterimi kullanılarak Rainbow gravitede enerji yoğunlukları hesaplanmaktadır. GMGHS kara delik modeli için Einstein ve Sicim Çerçevesi alt durumları için hesaplamalar ayrıntılandırılacaktır.

**Anahtar Kelimeler:** Enerji momentum yerelleşmesi, gökkuşağı kütleçekim kuramı formalizmi, GMGHS kara delik modeli.

### ABSTRACT

One of the biggest dreams of theoretical physicists is to create a fully working quantized theory of gravity. Quantizing the general theory of relativity will remove a critical obstacle to expressing gravitational, electromagnetic, strong, and weak interactions with a single theory. Absolute parallelism theory, which explains the interactions of electromagnetic interactions and gravitational effects created by Einstein, has been an alternative theory to the general theory of relativity. Both Einstein's general theory of relativity and absolute parallelism shed light on the solution to many problems in theoretical physics. On the other hand, as a result of the understanding of the accelerated expansion of our universe and the discovery of the existence of gravitational waves, it is seen that some points of the general theory of relativity are missing. Theoretical physicists preferred to modify general relativity rather than avoid the successful approaches that general relativity offers us. Hence, the rainbow formalism of gravity, one of the quantum gravity theories, has recently gained importance. The energy of the test particle considered in this formalism affects the fabric of space-time. Therefore, when the metric tensor describing space-time is written, it must be modified with functions called rainbow functions that characterize the energy of the test particle. In this study, energy densities are calculated in rainbow gravity using the Möller energy momentum prescription for the Gibbons-Maeda-Garfinkle-Horowitz-Strominger (GMGHS) black hole model. Calculations for the Einstein and String Frames subcases for the GMGHS black hole model are detailed.

**Keywords:** Energy momentum localization, rainbow gravity theory formalism, GMGHS black hole model.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**ASPERGILLUS INFECTION AMONG HIV/AIDS PATIENTS ATTENDING GENERAL  
HOSPITAL, MINNA, NIGER STATE, NIGERIA**

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**ABSTRACT**

*Aspergillus* infection in human is increasingly becoming important especially in those with impaired immunity and HIV/AIDS. This study was carried out to determine the prevalence of *Aspergillus* infections in patients attending the General Hospital, Minna, Niger State, Nigeria. Out of 116 patients administered with questionnaires, 73 consented to provide sputum samples. Early morning sputum samples were collected from individual participants. The samples were inoculated on Sabouraud Dextose Agar. *Aspergillus* species isolated were *Aspergillus niger* (45.6%), *Aspergillus nidulans* (5.3%), *Aspergillus flavus* (29.8%) and *Aspergillus fumigatus* (19.3%). Subjects aged 26-35 years had the highest prevalence (31.0%), whereas those between 45-65 years, had the least prevalence. Number of males infected accounted for (52.5%) whereas number of females infected (20.5%).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## BIOSORPTION OF $\text{Ni}^{2+}$ AND $\text{Pb}^{2+}$ FROM WASTE WATER USING DOUM PALM NUT SHELL ACTIVATED CARBON

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### ABSTRACT

The search for cheaper and environmentally friendly methods of waste treatment using natural products has taken a central stage in the recent past. Doum palm nutshell activated carbon (DPSAC) was investigated with a view of using it as a low cost biosorbent for the removal of toxic heavy metals from wastewater. The activated carbon was prepared from raw doum palm nutshell which was used for the adsorption of  $\text{Ni}^{2+}$  and  $\text{Pb}^{2+}$ . The effect of contact time, adsorbent dosage and pH of solution were studied by batch adsorption experiment, in which maximum removal of  $\text{Ni}^{2+}$  was recorded at 50min and maximum removal of  $\text{Pb}^{2+}$  was recorded at 30min of contact time. Contact of  $\text{Ni}^{2+}$  with 0.5g of DPSAC adsorbent, there is 99.87% maximum adsorption capacity while  $\text{Pb}^{2+}$  with 0.6g of DPSAC adsorbent, there is 99.81% maximum adsorption capacity. The amount of metal ion adsorbed was optimum at solution pH of 9 of both the two metal ions.

**Keywords:** biosorption, waste water, nutshell, and activated carbon

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## IN SILICO ADME- TOX PREDICTION IN EARLY DRUG DISCOVERY

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### ABSTRACT

In silico ADMET models have progressed significantly over the past 4 decades, but still, the pharmaceutical industry is vexed by the late-stage toxicity failure of lead molecules. This problem of late-stage attrition of the drug candidates because of adverse ADMET profile motivated us to analyse the current role and status of different in silico tools along with the rise of machine learning (ML) based program for ADMET prediction. Application of in silico ADME-Tox models has further enhanced discovery support, enabling virtual screening of compounds and thus, application of ADME-Tox at every stage of the discovery process. Ultimately, effective and efficient ADME-Tox support of discovery will depend on a complementary and synergistic use of experimental and in silico ADME-Tox.

**Keywords:** ADME/Tox in silico, in vitro drug Discovery, ADME-tox prediction.

### Introduction:

Absorption ,Distribution, metabolism, and excretion (ADME) properties play a significant role in drug development. In fact, around 40% of all drug failures are, overall, due to ADME problems. Despite the fact that preclinical ADME studies have led to a reduction of failures caused by pharmacokinetics (PK), drug toxicity remains a problem. Both, nonoptimal ADME and toxicity can end up with late-stage failures, responsible for a large unproductive investment of time and money. Toward the improvement of ADME prediction, in silico models are contributing to drug optimization. Due to the complexity of the ADME process, it is not possible to make decisions based on a single descriptor. Big data and machine learning implementations promise a hopeful landscape in ADME and toxicity prediction.

### Classification:

#### Experimental ADME-Tox tools in drug discovery:

The goal of in vitro ADME-Tox characterization is to provide, with reasonable accuracy, a preliminary prediction of the in vivo behaviour of a compound to assess its potential to become a drug. Many factors combine to determine this, therefore, a variety of experimental assays have been developed to characterize each aspect of the processes . The tools involved include physicochemical methods and biological assays using subcellular fractions, primary cell culture, immortalized cell.

#### The emergence of in silico ADME-Tox tools:

Despite the increased throughput provided by the simplified in vitro ADME-Tox assays, throughput capacity remains low in comparison with that of HTS activity assays or combinatorial chemistry, consequently limiting the application of these assays to only a fraction of compounds evaluated in discovery. The need for increased ADME-Tox throughput to fully meet the demands of discovery has led to renewed and increasing interests in computational or in silico models that make predictions .

#### The integration of in vitro and in silico ADME-Tox tools:

Both experimental and computational ADME-Tox have been used in support of the discovery process and each has its own unique advantages and uses but also distinct limitations. The adoption and use of experimental ADME-Tox is almost universal across all companies, whereas the application of in silico ADME-Tox is less widespread and the extent to which the results obtained from it are used in decision-making is unclear.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## Materials and Methods:

### ADME Descriptors:

Only when the ADME/Tox properties of a drug like compound are of sufficiently high quality, and when the target has been validated, the compound could be developed into new medication. This is why diverse methods have been integrated into web servers to predict drug-likeness of molecules. For instance, Jia et al. recently reviewed freely accessible online resources to evaluate drug-likeness of compound data sets. It was concluded that comprehensive databases that collect and offer high-quality and up-to-date data are essential for constructing rules or models for in silico drug-likeness evaluation. It was also found that online ADME/Tox resources provide useful guidelines to extract rational compounds that match the desirable PK properties or to filter compounds that are not likely to be drugs. Finally, it was concluded that NP databases are attractive sources for selecting novel scaffolds with promising bioavailability properties. Some physical properties have a strong correlation with ADME endpoints. For example, log P<sub>w/oct</sub> (the partition coefficient of a compound between water and 1-octanol) has a strong association with the permeability of compounds. In the past several decades, a significant amount of in vitro and in vivo assay data has been accumulated as a byproduct of pharmaceutical development. This accumulated data enabled the development of models and software to predict ADME properties with high reliability and accuracy.

### Toxicity Descriptors:

Determining the toxicity of chemical compounds is necessary to identify their harmful effects on humans, animals, plants, or the environment. In vivo animal tests are constrained by time, ethical considerations, and financial burden. Therefore, computational methods for estimating the toxicity of chemicals are considered useful. In silico toxicology aims to complement existing toxicity tests to predict toxicity, prioritize chemicals, guide toxicity tests, and minimize late-stage failures in drug design.

### Conclusion:

A goal of introducing ADME-Tox in discovery was to increase the success rate of drug development projects by addressing ADME-Tox issues, one of the major causes of project failure, at the early stages of discovery and at a relatively low cost. This effort has been ongoing over the past few years. The application of experimental ADME-Tox tools is now almost universal and has progressed with significant improvements in throughput and turnaround time that have been achieved through assay.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**INDONESIA NATIONAL BUDGET AS A VACCINE TO RESTORATION OF  
CONTRACTION IN NATIONAL TOURISM SECTOR**

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**ABSTRACT**

The contraction in the national tourism sector was caused by the COVID-19 pandemic that hit the international world. Several variables that show the performance of the national tourism sector have shown a significant decline during this pandemic. The variables of foreign tourist visits and Room Occupancy Rate (TPK), for example, experienced a contraction due to a lack of trust of destination from foreign tourists. Government policy, especially fiscal policy, is designed to focus on stimulus for economic actors in the tourism sector. However, the author sees that the government's fiscal policy also needs to focus on labor aspects and long-term plans for efforts to restart the tourism sector.

According to the author, the problem in this paper needs to be discussed because this issue is very relevant to the current conditions of the contracting national tourism sector. The 2021 RAPBN has also determined several priority sectors for national development, one of which is the tourism sector. Apart from that, the problems discussed in this paper are also in accordance with the fact that international expectations regarding Indonesia's tourism potential are very promising.

The solution that the author offers through this paper is the provision of a job loss insurance program, specifically for tourism industry workers, called the Job Loss Insurance Program in the Tourism Sector (PAKTA) which focuses on efforts to secure the financial aspects of employment in the tourism sector. The second solution that the author offers is the Integrated Ecotourism Area Infrastructure (IKAT) program which focuses on long-term efforts to restart Indonesian tourism based on infrastructure provision.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## INDONESIAN CROWDFUNDING COOPERATIVE (IC COOP): INTEGRATION INITIATIVE COOPERATIVES FOR COLLECTIVE NATIONAL ECONOMIC RECOVERY

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### ABSTRACT

One of the characteristics of the Indonesian nation, namely the attitude of mutual cooperation, is one of the differentiating factors that plays an important role in the resilience of the national economy which is based on Pancasila to continue to grow. The attitude of mutual cooperation in the Indonesian economy is reflected in the existence of cooperatives which are considered the cornerstones of the national economy. The recovery of the national economy and the increasing trend of cooperative growth is a signal and momentum to utilize cooperatives as an alternative route for economic recovery. This condition is in accordance with efforts to realize an inclusive APBN, where APBN instruments must pay attention to growth (pro-growth), absorbed workforce (pro-job), poverty alleviation (pro-poor), and environmental insight (pro-environment). Referring to the background of the topic raised, this paper aims to describe the potential and obstacles faced by cooperatives to support national economic recovery. Apart from that, this paper also aims to offer applicable recommendations for policy makers in developing economic recovery schemes that are more inclusive and adaptive to existing dynamics.

The recommendation offered by the author is the formation of an authority that handles cooperatives in an integrated manner called Indonesia Crowdfunding Cooperatives (IC Coop). IC Coop is a Government agency, with the status of a Public Service Agency (BLU) under the coordination of the Ministry of Cooperatives and SMEs, which is tasked with integrating the development of the national cooperative system starting from the licensing (legal), operation (operation), supervision (supervision), assistance (mentoring) stages. ), and increasing the class of cooperatives in supporting the national economy. This goal will be achieved through sapta tantra (seven basic things) carried out by IC Coop, such as acceleration and efficiency of cooperative licensing, integration and classification of cooperatives based on type of business, delegation of supervisory task forces, preparation of Basic Standard Operating Procedures (SOPD) for cooperative services, collection and allocation of cooperative reserve funds as investment capital, issuing bonds for integrated cooperatives, and connecting cooperatives with banking and other financial institutions.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**UNDERSTANDING VARICOSE VEINS – DIAGNOSIS, TREATMENT AND PREVENTION**

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**ABSTRACT**

Varicose veins are twisted, enlarged veins. vein that is close to the skin's surface (superficial) can become varicose. Varicose veins most commonly affect the veins in the legs. Varicose veins and spider veins are both types of venous disease. Spider veins are smaller and thinner than varicose veins. It causes standing and walking increase the pressure in the veins of the lower body. Varicose veins are usually caused by weak vein walls and valves. As blood pressure in your vein increases, the weakened walls allow your vein to get bigger. As your vein stretches, the valves that keep blood moving in one direction in your vein can't work like they should. Sluggish blood backs up or pools in your vein, causing your vein to swell, bulge and twist. The most recognizable sign of varicose veins is a gnarled, blue or purple vein just under your skin's surface. Bulging veins, Heavy legs, Swelling and Skin discolorations and ulcers. Varicose veins can usually be diagnosed by a simple physical examination; however, the cause of the varicose vein requires the use of Doppler ultrasound. Treatment for varicose veins may include self-care measures, compression stockings, and surgeries or procedures such as **Sclerotherapy, Laser treatment, High ligation and vein stripping**. Improving blood flow and muscle tone might reduce the risk of developing varicose veins. The same measures that treat the discomfort from varicose veins can help prevent them.

**Keywords:** spider veins, sclerotherapy, Doppler ultrasound

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## IMPORTANT RESPIRATORY SYSTEM DISEASES IN HORSES

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### ABSTRACT

Respiratory system diseases of horses are caused by predisposing factors, maintenance conditions, viruses, bacteria and fungi. The most important bacterial disease agents associated with the horse industry are *Streptococcus equi*, *Bulkorderia mallei* and *Rhodococcus equi* in foals. Gurm disease, also known as gourd, is the most common upper respiratory disease in horses. It is especially spread around by the discharge of infected horses. The most common symptoms are runny nose, cough, loss of appetite, and in later periods, lymph nodes grow and open out as abscesses. One of the most important diseases for foals is *Rhodococcus Equi* (*R. equi*), which causes bronchopneumonia and lung abscess. Mortality can be seen at a rate of 50%, especially in immunocompromised foals. The agent is carried in the intestines of adult animals and can be found widely in all environments, including manure, contaminated soil in contaminate areas and farm materials. Preventive medicine rules are very important for *R. equi* infections, especially for foals. It is important to monitor the body temperature of the foals daily, separate the patients, and remove them from dusty environments while cleaning the environments in which they are barns. These measures can be saving activities especially for horse breeders. Finally, the most dangerous disease in the industry, glanders, is known as *Bulkorderia mallei*. This disease requires global eradication programs, especially since it is known to be zoonotic. Malleus disease is very important for both humans and animals. It causes deaths and poses a risk, especially for horse breeders. The disease manifests itself as nasal glanders, lung glanders and skin glanders. Diagnosis is made with an allergic test called the Mallein test, and animals found to be sick are killed immediately.

The horse industry suffers great losses all over the world and in our country due to these highlighted diseases. This situation, which is especially important for race horses and foals, reveals to us the importance of preventive medicine. The care, hygiene and feeding conditions of horses should be at optimum standards, and it is possible to prevent diseases by taking vaccination schedules into consideration.

**Keywords:** Horse, respiratory system, bacteria

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## COMPARATIVE ANALYSIS OF METHODS FOR EVALUATING SOIL SETTLEMENT IN GEOTECHNICAL ENGINEERING (AZAOKA AND TRADITIONAL, BASED ON OEDOMETRY MEASUREMENTS)

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### ABSTRACT

This article presents a comprehensive comparative study between two commonly used methods for assessing soil settlement in geotechnical engineering. The traditional method relies on consolidation measurements, while the AZAOKA method utilizes real-time data collected by settlement gauges. The study evaluates various aspects including accuracy, speed, cost, adaptability, and reliability of each approach. The results highlight the advantages and limitations of each method, providing crucial information to guide geotechnical engineers in selecting the most suitable method for their specific needs. This research contributes to the improvement of settlement calculation practices in geotechnical engineering by emphasizing the benefits of real-time settlement gauges in certain scenarios, while also underscoring the ongoing relevance of consolidation measurements in other cases. In summary, this article offers essential insights for geotechnical practitioners and researchers working on soil settlement issues, assisting them in making informed decisions regarding the most appropriate method to use based on project-specific requirements.

**Keywords:** Soil settlement assessment, Geotechnical engineering methods, Comparative study, Real-time data, Consolidation measurements, Settlement gauge analysis.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## BIODEGRADABLE MAGNESIUM MMC FOR BIOMEDICAL IMPLANTS: A REVIEW

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### ABSTRACT

The ongoing medical implants are being created utilizing materials like Co-Cr, stainless steel, and titanium alloys. These traditional embed materials prompt a stress shield effect. This leads to secondary operations, which are done to remove the implant. Biodegradable magnesium metal matrix composites are advanced materials designed for various applications, primarily in the biomedical and environmental fields. These composites combine magnesium (Mg) as the matrix material with biodegradable reinforcements, creating a material that possesses desirable mechanical properties while also being capable of breaking down naturally over time. Magnesium composites are exposed to various designing methodologies, for example, supporting components, surface treatment, and changing synthesis processes to increase their biocompatibility and mechanical properties. This paper aims to provide researchers with a comprehensive understanding of biodegradable Mg-MMC used in biomedical implants.

**Keywords:** Mg- MMC, Biodegradable, Medical Implants



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## MOVING BEYOND TRADITIONAL ASSESSMENT: THE TYLER EXPANDED MODEL AND ITS RELEVANCE FOR MALAYSIAN HIGHER EDUCATION

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### ABSTRACT

This study seeks to address the need for curriculum review for research method course, particularly in the context group assignment, to better align with the needs of 21st century learners. Previous research has highlighted the importance of rethinking assessment practices to promote deeper learning and critical thinking skills. However, existing studies have primarily used cross-sectional data, making it difficult to identify changes in the use of individual versus group assessments. To address this gap, Tyler's Expanded Model was applied as a curriculum review model and used mixed methods to perform a needs analysis. This study included interviews with educators and surveys with students to gain insights into their experiences with assessment practices. The data was analyzed using a theme analysis method and a descriptive analysis. The findings suggest that there is a need for more collaborative and student-centered assessment practices in research methods courses, particularly in the use of group assessments. Students expressed a desire for more opportunities to work in teams and develop their teamwork skills, which they believed would better prepare them for the workplace. Educators also highlighted the importance of developing students' critical thinking skills and ability to work collaboratively in groups. Overall, this study underscores the need for a more student-centered and collaborative approach to assessment in research course, particularly in research methods subjects. By incorporating the insights gained from this study, educators can better prepare their students for success in the 21st century workforce.

**Keywords:** 21<sup>st</sup> century learners, curriculum review, Tyler's Expanded Model, needs analysis, assessment practices. Research methodology

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## STRONG MOMS, FRAGILE BONES: OSTEOPOROSIS IN PREGNANCY

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### ABSTRACT

#### **Background:**

Osteoporosis is a common disease characterized by a systemic impairment of bone mass due to the deficiency of Vitamin-D those results in fragility fractures. With an aging population, the medical and socioeconomic effect of osteoporosis, particularly Osteoporosis poses unique challenges for pregnant individuals, necessitating specialized care to ensure maternal and fetal well-being.

#### **Aim:**

The study focuses on the development of osteoporosis in women which can be a silent killer especially in Pregnant women and worsens the life style of their wellbeing. The conduct study is representing the idea in comprehensive literature research and evidence-based interventions, to reduce the risk of fracture and improve bone health during pregnancy.

#### **Methodology:**

This study analyzes the complex relations between pregnancy and osteoporosis, highlighting the demand for individualized treatment strategies. The factors examined were physiological alterations, hormonal swings, and probable side effects of this dual diagnosis. The conducted research was divided in two parts in which detailed review of the literature of last 5 years and using those evidence the cross-sectional survey was implemented. The study offers evidence-based therapies such as dietary supplements, exercise advice, and medication.

#### **Result:**

The evaluated results show that 60% of the random women who participated in survey were found to be deficient in vitamin D. This was comparable to the percentages of pregnant women (53%) and nursing moms (58%), respectively, who were vitamin D deficient. Additionally, our study revealed that vitamin D shortage in mothers increases the likelihood of neonatal vitamin D deficit and puts nursing moms at a higher risk of developing osteoporosis. We advise frequent supplementation with calcium and vitamin D, as well as monthly monitoring of vitamin D levels, for all women, including those who are expecting or nursing.

#### **Conclusion:**

By addressing this under-researched intersection, healthcare providers can enhance the quality of care for pregnant individuals with osteoporosis, safeguarding both maternal and fetal health.

**Keywords:** Osteoporosis, Pregnancy, Vitamin-D deficiency, Women Health

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ENHANCING PERIPHERAL NERVE REGENERATION THROUGH ELECTRICAL STIMULATION AND EXERCISE

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### ABSTRACT

This comprehensive review examines the potential of non-surgical approaches, namely electrical stimulation and exercise, in promoting the regeneration of injured peripheral nerves. Peripheral nerve injuries pose significant challenges in treatment, often resulting in disrupted communication between the central nervous system and the periphery. Current surgical techniques have limitations, particularly in cases involving adjacent spinal cord injuries or significant gaps between nerve stumps. Therefore, exploring alternative therapies that can enhance axonal regeneration is of great importance. Recent studies have demonstrated that the combination of electrical stimulation and exercise produces a synergistic effect on nerve repair. This combined therapy enhances the expression of growth factors, promotes angiogenesis, increases nerve conduction velocity, and improves functional recovery. Furthermore, it augments the number of regenerating axons and facilitates the maturation of regenerated nerve fibers.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**AN ESTIMATED DROOP CONTROLLER FOR AN EFFECTIVE TRANSFER IN  
MICROGRID OPERATION**

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**ABSTRACT**

In the domain of microgrid (MG) inverters, one of the most intricate challenges is orchestrating a seamless transition from the conventional grid-connected (GC) mode to the autonomous stand-alone (SA) operation mode. This transition necessitates a delicate balance to sustain the inverter's frequency and voltage parameters within specified tolerances, particularly in islanded grid configurations. To overcome this challenge, the implementation of a precise and adaptive frequency and voltage droop control mechanism is crucial. The proposed control methodology is a multifaceted approach encompassing two pivotal components, meticulously tailored to ensure a smooth transition from GC to SA. Firstly, a fixed voltage reference generation algorithm, inspired by the well-established droop technique, ensures versatility across all operational modes, facilitating effortless shifts between grid-connected and stand-alone operation. Secondly, an innovative modified voltage-current controller incorporates a Luenberger observer to provide real-time voltage reference estimations during SA mode. This feature is critical for maintaining system stability under varying conditions. To substantiate the effectiveness of the proposed control strategy, a comprehensive evaluation was conducted, with a primary focus on current measurement at the point of common coupling (PCC). This assessment considered a spectrum of scenarios, thereby affirming the efficiency and robustness of the control strategy across various microgrid inverter operations. The outcomes of this study not only underscore the strategy's reliability but also enhance the resilience of microgrid systems.

**Key words:** Microgrid; Droop controller; Grid-connected; Stand-alone; Observer.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ÜRİK ASİT/ALBÜMİN ORANININ COVID-19 TANISIYLA TAKİP EDİLEN HASTALARDA PROGNOZA ETKİSİ

### THE EFFECT OF URIC ACID/ALBUMIN RATIO ON PROGNOSIS OF PATIENTS FOLLOWED UP WITH COVID-19 DIAGNOSIS

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#### ÖZET

**Giriş/Amaç:** Bu çalışmada yoğun bakım ünitesinde ve servislerde takip edilen COVID-19 hastalarında UAR'nin prognoza etkisinin araştırılması amaçlandı.

**Gereç ve Yöntem:** 01.05.2020-01.05.2020 tarihleri arasında Sağlık Bilimleri Üniversitesi Sultan Abdulhamit Han Eğitim ve Araştırma Hastanesi'nde yatan 204 COVID-19 hastasının (>18 yaş) UAR değerlerinin gözlemlenmesi amacıyla tek merkezli, retrospektif bir çalışma düzenlendi. 01.04.2022. UAR için optimal kesim değerini belirlemek üzere ROC eğrisi analizi kullanılarak hastalar UAR'a göre düşük ve yüksek UAR grupları olarak iki gruba ayrıldı. Katılımcıların yatışları sırasındaki demografik-klinik özellikleri ve laboratuvar parametreleri hastanenin elektronik tıbbi kayıtlarından geriye dönük olarak elde edildi.

**Bulgular:** Yüksek UAR'li ( $\geq 1,63$ ) hastaların yoğun bakıma daha uzun süre yatması gerektiği (%14,5 vs %51,  $p<0,001$ ) ve hastane içi mortalitenin daha yüksek olduğu görüldü (%0,05 vs %43,5,  $p<0,001$ ).

**Sonuç:** Bu çalışmada, diğer parametrelerden bağımsız olarak yoğun bakım ünitesi ve servislerde takip edilen COVID-19 tanılı hastalarda UAR'nin hastane içi mortaliteyi öngörmeye yararlı bir araç olduğu sonucuna varıldı.

**Anahtar Kelimeler:** UAR (Ürik Asit/Albumin Oranı), covid-19, Prognoz, Mortalite

#### ABSTRACT

**Background/aim:** In this study, it was aimed to investigate the effect of UAR on prognosis in COVID-19 patients followed in intensive care unit and on wards.

**Materials and methods:** A single-centered, retrospective study was arranged to observe the UAR values of 204 COVID-19 patients (>18 years old), hospitalized at the University of Health Sciences Sultan Abdulhamit Han Education and Research Hospital between 01.05.2020-01.04.2022. The patients were divided into two groups according to UAR, as low and high UAR groups using ROC curve analysis to determine optimal cut-off value for UAR. The demographic-clinical characteristics and laboratory parameters of the participants during their hospitalization were retrospectively obtained from the hospital's electronic medical records.

**Results:** Patients with high UAR ( $\geq 1.63$ ) required a longer lasting intensive care unit admission (14.5% vs 51%,  $p<0.001$ ) and demonstrated higher in-hospital mortality (0.05% vs 43.5%,  $p<0.001$ ).

**Conclusions:** In this study, it was concluded that UAR is a useful tool to predict in-hospital mortality in patients diagnosed with COVID-19 followed up in the intensive care unit and wards, independently from other parameters.

**Keywords:** UAR (Uric Acid/Albumin Ratio), Covid-19, Prognosis, Mortality

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## RELATIONSHIP BETWEEN ISLAM AND SCIENCE

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### ABSTRACT

This research aims to explain the study of the relationship between Islam and science. The research method uses qualitative research with a library research approach. This research concludes that science is understood in a short sense as objective, structured and orderly knowledge. Science cannot be separated from religion. He is a reference source for religion and all developments in science. He is the main source of inspiration for Muslims' views regarding the integration of science and religion. Humans obtain knowledge from various sources and through many ways and paths, but all knowledge ultimately comes from God. Muslim philosophers and scientists believe that in the act of thinking and knowing, the human mind obtains enlightenment from God who knows something that is not yet known and will be known because of the model and how to obtain it. Science needs religion to provide a moral foundation for the application and usefulness of science for human life and the environment. Because science, apart from having a positive impact, can also have a negative impact on human life. Science in Islam is seen as a human need to achieve prosperity in life in the world and make it easier to know God. Islam is not only open to innovations carried out by science, but also encourages the achievement of this progress.

**Keywords:** Relationship, Between Islam, Science

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## IMPLEMENTATION OF ISLAMIC SCIENCE OR SCIENCE

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### ABSTRACT

The aim of this research is to describe the implementation of Islamic education/science from a literature review perspective. The writing method uses a library research approach sourced from authoritative journals and books regarding the implementation of Islamic education/science. The results of the research conclude that Scientific Research between Religion and Science as Models, Patterns and Paradigms If we talk about core concepts in the Islamic religion, it is easy to say that the issue of basic beliefs is the basis of mother of science in the Islamic religion. In general, the core concept of the Islamic religion is based on inspiration regarding Allah SWT, nature and humans, physically and metaphysically. This means something related to the essence based on these three things, of course it is indirectly attached to the study of the mother of science in Islam. As the most fundamental foundation based on knowledge in the Islamic religion, it certainly conveys the most fundamental viewpoint in the Islamic religion.

**Keywords:** implementation, science and Islamic science



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SELF -CONCEPT, MISTRUST AND ANTI-SOCIAL BEHAVIOR IN WORKPLACE INDIVIDUALS: A CORRELATIONAL STUDY

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### ABSTRACT

The aim of this comprehensive research was to analyze the relationship between self-concept, mistrust and anti-social behavior in workplace individuals. The main hypothesis of this study is that there is a positive relationship between mistrust and anti-social behavior in workplace individuals. The study used a purposive sampling technique, involving a representative sample of 151 people (N = 51), with 93 male participants and 58 female participants. The age distribution of the participants exhibited an average age of (M = 29.63, SD = 8.25). The data was collected through assessment instruments that displayed good internal reliability, such as the Personal Self-Concept Questionnaire (Goñi *et al.* 2011), Brief Anti-Social Behavior Scale (Laura *et al.* 2021), Paranoid Tendency Scale (Shahzad & Jabeen, 2021 unpublished). These scales were used to collect data from public and private institutes of Lahore. Along with this a customized scale was used to acquire demographic data. The results of the correlational analysis used in this study revealed that anti-social behavior has a low positive relationship with all the factors of positive self-concept and a moderate positive relationship with mistrust. Similarly, mistrust has a low positive relationship with a factor of personal self-concept. In conclusion, self-concept and mistrust both have a positive relationship with anti-social behavior in workplace and hence both play a role in disrupting the work environment dynamics, given that they are not maintained appropriately. This study will be useful to study and understand the social vulnerability of workplace individuals.

**Keywords:** Self-Concept, Mistrust, Anti-Social Behavior and Workplace Individuals

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## QUALITY OF EXPERIENCE IN INTERNET OF MUSIC THINGS

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### ABSTRACT

Quality of Experience (QoE) assesses the large level of a customer's gratification and practice with a consequence or services and the purveyor provided products and customised services. We constantly involve in improving the system efficiency and the outcome productivity that effects the frequent modification in cloud landscape. Since the previous decades, the business models relocated away from building up own on-premise computational and information centre in the domains of cloud infrastructure. Now, the sphere of cloud computing is experiencing the self-transformation with the flourishing Internet of Things (IoT) [1-4]. IoT consists of several interrelated computational devices that offered with inimitable identifiers and the capability to transmit data over the Internetwork without necessitating human-human or human-machine collaboration [1-2]. With IoT, trivial devices which have their identifiable processing power, and generate more and more scaled information [1-4]. It's habitually not effectual to transmit all information to the cloud for computation and processing: that practice, no worry how rapid, can surge the response latency at the device's geospatial position. Furthermore, it's contingent on Internet accessibility and can cause confronts of security, information protection, and data privacy. This is why many businesses and organisations which have disseminated IoT operations have initiated assigning administering accomplishments turn to local on-site schemas [4-5]. Although they are not assembling local information centers repeatedly. Rather they are leveraging the capabilities of the IoT devices on-sites already. By embracing the computing on the edge approach, Numerous businesses are healthier proficient to implement prompt modernisation and warrant excessive obtainability for real-time applications. Impelling analyse to the peripheral devices on the Internetwork is usually called as the edge computing or computation at the edge [4-5]. Fundamentally another expression for distributed rather than the centralized computing. The IoT is the most operational when the computational tasks take place on-site for the instantaneous requirements of the location, but the cloud can be utilised to accumulate information from the multiple locations for the bigger enterprises. Being influenced such types of local computational frameworks, we are to integrate the containerised peripherals to the music composition, reconstruction, and generation with a distributed network domain for providing the music computing services, distributed music-making, smart auto-tuning of the instruments, and analysing the qualitative rhythmic behaviours [6-7].

**Keywords:** Computational Musicology, IoT, WoE, CDEF Computing, Internet of Music Things.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**IMPLEMENTATION OF REGIONAL EXPENDITURE IN CENTRAL JAVA PROVINCE IN  
INDONESIA**

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**ABSTRACT**

Regional expenditure is all regional obligations that are recognized as a deduction from the value of net assets in the relevant fiscal year period. Regional spending consists of operational spending including personnel spending, goods and services spending, interest spending, subsidy spending, grant spending and social assistance spending. Capital Expenditures include capital expenditures for land, equipment and machinery, buildings and structures, roads, irrigation and networks as well as other fixed assets. This research aims to explain the importance of Central Java regional shopping. This research is library research with a qualitative approach. The data sources used in this research come from various literature in journal articles that are relevant to the research topic. The method used to analyze the data is content analysis from the literature sources used in the research. The results of the research show that the aim is to formulate an appropriate strategy for the Central Java Provincial Government in improving the quality of regional spending. The regional expenditure component is a manifestation of regional government spending money on public services. There are four main posts in regional expenditure, namely the Personnel Expenditure post, the Goods and Services Expenditure post, the Capital Expenditure post, and other expenditure posts. Regional expenditure is used in the context of implementing government affairs which fall under the authority of the province or district/city, which consists of mandatory affairs and optional affairs which are determined by statutory provisions.

**Keywords:** Regenional Expenditure, Physical Decentralization, Regional Autonomy

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## MAPPING TOURISM OBJECTS AND ATTRACTIONS IN ECOTOURISM DEVELOPMENT COMMUNITY BASED IN PESAWARAN REGENCY, PROVINCE LAMPUNG, INDONESIA

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### ABSTRACT

Community-based ecotourism is the development of a place, one of which is Banjaran Village, Pesawaran Regency, Lampung Province through the tourism sector. This development utilizes the potential of natural and cultural resources owned by the community as tourist objects and attractions. This research aims to map tourist objects and attractions in order to provide an overview to tourists as a form of travel guide to tourist locations. The data collection method uses starting point retrieval with the Avenza Maps and ArcGIS applications. Next, it is analyzed using a qualitative descriptive method. The results of research in conducting mapping show that there are important elements during the search such as settlements, bridges, mosques and agroforestry land, all of which are used as development objects and tourist attractions. This research provides basic knowledge and guidance for tourists or the public in preserving the environment and developing community-based ecotourism so that it can strengthen its objects and attractions.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**AN EXPLICIT SURVEY ON THE EFFICACY OF DIGITAL SIGNATURE VERIFICATION  
SYSTEM (DSVS) AND ITS IMPORTANCE TO BANKING INDUSTRY**

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**ABSTRACT**

Today the quest for fast money has driven many people to carry out different illegal acts and signature counterfeiting is identifiable among this acts. Financial institutions including banks also fall victim because of lack of effective technology to verify signatures. Digital signature has been used over the past years in several industries to ensure authentication, non-repudiation, data integrity and reduce the risk of fraudulent transaction. The term digital signature is synonymic to electronic signature (e-signature). According to Sur & Roy (2011), digital signature has the potential that can safeguard valuable information over differing types of networks. This paper presents digital signature verification system as a means to enhance customers' data security in the banking industry. The paper discussed the basic concept and characteristic feature of digital signature. Some of the advantage and challenges of using digital signature in the banking sector were also highlighted in the paper work. In order to collect important information for the paper write-up, online Google form questionnaire instrument was used to collect vital information from respondents. The data retrieved were collated and subjected to reliability analysis. Conclusively, the paper inferred that digital signature is based on encryption methods that create a unique signature for each user. The technology ensures the security of the documents in the digital environment, guaranteeing their authenticity and integrity.

**Keyword:** Digital Signature Verification System, DSVS, Banking Industry.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## THE INDONESIA GREEN POLICY: A REALISTIC SHIFTING INTO A GREEN BASED ENERGY INDUSTRY TO BOOST PUBLIC WELFARE

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### ABSTRACT

Best policy eradication of the Corona Virus Disease-19 (COVID-19) pandemic in Indonesia has brought about real recovery of the Indonesian economy in society, but the challenges for the Indonesian economy in the future will not only revolve around the health crisis caused by the COVID-19 pandemic but there are new challenges, namely food and energy crises are driving inflation in many countries. Many countries are experiencing a spike in inflation, including advanced countries such as the United States, which recorded inflation of 8.5% in July 2022. The United States is also faced with the challenge of an economic recession which will lead to stagflation, as evidenced by Q-2 2022 experiencing an economic contraction of 0.9%. Not only the United States, Indonesia also experienced a spike in inflation, but Indonesia was relatively successful in controlling it, as evidenced by the inflation rate of 4.69% (YoY) in August 2022 and this figure is much more moderate than inflation in ASEAN countries and other G-20 member countries. However, it should be noted from these inflation figures that the Government is still administering energy prices by providing subsidies and compensation from National Budget, which amounted to 502 Trillion Rupiah this year and is the largest subsidy and compensation figure in the last 10 years.

At a time when many countries are experiencing stagflation or economic recession caused by the energy and food crisis, Indonesia's economic growth can grow impressively in Q-2 2022 by 5.44% beyond market expectations and consensus. This means that the role of the National Budget in absorbing economic shocks is very real and supportive. community economic recovery by providing subsidies and energy compensation funds. Even though inflation from the administrated price indicator in August 2022 has decreased from the previous month, namely 0.33% (mtm) from the previous month's 1.17%, Indonesia needs to be alert and careful considering that Indonesia is an importer of fuel raw materials from abroad which in The last 10 years have experienced a significant surge in import numbers due to decreased exploration. On the state spending side, changes in oil prices will affect fuel and electricity subsidies from profit sharing funds due to crude oil procurement which has the effect of increasing subsidies from the National Budget. In the Indonesia Economic Prospects report released by the World Bank, it also notes that there is potential for Indonesia's economic growth to slow to 4.6% (YoY) in 2022 in line with pressure related to the decline in global economic conditions. This means that Indonesia must remain alert to VUCA ( volatility, uncertainty, complexity, and ambiguity).



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## UNMASKING BACTERIAL DEFENDERS: CUTTING-EDGE ANTIMICROBIAL RESISTANCE DETECTION INNOVATIONS

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### ABSTRACT

Antimicrobial resistance (AMR) records a serious global health alarm, posturing ample challenges to the effectual treatment of bacterial infections. As the predominance of drug resistant bacteria continues to rise, the improvement and implementation of advanced techniques for AMR detection have become essential. This review offers a broad overview of the up-to-date methodologies employed in the identification and classification of antimicrobial resistance in bacteria. In recent years, genomic approaches have revolutionized AMR detection, allowing for rapid and accurate evaluation of resistance genes and mutations. Whole genome sequencing, coupled with bioinformatics tools, has enabled the chasing of resistance evolution and transmission dynamics. Additionally transcriptomics and proteomics have explained the underlying mechanisms of AMR, assisting in the development of targeted therapies. Furthermore, advanced phenotypic assays, such as microfluidic systems and mass spectrometry based techniques, have improved our skill to assess bacterial susceptibility to antibiotics. The addition of artificial intelligence and machine learning algorithms has simplified data analysis and expectation of resistance profiles with high precision. This review highlights the benefits and restraints of each technique and reflects their potential for clinical and public health applications. The continuing challenges in AMR detection, including the emergence of novel resistance mechanisms and the need for regulation, are also addressed. The review concludes that more accurate, precise and economical methods are needed to understand exact situation of resistance to adjust the management strategies accordingly.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**UNVEILING THE MARVELS AND MYSTERIES OF NANO MEDICINE**

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**ABSTRACT**

Nanomedicine is the branch of study that uses nanotechnology to support and improve molecular levels of human health. Applications of nanotechnology in medicine today and in the future include research on diagnostic tools, medication delivery systems to boost gene therapy, and tissue engineering technologies. Nano toxicology is now-a-day inadequate in helping academia, managing bodies in illuminating the mechanism of action, maintaining its hazards and benefits, in consequence increasing the benefit of these material in medicine without dealing public health and environmental honor. Nanoparticles effect the plant growth, their impregnation and releases harmful ions. Nano medicines provide benefit to human being but can also causes damage to various essential organs of the organisms.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ADVANCED NON-INVASIVE METHODS TO QUANTIFY HEAT STRESS RESPONSE IN FARM ANIMALS

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### ABSTRACT

In the changing climatic scenario, heat stress is considered to be a major concern to livestock owners as it affects the livestock production drastically. There are number of approaches to quantify heat stress responses in farm animals. From an animal welfare point of view, it can be categorised as invasive and non-invasive approaches. Non-invasive methods assess animal's behavioural (postural adjustments, rumination time, drinking frequency) and physiological (respiration, heart, pulse rate and body temperature) responses to heat stress that can be monitored without interference of human or additional stress on the animal. Bioclimatic thermal indices are used by researchers across the globe to characterize the environmental conditions to which animals are exposed depending on the species, breed, and production type. Temperature humidity index and heat load index are among the widely used bioclimatic indices for heat stress studies. Stress markers such as cortisol can be measured in the feces, urine, hair, saliva and milk to assess the level of heat stress in farm animals. Some of the next generation sequencing methodologies, like metagenomics, can aid in quantifying and assessing the heat stress induced alteration in the fecal biome non-invasively. Advanced technologies applied for the real-time analysis of cardinal signs such as sounds through microphones, behavioral images, videos through cameras, and data stalking body weight and measurements might provide deeper insights towards improving biological metrics in livestock exposed to heat stress. Sensor-based technologies like ear canal sensors, rumen boluses, rectal and vaginal probes, infrared thermography (IRT), and implantable microchips can be employed in grazing animals to assess the quantum of heat stress. Among these, IRT is considered to be the widely adopted methodology that records the surface body temperature. Behavioral responses and activity alterations in heat stressed animals can be monitored using accelerometers, bluetooth technology, global positioning systems (GPSs) and global navigation satellite systems (GNSSs). Machine learning offers a scalable solution in determining the heat stress response in farm animals by utilizing data from different sources like hardware sensors. Most of these non-invasive approaches have the potential to assess the impact of heat stress on livestock effectively. However, these methodologies should be standardized with their uses extended to the developing and tropical countries which experience higher risks due to climate change.

**Keywords:** Bioclimatic indices; Heat stress; Machine learning; Non-invasive methods; Sensors

**UNEARTHING FRESH ANTICANCER AGENTS FOR HUMAN BREAST CANCER CELL  
LINE: INVESTIGATING VIA QSAR AND MOLECULAR DOCKING ANALYSES**

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**ABSTRACT**

In this study, we explored the quantitative correlation between the anti-NSCLC (Non-Small Cell Lung Cancer) biological activity and the molecular structure within a series of 38 derivatives of cyclohexane-1,3-dione-dimidone. To achieve this, we utilized molecular descriptors computed through DFT-B3LYP/6-31G, along with topological and physicochemical analysis. The outcomes of the QSAR models developed herein using MLR and MNLr techniques exhibit the robust predictive capability of these models. Specifically, the linear model yielded an R<sup>2</sup> value of 0.913 (R<sup>2</sup>CV = 0.85, R<sup>2</sup>test = 0.934), while the nonlinear model achieved R<sup>2</sup> values of 0.991 (R<sup>2</sup>CV = 0.82, R<sup>2</sup>test = 0.997). Leveraging the predictions derived from the QSAR model, novel molecular structures were designed and subsequently assessed for their anti-NSCLC activity. Furthermore, significant interactions between these molecules and the human c-Met protein were forecasted. Integrating projections from the QSAR models, molecular docking analyses, and in silico ADMET property evaluations, we pinpointed one out of the 16 newly developed molecules as a potential drug candidate for NSCLC.

**Key words:** QSAR, ADMET, Molecular Docking, NSCLC, C-met

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ACCESS TO HEALTH SERVICES IN KANREAPIA HAMLET, GOWA REGENCY, INDONESIA

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### ABSTRACT

Health services are one component of the national health system that has direct contact with the community. Health service facilities are places used to provide promotive, preventive, and curative health service efforts. One of aspects of health services is to support the Universal Health Coverage (UHC) Programme. The form of implementation from the Indonesian government in the context of realizing the UHC program is the establishment of the National Health Insurance (NHI) program or what is known as the National Health Insurance (JKN) in Indonesia which is managed by the Social Security Administration Agency (BPJS). This study aimed to know the description of health services. The research was conducted on July 12-26, 2023 in Kanreapia Hamlet, Indonesia. This research was a qualitative study using a descriptive approach. The sample was 80 respondents. The result showed that most of respondents used health facility (52;65%). On 52 respondents who used health facility, most of them choose health primary care (35;67%). Respondents usually went to health facility used their own transportation. In terms of distance traveled, the hospital distance for 5 respondents was more than 10 km. Meanwhile, for community health centers and medical practitioners, the majority of travel distances are less than 10 km (54%, 67%). For travel time, if respondents have hospitals and health centers, then they need more than 30 minutes (100%, 60%). Meanwhile, to go to a doctor's office, the majority of respondents took less than 30 minutes (58%). Based on the JKN membership variable, the majority of respondents have joined as JKN members (53.66%). The government in Gowa Regency should carry out health outreach and National Health Insurance so that people can have health insurance.

**Keywords:** health, services, facility

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## IN SILICO COMPUTATIONAL DRUG DISCOVERY: A MONTE CARLO APPROACH FOR DEVELOPING A NOVEL JAK3 INHIBITORS

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### ABSTRACT

Inhibition of Janus kinase 3 (JAK3), a member of the JAK family of tyrosine kinases, remains an essential area of research for developing treatments for autoimmune diseases, particularly cancer and rheumatoid arthritis. The recent discovery of a new JAK3 protein, PDB ID: 4Z16, offers exciting possibilities for developing inhibitors capable of forming a covalent bond with the Cys909 residue, thereby contributing to JAK3 inhibition. A powerful prediction model was constructed and validated using Monte Carlo methods, employing various internal and external techniques, including. This approach resulted in the prediction of eleven new molecules, which were subsequently filtered to identify six compounds exhibiting potent pIC<sub>50</sub> values. These candidates were then subjected to ADMET analysis, molecular docking (including reversible-reversible docking with tofacitinib, an FDA-approved drug, and reversible-irreversible docking for the newly designed compounds), molecular dynamics (MD) analysis for 300 ns, and calculation of free binding energy. The results suggested that these compounds hold promise as JAK3 inhibitors. In summary, the new compounds have exhibited favorable outcomes compared to other compounds across various modeling approaches. The collective findings from these investigations provide valuable insights into the potential therapeutic applications of covalent JAK3 inhibitors, offering a promising direction for the development of novel treatments for autoimmune disorders.

**Keywords:** JAK3 inhibition, Cancer, Rheumatoid Arthritis, Drug Design, Small molecule inhibitors, Therapeutic targets, Monte Carlo.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## RELATIONSHIP BETWEEN LINGUISTICS AND LITERATURE: A NEW CONFIGURATION

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### ABSTRACT

By this paper, we try to review the relationship between linguistics and literature, which knows highs and lows, rejection and adhesion, openness and enclosure, marking moments of rupture or discontinuity. Maingueneau has traced the historical evolution of these constantly reconfiguring relationships. While linguistics has provided tools for interpreting literary texts, it has subsequently closed in on itself, as literature has come to see itself as a particular use of language, the interpretation of which refuses a linguistic analysis deemed unable to account the complexity of the literary fact perceived as a prestigious act transcending any linguistic description. The aim of our contribution is to show that developments in the sciences of language have helped build new bridges between linguistics and literature. The latter benefits from advances in linguistics of enunciation, among other fields. We have thus moved from linguistics of the sentence to linguistics of the discourse, unifying all verbal activities under the label "discourse" while admitting discursive diversity. Literature, apprehended as literary discourse, opens up to devices able to interpret it in a way that is no longer elementary or fragmentary, but rather global and in-depth.

**Key words:** linguistics-literature- discourse- literary discourse-linguistics of enunciation



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ANTISEIZURE AND ANTIOXIDANT PROPERTIES OF ETHANOL FRACTION OF AERIAL PART OF *Borreria ocymoides* ON ISONIAZID-INDUCED SEIZURE IN RAT MODELS

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### ABSTRACT

Epilepsy is not one condition, but is a diverse family of disorders, having in common an abnormally increase predisposition to seizure. It is a group of disorders of the CNS Characterized by paroxysmal cerebral dysrhythmia, manifesting as brief episodes(seizure) of loss or disturbance of consciousness

Seizure is a sudden, uncontrolled burst of electrical activity in the brain. The present research was designed to investigate the antiseizure and antioxidant properties of ethanol fraction of aerial part of *Borreria ocymoides* on isoniazid-induced seizure in rats model. The effect of ethanol fraction of aerial part of *Borreria ocymoides* on seizure latency, percentage protection against seizure, percentage protection against lethality, anti-oxidant status and neurotransmitters, were investigated in PTZ seizure-induced rats using standard biochemical methods. The qualitative and quantitative phytochemical results of the ethanol fraction of aerial part of *Borreria ocymoides* constitute respectively; Saponins, flavanoids, tannins, Terpenoids alkaloids, steroids, Cardiac glycosides. The acute toxicity test results of ethanol fraction of aerial part of *Borreria ocymoides* showed that the extract was not toxic at the highest dosage (5000 mg/kg body weight) administered. The results showed a significant ( $P < 0.05$ ) reduction in GLU, and DOP with a corresponding increase in GABA and GABA-T of the group treated with 200, 400 and 600 mg/kg b.w when compared with positive control in seizure induced rats.

**Keyword:** Seizure, Neurotransmitter, antioxidants, electrolytes and ethanol fraction.

SYNTHESIS AND CHARACTERIZATION OF METAL MOLYBDATE CATALYSTS AND  
ITS APPLICATION IN THE REDUCTION REACTION OF THE THREE ISOMERS OF  
NITROPHENOL

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**ABSTRACT**

Nickel molybdate is among the most studied ternary oxides in the family  $AMoO_4$  (A is a transition element or a divalent metal from the alkaline earth column). According to the literature,  $NiMoO_4$  possesses five allotropic forms  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$  and  $\epsilon$  depending on the synthesis conditions, the temperature and the pressure. Indeed, under atmospheric pressure, the nickel molybdate can be detected in two crystalline forms. In fact, it can be in the stable form located at a medium high temperature,  $\alpha$ - $NiMoO_4$ , in which Mo is tetrahedrally coordinated, or it can have an octahedral coordination in the metastable low temperature (below 190K) form,  $\gamma$ - $NiMoO_4$ .

In this work, we synthesized  $\alpha$ - $NiMoO_4$  in the solid state utilizing a new and simple process, without resorting to any solvent at relatively low temperature. The as-prepared nickel molybdate nanopowders were readied through calcination of an oxalate complex in static air at 550°C. The oxalate complex was investigated by TGA and FTIR spectroscopy. The as-readied  $\alpha$ - $NiMoO_4$  was characterized by XRD, and BET technique. Its catalytic effectiveness was verified in the reduction reaction of the nitrophenol isomers. The nickel molybdate exhibits exceptionally high reduction reaction of the three isomers of nitrophenol to the three corresponding aminophenol isomers.

**Keywords:** ternary oxides, oxalate complex, nickel molybdate nanopowders, Reduction of nitrophenol

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## THE FOREIGN LANGUAGE TEACHER AND CULTURAL DIVERSITY

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### ABSTRACT

This summary highlights the fact that cultural diversity remains a reality that raises a number of questions for teachers of heterogeneous groups.

This volume asserts that the foreign language teacher cannot escape this reality. Cultural differences, a process in which the school is now at the root of a number of cultural phenomena. The teacher must face up to these in order to shape tomorrow's society and develop the ability to live together despite all differences.

However, our paper examines the role of culture in the teaching of a foreign language. It focuses on the definition of culture, and would be an opportunity to take stock of a set of fundamental concepts concepts that are fundamental to understanding our work.

Our theme focuses on the process of cultural mediation as a gateway to foreign culture in a heterogeneous language classroom where cultural diversity is very clear. cultural diversity reigns, and addresses the various theories theories related to the same subject, we study the phenomenon of heterogeneity as a source of heterogeneity as a source of richness for both partners in the teaching

Our article aims to persuade educators that culture is a way of solving the problems we face. It focuses on the teaching of FLE, which has played and continues to play a key role, given that this foreign language is a second language, for the simple reason that it has become an educational device where the practitioner of this profession will adopt a spirit of mediation to produce common ground between several cultures in a closed social space. While remaining within the same framework, we must consider the teacher as a major element in the institutional learning process.

**Key words:** Intercultural teaching, culture, cultural diversity, heterogeneity, mediation.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ASSESSING THE INFLUENCE OF CLIMATE CHANGE ON MOROCCO'S RESERVE RESOURCES FOR DURUM WHEAT LAND

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### ABSTRACT

The objective of this study was to perform a comparative analysis of physiological, biochemical responses and yield parameters of durum wheat (*Triticum durum* Desf.) in the semi-arid region. Thirteen INRA-Morocco durum wheat lines were evaluated under rain conditions during two cropping seasons (2019/20, 2020/21). The trials were conducted in the experimental field of the National Institute of Agricultural Research of Douyet Fès (34°2 N, 5°W, 416 m). Various agro-physiological and biochemical parameters were studied: relative water content, chlorophyll content, leaf surface, leaf temperature, proline content, yield and yield components. A rainfall deficit was found to significantly increase proline content and leaf temperature and decrease relative water content, chlorophyll content, leaf area and yield ( $P < 0.01$ ). According to these parameters and rainfall indices, our results indicated that field-induced precipitation variations caused contradictions in the response of assessed traits to drought-related interactions between the two growing seasons (2020-2021) the identification of genotypes in the presence and absence of precipitation using a combination of drought-related traits.

**Keywords:** Durum wheat, drought, proline, relative water content, yield.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## UNEARTHING FRESH ANTICANCER AGENTS FOR HUMAN BREAST CANCER CELL LINE: INVESTIGATING VIA QSAR AND MOLECULAR DOCKING ANALYSES

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### ABSTRACT

In this study, we explored the quantitative correlation between the anti-NSCLC (Non-Small Cell Lung Cancer) biological activity and the molecular structure within a series of 38 derivatives of cyclohexane-1,3-dione-dimidone. To achieve this, we utilized molecular descriptors computed through DFT-B3LYP/6-31G, along with topological and physicochemical analysis. The outcomes of the QSAR models developed herein using MLR and MNLN techniques exhibit the robust predictive capability of these models. Specifically, the linear model yielded an R<sup>2</sup> value of 0.913 (R<sup>2</sup>CV = 0.85, R<sup>2</sup>test = 0.934), while the nonlinear model achieved R<sup>2</sup> values of 0.991 (R<sup>2</sup>CV = 0.82, R<sup>2</sup>test = 0.997). Leveraging the predictions derived from the QSAR model, novel molecular structures were designed and subsequently assessed for their anti-NSCLC activity. Furthermore, significant interactions between these molecules and the human c-Met protein were forecasted. Integrating projections from the QSAR models, molecular docking analyses, and in silico ADMET property evaluations, we pinpointed one out of the 16 newly developed molecules as a potential drug candidate for NSCLC.

**Key words:** QSAR, ADMET, Molecular Docking, NSCLC, C-met

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ELECTRONIC PROPERTIES AND OPTICAL ABSORPTION SPECTRA OF DYE-SENSITIZED SOLAR CELLS (DSSCS) BASED ON CYANO-FUNCTIONAL SMALL MOLECULES:DFT AND TD-DFT STUDIES

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### ABSTRACT

In this work, we examine the performance of novel dyes, namely MC20, MC28, MZ173, MZ175, and MK162, as photosensitizers in dye-sensitized solar cells. We use density functional theory calculations to explore the energy levels, absorption wavelengths, and photovoltaic characteristics of these dyes. The calculated energy levels show appropriate alignment with electron transport layers, guaranteeing efficient charge injection and reducing energy losses. These dyes also exhibit absorption wavelengths in the visible range, indicating that they are capable of efficiently harnessing solar energy. Analysis of their photovoltaic properties has demonstrated their potential in terms of the open circuit voltage. The dyes show favorable properties, making them potential candidates for efficient light absorption and electron transfer in dye-sensitized solar cells. These results underline the need to include them in future dye-sensitized solar cells research and provide interesting pointers for the design and optimization of efficient photosensitizers

**Keywords:** TD-DFT, organic dyes, photovoltaic, dye-sensitized solar cells.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## CAUSES AND EFFECT OF UNETHICAL PROFESSIONAL PRACTICES ON THE MANAGEMENT OF CONSTRUCTION PROJECTS IN THE NORTH CENTRAL PART OF NIGERIA

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### ABSTRACT

Although construction industry plays a vital role towards accomplishing social and fiscal developmental goals that are greatly lacking in the north central states of Nigeria, however the industry is afflicted with a number of difficulties, One of the major difficulties hindering the management of construction projects is the unethical professional practices; which include lack of standard services, unruliness, lack of decency, weak accountability, carelessness and lack of transparency, These undesirable trends affects the management of construction projects and the role of the industry in enhancing the economic, Social and fiscal growth of the research area. The main aim of this study is to examine the causes and effects of unethical professional practice on management of construction projects in the North central part of Nigeria. The study will adopt a sequential explanatory mixed methods (MM) research design, which is the most straightforward among the mixed methods to explore the causes and effect of unethical professional practice on the management of construction projects in this research area, in addition to the initial phase of quantitative data collection and analysis and using qualitative results in explaining and interpreting the findings of the quantitative phase,

**Keywords:** Unethical, Management, Construction industry, Professional Practice.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## INTERNATIONAL ORGANIZATIONAL COMMUNICATION IN DIGITAL AGE

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### ABSTRACT

Since its inception, human beings have felt the need to communicate. Over the years, communication has developed to encompass various aspects of life, starting with basic communication that ensures survival and extending to communication within an organization. The latter, as an organized structure, relies on internal communication, which is a crucial factor for its success and sustainability.

To this end, some organizations are increasingly placing internal communication at the heart of their activities. This trend began in the 1980s when the first roles in internal communication began to take shape, and human resources managers started to establish communication departments within their companies. Towards the end of the 20th century, the intranet made its appearance in organizations, making it easier for managers to communicate via a closed, company-specific network.

The objective of this communication is to explain and define various concepts related to communication, digital technology, and digitalized communication methods. It underscores the role of digital transformation in enhancing internal communication within organizations, drawing upon the findings of research conducted by theorists and researchers in the field of internal communication. This work also explores how companies are embracing new approaches to facilitate effective communication among employees, particularly through the use of digital platforms and online communication tools. It highlights and sheds light on the growing significance of internal communication for organizational success, elucidating how communication and human resources professionals must adapt to technological advancements to ensure the success and sustainability of their organizations.

**Keywords:** Internal Communication, Organization, Digital

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## LA COMMUNICATION INTERNE DES ORGANISATIONS A L'ERE DU DIGITAL

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### RESUME

Depuis sa création, l'être humain a ressenti le besoin de communiquer. Au fil des années, la communication s'est développée pour englober des divers aspects de la vie, en commençant par la communication de base qui assure la survie et en s'étendant à la communication au sein d'une organisation. Cette dernière en tant que structure organisée, s'appuie sur la communication interne qui est un facteur crucial de son succès et sa pérennité.

Pour ce faire, certaines organisations se mettent de plus en plus à placer la communication interne au cœur de leurs activités, Cette tendance a débuté dans les années 1980 lorsque les premiers métiers de la communication interne ont commencé à prendre forme, et les responsables des ressources humaines ont entamé l'implantation des départements de communication au sein de leurs entreprises. Vers la fin du 20ème siècle, l'intranet a fait son apparition dans les organisations et a offert la possibilité aux acteurs des organisations de communiquer via un réseau fermé, propre à l'entreprise.

L'objectif de cette communication est d'expliquer et citer en premier lieu les différentes notions de la communication, le digital, et les moyens de communication digitalisé, elle met l'accent sur le rôle de la transformation digitale dans l'amélioration de la communication interne dans les organisations, en se basant sur les résultats des recherches menées par les théoriciens et les chercheurs en communication interne. Ce travail examine également comment les entreprises adoptent de nouvelles approches afin de favoriser une communication efficace entre les employés notamment grâce à l'utilisation des plateformes numériques et d'outils de communication en ligne. Il souligne et met en lumière l'importance croissante de la communication interne pour le succès organisationnel et explique comment les professionnels de la communication et des ressources humaines doivent s'adapter aux progrès technique pour garantir le succès et la pérennité de leurs organisations.

**Mots-clés :** Communication Interne, Organisation, Digital

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## GENOME WIDE ANALYSIS OF UBIQUITIN CARBOXYL TERMINAL HYDROLASES IN RICE: THEIR ROLE IN GROWTH AND STRESS RESPONSE

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### ABSTRACT

Ubiquitination is the third most frequent, reversible and extremely diverse post-translational modification (PTM) occur in plants. Ubiquitin carboxyl terminal hydrolase's (UCHs) are a class of deubiquitinating enzymes (DUBs), that are responsible for cleaving ubiquitin molecules from target proteins, they typically contain a catalytic domain that hydrolyses the isopeptide bond between ubiquitin and the target protein. In the present investigation, in a genome wide survey, a total of 59 putative rice UCH's genes have been identified and located in the rice genome, distributed throughout the 12 chromosomes at different densities. All 59 candidate genes were selected, for a detailed characterization of their gene structures, protein properties, cis-regulatory elements, and comprehensive analysis. Ubiquitin Carboxyl terminal hydrolases appear to be involved in the interactions with other ubiquitin and de-ubiquitin proteins and their encoded proteins have higher content of alpha-helices in their predicted secondary structures. Majority of Ubiquitin Carboxyl Terminal Hydrolase (UCH's) have binding sites for metal and non-metal ligands. Analysis of exon-intron junctions and sequence motifs in each candidate genes has revealed high levels of conservation within and between phylogenetic groups. The putative promoter regions of these genes also carry cis-regulatory elements that respond specifically to stress and signalling molecules. It shows that the ubiquitin carboxyl terminal hydrolase protein family is valuable for manipulation of stress tolerance in rice and other crops. A primer was designed for UCH 10 gene for future molecular studies. This genome wide study provides valuable information of chromosome organisation, gene structure, protein secondary structures, evolutionary and expression analysis of 59 rice UCH, as well as determined their potential involvement in growth development and stress responses. In this genome wide study bioinformatics tools and huge databases like NCBI, RGAP-DB, ORY-GENES DATABASE, PHYTOZOME, PFAM and many other software tools are used, it shows how impact they gonna be creating in future for creating transgenic plants with upregulated genes and instantaneously respond to several biotic and abiotic stresses independently.

**Key words:** Rice, Ubiquitin carboxyl terminal hydrolase's, Bioinformatics tools, NCBI, DUBs and Transgenic plants

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## 3D-QSAR, ADME-TOX IN SILICO PREDICTION AND MOLECULAR DOCKING STUDIES FOR MODELING THE ANALGESIC ACTIVITY AGAINST NEUROPATHIC PAIN OF NOVEL NR2B-SELECTIVE NMDA RECEPTOR ANTAGONISTS

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A new class of selective antagonists of the N-Methyl-D-Aspartate (NMDA) receptor subunit 2B have been developed using molecular modeling techniques. The three-dimensional quantitative structure–activity relationship (3D-QSAR) study, based on comparative molecular field analysis (CoMFA) and comparative molecular similarity index analysis (CoMSIA) models, indicate that steric, electrostatic and hydrogen bond acceptor fields have a key function in the analgesic activity against neuropathic pain. The predictive accuracy of the developed CoMFA model ( $Q^2 = 0.540$ ,  $R^2 = 0.980$ ,  $R^2_{pred} = 0.613$ ) and the best CoMSIA model ( $Q^2 = 0.665$ ,  $R^2 = 0.916$ ,  $R^2_{pred} = 0.701$ ) has been successfully examined through external and internal validation. Based on ADMET in silico properties, L1, L2 and L3 ligands are non-toxic inhibitors of 1A2, 2C19 and 2C9 cytochromes, predicted to passively cross the blood–brain barrier (BBB) and have the highest probability to penetrate the central nervous system (CNS). Molecular docking results indicate that the active ligands (L1, L2 and L3) interact specifically with Phe176, Glu235, Glu236, Gln110, Asp136 and Glu178 amino acids of the transport protein encoded as 3QEL. Therefore, they could be used as analgesic drugs for the treatment of neuropathic pain.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## CROSS-CULTURAL ADAPTATION AND PSYCHOMETRIC VALIDATION OF THE BSAQ « BOARD SELF ASSESSMENT QUESTIONNAIRE » SCALE

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### ABSTRACT

**Context:** In response to a wide range of institutional, political and financial pressures, substantial progress has been made in upgrading the public hospital. However, the latter suffers from major dysfunctions with the effectiveness of its leadership and governance being questioned.

**Objective:** In order to assess the effectiveness of governance boards, we propose a translation and cross-cultural adaptation of the Board Self Assessment Questionnaire (BSAQ).

**Methods:** The BSAQ was translated following the methodology of cross-cultural adaptation of measurement scales. In addition, psychometric properties were assessed on 82 board members representing 13 hospitals. Reproducibility and internal consistency were measured by intraclass coefficient (ICC) and Cronbach's  $\alpha$  tests.

**Results:** During the adaptation process, some items were modified to adapt the questionnaire to the Moroccan hospital context. Reliability analysis of the scale showed an excellent internal consistency of 0.942. Moreover, the reproducibility represented by the ICC intra-class coefficient was largely satisfactory for all dimensions. Construct validity analysis showed that the majority of items correlated well with their dimensions.

**Conclusion:** This study provides policy makers and researchers with a validated tool to describe, understand and assess the roles and functioning of hospital governance boards in a structured way. Such an assessment is considered a key step towards excellence in hospital governance.

**Keywords:** Cross-cultural adaptation, BSAQ, Board governance, skills, public hospitals.

**INTERNATIONAL ANKARA CONGRESS ON  
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**VERIFICATION OF THE AUTHENTICITY OF OLIVE OIL**

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**ABSTRACT**

Olive oil stands as a multifaceted product, playing a pivotal role in the Mediterranean diet and garnering endorsement from numerous nutritionists. Moreover, it holds significant prominence in scientific research, owing to its medicinal and cosmetic attributes.

Over 96 percent of Morocco's olive groves primarily comprise the Picholine Marocaine variety group, a fact documented by the Ministry of Agriculture and Marine Fisheries in 2006. This variety group is known for its adaptability and the exceptional quality of its olives, serving a dual purpose in both oil production and olive canning. The quality of olive oil is contingent not only on fluctuations in soil and climatic conditions but also on a multitude of factors entwined within the olive and olive oil production, processing, and marketing cycles, as outlined by the International Olive Council in 2011.

In our endeavor to assess the quality of olive oil produced and marketed in northern Morocco while concurrently developing identification methodologies, we intend to employ a comprehensive two-pronged approach, involving both field research and laboratory analysis.

In the context of field research, we will identify representative artisanal units among modern and semi-modern oil mills situated in the primary olive production regions of northern Morocco. The field survey will encompass an evaluation of the material produced, delve into the technological facets of olive crushing units, and scrutinize the techniques associated with olive oil processing, packaging, and storage.

In parallel, laboratory analysis will concentrate on assessing the quality of oils extracted from crushed olives and discerning the factors that influence the qualitative attributes of olive oils throughout the entire spectrum, ranging from olive harvesting to oil storage.

**Keywords:** Olive oil, Picholine Marocaine, quality.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## HYDROCARBON PIPELINE LEAK DETECTION USING MACHINE LEARNING MODELS

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### ABSTRACT

One of the most disastrous and destructive events that is extremely difficult to model are hydrocarbon leaks. Research on the development of hydrocarbon leak detection models has helped to minimize risk, recommend policy changes, save loss of life, and lessen property damage caused by leaks. Machine learning (ML) techniques have greatly advanced prediction systems over the past two decades, offering higher performance and more affordable solutions by simulating the intricate mathematical expressions of physical processes of leakage. The popularity of ML among operators of hydrocarbon pipelines has significantly expanded as a result of its immense advantages and possibilities. Researchers seek to develop more precise and effective detection models by incorporating fresh ML techniques and hybridizing already existing ones. This paper's major contribution is a demonstration of the state-of-the-art in ML models for leak detection and a discussion of the best models. In order to give a thorough overview of the many ML algorithms utilized in the area, the literature where ML models were benchmarked through a qualitative examination of robustness, accuracy, efficacy, and speed is specifically explored in this work. The performance comparison of ML models offers a thorough grasp of the various methodologies within the context of a thorough assessment and debate. The most promising detection techniques for both long-term and short-term leaks are thus introduced in this study. Investigated are also the key trends in raising the standard of leak detection models. The most successful ways for enhancing ML methods are claimed to include model optimization, algorithm ensemble, data decomposition, and hybridization.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## BUILDING PARTNERSHIPS TO ADDRESS POVERTY ALLEVIATION: A MULTISECTORAL APPROACH

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### ABSTRACT

Addressing poverty requires a multifaceted and collaborative approach that transcends the boundaries of traditional sectors. This paper delves into the critical role of cross-sectoral partnerships in effectively combating poverty at the grassroots level. This paper examines the profound impact of collaboration among governments, civil society organizations, and the private sector on alleviating poverty and achieving Sustainable Development Goal 1.

The paper begins by highlighting the pressing need for multisectoral partnerships, given the complex and interconnected nature of poverty. It presents case studies and success stories from various regions, showcasing instances where collaborative efforts have yielded tangible results in poverty reduction. These examples underscore the significance of aligning resources, expertise, and goals across sectors to maximize impact.

Furthermore, the paper delves into the key principles that underpin successful multisectoral partnerships, emphasizing factors such as shared vision, mutual trust, and effective communication. It also explores the challenges and barriers that can hinder collaboration, offering insights into strategies to overcome these obstacles.

By drawing lessons from both developing and developed contexts, this paper provides a comprehensive framework for policymakers, practitioners, and stakeholders interested in fostering partnerships to combat poverty. It underscores the importance of integrating poverty alleviation efforts with broader development agendas and highlights the potential for such collaborations to address not only immediate economic challenges but also the root causes of poverty, including inequality and social exclusion.

In an era where global challenges demand collective action, this paper offers valuable guidance on how partnerships can serve as a powerful catalyst for achieving sustainable and inclusive development, ultimately paving the way for a world with reduced poverty and improved well-being for all.

**Key Words:** Poverty alleviation, Multisectoral Partnerships, Collaboration, Sustainable Development Goal 1, Grassroots Development

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## PROFLECTION OF CHRISTIAN RELIGIOUS EDUCATION MANAGEMENT AND THE PHILOSOPHY OF STATE LEADERS IN MINAHASA, INDONESIA

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### ABSTRACT

Christian Religious Education (PAK) aims at empowering religion and culture. However, religion commands a disproportionately large part compared to culture, with its elements often dominating the latter. The Minahasa leadership philosophy is full of innovative ideas that can help drive the development and management of this subject in the future. This study aimed to identify the management values of the Minahasa leadership philosophy that could contribute to PAK management. A descriptive-analytic approach was used to build ideas from books, articles, and interviews. Conclusively, the leadership system in Minahasa has the potential to manage PAK due to its synergistic and communal value proactively.

**Keywords:** Religion, Culture, Management, Minahasa, PAK (Christian Religious Education)

### Introduction

Academic studies on leadership philosophy in Minahasa have been mainly ignored. A few references, such as Renwarin (2006), explored the concepts of *matuari* and *tona'as* in relation to the cultural dynamics of the *Tombulu* sub-ethnic group. In 2019, Pinontoan wrote a book about *walian* and *tuang pandita*, discussing the interaction between culture and Dutch colonial Christianity. Furthermore, Rumbay tried to bring together the concept of Paul's leadership with the leader of the Minahasa country. These three examples illustrate the community's understanding of leadership values from a socio-anthropological and religious perspective. The existing academic knowledge falls short of its leadership philosophy. For example, old laws and titles such as "walak head" and "*pakasaan*" have not received serious academic attention.

Karudeng (2021) observed that Minahasa's rich cultural values had been seriously degraded by secularism and immigrant religions that claim local traditions as part of their original identity, including leadership concepts such as the role of *walian* and *tona'as*. The public interprets Minahasa from religious and cosmological concepts, while the secular world and modern religion interpret it from a socio-political perspective and western theology. It is essential to revitalize traditional leadership values to keep the area's ancestral heritage alive. Efforts must be made to align the concept of leadership with the local education system to create a more sustainable future.

Christian Religious Education (PAK) is offered at the senior secondary education level. Senior High Schools (SMA) and Vocational High Schools (SMK) are required to include lessons on religious and socio-cultural values as part of their curriculum. The content is largely focused on religion rather than cultural values. Although the Minister of Religion and Culture Regulation number 37 (2018:340-345) states that PAK lessons should have spiritual and social attitude competencies, cultural values are still declining today. Additionally, offering education promotes the implementation of community-based education, which adheres to local social and cultural customs (as outlined in Law Number 23 of 2003, article 55). The government's 'free learning' education initiative has relaxed the assessment standards for determining learning design to give teachers more freedom to select basic and core competencies in a more straightforward manner (Circular Letter of the Minister of Education and Culture, number 14 of 2019). It is vital to utilize all available opportunities to ensure local cultural values form part of the PAK elements. Although various studies showed that religion is not necessarily superior to culture, the former is dominant in PAK syllabus, and there has been little effort to incorporate local culture into the country's construction. Tobing (2020) explained that the PAK curriculum emphasizes Christian values, aiming to spread the faith with Christian attributes. The main focus of this subject is on developing Christ-like

character. Tubulau (2020) argued that the primary aim of PAK is to ensure that everyone becomes a disciple of Christ. This emphasizes the religious aspects while ignoring the local culture.

Involving cultural elements in the construction of PAK demands the concept of projective education management. Jonathans et al. (2022:26-28) argued that the government's 'freedom learning' program provides new opportunities for educators to manage their schools and curricula more effectively. Additionally, the program promotes collaboration between educators, leading to more innovative and effective educational practices. This means the PAK management should be open and flexible to accommodate religious and cultural values. Although the cultural elements are not well represented, there is expectation that this will change in the future.

One way to address this disparity is to incorporate the noble values of Minahasa state leaders into the PAK management. Leadership concepts such as the old law, *walak* head, *walian*, *tona'as* and *pakasaan* have management values that can be implemented. Though various studies were conducted on leadership in Minahasa, none of them addressed the leadership element of culture. Furthermore, the management value of the leadership model has not been explored. For instance, Rompas et al. (2018) examined various leadership management models for the transportation service in the Southeast Minahasa District. Rumondor (2013) explored the relationship between discipline issues and work motivation and how leadership can impact work motivation. Suryo (2010) investigated transformational leadership in Minahasa. The studies focused only on how the government bureaucracy and education are run. Dumanauw (2018) discussed change management in the office, while Koso (2018) examined management in regionally owned enterprises. Potangan (2021) looked at rural government management, and Rumbay et al. (2021a) studied the potential for total quality management in Christian education. Furthermore, Rumbay et al. (2021b) examined education administration management and its relevance to structure and bureaucracy.

The lack of attention to the philosophical reflections of state leaders in Minahasa and PAK management deserves exploration. This leads to the question: How will the leadership philosophy in Minahasa contribute to the management of Christian Religious Education (PAK)?

### Method

This study employed a qualitative approach with a descriptive-analytic methodology. Books and journal articles were the primary sources in constructing the concept of leadership philosophy in Minahasa and PAK elements. Through interviews with a teacher at the Manado State Christian Institute specializing in Tribal Religion in Minahasa, a lecturer at the Faculty of Cultural Sciences at Samratulangi University, a practitioner of indigenous Minahasa beliefs, and a community leader were conducted to gain a comprehensive understanding of the topic.

### Discussion

#### *Reflection towards PAK Management*

Reflecting on past events can help one understand the current events and develop a more comprehensive understanding of what is occurring. Suharna et al. (2013:280) argued that reflection is one of the highest levels of thinking. It involves analyzing past actions and their consequences, considering different alternatives, and thinking about the way things could be done differently. According to Kusumaningrum and Saefudin (2012: 575), reflective thinking is an important part of education, contributing to social development through experience and problem-solving skills. Its patterns consider everything before concluding (Phan, 2008:578). Suharna et al. (2013:281) emphasized the aspects of analysis, evaluation, motivation, and appropriate strategies. Sunaryo (2011:5), on the other hand, concluded that reflection is an intellectual link that involves investigation and conclusion.

There are only two main elements to the definition of reflection: retrospective and response. According to Choy & Oo (2012), retrospective thinking is a process of looking back at past experiences and using them to inform present situations. Suharna et al. (2013: 283) argued that a reflection is a response to past and current events. Therefore, when people reflect on something, they always consider what has occurred and what is currently happening. Such an approach focuses too much on the past and does not contribute to the future.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

When reflecting on the management of PAK, it is necessary to evaluate the patterns and systems conducted in the past or are currently being carried out. If necessary, the management must be deconstructed and reconstructed. Reflecting on PAK management is not enough, implying that educational institutions need to go one step further and engage in proflection. Hansen (2016) found that the term "proflection" was first used by Peter Rod, who later became known as the "originator" of the word. According to Rod (2010), proflection is the process of focusing on the future and using certain theories or materials with futuristic meaning. It involves looking forward to something unknown and discovering something new. This process can have different outcomes depending on the route one takes. Curiosity is what drives people to experiment and test new things to see what the future might hold (Rennison, 2013).

The objective of PAK management is to help people move on from past events and be open to future possibilities. Reflections on leadership philosophies in Minahasa are an important part of the cultural evaluation, but past events are not as crucial as the foretaste of the future. The ideas and values of local culture can be preserved with exemplary leadership in place. The Minahasa leadership philosophy is a real implementation of the PAK management proflection. This combination and harmonization of different cultures, religions, and education systems offer promising results and future discoveries. Therefore, reflection should lead to proflection, which can contribute to the advancement of culture, religion, and education.

### *Hierarchy towards Synergy*

Minahasa's leadership system is hierarchical but does not recognize the royal system such as other regions in the archipelago. A leader governs a group by upholding established customs and traditions. At the lowest level, a leader is also called the head of the *taranak*. This position is comparable to the head of the household in a large family. Wowor (2022) revealed that a large family is comprised of several small families living together. This is evident from the original house setting of the Minahasa tribe, called *walewangko*, which had several bedrooms and a kitchen. Several small families lived together in one house under the leadership of a *taranak* head, and the old term used is *ukung*, currently translated as the old law. According to Sual (2022), the term emerged after the Dutch's involvement in the Minahasa social system. The current concept views the old law as the head of a village who presides over political, social, and cultural functions (Ratar, Pangemanan, & Rimpoporok, 2021; Waworundeng, 2017; Teiwilang, Lapian, & Sendow, 2017; Pendong, Pioh, & Kairupan, 2017; Chalim, Gosal, & Waworundeng, 2021).

The old *ukung* is a deliberate process carried out by the heads of the *taranak*. Aspirations and inputs from small families are conveyed to the head of the *taranak*, who is involved in the selection of *ukung* elders at a higher level. Demographically, the old *ukung* covers the territorial area of one or several villages. Pinontoan (2022) asserted that before colonial rule, *ukung* referred to the notion of a head or leader, while old is a term for an elderly person with a wealth of experience regarding economic and social life. Responsibilities bestowed to this person included overseeing the opening of new plantation lands and coordinating various community rituals in collaboration with priests (Sual, 2022). Pinontoan (2022) noted that an old *ukung* is responsible for coordinating the village security guards. In the ancient Minahasa communities, disturbances and threats from outside the village typically included attacks by wild animals, enemies from outside, and occult sciences. Overall, security coordination and regulation is one of the main tasks of an old *ukung*.

There is a specified leadership hierarchy, with the *taranak* being the lowest, followed by the old *ukung*, and then the *walak* head. However, a thin line exists between old *ukung* and *walak* heads. This has been attributed to data destroyed in the late 18th and early 19th centuries when Christianity and secularism were essential parts of society. Initially, this tradition relied heavily on the collective memory of village elders and secondary data from libraries. Sual (2022) argued that *walak* head is another term for the law of *wangko* or *tona'as wangko*, which controls several hamlets or villages. A *walak* is a chief with a higher position (equivalent to the head of a sub-district) compared to an old *ukung* who only controls a particular village. Pinontoan (2022) further indicated that the Dutch colonials selected him due to political interests to provide taxes and carry out forced cultivation.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

The head of the *walak* elected by the Dutch could intervene politically against the old *ukung*. Although initially elected by representatives of the *taranak* and old *ukung* through village meetings, colonialism shifted society's vital role to its political interests. The actual process required that each *taranak* or extended family gather together and submit one name to be vetted for the leadership position. Representatives would also gather in an open field to participate in the election activity. Several names would be proposed, but people with special abilities were the most preferred candidates. The selection of the heads had a similar pattern and system. Furthermore, the two leadership positions had the same social and political duties, making it difficult to distinguish their roles and responsibilities.

The confusion in using the terms old *ukung* and *walak* heads arose due to the inclusion of colonial political intervention and the secular system (Wowor, 2020). Although the word "ukung" has changed over time, it is still possible to distinguish between the old and new meanings. The head oversees a sub-district that consists of multiple villages. This meant that the leadership system was organized in layers, with the *taranak* at the bottom, followed by the old *ukung*, then the head of the *walak*, and finally the *pakasaan*, or equivalent to the regent who oversees a district consisting of several sub-districts and villages. However, *pakasaan* has not gained popularity with the public compared to other terms.

The terms *pakasaan* and *walak* refer to specific areas and leadership roles within regions, respectively. According to (Saumana et al., 2015), *pakasaan* refers to the territorial denotation, while residents under the leadership of a *walak* are usually blood-related and have the same lineage (Kimbal, 2015). Therefore, *walak* is a genealogical and territorial expression that promotes the emergence of the term *pakasaan*. Due to the increasing population, there is a potential for conflict within *walaks*. In the event of disputes, some *taranak* may leave the *walak* area to find a new home. This process is known as *tumani* or *matani*, where the new community maintains kinship ties with their original community. Their growth and spread created an extensive network among the community, referred to as *pakasaan* and led by a chief (Japar et al., 2021:56).

The leadership hierarchy is firm and expressive of synergy in its tactics. The different levels of leadership within a community are aspirational for the groups they represent and are socially connected through the heads of *taranak*, old *ukung*, and *walak* to *pakasaan*. Synergic structural management was considered where selection of a leader was done through a process that brought all community groups together under one social organization, hence, individual interests become communal interests. Furthermore, each leader was assigned a significant role in reconciling any horizontal conflicts. The head of *pakasaan* was responsible for maintaining peace among the *walak*, which demonstrated the synergistic relationship between the two groups. Moreover, the leaders determined the relationship between the community and the immigrants, including the Dutch colonialists. This means the political function of an old *ukung* was to act as a bridge uniting two different interests. The primary socio-economic function involved ensuring the welfare and safety of the *taranak*. Each individual had unique socio-economic interests that an elected leader synergized. Even at the lowest level of leadership, they were tasked with balancing the aspirations of their family with the public interest and the old *ukung* and *walak* heads.

Hierarchy-synergy management was an essential value in the leadership system in the community. Integrating this value into PAK management contributed to the development of the area. Therefore, various patterns that had been practiced and implemented needed to be reflected in the current context. It is crucial to consider how PAK will be managed from a proactive perspective in the future. The value of leadership came from tradition and culture, which offered a visionary future for PAK management. PAK could adopt a hierarchical-synergy system, which would open up future development and management opportunities.

## *Individual to Communal*

The tradition recognized the terms *tonaas* and *walian* in addition to the head of *taranak*, old *ukung*, *walak* and *pakasaan*. A *tonaas* is a person who has magical abilities and can be matched with another person who has similar abilities. Renwarin (2006) discovered that the term "*tounahas*" was derived from the word "tou", meaning people, and "nahas" or "ta'as", meaning palm fruit. The palm fruit has a strong outer shell but a soft inner core. This understanding meant strength, greatness, ability, experience, and victory. It was concluded that *tonaas* was someone who had supernatural powers above the average of



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

other people in a certain area of expertise. The term *tonaas* was also associated with the hardwood used to build houses. Types of wood such as forest *cempaka* or *cempaka mareno* are used extensively in construction due to their strength.

According to (Sual, 2022), *tonaas* was responsible for political, social, and economic functions. Sual asserted that there was a representation of individual abilities, where a community leader could be elected or appointed by people considered *tonaas*. (Pinontoan, 2022) argued that they could be categorized as a title but not a position in the structure of society. Therefore, a person who was an expert in hunting (*panumaan*), farming (*mangundang*), and astrology, and could detect the sounds of birds (*manalingga*), was considered a *tonaas*. In addition, the individual had to demonstrate a deep understanding of the community's spiritual values.

Karundeng and Sual (2022) outlined several traits of an individual who could be considered *tonaas*. Firstly, a *tonaas* should be wise and reasonable. *Tonaas* comes from the root word *ngaasan*, which can also mean "brained". Therefore, a person could be considered a *tonaas* if they exhibited wisdom and intellectual knowledge. Secondly, one needed to have strength, or *tumawai*, indicating wood's strength and hardness. It implies that one was expected to have the power of wood balanced with the sensitivity of the heart or intention. Finally, the individual had to possess formidable skills in combat and security to be considered for the role. This was referred to as '*mawayi*', or supernatural powers. The leaders needed to possess the necessary skills to coordinate village arrangements, such as opening new plantation land. The workers were assigned to groups based on their expertise, including clearing the land, managing the soil, and planting seeds. At harvest time, *tonaas* had the expertise to ensure that the harvest was adequately managed. This was because the next planting season was closely related to the harvest, as well as hunting for wild animals for consumption. Collaboration was critical to a successful hunt, and the leaders were required to interpret astrological signs and the calls of birds to be successful. They ensured that everyone was on the same page and that the hunt was successful. In practice, hunting activities were consulted with the old *ukung* or *walak* heads to get their experienced input on the best application method to be successful.

The leadership of a *tonaas* was not a socio-political position, but rather a person's ability. Although the individual may have possessed supernatural powers that sometimes won him the trust of the *Taranak* heads, occupying public positions was not an obligation. Therefore, the title of *tonaas* was a gift that society gave to an individual, and with it came certain expectations and responsibilities. If the individual violated social norms, the community could reduce or withdraw privileges.

However, the managerial system was the most noteworthy in regulating work. *Tonaas* was an integral part of the community, and they worked together to make things occurs. For example, in agriculture, they cooperated with the old *ukung* and *walian* to carry out rituals and land clearing. On the other hand, a *walian* was a religious leader recognized by the local community and possessed early unique signs. They were often associated with the health sector, but anyone could become a *walian* with the right signs and recognition. In addition, when someone showed unique characteristics, the elders would give them special guidance to stop them from straying from village rules and customs. They were expected to have the ability to heal the sick, give birth at odd hours, have unique hand lines, perform certain supernatural powers such as flying in trees, and not get hurt when hit by sharp objects (Sual, 2022). According to (Pinontoan, 2022), a religious leader categorized as a shaman in a modern perspective was known as a *walian*. However, the term shaman had a negative connotation from a secular perspective, making it necessary to understand the term from a cultural point of view. The term referred to a priest who led traditional rituals from a shamanistic perspective.

In certain activities, both *tonaas* and *walians* are required to perform joint tasks. Individuals with social and religious mandates often gathered communally to carry out activities together. For instance, when agricultural fields were ready, a *walian* would lead prayers and rituals, asking the Creator to give fertility and success at harvest time. Wowor (2022) found that a *walian* would set out a container and recite a prayer so the seeds from the sky could fall into the designated area. Furthermore, those who understood astrology could provide instructions for the right time to plant and harvest. They were assisted by people with expertise in cultivating the land. This indicates community mobilization was led directly by old *ukung* or *walak* heads. The work carried out by the Minahasa community was a chain that described

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

every leader and individual who moved into the public sphere and presented collaborative work. Management was transferred from private to communal.

The harmonious integration of communal work could also be explicitly seen in the duties of a *walian*. Sual (2022) reported that a companion or assistant typically supported the work of the *walian*. The community entirely entrusted those selected by their elders to coordinate and run ceremonial rituals smoothly. In making offerings, *kasule* was responsible for creating threads, betel nut, making umper or offerings, slaughtering sacrificial animals, praying for sick people, reading signs on animals, and other ritual matters. The interaction and integration of individual leaders and proletarian society was essential for social chain and field coordination. The various *tonaas*, *walian*, *kasule*, old *ukung*, *walak* heads, and *pakasaan* heads had their expertise and ways, but they all came together in social spaces to work together.

These opportunities allowed PAK to improve the quality of management, each value and element can be better managed and coordinated in the future. Incorporating the philosophical values of leadership contributes to the development of PAK management. It also helps preserve the original cultural values eroded by the times and the secular system. Hence, each stage of transformation should be guarded to maintain the purity of cultural heritage.

## Conclusion

The leadership philosophy of Minahasa has valuable information that could be used to improve the management of PAK. Synergy and communal values are essential elements that can be an alternative for the management of the subject. Incorporating cultural aspects into the management process could preserve local cultural heritage and infuse PAK with a unique feature. In addition, the leadership was used as a solutive alternative to government regulations regarding the construction of culture and religion in PAK. The management's understanding of local cultural patterns opened up the possibility of creating a religious and cultural PAK in the future.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DECOLONIZATION OF CONTRACT LAW: EMBRACING CULTURAL EMIC VALUES OF MINAHASAN'S TRADITION IN AN AGREEMENT

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### ABSTRACT

The dimensions and elements of law in social life in Indonesia are stuck under colonialism legacy. Civil law, explicitly speaking, contract law in Indonesia, is one of the legacies that reflects the vital characteristics of colonialism. As a result, the implementation of contract law differs from local principles and has the potential to share legal uncertainty. The Minahasan tradition of making agreements is one of the local cultural values that can be a source of law concerning contract law. Adopting local values can be an alternative contribution to the decolonization of contract law. This research uses a qualitative descriptive analysis method where references such as books, articles, and other sources will be the main backbone. In sum, the anthropological values of equality, trust, and loyalty are significant elements of the Minahasan tradition of contract-making that can contribute to the decolonization of contract law in Indonesia

**Keywords:** contract law; culture; Minahasa; KUHPdt; agreement

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## İMAM HATİP ORTAOKULLARINDA HAFIZLIK PROJESİ (BATMAN ÖRNEĞİ) HAFIZ PROJECT IN IMAM HATIP SECONDARY SCHOOLS (BATMAN EXAMPLE)

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### ÖZET

Son yıllarda ülkemizde İmam Hatip ortaokullarında İngilizce dil odaklı eğitime benzer bir şekilde hafızlık projesi uygulanmaktadır. Öğrenciler akademik sınavı geçtikten sonra tatil sürecinde eğitim alır ve Eylül ayında yetenek sınavına tabi tutulurlar. Başarılı olan öğrenciler beşinci sınıftan itibaren eğitimlerine başlarlar.

Bu eğitimde öğrenciler, okul gününün belirli saatlerinde hafızlık eğitimi alırken diğer zamanlarda akademik derslere katılırlar. Beşinci sınıfta öğrenciler hafızlık için temel eğitim alırlar. Altıncı sınıfta ise akademik derslerden bağımsız olarak sadece hafızlık eğitimine yönlendirilirler. Yedinci ve sekizinci sınıflarda ise öğrenciler hafızlık eğitimlerini pekiştirmeye odaklanırken aynı zamanda akademik eğitime de önem verirler.

Bu proje, Diyanet İşleri Başkanlığı ve Din Öğretimi Genel Müdürlüğü tarafından yürütülmektedir. İmzalanan protokole göre, il müftüleri ve il milli eğitim müdürlükleri bu iki kurumu il düzeyinde temsil eder. Bu proje başarıyla uygulanırken zaman zaman bazı aksaklıklar ortaya çıkmaktadır. Bu proje, devlet tarafından din eğitiminin yeraltından verilmesini önlemek ve öğrencilerin hem sağlam ve sahih din eğitimi almasını hem de akademik başarı elde etmelerini sağlamayı hedeflemektedir.

Son yıllarda bu eğitimi alan öğrencilerin LGS sınavında başarılı oldukları, hatta Türkiye dereceleri elde ettikleri ve birçoğunun fen liseleri gibi sınavla öğrenci alan nitelikli liselere kabul edildikleri gözlemlenmiştir. Ancak Batman ilinde, bu projenin istenen seviyede olmadığı söylenebilir.

Bu proje, Batman ilinde üç okulda uygulanmaktadır. Proje, merkezdeki Gazi Anadolu İmam Hatip Lisesi ve Kozluk ilçesindeki Tepecik İmam Hatip Ortaokulu'nda erkek öğrencilere yönelik gerçekleştirilmektedir. Kız öğrenciler ise merkezdeki Fatma Zehra Anadolu İmam Hatip Lisesi'nde eğitim almaktadır.

Bu çalışma, Batman ilinde İmam Hatip ortaokullarında uygulanan hafızlık projesini açıklamaktadır. Çalışma, projenin başarılı yönlerini ve üzerinde durulması gereken alanları ele alınmıştır. Çalışmada, Türkiye'deki İmam Hatip okullarının tanıtımı ve diğer yönlerine girilmemiştir. Bu çalışmanın amaçlarından biri, Batman İmam Hatip ortaokullarında gerçekleştirilen hafızlık projesinin genel bir bakışını sunmayı, diğeri ise ilimizde bu projenin zayıf yönlerini tespit etmek ve ilgililer tarafından giderilmesini sağlamayı amaçlamıştır.

**Anahtar Kelimeler:** Batman, Din Eğitimi, Hafızlık, İmam Hatip

### ABSTRACT

In recent years, a memorization project similar to English language-focused education has been implemented in Imam Hatip middle schools in our country. After students pass the academic exam, they undergo education during the holiday period and are subjected to a talent exam in September. Successful students start their education from the 5th grade.

In this education, students receive memorization training at certain times of the school day while also attending academic classes at other times. In the fifth grade, students receive basic training for memorization preparation. In the sixth grade, they are directed exclusively towards memorization

training, independent of academic subjects. In the 7th and 8th grades, students focus on reinforcing their memorization training while also emphasizing academic education.

This project is carried out under the responsibility of the Presidency of Religious Affairs and the General Directorate of Religious Education. According to the signed protocol, provincial muftis and provincial directorates of national education represent these two institutions at the provincial level. While this project is being successfully implemented, occasional shortcomings may arise. The aim of this project is to ensure that religious education is provided by the state, preventing it from being provided underground, and enabling students to receive both religious education in a healthy manner and to achieve academic success.

In recent years, it has been observed that students who receive this education have been successful in the LGS exam, even achieving national rankings, and many of them have been admitted to prestigious high schools that admit students through exams, especially science high schools. However, in Batman province, it can be said that this project is not yet at the desired level.

This project is implemented in three schools in Batman province. The project is conducted for male students at Gazi Anadolu Imam Hatip High School in the center and Tepecik Imam Hatip Middle School in Kozluk district. Female students, on the other hand, receive education at Fatma Zehra Anadolu Imam Hatip High School in the center.

This study explains the memorization project implemented in Imam Hatip middle schools in Batman province. The study will address the successful aspects and the areas where there are shortcomings in this project. The study will not delve into the introduction and other aspects of Imam Hatip schools in Turkey. One of the aims of this study is to present an overview of the memorization project carried out in Batman Imam Hatip middle schools, while the other aim is to identify the weaknesses of this project and ensure that they are rectified by those concerned.

**Keywords:** Batman, Religious Education, Memorization, Imam Hatip

## GİRİŞ

Ülkemizde yaklaşık 165 okulda, örgün eğitimle birlikte yürütülen hafızlık projesi, MEB Din Öğretimi Genel Müdürlüğü ve Diyanet İşleri Başkanlığı iş birliğiyle 2014-2015 eğitim-öğretim yılında hayata geçirilmiştir.<sup>1</sup> Bu proje, öğrencilerin hafızlık eğitimleri ve sonrasındaki eğitim-öğretim süreçlerinin etkin, verimli ve sistematik bir şekilde gerçekleştirilmesini, mesleki, akademik, sosyal, kültürel, sportif ve ahlaki gelişimlerinin desteklenmesini hedeflemektedir. Projenin en önemli paydaşlarından biri, Diyanet İşleri Başkanlığına bağlı Kur'an kurslarıdır. Bu kurslara kayıt yaptıran öğrenciler, hafızlık eğitimlerinin yanı sıra MEB'e bağlı imam hatip ortaokullarında akademik derslerini de almaktadırlar.<sup>2</sup> 2019 yılında imzalanan protokol ve okul-Kur'an kursu işbirliği usul ve esaslarıyla, proje daha da güçlendirilmiştir.<sup>3</sup>

Bu proje, öğrencilerin Kur'an-ı Kerim'i ezberlemeleri ve Kur'an'ın ana konularını öğrenmeleri için okul tatili olmadan ve sınıf tekrarı yapmadan fırsat sağlamayı amaçlamaktadır. Ayrıca, öğrencilerin bir üst öğrenime hazırlanmalarına yardımcı olmak, sorumluluk bilincini geliştirmek ve düşünen, tartışabilen,

<sup>1</sup> Pakize Yetimova, *Ortaokula Devam Eden Öğrencilerin Hafızlık Eğitiminde Yaşanan Sorunlar Ve Çözüm Önerilerine Yönelik Bir Araştırma* (İstanbul: İstanbul Üniversitesi, Yüksek Lisans, 2018), 15.

<sup>2</sup> İmam Hatip okullarının kuruluşu ve geçirdiği evreler için geniş bir şekilde bkz. Mustafa Öcal, "Cumhuriyet Döneminde Türkiye'de Din Eğitimi ve Öğretimi", *Uludağ Üniversitesi İlahiyat Fakültesi Dergisi* 7/7 (1998), 246-268.

<sup>3</sup> Güneş, Adem . "Hafızlık Eğitiminin Öğrencilerin Sosyal ve Özgüven Gelişimlerine Etkisi -Örgün Eğitimle Birlikte Hafızlık Yapan İHO Öğrencileri Üzerine Bir Araştırma-". *İlahiyat Tetkikleri Dergisi* - / 53 (Haziran 2020): 263-286;267;[https://hendeknehatuniho.meb.k12.tr/icerikler/orgun-egitimle-birliktehafizlik-projesi\\_nedir\\_11969177](https://hendeknehatuniho.meb.k12.tr/icerikler/orgun-egitimle-birliktehafizlik-projesi_nedir_11969177). 23. 09. 2023, saat: 18:23; <https://hafiz.meb.gov.tr/pdf/>, 23. 09. 2023, saat: 18: 29

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

sosyal ilişkileri gelişmiş ve evrensel değerlere sahip bireyler olarak yetişmelerini sağlamak hedeflenmektedir.<sup>4</sup>

Hafızlık eğitimi, ortaokul düzeyinde yapılmaktadır. Bu sayede öğrenciler, hafızlık eğitimine erken yaşta başlayarak, eğitimlerinin ortaokul düzeyinde yapılması ve ilgi, istidat ve kabiliyetleri doğrultusunda seçilmeleri gibi faktörler sayesinde, hafızlık eğitimini daha kolay ve kalıcı hale getirebilmektedirler. Hafızlığa 5. sınıfta başlanması, 6. sınıflarda tamamlanması, 7. ve 8. sınıflarda pekiştirilmesi gibi bir süreç izlenmektedir. Bu süreçte öğrenciler, okul ortamından, aileden ve sosyal çevreden uzak kalmadan örgün eğitimden azami düzeyde yararlanarak hafızlık eğitimi almaktadırlar.<sup>5</sup>

Hafızlık eğitimi sürecinde, öğrencilerin millî, mânevî, ahlâkî, kültürel ve insânî değerleri içselleştirmeleri amaçlanmaktadır. Bu amaç doğrultusunda, Kur'an ayetlerinin anlamından ve hafızlık eğitiminin kazanımlarından yararlanılmaktadır. Ayrıca, öğrencilerin, ortaokul düzeyinde din eğitim ve öğretimi ile ilgili temel becerileri edinmeleri ve Kur'an'ın ana konuları hakkında bilgi sahibi olmaları hedeflenmektedir. Hafızlık eğitimi sürecinde, öğrencilerin kişisel becerilerinin ve sosyal yeteneklerinin geliştirilmesi için çeşitli sosyal-kültürel etkinlikler düzenlenmektedir. Öğrenciler, hafızlık eğitimi vesilesiyle kazandıkları çalışma disiplini, zaman yönetimi gibi becerilerinin geliştirilmesi ve pekiştirilmesi için de desteklenmektedirler.<sup>6</sup>

Örgün eğitim ile birlikte yürütülen Hafızlık Projesi kapsamında, proje okullarında 6.251 ve program okullarında 9.818 öğrenci öğrenim görmektedir. Böylelikle toplam öğrenci sayısı 16.069'dur. 2023 yılında öğrenci sayısı yaklaşık 20.000 civarındadır.

2020 Mart ayı verilerine göre, proje ve program okullarında 5.171 öğrenci okumakta, 8.484 öğrenci hafızlık eğitimi almaktadır. Ayrıca, 2.414 öğrenci hafızlık eğitimini tamamlamıştır. Son üç yılda bu sayının 5.000 olduğu tahmin edilmektedir.

2015-2019 yılları arasında, en yüksek yılsonu başarı ortalamasına sahip öğrencilerin, Hafızlık Projesi kapsamında öğrenim gören tüm sınıf düzeylerindeki öğrenciler olduğu görülmektedir. Ayrıca, 2015 yılında öğrenime başlayan öğrencilerin başarı ortalaması 83.75 iken, 2019 yılında bu ortalamaları 88.2'ye yükselmiştir. Proje kapsamındaki öğrencilerin, TÜBİTAK, TEKNOFEST, ODTÜ, İTÜ gibi çeşitli üniversitelerin mühendislik alanlarında düzenlenen projelerden elde ettikleri dereceler, MEB liselere geçiş sınavında gösterdikleri başarılar, akademik açıdan üst düzeyde gelişimin sağlandığının en büyük göstergelerini oluşturmaktadır. Ayrıca, yüzme, okçuluk gibi ulusal alanda sportif yarışmalardan elde edilen dereceler, ebru, hat, musiki korolar gibi sanatsal çalışmalar da bu proje kapsamındaki öğrencilerin tüm yönleriyle gelişimine katkı sağlamaktadır.<sup>7</sup>

Batman ilinde ilk olarak Batman Kız Anadolu İmam Hatip lisesi bünyesinde 40 kız öğrencinin katılımıyla uygulanan bu proje 2020 yılında 15 Temmuz İmam Hatip Ortaokulunda erkek öğrencilere uygulanmıştır. Aynı yıl ilimiz Kozluk ilçesinde Tepecik İmam Hatip Ortaokulunda hem kız hem de erkek öğrencilere uygulanmıştır.

Kız öğrencilere uygulanan proje 2020 yılından itibaren TP. Fatma Zehra İmam Hatip Fen ve Sosyalbilimler proje lisesinin bünyesine alınmış 2021 yılında ise erkeklere uygulanan proje Gazi Anadolu İmam Hatip Lisesi bünyesine alınmıştır. Tepecik İmam Hatip Ortaokulu ise ilk günkü gibi aynı fiziki mekanda uygulanmaya devam etmektedir.

Batman ilinde ilk olarak Batman Kız Anadolu İmam Hatip Lisesi bünyesinde 40 kız öğrencinin katılımıyla gerçekleştirilen proje, 2020 yılında 15 Temmuz İmam Hatip Ortaokulu'nda erkek öğrencilere uygulanmıştır. Aynı yıl, Kozluk ilçesindeki Tepecik İmam Hatip Ortaokulu'nda ise hem kız hem de erkek öğrencilere proje uygulanmıştır.

<sup>4</sup> Din Öğretimi Genel Müdürlüğü, *Örgün Eğitimle Birlikte Hafızlık Projesi Usul ve Esasları* (Ankara: Din Öğretimi Genel Müdürlüğü Yayınları, 2019), 2.

<sup>5</sup> Din Öğretimi Genel Müdürlüğü, *Örgün Eğitimle Birlikte Hafızlık Projesi Usul ve Esasları*, 3.

<sup>6</sup>[https://hendeknehatuniho.meb.k12.tr/icerikler/orgun-egitimle-birlikte-hafizlik-projesi-nedir\\_11969177.23.09](https://hendeknehatuniho.meb.k12.tr/icerikler/orgun-egitimle-birlikte-hafizlik-projesi-nedir_11969177.23.09). 2023, saat: 18:52.

<sup>7</sup> Bu Bilgiler Milli Eğitim Bakanlığı Din Öğretimi Web Sayfasından alınmıştır.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Kız öğrencilere yönelik proje, 2020 yılından itibaren TP. Fatma Zehra İmam Hatip Fen ve Sosyalbilimler Proje Lisesi bünyesine alınmıştır. Erkek öğrencilere yönelik proje ise 2021 yılında Gazi Anadolu İmam Hatip Lisesi bünyesine alınmıştır. Tepecik İmam Hatip Ortaokulu ise ilk günkü yerinde ve fiziki mekanında proje uygulamalarına devam etmektedir.

Yukarıda bahsi geçen projenin Batman ilindeki uygulaması, istenilen seviyede olmadığına dair birçok sebep bulunmaktadır. Bununla birlikte, proje Batman ilinde birçok olumlu yanı da barındırmaktadır. Bu olumlu yönler arasında, proje kapsamında öğrencilerin sosyal ve kültürel açıdan gelişimlerine katkı sağlanması, öğrencilerin özgüvenlerinin artırılması, öğrencilerin akademik başarılarının yükseltilmesi gibi faktörler yer almaktadır. Bu nedenle, proje Batman ilindeki eğitim sistemi için önemli bir adım olarak değerlendirilebilir.

Bu çalışmada, Batman ilindeki İmam Hatip Ortaokullarında uygulanan hafızlık projesinin zayıf yönleri ele alınacak ve çözüm önerileri sunulacaktır. Ayrıca, projenin güçlü yanlarına da değinilerek, değerlendirmeler yapılacaktır. Bu çalışma, saha gözlemlerine dayanarak, projenin uygulandığı bir okulda gerçekleştirilmiştir. Tarihsel gelişim ve uygulama yöntemleri gibi konulara değinilmeyecek, sadece Batman ilindeki bu projenin güçlü ve zayıf yönlerine odaklanılacaktır. Projenin zayıf yönlerinin giderilmesi için öneriler sunulacak ve bu sayede yöneticilerin sorunlu alanları çözme konusunda adımlar atması hedeflenmektedir.

## BATMAN İMAM HATİP ORTAOKULLARINDA HAFIZLIK PROJESİ

İmam Hatip ortaokulları ve normal ortaokullar, genel olarak benzer derslerin öğretildiği okullardır. Her iki okulda da haftalık 36 saat ders işlenmektedir. Ancak, Hafızlık projesi uygulanan İmam Hatip ortaokullarında kendine özgü bir müfredat bulunmaktadır. Bu okullarda da haftalık 36 saat ders işlenmektedir, ancak 10 saatlik bir bölümü seçmeli Kur'an-ı Kerim dersi oluşturmaktadır. Bu durum, yabancı dil ağırlıklı proje okullarında yabancı dil için uygulanan projeye benzer. Yabancı dil ağırlıklı okullarda öğrenciler, 10 saatlik seçmeli yabancı dil dersi alırken, kalan ders saatleri diğer derslerin haftalık ders saatlerini oluşturmaktadır.

### Çizelge :1 İmam Hatip Ortaokullarında Haftalık Ders Saatleri

S.NO	Ders	5. sınıf Ders Saati	6. sınıf Ders Saati*	7. sınıf Ders Saati	8. sınıf Ders Saati
1	Türkçe	6	6	5	5
2	Matematik	5	5	5	5
3	Fen Bilimleri	4	4	4	4
4	Sosyal Bilgiler	3	3	3	
5	T. C. İnkılap Tarihi ve Atatürkçülük				2
6	Yabancı Dil	3	3	4	4
7	Din Kültürü ve Ah. Bil.	2	2	2	2
8	Görsel Sanatlar	1	1	1	1
9	Müzik	1	1	1	1
10	Beden Eğitimi ve Spor**	2	1	1	1
11	Bilişim Teknolojileri ve Yaz.	2	2		
12	Rehberlik ve Kariyer Planlama				1
11	Kur'an-ı Kerim	2	2	2	2
12	Arapça	2	2	2	2
13	Peygamberimizin Hayatı	2	2	2	2
14	Temel Dini Bilgiler		1	1	

\* Örgün eğitimle beraber hafızlık projesini uygulayan imam hatip ortaokullarında öğrenciler pasif olup Kur'an kurslarında hafızlık eğitimi almaktadırlar.

\*\* son yapılan değişiklikle beraber örgün eğitimle beraber hafızlık projesini uygulayan okullarda 1 ders saati 5. Sınıfa getirilmiştir.



Yukarıdaki tablo, normal İmam Hatip ortaokullarında haftalık ders saatlerini göstermektedir. Bu okullarda, 5, 6 ve 7. sınıflarda 36 saatlik zorunlu bir ders programı uygulanmaktadır. Bu ders programı içerisinde seçmeli dersler de yer almaktadır. 8. sınıflarda ise 34 saatlik zorunlu bir ders programı ve 2 saatlik seçmeli ders programı uygulanmaktadır. Ancak, hafızlık projesi uygulanan ortaokullarda haftalık ders saatleri değişmektedir. Son yapılan değişiklikle birlikte, 5. sınıflarda 26 saatlik zorunlu bir ders programı uygulanmaktadır. Milli Eğitim Bakanlığı'nda çalışan öğretmenler tarafından verilen derslerin yanı sıra, Peygamberimizin hayatı dahil Kur'an-ı Kerim dersleri de toplamda 10 saatlik bir programda Kur'an Kursunda görevli öğretmenler tarafından verilmektedir. 6. sınıfta okuyan öğrenciler, pasif öğrenci konumunda olup tamamen hafızlık eğitimini almaktadırlar. 7. sınıfa geçen öğrenciler ise hafızlık eğitimini tamamlamış bir şekilde öğrenimlerine kaldıkları yerden devam etmektedirler. 8. sınıfa geçen öğrenciler ise normal ortaokullardaki müfredatı uygulamaktadırlar. Bu öğrenciler, LGS sınavına girerek son yıllarda Türkiye dereceleri almaktadırlar.<sup>8</sup>

### **1. Batman İlindeki İmam Hatip Ortaokullarında Hafızlık Projesinin Güçlü Yönleri**

Batman ilindeki İmam Hatip ortaokullarında yürütülen hafızlık projesi, başlangıcından itibaren büyük bir ilgiyle karşılanmıştır. Bu durum, proje için en güçlü desteklerden biridir. Bu ilginin arkasında, halkın dinî duygularının hala güçlü olması yatmaktadır. Ayrıca, vatandaşlar, çocuklarının örgün eğitimlerine devam etmelerini isterken, aynı zamanda manevî duyguları güçlü bir birey yetiştirme arzusunu da taşımaktadır. Bu nedenle, vatandaşlar, yaz aylarında çocuklarının yaz Kur'an kurslarına gitmek yerine, daha disiplinli ve düzenli bir kursta eğitim almalarını tercih etmektedirler. Bu proje, vatandaşların somut taleplerini karşılamakta ve öğrencilerin velileriyle birlikte büyük bir hevesle katılmalarını sağlamaktadır.

Bu proje, hem dini açıdan eğitim almak isteyen bireylerin hem de akademik başarıya önem veren öğrencilerin ihtiyaçlarını karşılayabilmesiyle güçlü bir yön sergiliyor. Düşük sınıf mevcutları ve seçici kabul süreci sayesinde, her iki yönden de öğrencilerin de gelişimine katkı sağlayacak. Ayrıca, kız ve erkek öğrencilerin ayrı sınıflarda veya okullarda eğitim almaları, Batman'da yaşayan vatandaşlar için önemli bir güvenlik önlemi olarak görülüyor. Müteaddiyin vatandaşlar, çocuklarının karma eğitim almalarını istemediklerinden, bu projeye büyük destek vermektedirler.<sup>9</sup>

Projenin diğer güçlü yönlerinden biri, bölgede güçlü bir medrese kültürünün var olmasıdır. Eğer medrese ve hafızlık eğitimi projeye dahil edilirse, bu proje için büyük bir katkı sağlayabilir. Öğrencilerin, haftanın belirli günlerinde Diyanet İşleri Başkanlığına bağlı resmi Kur'an kurslarına gitmeleri, velilerin projedeki eğitim-öğretime olumlu bakmalarını sağlayabilir. Ayrıca, bazı günler klasik Arapça derslerinin verilmesi, öğrenci ve velilerin projeye olan güvenini artırabilir. Bu nedenle, medrese kültüründen en iyi şekilde yararlanması gerekmektedir.

### **2. Batman İlindeki İmam Hatip Ortaokullarında Hafızlık Projesinin Zayıf Yönleri: Sorunlar ve Çözüm Önerileri**

Batman ilindeki İmam Hatip ortaokullarında uygulanan hafızlık projesi, birçok zayıf yönü içermektedir. Bu zayıf yönler, eğitimin aksamasına ve öğrencilerin geleceği hakkında bazı şüphelerin oluşmasına neden olmaktadır. Özellikle belirlediğimiz önemli zayıf yönler, projenin eğitim sürecindeki aksamalara sebep olması ve öğrencilerin gelecekteki kariyerleri hakkında belirsizlik oluşturmaktadır.

Eğitim-öğretim süreci, öğrenci, öğretmen, veli ve okul yöneticileri gibi dört önemli unsura dayanmaktadır. Bunların yanı sıra, fiziki imkanlar ve eğitim araç gereçleri de önemli bir rol oynamaktadır. Batman ilindeki örgün eğitim sistemiyle birlikte yürütülen hafızlık projesinde, bu temel

<sup>8</sup> Bu Bilgiler Milli Eğitim Bakanlığı Din Öğretimi Genel Müdürlüğü Web Sayfasından alınmıştır.

<sup>9</sup> Adem Güneş, "Hafızlık Eğitiminin Öğrencilerin Sosyal ve Öz güven Gelişimlerine Etkisi -Örgün Eğitimle Birlikte Hafızlık Yapan İHO Öğrencileri Üzerine Bir Araştırma", *İlahiyat Tetkikler Dergisi* 53/1 (2020), 270.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

unsurlar arasındaki uyumsuzluk veya tamamlanmama durumları nedeniyle projenin geleceğini belirsiz hale getirmektedir.<sup>10</sup>

Projenin öğrenci ayağında zayıflık gözlemlenmektedir ve bu durum, öğrencilerin hafızlık eğitimine ilgisiz olmalarından kaynaklanmaktadır. Öğrencilere sadece hafızlık yapmaları telkin edilerek, LGS gibi önemli sınavlardan habersiz bir şekilde sadece Kur'an-ı Kerim'i ezberlemeleri istenmektedir. Bu durum, öğrencilerin istidat ve kabiliyetlerine göre geleceklerini planlamalarını engellemektedir. Eğitimin temel amacı, milli ve manevi duyguları güçlü bireyler yetiştirmektir. Ancak Batman ilindeki bu proje, öğrencilerin çoğunlukla hafızlık eğitimi veren hocalarla zaman geçirmeleri nedeniyle bu duyguların zayıf olduğunu ortaya koymaktadır. Ayrıca, öğrenciler TÜBİTAK gibi projelerden habersiz bir şekilde eğitimlerine devam etmektedirler. Bu durum, projenin gelecek kuşaklara aktarılması ve güncel koşullara uygun hale getirilmesi açısından ciddi bir tehdit oluşturmaktadır.<sup>11</sup>

Projenin öğretmen ayağında zayıflık, eğitim-öğretim sürecinin Milli Eğitim Bakanlığı'nda çalışan öğretmenler ve Diyanet İşleri Başkanlığı'na bağlı Kur'an kurslarında çalışan öğretmenler tarafından yürütülmesi nedeniyle ortaya çıkmaktadır. Bu durum, zaman zaman taraflar arasında ciddi tartışmalara neden olmaktadır. Örneğin, Türkçe dersine giren bir öğretmen, öğrencilerin derslerine odaklanmadığını ve hafızlık eğitimi veren öğretmenlerin daha çok hafızlık eğitimine odaklanmaları gerektiğini söylediğini belirtmiştir.<sup>12</sup> Ayrıca, hafızlık eğitimi veren öğretmenlerin pedagojik eğitim almamış olmaları, eğitimin güncel durumlarından habersiz olmaları ve daha çok klasik medrese eğitimiyle bu projenin yürütüleceğine inanmaları gibi sebeplerden dolayı projenin öğretmen ayağındaki zayıf yönlerden biri olarak gösterilebilir.<sup>13</sup> Bununla birlikte, Milli Eğitim Bakanlığı'nda çalışan öğretmenlerin de böyle bir projenin farkında olmamaları ciddi bir olumsuz durum olarak sunulabilir. Bunun sebebi, böyle bir projenin okullarda ilk kez veriliyor olmasıdır.

Eğitim ve öğretimin veliler tarafından da desteklenmesi gerekmektedir. Batman ilinde yürütülen hafızlık projesine öğrenci gönderen velilerin, bu projeyi tam olarak anlamadıkları gözlemlenmiştir. Veliler, bölgede bulunan medreseler gibi okulu tasarlamakta ve çoğu zaman akademik derslerden rahatsızlık duymaktadır. Ayrıca, velilerin herhangi bir sorunu büyüterek ilgililere ulaştırması, okul yöneticilerinin eğitime odaklanmasını olumsuz yönde etkileyebilmektedir. Bunun yanı sıra, her velinin öğrencisinin hafız olmasını istemesi doğal bir istektir. Ancak, her öğrenci istenilen zamanda eğitiminin bu safhasını tamamlayamayabilir ve bu durum velileri ciddi şekilde etkileyebilir. Veliler, bu durumda öğretmenleri, okul yöneticilerini veya projede görevli diğer yetkilileri suçlama eğiliminde olabilmektedir. Velilerin öğrencilerine karşı ilgisiz davranmaları, evde ders çalıştırmamaları ve bunun sonucunda öğrencilerin zamanında ezber verememeleri, veli ayağındaki projenin zayıf yönleri olarak değerlendirilebilir.<sup>14</sup>

Okul yöneticileri, eğitim liderleri olarak önemli bir rol oynarlar ve eğitim ve öğretimin bir parçasını oluştururlar. Her okulun kendine özgü bir kültürü ve yönetimi vardır. İmam Hatip okulları da kendine özgü kuralları ve kültürü olan okullardır. Batman'daki bazı İmam Hatip ortaokulları, hafızlık projesini uygulamaktadır ancak bu projeyi tam olarak anlamayan yöneticiler tarafından yönetilmektedir. Örneğin, hafızlık projesine bakan okul müdür yardımcısı, projenin amacını anlamamaktadır. Merkez ilçede bulunan iki lisede de hafızlık projesini yürütecek müdür yardımcısı mevcut değildir. Okul yöneticileri, branş bazında liseleri temsil ederler ve bu durum hafızlık projesinde takip edilecek iş ve mevzuatı

<sup>10</sup> Bu konuda geniş bir şekilde bkz. Pakize Yetimova, *Ortaokula Devam Eden Öğrencilerin Hafızlık Eğitiminde Yaşanan Sorunlar Ve Çözüm Önerilerine Yönelik Bir Araştırma*. Ayrıca geniş bir şekilde bkz. Abdullah Adıgüzel vd., "Hafız İmam Hatip Ortaokullarındaki Hafızlık Eğitimine İlişkin Öğretici Ve Öğrenci Görüşler", *Elektronik Sosyal Bilimler Dergisi* 17/68 (Güz 2018), 1460 vd.

<sup>11</sup> Adem Güneş, "Hafızlık Eğitiminin Öğrencilerin Sosyal ve Özgüven Gelişimlerine Etkisi -Örgün Eğitimle Birlikte Hafızlık Yapan İHO Öğrencileri Üzerine Bir Araştırma", 272.

<sup>12</sup> Gazi Anadolu İmam Hatip Lisesinde yapan bir öğretmen

<sup>13</sup> Abdullah Adıgüzel vd., "Hafız İmam Hatip Ortaokullarındaki Hafızlık Eğitimine İlişkin Öğretici Ve Öğrenci Görüşler", *Elektronik Sosyal Bilimler Dergisi* 17/68 (Güz 2018), 1454.

<sup>14</sup> Adem Güneş, "Hafızlık Eğitiminin Öğrencilerin Sosyal ve Özgüven Gelişimlerine Etkisi -Örgün Eğitimle Birlikte Hafızlık Yapan İHO Öğrencileri Üzerine Bir Araştırma", 274.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

güçleştirmektedir. Bu nedenle, okul yöneticileri enerjilerini boşa harcamaktadırlar. Örneğin, Gazi Anadolu İmam Hatip Lisesi'nde hafızlık projesini yürütecek müdür yardımcısı yoktur ve okul yöneticileri fizik, tarih, coğrafya ve matematik branş öğretmenlerinden oluşmaktadır. Bu durum, yöneticilerin okullarını tanıtmada sorun yaşamasına ve velilerle iletişimde sorunların oluşmasına neden olmaktadır. Örneğin, hafızlık eğitimiyle ilgili bir etkinlik düzenleneceğinde, okul yöneticileri bu etkinliği nasıl yürütecekleri konusunda bilgi sahibi değildirler. Okul yöneticileri ilgili okulları normal bir ortaokul veya lise olarak düşünmektedirler, ancak bu durum hafızlık eğitimi için sağlıklı bir durum değildir.

Örgün eğitimle birlikte hafızlık projesiyle ilgili veli, öğrenci, öğretmen ve okul yöneticisiyle anlatılan zayıf yönlerine ek olarak şunlar da dile getirilebilir:

Batman ilinde yürütülen hafızlık projesi, bölge insanı ve toplumda sözü geçen kimseler tarafından henüz tam olarak anlaşılammıştır. Bu durumun nedeni, bölgenin daha çok medrese eğitimine önem vermesidir. Medrese eğitimi, İslami ilimler açısından önemli olduğu için hafızlık eğitimi ikinci planda kalmaktadır. Medrese eğitiminde daha çok klasik Arapça ders kitaplarına önem verilirken, hafızlık eğitimi yeterince ilgi görmemektedir. Bu nedenle, hafızlık projesinin bölgede daha iyi anlaşılması ve benimsenmesi için farkındalık çalışmaları yapılması gerekmektedir.

Örgün eğitimle birlikte yürütülen hafızlık projesinin zayıf yönlerinden biri, okulların fiziki olarak bu eğitimi verecek kapasitede olmamasıdır. Örneğin, Gazi Anadolu İmam Hatip Lisesi bünyesindeki hafızlık projesi, yatılı bölge okulundan dönüştürülen bir binada verilmektedir. Ulaşım açısından şehir merkezine uzak olduğu gibi okul alt yapısı bina olarak bu projenin yürütülmesi için yeterli değildir. Ayrıca, Fatma Zehra İmam Hatip Lisesi'nin birden fazla projeyi barındırmasından dolayı hafızlık projesine yeterince ilgi gösterilmemektedir. Bu okulda ayrıca hafızlık yapacak kız öğrencilerinin yatılı olarak kalacakları bir pansiyonları da bulunmamaktadır. Bu nedenle, hafızlık projesinin yürütülmesi için uygun fiziki koşulların sağlanması gerekmektedir.

Kozluk ilçesi Tepecik hafızlık projesi, başka bir ortaokulla beraber iç içe eğitim faaliyetini yürütmektedir. Ancak, okulun pansiyonu eski olup öğrencilerin kalmasına uygun değildir. Okulda hem kız hem de erkek öğrenciler hafızlık görmektedirler. Okul ilçe merkezine uzak olduğu için ulaşım açısından da sıkıntı oluşturmaktadır. Bu nedenle, hafızlık projesinin yürütüleceği okulların fiziki koşullarının iyileştirilmesi ve ulaşım sorununun çözülmesi gerekmektedir.<sup>15</sup>

Bu proje, Diyanet İşleri Başkanlığına bağlı Kur'an kurslarına kayıt yaptıran öğrencilere yönelik olarak tasarlanmıştır. Ancak ilimizde, ortaokullar arasında yatılı Kur'an kursu bulunmamaktadır. Bu durum, 6. sınıf öğrencilerinin hafızlık eğitimlerini sağlıklı bir şekilde almalarına engel teşkil etmektedir. Çünkü 6. sınıf öğrencilerinin hafızlık eğitimlerini okullarda tamamlamaları, hem fiziksel hem de maddi açıdan mümkün görünmemektedir. İl müftülüğü, bu sorunun farkında olarak, okul bünyesinde C tipi Kur'an kursu açma yoluna gitmiştir. Ancak, bu sorunun çözümü, Ankara ilinde olduğu gibi bağımsız öğrencilerin yatılı kalabileceği ve iaaşe masraflarının karşılanacağı il müftülüğüne bağlı Kur'an kurslarının açılmasıdır.<sup>16</sup>

Batman ilindeki hafızlık projesi okullarında, bilimsel proje yürütecek bilişim teknolojisi ve yazılım sınıfları bulunmamaktadır. Bu durum, öğrencilerin geleceğe hazırlanması açısından önemli bir eksikliklerdir. Bilimsel proje yürütmek, öğrencilerin araştırma, analiz ve problem çözme becerilerini geliştirmelerine yardımcı olur. Ayrıca, bilişim teknolojisi ve yazılım sınıfları, öğrencilerin teknolojiye hakimiyetlerini artırarak, dijital çağın gereksinimlerine uygun bir eğitim almalarını sağlar. Bu nedenle, hafızlık projesi okullarında da bilimsel proje yürütecek bilişim teknolojisi ve yazılım sınıflarının açılması, öğrencilerin daha donanımlı bir eğitim almalarına katkı sağlayacaktır.

<sup>15</sup> Abdullah Adıgüzel vd., "Hafız İmam Hatip Ortaokullarındaki Hafızlık Eğitimine İlişkin Öğretici Ve Öğrenci Görüşler", 1471. Ayrıca bkz. Adem Güneş, "Hafızlık Eğitiminin Öğrencilerin Sosyal ve Özgüven Gelişimlerine Etkisi -Örgün Eğitimle Birlikte Hafızlık Yapan İHO Öğrencileri Üzerine Bir Araştırma", 273.

<sup>16</sup> Din Eğitimi Genel Müdürlüğü, *Örgün Eğitimle Birlikte Hafızlık Projesi Usul ve Esasları*, 4, 7.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Batman ilinde yürütülen örgün eğitimle birlikte hafızlık projesinin zayıf yönlerinin güçlendirilmesi için aşağıdaki öneriler sunulabilir:

1. Öğrencilerin sınavlar hakkında farkındalık kazanmaları ve eğitimin sadece Kur'an ezberlemekle sınırlı kalmayacağı konusunda bilinçlendirilmeleri için, rehberlik ve kariyer planlama derslerine öncelik verilmesi gerekmektedir.

2. Projenin önemli bir parçası olan hafız öğretmenleri, görevleri ve sorumlulukları hakkında bilgilendirilmek üzere hizmet içi eğitimlerden geçirilmelidir. Bu eğitimler, hafız öğretmenlerinin projenin amacına hizmet etmelerini sağlamak için önemlidir. Ayrıca, il müftülüğü tarafından aylık olarak denetlenmeleri ve projenin amacına hizmet etmeyen öğretmenlerin görev yerlerinin değiştirilmesi gerekmektedir.

Benzer şekilde, Milli Eğitim Bakanlığı'nda çalışan öğretmenler de mahalli veya merkezi hizmet içi eğitimlerden geçirilerek, projenin önemi konusunda bilgilendirilmelidir. Her iki öğretmen grubunun da birbirlerini tamamlayan bir unsur olduğu vurgulanmalıdır. Bu sayede, hafız öğretmenleri ve öğretmenler arasında işbirliği ve koordinasyon sağlanarak, projenin amacına daha etkili bir şekilde hizmet edilmesi mümkün olacaktır.

3. Veliler, projenin amacı hakkında basit bir şekilde bilgilendirilmeli ve bu projenin yabancı dil ağırlıklı sınıflar oluşturan okullar gibi olduğu açıklanmalıdır. Bu sayede, velilerin büyük beklentiler içine girmesi önlenmiş olacaktır. Ayrıca, velilere bu projenin sağlıklı bir şekilde yürütülebilmesi için evde de eğitimin devam etmesi gerektiği hatırlatılmalıdır. Bu konuda, veliler profesyonel ekipler tarafından eğitilmelidir.

4. Bu okulların yönetim kadrosunda, hafızlık eğitimini tamamlamış bir öğretmenin bulunması tercih edilmelidir. Bu mümkün olmadığı takdirde, ortaokul müfredatını bilen ve hafızlık eğitimine hakim olan adaylar arasından müdür yardımcısı seçimi, mülakat yöntemiyle gerçekleştirilmelidir. Bu seçim sürecinde, okul müdürünün görüşü de dikkate alınmalıdır.

5. Fiziksel açıdan geliştirilmiş okulların oluşturulması ve hafızlık projesinin uygulanacağı ortaokulların kurulması, hem kız hem de erkek öğrencilerin örgün eğitim alabileceği ayrı okulların oluşturulması gerekmektedir. Hafızlık eğitimi verilecek lise de belirlenmeli ve projeye dahil edilmelidir. Bu amaçla, Gazi Anadolu İmam Hatip Lisesi, uygun bir mekan olarak seçilebilir. Bu okul, arazi olarak birçok eğitim fonksiyonunu barındıracak şekilde tasarlanabilir. Okul, külliye şeklinde yeniden inşa edilerek, kız ve erkek öğrencilerin yatılı olarak eğitim görebileceği bir yapıya dönüştürülmelidir.

6. Yatılı öğrencilere rehberlik edecek hafız öğretmenler, Milli Eğitim öğretmenleri gibi belletmenlik görevinden faydalanmalıdır. Bu sayede, hafız öğretmenler, öğrencilerini akşam saatlerinde de takip etme imkanına sahip olacaklardır. Ayrıca, külliye şeklinde inşa edilecek okula lojmanlar yapılmalı ve bu öğretmenlere lojmanlarda ikamet etme seçeneği sunulmalıdır.

7. Bu okullara teknoloji ve bilişim sınıfları oluşturulmalı ve bu sınıflarda yarışmalara katılacak kadar eğitim verilmelidir.

8. Bu okullarda görev yapacak öğretmenlerin mümkün olduğunca hafız olan öğretmenlerden seçilmelidir. Bu konuda yönetmelik değişikliğine gidilerek atamalarda kolaylık sağlanmalıdır.

9. Hafızlık eğitimi veren okulların öğrencilerine, hafızlık eğitimi dışında da çeşitli sosyal ve kültürel etkinlikler sunulmalıdır. Bu, öğrencilerin genel olarak gelişimlerine katkıda bulunacak ve motivasyonlarını artıracaktır.

10. Son olarak önerimizlerden biri de Diyanet İşleri Başkanlığına bağlı yatılı Kur'an kurslarının, okullarla eşleştirilmesi ve bu konunun resmi bir yazıyla belgelendirilmesidir. Bu sayede, öğrencilerin 6. sınıftan itibaren akademik derslerini okullarda tamamlamayacakları vurgulanacak ve hafızlık eğitimlerini daha sağlıklı bir şekilde almaları sağlanacaktır.

## SONUÇ

Batman ilindeki imam hatip ortaokulları, örgün eğitimle birlikte yürütülen hafızlık projesinin güçlü ve zayıf yönlerini incelemişlerdir. Araştırma sonuçlarına göre, örgün eğitimle birlikte yürütülen hafızlık projesinin en ufak bir olumsuzluğunun bile eğitim öğretime negatif yönde yansıtılabileceği ortaya çıkmıştır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Araştırmada, Batman ilindeki İmam Hatip ortaokullarında yürütülen hafızlık projesi, halkın dinî duygularının güçlü olması ve manevi duyguları güçlü bir birey yetiştirme arzusunun birleşimiyle büyük bir ilgiyle karşılandığı saptanmıştır. Proje, hem dini açıdan eğitim almak isteyen bireylerin hem de akademik başarıya önem veren öğrencilerin ihtiyaçlarını karşılayabilmesiyle güçlü bir yön sergilemektedir. Ayrıca, düşük sınıf mevcutları ve seçici kabul süreci sayesinde, her iki yönden de öğrencilerin gelişimine katkı sağlamaktadır. Kız ve erkek öğrencilerin ayrı sınıflarda veya okullarda eğitim almaları, müteaddiyin vatandaşların desteğini kazanmıştır. Projenin diğer güçlü yönlerinden biri, bölgede var olan güçlü medrese kültürüdür. Medrese ve hafızlık eğitimi projeye dahil edilirse, projeye büyük bir katkı sağlayabilir. Bu nedenle, medrese kültüründen en iyi şekilde yararlanılması gerekmektedir. Tüm bu faktörler, Batman ilindeki İmam Hatip ortaokullarında yürütülen hafızlık projesinin başarısını desteklemektedir.

Araştırmada, veli, öğrenci, öğretmen ve idareci olmak üzere eğitimi oluşturan dört önemli unsur incelenmiş ve bunların birbirleriyle uyumlu bir şekilde çalışmaları gerektiği saptanmıştır. Bu dört unsurun birinin aksaması veya diğerlerine karşı olumsuz bir tutum sergilemesi, örgün eğitimle birlikte yürütülen hafızlık projesinin başarısını olumsuz etkileyebilir.

Batman ilindeki hafızlık projesinin zayıf yönleri, eğitim-öğretim sürecindeki aksamalar, öğrencilerin geleceği hakkında belirsizlik oluşturması, öğrenci, öğretmen, veli ve okul yöneticileri arasındaki uyumsuzluklar ve fiziki imkanların yetersizliği gibi faktörlerden kaynaklanmaktadır. Bu zayıf yönlerin giderilmesi için, farkındalık çalışmaları yapılması, okulların fiziki koşullarının iyileştirilmesi, öğrencilerin teknolojik gelişmelere ayak uydurabilmeleri için bilişim teknolojisi ve yazılım sınıflarının açılması gibi önlemler alınması gerekmektedir.

Araştırmada Batman ilinde yürütülen hafızlık projesinin zayıf yönlerinin güçlendirilmesi için öneriler sunulmuştur. Bu öneriler arasında öğrencilerin bilinçlendirilmesi, hafız öğretmenlerinin eğitimi, velilerin bilgilendirilmesi, okul yönetim kadrosunun seçimi, fiziksel açıdan geliştirilmiş okulların oluşturulması, teknoloji ve bilişim sınıflarının oluşturulması, öğretmenlerin seçimi, sosyal ve kültürel etkinliklerin sunulması ve yatılı Kur'an kurslarının okullarla eşleştirilmesi yer almaktadır. Bu önerilerin uygulanması, hafızlık projesinin amacına daha etkili bir şekilde hizmet etmesini sağlayacaktır.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**KAYSERİ'DEKİ TAYYARE FABRİKASINDA 1926 İLE 1942 YILLARI ARASINDA  
ÜRETİLEN UÇAKLAR VE UÇAK ÜRETİMİNİN GELİŞİMİ**

THE AIRCRAFTS THAT ARE PRODUCED BETWEEN 1926 AND 1942 IN AIRCRAFT  
FACTORY IN KAYSERİ AND THE DEVELOPMENT OF AIRCRAFT PRODUCTION

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**ÖZET**

Türkiye'de ilk defa kamu sektörü tarafından uçak üretimi, 1926 yılında Kayseri'de kurulan tayyare fabrikasında gerçekleştirilmiştir. Bu çalışma, 1926 ile 1942 yılları arasında Kayseri Tayyare Fabrikası'nda üretilen uçakları ve gelişimini değerlendirmektedir. Bilindiği üzere cumhuriyetin kurulduğu ilk yıllar da dâhil olmak üzere havacılık sektörü, bir gelişim süreci içerisine girmiş ve ülkelerin üstünlük referansı haline gelmiştir. Bu araştırma, dünyada gelişen havacılık sektöründe yer almak için Türk devleti tarafından kurulan Kayseri Tayyare Fabrikası'nda üretilen uçaklar ile meydana gelen gelişim sürecini ortaya koymayı amaçlamaktadır. Döneme ait arşiv kaynakları yanında Türk havacılığına ilişkin akademik araştırmalar temel referans noktasını oluşturmaktadır. Bu çerçevede ilk defa 1926'da Kayseri'de Tayyare Motor Türk Anonim Şirketi (TOMTAŞ) tarafından kurulan ve daha sonra 1931'de Milli Müdafaa Vekâleti tarafından idare olunmaya başlayan Kayseri Tayyare Fabrikası ve bu tesislerde üretilmiş uçaklar ile gelişim süreci ele alınmıştır. Böylece, 1926-1942 yılları arasında uçak üretim faaliyetlerine devam eden Kayseri Tayyare Fabrikası'nın Türkiye'nin ulusal havacılık gelişim çizgisine katkısı tespit edilmeye çalışılmıştır.

**Anahtar kelimeler:** Havacılık, Uçak, Uçak Fabrikası, Teknoloji, Gelişme.

**ABSTRACT**

For the first time in Türkiye, the production of aircrafts by public sector was carried out in the aircraft factory that is established in Kayseri in 1926. This study evaluates the aircrafts that are manufactured in aircraft factory in Kayseri which are established by public sector between 1926 – 1942 and their developments. As it is known, including the first years of the establishment of the republic, the aviation industry has entered a development process and become the reference of superiority of countries. This study aims to reveal the development process with the aircrafts that are produced in Kayseri Aircraft Factory which is established by the Turkish state in order to take part in the aviation sector which started to develop in the World. In addition to archived sources of the period, the academic studies on Turkish aviation constituted the main reference point. In this context, Kayseri Aircraft Factory, which was first established in Kayseri in 1926 by Tayyare Motor Türk Anonim Şirketi (TOMTAŞ) and then started to be administered by the Ministry of National Defense in 1931, and the development process with the aircrafts produced in these facilities are discussed. In this way, the contribution of Kayseri Aircraft Factory, which continued its aircraft production activities between 1926-1942, to the national aviation development line of Türkiye was tried to be determined.

**Keywords:** Aviation, Aircraft, Aircraft Factory, Technology, Development.

**GİRİŞ**

Bu çalışmada 1926-1942 yılları arasında uçak üretimi gerçekleştiren Kayseri'deki Tayyare Fabrikası'nın ne tür çalışmalar yaptığı, bu fabrikada hangi uçak modellerinin üretildiği, gerekli

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

teknolojik olanakların nasıl sağlandığı, sürecin nasıl şekillendiği ve Türk havacılığının gelişimine ne ölçüde fayda sağladığı gibi sorulara cevap aranmıştır.

Çalışma, içerik bakımından yukarıda belirtilen dönemde Kayseri'deki Tayyare Fabrikası'nın gelişim aşamalarını, gerek üretim teknolojisi gerekse uçak teknolojisi bakımından ulaşılan noktayı, personel ile ilgili gelişmeleri kapsamaktadır. Makalenin kronolojik çerçevesi belirlenirken, TOMTAŞ tarafından 1926 yılında Kayseri'de kurulan Tayyare Fabrikası başlangıç olarak belirlenmiştir. Fabrikanın uçak üretim faaliyetlerinin durma noktasına geldiği ve bakım ikmal merkezine dönüştüğü 1942 yılı ise incelemenin son tarihi olarak belirlenmiştir.

Cumhuriyet döneminde gelişim gösteren bir çok sektör gibi havacılık sektörü de ayrı bir öneme sahip olmuştur. Yirminci yüzyıl, devletlerin savunma sanayiini güçlendirmek, hava üstünlüğü sağlamak ve teknolojilerini geliştirmek için büyük yatırımlar yaptığı bir dönemdir. Bu dönemde havacılık alanında faaliyet gösteren Amerikan The Curtiss Aeroplane and Motor Company Inc., Alman Junkers Flugzeugwerke A.G, Alman Gothaer Waggon Fabrik A.G., İngiliz Philips And Powis Aircraft Ltd., ve Polonya Panstwowe Zakłady Lotnicze gibi firmalar en önemli örneklerdendir. Hızla gelişen dünya havacılık faaliyetleri içerisinde, Türkiye Cumhuriyeti de bu alanda yerini almak, gelişim sağlamak ve çağı yakalamak için dâhili ve harici tüm imkânları kullanmaktan geri kalmamıştır. Bu amaçla kurulan fabrikalardan bir tanesi de Kayseri'deki tayyare fabrikasıdır. Bu çalışma, Kayseri'deki fabrikada uçak üretimi için ortaya konulan çabaları, yabancı ülkeler ile kurulan bağlantıları, bu bağlantılar kurulurken takip edilen yolları ve yapılan tercihlerin sebeplerini ortaya çıkarmış olması bakımından önemlidir. Havacılık sanayiinin gelişmesi için ortaya konulan çabalar, ulusal kalkınmanın bir parçası olarak değerlendirilmiştir.

Bu çalışmada, Türkiye Cumhuriyeti Cumhurbaşkanlığı Devlet Arşivleri ana kaynağı teşkil etmektedir. Arşivlerden incelenen kaynaklarda, anlaşma yapılan ve ülke dışında faaliyet gösteren firmalar ile ilgili bilgiler, fabrikanın faaliyetine başlama süreci, ülke dışından getirilen teknik personel hakkında bilgiler, fabrika faaliyetleri hakkındaki raporlar incelenmiştir. İstanbul Hava Kuvvetleri Müzesi ile Ankara Paraşüt Kulesi ve Türk Hava Kurumu Müzesi ziyaret edilerek, Türk havacılığının tarihsel gelişimi içerisinde kullanılan uçaklar ve malzemeler incelenmiştir. Osmanlı Devleti ve Milli Mücadele döneminde yapılan havacılık faaliyetleri ile ilgili bilgilere, Yavuz Kansu, Yılmaz Öztuna, Sermet Öztuna tarafından hazırlanan *Havacılık Tarihinde Türkler I* ve İrfan Sarp'ın *Türk Hava Kuvvetlerinin Doğuş Yılları* isimli kitaplardan ve diğer telif eserlerden ulaşılmıştır. Bu eserler, Türkiye'de havacılık faaliyetlerinin başlangıcından Cumhuriyetin kuruluş dönemlerine kadar yapılan çalışmaların ortaya konulması bakımından çalışmaya önemli katkı sağlamıştır. Fabrikanın faaliyetlerine ilişkin bilgiler öncelikle arşiv kaynaklarından temin edilmeye çalışılmış, TOMTAŞ ve Amerikan The Curtiss Aeroplane and Motor Company Inc., firması ile yapılan anlaşmalar dışında, yapılan diğer lisans anlaşmalarına rastlanmamıştır. Fabrika ve üretilen uçakların teknik özellikleri ile ilgili bilgiler, Osman Yalçın'ın *Türk Hava Harp Sanayii Tarihi*, İsmail Yavuz'un *Mustafa Kemal'in Uçakları Türkiye'nin Uçak İmalat Tarihi (1923-2012)*, Neslihan Altuncuoğlu vd'nin *Kayseri Uçak Fabrikası*, Rifat Bayrak'ın *Kayseri Tayyare Fabrikası Havacılık Tarihi* ve Tuncay Deniz'in *Türk Uçak Üretimi* gibi eserlerden ve dönemin gazetelerinden faydalanılmış çalışmanın çatısı oluşturulmuştur.

Kayseri'deki tayyare fabrikasının faaliyet gösterdiği 1926-1942 yılları arasındaki uçak üretimi ve gelişimini kapsayan çalışmamız yapılırken öncelikli olarak literatür taraması yapıp, elde edilen bilgilerin analizi yapıldı. Elde edilen bilgiler ile arşiv bilgileri karşılaştırmalı olarak değerlendirildi.

Bu çalışmada, Osmanlı Devleti'ndeki havacılık faaliyetlerine kısaca değinilerek, Türkiye Cumhuriyeti'nin kuruluşundan sonra, Kayseri'de 1926 yılında Tayyare Motor Türk Anonim Şirketi (TOMTAŞ) tarafından açılan ve daha sonra 1931 yılında Milli Müdafaa Vekâleti'ne devredilen, Kayseri Tayyare Fabrikası'nın ürettiği uçakların, ilerleyen süreçte teknolojik gelişimleri ve özellikleri ayrıntılarıyla belirtilip, ülkenin havacılık alanındaki etkileri ortaya konuldu.

## ARAŞTIRMA VE BULGULAR

### Türkiye Cumhuriyeti'nin Kuruluşundan Önce Havacılık İmkânları

Osmanlı Devleti, 1903 yılında Amerika Birleşik Devletleri'nde motorlu bir uçağın kısa süre havada kalmayı başarması ile başlayan havacılık alanındaki gelişmelere kayıtsız kalmayarak yeniliği



kullanmaya teşebbüs etti. Devletin ilgisi daha çok askeri alandaki açığı kapatmak içindi. Harbiye Nazırı olan Mahmut Şevket Paşa, o dönemde Erkan-ı Harbiye ikinci Şube başkanı Süreyya Bey'i 1911 yılında askeri havacılık çalışmalarını başlatmak üzere görevlendirdi<sup>1</sup>. Havacılık alanında bilgisi olan ve Fransızca bilen iki kişi eğitim için Fransa'ya gönderilme kararı alındı. 1911 yılında süvari Yüzbaşı Fesa Bey ve İstihkâm Teğmeni Kenan Bey Fransa'ya gönderildi. Aynı zamanda, havacılık hakkında yayınlanan kitap ve dergilerin Genel Kurmaya gönderilmesi için Berlin, Paris ve Viyana elçiliklerine yazılar gönderildi<sup>2</sup>. 1912 yılında Fransa'dan iki uçak satın alındı. Bu uçakların iniş-kalkışları için Yeşilköy'de bir havaalanı, uçak bakım-tamir bölümü gibi kısımların yapımına başlandı. 1912 yılı sonuna kadar uçak sayısı 17'yi buldu<sup>3</sup>. I. Dünya Savaşı'nda Osmanlı Hava kuvvetleri, Alman Hava kuvvetleri ile işbirliği yaparak, uçak ve pilot eksikliğini Almanya'dan karşıladı<sup>4</sup>. Ancak savaşta Osmanlı Devleti askeri olarak zor duruma düştü. Fransız ve İngilizlerin Osmanlı topraklarını işgale başlamasıyla, işgal edilen cephelerde bulunan uçaklar İstanbul'da toplandı<sup>5</sup>.

Milli Mücadele döneminde hava desteği sağlamak için Osmanlı envanterinde bulunan ve işgale uğramamış cephelerde bulunan uçaklar ile düşman kuvvetlerinden ele geçirilen uçaklardan faydalanıldı. Konya, Afyon ve Eskişehir'de tamirhaneler oluşturularak bakımsız ve arızalı uçakların uçar hale getirilmesi için yoğun çaba sarf edildi. İhtiyaç duyulan yedek parça ve emayit, ülke içerisinde üretilemediğinden dolayı I.- II. İnönü ve Sakarya Savaşlarında ancak birkaç uçakla mücadele edilebildi<sup>6</sup>. Büyük Taarruzda ise Almanya'dan satın alınarak Rusya üzerinden Karadeniz yoluyla Anadolu'ya getirilen uçaklar<sup>7</sup> ile Fransız ve İtalyanlardan satın alınan uçar haldeki toplam 17 tane uçakla mücadele edildi<sup>8</sup>.

### **Türkiye Cumhuriyeti'nin Kuruluşundan Sonra Havacılık**

Türkiye Cumhuriyeti yöneticileri, devletin kuruluşunun ilk yıllarından itibaren, ülkenin savunmasının güçlendirilmesi için havacılık alanını da göz ardı etmediler. Bu amaçla dönemin şartlarına uygun hava savunma sistemlerini ülkeye kazandırmak için çalışmalara başlandı.

Büyük Taarruzdan sonra İzmir'e intikal eden Hava Kuvvetleri Müfettişliği, Kurmay Albay Muzaffer Bey'in (Ergüder) komutasında 1923 yılı Temmuz ayı itibarıyla uçuş okulu, ikmal tesisleri ve muharip unsurlardan oluşmaktaydı. Birlik bünyesindeki uçuş okulu Gaziemir'de, uçaksavar bölüğü Halkapınar'da, uçak bölükleri, İzmit, Erzurum, İzmir/Gaziemir, Bandırma ve Deniz Uçak Bölüğü de İzmir'de bulunmaktaydı. Hava ikmal birimleri ise Afyon ve Ankara'daydı. Deniz uçak bölüğü ile birlikte toplam 38 uçak, 12 pilot bulunmaktaydı. Gaziemir'e yerleşen uçuş okulu, faaliyetine 8 yardımcı pilotu eğitime alarak hava kuvvetlerinin pilot eksikliğini gidermeyi amaçlandı<sup>9</sup>.

Hava Kuvvetleri Müfettişliği, yurt savunması için vazgeçilmez olan havacılık endüstrisini geliştirmek ve bu kapsamda hava harp sanayisinin ulaştığı teknolojik seviyelerini yakından görmek ve araştırmalar yapmak üzere 20 Aralık 1923'de Alb. Muzaffer Bey başkanlığında Hava Müfettişliğinde görevli Bnb. Fesa Bey, Makine Yzb. Murat Bey, Astsb. Pilot Vecihi Bey, Pilot Halim Bey ve Deniz Yzb. Cemal Bey'in katılımında bir yurt dışı gezisi düzenledi. Fransa, İtalya, İngiltere ve Almanya'yı kapsayan

<sup>1</sup> Ö. Kürşad Karacagil, "Süreyya (paşa) İlmen ve Serbest Cumhuriyet Fırkası, Tarih Dergisi, Sayı 57 (2013/1), İstanbul 2013 s. 129. (ss. 127-145)

<sup>2</sup> Mehmet Köçer, Türk Havacılığı (1911-1922), Yüksek Lisans Tezi, Fırat Üniv. Sosyal Bilimler Enstitüsü, Elazığ 1997, s. 5.

<sup>3</sup> Mehmet Köçer, Türk Havacılığı (1911-1922), Yüksek Lisans Tezi, Fırat Üniv. Sosyal Bilimler Enstitüsü, Elazığ 1997, s. 6, 7; Avni Okar, *Türkiye'de Tayyarecilik 1910-1924*, Yapı Kredi Yayınları, İstanbul, 2018, s. 9-10.

<sup>4</sup> İrfan Sarp, *Türk Hava Kuvvetlerinin Doğuş Yılları*, Pozitif Yay., İstanbul, 2010, s. 64-66.

<sup>5</sup> Doğanay, Rahmi, Milli Mücadele'de Türk Havacılığı ve Başkomutanlık Savaşı'nda Havacıların Rolü", *Fırat Üniv. Sosyal Bilimler Dergisi*, cilt X, sayı 2, Ağustos 2008, s. 54.

<sup>6</sup> İrfan SARP, *Türk Hava Kuvvetlerinin Doğuş Yılları*, Pozitif Yay., İstanbul, 2010, s. 152-170.

<sup>7</sup> Rahmi Doğanay, Milli Mücadele'de Türk Havacılığı ve Başkomutanlık Savaşı'nda Havacıların Rolü", *Fırat Üniv. Sosyal Bilimler Dergisi*, cilt X, sayı 2, Ağustos 2008, s. 55.

<sup>8</sup> Kapucu, Korkmaz, *Osmanlı'dan Cumhuriyet'e Askeri Hava Seyahatleri (1909-1939)*, s.76.

<sup>9</sup> Kaymaklı, a.g.e., s.156-157.

araştırma gezisinde uçak alımı, üç Fransız uçuş öğretmenin Türkiye’de çalışması, Fransa’ya öğrenci gönderilmesi gibi hususlarda ön anlaşmalar yapıldı.<sup>10</sup>

Havacılığın sadece askeri yönde değil, modern batılı ülkelerde olduğu gibi sivil alanlarda da gelişmesini isteyen Mustafa Kemal Paşa, Yaveri Cevat Abbas (Gürer) Bey’e verdiği emirle 16 Şubat 1925 günü Ankara Türk Ocağı’ndaki toplantıda Türk Tayyare Cemiyeti’nin (T.T.C.) kurulmasını sağladı.<sup>11</sup> Cemiyetin amacı, yurt savunmasında göklerin öneminin her kesim tarafından bilinmesi, askeri ve sivil havacılığın gelişmesine destek verilmesi, gençlerde havacılık alanında ilgi uyandırılması oldu. Türk Tayyare Cemiyeti, kuruluşunun üzerinden geçen 4 ay gibi kısa bir zamanda 25 Haziran 1925’te 320 şubeye ulaştı. Cemiyet halktan gelecek yardımları da kabul etmek amacıyla bağış kampanyaları düzenledi, elde edilen bağışlarla Ankara’da bulunan otuzbin dönümlük Ahi Mesut Çiftliğini tayyare okulu kurmak için satın aldı.<sup>12</sup> 1935 yılında yurt genelinde T.H.K. için başlatılan yardım kampanyasına Atatürk on bin lira bağışta bulunmuş ve “*Bu ulus en zor zamanlarda memleket ödevlerine canla başla koşturmuş. İstediklerinden daha fazlasını başaracaklardır. Tuttukları yol doğrudur.*” sözü ile düşüncesini ifade etmiştir.<sup>13</sup> Cemiyetin faaliyetleri bunlarla sınırlı kalmadı. Kayseri ve Eskişehir’de TOMTAŞ tarafından kurulan uçak fabrikalarına maddi destek sağladı. Hava kuvvetlerinin tamir bakım personelinin yetiştirilmesini sağlamak için 23 Nisan 1926’da Yeşilköy’de, Uçak Makinist okulunu açtı ayrıca uçak mühendisliği eğitimi almak üzere 8 öğrenciyi de yurtdışına gönderdi.<sup>14</sup> 24 Mayıs 1935 tarihinde yapılan büyük kongrede alınan kararlarla Türk Tayyare Cemiyeti’nin ismi Türk Hava Kurumu (T.H.K) olarak değiştirilmiş, aynı yıl kurumun kendi bünyesinde 3 Mayıs 1935’te Türkkuşu adı ile yeni bir birim oluşturularak gençlerin paraşütle atılması, planör ve uçak kullanması ve model uçak yapması için kurslar düzenledi.

### **Tayyare Motor Türk Anonim Şirketi (TOMTAŞ) Uçak Fabrikası**

Türkiye Cumhuriyeti’nin kuruluşundan itibaren ülkenin güvenliğini sağlama düşüncesiyle milli hava sanayiini kurma çalışmaları başladı. Kurulacak Milli Hava Sanayii için uçak endüstrisinde önde gelen ülkelerde araştırma yapılmasına karşın, Lozan’da İngiltere ve Fransa ile çözümlenemeyen sorunların etkisi ile Almanya’da araştırma yapılması yoğunluk kazandı.<sup>15</sup> 3 Mart 1924’de Almanya ile imzalanan Dostluk Antlaşması’nın<sup>16</sup> devamı olarak, 08 Mayıs 1924’de Almanya’nın Ankara Büyükelçiliğine Rudolf Nadolny, 08 Ekim 1924’de Türkiye’nin Berlin Büyükelçiliğine Kemaleddin Sami Bey atandılar.<sup>17</sup>

Kemaleddin Sami Bey,den Türkiye’nin kurmak istediği fabrika için Türkiye’ye yardımcı olabilecek Alman firmalar üzerinde incelemelerde bulunması istendi. Kemaleddin Sami Bey, Telefunken, A.E.G, Siemens ve Junkers Flugzeugwerke A.G tayyare fabrikalarında konu ile ilgili yaptığı araştırmalar sonucunda, 18 Aralık 1924’de bir rapor hazırladı. Raporunda Junkers Flugzeugwerke A.G şirketi ile ilgili olarak, bir ay içerisinde iki kişilik 100 adet bombardıman uçağı yapabilecek kapasiteye sahip olduğunu, 250 mühendis ve 3.000 işçisiyle tamamen alüminyum ve demir aksama sahip uçaklar üretebildiğini, firma yetkililerinin de Türkiye’de bir uçak fabrikası kurmaya istekli olduklarını

<sup>10</sup> H.İbrahim Fırtına, *Orgeneral Muzaffer Ergüder’in Havacılık Anıları 1922-1930*, Kırmızıkeçi Yayınevi, İstanbul, 2018, S.171-174; Kaymaklı, a.g.e.,s.160.

<sup>11</sup> Turgut Gürer, *Atatürk’ün Yaveri Cevat Abbas Gürer Cepheden Meclise Büyük Önder İle 24 Yıl*, Özkaracan Matbaacılık, İstanbul, 2006, s. 185.

<sup>12</sup> Mustafa Kılıç, “Türk Tayyare Cemiyeti - Türk Hava Kurumu”, *Doğuşu ve Gelişimi Türk Havacılık Tarihi*, Haz.Deniz Dalkılıç, İBB Yayınları, İstanbul, 2022, s. 351-352.

<sup>13</sup> “Atatürk Hava Kurumuna 10.000 Lira Verdi”, *Ulus Gazetesi*, 30 Mayıs 1935, s. 1.

<sup>14</sup> BCA,30-10/60-403-21, 27.10.1926. [https://www.thk.org.tr/turk\\_tayyare\\_cemiyeti](https://www.thk.org.tr/turk_tayyare_cemiyeti)

<sup>15</sup> Fahir Armaoğlu, *20. Yüzyıl Siyasi Tarihi 1914-1995*, Timaş Yayınları, İstanbul, 2017, s. 288-289.

<sup>16</sup> 1920’li yıllarda Almanya, Versay Antlaşması gereği, savunma sanayii ile ilgili çalışmaları Almanya sınırları içerisinde yapamamaktadır. Başka ülkelerle işbirliği yaparak, söz konusu eksikliği gidermeye çalışmaktadır. Almanya’nın bu durumu, Türkiye için de oldukça olumlu sonuçlar vermiştir.

<sup>17</sup> Emre Uçar, *Türk Havacılık Sanayiinde Kayseri Uçak Fabrikası’nın Yeri*, Yayınlanmamış Yüksek Lisans Tezi, Kırıkkale Üniversitesi Sosyal Bilimler Enstitüsü, Kırıkkale, 2008, s. 22; Serdar Sarısır, *Atatürk Dönemi Milli Hava Harp Sanayii İçindeki Kayseri Tayyare fabrikasının Yeri*, Yayınlanmamış Yüksek Lisans Tezi, Erciyes Üniversitesi Sosyal Bilimler Enstitüsü, Kayseri, 1998, s. 48.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

belirtmiştir.<sup>18</sup> Bunun üzerine, 4 Mayıs - 18 Haziran 1925 tarihleri arasında Avrupa seyahatinde bulunan Cumhurbaşkanlığı Genel Sekreteri Tevfik Bey, Berlin’de Alman sanayicilerle görüşerek, Türkiye’de yapacakları yatırımlar için kolaylık sağlanacağını bildirmiştir.<sup>19</sup>

Türkiye ile Junkers Flugzeugwerke A.G şirketinin kurucusu Hugo Junkers’in karşılıklı isteği ve Almanya’nın Ankara Büyükelçisi Rudolf Nadolny’nin çabaları neticesinde, Junkers firması yöneticisi Sachsenberg, Türk Genelkurmay yetkilileri ile görüşmek üzere 15 Ağustos 1925’te Ankara’ya geldi. Yapılan görüşmeler neticesinde uçak fabrikasının ortaklaşa olarak kurulması için mutabakata varıldı. Türkiye Cumhuriyeti adına Maliye Vekili Hasan Bey,<sup>20</sup> 07 Eylül 1925 tarihinde Junkers Firması yetkilileri ile antlaşmayı imzaladı. Antlaşma uyarınca, ortak kurulacak şirketin sermayesi, taraflar arasında eşit pay olacak şekilde 7 milyon mark (yaklaşık 3.5 milyon TL) olarak belirlendi. Kayseri’de ve Eskişehir’de üretimin yanında uçak bakım ve onarımının da gerçekleştirilebileceği birer fabrika kurulmasına karar verildi.<sup>21</sup> Bakanlar Kurulu’nun 25.10.1925 tarihli onayıyla, Türkiye – Alman Junkers Firması ortaklığında TOMTAŞ kuruldu.<sup>22</sup> Genel merkezi Ankara’da olan şirketin yöneticiliğine Refik Koraltan<sup>23</sup> atandı. Şirket, uçak üretim fabrikası olarak Anadolu’nun merkezinde ve savunmaya uygun jeostratejik konumda olan, bölgenin ticaret yolları üzerinde, lojistik bakımdan askeri imkânları sağlayacak düzeyde ve daha önceden askeri güherçile ve barut fabrikaları bulunan Kayseri tercih edildi.<sup>24</sup>

TOMTAŞ’a bağlı Kayseri Tayyare Fabrikası, uçak üretmek ve bakım yapmak üzere 6 Ekim 1926 tarihinde açılışı gerçekleştirilerek 6 hangar’da, toplam 500 Kw’lık güç santrali ve 50 Türk, 120 Alman olmak üzere toplam 170 personelle çalışmaya başladı.<sup>25</sup>

Fabrikada üretilen uçak sayıları hakkında bazı kaynaklarda farklı rakamlar belirtilmekle beraber 1926 - 1927 yılları arasında Osman Yalçın ve Neslihan Altuncuoğlu 30 adet Junkers A-20 L’nin ve 3 adet de F-13 tipi uçağın montajının gerçekleştirildiğini<sup>26</sup> belirtmişler genel kanaatte bu yönde bulunmaktadır. Bunun yanında fabrikada, Türk Hava Kuvvetleri’nin envanterinde bulunan Junkers A-20, F-13, G-23 uçakları ve kullanımda bulunan diğer uçakların bakım ve onarımları yapılmıştır.

Montajı yapılan Junkers A 20 modeli uçaklar, alçak kanatlı olup, kanatları dâhil tamamen metaldir. Tekerlek şasisi, şamandıra veya yer kızıağı ile değiştirilebilir özelliği ile su ve kar üzerine inebilme kabiliyetindedir.<sup>27</sup> Junkers F-13 modeli uçaklar ise nakliye uçağıdır, dört yolcu kapasiteli, tek kanatlı, önden tek motorlu ve tamamen metaldir.<sup>28</sup>

<sup>18</sup> BCA, 230-0-0-0/8-26-3/ 18.12.1924.

<sup>19</sup> Uçar, a.g.t., s. 23.

<sup>20</sup> BCA, 030.18-1-1/15-50-20/ 05.08.1925.

<sup>21</sup> Tayhani, a.g.e., s. 217-219.

<sup>22</sup> Tayhani, a.g.e., s. 217-219.

<sup>23</sup> **Refik Koraltan:** 1889’ da Divriği’de doğdu, 1910 yılında Hukuk Fakültesinden mezun oldu, milli mücadeleye katıldı, Yozgat İstiklal Mahkemesi Başkanlığı ve 1920-1960 yılları arasında 11 dönem milletvekilliği yaptı. 1950-1960 yılları arasında Meclis Başkanlığı görevini üstlendi, 1974 yılında vefat etti. [Refik Koraltan - Vikipedi \(wikipedia.org\)](https://tr.wikipedia.org/wiki/Refik_Koraltan), 20.03.2023.

<sup>24</sup> BCA, 230-8-27-7, “Fabrikanın Kayseri’de inşa edilmesi” 13.04.1926; Sarısrı, a.g.e., s. 54,55.

<sup>25</sup> Tayhani, a.g.e. s. 218.

<sup>26</sup> Yalçın, *Türk Hava Harp Sanayii Tarihi*, s. 122-123; Neslihan Altuncuoğlu, vd., s. 208.

<sup>27</sup> Junkers A 20 (de-academic.com), 19.05.2022.

<sup>28</sup> Junkers 13 - Vikipedi (wikipedia.org), 22.05.2022.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 1.** TOMTAŞ Uçak Fabrikasında Üretilen Uçakların Özellikleri<sup>29</sup>

Fabrikanın Adı	Uçak Modeli	Tipi	Motor sayısı	Motor Gücü	Azami hız	Uzunluk	Yükseklik	Kanat Açıklığı
TOMTAŞ Uçak Fabrikası	Junkers A 20	Keşif-Hafif Bombardman	Tek	185 hp	170 Km/saat	8,35 m	3,05 m	15,34 m
	Junkers F-13	Yolcu	Tek	230 hp	176 Km/saat	9,6 m	4,1 m	17,80 m

Büyük ümitlerle kurulan TOMTAŞ, Alman ortağı Junkers Firması'nın, ekonomik krize girmesi, anlaşma şartlarını süresi içerisinde yerine getirememesi, Türk tarafında teknik yeterliliğe sahip eleman eksikliği gibi sebeplerle ümit edilen üretim ve satış gerçekleştirilemediğinden, 03 Mayıs 1928'de üretim durduruldu ve 28 Mayıs 1928'de fabrika kapatıldı.<sup>30</sup> Milli Savunma Vekaleti ile Junkers firması arasında ortaklığın sonlandırılması için 24.11.1929'da yapılan protokol ve 27.11.1929 tarihli Bakanlar Kurulu Kararı ile Türk Tayyare Cemiyeti, 520.000 TL Junkers firmasına ödemesi karşılığında tüm hisselerini ve haklarını satın alarak fabrika tamamen Türkiye Cumhuriyeti'nin oldu.<sup>31</sup>

Türkiye'de TOMTAŞ ile temeli atılan ilk yerli uçak fabrikası, başlangıçta yeniden bir uçak üretim tesisi olmayıp, fiilen montaj fabrikasıdır. Dolayısıyla o günkü Türkiye'nin sanayisine doğrudan katkı yapacak nitelikte olmayıp, havacılık teknolojisinin gelişmesine, havacı teknik personelinin yetişmesine ve bölge ve civarının ekonomik kalkınmasına katkı sağlamıştır.

## 2. 2. Kayseri Tayyare Fabrikası

Kayseri'deki tayyare fabrikası, TOMTAŞ'ın tasfiye sürecinin tamamlanmasından sonra 1930 yılında Milli Müdafaa Vekâlet'ine devredildi. 1931 yılında ise Hava Müsteşarlığı'na bağlanarak daha önce temeli atılan beş hangarın inşaatları tamamlandı ve toplamda onbir hangarla yeniden faaliyetlerine başladı.<sup>32</sup>

Fabrika idareciliğine atanan Hv.Bnb. Murat Başaran ve ekibi göreve geldikten sonra havacılık sanayiini geliştirmek, hava kuvvetlerinin ihtiyacı olan uçakları üretmek için havacılık alanında gelişmiş ülkelerde bulunan uçak yapım şirketleri ile temasa geçti.<sup>33</sup> Yapılan araştırmalar neticesinde Mart 1929'da Türkiye'yi ziyaret eden Curtiss-Wright Şirketi'nin temsilcisi Mr. Mario Calderera ile yapılan görüşmeler ve uçak üreten firmaları incelemek üzere Amerika'ya giden Binbaşı Şefik Çakmak'ın görüşleri, lisans anlaşması ile uçak üretimi yapılmasında etkili oldu. Şirket, Türkiye temsilcisi olarak gazeteci Ahmet Emin Yalman ile anlaşmış ve bir program hazırlamıştır. Bu çerçevede, Curtiss uçaklarının ve Wright motorlarının Türkiye'ye satışı, Türk hava yollarının ve bir hava meydanı şebekesinin kurulması, Türkiye tarafından satın alınacak uçakların bir kısmının, Kayseri'de Amerikan ustaları ile Türk işçileri tarafından yapılması, Kayseri'deki fabrikanın tam bir uçak fabrikası haline gelmesi ve Wright uçak motorlarının da burada üretilmesi için Curtiss-Wright Şirketi ile Türk Hükümeti arasında devamlı iş birliğinin sağlanması kararlaştırıldı.<sup>34</sup>

Fabrikada üretilecek uçakların patenti, "Amerikan The Curtiss Aeroplane and Motor Company Inc." firmasına ait olup lisans anlaşması ile Curtiss Hawk II ve Fledgling 2-C1 modeli uçaklarının üretimi

<sup>29</sup>Rifat Bayrak, *Kayseri Tayyare Fabrikası Havacılık Tarihi*, Kayseri Melikgazi Belediyesi Kültür Yayınları, Kayseri, 2021.

<sup>30</sup> Sarısır, a.g.t., s. 71.

<sup>31</sup> BCA, 30-18-1-2/6-57-15-8591-27.11.1929.

<sup>32</sup> İsmail, Yavuz, *Mustafa Kemal'in Uçakları Türkiye'nin Uçak İmalat Tarihi (1923-1950)*, Türkiye İş Bankası Kültür Yayınları, İstanbul, 2020, s.37; Neslihan Altuncuoğlu, Hatice Özlem Özhan, Yağmur Hodancı, Abdullah Erdoğan, *Kayseri Uçak Fabrikası*, Kayseri Büyükşehir Belediyesi Kültür Yayınları, Kayseri, 2021, s. 223.

<sup>33</sup> Tatar, a.g.e., s. 237.

<sup>34</sup> Atakan Esen, Sabit Çetin, "İki Savaş Arası Dönem Türk-Amerikan İlişkilerine Yeni Bir Soluk: Curtiss-Wright Şirketi İle Yapılan İş Birliği Ve Türk Havacılığını Geliştirme Çabaları", *Belgi Dergisi*, S.21 (Kış 2021/1), ss.89-123, s102-103.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

kararlaştırıldı. Sözleşme imzalamak üzere Milli Müdafaa Vekâleti'ne yetki verilerek,<sup>35</sup> 23 Kasım 1931 tarihinde sözleşme imzalandı.<sup>36</sup> Sözleşme çerçevesinde 1933-1939 yılları arasında 22 adet imalat ve 24 adet montaj olmak üzere toplam 46 adet Curtiss Hawk ve 8 adet Fledgling modeli uçak üretildi.<sup>37</sup>

Fabrikada imal edilen Curtiss Hawk II modeli uçaklar, çift kanatlı, tek motorlu, ön gövdesi çelik kaplamalı, kanatları, kanatçıkları, arka gövde ve kuyruk kısmı ise bez kaplamalıdır.<sup>38</sup> Fledgling 2-C1 modeli uçaklar ise, çift kişilik, çift kanatlı, tek motorlu, gövdesi çelik borudan, kuyruğu alüminyum malzemeden, kanatları ise ahşap malzeme üzerine bez kaplama olarak imal edilmiştir.<sup>39</sup> Fabrikada imal edilen ilk 8 uçaktan biri olan 1401 no'lu Fledgling modeli eğitim uçağı, 26 Haziran 1934 tarihinde Atatürk'ün isteğiyle, İran Şahı Rıza Pehlevi'ye hediye edilerek Plt.Yzb. Enver Akoğlu ve Makinist Nihat Kayalı tarafından Tahran'a götürülmüştür.<sup>40</sup>

Türk Hükümeti, Türk Hava Kuvvetlerinin eğitim uçağı ihtiyacını karşılamak üzere 1936 yılında ikinci kez Alman firmaları ile temasa geçti. Yapılan araştırmalar neticesinde Gothaer Waggon Fabrik A.G. firması ile 46 adet Gotha 145 tipi uçağı üretmek üzere lisans anlaşması yaptı. Gotha firması önce üç adet uçağı ait parçaları Türkiye'ye göndererek montaj şeklinde örnek olarak imal etmiş, kalan 43 adedi ise Kayseri Tayyare Fabrikasında Alman ve Türk personellerin ortaklaşa çalışması ile imal edilmiştir.<sup>41</sup> Uçaklar, çift kanatlı çift kişilik, çift kumandalı ve tek motorlu eğitim uçaklarıdır. Gövdesi çelik borudan üretilen uçağın kanatları ahşaptır. Çift ahşap sparlı olan kanatlarda N şeklinde kanat dikmeleri bulunmaktadır. Kuyruk, kanatçıklar, gövde, yön ve irtifa dümenleri bez kaplamalı olan uçağın, kanatları ise kontraplak üzerine bez kaplamadır. Eğitim için en önemli özelliği öğrenci ve öğretmenin beraber binebileceği ve çift kumandalı oluşudur. Gotha 145 tipi uçaklar, Türk Hava Kuvvetleri'nde 1947 yılına kadar kullanılmıştır.<sup>42</sup>

Türk Hava Kuvvetleri'nin avcı uçağı ihtiyacını karşılamak üzere arayışlarda bulunan Türk Hükümeti'nin yapılan araştırma neticesinde Fransız firma imalatı Dewoitine D.510T modeli uçak uygun görülmüştür. Uçak için sipariş verilmiş, ancak Fransa ile Hatay sorunu devam ettiğinden dolayı imal edilen 12 uçağı Fransa Hükümeti Mayıs 1935'te el koymuştur.<sup>43</sup> Bu olayın üzerine Türk Hükümeti, Polonya Tayyare Fabrikası "Panstwowe Zakłady Lotnicze" imalatı olan ve üzerinde Gnôme-Rhône 14 Kfs motoru bulunan 28 Haziran 1934'te Polonyalı pilot Boleslaw Orłowski'nin 414 km/s hıza ulaşarak radyal motorlu savaş uçakları hız rekorunu kırdığı P-24/II. modeli uçağı yönelmiştir. Türkiye, Polonya firmasına 1936 yılı başında uçak alımı ve imalatı için resmi talepte bulunarak 24 Nisan 1936'da sözleşme imzalamıştır. Firma, Türkiye'de görevlendireceği ekibin başkanlığına da daha önce 400 civarı metal avcı uçağı üretimini gerçekleştiren ekibin başında bulunan Wilhelm Gibalka'yı görevlendirmiştir. 23 Ekim 1936'da Kayseri'ye gelen Wilhelm Gibalka, lisans sözleşmesine ilişkin tüm konularda PZL'nin Türkiye'deki tek yetkilisi olarak göreve başlamıştır. İlk üretim P-24'ün deneme uçuşu 29 Mayıs 1937 tarihinde saat 18.00'de Eskişehir Hava Üssü Pilotu Üsteğmen İrfan Bey tarafından başarı ile gerçekleştirilmiş,<sup>44</sup> 1937 yılından itibaren 6 adet P.Z.L. P-24 A, 19 adet P.Z.L. P-24 C ve 2 adet P.Z.L.

<sup>35</sup> BCA, 30.18.1.2 /24.72.17/03.11.1931.

<sup>36</sup> Şirket, mukavele taslağını 7 Ekim 1931 tarihinde gönderdi. Curtiss-Wright Şirketi ile Kayseri Tayyare Fabrikası'nda tayyare ve motor imali, hava hatları ve genel havacılık işleri için yapılan müzakereler neticesinde beş-on senelik her türlü detayı içeren kapsamlı bir proje üzerinde uzlaşmamıştır. Çünkü her iki taraf da kendilerini güvenceye almadan bir taahhütte bulunmaktan kaçınmıştır. Teknik işleri, tayyare maliyet fiyatlarını, motor imal imkânını ve hava hatları işlerini incelemek üzere 1 senelik bir deneme sürecinin uygun olacağı üzerinde mutabakat sağlanmıştır. Konu Bakanlar Kurulu'nun 3 Kasım 1931 tarihli toplantısında görüşülmüş, 23 Kasım 1931 tarihinde imzalanmıştır.

<sup>37</sup> BCA, 30.18.1.2 / 24.72.17-11895- 3.11.1931; Yalçın, *Türk Hava Harp Sanayii Tarihi*, s. 129-132.

<sup>38</sup> Tuncay Deniz, *Türk Uçak Üretimi*, Ertem Matbası, 2004, s., s. 13.

<sup>39</sup> Deniz, a.g.e., s. 14.

<sup>40</sup> BCA, 30.18.1.2 /46-45-13/122-140/26.06.1934; Tatar, a.g.e., s. 238.

<sup>41</sup> BCA, 30.10 / 59.399.8-6141-20.4.1938; Yalçın, *Türk Hava Harp Sanayii Tarihi*, s. 132.

<sup>42</sup> Deniz, a.g.e., s. 15.

<sup>43</sup> Deniz, a.g.e., s. 16.

<sup>44</sup> Osman Fırat Baş, Türkiye ve Polonya arasında askeri havacılık alanında iş birliği: Kayseri Tayyare Fabrikası 1936-37, Kayseri Üniversitesi Sosyal Bilimler Dergisi, C.4, S.1, Kayseri, 2022, s. 63-71.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

P-24 G tiplerinde olmak üzere toplam 27 tane P.Z.L tipi uçak fabrikada imal edilmiştir.<sup>45</sup> Bu uçakların motorlarının imal tarzını görmek üzere Polonya'ya Almanya'ya<sup>46</sup> ve Fransa'ya<sup>47</sup> personeller gönderilmiştir. Bu dönemde fabrika, ayda dört uçak üretecek kapasiteye ulaşmıştır. P.Z.L. P-24 A modeli uçaklar, tek motorlu, tek kişilik, üstten tek kanatlı, gövde ve kanatları tamamen metal kaplamalı, kanatları martı tipinde ve destekli olarak dizayn edilmiştir. Uçağın iniş takımları sabit olup, amortisörlüdür. Uçakta kuyruk kazığı mevcuttur. Pervanesi metal olup üç pallidir. Uçaklar Türk Hava Kuvvetlerinde 1945 yılına kadar hizmette kalmıştır.<sup>48</sup>

Türkiye, İkinci Dünya Savaşı'nın başlaması ile Polonya ve Almanya'dan temin ettiği yedek parça ithalatında oluşan sorunlar ve aynı ülke teknik personellerin yurtlarına dönmelerinden dolayı eğitim uçağı ihtiyacını karşılamak için, İngiliz "Philips And Powis Aircraft Ltd." firması ile 1940 yılında lisans anlaşması imzalanmıştır. 1941 yılında 5 tane, 1942 yılında da 21 tane olmak üzere toplam 26 tane Miles Magister modeli uçaklar imal edilerek Türk Hava Kuvvetlerinin hizmetine verilmiştir.<sup>49</sup> Uçaklar, tek motorlu, alttan tek kanatlı, iki kişilik, çift kumandalı bir eğitim uçağıdır. Uçağın kanatları, kuyruğu ve gövdesi ahşap olup, kontrplak kaplamalı, yön ve irtifa dümenleri ise bez kaplamalıdır. Uçağın her iki kanadının içinde 47 litrelik yakıt tankı bulunmaktadır. Uçaklar üzerinde tadilat yapılarak, gece uçuşlarında, ilaç naklinde ve zirai mücadelede kullanılabilir. <sup>50</sup>

Kayseri Tayyare Fabrikası yurt içinde ve yurt dışında oldukça ilgi görmüş, Cumhurbaşkanı Mustafa Kemal Atatürk,<sup>51</sup> Başbakan İsmet İnönü,<sup>52</sup> yabancı devlet görevlileri,<sup>53</sup> öğrenciler ve izci grupları <sup>54</sup> tarafından ziyaret edilmiştir.

Fabrikada üretilen uçakların menşesine göre Türk işçilerini yetiştirmek ve görev yapmak üzere Amerikalı personel,<sup>55</sup> İngiliz uyruklu mühendisler,<sup>56</sup> Polonyalı mühendisler,<sup>57</sup> teknikerler,<sup>58</sup> motor uzmanları,<sup>59</sup> teknik Erbaşlar,<sup>60</sup> makinistler<sup>61</sup> ve diğer personel,<sup>62</sup> görevlendirilmiştir. 1938 yılında ise uçak tiplerini tetkik etmek üzere daha önce uçuş tecrübesi olan, İran şahına hediye edilen uçağı da götüren Yüzbaşı Enver Akoğlu, İngiltere ve Almanya'ya gönderilmiştir.<sup>63</sup> Kayseri Tayyare Fabrikası'nda, 1931 yılından 1942 yılına kadar dört farklı ülkenin markasına ait yedi ayrı modelde uçak imalatı yapılmıştır.<sup>64</sup> Uçak imalatı dışında, 1937-1947 yılları arasında 24 tip uçağı FASBAT (Fabrika Seviyesi Bakım Tamir) ve 14 tip motor revizyonu (RN) gerçekleştirilmiştir.<sup>65</sup> Fabrika, II. Dünya Savaşı'ndan dolayı 1942 yılından itibaren personel ve yedek parça teminindeki güçlükler nedeniyle uçak üretimini durdurmuştur. Hava

<sup>45</sup> Deniz, a.g.e., s. 16.

<sup>46</sup> BCA, 30.18.1.2 /66.53.12/20.06.1936.

<sup>47</sup> BCA, 30.18.1.2 /83-52-1/09.06.1938.

<sup>48</sup> Deniz, a.g.e., s. 16-18.

<sup>49</sup> Deniz, a.g.e., s. 16.

<sup>50</sup> Deniz, a.g.e., s. 38.

<sup>51</sup> "Gazi Hz. Kayseri'ye Vasıl Oldu", *Akşam*, 5 Şubat 1934, s.1; "Gazi Hz. Nigdeyi tefrif buyurdular", *Cumhuriyet*, 6 Şubat 1934, s.1.

<sup>52</sup> "Milli Şefimizin Kayseri' de Tetkikleri", *Ulus*, 27 Birincikanun 1939, s.1.

<sup>53</sup> "General Eidemann Yarın Şehrimizden Ayrılıyor", *Ulus*, 1 İkinciteşrin 1936, s.1.

<sup>54</sup> "2.000 İzci İle Beraber Kırıkkale Ve Kayseri Fabrikalarını Ziyaret" *Cumhuriyet*, 6 Kasım 1938, s.6.

<sup>55</sup> BCA, 30.18.1.2 /40.80.17-15279-12.11.1933.

<sup>56</sup> BCA, 30.18.1.2 /92-86-9/10.09.1940; BCA, 30.18.1.2 /88-87-9/04.09.1939.

<sup>57</sup> BCA, 30.18.1.2 /70-94-8/17.12.1936.

<sup>58</sup> BCA, 30.18.1.2 /79-85-15/07.10.1937.

<sup>59</sup> BCA, 30.18.1.2 /92-97-4/10.10.1940.

<sup>60</sup> BCA, 30.18.1.2 /106-74-3/16.10.1944.

<sup>61</sup> BCA, 30.18.1.2 /92-83-1/20.08.1940.

<sup>62</sup> BCA, 30.18.1.2 /108.41.8/02.07.1945; BCA, 30.18.1.2 /108.48.20/09.08.1945.

<sup>63</sup> BCA, 30.18.1.2 /84-67-6/19.07.1938.

<sup>64</sup> Yavuz, TOMTAŞ dönemi dâhil Kayseri'deki uçak fabrikasında 1926-1941 yılları arasında yaklaşık 212 uçak üretildiğini ifade etmektedir.

<sup>65</sup> Cevat Sarıkaya, *Tarihi Gelişim İçerisinde Türk Hava Harp Sanayi*, Yayınlanmamış Yüksek Lisans Tezi, Gebze Teknik Üniversitesi Sosyal Bilimler Enstitüsü, Gebze, 2015, s. 45.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Kuvvetlerine ait pervaneli uçakların fabrika seviyesi bakım, ikmal, onarım ve üretim işlemlerini yapan hava ikmal bakım merkezine dönüştürülmüştür.<sup>66</sup>

**Tablo 2.** Kayseri Tayyare Fabrikasında Üretilen Uçakların Özellikleri<sup>67</sup>

Fabrikanın Adı	Uçak Modeli	Tipi	Motor sayısı	Motor Gücü	Azami hız	Uzunluk	Yükseklik	Kanat Açıklığı
Kayseri Tayyare Fabrikası	Curtiss Hawk II	Avcı	Tek	600 hp	325 Km/saat	6,88 m	2,96 m	9,60 m
	Fledgling 2-C1	Eğitim	Tek	220 hp	175 Km/saat	8,33 m	3,14 m	11,93 m
	Gotha 145	Eğitim	Tek	240 hp	212 Km/saat	8,70 m	2,90 m	9,00 m
	PZL P-24	Avcı	Tek	930 hp	410 Km/saat	7,50 m	2,69 m	10,71 m
	Miles Magister 14A	Eğitim	Tek	130 hp	212 Km/saat	7,51 m	2,03 m	10,31 m

## SONUÇ

Motor gücü ile havalanan ilk uçaklar yirminci yüzyılın başlarında ortaya çıkmış ve her geçen gün gelişmeye devam etmiştir. Savaşlarda uçaklardan yararlanma düşüncesi ülkeleri havacılık endüstrisinde çalışma yapmaya zorlamış, Türkler de Trablusgarp Savaşı'ndan itibaren havacılığa önem vermişlerdir. Milli Mücadelenin ardından kurulan Türkiye Cumhuriyeti devletinin devlet adamları da havacılık sektörünün hayati önemini saptamış ve yerli kaynaklar ile geliştirilmesi düşünülmüştür.

Kayseri'de ilk olarak 1926 yılında Alman Junkers firması ile TOMTAŞ ortaklığı şeklinde başlayan uçak üretimi, 1931 yılında Milli Müdafaa Vekâleti'ne bağlı olarak lisans anlaşması şeklinde devam etmiştir. Fabrikada dört farklı ülke lisansı ile çok sayıda uçak üretimi yapılarak havacılık sektörüne ve hava kuvvetlerine katkı sağlanmıştır. Farklı ülke lisansları ile üretim yapılması, yabancı uyruklu teknik personelin tecrübelerinden ülkenin havacılık personelinin yetişmesine ve uçak üretim sanayiinin gelişmesine yardımcı olunmuştur.

Kayseri Tayyare Fabrikası'nda ilk defa üretilen avcı ve bombardıman özelliğine sahip Junkers A-20'ler çift kanatlı, 185 hp gücünde ve saatteki hızları 170 km iken, son üretilen aynı özelliğe sahip P.Z.L. P-24 A'lar tek kanatlı 930 hp gücünde ve saatteki hızları 410 km'ye ulaşmıştır. Yine ilk üretilen eğitim uçağı özelliğine sahip Fledgling 2-C1'ler çift kanatlı, 220 hp gücünde ve saatteki hızı 175 km iken son üretilen Miles Magister 14A'lar tek kanatlı, iki kişilik, 130 hp gücünde ve saatteki hızları 212 km'dir. Görüleceği üzere 1926'dan itibaren Kayseri'de üretilen ilk Türk uçakları, kapasite, kullanım ve performans bakımından daha basit modellerde iken, 1942'ye gelindiğinde en son üretilen uçaklar, daha modern, teknolojik bakımdan daha fonksiyonel, motor kapasitesi açısından daha güçlü, döneminin uçakları ile hemen hemen yarışabilecek durumda olan uçaklar haline gelmiştir.

Kayseri Tayyare Fabrikası'nın TOMTAŞ ile başlayan uçak üretim tecrübesi, II. Dünya Savaşı'nda Türk Hava Kuvvetleri'nin ihtiyacı olan faal uçakların her an hazır bulunmasında büyük rol oynamış, halen Türkiye'nin 2. Hava İkmal ve Bakım Merkezi olarak görev yapmaya devam etmektedir.

<sup>66</sup> Tatar, a.g.e., s. 242.

<sup>67</sup> Yavuz, a.g.e., s.37-44; Deniz, a.g.e., s. 13-18.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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October 13-14, 2023

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October 13-14, 2023

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**ÖZET**

İktisat biliminde son dönemde meydana gelen en önemli gelişmelerden biri, mutluluk kavramının farklı bakış açılarıyla tartışılması sonucu mutluluk ekonomisinin ortaya çıkmasıdır. Mutluluk ekonomisi, iktisat başta olmak üzere sosyoloji, psikoloji, davranış bilimleri ve siyaset bilimi gibi birçok disiplinden yararlanmaktadır. Özellikle 2000'li yıllarla birlikte mutluluk üzerine birçok çalışma kaleme alınmıştır. Çalışmalarda, mutluluk, yaşam doyumu ve öznel iyi oluş (ÖİÖ) kavramlarının birbirinin yerine kullanıldığı görülmektedir. Ancak ÖİÖ kavramının tanımlanmasında mutluluk ve yaşam doyumu terimlerinin çok daha sık kullanıldığı görülmektedir. Bu çalışmada, mutluluk ekonomisine katkı sağlamak düşüncesiyle Türkiye'de bireylerin ÖİÖ düzeylerine etki eden faktörlerin tespit edilmesi amaçlanmıştır. Bu amaç doğrultusunda Dünya Değerler Araştırması'nın (WVS) 2415 denekten elde ettiği anket verileri, genelleştirilmiş sıralı logit modeli kapsamında değerlendirilmiştir. Çalışmada, ÖİÖ düzeyine etki eden faktörlerin test edilmesi için mutluluk ve yaşam doyumu düzeyleri bağımlı değişken olarak alınmıştır. İki modelin kullanıldığı çalışmada, finansal memnuniyet ve sağlık değişkenlerinin ÖİÖ'un çok önemli belirleyicileri olduğu tespit edilmiştir. Özellikle gelirin ÖİÖ üzerinde anlamlı bir etkisi bulunmazken finansal memnuniyetin etkisinin çok yüksek olması, bireylerin tatmin düzeylerinin gelirden ziyade algılanan gelire bağlı olduğunu göstermektedir. Ayrıca, sosyal sınıf, güvenlik, iş endişesi, çocukların eğitimi ile ilgili endişe, özgürlük, yaratıcıya önem verme düzeyi, eğitim, medeni durum ve cinsiyet değişkenlerinin ÖİÖ üzerinde çok anlamlı etkileri olduğu bulunmuştur. Diğer yandan sosyal sınıf bağlamında kendini en alt sınıfta gören bireylerin en yüksek mutluluk düzeyine sahip olduğu; kendini en üst sınıfta görenlerin ise en yüksek yaşam doyumuna sahip olduğu gözlemlenmiştir.

**Anahtar Kelimeler:** Mutluluk Ekonomisi, Öznel İyi Oluş, Genelleştirilmiş Sıralı Logit Modeli, Finansal Memnuniyet.

**ABSTRACT**

One of the most important recent developments in economics is the emergence of happiness economics as a result of discussing the concept of happiness from different perspectives. Happiness economics benefits from many disciplines, especially economics, sociology, psychology, behavioral sciences and political science. Especially in the 2000s, many studies on happiness have been written. It is seen that the concepts of happiness, life satisfaction, and subjective well-being (SWB) are used interchangeably in studies. However, it is observed that the terms happiness and life satisfaction are used much more frequently in defining the concept of SWB. In this study, it was aimed to determine the factors affecting individuals' SWB levels in Turkey with the aim of contributing to the economy of happiness. For this purpose, the World Values Survey (WVS) survey data obtained from 2415 respondents are evaluated within the scope of the generalized ordered logit model. In the study, happiness and life satisfaction levels were taken as dependent variables in order to test the factors affecting the level of SWB. In the study using two models, financial satisfaction and health variables were found to be very important determinants of SWB. In particular, while income does not have a significant effect on SWB, the effect of financial satisfaction is very high, indicating that individuals' satisfaction levels depend on perceived income rather than income. In addition, social class, security, job worry, worry about children's education, freedom, level of importance of God, education, marital status, and gender variables were found to have very significant effects on SWB. On the other hand, in the context of social class, it was observed that individuals who considered themselves in the lowest class had the highest level of

happiness, while those who considered themselves in the highest class had the highest level of life satisfaction.

**Keywords:** Happiness Economics, Subjective Well-Being, Generalized Ordered Logit Model, Financial Satisfaction.

### GİRİŞ

Mutluluk, geçmişten günümüze sosyologların, psikologların, siyasetçilerin ve iktisatçıların ilgi odağı olmuştur. Ancak iktisatçılar, uzun dönem mutluluğu sadece salt iktisadi doktrinlerle açıklamaya yoluna gitmiş ve özellikle psikolojik faktörleri göz ardı etmişlerdir (Stanca, 2010). Son dönemde ise iktisatta mutluluk ve mutluluğu etkileyen faktörler, farklı bakış açılarıyla tartışılmaya başlanmıştır (Haucap ve Heimeshoff, 2014). Özellikle 1974 yılında Easterlin tarafından yayınlanan “*Does the Economic Growth Improve the Human Lot?*” adlı çalışma, iktisat temelinde mutluluğun daha sağlam esaslarla tartışılması yolunu açmıştır (Easterlin, 1974). Davranışsal İktisat altında bir disiplin olarak yerini alan mutluluk ekonomisi, günümüzde birçok çalışmaya konu olmuştur (bkz. Dolan, Peasgood, ve White, 2008; Bjørnskov, Dreher, ve Fischer, 2010; Stutzer ve Frey, 2012; Yu ve Blader, 2020; Ng, 2022).

Mutluluk ekonomisi, iktisat başta olmak üzere sosyoloji, psikoloji, davranış bilimleri, siyaset bilimi gibi birçok disiplinden yararlanmaktadır. Yani mutluk ekonomisinde, ekonomik faktörler yanı sıra sosyo-demografik özellikler, kişisel özellikler, sağlık, güvenlik, adalet, hürriyet, din ve beklentiler gibi faktörlerin mutluluk düzeyi üzerindeki etkisi ele alınmaktadır (Dolan vd., 2008; Barry, 2000; Veenhoven, 2005; Stanca, 2010). Diğer yandan mutluluk ekonomisiyle ilgili çalışmalarda, mutluluk kavramı yerine farklı farklı kavramların kullanıldığı görülmektedir. Özellikle bu çalışmalarda, mutluluk ve yaşam doyumu kavramlarının ÖİÖ kavramının tanımlanmasında çok yaygın kullanıldığına rastlanılmaktadır (bkz. Frey ve Stutzer, 2000; Flouri, 2004; Graham, Eggers, ve Sukhtankar, 2004; Diener ve Chan, 2011; Hong vd., 2022). Bu bağlamda bu çalışmada, ÖİÖ kavramı ana kavram olarak kullanılmıştır.

Mutluluk ekonomisinin önem kazandığı bu son dönemde, dünyanın birçok bölgesinde bireylerin ÖİÖ düzeyleri üzerine çalışmalar kaleme alınmaktadır. Bu çalışmada da Türkiye’de bireylerin ÖİÖ düzeylerine etki eden faktörlerin tespit edilmesi amaçlanmıştır. Bu amaç doğrultusunda Dünya Değerler Araştırması’nın (WVS) 7. dalga araştırması kapsamında 2018 yılında Türkiye’de uygulanan anket verileri, çalışmada kullanılmıştır (Worldvaluessurvey.org, 2019). Diğer yandan literatürde sıralı lojistik regresyon modeli çok kullanılmasına karşı bu çalışmada, paralellik varsayımı karşılanmadığından dolayı genelleştirilmiş sıralı logit modeli (GSLM) kullanılmıştır. Özellikle şuna kadar literatürde bu kapsamda ve bu yöntem çerçevesinde bir çalışmanın kaleme alınmamış olması, bu çalışmanın önemini arttırmaktadır. Ayrıca çalışmanın ikinci bölümde, ÖİÖ ile alakalı literatür özetlenmiştir. Üçüncü bölümde çalışmanın metodolojisi, dördüncü bölümde bulgular ve beşinci bölümde ise sonuç ve önerilere yer verilmiştir.

### LİTERATÜR

Mutluluk ekonomisi üzerine, özellikle 2000 yılından bu yana yapılan çalışmalarda çok büyük bir artış olduğu görülmektedir (Lim, Shaw, Liao, ve Duan, 2020). Yapılan çalışmalarda, ÖİÖ’un belirleyicilerine dikkat çekilmiştir. Bu çalışmalarda, gelir, kişisel özellikler (yaş, cinsiyet, medeni durumu vs.), eğitim, sağlık, sosyal aktiviteler, boş zaman, psikolojik bileşenler (stres deneyimi ve dini inanışlar gibi) ve sosyoekonomik faktörler (ekonomik büyüme, işsizlik ve istihdam oranı) üzerinde durulmuştur (bkz. Easterlin, 1974; Diener, Suh, Lucas, ve Smith, 1999; Flouri, 2004; Ferrer-i-Carbonell, 2005; Newman, Tay, ve Diener, 2014; Dong ve Kübler, 2021; Li ve Lyu, 2022; Yang, Lu, ve Li, 2023).

Yapılan çalışmalarda, gelirin ÖİÖ’un çok önemli bir belirleyicisi olduğu görülmüştür (bkz. Easterlin, 1974; Luttmer, 2005; Dorn, Fischer, Kirchgässner, ve Sousa-Poza, 2007; Beja, 2014). Easterlin(1974) yaptığı çalışmada, bireylerin gelir düzeyleri ile ÖİÖ düzeyleri arasında belli bir gelir düzeyine kadar pozitif bir ilişkinin olduğunu, ancak belli bir noktadan sonra gelirdeki artışın ÖİÖ’u etkilemediğini savunmuştur. Diğer yandan yapılan diğer çalışmalarda ise gelir düzeyi yüksek bireylerin yüksek ÖİÖ düzeyine sahip olduğu tespit edilmiştir (Luttmer, 2005; Ferrer-i-Carbonell, 2005).



Sosyoekonomik göstergeler ile ÖİO arasında önemli ilişkilerin olduğu ve özellikle ülkeden ülkeye önemli farklılıklar gösterdiği yapılan çalışmalarda kanıtlanmıştır (bkz. Easterlin ve Sawangfa, 2010; Stevenson ve Wolfers, 2008; Öztürk ve Suluk, 2020). Hagerty (2000), gelir adaletsizliği ile ÖİO arasında negatif ilişki olduğunu, Haller ve Hadler (2006) ise gelir adaletsizliğinin yaşam memnuniyetini arttırdığını gözlemiştir. Hagerty (2000), gelir adaletsizliğinin ABD’de ÖİO üzerinde olumsuz, Senik (2004) ise Rusya’da olumlu etkiye sahip olduğunu tespit etmiştir. Di Tella, MacCulloch ve Oswald (2001) çalışmalarında, işsizlik oranlarının ÖİO’u azalttığını görmüşlerdir. Wolfers (2003), enflasyonun ÖİO’u azalttığını gözlemiştir. Ayrıca işsizlik düzeyinde meydana gelen bir birimlik artışın enflasyonda meydana gelen bir birimlik artışa göre ÖİO üzerindeki etkisinin daha yüksek olduğunu vurgulamıştır.

Alesina vd. (2004) çalışmalarında, erkeklere nispeten kadınların daha yüksek ÖİO düzeyine sahip olduğunu gözlemlerken Frey ve Stutzer (2000) ise erkeklerin kadınlara göre daha yüksek ÖİO düzeyine sahip olduğunu gözlemiştir. Ancak Louis ve Zhao (2002) ise çalışmalarında cinsiyet bağlamında kadın ve erkek bireyler arasında hiçbir önemli bir farklılığı olmadığı sonucuna varmıştır. Öte yandan yapılan çalışmalarda yaşın ÖİO üzerindeki etkisinin farklı yaş kategorilerine göre değişiklik gösterdiği gözlemlenmiştir. Genç ve ileri yaş düzeylerine sahip bireylerin ÖİO düzeylerinin 32-50 yaş aralığındaki bireylere göre daha iyi seviyede olduğu tespit edilmiştir (Dolan vd., 2008).

Yapılan çalışmalarda medeni durumun ÖİO’un üzerinde önemli bir belirleyici olduğu görülmüştür (Linz ve Semykina, 2012; Andersson, 2008). Ancak bazı çalışmalarda evlilik ve ÖİO arasında anlamlı bir ilişki bulunamazken sadece bazı ülkelerde evliliğin etkisinin anlamlı olduğu görülmüştür (Linz ve Semykina, 2012; Mahama ve Maharjan, 2018). Diğer yandan eğitimin de ÖİO üzerinde önemli etkiye sahip olduğu görülmüştür (Blanchflower ve Oswald, 2004). Hatta eğitim düzeyinin düşük gelirli ülkelerde yaşayan bireyler üzerinde daha yüksek bir etkiye sahip olduğu gözlemlenmiştir (Ferrer-i-Carbonell, 2005).

Fiziksel ve zihinsel sağlığın ÖİO üzerinde önemli bir etkiye sahip olduğu birçok çalışmada kanıtlanmıştır (Andersson, 2008; Dolan vd., 2008; Bowling, Eschleman, ve Wang, 2010). Helliwell (2006), inancı ne olursa olsun dindar insanların dindar olmayan insanlardan daha mutlu olduğunu gözlemiştir. Ayrıca Clark ve Felkles (2005), dini faaliyetlere düzenli katılan bireylerin daha mutlu olduğunu tespit etmiştir.

Bireylerin ÖİO düzeyleri ile ülkelerdeki demokrasi düzeyi arasında önemli bir ilişkinin olduğu birçok çalışmada ortaya konulmuştur (Tsai, 2009; Bjørnskov, 2010; Berggren and Bjørnskov, 2020). Frey ve Stutzer (2000), katılımcı demokrasinin yoğun olduğu ülkelerde bireylerin yaşam memnuniyetlerinin nispeten daha yüksek olduğu gözlemlenmiştir. Diğer yandan bireylerde sosyal güven arttıkça mutluluk düzeyinin daha arttığı hatta intihar olaylarının olma olasılığının daha da azaldığı birçok çalışmada gözlemlenmiştir (Helliwell, 2006; Helliwell and Putnam, 2004; Dolan vd., 2008). Bireylerin komşularla ilgili algılarının yaşam doyumunu önemli düzeyde etkilediği yönünde önemli kanıtlar elde edilmiştir (Dolan vd., 2008). Diğer yandan devlet kurumlarına ve hükümete duyulan güvenin daha yüksek yaşam doyumuna sebep olduğu tespit edilmiştir (Helliwell 2003; Hudson 2006). Ayrıca bireylerin finansal koşullar yönündeki algılarının yaşam doyumunu üzerinde çok önemli etkilere sahip olduğu görülmüştür (Brown, Taylor, ve Wheatley Price, 2005).

## 1. METODOLOJİ

### 3.1. Veri

Bu çalışmada, WVS verileri kullanılmıştır<sup>1</sup>. WVS tarafından yürütülen 7. dalga çalışması kapsamında Türkiye’de 2415 denekten toplanan veriler, bu çalışma kapsamında değerlendirilmiştir. Çalışma kapsamında kullanılan değişkenler ve değişkenlere ilişkin özet istatistik değerlerine Tablo 1’de yer verilmiştir. WVS’nin 7. dalga araştırmasında, yaşam doyumunu, finansal memnuniyet, hürriyet ve yaratıcıya önem verme düzeyi değişkenleri 10’lu likert ölçek bağlamında değerlendirilmesine karşın bu çalışmada, bu değişkenler 5’li likert ölçeğe dönüştürülerek analizlere dâhil edilmiştir.

<sup>1</sup> WVS verileri, uluslararası sosyo-kültürel değerleri ve siyasi değişimleri araştırmayı amaçlayan yüze yakın ülkeyi kapsamaktadır. Örnekler, ulusal düzeyleri temsil etmektedir. Araştırmalarda, sosyo-demografik özellikler, öznel refah, toplumsal değerler, din, politika ve diğer sosyo-kültürel değerleri ölçmek için ortak anket bir kullanılmaktadır (Worldvaluessurvey.org, 2019).

**Tablo 1.** Modellerde kullanılan değişkenlerin tanımı ve özet istatistikleri

Değişken	Ölçüm İndeksi	Kategori sırası	Ort.	S.S.	Gözlem sayısı
Mutluluk	1-4	Azalan	1,94	0,65	2415
Yaşam Doyumu	1-5	Azalan	3,49	0,96	2415
Finansal memnuniyet	1-5	Artan	3,20	0,96	2415
Sağlık	1-5	Artan	2,85	0,70	2415
Sosyal sınıf	1-5	Artan	2,94	0,62	2415
Güvenlik	1-4	Artan	2,84	0,62	2415
İş endişesi	1-4	Artan	2,78	1,05	2415
Çocuk eğitim endişesi	1-4	Artan	2,82	1,07	2415
Hürriyet	1-5	Artan	3,56	1,04	2415
Yaratıcıya önem verme düzeyi	1-5	Artan	4,19	1,03	2415
Eğitim	1-5	Artan	2,32	1,92	2415
Medeni durum	1-6	-	2,77	2,33	2415

### 3.2. Metodoloji

ÖİÖ üzerine yapılan çalışmalarda ağırlıklı olarak sıralı lojistik regresyon kullanılmıştır (bkz. Alesina vd., 2004; Besim Akin vd., 2012; Lim vd., 2020; Yang vd., 2023). Ancak sıralı lojistik regresyon kullanılması için bağımlı değişkenin kategorileri ile bağımsız değişkenler arasında paralellik olup olmadığına bakılmalıdır. Eğer paralellik varsayımı ihlal edilirse genelleştirilmiş sıralı logit modeline başvurulur (Williams, 2006; Mahama ve Maharjan, 2018). Bu bağlamda yapılan sıralı lojistik regresyon analizinde, paralellik varsayımının ihlal edildiği gözlemlenmiş ve genelleştirilmiş sıralı logit modelinin kullanılmasına karar verilmiştir.

#### Genelleştirilmiş Sıralı Logit Modeli

Bu model, bağımlı değişkenin sıralı yapısını dikkate alan ve sıralı lojistik modele alternatif kullanılan bir modeldir. Aynı zamanda sıralı logit modelde yer alan paralellik varsayımını gevşetmektedir (Timur ve Akay Çağlayan, 2017). Genelleştirilmiş sıralı logit modeli, Williams (2006) tarafından şu şekilde tanımlanmıştır:

$$P_{ij} = \Pr(Y_i > j) = g(X_i \beta_j) = \frac{\exp(\alpha_j + X_i \beta_j)}{1 + \exp(\alpha_j + X_i \beta_j)}, j = 1, 2, \dots, M - 1 \quad (1)$$

Burada  $Y_i$ , bağımlı değişken ve  $X_i$  ise bağımsız değişkenler vektörünü temsil eder. Diğer yandan  $\alpha_j$  kesişim,  $\beta_j$  tahmin edilecek parametreyi temsil etmekte ve  $M$  ise bağımlı değişkenin maksimum değerini ifade eder. Bu çalışmada bağımlı değişkeni ölçmek için 5'li ve 4'lü likert ölçeği kullanıldığından  $M$  değeri 5 veya 4'e eşit olmaktadır. Yaşam memnuniyeti ve mutluluk bağımlı değişkenlerini ölçmek için likert ölçeği kullanılmıştır. 1 numaralı denkleme göre bağımlı değişkenin ( $Y_i$ ) her bir kesme noktasının olasılığı şu şekilde belirtilebilir:

$$\Pr(Y_i = 1) = 1 - g(X_i \beta_1) \quad (2)$$

$$\Pr(Y_i = j) = g(X_i \beta_{j-1}) - g(X_i \beta_j), j = 2, \dots, M - 1 \quad (3)$$

$$\Pr(Y_i = M) = g(X_i \beta_{M-1}) \quad (4)$$

Eğer  $M=2$  olursa genelleştirilmiş sıralı logit modeli, standart ikili logit modeli olur. Eğer  $M>2$  olursa binary logit model olarak yorumlanır.

#### BULUGULAR

Araştırma kapsamında ankete katılan 2415 katılımcının cinsiyet dağılımına bakıldığında erkek ve bayan dağılımının neredeyse aynı olduğu gözlemlenmiştir. Medeni durum bakımından bakıldığında katılımcıların %62,1'inin evli, %32,4'ünün bekâr ve geri kalanlarının ise dul ve ayrı yaşadıkları görülmüştür. Eğitim düzeyi bakımından bakıldığında %11,5'inin hiç okula gitmediği, %36,6'sının ilkökul, %10,6'sının ortaokul, %24,2'sinin lise ve 17,1'inin ise üniversite mezunu olduğu gözlemlenmiştir. Ayrıca katılımcıların ortalama 38,8 yaşında oldukları görülmüştür.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 2** Paralel Doğrular Varsayımı için Olabilirlik Oran Testi Sonuçları

<i>Bağımlı Değişken</i>	<i>Test</i>	<i>-2 Log Likelihood</i>	<i>X<sup>2</sup></i>	<i>df</i>	<i>p&gt;Chi2</i>
Yaşam Doyumu	Null Hypothesis	4890,515	569,836	96	0,000
	General	4320,679			
Mutluluk	Null Hypothesis	2890,013	83,538	44	0,000
	General	2806,475			

Çalışma kapsamında ilk olarak bağımlı değişkenlerin kategorileri ile bağımsız değişkenler arasında paralellik olup olmadığının test edilmesi için olabilirlik oran testi uygulanmıştır. Tablo 2’de her iki modelle ilişkin olabilirlik oran testi sonuçları verilmiştir. Sonuçlara bakıldığında her iki model için paralellik varsayımının ( $p < 0,00$ ) ihlal edildiği görülmektedir. Paralel doğrular varsayımının bozulması durumunda sıralı lojistik model ile tahmin edilen parametreler gerçeği yansıtmayacağından dolayı genelleştirilmiş sıralı logit modeli kullanılmıştır.

Çalışmanın birinci modelinde, mutluluk bağımlı değişken; finansal memnuniyet, sağlık, sosyal sınıf, güvenlik, iş endişesi ve eğitim düzeyi ise bağımsız değişken olarak analize dâhil edilmiştir. Diğer yandan bağımlı değişken azalan, bağımsız değişkenler ise artan kategorik sıralı olarak modelde kullanılmıştır.

Tablo 3’te birinci model için genelleştirilmiş sıralı logit modeli sonuçları verilmiştir. Birinci modelin sonuçlarına göre en yüksek finansal memnuniyet değeri referans alındığında, en düşük finansal memnuniyete sahip olan bireylerin hiç mutlu olmama olasılıklarının 4,156 kat daha fazla olduğu görülmüştür. Ayrıca finansal memnuniyet kategorilerine bir bütün bakıldığında, bireylerin finansal memnuniyet düzeyleri arttıkça hiç mutlu olmama olasılıklarının doğru orantılı olarak azaldığı gözlemlenmiştir. Yani birlerin finansal memnuniyet düzeylerinin önemli düzeyde mutluluk üzerinde pozitif bir etkiye sahip olduğu tespit edilmiştir.

**Tablo 3.** Birinci Model Kapsamında Elde Edilen Genelleştirilmiş Sıralı Logit Modeli Sonuçları

<b>Bağımsız Değişkenler</b>		<b>Bağımlı Değişken: Mutluluk (4-1) Çok mutluyum (4), Biraz mutluyum (3) Pek mutlu değilim (2), Hiç mutlu değilim (1) Referans Değer: Hiç mutlu değilim (1)</b>			
	<b>Kategoriler</b>	<b><math>\beta</math></b>	<b>S.D</b>	<b>ODDS Oranı</b>	<b>p</b>
<b>Finansal Memnuniyet</b> (Referans Değer: 5)	1	1,425	0,273	4,156	0,000
	2	1,112	0,221	3,040	0,000
	3	0,419	0,201	1,520	0,038
	4	0,181	0,200	1,198	0,367
<b>Sağlık</b> (Referans Değer: Çok iyi )	Çok kötü	6,101	0,636	446,386	0,000
	Kötü	3,994	0,282	54,285	0,000
	Fena Değil	2,825	0,159	16,863	0,000
	İyi	1,842	0,129	6,308	0,000
<b>Sosyal Sınıf</b> (Referans Değer: Üst sınıf)	Alt sınıf	1,199	0,270	3,316	0,000
	İşçi sınıfı	0,587	0,229	1,798	0,010
	Orta sınıfın altı	0,628	0,228	1,874	0,006
	Orta sınıfın üstü	0,289	0,227	1,334	0,205
<b>Güvenlik</b> (Referans Değer: Çok güvenli)	Hiç güvenli değil	0,572	0,300	1,772	0,057
	Pek güvenli değil	0,741	0,173	2,099	0,000
	Güvenli	0,254	0,151	1,289	0,094
<b>İş Endişesi</b> (Referans Değer: Hiç endişe duymuyorum)	Çok endişeliyim	0,801	0,137	2,227	0,000
	Biraz endişeliyim	0,648	0,133	1,913	0,000
	Pek endişe duymuyorum	0,520	0,151	1,683	0,000
<b>Eğitim</b> (Referans Değer: Üniversite)	Hiç okula gitmemiş	-0,759	0,174	0,468	0,000
	İlkokul	-0,294	0,133	0,745	0,028
	Ortaokul	-0,304	0,175	0,738	0,083
	Lise	-0,090	0,140	0,914	0,521

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Bireylerin sağlık durumları göz önüne alındığında, sağlık durumu çok iyi olan bireylere kıyasla sağlık durumu çok kötü olan bireylerin hiç mutlu olmama olasılıklarının 446,386 kat fazla olduğu, ayrıca sağlık durumu kötü olanların da hiç mutlu olmama olasılıklarının 54,285 kat fazla olduğu gözlemlenmiştir. Diğer yandan sağlık durumu iyi olanların çok iyi olanlara kıyasla hiç mutlu olmama olasılıklarının bile 6,308 kat daha fazla olduğu görülmüştür. Bu sonuçlar, Türkiye toplumunda sağlığın mutluluk üzerinde çok yüksek derecede anlamlı ve pozitif etkiye sahip olduğunu göstermektedir.

Bireylerin kendilerini kabul gördükleri sosyal sınıf düzeyleri göz önüne alındığında, kendini en üst sınıfta tanımlayanlara kıyasla kendini en alt sınıfta tanımlayanların hiç mutlu olmama olasılıklarının 3,316 kat fazla olduğu görülmüştür. Kendini işçi sınıfında gören bireylerin kendini en üst sınıfta tanımlayanlara kıyasla hiç mutlu olmama olasılıklarının 1,798 kat fazla olduğu; kendini orta sınıfın altı ve üstü olarak tanımlayanların kendini en üst sınıfta tanımlayanlara kıyasla sırsıyla hiç mutlu olmama olasılıklarının 1,874 ve 1,334 kat daha fazla olduğu gözlemlenmiştir. Sosyal sınıfla ilgili sonuçlara bir bütün bakıldığında, Türkiye toplumunda sosyal sınıfın mutluluk üzerinde önemli düzeyde etkili olduğu söylenebilir.

Güvenlik düzeyi sonuçlarına bakıldığında, kendini çok güvenli hissedenlere kıyasla kendini hiç güvenli hissetmeyenlerin hiç mutlu olmama olasılıklarının 1,772 kat daha fazla olduğu; kendini pek güvenli hissetmeyenlerin de hiç mutlu olmama olasılıklarının 2,099 kat daha fazla görülmüştür. Bu sonuçlar, Türkiye’de bireylerin kendini güvende hissetme düzeylerinin önemli düzeyde mutluluk düzeyi üzerinde etkili olduğunu göstermektedir.

Bireylerin iş endişesi düzeyleri göz önüne alındığında, hiç iş endişesi olmayanlara kıyasla çok endişeli olanların hiç mutlu olmama olasılıklarının 2,227 kat fazla olduğu ve bireylerin iş endişe düzeyleri azaldıkça hiç mutlu olmama olasılıklarının giderek azaldığı görülmüştür. Sonuç olarak, Türkiye toplumunda iş endişesi düzeyi azaldıkça mutluluk düzeylerinin arttığı söylenebilir.

Son olarak eğitim düzeyine bakıldığında, üniversite mezunlarına kıyasla hiç okula gitmemiş bireylerin hiç mutlu olmama olasılıklarının 0,468 kat daha az olduğu; ilkökul mezunlarının hiç mutlu olmama olasılıklarının ise 0,745 kat daha az olduğu tespit edilmiştir. Bu sonuçlar, Türkiye’de eğitim düzeyi düşük olan bireylerin mutluluk düzeyinin daha yüksek olduğunu göstermektedir.

Çalışmanın ikinci modelinde, yaşam doyumu bağımlı; finansal memnuniyet, sağlık, sosyal sınıf, güvenlik, eğitim endişesi, hürriyet, yaratıcıya önem verme düzeyi ve medeni durum ise bağımsız değişken olarak değerlendirilmiştir.

Tablo 4’te ikinci model kapsamında elde edilen genelleştirilmiş sıralı logit modeli sonuçları verilmiştir. Bu sonuçlar bağlamında bakıldığında, en yüksek finansal memnuniyet düzeyine sahip olan bireylere kıyasla en düşük finansal memnuniyetine sahip olanların en düşük yaşam doyumu düzeyine sahip olma olasılıklarının 52,377 kat fazla olduğu gözlemlenmiştir. Ayrıca bireylerin finansal memnuniyet düzeyi arttıkça en düşük yaşam doyumu düzeyine sahip olma olasılıklarının çok sert azaldığı görülmüştür. Bu durum da Türkiye toplumunda, finansal memnuniyet düzeyinin yaşam doyumu üzerinde yüksek düzeyde anlamlı ve pozitif bir etkiye sahip olduğunu gösterdiği ifade edilebilir. Diğer yandan bireylerin sağlık durumu göz önüne alındığında, Türkiye toplumunda sağlığın yaşam doyumu üzerinde anlamlı ve pozitif etkiye sahip olduğunu görülmektedir.

Çalışmada, kendini en üst sınıf olarak tanımlayanlara kıyasla kendini en alt sınıfta tanımlayanların en düşük yaşam doyumu düzeyine sahip olma olasılıklarının 2,098 kat fazla olduğu görülmüştür. Kendini pek güvenli hissetmeyenlerin kendini çok güvenli hissedenlere kıyasla en düşük yaşam doyumu düzeyine sahip olma olasılıklarının 1,809 kat fazla olduğu gözlemlenmiştir. Çocuklarının eğitimlerinden hiç endişe duymayanlara kıyasla çok endişe duyanların en düşük yaşam doyumu düzeyine sahip olma olasılıklarının 1,767 kat fazla olduğu tespit edilmiştir. Ayrıca bireylerin çocuklarının eğitiminden endişe duyma düzeyleri azaldıkça en düşük yaşam doyumu düzeyine sahip olma olasılıklarının giderek azaldığı görülmüştür.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 4.** İkinci Model Kapsamında Elde Edilen Genelleştirilmiş Sıralı Logit Modeli Sonuçları

<i>Bağımsız Değişkenler</i>		<i>Bağımlı Değişken: Yaşam Doyumu (5-1) Referans Değer: En düşük yaşam doyumu düzeyi (1)</i>			
	<b>Kategoriler</b>	<b><math>\beta</math></b>	<b>S.D</b>	<b>ODDS Oranı</b>	<b>p</b>
<b>Finansal Memnuniyet</b> (Referans Değer: 5)	1	3,958	0,288	52,377	0,000
	2	3,059	0,228	21,296	0,000
	3	2,291	0,210	9,881	0,000
	4	1,310	0,201	3,707	0,000
<b>Sağlık</b> (Referans Değer: Çok iyi )	Çok kötü	1,444	0,620	4,239	0,020
	Kötü	1,681	0,255	5,371	0,000
	Fena Değil	1,231	0,142	3,426	0,000
	İyi	0,738	0,121	2,093	0,000
<b>Sosyal Sınıf</b> (Referans Değer: Üst sınıf)	Alt sınıf	0,741	0,261	2,098	0,005
	İşçi sınıfı	0,139	0,222	1,149	0,534
	Orta sınıfın altı	0,186	0,222	1,204	0,404
	Orta sınıfın üstü	0,126	0,222	1,135	0,571
<b>Güvenlik</b> (Referans Değer: Çok güvenli)	Hiç güvenli değil	0,195	0,289	1,216	0,500
	Pek güvenli değil	0,593	0,161	1,809	0,000
	Güvenlikli	0,300	0,141	1,349	0,034
<b>Çocukların Eğitimine Yönelik Endişesi</b> (Referans Değer: Hiç endişe duymuyorum)	Çok endişeliyim	0,569	0,126	1,767	0,000
	Biraz endişeliyim	0,453	0,123	1,573	0,000
	Pek endişe duymuyorum	0,260	0,147	1,297	0,077
<b>Hürriyet</b> (Referans Değer: 5)	1	0,852	0,229	1,486	0,000
	2	1,482	0,168	1,662	0,000
	3	1,204	0,134	1,514	0,000
	4	0,709	0,121	1,163	0,000
<b>Yaratıcıya Önem Verme Düzeyi</b> (Referans Değer: 5)	1	0,396	0,269	1,486	0,142
	2	0,508	0,205	1,662	0,013
	3	0,415	0,115	1,514	0,000
	4	0,151	0,105	1,163	0,153
<b>Medeni Durum</b> (Referans Değer: Bekâr)	Evli	-0,225	0,091	0,799	0,014
	Evli gibi birlikte yaşamakta	0,476	0,928	1,609	0,608
	Boşanmış	0,319	0,264	1,375	0,228
	Evli fakat ayrı yaşıyor	-0,768	0,909	0,464	0,398
	Dul	-0,085	0,257	0,919	0,743

Türkiye toplumunda bireylerin hürriyet ve yaratıcıya önem verme düzeyleri arttıkça en düşük yaşam doyumu düzeyine sahip olma olasılıklarının giderek azaldığı gözlemlenmiştir. Bu sonuç, Türkiye’de bireylerin yaşam doyumu düzeyleri üzerinde hürriyet ve yaratıcıya önem verme düzeyinin önemli bir belirleyici olduğunu göstermektedir.

Evli olan bireylerin bekârlara kıyasla en düşük yaşam doyumu düzeyine sahip olma olasılıklarının 0,799 kat daha az olduğu görülmüştür. Yani Türkiye’de kadınların erkeklere nispeten daha yüksek yaşam doyumuna sahip oldukları söylenebilir.

## SONUÇ VE DEĞERLENDİRME

1970’li yıllardan bu yana iktisadın psikoloji başta olmak üzere diğer ilgili bilimlerle yaklaşması sonucu, mutlulukla ilgili çalışmalar mutluluk ekonomisi adı altında kendine bir yer bulmuştur. Dünyanın dört bir tarafında yapılan saha çalışmalarında elde edilen anket verilerinin ve ilgili makroekonomik verilerin kullanıldığı çalışmalarda, ekonomik faktörler yanı sıra sosyo-demografik özellikler, kişisel özellikler, sağlık, güvenlik, adalet, hürriyet, din ve beklentiler gibi faktörlerin ÖİO üzerinde önemli belirleyiciler olduğu orta konulmuştur. Türkiye genelini kapsayan bu çalışmada ise hem literatürdeki sonuçlara paralel hem de farklı sonuçlar elde edilmiştir.

2415 anket verisinin kullanıldığı bu çalışmada, genelleştirilmiş sıralı logit modeli kullanılmıştır. Çalışmada, Türkiye’de bireylerin gelir düzeyi ile mutluluk düzeyleri arasında bir ilişki bulunmazken bireylerin finansal memnuniyet düzeylerinin mutluluk düzeyi üzerinde çok önemli düzeyde anlamlı ve pozitif bir etkiye sahip olduğu tespit edilmiştir. Ayrıca bireylerin finansal memnuniyet düzeylerinin yaşam doyumu üzerinde de çok önemli düzeyde anlamlı ve pozitif bir etkiye sahip olduğu gözlemlenmiştir. Bu sonuçlar, Betsey ve Justin (2008), Deaton (2008) ve Diener vd. (2013) ifade ettiği gibi gelir ile ÖİÖ (mutluluk ve yaşam doyumu) arasında pozitif bir ilişki bulunmamıştır. Ancak bireylerin algıladıkları gelir düzeyleri yani finansal memnuniyet düzeyi ile ÖİÖ arasında çok önemli düzeyde anlamlı ve pozitif bir ilişki bulunmuştur.

Türkiye’de bireylerin sağlık düzeyi ile ÖİÖ düzeyleri arasında çok önemli düzeyde pozitif ve anlamlı bir ilişki gözlemlenmiştir. Bu sonuç, Dolan vd. (2008) ve Yang vd. (2023) yaptığı çalışmayı destekler niteliktedir. Ayrıca yaratıcıya önem verme düzeyi ile ÖİÖ arasında önemli düzeyde pozitif ve anlamlı bir ilişki görülmüştür. Bu ilişki, Helliwell (2006)’in yaratıcıya inancı yüksek olan bireylerin yüksek yaşam doyumlarına sahip olduğu görüşünü destekler niteliktedir. Diğer yandan Dolan vd. (2008), Helliwell ve Putnam (2004) ve Bjørnskov vd. (2010)’nin elde ettiği sonuçlara paralel olarak Türkiye’de sosyal sınıf düzeyinin ÖİÖ düzeyi üzerinde çok önemli bir belirleyici olduğu görülmüştür.

Çalışmada güvenlik ve hürriyet düzeyinin ÖİÖ üzerinde önemli belirleyici olduğu ve bu sonucun, Paleologou (2022), Berggren and Bjørnskov (2020), Helliwell (2006) ve Ott’un (2010) ifade ettiği gibi insanların kendini hür hissedip özgür seçimler yapmasının mutluluğu arttırdığı görüşü, bu çalışmada kanıtlanmıştır.

Çalışmada, bireylerin eğitim düzeyleri ile medeni durumlarının ÖİÖ üzerinde önemli düzeyde etkili olduğu gözlemlenmiştir. Bu sonuçlar bağlamında bakıldığında, Blanchflower and Oswald (2004b) ifade ettiği gibi eğitim düzeyi ile ÖİÖ arasında pozitif bir ilişki olduğu söylenebilir. Ayrıca Gazioglu and Tansel (2006) çalışmalarının aksine evli olan bireylerin bekâr olanlara kıyasla daha yüksek ÖİÖ düzeyine sahip olduğu görülmüştür.

Çalışmadaki sonuçlara bir bütün olarak bakıldığında, Türkiye’de bireylerin ÖİÖ düzeyini etkileyen birçok faktörün olduğu görülmektedir. Özellikle bu faktörler içerisinde, finansal memnuniyet ve sağlık düzeyi payının çok yüksek olduğu söylenebilir. Türkiye’de ilk defa Tablo 1’de yer verilen değişkenlerin literatürde yaygın olarak kullanılmayan genelleştirilmiş sıralı logit modeli çerçevesinde değerlendirilmesi ve çok önemli sonuçların elde edilmesi, mutluluk ekonomisi alanına önemli katkılar sağladığı düşünülmektedir. Ayrıca bu çalışma kapsamında kullanılan modellerin farklı ülkelerden elde edilen veriler bağlamında değerlendirilmesi önerilmektedir.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## THE INFLUENCE OF INTERNET OF BEHAVIOR PARADIGM ON RECENT INNOVATIONS IN DIGITAL MARKETING

### DAVRANIŞLARIN İNTERNETİ PARADİGMASININ DİJİTAL PAZARLAMADAKİ SON YENİLİKLERE ETKİSİ

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#### ABSTRACT

The term Internet of Behaviors (IoB) as a growing trend over the world, is an extension of the Internet of Things (IoT) and Artificial Intelligence (AI). This new paradigm aims to revolutionize the way we interact with the world around us by using valuable data from connected devices to monitor, analyze, and influence human behavior. IoB paradigm attempts to understand the data collected from users' online activity from a behavioral psychology perspective. The concept is based on the idea that every digital interaction of a person with their devices -such as smartphones, smartwatches, other wearables - generates data that can be analyzed in order to create a behavioral profile. Afterwards, this behavioral data can be used to predict and influence the future behavior of a person. It seeks to address how to understand the data and apply this understanding to create valuable services or market new products, all from a human psychology perspective. By incorporating AI into IoB models, marketers can better predict consumer behavior and tailor their marketing efforts accordingly. AI algorithms can analyze vast amounts of data quickly, identifying patterns and trends that humans may not have spotted. This study aims to understand the power of IoB paradigm in digital marketing and how different technologies of IoB can impact the recent tools of digital marketing. We will explore the importance of IoB paradigm in relation to the four leading digital marketing tools: chatbots, interactive content tools, programmatic advertising, and voice search optimization. As the research design on IoB and its implementations in literature is still developing, this study will provide a valuable insights for development of IoB based digital marketing models and also for the stakeholders including businesses, and policymakers.

**Keywords:** Internet of Behaviors, IoB, Digital Marketing, Chatbots, Interactive Content Tools, Programmatic Advertising, Voice Search Optimization, Implications

#### ÖZET

Davranışların İnterneti (Internet of Behaviors, IoB) terimi, dünya çapında büyüyen bir trend olarak, Nesnelerin İnterneti (Internet of Things, IoT) ve Yapay Zekanın (Artificial Intelligence, AI) bir uzantısı olarak tanımlanır. Bu yeni paradigma, insan davranışını izlemek, analiz etmek ve etkilemek için bağlı cihazlardan gelen değerli verileri kullanarak çevremizdeki dünyayla etkileşim biçimimizde devrim yaratmayı amaçlamaktadır. IoB paradigması, kullanıcıların çevrimiçi aktivitelerinden toplanan verilerini davranışsal psikoloji perspektifinden anlamaya çalışır. Konsept, bir kişinin akıllı telefonlar, akıllı saatler ve diğer giyilebilir cihazlar gibi cihazlarıyla her dijital etkileşiminin, davranışsal bir profil oluşturmak için analiz edilebilecek veriler ürettiği fikrine dayanmaktadır. Daha sonra, bu davranışsal veriler, bir kişinin gelecekteki davranışını tahmin etmek ve etkilemek için kullanılabilir. Verilerin nasıl anlaşılacağını ve bu anlayışın değerli hizmetler oluşturmak veya yeni ürünler pazarlamak için nasıl uygulanacağını insan psikolojisi perspektifinden ele almayı amaçlamaktadır. Dijital pazarlama uzmanları, yapay zekayı IoB modellerine dahil ederek tüketici davranışını daha iyi tahmin edebilir ve pazarlama çabalarını buna göre uyarlayabilir. AI algoritmaları, insanların fark etmemiş olabileceği kalıpları ve eğilimleri belirleyerek çok büyük miktarda veriyi hızlı bir şekilde analiz edebilir. Bu çalışma, dijital pazarlamadaki IoB paradigmasının gücünü anlamayı ve IoB'nin farklı teknolojilerinin

dijital pazarlama araçlarını nasıl etkileyebileceğini araştırmayı amaçlamaktadır. IoB paradigmasının önemini, önde gelen dört dijital pazarlama aracı olan sohbet robotları, etkileşimli içerik araçları, programlı reklamcılık ve sesli arama optimizasyonu ile nasıl ilişkilendirdiğini inceleyeceğiz. IoB üzerine araştırma tasarımı ve literatürdeki uygulamaları hala gelişmekte olduğundan, bu çalışma IoB tabanlı dijital pazarlama modellerinin geliştirilmesi ve ayrıca işletmeler ve politika yapımcılar dahil olmak üzere paydaşlar için değerli bilgiler sağlayacaktır.

**Anahtar Kelimeler:** Davranışların İnterneti, IoB, Dijital Pazarlama, Sohbet Robotları, Etkileşimli İçerik Araçları, Programlı Reklamcılık, Sesli Arama Optimizasyonu, Çıkarımlar

## INTRODUCTION

The Internet of Behaviors (IoB) is rapidly becoming a worldwide trend, building upon the foundations of the Internet of Things (IoT) and Artificial Intelligence (AI). This innovative paradigm has the capacity to transform our engagement with the digital world; by using data from interconnected devices, it can track, study, and even influence human behavior (Al-Fuqaha et al., 2015; Elayan et al., 2022; Zhao et al., 2023). IoB distinguishes itself by viewing user information through the lens of behavioral psychology, recognizing that each digital engagement -whether via smartphones, smartwatches, or other wearable technology- produces crucial behavioral data. This data can be utilized to craft detailed behavioral blueprints as behavioral profiles. By peering into these behavioral profiles, IoB endeavors to not only understand past behaviors but also predict and shape future actions (Sun et al., 2023; Zhao et al., 2023). The incorporation of AI into the IoB approach offers particularly striking possibilities for practitioners. With AI algorithms, IoB-driven systems can handle massive amounts of data with incredible speed, and also reveal concealed patterns and trends that frequently go unnoticed by human analysts. It seeks to decipher the complex network of human psychology interconnected with our digital interactions.

IoB paradigm derives its transformative power from diverse technologies that collectively enable the collection, analysis, and utilization of behavioral data (Figure 1). At its core, IoB capitalizes on IoT devices, encompassing sensors, wearables, and smart appliances, to gather data from physical environments and human interactions. Advanced data analytics and machine learning algorithms decipher complex patterns within these datasets, while AI automates decision-making processes and paves the way for predictive insights. Biometric technologies verify users and reveal behavioral indicators linked to physical traits. Location tracking, virtual reality (VR), augmented reality (AR), blockchain, cloud computing and wearable devices all converge to provide a holistic understanding of human behavior (Al-Fuqaha et al., 2015; Afor et al., 2022; Sun et al., 2023). IoB's distinct advantage stems from its capacity to integrate these technologies, providing organizations with a data-driven guide to enhance products, services, marketing approaches, and user experiences, all while maintaining strict privacy and ethical standards.

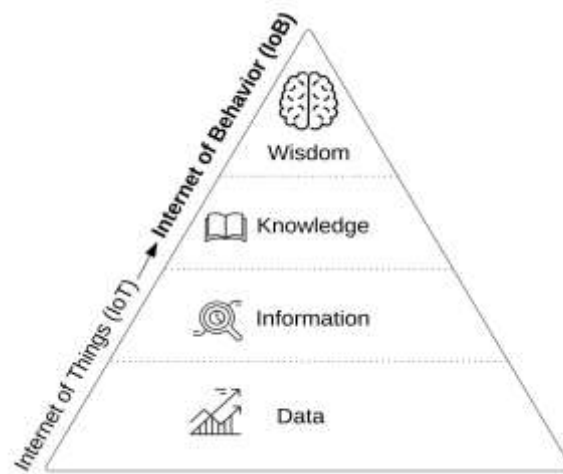


Figure 1: From IoT to IoB (Sun et al., 2023; Zhao et al., 2023)

In this context, this study sets out to explore the value of the IoB paradigm within the world of digital marketing. The main purpose is to highlight the importance of IoB approach in leading digital marketing tools which are particularly chatbots, interactive content tools, programmatic advertising, and voice search optimization; and to understand how IoB paradigm may reshape digital marketing practices, customer engagement, and user experiences in different ways.

## **BACKGROUND**

Digital marketing encompasses a broad range of marketing activities and strategies that leverage digital channels and technologies to promote products, services, or brands to a target audience. It involves online platforms such as websites, social media, email, search engines, and various digital advertising channels to connect with customers, engage with them, and ultimately drive sales or achieve other marketing goals (Gkikas et al., 2019; Saura et al., 2020; Nguyen et al., 2021). Currently, some of the recent and leading tools in digital marketing include: chatbots, interactive content tools, programmatic advertising platforms, and voice search optimization tools (Palos-Sanchez et al., 2019; Nguyen et al., 2021; Omarov et al., 2022; Al-Tuama et al., 2022):

(1) Chatbots are software applications designed to simulate human conversation, either via textual or auditory methods. It can interact with users using pre-defined scripts or more advanced algorithms, and some are enhanced with AI to better understand and respond to user input. AI-driven chatbots are popular in digital marketing in order to facilitate real-time interactions on digital platforms. These tools enable businesses to provide instant, 24/7 responses to customer inquiries, enhancing user experience by streamlining interactions, driving sales, and offering automated customer support, thus reshaping the way brands engage with their audience online.

(2) Interactive content tools are modern digital marketing instruments that allow creators to produce content that requires active engagement from the audience. Examples include quizzes, polls, interactive infographics, and calculators. Such tools are designed to increase user engagement and provide a more immersive experience compared to passive content.

(3) Programmatic advertising platforms refers to the automated buying and selling of online advertising space using software and algorithms. Instead of traditional manual ad buying, programmatic advertising uses machines and algorithms to purchase display space, allowing for real-time auction ad buying, targeting specific audiences, and optimizing based on data-driven decisions. With the help of data-driven insights, these platforms optimize ad relevance and drive higher return on investment for marketers.

(4) Voice search optimization tools are designed to help businesses ensure their content is discoverable through voice searches. With the rise of digital assistants like Amazon's Alexa, Google Assistant, or Apple's Siri, optimizing for voice search has become increasingly important. These tools can help analyze voice search queries, provide insights on voice-friendly keywords, and guide content strategy to align with voice search behaviors. This shift in optimization underscores the evolving user behavior, where verbalizing a query is fast becoming more prevalent than traditional typed searches.

In this study, we seek to provide an in-depth understanding of the dynamic relationship between IoB and digital marketing. The impacts of IoB approach on four popular trending tools are assessed in order to understand the transformative potential of the IoB within the realm of digital marketing. As illustrated in Figure 2, the potential of each digital marketing tool is examined in terms of behavioral data sensing capability and behavioral insights generation. The potential of these marketing tools to act as catalysts in developing IoB-driven digital marketing strategies has been assessed.

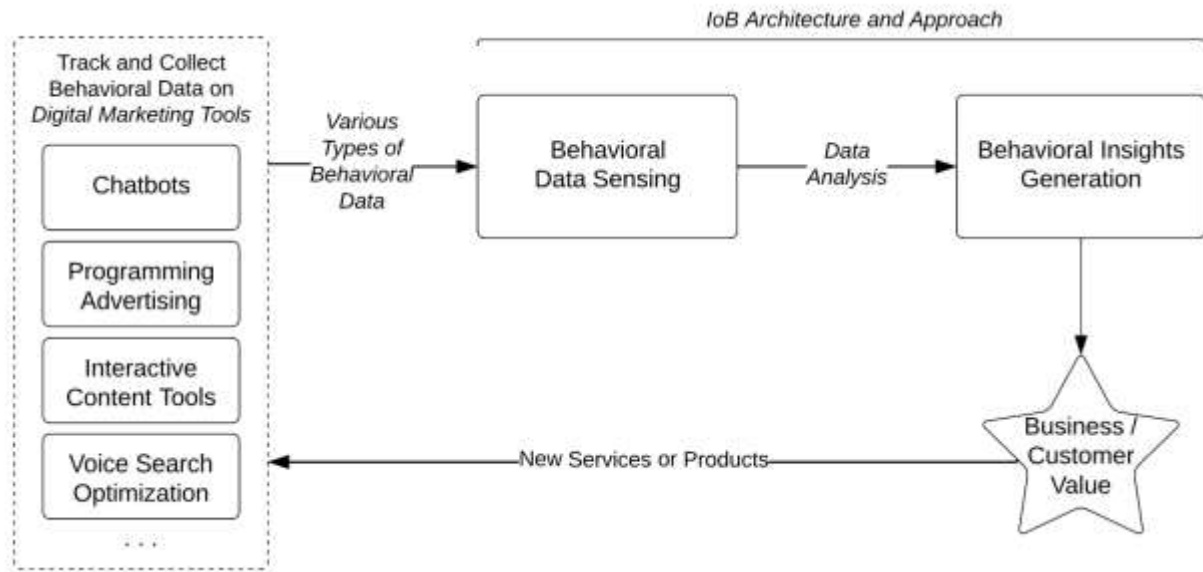


Figure 2: The Potential of IoB-driven Digital Marketing

**FINDINGS**

The integration of IoB with digital marketing world has significant implications, as it enhances marketers' ability to understand, target, and engage with consumers based on their behaviors and preferences. This section assesses the potential of each digital marketing tool to act as a catalyst for the IoB-driven digital marketing.

**Chatbots**

The integration of IoB approach with chatbots offers a promising evolution in user interactions. Table 1 presents some examples of behavioral data and behavioral insights that can be generated by chatbots.

Accordingly, chatbots can act as a part of IoB technology and provide real-time data collection and immediate response based on user behaviors. By harnessing and analyzing behavioral data from users, chatbots can deliver more personalized experiences, understand the user needs in real-time. Such data-driven behavioral insights allow chatbots to respond contextually, predict user queries and adjust their tone based on the user's emotional state. For instance, if a user searches for a specific topic or shows interest in a particular issue frequently, the chatbot can use this behavior data to offer relevant products; if a user shows dissatisfaction after a certain response, the chatbot can adjust its future interactions accordingly.

Furthermore, IoB paradigm can help for a continuous feedback mechanism. As chatbots interact with users, the behavioral data can be fed back into the system, which allows chatbots to constantly refine and improve their interactions. With the use of behavioral data analytics, chatbots can provide an additional layer of security to enhance the user trust and confidence within the system. For instance, if a user's behavior or typing pattern appears different, the chatbot can introduce additional security checks or flag the interaction for review. By incorporating biometric and other advanced IoB technologies, chatbot interactions, especially those involving sensitive information, can be made more secure.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Table 1: IoB Approach on Chatbots with Examples

Behavioral Data	Behavioral Insights	Services for Customers
Text-based conversations	Specific areas of interest, concerns, or knowledge gaps of the user base	Developing knowledge hubs addressing these areas which optimizes online content and directs traffic to that specific content
Interaction frequency	Degree of user dependence on the chatbot, and reliance on the chatbot	Offering loyalty programs or discounts for frequent users, which encourages repeat business and brand loyalty
Interaction duration	User's level of engagement, potentially revealing whether they find conversations satisfying or lacking in depth	Introducing progressive challenges/rewards based on user engagement time
Interaction timing	Patterns about user habits, such as peak activity hours or preferred times to seek information, aiding in targeted service delivery	Providing scheduled promotions or live events during times when users are most active, which enhances click-through rates
Sentiment analysis	Emotional well-being or mood of users, helping in tailoring conversational tone and approach	Providing personalized responses or offers based on detected sentiment; such as offering discounts or solutions when negative sentiment is detected
Clickthrough rates	User preferences and decision-making behavior, indicating which reflects content relevance	Introducing campaigns based on items or services users showed interest in but didn't finalize, which means recapturing potential lost sales
Drop-off points	Specific stages or issues that cause user dissatisfaction or confusion	Introducing a "Save for Later" feature at stages where users tend to drop off, especially in e-commerce platforms, which allows users to quickly mark items of interest

### Interactive Content Tools

By integrating the principles and technologies of IoB approach, interactive content tools can also offer more personalized, data-driven experiences, leading to deeper user engagement and more informed decision-making for marketers. Table 2 presents some examples of behavioral data and behavioral insights that can be generated by interactive content platforms.

Accordingly, interactive content tools, when synergized with the IoB approach, can offer a deep insights into user engagement, preferences, and decision-making patterns. By capturing behavioral data during interactions -such as a user's choices in quizzes or time spent on specific sections- these tools can dynamically adapt content to suit individual preferences. For example, if a user frequently interacts with content related to sustainable products, subsequent content can be used to spotlight eco-friendly choices.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Table 2: IoB Approach on Interactive Content Tools with Examples

Behavioral Data	Behavioral Insights	Services for Customers
User engagement duration	Interest level and depth of engagement with content; how long users engage with content	Introducing personalized, dynamic content suggestions based on the time spent; such as for short engagements, providing concise summaries or infographics; or for long engagements, recommending in-depth articles or videos
High-interest areas	Topics or sections that resonate most with users; identified through choices in quizzes or surveys	Introducing popular topics or sections and creating spin-off content based on them, which drives more traffic to high-engagement areas
Hover and click heatmaps	Visual representations of attraction or interest within the content	Reorganizing content layout based on areas users hover or click on the most; placing ads strategically
Content hotspots	Sections or areas with high user activity	Creating weekly or monthly spotlights or features on these hotspots to attract repeat visits
Areas of confusion	Sections or areas that might be unclear, or too complex; areas with unusual or unexpected interaction patterns	Offering timely help or support options when users seem to be confused or spend too long in one area
Completion rates	Percentage of users who complete the content; overall effectiveness and value of content to the user	Introducing badges, certificates or rewards for users who complete specific content; performing gamification strategies to increase user engagement and interaction
Revisit rates	Frequency of users returning to the content; the lasting impact and relevance of content over time	Rewarding users who frequently return to the platform or purchase products, which drives repeat traffic and potentially increases loyalty

Additionally, integrating blockchain technology can ensure the trustworthiness of this behavioral data and enhance the user confidence. For example, with blockchain integration, each choice made by the user can be securely recorded, ensuring data integrity. Over time, as choices accumulate from various users, the system can recommend products with greater accuracy based on verified, immutable behavior logs. Thus, IoB-driven interactive content not only personalizes user experience but also enhances the transparency and credibility of digital interactions.

### Programmatic Advertising

Incorporating IoB approach into programmatic advertising can provide more precise targeting, optimized ad placements, and enhanced user experiences based on behavioral insights. Similarly, some examples of critical behavioral data and insights that can be generated by programmatic advertising platforms are given in Table 3.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

**October 13-14, 2023**

Table 3: IoB Approach on Programmatic Advertising Platforms with Examples

Behavioral Data	Behavioral Insights	Services for Customers
Ad interactions	Metrics of user engagement, indicating which advertisements resonate with the audience	Introducing personalized ad playlists and showing more of the ads that users have previously engaged
Browsing patterns	User navigation behavior, showing preferred content or sites and the typical order of their browsing	Performing selected content suggestions based on previous browsing patterns; offering products, or videos related to the sites they frequent
Engagement metrics	Depth of user interaction, including how long users view ads and the actions they take post-click	Providing adaptive ad durations, where ads can be shortened or extended based on how long users typically engage with similar content
Peak interaction times	Hours or times when users are most active, aiding in optimal ad delivery scheduling	Scheduling premium content or special offers during peak times
Interactions with sponsored content	Engagement levels with paid advertisements, indicating the effectiveness of specific sponsored content placements	Offering loyalty rewards or discounts for users who frequently engage with sponsored content; encouraging further interaction

By integrating programmatic advertising metrics and insights with IoB approach, these platforms can reach and interpret a richer set of behavioral data. For instance, if a user's smartwatch reports frequent visits to a gym and their smart home system indicates a preference for cooking healthy meals, programmatic advertising platforms, enhanced by IoB technologies, can understand the user's inclination towards a healthy lifestyle. Consequently, the user might be targeted with ads for fitness equipment, organic food products, or wellness apps, ensuring that the advertisements are not only contextually relevant but also aligned with their real-world behaviors and preferences.

This precision in targeting ensures also higher conversion rates and better ROI for advertisers. Marketers can achieve a structured understanding, allowing for more effective strategy formulation and campaign adjustments. Behavioral data collected from user interactions allows advertisers to more accurately define their target audiences and optimize targeting strategies.

### **Voice Search Optimization**

By integrating the principles and technologies of IoB, voice search optimization tools can better predict search intentions and deliver more personalized and relevant search results. In Table 4, some examples of behavioral data and behavioral insights that can be generated by voice search optimization tools are presented.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Table 4: IoB Approach on Voice Search Optimization with Examples

Behavioral Data	Behavioral Insights	Services for Customers
Voice search queries	Preferences in search terms, commonly asked questions, topics of interest	Developing content that aligns with the most frequently used search terms or address common questions
Time and day of voice searches	Peak times for user activity, days when users are most active	Performing ad campaigns during peak search times for increased visibility
Emotional tone during search	Mood-based search intent, emotion-driven needs	Providing ads tailored to detected emotions, such as relaxation ads during stressed voice tones.
Duration of interaction	Engagement levels, topics of high interest to users	Providing marketing strategies based on which topics/content keep users engaged the longest
Voice commanded purchases	Purchasing habits, product preferences of users	Suggesting related products and discounts based on past voice-commanded purchases
Location during voice search	Geo-specific interests, local needs or queries of users	Providing location-specific ads or promotions

For digital marketers, IoB integrated with voice search optimization tools can provide valuable insights from customers behavior and hyper-personalized marketing strategies. This integration offers detailed and accurate data, and also pave the way for truly personalized marketing strategies. For instance, a user's emotional tone during a voice search can be an indicator of their buying intent. If they sound stressed, they might be looking for immediate solutions or comfort products. IoB insights into user interactions with voice platforms can refine the voice shopping experience. Such a personalization can improve user experience and boost engagement.

Furthermore, using contextual data like geolocation and user activity, IoB approach helps voice search algorithms offer more relevant results tailored to the user's current situation. Based on a user's past behaviors, IoB can customize voice search results, presenting answers more aligned with individual preferences. With geolocation and behavioral patterns, IoB enables voice search to better prioritize local results pertinent to the user's context. Also, voice biometrics, an aspect of IoB, can ensure user identity verification during voice interactions which can enhance security of systems.

## CONCLUSION

Within the rapidly evolving landscape of digital marketing, the IoB paradigm emerges as one of the most promising innovations. As consumer behaviors and preferences grow more integrated with digital interactions, IoB emerges as a powerful approach for marketers seeking to connect with their audiences on a deeper level. IoB harnesses data-driven insights from user behaviors, to not only understand the present but also predict and influence future actions. Its importance in digital marketing lies in its ability to offer a more profound understanding of customers, enabling businesses to develop highly personalized marketing strategies, deliver more relevant content, and enhance the overall customer experience.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

In this study, the potential of leading digital marketing tools (i.e., chatbots, interactive content tools, programmatic advertising platforms, and voice search optimization tools) to act as catalysts for the IoB-driven digital marketing is examined in terms of behavioral data sensing capability and behavioral insights generation. It is obvious that marketers can make behavioral data-driven decisions, optimize their strategies, and create more engaging and effective campaigns that align with the behaviors and preferences of their target audience by using IoB principles. Some potential research issues are defined as well which can serve as a foundation for extensive studies for the evolving nature of IoB-driven digital marketing:

- How will the integration of IoB into digital marketing tools and platforms influence user data confidentiality and privacy?
- What are the ethical concerns and how can they be addressed?
- With the increased flow of behavioral data, what security measures need to be in place to protect user data from breaches on digital marketing platforms?
- How do consumers perceive and accept IoB-driven digital marketing?
- Are there concerns about over-personalization?
- As the role of IoB expands in digital marketing, what regulations might govern its use, and how will marketers ensure compliance?

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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TÜKETİCİ KIBRİ ve DEMOGRAFİK DEĞİŞKENLERE GÖRE İNCELENMESİ  
INVESTIGATION OF CONSUMER ARROGANCE AND DEMOGRAPHIC VARIABLES

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**ÖZET**

Kibir, tüketicilerin kendilerini diğerlerinden üstün görme olarak açıklanabilen bir kişilik özelliğidir. Kibirli tüketiciler; narsist özellikler taşırlar, kendilerini çok severler, fiziksel görünüşe önem verirler ve başarı odaklı yaşarlar. Bu özellikler, satın alma davranışına da yansımaktadır. Tüketici kibri olarak tanımlanabilecek bu eğilim, satın alınan ürünlerle kendilerini üstün gösterme çabası olarak tanımlanabilir. Kibirli tüketiciler, satın aldıkları ürünlerle bir bağ kurmaktadır. Onlara göre satın alınan ürünler, statü veya prestij gibi sembolik anlamlarla diğer tüketicilere karşı üstünlük sağlamaktadır. Her ne kadar olumsuz bir kişilik özelliği olsa da kibirli tüketiciler işletmeler için hedef kitle haline dönüşebilir. İşletmeler, tüketici kibrini kendi lehlerine kullanarak müşteri yaratabilirler. Ayrıca tüketici profilinin tüm yönleriyle değerlendirilmesi tüketici odaklı pazarlama anlayışının bir gerekliliğidir. Dolayısıyla bu çalışma tüketici kibrinin demografik değişkenlere nasıl farklılaştığını ele alarak kibirli müşteri profilinin daha spesifik değerlendirilebilmesini hedeflemektedir. Bu amaçla, 713 tüketiciye anket uygulanmıştır. T testi, 2 gruplu demografik değişkenlerin analizinde kullanılırken ANOVA gruplu değişkenlerin analizinde kullanılmıştır. Analiz sonuçlarına göre tüketici kibri, yaş ve medeni duruma göre farklılık göstermektedir. Genç yaşta tüketicilerin ve evli tüketicilerin tüketici kibri puanları daha yüksektir. Tüketici kibri, pazarlama literatüründe çok yeni bir kavramdır ve yapılan araştırmaların sınırlı sayıda olduğu görülmektedir. Ayrıca tüketici kibrinin demografik değişkenlerle ilişkisinin değerlendirildiği bir çalışmaya rastlanılmamıştır. Bu özellikleriyle bu çalışma ilgili literatüre katkıda bulunmakta ve işletmelere çeşitli öneriler geliştirmektedir.

Anahtar Kelimeler: Kibir, Tüketici kibri, Demografik değişkenler.

**ABSTRACT**

Arrogance is a personality trait that can be explained by consumers perceiving themselves as superior to others. Arrogant consumers, who have narcissistic characteristics, love themselves very much, give importance to physical appearance, and live in a success-oriented manner. These characteristics are also reflected in the purchasing behavior. This tendency, which can be defined as consumer arrogance, can be defined as an effort to show oneself superiority through purchased products. Arrogant consumers form bonds with products they buy. According to them, products purchased are superior to other consumers with symbolic meanings, such as status or prestige. Although arrogant consumers have a negative personality trait, they can become target audiences for businesses. Businesses can create consumers by using consumer arrogance to their advantages. In addition, evaluating consumer profiles in all aspects is a requirement for a consumer-oriented marketing approach. Therefore, this study aims to evaluate arrogant consumers profiles more specifically by considering how consumer arrogance differs according to demographic variables. A questionnaire was administered to 713 consumers. The t-test was used to analyze demographic variables between the two groups, while ANOVA was used to analyze more group variables. According to the analysis results, consumer arrogance differs according to age and marital status. Younger and married consumers had higher arrogance scores. Consumer arrogance is a very new concept in the marketing literature, and it seems that the research is limited. In addition, no study has evaluated the relationship between consumer arrogance and the demographic variables. With these features, this study contributes to the relevant literature and develops various business suggestions.

**Keywords:** Arrogance, Consumer arrogance, Demographic variables.

## **GİRİŞ**

Tüketim, günümüzde kendini tanımlama ve ifade etme şeklinde dönüşmüştür. Sosyal medya ve internet gibi araçların kullanımının yaygınlaşmasıyla birlikte başkalarıyla etkileşimin en yüksek düzeyde olduğu şu günlerde, diğerlerinden farklı olma veya kendisi gibi olanlarla benzer tüketim alışkanlıkları sergileme eğilimi dikkat çekmektedir. Kendilerini başkalarından üstün gören tüketicilerin böylesi bir dönemde, diğerlerinden farklı ve üstün olduklarını gösterme veya kendilerine denk bulduğu diğer tüketicilerle benzer olduklarını kanıtlama çabalarının tüketime yansması olağan bir süreçtir. Bu süreç, birçok faktörden etkilenmekte ve işletmelerin pazarlama stratejilerine ilham kaynağı olmaktadır.

Tüketicilerin satın alma kararlarını yaş, medeni durum, cinsiyet, gelir ve eğitim düzeyi gibi demografik değişkenlerin yanı sıra (Tekvar, 2016; Gümüş, 2019) tüketicilerin kişilik özellikleri (Buluk ve Erdem, 2021), psikolojileri (Cisek vd., 2014) veya yaşam tarzları (Özden, 2019) gibi faktörler etkilenmektedir. Tüketim davranışını etkileyen her bir faktörün tespiti, tüketici odaklı pazarlama stratejilerinin geliştirilmesi açısından elzem bir konudur. Bu nedenle tüketicilerin satın alma kararlarını etkileyen spesifik özelliklerin daha derinlikli incelenmesi gerekmektedir. Kibir, bu spesifik özelliklerden biridir ve pazarlama literatüründe bu kavramın çok sınırlı bir şekilde ele alındığı görülmektedir (Ruvio vd., 2007).

Türk Dil Kurumu kibir kavramını “kendini başkalarından üstün tutma; benlik, böbürlenme, gurur” şeklinde tanımlamaktadır (TDK, 2023). Kibir, hem toplumsal normlarda hem de dini inançlarda tasvip edilmeyen bir kişilik özelliğidir. Örneğin kibir, İslam inancında Şeytani bir tavır olarak görülmektedir (Özkan, 2022). Benzer şekilde Hristiyan inancında kibir, yedi büyük günahın bir tanesidir (Güngör, 2014). Nitekim insanın kendisini aşırı beğenmesi ve sevmesi, başkalarından üstün olduğuna ve bu anlamda her şeyin merkezinde olması gerektiğine inanması bencilliğin bir göstergesidir. Bu özellikleri nedeniyle kibir, tüketici davranışının karanlık yüzü olarak görülmektedir (Dootson vd., 2017; Hirschmann, 1991). Örneğin Bozacı vd. (2018), satış elemanlarının tükenmişlikleri ve işten ayrılma gerekçelerinde kibirli yöneticilerin önemli bir payı olduğunu göstermişlerdir. Kibirli bireylerin davranışları tüketim alışkanlıklarına da yansımaktadır. Kibirli tüketiciler, kendi hayatlarına odaklı yaşamaktadırlar ve başkalarının ilgisine ve onayına ihtiyaç duyabilmektedirler (Ülker, 2021). Narsizm gibi bir kişilik bozukluğu olan tüketicilerde; kibir, üstünlük kurma çabası veya kendini mükemmel görme gibi davranışlar gözlenmektedir (Kubarych vd., 2004) ve kibir, narsizmin bir boyutudur (Lewis, 2000). Awad ve Youn (2018), narsist tüketicilerin kibirli markalara karşı daha olumlu tutumlara sahip olduklarını tespit etmişlerdir.

Sonuç olarak kibir olumsuz bir kişilik özelliği olsa da tüketici profiline bir parçasıdır. Bu anlamda pazarlamanın ilgi alanına girmektedir. İşletmeler, pazarlama stratejilerini geliştirirken her türlü tüketici profiline dikkate almalıdırlar. Nitekim olumsuz bir kişilik özelliği, işletmeler için fark yaratan bir avantaja dönüşebilir. Örneğin kibirli tüketicilerin diğerlerinden daha iyi olma arzuları, ürünlerini satın alan işletmeler için etkili bir reklam unsuruna dönüşebilir (Ruvio ve Shoham, 2016). Bu müşteriler, satın aldıklarıyla böbürlenmeyi sevdiklerinden iyi birer referans olabilirler. Ancak kibirli iletişimin olumsuz içeriği diğer tüketicilerde antipatik duygular da yaratabilir (Ruvio vd., 2007). Örneğin, reklamlarda kibir kullanımı, tüketicinin markayla önceki deneyimlerine bağlı olarak tutumlar üzerinde zıt etkilere sahip olabilmektedir (Brown, 2012). Bu nedenle işletmeler önlem almak zorunda da kalabilirler. Tüketiciler kibirli markaları yüksek statü ve kaliteyi yansıttığı için takdir etse de, kibir tüketicileri aşağılık hissettirebilir (Munichor ve Steinhart, 2016). Farklı bir bakış açısıyla bu tüketiciler “farklı ve özel” olma mesajlarına daha duyarlı olduklarından isabetli bir hedef kitlesi pozisyonunda da olabilirler (Ruvio ve Shoham, 2016). Sonuç olarak işletmelerin hedef kitlelerini tanımaları, stratejilerini müşteri odaklı düzenleyebilmeleri ve tutundurma çalışmalarını daha etkili yapabilmeleri için kibirli tüketici profiline tanımaları gerekmektedir. Halbuki tüketici kibri pazarlama literatüründe yeteri kadar araştırılmamıştır (Nanda ve Coulter, 2018). Bu çalışma, kibirli tüketici profiline demografik değişkenler açısından ele alarak ilgili literatürde boşluğu doldurmada ve ilgili literatüre katkı sağlamaktadır.

## **KAVRAMSAL ÇERÇEVE**

### **Tüketici Kibri**

Kibir, bir kişilik özelliğidir (Ruvio ve Shoham, 2016; Trumbull, 2010). Ancak onaylanan bir kişilik özelliği değildir. Nitekim kibir; bencillik, narsizm, kendini üstün görme veya ukalalık gibi olumsuz



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

kişilik özellikleriyle birlikte anılmaktadır. Tüketici kibri ise tüketicilerin satın aldıkları ürünler aracılığıyla sosyal üstünlüklerini gösterme eğilimi olarak tanımlanmaktadır (Ruvio ve Shoham, 2016). Bu bağlamda değerlendirildiğinde tüketici kibri, kendini başkalarından üstün görme ve böbürlenme gibi kişilik özelliklerinin tüketime yansması olarak ele alınabilir. Kibirli tüketiciler, satın aldıkları ürünler ile kendileri arasında ilişki kurmaktadır (Hayward ve Hambrick, 1997). Bu bakış açısında satın alınan ürünün kalitesi, değeri veya herhangi bir üstün özelliği, o ürünü satın alanı da benzer şekilde diğerlerinden üstün kılmaktadır. Böylece kibirli tüketiciler satın aldıkları ürüne; bir sosyal statü, prestij veya bunlar gibi üst düzey çeşitli sembolik değerler katmaktadır. Kibirli tüketiciler, satın aldıkları ile benlikleri arasında bir bağ kurarak ürün kalitesi ile kendi üstün özellikleri arasında doğrudan bir bağ kurmaktadır (Verbeke vd., 2004).

Tüketici kibrinin, kişinin fiziksel görünümüne ve başarı yönüne dair iki boyutu bulunmaktadır ve her ikisi içinde böbürlenmeyi veya endişe etmeyi içermektedir (Netemeyer vd., 1995; Karapınar ve Dursun, 2021). Fiziksel olarak çekicilik ve başarılı olma durumları, kibirli tüketiciler için bir üstünlük belirtisidir. İş hayatında başarılı olmak, bu başarıları odak noktası haline getirmek ve başarılarla böbürlenmek kibirli bireylerin özellikleri arasındadır. Bunlar, kibirli tüketiciler için aynı zamanda toplumda prestijli bireyler olmanın ve takdir edilmenin kaynaklarıdır.

Dolayısıyla kibirli tüketiciler fiziksel görünümü veya başarılarıyla ilgili ya kendilerini fazla değerli bulurlar ya da yetersiz bulurlar. Kibirli tüketiciler üstün oldukları inancıyla lüks tüketime yönelebilirler (Aksoy ve Çıkmaz, 2022). Uz (2022) yapmış olduğu çalışmada, kibir duygusunun lüks marka satın alma niyeti üzerinde olumlu bir etkisi olduğunu tespit etmiştir. Veyahut kibirli tüketiciler, kendilerini yetersiz buldukları için satın aldıkları ürünlerle eksik yönlerini tamamlama veya gizleme kaygısıyla gösterişli ürünler satın alabilirler. Örneğin Johnson vd. (2010), kibirli tüketicilerin yetersizliklerini gizlemek için kibirli davrandıklarını belirtmektedirler. Bu tüketiciler için üstün olma duygusu o kadar önemlidir ki, düşük kalitede veya pahada değersiz ürünleri satın alanlar da düşük karakterde bireylerdir (Aksoy ve Çıkmaz, 2022). Bu tüketiciler, kendilerini o kadar üstün görürler ki kendilerini bir kanaat önderi veya pazar uzmanı olarak algılayabilirler ve “en iyisini ben bilirim” inancına sıkı sıkıya inanabilirler (Ruvio ve Shoham, 2016).

Ruvio vd., 2007 yılında tüketici kibri üzerine çalışmışlar ve beş boyutlu bir yapı elde etmişlerdir. Bu boyutlar, markayla kendini kanıtlama, teşhirciliğe dayalı satın alma, “en iyisini ben bilirim” zihniyeti, gösteriş temelli satın alma, satın alma üstünlüğü ve gereksiz satın alma olarak isimlendirmişlerdir. Ruvio ve Shoham (2016) sonraki yıllarda yaptıkları çalışmada tüketici kibri dört boyutlu olarak tanımlamışlardır. Bu boyutlar, imaj temelli tüketim, gösteriş temelli satın alma, tüketici övünmesi, tüketici üstünlüğü şeklindedir. İmaj temelli tüketim, bilinen markaların tercih edildiği, eğlenceli ve kaliteli tüketimin tercih edilmesidir. Gösteriş temelli tüketim, satın alınan ürünlerle gösteriş yapmak hedeflenmektedir. Tüketici övünmesi, tüketimdeki başarıların üstünlüğünü diğer tüketicilere sözlü olarak ifade edilmesidir. Tüketici üstünlüğü, daha iyi mal veya mülk edinme amacıyla tüketim yaparak diğerlerinden üstün olma inancını ifade etmektedir.

Tüketici kibri üzerine çalışan bir başka araştırmacı grubu Ansaripur vd. (2020)'dir. Bu araştırmacılar, tüketici kibrinin; imaja dayalı tüketim, teşhirciliğe dayalı tüketim, tüketici böbürlenmesi, tüketici üstünlüğü ve benzersizlik ihtiyacı dâhil olmak üzere beş boyutu olduğunu belirtmektedirler. İlk dört boyut, bu alanda daha önce yapılan araştırmalarla tutarlıdır ancak benzersizlik ihtiyacı bu araştırmacılar tarafından tüketici kibri boyutlarına eklenmiştir (Ansaripur vd., 2020). Bu boyut, insanların ürünlerinin ve mülklerinin benzersizliği ve münhasırlığı hakkında konuştuğu benzersiz olma ihtiyacıdır (Ansaripur vd., 2020).

İlgili literatürde tüketici kibri ile ilgili sınırlı araştırma olduğu görülmektedir. Kibirle ilgili yapılan araştırmalarda genellikle lüks veya gösterişçi tüketim ve materyalizm gibi kibirli tüketicilerin satın alma kararları üzerine odaklanıldığı görülmektedir. Gelibolu ve Balıkcıoğlu (2021) yapmış oldukları araştırmada, tüketici kibrinin yaşam tatmini arttırdığını ve materyalizmin yaşam tatmini üzerindeki etkisinin artmasına neden olduğunu tespit etmişlerdir. Balıkcıoğlu ve Arslan (2019) ise tüketici kibrinin yaşam tatmini üzerinde olumlu etkisi olduğunu göstermişlerdir. Aksoy ve Çıkmaz (2002), tüketici kibri üzerine yaptıkları araştırmada, kibirli tüketicilerin lüks moda ürünleri satın alma eğiliminde olduklarını

tespit etmişlerdir. Benzer şekilde Sedikides vd. (2007), kibirli tüketicilerin lüks moda alışverişi yaparak özgüvenlerini tatmin etme eğiliminde olduklarını ortaya koymuşlardır.

Ruvio vd. (2020), tüketici kibrinin yeterinde araştırılmadığını, tüketicilerin çoğu olumlu ağızdan ağza iletişim kurarken, kibirli tüketicilerin hem olumlu hem de olumsuz ağızdan ağza iletişimi beslediklerini tespit etmişlerdir. Pandari ve Monfared (2022), tüketici kibrinin görünüş ve özgünlük bileşenlerinde pozitif etkili olduğunu göstermişlerdir. Şenyüz ve Hasford (2022), ilişki kurma güdüsü olan tüketicilerin, pazarlama mesajlarında kibir vurgusu yapan ürünlere ve markalara karşı daha olumlu tutumlara ve daha yüksek satın alma niyetlerine sahip olduklarını göstermişlerdir.

Yapılmış araştırmalardan da görüldüğü gibi tüketici kibri, pazarlama literatüründe çok yeni bir kavramdır ve bu konu ile ilgili yapılmış çalışmalar sınırlı kalmaktadır. Bu nedenle tüketici kibri üzerine yapılmış araştırmaların çoğaltılması ve kibirli tüketici davranışının çeşitli değişkenlerle ele alınarak çok yönlü bir şekilde değerlendirilmesi gerekmektedir.

### ARAŞTIRMANIN YÖNTEMİ

#### Araştırmanın Amacı

Bu çalışmanın amacı, tüketici kibrinin demografik değişkenlere göre nasıl farklılaştığını ortaya koyarak ilgili literatüre katkıda bulunmak ve işletmelere öneriler geliştirmektir.

#### Araştırmanın Önemi

İşletmeler, kibirli tüketicileri tespit ederek sosyal medya gibi araçlarla ürünlerinin övülmesini destekleyebilirler (Ruvio ve Shoham, 2016). Bu bağlamda kibir, olumsuz bir kişilik özelliği iken işletmelerin olumlu bir pazarlama stratejisi geliştirmelerine yardımcı olan bir araç haline dönüşebilir. Aynı zamanda tüketici kibri, işletmeler için olumsuz sonuçlar da doğurabilir. Nitekim Ruvio vd. (2020), tüketici kibrinin olumsuz ağızdan ağza iletişimi beslediğini göstermiştir. Bu nedenlerle tüketici kibrinin demografik değişkenlerle ilişkisi tespit edilerek, hangi tüketici profiline daha çok kibirli olma eğiliminde olduğunun tespit edilmesinin önemli olduğu düşünülmektedir. Böylece hedef kitlelere çok daha kolay ulaşılabilir. İlgili literatürde tüketici kibrinin yeteri kadar ele alınmadığı görülmektedir ve tüketici kibrinin demografik değişkenlerle ilişkisine dair bir araştırmaya rastlanılmamıştır. Bu çalışma, ele aldığı konu itibarıyla ilgili literatüre katkıda bulunmaktadır. Aynı zamanda bu çalışma, işletmelere çeşitli öneriler sunarak yönetsel katkılar sağlaması açısından önem taşımaktadır.

#### Araştırmanın Hipotezleri

Chang vd. (2008), gelir düzeyi yüksek genç tüketicilerin fiziksel anlamda daha kibirli bir yapıda olduklarını belirtmektedirler. Workman ve Lee (2012) ise fiziksel görünüşleriyle ilgili kibirli genç tüketicilerde marka duyarlılığı olduğunu tespit etmişlerdir. Bu bağlamda araştırma kapsamında aşağıdaki hipotezler geliştirilmiştir:

H1. Tüketici kibri boyutları, tüketicilerin cinsiyetlerine göre farklılık göstermektedir.

H1a. İmaj temelli tüketim, tüketicilerin cinsiyetlerine göre farklılık göstermektedir.

H1b. Gösteriş temelli satın alma, tüketicilerin cinsiyetlerine göre farklılık göstermektedir.

H1c. Tüketici övünmesi, tüketicilerin cinsiyetlerine göre farklılık göstermektedir.

H1d. Tüketici üstünlüğü, tüketicilerin cinsiyetlerine göre farklılık göstermektedir.

H2. Tüketici kibri boyutları, tüketicilerin yaşlarına göre farklılık göstermektedir.

H2a. İmaj temelli tüketim, tüketicilerin yaşlarına göre farklılık göstermektedir.

H2b. Gösteriş temelli satın alma, tüketicilerin yaşlarına göre farklılık göstermektedir.

H2c. Tüketici övünmesi, tüketicilerin yaşlarına göre farklılık göstermektedir.

H2d. Tüketici üstünlüğü, tüketicilerin yaşlarına göre farklılık göstermektedir.

H3. Tüketici kibri, tüketicilerin eğitim düzeylerine göre farklılık göstermektedir.

H3a. İmaj temelli tüketim, tüketicilerin eğitim düzeylerine göre farklılık göstermektedir.

H3b. Gösteriş temelli satın alma, tüketicilerin eğitim düzeylerine göre farklılık göstermektedir.

H3c. Tüketici övünmesi, tüketicilerin eğitim düzeylerine göre farklılık göstermektedir.

H3d. Tüketici üstünlüğü, tüketicilerin eğitim düzeylerine göre farklılık göstermektedir.

H4. Tüketici kibri boyutları, tüketicilerin gelir düzeylerine göre farklılık göstermektedir.

H4a. İmaj temelli tüketim, tüketicilerin gelir düzeylerine göre farklılık göstermektedir.

H4b. Gösteriş temelli satın alma, tüketicilerin gelir düzeylerine göre farklılık göstermektedir.

H4c. Tüketici övünmesi, tüketicilerin gelir düzeylerine göre farklılık göstermektedir.

H4d. Tüketici üstünlüğü, tüketicilerin gelir düzeylerine göre farklılık göstermektedir.

H5. Tüketici kibri, tüketicilerin medeni durumlarına göre farklılık göstermektedir.

H5a. İmaj temelli tüketim, tüketicilerin medeni durumlarına göre farklılık göstermektedir.

H5b. Gösteriş temelli satın alma, tüketicilerin medeni durumlarına göre farklılık göstermektedir.

H5c. Tüketici övünmesi, tüketicilerin medeni durumlarına göre farklılık göstermektedir.

H5d. Tüketici üstünlüğü, tüketicilerin medeni durumlarına göre farklılık göstermektedir.

#### **Araştırmanın Örnekleme**

Araştırmanın katılımcılarını 18 yaşından büyük tüketiciler oluşturmaktadır. Araştırmanın örnekleme, kolayda örnekleme yöntemi ile belirlenmiştir. Anketler, Ankara ve Samsun'da yüz yüze, dijital platformlarda ise (sosyal medya ve online sohbet ortamları) online olarak uygulanmıştır. 2023 yılının Nisan ve Ağustos ayları arasında uygulanan anketlere 713 tüketicinin katıldığı görülmüştür. Örnekleme büyüklüğünün %95 güven düzeyinde yeterli olduğu anlaşılmıştır (Cohen vd., 2005). Katılımcılara araştırmanın amacı ve araştırmacılar hakkında bilgi verilerek onam formu alınmıştır.

#### **Veri Toplama Yöntemi ve Aracı**

Bu çalışmada, anket yöntemi kullanılacaktır. Anket iki bölümden oluşmaktadır. İlk bölümde Balıkcıoğlu ve Arslan (2019) tarafından "Tüketici Kibri Ölçeğinin Türkiye ve Romanya'da Çapraz Kültürel Geçerliliği" adlı çalışmadan uyarlanan Tüketici Kibri Ölçeği yer almaktadır. Ölçek 16 ifadeden ve dört faktörden oluşmaktadır. Bu faktörler; imaj temelli tüketim, gösteriş temelli satın alma, tüketici övünmesi ve tüketici üstünlüğü şeklindedir. Ölçekte 5'li Likert tipi ölçek kullanılmıştır (1-Kesinlikle Katılmıyorum - 5-Kesinlikle Katılıyorum). Anketin ikinci bölümü tüketicilerin demografik bilgilerine yönelik sorulardan oluşmaktadır. Bu sorular; cinsiyet, yaş, eğitim düzeyi, gelir düzeyi ve medeni durum özelliklerini içermektedir.

#### **Verilerin Analizi**

Verilerin analizi SPSS 24.0 ile yapılmıştır. Ölçek puanları hesaplanan veri analizi sürecinde verilerin normal dağılım gösterdiği basıklık ve çarpıklık katsayıları ile belirlenmiştir. Ölçeklerden elde edilen basıklık ve çarpıklık değerlerinin +3 ile -3 arasında olması normal dağılım için yeterli görülmektedir (Hopkins ve Weeks, 1990). Normal dağılım gösterdiği belirlenen verilerde iki gruplu değişkenler t testi ile ikiden fazla gruplu değişkenler için ANOVA testi kullanılmıştır.

#### **BULGULAR**

Öncelikle ölçeğin güvenirlik analizi yapılmıştır. Güvenirlik analiz sonuçları Tablo 1'de sunulmuştur.

**Tablo 1.** Tüketici Kibri Ölçeği Güvenirlik Analizi

Cronbach's Alpha	Soru sayısı
0,805	16

Cronbach's alfa katsayısı ölçeğin güvenirlik düzeyini vermektedir. Katsayı 0 ile 1 arasında değişmektedir. Alfa ( $\alpha$ ) katsayısına bağlı olarak ölçeğin güvenilirliği şu şekilde yorumlanmaktadır (Nunnally, 1967):

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- $.00 \leq \alpha < .40$  ise ölçek güvenilir değildir
- $.40 \leq \alpha < .60$  ise ölçeğin güvenilirliği düşük
- $.60 \leq \alpha < .80$  ise ölçek oldukça güvenilir
- $.80 \leq \alpha < 1.00$  ise ölçek yüksek derecede güvenilir bir ölçektir.

Tablo 1'e göre Tüketici Kibri Ölçeği, yüksek derecede güvenilir bir ölçektir.

Ölçeğin çarpıklık ve basıklık değerleri Tablo 2'de sunulmuştur.

**Tablo 2.** Basıklık ve Çarpıklık Değerleri

	n	Çarpıklık	Basıklık
İmaj Temelli Tüketim	713	0,113	-1,481
Gösteriş Temelli Satın Alma	713	0,405	-0,863
Tüketici Övünmesi	713	-0,147	-0,528
Tüketici Üstünlüğü	713	0,049	-1,104
Tüketici Kibri Ölçeği	713	0,315	-0,368

Tablo 2'ye göre değerler incelendiğinde her bir puanın basıklık ve çarpıklık katsayılarının -3 ile +3 arasında olduğu görülmektedir. Puanların normal dağılım göstermesi nedeni ile çalışmada parametrik test teknikleri kullanılmıştır.

Ölçek puanının tanımlayıcı istatistiği Tablo 3'te sunulmuştur.

**Tablo 3.** Ölçek Puanlarının Tanımlayıcı İstatistikleri

	n	Minimum	Maximum	X	ss
İmaj Temelli Tüketim	713	4,00	20,00	11,51	5,40
Gösteriş Temelli Satın Alma	713	4,00	20,00	10,48	4,51
Tüketici Övünmesi	713	4,00	20,00	11,03	3,52
Tüketici Üstünlüğü	713	4,00	20,00	12,52	4,75
Tüketici Kibri Ölçeği	713	19,00	75,00	45,55	12,52

Katılımcıların demografik özellikleri Tablo 4'teki gibidir.

**Tablo 4.** Demografik Özelliklere Yönelik Dağılımı

	n	%	
1. Yaş	18-28 yaş arası	179	25,1
	29-39 yaş arası	197	27,6
	40-50 yaş arası	219	30,7
	51 yaş ve üzeri	118	16,5
2. Cinsiyet	Kadın	396	55,5
	Erkek	317	44,5
3. Eğitim düzeyi	İlköğretim	84	11,8
	Lise	143	20,1
	Ön Lisans	172	24,1
	Lisans	165	23,1
	Yüksek Lisans	79	11,1
	Doktora	70	9,8
4. Gelir düzeyi	Asgari ücretten az	169	23,7
	11.402 - 17.500	170	23,8
	17.501-22.500 TL	161	22,6
	22.501-27.500 TL	131	18,4
	27.501 TL üzeri	82	11,5
5. Medeni durum	Evli	411	57,6
	Bekâr	302	42,4

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Tablo 4'e göre katılımcıların yaş aralıklarına göre dağılımı şu şekildedir: Bulgulara göre, katılımcıların çoğunluğu 40 yaş ve altında yer almaktadır. Katılımcıların çoğunluğunu kadınlar oluşturmaktadır. Bulgulara göre, katılımcıların çoğunluğu orta ve üst düzeyde eğitim almıştır. Katılımcıların çoğunluğu orta düzeyde gelire sahip olup, asgari ücretin altında olanlar da önemli bir oranı temsil etmektedir. Evli katılımcıların oranı %57.6 iken bekâr katılımcıların oranı %42.4 olarak belirlenmiştir. Bulgulara göre, katılımcıların çoğunluğu evlidir.

Katılımcıların tüketici kibri düzeylerinin cinsiyetlerine göre farklılıklarına ilişkin veriler Tablo 5'te sunulmuştur.

**Tablo 5.** Tüketici Kibrinin Cinsiyete Göre Farklılıkları

		n	X	ss	t	p
İmaj Temelli Tüketim	Kadın	396	12,09	5,49	3,215	0,001*
	Erkek	317	10,79	5,21		
Gösteriş Temelli Satın Alma	Kadın	396	10,65	4,81	1,148	0,252
	Erkek	317	10,27	4,09		
Tüketici Övünmesi	Kadın	396	10,85	3,93	-1,608	0,108
	Erkek	317	11,26	2,93		
Tüketici Üstünlüğü	Kadın	396	12,33	4,82	-1,200	0,231
	Erkek	317	12,76	4,66		

\*p<0,05 : t test

Tablo 5'e göre imaj temelli tüketim p değerleri 0.05'ten küçüktür ( $p < 0.05$ ). Bu durum, kadınlar ve erkekler arasında anlamlı farklar olduğunu gösterir. İmaj temelli tüketim, kadınlarda erkeklere göre daha yüksek ortalama değerlere sahiptirler. Diğer taraftan, gösteriş temelli satın alma, tüketici övünmesi ve tüketici üstünlüğü için p değerleri 0.05'ten büyüktür ( $p > 0.05$ ). Bu durumda, bu boyutlarda kadınlar ve erkekler arasında anlamlı bir fark olmadığı sonucuna ulaşılmıştır.

Katılımcıların tüketici kibri düzeylerinin yaş gruplarına göre farklılıklarına ilişkin veriler Tablo 6'da sunulmuştur.

**Tablo 6.** Tüketici Kibrinin Yaş Gruplarına Göre Farklılıkları

		n	X	ss	Anova	
					F	p
İmaj Temelli Tüketim	18-28 yaş arası	179	12,28	5,34	17,379	0,000*
	29-39 yaş arası	197	12,93	4,76		
	40-50 yaş arası	219	11,08	5,41		
	51 yaş ve üzeri	118	8,78	5,45		
Gösteriş Temelli Satın Alma	18-28 yaş arası	179	9,55	3,85	37,976	0,000*
	29-39 yaş arası	197	12,96	4,85		
	40-50 yaş arası	219	10,26	3,98		
	51 yaş ve üzeri	118	8,18	3,87		
Tüketici Övünmesi	18-28 yaş arası	179	11,34	3,24	17,537	0,000*
	29-39 yaş arası	197	12,11	3,62		
	40-50 yaş arası	219	10,74	3,13		
	51 yaş ve üzeri	118	9,31	3,76		
Tüketici Üstünlüğü	18-28 yaş arası	179	12,59	4,40	23,321	0,000*
	29-39 yaş arası	197	14,35	4,85		
	40-50 yaş arası	219	12,20	4,56		
	51 yaş ve üzeri	118	9,97	4,17		

\*p<0,05 : Anova test

Tablo 6'ya göre, imaj temelli tüketim, 18-28 yaş arası grubun ortalama tüketim puanı ( $X=12.28$ ) ile en yüksektir. Gösteriş temelli satın alma, 29-39 yaş arası grubun ortalama satın alma puanı ile ( $X=12.96$ ) en yüksektir. Tüketici övünmesi, 18-28 yaş arası grubun ortalama övünme puanı ile ( $X=11.34$ ) en

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

yüksektir. Tüketici üstünlüğü, 29-39 yaş arası grubun ortalama üstünlük puanı ( $X=14.35$ ) ile en yüksektir.

Katılımcıların tüketici kibri düzeylerinin eğitim düzeylerine göre farklılıklarına ilişkin veriler Tablo 7’de sunulmuştur.

**Tablo 7.** Tüketici Kibrinin Eğitim Düzeyi Gruplarına Göre Farklılıkları

		n	X	ss	Anova	
					F	p
İmaj Temelli Tüketim	İlköğretim	84	11,05	5,48	1,264	0,278
	Lise	143	11,55	5,14		
	Ön Lisans	172	11,87	5,58		
	Lisans	165	11,98	5,35		
	Yüksek Lisans	79	10,35	5,44		
	Doktora	70	11,34	5,43		
Gösteriş Temelli Satın Alma	İlköğretim	84	9,89	4,90	1,560	0,169
	Lise	143	10,43	4,92		
	Ön Lisans	172	10,27	4,28		
	Lisans	165	10,42	3,84		
	Yüksek Lisans	79	10,68	4,15		
	Doktora	70	11,77	5,36		
Tüketici Övünmesi	İlköğretim	84	10,21	4,32	1,496	0,189
	Lise	143	10,88	3,79		
	Ön Lisans	172	11,12	3,05		
	Lisans	165	11,45	3,36		
	Yüksek Lisans	79	11,18	3,07		
	Doktora	70	10,94	3,78		
Tüketici Üstünlüğü	İlköğretim	84	12,77	4,07	2,142	0,059
	Lise	143	12,42	4,72		
	Ön Lisans	172	13,10	4,95		
	Lisans	165	12,31	4,62		
	Yüksek Lisans	79	11,15	4,52		
	Doktora	70	13,06	5,41		
	Lisans	165	46,16	11,34		
	Yüksek Lisans	79	43,37	11,88		
Doktora	70	47,11	15,75			

\* $p < 0,05$  : Anova test

Tablo 7’ye göre tüketici kibri boyutları puanlarının p değerleri 0.05'ten büyüktür ( $p > 0.05$ ). Bu durumda, bu boyutlarda eğitim düzeyi grupları arasında anlamlı bir fark olmadığı görülmüştür.

Katılımcıların tüketici kibri düzeylerinin gelir düzeylerine göre farklılıklarına ilişkin veriler Tablo 8’de sunulmuştur.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 8.** Tüketici Kibrinin Gelir Düzeyi Gruplarına Göre Farklılıkları

		n	X	ss	Anova	
					F	p
İmaj Temelli Tüketim	Asgari ücretten az	169	10,82	5,34	<b>2,321</b>	<b>0,055</b>
	11.402 - 17.500	170	11,51	5,41		
	17.501-22.500 TL	161	11,77	5,42		
	22.501-27.500 TL	131	12,53	5,48		
	27.501 TL üzeri	82	10,82	5,18		
Gösteriş Temelli Satın Alma	Asgari ücretten az	169	10,46	4,58	<b>1,483</b>	<b>0,206</b>
	11.402 - 17.500	170	10,25	4,33		
	17.501-22.500 TL	161	10,76	4,61		
	22.501-27.500 TL	131	11,02	4,76		
	27.501 TL üzeri	82	9,62	4,01		
Tüketici Övünmesi	Asgari ücretten az	169	11,02	3,85	<b>0,419</b>	<b>0,795</b>
	11.402 - 17.500	170	10,76	3,60		
	17.501-22.500 TL	161	11,19	3,39		
	22.501-27.500 TL	131	11,21	3,51		
	27.501 TL üzeri	82	11,02	2,94		
Tüketici Üstünlüğü	Asgari ücretten az	169	11,92	4,61	<b>2,596</b>	<b>0,035*</b>
	11.402 - 17.500	170	12,17	4,66		
	17.501-22.500 TL	161	12,87	4,98		
	22.501-27.500 TL	131	13,50	4,79		
	27.501 TL üzeri	82	12,26	4,51		
	27.501 TL üzeri	82	43,72	10,68		

\*p<0,05 : Anova test

Tablo 8'e göre tüketici üstünlüğü puanı aylık gelir durumuna göre anlamlı farklılık göstermektedir (p<0,05).Ortalama puanlarına göre gelir düzeyi 22.501-27.500 TL aralığında olanların tüketici üstünlüğü puanı en yüksek iken gelir düzeyi 11.402 - 17.500 aralığında olanların puanı en düşüktür.

Katılımcıların tüketici kibri düzeylerinin medeni duruma göre farklılıklarına ilişkin veriler Tablo 9'da sunulmuştur.

**Tablo 9.** Tüketici Kibrinin Medeni Duruma Göre Farklılıkları

		n	X	ss	t	p
İmaj Temelli Tüketim	Bekâr	302	46,33	9,03	<b>6,402</b>	<b>0,000*</b>
	Evli	411	12,64	4,61		
	Bekâr	302	9,99	6,01		
Gösteriş Temelli Satın Alma	Evli	411	12,10	4,61	<b>12,986</b>	<b>0,000*</b>
	Bekâr	302	8,28	3,25		
Tüketici Övünmesi	Evli	411	11,83	3,38	<b>7,329</b>	<b>0,000*</b>
	Bekâr	302	9,94	3,43		
Tüketici Üstünlüğü	Evli	411	14,11	4,25	<b>11,276</b>	<b>0,000*</b>
	Bekâr	302	10,36	4,54		

\*p<0,05 : t test

Tablo 9'a göre, imaj temelli tüketim, gösteriş temelli satın alma, tüketici övünmesi, tüketici üstünlüğü ve tüketici kibri ölçeği p değerleri 0.05'ten küçüktür (p < 0.05). İmaj temelli tüketim için bekârların ortalama değeri (X=9.99) evli olanların ortalama değerine (X=12.64) göre daha düşüktür, bu da bekârların imaj temelli tüketimde daha düşük puan aldığını göstermektedir. Gösteriş temelli satın alma için bekârların ortalama değeri (X=8.28) evli olanların ortalama değerine (X=12.10) göre daha düşüktür, bu da bekârların gösteriş temelli satın alma eğilimlerinin daha düşük olduğunu göstermektedir. Tüketici övünmesi için bekârların ortalama değeri (X=9.94) evli olanların ortalama değerine (X=11.83) göre daha düşüktür, bu da bekârların tüketici övünmesi eğilimlerinin daha düşük olduğunu göstermektedir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Tüketici üstünlüğü için bekârların ortalama değeri ( $X=10.36$ ) evli olanların ortalama değerine ( $X=14.11$ ) göre daha düşüktür, bu da bekârların tüketici üstünlüğü eğilimlerinin daha düşük olduğunu göstermektedir.

Elde edilen veriler doğrultusunda araştırma kapsamında geliştirilen hipotez kabul/ret durumları Tablo 10'da sunulmuştur.

**Tablo 10.** Hipotez Kabul/Ret Tablosu

Hipotezler	Kabul/Ret
H1. Tüketici kibri boyutları, tüketicilerin cinsiyetlerine göre farklılık göstermektedir.	Kısmen kabul edilmiştir
H1a. İmaj temelli tüketim, tüketicilerin cinsiyetlerine göre farklılık göstermektedir.	Kabul
H1b. Gösteriş temelli satın alma, tüketicilerin cinsiyetlerine göre farklılık göstermektedir.	Ret
H1c. Tüketici övünmesi, tüketicilerin cinsiyetlerine göre farklılık göstermektedir.	Ret
H1d. Tüketici üstünlüğü, tüketicilerin cinsiyetlerine göre farklılık göstermektedir.	Ret
H2. Tüketici kibri boyutları, tüketicilerin yaşlarına göre farklılık göstermektedir.	Kabul
H2a. İmaj temelli tüketim, tüketicilerin yaşlarına göre farklılık göstermektedir.	Kabul
H2b. Gösteriş temelli satın alma, tüketicilerin yaşlarına göre farklılık göstermektedir.	Kabul
H2c. Tüketici övünmesi, tüketicilerin yaşlarına göre farklılık göstermektedir.	Kabul
H2d. Tüketici üstünlüğü, tüketicilerin yaşlarına göre farklılık göstermektedir.	Kabul
H3. Tüketici kibri, tüketicilerin eğitim düzeylerine göre farklılık göstermektedir.	Ret
H3a. İmaj temelli tüketim, tüketicilerin eğitim düzeylerine göre farklılık göstermektedir.	Ret
H3b. Gösteriş temelli satın alma, tüketicilerin eğitim düzeylerine göre farklılık göstermektedir.	Ret
H3c. Tüketici övünmesi, tüketicilerin eğitim düzeylerine göre farklılık göstermektedir.	Ret
H3d. Tüketici üstünlüğü, tüketicilerin eğitim düzeylerine göre farklılık göstermektedir.	Ret
H4. Tüketici kibri boyutları, tüketicilerin gelir düzeylerine göre farklılık göstermektedir.	Kısmen kabul edilmiştir.
H4a. İmaj temelli tüketim, tüketicilerin gelir düzeylerine göre farklılık göstermektedir.	Ret
H4b. Gösteriş temelli satın alma, tüketicilerin gelir düzeylerine göre farklılık göstermektedir.	Ret
H4c. Tüketici övünmesi, tüketicilerin gelir düzeylerine göre farklılık göstermektedir.	Ret
H4d. Tüketici üstünlüğü, tüketicilerin gelir düzeylerine göre farklılık göstermektedir.	Kabul
H5. Tüketici kibri, tüketicilerin medeni durumlarına göre farklılık göstermektedir.	Kabul
H5a. İmaj temelli tüketim, tüketicilerin medeni durumlarına göre farklılık göstermektedir.	Kabul
H5b. Gösteriş temelli satın alma, tüketicilerin medeni durumlarına göre farklılık göstermektedir.	Kabul
H5c. Tüketici övünmesi, tüketicilerin medeni durumlarına göre farklılık göstermektedir.	Kabul
H5d. Tüketici üstünlüğü, tüketicilerin medeni durumlarına göre farklılık göstermektedir.	Kabul

## TARTIŞMA ve SONUÇ

Tüketici kibri, özellikle günümüz tüketicileri açısından daha çok dikkate alınması gereken bir unsurdur. Sosyal medya gibi platformların kullanımı yaygınlaştıkça her bir tüketici, kendi sosyal çevresini ve hayranlarını yaratmış, bu durum daha çok kendini seven ve diğerlerinden daha üstün gören bireylerin artmasına neden olmuştur. Buna ek olarak satın alınan ürünlerin sembolik anlamlarıyla kendilerini tanımlayan tüketiciler, satın aldıkları lüks ve pahalı ürünleri dijital ortamlarda daha kolay teşhir

edebildiklerinden kibir duygularının daha da perçinlendiği düşünülmektedir. Nitekim tüketici kibrinin demografik özellikler açısından farklılıklarının incelendiği bu çalışmada, sosyal medyayı daha çok kullandığı gözlenen genç tüketicilerin (Yaşar ve Uğurhan, 2021) daha yüksek tüketici kibri gösterdikleri tespit edilmiştir. Yapılan diğer çalışmalarda benzer sonuçlara ulaşıldığı görülmektedir (Chang vd., 2008, Workman ve Lee, 2012). Bu çalışmada ayrıca evli ve kadın tüketicilerin, tüketici kibrinin tüm boyutlarında daha yüksek puanlara sahip olduğu görülmüştür. Tüketici kibri, ilgili literatürde çok yeni bir konudur ancak gösteriş üzerine yapılan çalışmalarda evli tüketicilerin daha yüksek gösteriş eğilimi olduğu görülmektedir (Kaya ve Yalçın, 2018). Kadın tüketicilerde ise imaj temelli tüketim erkek tüketicilere göre daha yüksektir. İlgili literatürde kadın tüketicilerde, ideal imaja yönelik tüketim davranışlarının daha çok olduğu belirtilmektedir (Doğan vd., 2017; Yanıklar, 2006). Son olarak üst düzeyde geliri olan tüketicilerin tüketici üstünlüğü puanları daha yüksektir. Özdemir ve İnanç (2018) üst düzey gelir grubunda olanların gösteriş tüketimi eğilimlerinin daha yüksek olduğunu belirtmektedirler. Bu sonuçlar, bu çalışmada elde edilen sonuçlarla örtüşmektedir.

Araştırmada elde edilen bulgular doğrultusunda işletmelere ve araştırmacılara şu öneriler geliştirilmiştir:

- İmaj algısı yüksek ürünlerin tutundurma çalışmalarında daha çok kadın tüketicileri hedef alan tutundurma faaliyetleri yapılabilir.
- Evli tüketiciler, bekâr tüketicilere göre daha kibirli tüketim davranışı gösterdiklerinden, işletmeler bu tüketicilere yönelik kendilerini daha üstün ve başarılı hissedecekleri pazarlama stratejileri geliştirebilirler. Örneğin satın alınan ürünün başarı ve üstünlük yarattığı mesajı bu tüketiciler için daha değerlidir ve reklamlarda evli çiftler kullanılabilir.
- Üst düzey gelir grubunu hedef alan işletmeler, bu tüketicilere yönelik başarı ve üstünlük mesajlarına daha çok vurgu yapabilirler.
- Gelecekte yapılacak çalışmalar tüketici kibrinin, satın alma niyeti, benlik algısı ve yaşam tarzı ile ilişkileri üzerine odaklanabilir.

Bu çalışmada, zaman kısıtı ve mali kısıtlar nedeniyle 713 tüketiciye ulaşılmıştır. Daha kapsamlı araştırmalar için farklı kültürleri kapsayan araştırmaların yapılması gerektiği düşünülmektedir. Ayrıca Ankara ve Samsun dışında, Türkiye'nin farklı şehirlerini kapsayan araştırmalar yapılarak daha çok tüketiciye ulaşılmalıdır. Tüketici kibrinin, ilgili literatürde çok yeni bir kavram olmasına rağmen, gelecekte tüketici davranışını şekillendiren eğilimlerden biri olacağı düşünülmektedir. Gelecekteki tüketici davranışını anlamayabilmek için bu alanda yapılacak çalışmaların artması gerekmektedir.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**TARİHİ KIPÇAK TÜRKÇESİNDE AVCILIK TERİMLERİ  
HUNTING TERMS IN HISTORICAL KIPCHAK LANGUAGE**

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**ÖZET**

Avcılık tarih boyunca yalnızca insanlığın en eski geçim faaliyetlerinden biri olmamış; bunun yanı sıra doğadan kaynak elde etmenin alternatif bir yolu, inanç uygulamasının bir parçası, ticarete hammadde sağlayan bir unsur, savaş taktikleri ve uygulamaları konusunda bir tür deneme alanı ve soyut fikirlerin tuzak adı verilen bir nevi ilkel makineler haline dönüşmesini sağlayan karmaşık düşünsel ve eylemsel bir faaliyet alanı olmuştur. Konar göçer bir hayat sürdürdükleri için besin konusunda kaynakları belli sebeplerle dönem dönem kıtlaşan eski Türk toplulukları için avcılık bazen onları hayatta tutan en önemli besin kaynağı konumundadır. Önemli Türk topluluklarından olan Kıpçaklar da çeşitli nedenlerle av faaliyetleri gerçekleştirmişler ve bu faaliyete değer vermişlerdir. Bu durum, kaçınılmaz olarak Kıpçakların eserlerine de yansımıştır. Türk dilinin Orta Türkçe dönemine tekabül eden 13-15. yüzyıllar arasında Altın Orda Devleti coğrafyasında (bugünkü Rusya, Ukrayna ve Kafkaslar) İtalyan ve Almanların kaleme aldığı Codex Cumanicus ile, 13. yüzyılın ortalarından 16. yüzyılın başlarına kadar Memluk coğrafyasında (Mısır ve Suriye) varlık gösteren Kıpçakların dilinde yazılan eserler, ava dair bilgileri ihtiva etmesi açısından önemlidir.

Çalışmada öncelikle Kıpçakların ilgili dönemleri hakkında bilgi verilecek ve bu dönemlerdeki avcılıkları hakkında tarihî bilgiye yer verilecektir. Ardından tarihî Kıpçak diliyle yazılmış eserlerde bulunan avcılıkla ilgili terminoloji çeşitli kıstaslar göz önüne alınarak sınıflandırılacaktır (ava dair genel eylemler ve adlar, av araçları, avı yakalamada yardım eden hayvanlar vs.). Çalışmada, tarihî Kıpçak Türkçesiyle yazılmış eserlerde bulunan avcılıkla ilgili terminoloji, eğer varsa bağlamı ile birlikte değerlendirilecektir. Böylelikle avcılığa dair bu toplulukların algısı ve anlayışlarının bir bağlama oturtulması daha da kolaylaşacaktır. Nihayetinde, tarihî Kıpçak dilini konuşan toplulukların avcılık faaliyetinin nasıl ve ne şekilde gerçekleştirildiğinin ve hangi hayvanların avlandığının ortaya konması hedeflenmektedir.

**Anahtar kelimeler:** Kıpçak Türkçesi, av, avcılık, terminoloji, sözvarlığı.

**ABSTRACT**

Hunting has not only been one of humanity's oldest livelihood activities throughout history; it has also served as an alternative means of obtaining resources from nature, a component of belief practices, a supplier of raw materials for trade, a testing ground for warfare tactics and practices, and a complex realm of intellectual and practical activity that has transformed abstract ideas into a kind of primitive machinery known as traps. For ancient Turkic communities, who led a nomadic lifestyle and had periodically limited food resources due to various reasons, hunting sometimes served as the most crucial source of sustenance that kept them alive. The Kipchaks, one of the significant Turkic communities, also engaged in hunting activities for various reasons and gave importance on this activity. Indeed, this situation inevitably influenced the written materials of the Kipchaks. The written materials in the Kipchak language during the Middle Turkic period, which corresponds to the 13th-15th centuries in the Golden Horde region (present-day Russia, Ukraine, and the Caucasus) by Italian and German authors in the Codex Cumanicus, as well as the works written in the Kipchak language in the Memluk region from the mid-13th century to the early 16th century (Egypt and Syria), are important in terms of containing information about hunting.



The study will begin by providing information about the relevant periods of the Kipchak people, and historical information about their hunting activities during these periods will be presented. Subsequently, the terminology related to hunting found in historical Kipchak written materials will be classified based on various criteria, including general actions and words related to hunting, hunting tools, animals that help to catch prey, and so on. In the study, the hunting-related terminology found in historical Kipchak material will be evaluated with their context, if available. This will further facilitate contextualizing the perception and understanding of hunting within these communities. Ultimately, the goal is to uncover how and in what manner the hunting activities of the historical Kipchak-speaking communities were conducted and which animals were hunted.

**Keywords:** Kipchak language, hunt, hunting, terminology, vocabulary.

## **GİRİŞ**

*Güncel Türkçe Sözlük*'te (2005, s. 147) *av* maddesi "1. Karada, denizde, gölde veya akarsularda evcil olmayan hayvanları vurma veya yakalama işi. 2. Bir hayvanın bir başka hayvanı yemek için yakalaması. 3. Bu yollarla yakalanan hayvan" olarak açıklanmıştır. En basit ifadeyle çeşitli şekillerde vahşi bir hayvanın yakalanma/öldürülme işi olarak tanımlayabileceğimiz avcılık insanlık için oldukça önemli bir faaliyet olmuştur. Avcılık tarih boyunca yalnızca insanlığın en eski geçim faaliyetlerinden biri olmamış; bunun yanı sıra doğadan kaynak elde etmenin alternatif bir yolu, inanç uygulamasının bir parçası, ticarete hammadde sağlayan bir unsur, savaş taktikleri ve uygulamaları konusunda bir tür deneme alanı ve soyut fikirlerin tuzak adı verilen bir nevi ilkel makineler haline dönüşmesini sağlayan karmaşık düşünsel ve eylemsel bir faaliyet alanı olmuştur.

Konar göçer bir hayat sürdürdükleri için besin konusunda kaynakları belli sebeplerle dönem dönem kıtlaşan eski Türk toplulukları için avcılık bazen onları hayatta tutan en önemli besin kaynağı konumundadır. Önemli Türk topluluklarından olan Kıpçaklar da çeşitli nedenlerle av faaliyetleri gerçekleştirmişler ve bu faaliyete değer vermişlerdir. Bu durum, kaçınılmaz olarak Kıpçakların eserlerine de yansımıştır. Türk dilinin Orta Türkçe dönemine tekabül eden 13-15. yüzyıllar arasında Altın Orda Devleti coğrafyasında (bugünkü Rusya, Ukrayna ve Kafkaslar) İtalyan ve Almanların kaleme aldığı Codex Cumanicus ile, 13. yüzyılın ortalarından 16. yüzyılın başlarına kadar Memluk coğrafyasında (Mısır ve Suriye) varlık gösteren Kıpçakların dilinde yazılan eserler, ava dair bilgileri ihtiva etmesi açısından önemlidir.

Çalışmada öncelikle Kıpçakların ilgili dönemleri hakkında bilgi verilecek ve bu dönemlerdeki avcılıkları hakkında tarihî bilgiye yer verilecektir. Ardından tarihî Kıpçak diliyle yazılmış eserlerde bulunan avcılıkla ilgili terminoloji çeşitli kıstaslar göz önüne alınarak sınıflandırılacaktır (ava dair genel eylemler ve adlar, av araçları, avı yakalamada yardım eden hayvanlar vs.). Çalışmada, tarihî Kıpçak Türkçesiyle yazılmış eserlerde bulunan avcılıkla ilgili terminoloji, eğer varsa bağlamı ile birlikte değerlendirilecektir. Böylelikle avcılığa dair bu toplulukların algısı ve anlayışlarının bir bağlama oturtulması daha da kolaylaşacaktır. Nihayetinde, tarihî Kıpçak dilini konuşan toplulukların avcılık faaliyetinin nasıl ve ne şekilde gerçekleştirildiğinin ve hangi hayvanların avlandığının ortaya konması hedeflenmektedir.

## **YÖNTEM**

Çalışmada Orta Çağ Kıpçak topluluklarının avcılık faaliyetlerinin dil verilerinden hareketle anlaşılması ve yorumlanması hedeflenmektedir. Bu sebeple ilk olarak Orta Çağ Kıpçak devletleri ve coğrafyaları hakkında kısa bir bilgi verilecek ve Kıpçaklara komşu kavimlerin onların avcılık faaliyetleriyle ilgili verdikleri bilgilere kısaca yer verilecektir. Çalışmanın ana inceleme kısmında tarihî Kıpçak Türkçesi dönemine ait metinlerin söz varlıkları incelenecek ve avcılıkla ilgili olan kelimeler saptanacaktır. Sonra bu terimler av faaliyetini ifade eden adlar ve eylemler, bu faaliyeti gerçekleştiren fail adları, avcılığın gerçekleştirilme tarzına göre aktif ve pasif av alet, yöntem ve tekniklerine dair adlar, av ile ilgili mekânlar, avcıya yardım eden avcı hayvanlar ve av faaliyetinin nesnesi olan hayvanlar düşünülerek tasnif edilmişlerdir. Mümkün olduğunda av ile ilgili terimlerin geçtiği bağlamlar da dikkate alınarak ilgili av faaliyetinin tamamlayıcı unsurlarıyla bütünlüklü bir şekilde anlaşılması hedeflenmiştir. Terimlerin buldukları eserlere ve sayfasına atıfta bulunulurken eserler üzerine yapılan çalışmada kullanılan kısaltmalar dikkate alınmıştır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## VERİTABANI

Tarihî Kıpçak Türkçesiyle ilgili yazılmış sözlük, gramer kitapları ve bu dilde yazılmış eserler çalışmanın veritabanını oluşturmaktadır. Eserler için kullanılan kısaltmalar şu şekildedir:

BM: Kitâbu Bulgatü'l-Müşâtâk fi Lügati't-Türk ve'l-Kıfçak

BV: Baytaratu'l-Vâzih

CC: Codex Cumanicus

DM: Ed-Dürretü'l-Mudiyye fi'l-Lügati't-Türkiyye

GT: Gülistan Tercümesi (Kitâb Gülistân bi't-Türkî)

İH: El-İdrâk Haşiyesi

İM: İrşâdü'l-Mülûk ve's-Selâtn

İN: Kitâb fi İlmi'n-Nüşşâb

KF: Kitâb fi'l-Fıkh

KFT: Kitâb fi'l-Fıkh bi'l-Lisâni't-Türkî

Kİ: Kitâbü'l-İdrâk li-Lisâni'l-Etrâk

KK: El-Kavanînu'l-Küllîyye li-Zabti'l-Lügati't-Türkiyye

MG: Münyetü'l-Guzât

MS: Kitâb-ı Mukaddime-i Ebu'l-Leysi's-Semerkindî

RH: Kitâb fi Rıyâzâtı'l-Hayl

TA: Kitâb-ı Mecmû-ı Tercümân-ı Türkî ve Acemî ve Mugâlî

TZ: Et-Tuhfetü'z-Zekeriyye fi'l-Lügati't-Türkiyye

## Orta Çağ Kıpçak Topluluklarının Avcılıklarıyla İlgili Edinilen Tarihî Bilgiler

Gerdîzî *Zeyn el-ahbâr* adlı eserinde Kimeklerin kökeninden bahsettiği kısımda, Kıpçakların da Kimeklerle aynı soydan türediğini belirtmiş ve bir türeyiş mitinden bahsetmiştir. Bu mite göre Tatarların küçük oğlu Şed (Şâd) ağabeyiyle anlaşamamış ve sevdiği bir câriyesiyle başka bir yere göçmüştür. Göçtüğü yer sulak, ormanlık ve av hayvanlarının bol olduğu bir yerdir. Anlatıya göre Şed ve câriye her gün iki av avlayarak geçinmekteydi. Samur, sincap ve kakım kürkünden giysi yapmaktaydılar. Gerdîzî'ye göre sonra Tatarların yedi çocuğu bu bölgeye gelmiştir. Bu gelen çocuklardan ikisi Kimek ve Kıpçak'tır. Daha sonra Tatar memleketine giden topluluklar, o memleketin harab olduğu haberini getirince bu yedi çocuk ve sülalesi Şed'in memleketinde kalmıştır (Şeşen, 2001, s. 73-74). Anlatılan mitin önemli yanı Kıpçakların köken anlatılarından en azından birinde avcılıkla ilgili bilgi bulunmasıdır. Kıpçaklar geçerek geldikleri bu yerlerinde av hayvanının bulunmasına dikkat etmişler, avcılığı önemsemişlerdir.

İdrîsî *Nüzhet el-müşâtâk fi ihtirâk el-âfâk* adlı eserinde yedinci ikliminin altıncı kısmında İç Kumaniye ile Bulgar ülkesinin bir kısmından bahsetmektedir. Bu kısımda Kumaniye ülkesinin kuzeyinde bulunan Ganûn adında bir gölün bulunduğunu, bu gölde bol balık olduğunu, gölün etrafında bulunan ağaçlıklarda parsaların yaşadığını belirtmiştir (Şeşen, 2001, s. 128-129). Balığa dikkat çekilmesi bu hayvanın yerel halk için geçim kaynağı olmasından, parsa dikkat çekilmesi bu hayvanın tehlikeli olmasından ve belki de bu sebeple ya da kürk elde etmek için avlanabileceğinden kaynaklanıyor olabilir.

Hükümdarların etrafında gerçekleştirilen avlara birbirinden farklı pek çok kültürde ve toplumda rastlanmaktadır (Allsen 2006). Memlûk hükümdarları da, Memlûk tarihçileri tarafından *es-sayd el-mubârek* "mübarek av" olarak adlandırılan bu tür avlar gerçekleştirmişlerdir. Hükümdarların av faaliyetiyle yakından ilgilenmeleri sebebiyle Memlûk sarayında bu konuda uzmanlaşmış görevlilerin de bulunduğu bilinmektedir. *Emîr şikâr* "av emiri" hükümdara av sırasında eşlik eden ve av av hayvanlarından sorumlu, *hâris et-tayr* "kuş bekçisi" kuşluktardan, *bâzdâr* "şahin eğiticisi" avda yardımcı

olan yırtıcı kuşlardan, *havandâr* avlanmak için yetiştirilen kuşlardan, sevvâk avlanan hayvanları tolamaktan, *kilâbzî* av sırasında köpeklerin sevkinden sorumlu olarak sarayda istihdam edilmiş görevlilerdir (Kortantamer, 2008, s. 73-74).

Hükümdarların öncülük ettikleri avlarda avcı kuşların da kullanılışı, bu kuşların bakımlarıyla ve avda kullanımlarıyla ilgili araştırmaları tetiklemiş ve *el-beyzere* adı verilen bu alanla ilgilenen bir araştırma alanı oluşturulmasına sebep olmuştur. Kuş avlarında yardımcı olacak kuşların eğitimi ve avlanacak kuşlara da bakmak için oluşturulan evlerin (*matâ'im et-tayr*) varlığı avda kuşların ne kadar önemli bir yere sahip olduğunu gösteren bir diğer unsurdur (Kortantamer, 2008, s.47).

Avın, Memlûk hükümdarları için iç ve dış diplomatik bağlar kurma ve var olan bağları geliştirme gibi işlevleri de söz konusudur. Bunu, Memlûk hükümdarlarının liderlik ettikleri av faaliyetlerine emirlerin de eşlik etmesi (Kortantamer, 2008, s. 47) bir tür bağlılık sunma biçimi olarak düşünülebilir. Bağlılığı ve karşılıklı anlaşmayı ifade etmenin bir diğer yolu olan hediyeleşmeler de Memlûklerin av faaliyetinde gerçekleştirdikleri bir eylem olmuştur (Kortantamer, 2008, s. 47, 48, 50). Buna ek olarak av sırasında başka ülkelerin elçileri de kabul edilebilmiş (Kortantamer, 2008, s. 49), onlardan da hediyeler kabul edilmiştir (Kortantamer, 2008, 51).

Hükümdarların liderlik ettikleri bu türden avlar Allsen *soylu avı* (royal hunt) olarak ifade etmektedir (2006, s. 14). Soylu avlarına tanıklık etmiş olan pek çok tarihçi, bu avın gerçekleşme biçimini tarif etmiştir. Soylu avının dikkat çeken bir örneği 1250'lerde Cüveynî tarafından kaydedilmiştir. Buna göre av kışın düzenlenmiş ve birkaç ay sürmüştür. Av hayvanlarının yoğunlaştığı bölgeler tespit edildikten sonra ordu geniş bir halka (Moğolca *nerge*) şeklini almıştır. Oluşturulan bu daire bozulmadan daraltılarak av hayvanları rahat bir şekilde avlanabilecek bir alana kısırlanmıştır. Bu halka düzeninde bozukluğa neden olan ve av hayvanlarını halkanın dışına kaçırarak ciddi cezalarla karşı karşıya kalmaktaydı. Halka başarıyla daraltıldığında halka alanı halat bir çitle çevrilip üstü keçe ile örtülmüş, ardından da av başlamıştır (Allsen, 2006, s. 27). Bu tarife benzer bir tarif Memlûk tarihçileri tarafından da yapılmıştır (Kortantamer, 2008, s. 47-48). Bu tarife göre av, katılımcıların *halka* şeklinde av bölgesini çevirmesiyle gerçekleştirilirdi. Avı yapılacak kuşlar salınır, onların yere konmalarını ya da yaklaşmalarını sağlamak için yere yem atılırdı. Kuş avından sonra sultan yabancı hayvanları da belli bir süre avladıktan sonra emirlerine de avlama izni verir (Kortantamer, 2008, s. 48).

Soylu avlarda hükümdarın avı başlatma geleneğinin altında, halklar için bazen zorunlu olan av faaliyetlerinin gerçekleştirilirken hayvanlarının atalarının kızdırılmamasının ve öc vesilesi oluşturulmamasının sağlanması istenmesidir (Roux, 1994, s. 181-182). Bu önemli sorumluluğu ve olası talihsizliği de hükümdarların üstlenmeleri beklenmektedir (Roux, 2005, s. 98, 110).

Allsen'in eserinde dikkat çektiği gibi, önemli doğal tehlikeler de barındıran av faaliyetleri siyasi rakiplerin ortadan kaldırılması için önemli fırsatlar sunmaktadır (2006, s. 207-208). Memlûk tarihçileri de av sırasında öldürülen pek çok üst düzey kişiye yer vermişlerdir. Bu kişiler arasında Sultan Kutuz ve Sultan el-Eşref Halil gibi devrin önemli isimleri de yer almaktadır (Kortantamer, 2008, s. 49-50).

## TERİMLER

### Avla İlgili Genel Adlar

İncelenen metinlerde av faaliyetini etmek için *av* ve *şayd* terimlerinin kullanıldığı tanıklanmıştır. İki terim de av faaliyetinin yanı sıra, avı yapılan hayvanı da ifade edecek bir kullanıma sahiptir.

*av* (I) "1. av (BM, Gİ, GT, İM, KF, KFT, Kİ, MG) krş. *uv*; *av avla-* "avlamak, avlanmak (DM) 2. av hayvanı (BM)

Gülistan Tercümesi'nde yer alan aşağıdaki bağlamda hükümdarla birlikte gerçekleştirilen bir *soylu avından* bahsedilmektedir. Hükümdar ve askerleri bahsi geçen avda geyik şişlemişlerdir. Kullanılan *şişlemek* eyleminden hareketle geyiğin avlanma işinin bir tür mızrakla gerçekleştirilmiş olabileceği düşünülebilir. Ancak bir diğer ihtimal de *şişlemek* eyleminin avda öldürülen geyiğin pişirilme yöntemine işaret etmesidir. Bu görüşü hükümdarın adamlarından birinin tuz aramaya gitmesi desteklemektedir. Dolayısıyla av sırasında, avlanan hayvanlardan bazılarının pişirilerek yendiği düşünülebilir.

GT 60 (30b) 13. satır

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

*hikāyet nūşın revān ‘ādil-ka avda kiyik*

61 (31a)

*şişledi-ler tuz yok idi bir kul kintke bardı*

*kim tuz kitürgey ....* (Karamanlıoğlu, 1989, s. 29-30)

“Hikaye: Nuşın Revan Adil’e avda geyik şişledi(ler). Tuz yok idi. Bir kişi tuz getirmek için köye gitti ...”

Gülistan Tercümesi’nde geçen aşağıdaki bağlamda hükümdarın (melik) askerleriyle avda çıktığı belirtilmiştir. Bahsi geçen avın kış vaktinde olması, soylu avlarının bazen kışın da yapıldığına bir delil olarak görülebilir.

GT 180 (90b) 10. satır

*hikāyet melik adil haş kul(l)arı bilen*

*avğa çıkıp kış künleri ‘imāret-den yırağ tüşüp*

*mağrīb ka yakın idi kim bir ikinci ivin kördi*

*-ler melik ayttı barıp anda tüşelim kim sizge savuk zahmet*

181 (91a)

*birmegey vezirlerden bir vezir ayttı kim melik-niñ* (Karamanlıoğlu, 1989, s. 89-90)

“Melik Adil ve has kullarıyla avda çıkıp kış günleri konaktan (makamından) uzak düşüp geceye yakın idi. Bir ikinci (kul) evi gördü. Melik söyledi: gidip oraya varalım ki size soğuk zahmet vermesin. Vezirlerden biri söyledi: Meliğin ...”

Gülistan Tercümesi’nde yer alan hikmetli sözde *av köpekleri* ve *pazar köpekleri* karşıtlığına yer verilmiştir. Bu ibare av için uzmanlaşmış köpeklerin bulunduğuna dair kanıtlardan biridir.

GT 336 (168b) 3. satır

*hikmet irdem-sizler irdem iyesin köre bilmes*

*niçük kim bāzār it-leri av it-lerin tilemes*

*yırağdın gavgā kılar yakın kilmes* (Karamanlıoğlu, 1989, s. 167).

“Hikmet: Pazar köpekleri(nin) av köpeklerini dilememesi (ve) uzaktan kavga edip yakına gelmemesi (gibi) erdemsizler erdem sahibini göremez”.

*şayd* “Ar. av, avlanma” (GT, İM)

Gülistan Tercümesi’nde av faaliyeti aşk ifadesini somutlaştıracak biçimde benzetme unsuru olarak kullanılmıştır. Burada *şayd* temelde avı yapılan hayvanı, benzetme unsuru olarak aşık olanı ifade etmektedir.

GT 267 (134a) 4. satır

*ol ir aytur bu ma’ñ-den ança sözledim kim sağındım*

*köñlün sözüme bağladı dağı özi maña şayd*

*boldı ol issi yüzli kız savuk hareket kılp*

*attı...* (Karamanlıoğlu, 1989, s. 133)

“O kişi söyler: Bu manadan (hareketle) şöyle söyledim: Gönünü sözüme bağladığımı ve kendinin bana av olduğunu düşündüm. O sıcak yüzlü kız soğuk (bir şekilde) davranıp attı ...”

*kış* maddesine bakınız (GT 195).

GT 245 (123a) 9. satırda *şayd* av faaliyetini ifade edecek bir biçimde kullanılmıştır.

*tüni kün közleriñ meşgul şayda*

*sana biz müştâğil sen ‘amru zayda* (Karamanlıoğlu, 1989, s. 122).

“Gündüz gece közlerin ava (av ile) meşgul, sana biz meşgulüz. Sen Amr ve Zayd’a (meşgulsün).”

*ğara kulağ* maddesine bakınız (GT 46).

### Avla İlgili Genel Eylemler

İncelenen metinlerde av faaliyetinin gerçekleşme tarzına, avlanan hayvana ve avda kullanılan yardımcı hayvanı kışkırtmaya yönelik kullanılan sözlere göre farklı terimler kullanılmıştır. Av faaliyetinin genel adına +IA isimden fiil yapım eki getirilmesi sonucu *av+la-* ve *av+la-n-* eylemleriyle ve buradan gelişen *ulu-* (*avla-* > *\*uvla-* > *\*uvlu-* > *ulu-*) eylemiyle, avın ok ya da benzeri fırlatmalı bir silah ile gerçekleştirilmesi *at-* eylemiyle, avın bir tuzak yardımıyla ya da elle yakalanması *tut-* eylemiyle, avlanan hayvanın türünü ifade eden *balık* kelimesine +IA isimden fiil yapım eki getirilmesiyle oluşan *baluğla-* eylemiyle, av faaliyetinin bir kovalamaca şeklinde gerçekleştiğini ifade eden *huvala-* eylemiyle, avda kullanılan köpeği ava teşvik etmek için kullanılan seslenmeyi ifade eden *kişgir-* eylemiyle kullanıldığı tanıklanmıştır.

*at-* “1. atmak, fırlatmak (...), 2. bırakmak, salmak (...), 3. ok atmak (İN, RH)

*avla-* “avlamak” (BM, DM, GT, İM, KFT, Kİ, RH, TA, TZ)

avcı maddesine bakınız (GT 209).

*avlan-* “avlanmak” (İM, KFT)

*baluğla-* “balık avlamak” (CC)

*huvala-* “Avlanmak, kovalamak, takip etmek” (CC)

*keyikle-* “avlamak, av yapmak” (BM)

*kişgir-* “tazıyı ava teşvik etmek, saldırtmak” (İH)

*tut-* (I) “1. tutmak (BM, BV, CC, Gİ, GT, İN, KF, MG, RH, TZ) krş. *dut-* (1), *tut-* (TA), *tut-* (KK) 2. elde etmek, yakalamak, saklamak (GT) krş. *dut-* II 3. bir şeyi salıvermemek üzere tutmak (İM), 4. dokunmak, el ile tutmak (İM) 5. yakalama (İM, MG)

*ulu-* (I) “avlamak” (Kİ)

### Avcı Anlamındaki Terimler

İncelenen metinlerde av faaliyetini gerçekleştireni ifade etmek için genel olarak avı ifade eden isme, avlanan hayvan ya da avda kullanılan alet adına +çl meslek eki getirilmiştir.

*avçı* “avcı” (GT)

GT 209 (105a) 4. satır’da geçen şiirde avcı kelimesi tanıklanmıştır. Bağlamda avcının avladığı hayvanın geyik olduğu ifade edilmiştir. Ancak bu sırada bir arslana rastlayan avcı korunma ya da arslan derisinin kıymetli olması sebebiyle bu hayvanı da avlamıştır. Avcının arslanı avlaması *tut-* eylemiyle ifade edilmiştir. Bu da arslanın derisine zarar verilmeyecek şekilde avlandığını ve avlanma sebebinin kıymetli dersi olduğu fikrini kuvvetlendirmektedir.

*şi’r təcir ki hemişe meksebitkey bir kün*

*mālın alıban anıñ harāmı yortar*

*avçı çıkıban kiyikler avlar vaktın*

*arslan körüben tutup terisin yırtar* (Karamanlıoğlu, 1989, s. 104)

“Şiir: Haydut her daim kazanç (elde) eden tüccar(ın) malını bir gün alıp kaçır. Avcı(nın) çıkıp geyik avladığı sırada arslan(ı) görüp tutup derisini yırtar.”

*avlavçı* “avcı” (TZ)

*oğçı* “okçu” (CC, İN, TA) krş. *oğçı* (DM, TA)

*baluğçı*: balıkçı (CC I) (CC I, s. 173)



*rāmī* “Ar. (ok) atan” (MG)

*şayyād* “Ar. avcı” (GT)

*ağ* maddesine bakınız (GT 188).

*av* maddesine bakınız (GT 336).

*süñüçi* “sümgü kullanan” (TA) krş. *süñüçi* (MG)

### Kullanılan Av Aletinin Türüne Göre

Avcının av sırasında daha aktif bir rol üstlendiği avlara aktif avcılık, daha pasif bir rol üstlendiği avlara pasif avcılık denmektedir (Jambalova, 1991, s. 28). Tabii ki bu iki avcılık tarzının arasında kalan bölgeler de vardır. Bu gibi durumlarda avcılık yönteminde avcının katılımının derecesi önemsenmiş, tasnif buna göre yapılmıştır.

### Aktif Av Aletleri

İncelenen metinlerde savaşlarda da kullanılan ok, yay, ok atmayı kolaylaştıran aletler ve sümgü anlamlarına gelen kelimelere rastlanmıştır. Bu tür silahların haricinde özellikle belli hayvanların avlanmasında kullanılan *çalış*, *kemān göre* ve *kuşluk* gibi kuş avlamada kullanılan özel ok ve aletler tanımlanmıştır.

*ayrıç* “iki çatallı olan ok, yol, tahta vb.” (Kİ)

*çalış* “okun kalın ve geniş” (İN)

*ebbe* “Ar. ok” (RH)

*kemān göre* “Far. T. içine çakıl koyup kuş vurmaya yarayan av aleti” (İH)

*kuşluk* (II) “kuşları vurmaya özgü geniş ok” (Kİ)

*nav* “Far. içinden ok atılan küçük oluk” (MG) krş. *nāvek* (MG)

*nüş(ş)āb* “Ar. ok” (İN)

*oğ* (I) “ok” (CC, İN) krş. *ok* (I) (DM, GT, Gİ, İM, İN, KF, KFT, Kİ, KK, MG, TA, TZ), *oyuk* (III)

*sümgü* “sümgü, kargı” (KK, TA) krş. *süñi* (DM, Gİ, GT, İM, KF, İN), *süñü* (CC, DM, GT, İM, KFT, Kİ, MG, TZ)

*süñülçe* “küçük sümgü” (CC)

*ya* (I) “yay” (CC, Gİ, İN, Kİ, MG, TA) krş. *yaa* (CC), *yay* (III) (DM, Gİ, İN, KK, MG, TZ), *ye* (CC)

### Pasif Av Alet, Yöntem ve Ürünleri

Avcılar avlarıyla aralarındaki farkları ortadan kaldırmak, kendi beden gücü kullanımından tasarruf etmek gibi sebeplerle en geniş manada tuzak kelimesiyle ifade ettiğimiz çeşitli düzenekler kurarak avlanabilirler. İncelenen eserlerde *ağ*, *av*, *dām*, *fak*, *ırğak*, *ilim*, *kapın*, *karmak*, *sırış*, *tuzak* gibi çeşitli pasif av alet ve yöntemleriyle avlanmışlardır. Bunlardan bazıları özellikle balık avı için özelleşmiş tuzaklardır (*ağ*, *av*, *ırğak*, *ilim*, *karmak*, *sırış*), bazıları da genel olarak “tuzağı” ifade eden araçlardır (*dām*, *fak*, *kapın*, *tuzak*).

*ağ* (II) “ağ, iplik, sicim, tel gibi ince şeylerden kafes biçiminde yapılmış örgü (BM, CC, GT, TA, TZ) krş *av* (III)

GT 188 (94b) 1. satır’da *şayyād*’ın balık tutmak için kullandığı alet ağdır. Burada avcı aktif bir görev üstlense de ağ teriminin geleneklele olarak pasif avla ilişkilendirilmesi uygundur. Bağlamda avcının balık avlamadaki başarısızlığının sebebi talihsizlik ve kader olarak açıklanmıştır.

*hikāyet bir za’if şayyādın-(nı) ağına kavi*

*balık tüşti tuta bilmedi balık şayyād ilinden*

*ağın alıp kitti şî’r*



*kiltürür irdi hemişe ağ balık-nı tutup  
kitti bu nevbet alıp balık ol ir ağın yutup  
özge şayyādlar aña melāmet kılıp ayttılar anıñ  
bigin şayd iline tüşti tuta bilmediñ ayttı  
ay qarındaş-lar nitse bolur çün benim andan  
naşibim yoq dağı anıñ sudan kısmeti bar idi meşel  
-de ayturlar ʔāli'-siz şayyād teñizde balık tuta bilmes dağı ecel-siz balık kuru yirde ölmes şı'r  
anı kim haq halāş itse belādan  
kiter ile (eyle?) alıp şayyād ağın (Karamanlıoğlu, 1989, s. 93)*

“Hikaye: Bir zayıf avcının ağına kuvvetli balık düştü. (Avcı balığı) tutamadı. Balık avcı(nın) elinden ağını alıp gitti. Şiir:

Getirirdi daima ağ balığı tutup.

Gitti bu sefer balık alıp o adamın ağını yutup.

Kendine avcılar ayıplayarak söylediler: Onun

gibi av eline düştü, tutamadın.

Söyledi: Ey kardeşler! Ne yapsa olur (ne yapabiliyordum)? Çünkü benim ondan nasibim yok. Ve onun sudan kısmeti var idi. Atasözünde (şöyle) der: Talihsiz avcı denizde balık tutamaz. Ve ecelsiz balık kuru yerde ölmez. Şiir:

Allah kimi beladan kurtarsa

avcı ağını alıp öylece gider.”

**av** (III) “ağ” (TZ) krş. **ağ** (III)

**dām** “Far. tuzak” (GT, KF)

GT 197’deki şiirde **dām** adı verilen ve güvercin (genel olarak kuş) avlamada kullanılan tuzağa kuşu çekmek için **dāne** “darı” kullanıldığı tanıklanmıştır. Tabii ki buradaki **dāne-i dām** kullanımı biraz da edebî gelenekten kaynaklanmaktadır. Ancak bu edebî gelenek te günlük hayata dair bilgilerden kaynağını alıyor olabilir. Dolayısıyla buradaki bu kullanımın somut bir gerçeğe de işaret ettiğini, kuş tuzaklarına (**dām**) yem olarak çeşitli tahılların konulduğu düşünmekteyiz. Kuşun tuzağa yakalanması bağlamda **każā** “kaza, kader” kavramı ile açıklanmaktadır.

... şı'r

*kime zamāne cefā kılmağa tiler bolsa*

*birür hilāf-i murādın aña kilip eyyām*

*kügerçin öz vatanını yana kaçan körgey*

*każā aña kılur ise naşib dāne-i dām* (Karamanlıoğlu, 1989, s. 98)

“... şiir:

Devir kime eziyet etmeyi diler olsa

Zaman ona istediğinin zıttıdır verir.

Güvercin öz vatanını nasıl görecektir?

Kaza ona tuzakta (bulunan) darıyı nasip kılır ise...”

**fağ** “tuzak” (İH)

**fiğ** “(hayvan yemi olan) fiğ” (İH)

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

*ırgak* “çengel, balık oltası ve benzeri şeyler” (Kİ, TZ) krş. *ıgık* (BM)

*ilim* “balık ağı” (CC)

*kapın* “tuzak” (İH)

*karmak* (CC) “olta”

*sırık* “sırık, olta sırığı” (CC) krş. *suruk* (CC)

*tuzak* “tuzak, ağ (BM, CC, DM, GT, Kİ, TZ) krş. *tuzaq* (TA)

CC 59a/11’de tuzak kelimesi dinî bir benzetmenin parçası olarak bulunmaktadır. Bu bağlama göre şeytan, insanlara tuzaklar kuran bir avcıdır. Kişi şeytanın tuzağına yakalandıktan sonra ne kadar yardım istese ve ağlasa da onu tuzaktan kurtaracak yardım gelmez. Bu bağlamda avcılıkla ilgili yapılacak çıkarım, benzetme unsuru olarak düşünülen tuzağın kendisine *ilin*’ilen (ip vb. ile oluşturulmuş bir düzeneğe düzeneğe ya da ağa takılmak, ilişmek) bir yapıda olduğudur.

*tüşerler yekning tuzak[i]na ilnirler anda ilap asov yoh neçe çağırrsa* (Argunşah ve Güner, 2015, s. 251)

“Şeytanın tuzağına yakalanırlar. O zaman ağlayıp ne kadar çağırırsalar (da) yardım yok”.

CC 69b/5’de tuzak kelimesi yine bir dinî anlatımı pekiştirmek için benzetme unsuru olarak kullanılmıştır. Ancak bu sefer tuzak sevginin tuzağıdır, yani olumlu bir bakışa sahiptir.

*alay bizni ilind[i]rdi sövmekniñ tuzağı* (Argunşah ve Güner, 2015, s. 290)

“O şekilde bizi yakaladı sevmek tuzağı”

*kuş* maddesine bakınız (GT 200 (100b)).

*kuş* maddesine bakınız (GT 226 (113b)).

*av* maddesine bakınız (GT 336).

GT 145 (73a) 11. satır’da tuzak kelimesi bir benzetme unsuru olarak yer almaktadır. Bahsi geçen bağlamın avcılık açısından dikkat çeken unsuru, tuzak ve ayak arasında kurulan ilişkinin doğasında gizlidir. Burada atıfta bulunulan tuzak, esas olarak avın ayağını yakalayan bir mekanizmaya işaret ediyor görünmektedir.

*eyā ehl-i dünya ve şāhib-i ‘iyāl*

*ayağın tuzağı oğul kız irür* (Karamanlıoğlu, 1989, s. 72)

“Hey dünya ehli ve aile sahibi!

Ayağın tuzağı oğul ve kızdır.”

*kuş* maddesine bakınız (GT 140 (70b)).

GT 330 (165b) 11. satır’da avcılık bilgisi açısından ilk dikkat çeken unsur av-savaş faaliyetleri arasında kurulan örtük benzerliktir. Buna göre düşman kişiye hile ile tuzak kuran avcıya benzetilmektedir. Tuzak kelimesiyle birlikte kullanılan *kur-* yardımcı fiili, tuzağın yapısının karmaşık, inşa edilen bir şekilde olduğuna işaret etmektedir.

*düşmen alına aldanmağıl dağı meddāh medhine mağrūr*

*bolmağıl kim ol al tuzağın kurup-turur dağı* (Karamanlıoğlu, 1989, s. 164)

“Düşman hilesine aldanma ve dahi meddahın medhine mağrūr

olma. O hile tuzağını kurmuştur. Ve dahi ...”

*av* maddesine bakınız (GT 336).

*yırgak* “kanca, çengel” (CC)

### Avla İlgili Mekânlar

Av faaliyetlerinde avın gerçekleştirildiği mekân ve bu mekânın düzenlenişi dikkat edilmesi gereken bir konudur. İncelenen metinlerde av faaliyetinin gerçekleştirildiği, av hayvanlarının çokça bulunduğu yerlerin özel olarak *avlağ*, *avlu* ve *kama* gibi özel adlarla dile getirildiği görülmüştür. Bu av yerlerine av faaliyetini kolaylaştıran bir unsur olarak avcıların kalabilecekleri mekânların inşa edildiği ve bu mekânların *avçılar evi*, *gümele* ve *kelik* kelimeleriyle ifade edildiği tanıklanmıştır. Avlanan hayvanlardan biri olan tavşanın yaşadığı yere de özel olarak isim verilmesi (*yağuk*), bu konuda insanların dikkatini göstermesi ve avcılık faaliyetinde kullanılabilir olması açısından önemlidir ve değerli bir bilgidir. Son olarak yaban hayatın var olduğu alanları ifade etmesi açısından *yâbânlık* kelimesine de rastlanması, Kıpçakların bu konudaki dikkatinin bir ifadesi olması açısından önemlidir.

*avçılar evi* “çalıdan, ottan yapılmış küçük kulübe” (İH)

*avlağ* (I) “1. av (TZ) 2. av yeri (TZ)” krş. *avlu*

*avlu* “av yeri” (Kİ) krş. *avlağ* (I)

*gümele* “avcı evi” (İH)

*kama* “Ar. av yeri” (BV)

*kelik* (I) “avcı kulübesi” (İH)

*yâbânlık* “Far. T. sahra, yabanlık, dışarı” (Gİ, KF)

*yağuk* “tavşan yuvası” (TA)

### Avda Yardımcı Hayvanlar

İncelenen metinlerde Kıpçakların av faaliyetlerinde av köpekleri, at ve çeşitli yırtıcı kuşları (kartal, doğan vs.) kullandıkları tanıklanmış ve bu hayvan adlarına çalışmada yer verilmiştir. Av faaliyetinde köpekler iz sürme, avlanan hayvanı korkutma, kovalayarak yorma, vurulan hayvanı avcıya getirme gibi konularda eğitilmişlerdir. At aktif avcılıkta avlanan hayvan ile avcı arasındaki hız farkını kapatması (Polat, 2008, s. 56) ve avcıya avantaj sağlaması konusunda değerli bir yere sahip olmuştur. Ayrıca savaşlarda da kullanılan at ve binicisi arasındaki uyumun gelişmesi konusunda da avcılık önemli bir yer tutmaktadır. Yırtıcı kuşlar özellikle kuş avında, bazen tilki gibi görece küçük cüsseli hayvanların avında avı gerçekleştiren unsur olarak kullanılmıştır. Ayrıca bu gibi hayvanlar avlarını kuş bakışı izleyebildikleri için kovalamacayı da kolaylaştırmaktadır.

*arğan* “evcil köpek” (BM)

*at* (II) “at” (BM, BV, CC, DM, Gİ, GT, İM, İN, KF, KFT, Kİ, RH, TZ) krş. *ağ*

*barağ* “çoban köpeği” (İH, TZ)

*basan* “köpeklere verilen ad” (Kİ)

*çağan* “doğan kuşu” (Kİ)

*çakır* (II) “doğan” (İH)

*çarlağ* (II) “kartal” (TZ)

*çekük* “kuş” (İH) (emin değilim nerede)

*çoğan* “doğan, şahin” (BM)

*çura*: (< Far. Curra) yırtıcı bir av kuşu (CC)

*fehîd* “Ar. yabani bir hayvan, tazi” (KFT)

*güçüken* “kartal cinsinden bir kuş” (BM, İH)

*hayl* (I) “Ar. at” (BV)

*karakuş* “kartal, tavşancıl” (BM, DM, KK, TA, CC)

*karavaş* (II) “karakuş, sungur” (TZ)

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

*karçağa* “aladoğan, atmaca” (CC) krş. *karçığa* (CC, İM) (< Mo. harçaga)

*kelb* “Ar. köpek” (GT, KF)

*kerkes* “Ar. kerkenez, karakuş cinsinden bir kuş, akbaba” (DM, İH, İM, TZ)

*ķılbarķ* “tüylü av köpeđi” (Kİ)

*ķırđı* “atmaca” (BM, TZ) krş. *ķırđıy* (CC, İM)

*köbük* “tüylü köpek, it cinsinin iri ve tüylü olanı (DM) krş. *köfük* (DM), *köpek* (BM, İH), *köpük* (II) (Kİ)

*köçken* “kerkes kuşu, kartal” (Kİ)

*ķurđaş* “atmaca kuşu” (TZ)

*ķuruđı* “bir cins dođan kuşu” (Kİ)

*küçegen* “kartal” (TA)

*laçın* “dođan, şahin” (BM, DM, İH, Kİ, TA, TZ)

*parla* “tüyü az olan köpek” (TZ)

*sađanđus* “şahin, dođan” (BM)

*sar* (I) “dođan, akbaba” (CC)

*sođanđus* “şahin, dođan” (BM)

*sonđđur* “dođan, şahin türünden bir kuş” (CC) krş. *sonķur* (BM, Kİ), *sunķur* (II) (TA, TZ)

*şāhīn* “Far. şahin kuşu” (DM)

*ķavşancıl* “tavşancıl” (TA)

*ķazı it* “tazı” (DM, TA)

*toruntay* “şahin cinsinden bir kuş” (TZ)

*tuđđrul* “tuđđrul kuşu” (Kİ)

*yađđlabay* “dođan cinsinden çakır denen bir kuş” (TZ)

*yapalaķ* “kartal” (İH)

*yuntavlı* “at” (TZ)

*zađđar* “bir tür küçük köpek” (İH)

## Avı Yapılan Hayvanlar

İncelenen metinlerde ve çeşitli tarihî kaynaklarda Kıpçakların çeşitli nedenlerle kara hayvanları, balık ve kuşları avladıkları tespit edilmiştir. Kara hayvanlarından bazıları yırtıcı ve tehlikeli niteliğe sahip olduđu için bu hayvanlar prestij elde etme ya da korunma maksatlı avlanmış olabilirler. Bazı kara hayvanlarının kürklerinin değerli olması, onların avlanması için bir sebep olmuştur. Bazı hayvanlar sırf besin elde etme sebebiyle avlanmışlardır. Kuşların avlanmasının en temel nedeni beslenmek ve zor bir hedefi vurarak yetenek göstermek olabilir. Avlanan hayvanların arasında çeşitli kemirgen türleri de yer almaktadır.

*aķ aş* “as denilen derisi makbul hayvanın ak renklisi, kakum (İH), *aķ pars* “beyaz pars” (Kİ)

*aķulakaz* “telli turna, alaca kaz” (BM)

*ala yapışķan* “balıkçıl” (BM)

*anđıt* “Angıt kuşu” (Kİ) krş. *anıt*

*anır* “Pelikan kuşu” (DM)

*arasilan* “arслан” (BM, BV, CC, DM, GT, İM, KF, KFT, Kİ, RH, TZ) krş. *arслан*, *aslan*, *astlan*

*ās* “Far. gelincik” (BM, DM)

*ayrağ* “yaban keçisi” (TA)

*ayvuğ* “ceylan” (BM) krş. *ayvuğ* (BM, TA)

*azığlı* “vahşi” (İM); *azığlı kedik* “yırtıcı av hayvanı” (İM)

*badanağ* “yelve kuşu” (TZ)

*balık* “balık” (BM, BV, DM, Gİ, GT, İM, KF, Kİ, KK, TA, TZ) krş. *baluğ* (CC I)

GT 43’te su kaynağının civarında çeşitli yırtıcı hayvanların bulunduğu bilgisi verilmiştir. Hicaz halkı yırtıcı hayvanların tehlikelerinden korktuğu için susasalar bile bu su kaynağına gidip su içmekten çekinmektedirler.

GT 43 (22a) 9. satır

*şi’r-i āğar ter içinde susap hicāzî-ler*

*şūr su-nu (suv-nu) körüp yakın kilmes*

*ğanda kim tatlı su ağar bolsa*

*ğurt ve kuş balığ andan iksilmes* (Karamanlıođlu, 1989, s. 21)

“(Bir) diğer şiiir: Hicazlılar susayıp ter içinde

Şur Suyu’nu (Şur nehrini?) görüp yakın gitmez.

Ne zaman tatlı su akar olsa

kurt, kuş ve balığ oradan eksilmez”

GT 345’te *balığ*’ın avlandığı yerin deniz olduğu belirtilmiştir. Balığın avcı tarafından yakalanıp yakalanamaması talihe yüklenmiştir.

GT 345 (173a) 4. satır

... *ğikmet*

*ğāli’siz şayyād tenjizde balığ tuta bilmes dağı ecel-siz*

*balığ ħurı yirde ölmes* (Karamanlıođlu, 1989, s. 172)

“Hikmet:

Talihsiz avcı denizde balığ tutamaz ve ecelsiz

balığ kuru yerde ölmez”.

CC 60a/14

*uzun ağaç başında*

*Ulu bitiv bitidim;*

*Kemsen ovlı kelğey dēp,*

*Kemsen turup sağladım. Ol kar[mak] bile balığ.*

“Uzun ağaç başında uzun bir mektup yazdım; talihsiz ođlu gelecek diye, o talihsiz için bekleyip durdum. O olta ve balığ”.

*bars* “Far. yaban kedisi, pars” (BM, DM, İM, Kİ, KK, TA) krş. *pars*

*batuğ* “kara batağ kuşu” (Kİ)

*bedene* (II) “Ar. bıldırcım” (DM, KK)

*berbağ* “Ar. kaz” (İM)

*beyen* “sincap” (Kİ)

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

***bıldırıcın*** “bıldırıcın” (Kİ, TA) krş. *bıldurçın* (BM), *böyürçin* (Kİ)

***bilçik*** “kurt yavrusu” (TA)

***borğatoy*** “toy kuşu” (BM)

***borsuk*** “porsuk” (BM, Kİ)

***böri*** “kurt” (CC, GT, İM, KFT, KK, TZ) krş. *börü* (II) (BM, CC, Kİ, TA)

*Böri* kelimesinin avcılık bilgisi çerçevesinde kullanıldığı örneklerde, *böri*'nin yırtıcılığına ve ondan korunmak gerekliliğine vurgu yapılmıştır. Av faaliyetinin sürüleri yırtıcı hayvanlardan korumak için de gerçekleştirildiği bilgisi de tanıklanmaktadır.

GT 136 (68b) 13. satır

*şi'r yaşıl şahrâda koynu bir müslmân*

137 (69a)

*halâş itti böri ağzından âsân*

“Şiir: Bir müslüman yeşil bozkırda koyunu

kurdun ağzından kolayca kurtardı”.

4. satır

*sağındım âdemî hâşî seni men*

*böri-niñ şa'b-reki sen imiş-sen* (Karamanlıoğlu, 1989, s. 67-68)

“Seni ben insanın hası (olarak) düşündüm.

Kurdun daha güçlüsü sen imişsin”.

GT 334 (167b) 5. satır

... *şi'r*

*niçün kuru kamaştan şeker tama' kıılır sen*

*kilmes böri ilinden ferve-çi-lik bilür sen* (Karamanlıoğlu, 1989, s. 166)

“... şiir:

Niçin kuru kamaştan şeker elde etmek istersin?

Kurdun elinden kürkçülük gelmez, bilirsin.”

GT 100 (50b) 10. satır

*alnıñda yavaş koy bigin müşfik yâr*

*artıñda böri kibi teriñni yırtar* (Karamanlıoğlu, 1989, s. 49)

“Karşında yumşak tabiatlı koyun gibi merhametli sevgili

arkanda kurt gibi derini yırtar.”

GT 337 (169a) 7. satır

... *şi'r tişi itti börüge kim terahhum*

*kılır bolsa iter ol koy-lara zulm* (Karamanlıoğlu, 1989, s. 168)

“şiir: Dişi kurda, o koyunlara zulm ettiğinde acıdı”

***bulan*** “yaban eşeği” (TZ) krş. *bulnaç* (Kİ)

***bülçek*** “kurt yavrusu” (BM, Kİ)

*cânâvar* “Far. 1. canavar, vahşi hayvan (CC, DM, İM, KK) 2. canlı, canlı hayvan” (GT, KFT)



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**cırlak** “toygar kuşu” (İH) krş. *cırlayık*

**çağa** “tüyü bitmemiş kuş yavrusu” (Kİ)

**çapçuk** “serçe” (Kİ) krş. *çibçuk* (TA, İM), *çipçak* (BM), *çipçik* (CC, İM), *çipçik* (CC), *sıbşık*, *şifşak*, *şipşik*

**çarça** “Tatarca’da bir kuş adı” (Kİ)

**çerçe** “serçe” (Kİ) krş. *serçe*, *serşe*, *sirçe*, *sirşe*, *şerşe*, *şirşe*

**cırlayık** “toygar kuşu” (İH) krş. *cırlak*

**çil** (I) “keklik” (BM, CC, İH, Kİ)

**çiy** “akbaba cinsinden bir kuş” (TA) krş. *çi* (I)

**çobān aldağucu** “çoban aldatan denilen küçük bir kuş” (İH)

**çul** “çul” (Kİ)

**danguz** “domuz” (TZ) krş. *dangkuz* (TZ), *donkuz*, *toğuz*, *tojuz*, *tonguz*, *tonğuz*

**davuşağan** “tavşan” (BM) krş. *tavşan*

**deglügeç** “delice kuşu” (TA) krş. *devlengeç* (TZ), *devlingeç* (KK), *devlügeç (III)* (İH, TA), *tevlengeç*, *tüvlügeç*, *tülüveç*

**delā** “Far. sansar” (CC)

**delice doğan** “akbaba, çaylak” (İH) krş. *delü toğan*

**dilkü** “tilki” (Kİ) krş. *tilkü*, *tülki*, *tülkü*

**donğuz** “domuz” (KK)

**duğ** “toy kuşu” (Kİ)

**durgay** “toygar kuşu” (BM) krş. *turgay*

**durrāc** “Ar. bir cins keklik, keklik cinsinden olan turaç kuşu” (GT)

**eçki** (I) “keçi, teke” (BM, CC, KFT, Kİ, TA) krş. *içki* (TZ), *içkü* (İM), *ikşi* (III) (TZ), *işke* (TZ), *işki* (TZ)

**elik** “ceylan” (Kİ)

**enir** “pelikan kuşu” (DM)

**enük** “köpek ve yırtıcı hayvan yavrusu” (Kİ, TZ)

**erkeç** “erkek keçi, teke” (CC, Kİ) krş. *irkeç* (BM)

**esed** “arслан” (GT)

**esri** “pars” (Kİ)

**evrek** (I) “ördek” (BM, Kİ)

**fehîd** “Ar. yabani bir hayvan, tazi” (KFT)

**ğazāl** “Ar. ceylan, geyik” (BV, İM) krş. *gazel* (İM)

**göçek kuşu** “yazın içeri, kışın sahile veya çöle uçan kuş” (İH)

**göl bağısı** “balıkçıl” (İH)

**güverçin** “güvercin” (TA) krş. *kügerçin*, *kügürçin*, *kükerçin*

**hınzır** “Ar. domuz” (KFT)

**ıtlā kâz** “bir çeşit kuş” (TZ)

**ibük** “ibibik, çavuş kuşu” (İH)

**ilik** (II) “ceylan” (TA)

**iyiz** “kaşıkçı kuşu” (BM)

**ķabak** (I) “boynuzsuz koç” (İH)

**ķaban** “yaban domuzu” (CC, DM) (< Mo. habang)

**ķabilan** “kaplan, panter” (BV) krş. *ķablan* (DM), *ķaflan* (KK), *ķaplan*, *ķoblan*

**ķal** (II) “vahşi, yabani, canavar” (CC)

**ķaplan** “kaplan, panter” (BM, BV, İH, İM, TZ) krş. *ķabilan*, *ķablan*, *ķaflan*, *ķoplan*

**ķara teyin** “gri sincap” (CC)

**ķaraca** “karaca” (Kİ)

**ķara ķulak** “çakala benzeyen bir hayvan” (GT)

GT 46’da *ķara ķulak*’ın yırtıcılığı ve avcılarını yediğı vurgulanmıştır. Dolayısıyla bu hayvanın avlanması korunma amaçlı olmalıdır.

GT 46 (23b) 11. satır

*ķara-ķulak-ķa sordular arslan şuhbetin ni*

*sebeb-den ihtiyār kıldıñ ayttı şaydı-nıñ*

*fazla-sın yir men ...* (Karamanlıođlu, 1989, s. 22)

“Karakulak’a sordular: Arslan sohbetini ne

sebepden hatırladın? Söyledi: Avcının

fazlasını yerim ...”

**ķara kützen** “kokarca, kır sansarı” (CC)

**ķarılğaç** “serçe” (İM)

**ķarlağaç** “kırlangıç” (BM) krş. *ķarlağaç* (TZ), *ķarlağuç* (Kİ, TZ), *ķarlağaç* (KK), *ķarlavuş* (Kİ), *ķırlağaç* (TA), *ķırlağuç* (İH)

**ķarsak** “1. bozkır tilkisi, karsak ve derisi; post, kürk (CC) 2. çakal (TZ)”

**ķartal** “kartal” (BM, DM, Kİ) krş. *ķarṭal* (TA)

**ķaz** “kaz” (BM, CC, DM, GT, İH, İM, Kİ, KK, TA, TZ)

GT 180 ve GT 61’de *ķaz*’ın şişlendiğı ve yendiğı bilgisi dolaylı olarak avlandığı anlamına da gelmektedir.

GT 180 (90b) 6. satır

*ni ķadar kim semiz ise biryān*

*tere (terre?)-den kem körer anı toķ ir*

*aç yarlı tapıp bişi şalgam*

*şişlemiş ķaz iti bigin hoş yir* (Karamanlıođlu, 1989, s. 89)

“Kebap ne kadar semiz (olursa olsun)

tok kişi onu tereden (bitki) değersiz görür

aç ve fakir pişmiş şalgam bulup

şişlenmiş kaz eti gibi hoş (bir şekilde) yer“

GT 61 (31a) 9. satır

*buyursa biş yumurtkanı alurğa küç bile sulñān*

*nögerleri tutup sançar yigirmi kaznı bir şişke* (Karamanlıođlu, 1989, s. 30)

“Sultan güç ile (emir vererek) beş yumurtayı almaları için buyursa  
hizmetkârları yirmi kazı tutup bir şişe batırırlar”

*keçi* “keçi” (BM, KFT, Kİ, TA, DM)

*keđik* “her türlü av hayvanı” (İM)

*kejegen* “geçegen denilen kuş” (İH)

*keklik* “keklik” (BM, Kİ, TZ) krş. *kiklik*

*kelek* (I) “düz ve uzun burunlu büyük bir kuş” (TZ)

*kelenü* “tarla faresi” (İH)

*keskeri* “Ar. göl ördeđi” (İM)

*keşi* “keçi, teke” (DM)

*keyik* (I) “geyik, ceylan” (BM, DM, GT, KK, RH) krş. *kiyik* (I)

*keyik* (II) “vahşi hayvan” (CC, TA) krş. *kiyik* (III)

*keyik şıđır* “yaban sığırı” (DM)

*kılkuyruđu* “keklik, kılkuyruk” (BM) krş. *kılkuyruk* (Kİ, TA)

*kıyan* “tavşan” (TZ) krş. *koyan*

*kış kuşu* “serçe gibi bir alaca kuş” (İH)

*kızğaş* “bir tür kuş” (TZ)

*kızılça turgay* “kızıl renkli bir kuş” (BM, Kİ)

*kiklik* “keklik” (DM)

*kiş* (II) “samur” (CC, İM, Kİ)

*kiyik* “1. geyik, ceylan (GT, MG, RH) krş. *keyik* 2. av hayvanı (İM) 3. vahşi hayvan (TZ) krş. *küyüz*”  
*av* maddesine bakınız (GT 60).

*avcı* maddesine bakınız (GT 209 (105a) 4. satır)

*koç* “koç” (BM, Kİ, TA) krş. *koçkar* (BM, CC, DM, GT, İM, Kİ, KK, TA, TZ)

*kođı* “kođu” (TZ) krş. *ko* (I)

*kolan* (II) “yaban eşeđi” (KK, TZ) krş. *kulan* (I) (BM, Kİ, TA)

*kolat* “arслан, arслан gibi güçlü” (TZ)

*koyan* “tavşan” (BM, CC, Kİ, TA, TZ) krş. *kıyan*

CC 60B/23'te *koyan* yuvasına özel olarak bir ad verildiđi (*koyan ini*) görölmektedir. Bu yuvaların aranması ve bulunması tavşan avı açısından önemli bir avcılık bilgisi ve tecrübesi gerektirmektedir.

CC 60B/23

*Seşseş ayrı başında sėgiz koyan ini bar sėn anı tapmasaş sınık iy[i]n ulagıl avluş bile tapmasaş avruv iy[i]n*

“Koyun postu ayrı başında sekiz tavşan yuvası var. Sen onu bulmasan kırık ağrısı ile ağla. Aklın ile bulmasan acı ile”

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

*kögerçin* “güvercin” (GT, İM) krş. *kögerçün* (İM), küvercin, ökerçin  
*dām* maddesine bakınız (GT 197).

*köstebek* “köstebek, gözsüz tarla faresi” (İH, TZ) krş. *kösüz tümek* (BM)

*kuğu* “kuğu kuşu” (TZ) krş. *kuv* (II) (BM)

*kuşakaz* “telli turna” (BM)

*kumkuş* “kuş sürüsü” (TZ)

*kunduz* “kunduz” (İH)

*kurt* (II) “kurt, börü” (BM, DM, İM, Kİ, TA) krş. *kurut* (KK, TA)

*kuş* “kuş” (BM, BV, CC, DM, GT, İM, KFT, KK, TA, TZ)

CC 60a/19-20’de kuş avının taş atma şeklinde gerçekleştirildiği ve kuşun ağaca konduğu sırada avlandığı bilgisi dikkat çekicidir.

CC 60a/19-20

*uzun ağaç başında*

*Urguvul atlı kuş oturur;*

*Anı atma er kerek,*

*yüregine taş kerek. Ol tın.*

“Uzun ağaç başında urguvul adlı kuş oturur; onu vurmaya er gerek yüregine taş gerek. O ruh.”

*balık* maddesine bakınız (GT 43).

GT 336’da bulunan hikmetli sözde kuşun açlık ve yem yeme isteği nedeniyle tuzağa yakalandığı bilgisi tanıklanmaktadır. Kuşun tuzağa yakalanması *tüş-* eylemiyle ifade edilmiştir. Bu eylemin avcılık açısından kullanımı genellikle avın bir tuzak çukuru yardımıyla yakalandığını çağrıştırmaktadır. Ancak tuzağa düşmek eylemi zamanla anlamını genişleterek tuzağa yakalanmayı da ifade eder olmuştur. Buradaki kullanım eylemin anlam genişlemesine uğramış hali olmalıdır. Bağlamda tuzak ile avlanan avcı anlamında *şayyād* kelimesi kullanılmıştır. *Şayyād*’ın tuzağı hazırlaması *kur-* eylemiyle ifade edilmiştir. Dolayısıyla bahsi geçen tuzak karmaşık, kurulan ve inşa edilen bir mekanizma olmalıdır.

GT 336 (168b) 8. satır

*hikmet boğaz belası bolmasa idi kuş tuzak-*

*-ka түşmegey idi şayyād dağı tuzakın kurmağay*

*idi ...* (Karamanlıoğlu, 1989, s. 167)

“Hikmet: Boğaz belası olmasa idi kuş tuzağa

tüşmeyecek idi. Avcı dahi tuzağını kurmayacak

idi...”

GT 226’da tuzağı kuran avcının kuşu yakalamak için sabırlı olması ve beklemesi gerektiği bilgisi yer almaktadır. Dolayısıyla burada avcının tuzak düzeneğini harekete geçirmesi gerekliliği söz konusu olabilir. Yani buradaki tuzak avcının sabırla bekleyip kuş tuzağa girince düzeneği harekete geçirdiği bir yapıda olmalıdır.

GT 226 (113b) 9. satır

(özne bir kim-irse)

*ni kündüz sabrı bar idi ni kiçe kararı bir kuş bigin*

*kim tuzak-ka түşmiş bolğay* (Karamanlıoğlu, 1989, s. 112)

“ne gündüz sabrı ne gece kararı var idi. Bir kuş gibi

tuzağa düşmüş olacak”.

GT 140'ta kuşun tuzağa yakalanması aşkın mecazî bir şekilde ifade edilmesi için kullanılmıştır.

GT 140 (70b) 10. satır

*yoluñda dġn ü dāniř terk itip-men*

*bu mihriñni köñülde berk itip-men*

*men ol kuř-men niçelerden ħutulğan*

*seniñ ‘iřķiñ tuzağına tutulğan* (Karamanlıođlu, 1989, s. 69)

“Yolunda din ve ilmi terk etmişim

Bu sevgini gönülde sağlamlaştırmışım

Ben nicelerinden kurtulan o kuşum

Senin aşkının tuzağına tutulan”.

GT 195'te avcılık bilgisi sevgi kazanmak anlamını somutlaştırmak için kullanılmıştır.

GT 195 (98a) 11. satır

*törtünçi hoř āvāz kirek kim dāvūdġ nağme bilen*

*uçar kuř-nı akar su-nı tıy-ğay dağı ol bu fazilet*

*bilen ħalāyık köñlin řayd ite bilgey* (Karamanlıođlu, 1989, s. 97)

“Dördüncü, Davudi nağme ile hoř sesli (birisi olması) gerek

uçan kuşu akar suyu dahi durduracak bu fazilet (erdem)

ile halkın gönlünü avlayabilecek.”

GT 200'de kuşun açlık sebebiyle, içerisinde yem olan tuzağa yakalandığı bilgisi yer almaktadır.

GT 200 (100b) 1. satır

*közün bađlar derāhim ‘ākil irniñ*

*řama’ salur uçar kuř-nı tuzak-ķa* (Karamanlıođlu, 1989, s. 99)

“Dirhemler (paralar) insan aklının gözünü bađlar.

Uçan kuşu tuzağa doymazlık salar.”

GT 126'da av faaliyeti yine bir anlatımı somutlaştırmak için kullanılmıştır. Bu bağlamdan avcılık açısından yapılabilecek çıkarım, kuş avında ağ kullanıldığıdır.

GT 126 (63b) 3. satır

*düşmen seni körüben iygü ‘amel içinde*

*da’vġ kuřun tuta almas ħurup bahāne ađın* (Karamanlıođlu, 1989, s. 62)

“Düşman seni iyi amel içinde görüp

bahane ađları kurarak dava kuşunu (kendi iddiasını, davasını) tutamaz”

*kuř maddesine bakınız* (GT 140 (70b)).

**ķutan** “bir kuş” (TZ)

**ķutuķ** “yabani eşek yavrusu” (BM, Kġ) krş. *ķoduķ, ķuduķ*

**ķügerçin** “güvercin” (BM, BV, DM, KFT, Kġ) krş. *ķüverçin, ķügürçin* (CC), *ķükerçin* (KK)

**ķünen** “gelincik” (TA)

**ķüvüldür** “balıkçıl kuşu” (TZ)

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**küzen** (I) “gelincik, dağ gelinciği” (BM) krş. *közen*

**küzen** (II) “sansar, firavun sıçanı da denilen kokarca” (CC, Kİ, TZ)

**leklek** “leylek” (Kİ)

**mamrağ** “kurt yavrusu” (TZ)

**memreç** “ayı yavrusu” (Kİ)

**naman** “köstebek” (TZ) *naman sokur* “kör köstebek” (TZ)

**nusūr** “Far. kuşlar” (BV)

**oğaz** “bir çeşit kuş” (TZ)

**oğlak** (I) “oğlak, keçi yavrusu” (BM, DM, Kİ, TA, TZ) krş. *ağlak, avlak* (III), *oğulak, ulah*

**opea** “kör köstebek” (CC)

**ovlak** “keçi yavrusu, oğlak” (Kİ) krş. *ağlak, avlak* (III), *oğlak* (I), *oğulak, ulah*

**ördek** “ördek” (DM, İH, İM, TA, TZ) krş. *yördek* (BM)

**palang** “Far. leopar, pars” (CC) krş. *peleng* (GT)

GT 111’de kaplanın insanlara saldırdığı bilgisi tanıklanmaktadır. Dolayısıyla bu hayvanlardan korunmak gerekliliği söz konusu olmalıdır. Bu hayvanlardan korunmanın bir tarzı da onları avlamak olabir.

GT 111 (56a) 12. satır

*hikāyet şeyh sa’di aytur bir şālīh irni*

*kördüm teniz yakasında peleng zahmı bilen mübtela bolup...* (Karamanlıoğlu, 1989, s. 55)

“Hikaye: Şeyh Sadi söyler: Bir salih (dini emirleri yerine getiren) kişiyi

gördüm, deniz kıyısında kaplan yarası ile mübtela olmuştur.”

**pars** “Far. pars, yaban kedisi” (TZ) krş. *bars*

**sağasğan** “saksasğan” (Kİ) krş. *sağızğan, sağsağan* (I) (BM, TZ), *saksasğan* (İH, Kİ), *saksıkan* (İM), *sasıkan*

**şağın** “yaban eşeği” (TA)

**saka** “saka kuşu” (CC)

**savan keyik** “yaban keçisi, antilop” (BM) krş. *savun keyik* (BM)

**savsar** “Far. sansar ve derisi” (CC, İM, TA) krş. *sansar*

**sazan balığı** “sazan balığı” (İH)

**serçe** “Far. serçe” (BM, İH, TA) krş. *çerçe, serşe* (DM, TZ), *sirçe* (BV), *sirşe* (TZ), *şerşe* (TZ), *şirşe*

**sıçan** “sıçan, fare” (İH, KF, Kİ, TA, TZ) krş. *sıçğan* (BV, Gİ), *sıçkan* (BM, CC, İM, KK, TA), *sışan, sışkan, sışkan* (TZ), *şışkan* (KK)

**sıgın** “geyik, yaban öküzü” (BM, İH, Kİ, TZ) krş. *sıyın* (TZ)

**şığır** “sığır” (DM, KK, TA) krş. *sır* (I), *şır* (KK), *sığır, sıyır* (KK)

**şığırçık** “sığırçık kuşu” (CC, DM, GT bulamadım!), TA, TZ) krş. *şığırçık* (DM), *sığırçuk* (BM, DM), *sırşık*

**şığır keyik** “yabani hayvan” (TA)

**sırtlan** “sırtlan” (BM, DM, Kİ, TA, TZ) krş. *şırtlan* (DM), *surtlan* (KK)

**silevsün** “Moğ. vaşak, ve vaşağın kürkü” (CC)



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- sokağ* “ala renkli geyik” (İH)  
*sovun* “yaban keçisi, antilop” (BM, Kİ)  
*şovur* “yabani geyik” (Kİ)  
*sögen balık* “it balığı” (İH)  
*sövlün* “sülün” (CC)  
*şuğır şavşar* “gelincik” (TA)  
*süglün* “sülün” (İH)  
*şagal* “çakal” (DM) krş. *çağal*, *şakal* (DM, TZ)  
*şal* (II) “kakım, as denen hayvan” (TZ)  
*şıbışık* “serçe” (DM) krş. *çapçuk*, *çibçuk*, *çibçak*, *çipçik*, *çipçuk*, *çipçik*, *şıfşak* (KK), *şıpşık* (TZ)  
*şır* “Far. aslan” (GT)  
*tağuz* “domuz” (DM) krş. *danguz*, *dankuz*, *donguz*, *tonguz*, *tojuz*  
*tardar* “bir tür bildircin türü” (BM) krş. *tartar* (TZ), *tartaz*  
*tavşan* “tavşan” (DM, KK, TA, TZ) krş. *davuşgan*  
*teke* “teke, erkek keçi” (BM, BV, DM, KFT, Kİ, TA, TZ) krş. *deke*  
*teyin* (I) “sincap” (CC, İH, İM, TA)  
*teys* “Ar. teke, erkek keçi” (KF)  
*til kuş* “bir tür kuş” (TZ)  
*tilkü* “tilki” (BM, DM, İM, Kİ, TA) krş. *dilkü*, *tülki* (GT, TZ), *tülkü* (BV, CC, Kİ)  
*toğan* (I) “akbaba, çaylak” (BM, TA)  
*toğtoy* “toy kuşu” (BM) krş. *toğtuy* (BM)  
*toğu* “balık yavrusu” (TZ)  
*tonguz* “domuz” (BM, BV, CC, İM) krş. d’li halleri ve *tojuz* (Kİ), *tonguz* (TA)  
*toy* (II) “toy kuşu” (İH, Kİ) krş. *toy* (TA)  
*turğay* “serçe gibi küçük kuş, tongar kuşu” (BV, İH) krş. *durğay*  
*turna* “turna kuşu” (BM, CC, DM, İM, Kİ, TZ) krş. *turna* (DM, KK, TA)  
*tülüveç* “pelikan kuşu” (İM)  
*uğar kazı* “balıkçıl kuş, leylek” (BM)  
*übük* “ibibik kuşu” (TZ)  
*ügeyik* “üveyik kuşu” (TA, TZ) krş. *ögeyik*  
*üptek* “alaca ibibik” (DM)  
*vağşi* “Ar. vahşi, yabani” (BV, KFT)  
*yaban eşeği* “yaban eşeği” (DM), *yaban yeşek* “yaban eşeği” (DM), *yaban şığır* “yaban sığırı” (DM)  
*yabānī* “Far. yabani” (KK)  
*yalman* “dağ faresi, tarla faresi (BM, DM, İM, Kİ, TA, TZ)  
*yavri* (II) “balık yavrusu” (TZ)  
*yayın balığı* “tatlı su balığı” (İH)

*yazı gögerçini* “kumru, yaban güvercini” (İH)

*yeder* “kuş yavrusu” (TA)

*yelve* “bıldırcına benzer bir kuş” (Kİ)

*yirik* “su kuşu, martı” (BM)

*yumran* “köstebek, büyük sıçan” (İH)

## TARTIŞMA VE SONUÇ

Çalışmada Orta Çağ dönemine ait Kıpçakça eserler taranmış ve eserlerde avcılıkla ilgili olan terimler tespit edilmiştir. Tespit edilen terimler av faaliyetini ifade eden adlar ve eylemler, bu faaliyeti gerçekleştiren fail adları, avcılığın gerçekleştirilme tarzına göre aktif ve pasif av alet, yöntem ve tekniklerine dair adlar, av ile ilgili mekânlar, avcıya yardım eden avcı hayvanlar ve av faaliyetinin nesnesi olan hayvanlar düşünülerek tasnif edilmişlerdir.

İncelenen metinlerden av faaliyetini ifade eden adlar olarak Türkçe *av* ve Arapça *şayd* terimleri tanıklanmıştır. Bu iki terim de “avı yapılan hayvan” ve “av faaliyetinin genel adı” anlamlarına sahiptir.

İncelenen metinlerde av faaliyetinin genel adına +IA isimden fiil yapım eki getirilmesi sonucu *av+la-* ve *av+la-n-* eylemleriyle ve buradan gelişen *ulu-* (*avla-* > \**uvla-* > \**uvlu-* > *ulu-*) eylemi kullanılmıştır. Avın ok ya da benzeri fırlatmalı bir silah ile gerçekleştirildiğini ifade eden *at-* eylemi ve avın bir tuzak yardımıyla ya da elle yakalanmasına işaret eden *tut-* eylemi tanıklanmıştır. Avlanan hayvanın türüne atıf yapan *balık* kelimesine +IA isimden fiil yapım eki getirilmesiyle oluşan *baluqla-* eylemi bulunmuştur. Av faaliyetinin bir kovalamaca şeklinde gerçekleştiğini ifade eden *huvala-* eylemiyle avda kullanılan köpeği ava teşvik etmek için kullanılan seslenmeyi ifade eden *kişgir-* eylemine yer verildiği görülmüştür.

İncelenen metinlerde avcıyı ifade etmek için avı ifade eden isme (*avçı* ve *avlavçı*), avlanan hayvan adına (*baluqçı*), avda kullanılan alet adına (*oşçı* ve *sünüçü*) +çI meslek eki getirildiği tanıklanmıştır. Bunun haricinde Arapça avcı anlamına gelen *şayyād* ve *rāmī* kelimeleri de metinlerde geçmektedir.

İncelenen metinlerde av faaliyetinde kullanılan yöntemin türüne göre av aletlerini aktif ve pasif av aletleri olarak sınıflandırmak mümkündür. Aktif av aletleri olarak ok, yay, ok atmaya kolaylaştıran aletler ve süngü anlamlarına gelen kelimeler kullanılmıştır. Bu tür silahlardan ve silah parçalarından başka özellikle belli hayvanların avlanmasında kullanılan *çalış*, *kemān göre* ve *kuşluk* gibi kuş avlamada kullanılan özel ok ve alet adları tanıklanmıştır. Pasif av faaliyeti çerçevesinde kullanılan tuzak adları olarak *ağ*, *av*, *dām*, *fağ*, *ırğak*, *ilim*, *kaplan*, *karmak*, *sırıh*, *tuzak* gibi çeşitli pasif av alet ve yöntemlerine rastlanmıştır. Bu tuzak adlarından *ağ*, *av*, *ırğak*, *ilim*, *karmak*, *sırıh* özellikle balık avlamada kullanıldığı, *dām*, *fağ*, *kaplan*, *tuzak* adlarının genel manada “tuzak” kavramını ifade ettiği tespit edilmiştir.

İncelenen metinlerde avın gerçekleştirildiği mekânlara özel olarak çeşitli adlar verildiği tespit edilmiştir. Av faaliyetinin gerçekleştirildiği, av hayvanlarının çokça bulunduğu yerler özel olarak *avlağ*, *avlu* ve *kama* olarak adlandırılmaktadır. Bu av yerlerine av faaliyetini kolaylaştıran bir unsur olarak avcılarının kalabilecekleri yapıların inşa edildiği ve bu yapıların *avçılar evi*, *gümele* ve *kelik* kelimeleriyle ifade edildiği tanıklanmıştır. Avlanan hayvanlardan biri olan tavşanın yaşadığı yere de özel olarak isim verilmesi (*yañuk*), bu konuda insanların dikkatini göstermesi ve avcılık faaliyetinde kullanılabilir olması açısından önemlidir ve değerli bir bilgidir. Av hayvanlarının çokça bulunduğu yaban hayatının bulunduğu alanları dile getirmek için *yābānlık* kelimesinin kullanıldığı görülmüştür.

İncelenen metinlerde Kıpçakların av faaliyetlerinde av köpekleri (*barağ*, *basan*, *fehîd*, *kelb*, *kılbarğ*, *köbük*, *parla*, *tazi it*, *zağar*), at ve çeşitli yırtıcı kuşları (*çağan*, *çakır*, *çarlak*, *çekük*, *çoğan*, *çura*, *güçiken*, *karakuş*, *karavaş*, *karçağa*, *kerkes*, *kırgı*, *köçken*, *kurğaş*, *kurugi*, *küçegen*, *laçin*, *sağangus*, *sar*, *soğanguş*, *songgur*, *şahîn*, *taşancıl*, *toruntay*, *tuğrul*, *yağlabay*, *yapalak*) kullandıkları tanıklanmıştır. Av faaliyetinde köpekler iz sürme, avlanan hayvanı korkutma, kovalayarak yorma, vurulan hayvanı avcıya getirme gibi konularda eğitilmişlerdir. At aktif avcılıkta avlanan hayvan ile avcı arasındaki hız farkını kapatması ve avcıya avantaj sağlaması konusunda değerli bir yere sahip olmuştur. Yırtıcı kuşlar özellikle kuş avında, bazen tilki gibi görece küçük cüsseli hayvanların avında avı gerçekleştiren unsur olarak kullanılmıştır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

İncelenen metinlerde ve çeşitli tarihî kaynakalarda Kıpçakların çeşitli nedenlerle kara hayvanları (*ayrak, ayvuğ, bulan, eçki, elik, erkek, gazâl, ilik, kabak, karaca, keçi, kedik, keşi, keyik, keyik sığır, kiyik, koç, kolan, kutuk, oğlak, ovlak, savan keyik, sığın, sığır, sığır keyik, soğak, sovun, şovur, teke, teys, yaban eşeği*, ), balık (*balık, sazan balığı, sögen balık, toğu, yavri, yayın balığı*) ve kuşları (*ağulağaz, ala yapışkan, angıt, anır, badanağ, batuk, bedene, berbat, bildircin, borgağoy, cırlak, çağa, çapçuk, çarça, çerçe, çırlayık, çil, çiy, çobân aldağuçı, çul, deglüğeç, delice doğan, duğ, durğay, durrâc, enir, evrek, göçek kuşu, göl bağası, güverçin, ıtlâ kaz, ibük, iyiz, karılgaç, karlağaç, kartal, kaz, kejejen, keklük, kelek, keskerî, kılkuyrugu, kış kuşu, kızgaş, kızılça turğay, kiklik, koğı, kögerçin, kuğu, kulakaz, kumkuş, kuş, kutan, kügerçin, küvüldür, leklek, nusûr, oğaz, ördek, sağasğan, sağa, serçe, sığırçık, sövlün, süglün, şıbşık, tardar, til kuş, toğan, toğtoy, toy, turğay, turna, tülüveç, uğar kazı, übük, ügeyik, üptek, yazı gögerçini, yeder, yelve, yirik*) avladıkları tespit edilmiştir. Kara hayvanlarından bazıları yırtıcı ve tehlikeli niteliğe sahip olduğu için bu hayvanlar (*araslan, azıglı kedik, bars, bilçik, böri, bülçek, cānāvar, danguz, donguz, enük, esed, esri, hınzır, kaban, kabılan, kal, kaplan, kara kulak, kolat, kurt, mamrah, memreç, palang, pars, sırtlan, sağal, şir, tağuz, tonguz, vahşî, yabānî*) prestij elde etme ya da korunma maksatlı avlanmış olabilirler. Bazı kara hayvanlarının kürklerinin değerli olması (*ağ aş, ās, beyen, borsuk, davuşağan, delā, dilkü, kara teyin, kara küzen, karsak, kelenü, kıyan, kiş, koyan, köstebek, kunduz, künen, küzen, naman, opea, sağın, savsar, sıçan, silevsün, şugır şavşar, şal, tavşan, teyin, tilkü, yalman, yumran*), onların avlanması için bir sebep olmuştur. Bu hayvanların önemli bir bölümü kemirgendir. Bazı hayvanlar sırf besin elde etme sebebiyle avlanmışlardır. Kuşların avlanmasının en temel nedeni beslenmek ve zor bir hedefi vurarak yetenek göstermek olabilir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## METaverse EVRENİNDE SANAL OFİSLERDE ÇALIŞARAK DİJİTAL SATIŞ YAPMA TEKNİKLERİ

### TECHNIQUES FOR MAKING DIGITAL SALES BY WORKING IN VIRTUAL OFFICES IN THE METAVERSE UNIVERSE

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#### ÖZET

Metaverse bireyler, işletmeler ve devlet kurumları için çok çeşitli olası uygulamaları sergiler. Sanal dünyaların işlevselliğinin, kullanımının ve etkisinin zamanla artması beklenmektedir. Metaverse insanlar, şirketler ve devlet kuruluşları için geniş bir potansiyel kullanım yelpazesine sahiptir. Sanal dünyaların beklenen gidişatı, bunların yeteneklerinin, kullanımlarının ve etkilerinin zaman içinde genişleyeceğini göstermektedir. İlk incelemede, tüketici ve şirket eylemlerinin, genellikle "trendler" veya "modalar" olarak adlandırılan, geçici olaylar olarak algılanabilecek özellikler sergilediği sıklıkla görülür. Bununla birlikte, zamanla bu eylemler giderek dünya çapında kalıcı toplumsal öneme sahip olacaktır. Mevcut salgın, metaverse'in benimsenmesinde ve kullanımında önemli bir artışa yol açtı. Metaverse kullanımı, dijital pazarlama ve markalama alanında önemli bir ilerlemeye katkıda bulunmuştur. Metaverse, marka merkezli içeriğin üretilmesi ve yayılması için potansiyele sahiptir. Arttırılmış gerçeklik ve sanal gerçeklik (AR ve VR) gibi gelişen teknolojilerin yapay zekayla birlikte dahil edilmesiyle son derece gerçekçi sanal dünyaların geliştirilme potansiyeli açıkça ortaya çıkıyor. Bu çalışmanın amacı, yapay zekanın akıllı ofisler üzerindeki etkilerini, dijital satış tekniklerini, metaverse pazarlamasını ve metaverse işyerlerinde çalışmayı incelemektir. Ayrıca, bu alanda yürütülen araştırmaların nispeten az miktarda olduğu göz önüne alındığında, metaverse ve yapay zekâ gibi teknolojilerin önemini vurgulamak hedeflenmiştir.

**Anahtar kelimeler:** Yapay Zeka, Dijital Satış Teknikleri, Metaverse, Metaverse Pazarlama, Metaverse Ofis.

#### ABSTRACT

The metaverse exhibits a diverse range of possible applications for individuals, enterprises, and governmental entities. The functionality, utilization, and influence of virtual worlds are anticipated to grow over time. The metaverse has a wide array of potential uses for people, corporations, and governmental organizations. The anticipated trajectory of virtual worlds suggests that their capabilities, use, and influence will expand over time. Upon first examination, it is often seen that consumer and company actions exhibit characteristics that may be perceived as temporary occurrences, typically denoted as "trends" or "fads." Nevertheless, with time, these actions will progressively have lasting societal importance on a worldwide level. The current pandemic has led to a significant increase in the

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

adoption and usage of the metaverse. The utilization of the metaverse has contributed to a significant progression in the domain of digital marketing and branding. The metaverse has potential for the generation and dissemination of brand-centric content. The potential for the development of extremely realistic virtual worlds is evident via the incorporation of developing technologies, namely augmented and virtual reality (AR and VR), in conjunction with artificial intelligence. The purpose of this study is to examine the effects of artificial intelligence on smart offices, digital sales techniques, metaverse marketing, and working in metaverse workplaces. Additionally, the aim is to highlight the importance of technologies such as the metaverse and artificial intelligence, given the relatively small amount of research conducted in this field.

**Keywords:** Artificial Intelligence, Digital Sales Techniques, Metaverse, Metaverse Marketing, Metaverse Office.

## INTRODUCTION

The term "metaverse" denotes a theoretical domain that exists beyond the confines of tangible reality and is distinguished by its perpetual and lasting essence. The environment is characterized by its ability to accommodate multiple users and its seamless integration of components from both the physical world and the digital virtual realm. This phenomenon may be attributed to the integration of many technologies that enable interaction with virtual environments, digital entities, and people through several modes, such as virtual reality (VR) and augmented reality (AR). Hence, the metaverse might be characterized as an intricate network of interrelated immersive encounters inside enduring multiuser platforms. This technology enables continuous physical user engagement in real-time and dynamic interactions with digital entities. The earliest iteration of the system comprised a network of virtual locations, whereby users' avatars possessed the capacity to shift fluidly between them through the use of teleportation. The present iteration of the metaverse comprises socially oriented and immersive virtual reality technologies that enable interoperability with large-scale multiplayer online video games, open game worlds, and augmented reality collaborative spaces (Mystakidis, 2022).

While the concept of telework has been around for a substantial duration, its visibility in the collective consciousness of the public has experienced a notable increase with the occurrence of the pandemic. Moreover, it is important to acknowledge that telework has seen substantial growth in terms of its scope and use in recent years. Prominent corporations, like Microsoft, Google, Siemens, and Meta, have gradually integrated teleworking into their established work protocols and have actively promoted the use of a hybrid office model (Birkinshaw et al., 2021).

The concept of a metaverse office entails offering people the ability to personalize a digital representation of themselves, facilitating the establishment of metaverse offices by companies, and facilitating communication between participants in a virtual environment. The notion of teleworking is currently seeing a shift as it moves towards the metaverse office paradigm. The surge in the use of metaverse office spaces may be attributed to several factors, including the impact of the pandemic, the increasing trend of globalization, advancements in technology, and the excitement of investors, notwithstanding the advantages offered by telecommuting. The use of technology provides organizations with several benefits, including cost-efficient office space, adaptable work arrangements for employees, and a reduction in carbon emissions and energy consumption. In comparison to traditional office arrangements, the metaverse workplace offers notable benefits through its ability to foster heightened levels of peer engagement and greater collaboration. Nevertheless, the notion of a metaverse workplace continues to evoke concerns regarding privacy, security, addiction, equity, and usability (Chen, 2023).

The literature pertaining to working in the metaverse universe in virtual offices was examined. Choi (2022) ran an experiment based on scenarios and posits that the implementation of telework has the potential to alleviate population pressure in megacities by incentivizing citizens to relocate from these densely populated areas. His study focused on the classification of telework into two categories: metaverse telework and non-metaverse telework. Also, he aimed to empirically demonstrate the positive impact of both types of telework on an individual's intention to relocate from a megacity to a non-megacity. This was particularly relevant in light of the increasing number of companies adopting



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

metaverse teleworking offices. Popescu et al. (2022) thoroughly included both theoretical and empirical literature pertaining to virtual workplaces situated inside the metaverse. Given the growing amount of evidence about immersive remote collaboration tools, behavioral predictive analytics, and extended reality technologies, it is important to look into how important remote collaboration tools, metaverse technology, and workplace monitoring systems are in virtual office spaces that include immersive digital environments. Chen (2023) investigated the potential use cases of metaverse offices within organizational contexts. These include examining the impact of immersive work experiences, the limitations of weak social networks, and the effectiveness of virtual meetings. He examined the application scenario and discussed four levels of organizational change that are anticipated to occur as a result of the future metaverse office. These levels include the inter-enterprise ecological collaboration model, distributed autonomous organizations, flexible leadership, and individual belongingness.

## METHODS

The present study utilized document analysis and comprehensive literature research as data collection and analysis methodologies, respectively, to investigate previously published works pertaining to the metaverse environment and the digital sales strategies implemented within virtual workspaces. Furthermore, an examination was conducted regarding the implications of the metaverse in the domains of marketing, office labor, and the ramifications of artificial intelligence on smart work environments. The totality of this research has been concluded. This investigation seeks to address the dearth of knowledge and provide a comprehensive analysis by emphasizing the significance of various technological advancements, such as the metaverse and artificial intelligence. This examination aims to address the existing knowledge gap and contribute to the limited body of research on this topic.

## WORKING IN METAVERSE OFFICE

In fact, working in the metaverse provided a solution that satisfied the needs of employees as well as the requirements of a variety of stakeholders, such as employers and HR managers. This compromise was an attempt to overcome important hurdles that are connected with entirely remote work. These concerns include difficulty in managing workers from the perspective of the organization, as well as issues related to self-discipline, poor performance, and feelings of isolation from the perspective of the worker. Simultaneously, it attempted to reduce the drawbacks of conventional office labor, such as the high expenses involved with renting or constructing expensive office buildings for the firm and the financial burden of dwelling in pricey neighborhoods near the workplace for employees. In other words, it wanted to make traditional office work less of a financial burden. The workplace of the metaverse makes an effort to maintain the beneficial qualities of working remotely while also incorporating the advantageous aspects of working in person and offline. This is accomplished by the implementation of elements such as the enhancement of social ties and collaboration, the facilitation of rapid involvement, and increased visibility of workers and the jobs they perform. One of the most severe challenges that were faced was the uneasiness felt by employees regarding the increased level of monitoring that was made possible by the use of the metaverse as a working environment. This was the case despite the fact that there were a variety of benefits connected with the use of the metaverse as a working environment. The visibility of workers and their work in the metaverse has the potential to make HR management easier and to build an atmosphere that encourages collaborative working relationships in the workplace. However, new employees who are thinking about entering the metaverse but have not yet had direct experience with it may find the increased social interaction and visibility to be challenging. This is because of the greater visibility of the metaverse. In addition, when the workplace moves from a physical area into the metaverse, where there are fewer restrictions on the speech and behavior of workers, there is the possibility that all of their words and acts will be stored as digital recordings. This will take place when the office makes the transfer (Park et al., 2023).

Teleworkers who work in a metaverse office environment may demonstrate greater self-confidence in their capacity to engage in telework tasks effectively, even when they are physically distant from their employer's location, in comparison to teleworkers who operate in a non-metaverse office setting. As a result, it is likely that individuals who participate in metaverse teleworking will demonstrate a higher propensity to move from highly populated metropolitan areas to locations that provide lower living costs and better ecological circumstances, as compared to individuals who do not engage in metaverse

teleworking. Despite the growing use of telecommuting and the challenges faced by densely populated metropolitan areas due to population strain, there is a dearth of studies examining the impact of telework on individuals' propensity to transfer from urban centers to less crowded areas. One prospective strategy for policymakers is allocating financial resources to facilitate research on technologies linked to the metaverse, encompassing virtual reality (VR), augmented reality (AR), head-mounted displays (HMD), sixth-generation mobile networks, and blockchain (Choi, 2022).

### **ARTIFICIAL INTELLIGENCE FACTOR IN SMART OFFICES**

The emergence of Industry 4.0 has introduced a comprehensive framework for the advancement and implementation of intelligent smart offices within the context of the current industrial revolution. In the present day, the utilization of advanced technologies, particularly artificial intelligence (AI), plays a significant role in maximizing office spaces and minimizing electricity-related expenses. The technologies that enable the deployment of AI-powered intelligent work environments include the Internet of Things (IoT), mobile applications, machine learning, and cloud computing. In the present day, individuals are devoting a substantial amount of their time to working in office settings rather than in their own homes. The growing dependence on electricity among office workers is facilitating improved convenience and productivity inside the workplace. Modern industrial facilities are equipped with many types of machinery that require a significant amount of electrical power. The use of an Internet of Things (IoT)-enabled artificial intelligence (AI) framework is utilized to optimize energy consumption in home operations, particularly in the context of lighting and fan usage. Machine learning methodologies are utilized to analyze the aforementioned dataset, with the objective of generating a visual analysis that enhances understanding of power usage trends and indicates possible opportunities for energy reduction. Moreover, cloud computing is a pivotal component that augments the efficiency of the Internet of Things (IoT) and enables the secure retention of significant quantities of data. The platform offers features that allow individuals to contribute to computing resources over the Internet. Hence, it is not unexpected that the origins of cloud technologies may be attributed to several components, including frameworks, efficient computing virtualization, networking, software services, distributed computing, and parallel computing (Swaroop et al., 2023).

### **DIGITAL SALES TECHNIQUES AND METAVERSE MARKETING**

The metaverse facilitates the provision of items that are not accessible in the physical sphere, owing to its wide range of features and technology. The virtual sphere lacks inherent regulations, allowing marketers to employ considerable imagination and innovation. Consequently, they are able to provide unique items that surpass the limitations of the physical world. The virtual aspect of the metaverse provides firms with the potential to effectively interact with a wide range of consumers, thereby providing an enhanced level of immersion. The commercials included inside the metaverse exhibit a significant level of engagement, setting them apart from other media formats. The deliberate construction of advertising's design and attributes can be intentionally devised to surpass the boundaries of reality and provide people with an elevated and transformative encounter. The product's high degree of immersion and interactivity allows customers to engage with it in a virtual fashion, thereby aiding marketers in the development of more complete consumer purchasing behaviors. The core elements of marketing inside the metaverse have similarities to those utilized in the physical realm, with the aim of creating authentic and engaging customer experiences. In order to attain success, it may be important for digital marketing tactics to undergo a process of growth. The need to reevaluate marketing objectives arises when incorporating the metaverse into business operations, despite the prevalent encouragement among marketers to launch activations inside the metaverse (Dwivedi et al., 2023).

The concept of the metaverse, which represents a potential evolution of the Internet, has attracted considerable attention from academic and corporate sectors alike. The metaverse can be imagined as a virtual world that includes three dimensions, providing a very immersive experience. Participants employ augmented reality (AR) or virtual reality (VR) technology to engage in communication with other individuals through the use of digital avatars that function as their visual representations. While initial versions of the metaverse may be observed inside many Massively Multiplayer Online (MMO) games, the full realization of the metaverse is expected to exhibit increased complexity and rely on a diverse array of technological advancements. The use of blockchain technology has the capacity to

generate a substantial influence on the metaverse, resulting in the formation of a decentralized and democratic virtual community that possesses an independent economic and governance structure. The potential implications of the metaverse for the sales and marketing sectors are substantial since it presents the possibility of constructing virtual retail environments inside the digital landscape of the metaverse. Moreover, the integration of virtual factories inside the metaverse has the capacity to greatly enhance operational efficiency for organizations. In addition, digital workplaces offer a streamlined platform that enables efficient communication among individuals. In the context of the metaverse creator economy, individuals are endowed with the capacity to generate user-generated content (UGC) and participate in commercial endeavors inside the designated marketplace. This facilitates the accumulation of bitcoins and tokens as a kind of compensation (Truong et al., 2023).

### **FINDINGS**

Upon examination of the pertinent scholarly literature, it becomes apparent that there is a dearth of studies conducted on the subject of metaverse workplaces. This phenomenon becomes evident upon examination of the pertinent scholarly investigations. Upon examination of the relevant literature, it is evident that this knowledge has been revealed. This information may be acquired through the examination of research conducted on a subject closely similar to the current topic, indicating its source. The advent of virtual workplaces in the metaverse has provided workers with unique opportunities to develop innovative digital sales strategies. These job prospects within virtual settings enable individuals to explore and invent novel techniques for conducting sales transactions in the digital realm. This phenomenon can be attributed to the presence of several virtual workspaces inside these settings.

### **DISCUSSION AND CONCLUSION**

It is becoming more important to understand the function that artificial intelligence (AI) plays in enhancing customer service, driving product innovation, optimizing human resource allocation for creative endeavors, and implementing approaches for cost reduction within a range of organizational frameworks. Moreover, it is becoming increasingly common knowledge that artificial intelligence (AI), commonly referred to as machine learning, is an essential component in the process of moving forward with product creation. Within the context of metaverse marketing, the use of digital selling tactics by means of the building of virtual offices within the metaverse world is of utmost significance. This may be accomplished through the creation of virtual offices. The metaverse and the real world are brought together through the creation of a link in order to achieve this goal. As a consequence of this, it is vitally required to place a greater emphasis on the exploration and development of technologies connected to augmented reality (AR) and virtual reality (VR).

It is vital for the growth of countries to attain some level of grasp of the relevance of the metaverse in connection to digital transformation. This understanding may be gained through study. If businesses want to keep their advantage in the market and be able to adapt to the quick speed of change, it is imperative for them to increase the amount of work and initiative they put into the areas. Users of virtual environments might be assigned onerous numerical targets that, should they want to do so, may be difficult to achieve. Within the confines of a confined physical space, one of the potential activities that may be carried out is known as the consolidation of virtual avatars. This is due to the fact that it would be extremely difficult to host a large number of these animals at the same time due to the limited space available. As a direct consequence of this, it is very essential to put money into the development of digital technologies such as the metaverse, artificial intelligence (AI), blockchain, digital twins, virtual reality (VR), and augmented reality (AR).

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## A HOUSING REVIEW AT THE INTERSECTION OF ARCHITECTURE AND ARCHEOLOGY: EPHEBUS YAMAÇ HOUSES-2

### MİMARLIK VE ARKEOLOJİ ARAKESİTİNDE BİR KONUT DEĞERLENDİRMESİ: EFES YAMAÇ EVLERİ-2

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#### ÖZET

Bu makale, mimarlık ile arkeoloji disiplinlerinin ara kesitinde bir çalışma olarak, antik çağda konut yerleşimleri üzerine bir araştırma sunmakta ve antik çağda eski bir yerleşim olan, Efes Antik Kenti'nde bulunan, ilk ve önemli konut yerleşimlerinden Efes Yamaç Evler projesini incelemektedir. Efes Antik Kenti içerisinde kurulmuş olan bu son derece nitelikli Yamaç Evler konut projesi, zamanının çok ötesinde bir proje olup, teras evler tipinde tasarlanmış bir konut topluluğudur. Efes Yamaç Evler projesi, özellikle antik kent içinde bulunan diğer tüm farklı fonksiyonel yapılar olan, çarşı, pazar, anfi tiyatro, kütüphane, ibadethane ve tabi ki bağlantıları oluşturan cadde ve sokaklar, ile son derece uyumlu konumlandırılmış bir konut yerleşimidir. Yamaç Evler projesi bağlamı ile son derece uyumlu bir planlama olup, topoğrafyaya ve doğal çevreye uyumlu bir şekilde yerleşmiş, 7 adet teras ev ve onların peristil (avlulu ev) tarzında planlanmış, iklime uygun olarak tasarlanan avlularından oluşmaktadır. Bu doğal çevreye uyum ve iklimle barışık şekilde tasarlanan yerleşim, dönemine göre oldukça ileri bir konut planlaması örneğini teşkil eder. Çalışmada özellikle Peristilli avlu'nun çevresinde ki mekanlar ile kurduğu ilişkiye dikkat çekilmiş, ayrıca topoğrafya göz önünde bulundurularak tasarlanan teras evler tipolojisinin yaratmış olduğu özgün mimari özellikler; 7 konutun her birinin kendi manzarasının ve avlusunun olması gibi, Yamaç Evler yerleşkesinin planlamasının ne kadar özel ve özgün bir planlama olduğunun kanıtı gibidir. Bu bakımdan çalışmada, bu nitelikli konut projesi incelenerek, her bir konutun mekan organizasyonları, mekan sentaksı aracılığı ile ve ağaç grafikleri çizilerek özellikle mekan yerleşimlerinin, peristilli avlu etrafında ki organizasyonları incelenmiştir.

**Anahtar kelimeler:** Mekânsal tasarım, Antik konutlar, Efes Yamaç Evler, Mekân sentaksı, Peristil avlu

#### ABSTRACT

This article is a study at the intersection of the disciplines of architecture and archaeology and presents a research on residential settlements in ancient times and examines the Ephesus Yamaç Evler project, which was an old settlement in ancient times. This highly qualified Yamaç Evler housing project, established in the Ancient City of Ephesus, is a project far ahead of its' time and is a residential community designed in the terrace house type. Ephesus Hillside Houses project is a residential settlement positioned in harmony with all the other functional structures in the ancient city, such as; the bazaar, market, amphitheater, library, place of worship and ofcourse, the avenues and streets that form the connections.

The Yamaç Evler project is extremely compatible with its context and consists of 7 terrace houses and their courtyards, planned in peristyle (courtyard house) style and designed to suit the climate, settled in harmony with the topography and natural environment. The settlement, which was designed to adapt to the natural environment and be in harmony with the climate, constitutes an example of housing planning that was quite advanced for its time. In the study, attention has been given to the relationship between the peristyle courtyard and the surrounding spaces.

In addition, the unique architectural features created by the typology of terrace houses, designed taking into account the topography indicates the fact that each of the seven residences has its' own view and courtyard as a proof of how special and original planning of the Yamaç Evler project is. In this respect,



in this study, this qualified housing project has been examined and the spatial organizations of each house were examined through space syntax and by drawing tree graphics, especially the organization of the space settlements around the peristyle courtyard.

**Keywords:** Spatial Design, Ancient Houses, Ephesus Slope Houses, Spatial Syntax, Peristyle Courtyard

### 1. INTRODUCTION: SPACE & SPATIALITY & SPATIAL RELATIONS

Its' mainly aimed to explore spatiality and space relations of Yamaç Ev-2 dwelling units that are commonly organized around the peristyle courtyard. Thus, in the study firstly examinations on space and space relations have been realized. Than, Ephesus Yamaç Houses 2 have been explored as the field and case study with its' famous peristyle courtyards and all architectural features that are unique to Yamaç Ev-2. All 6 dwelling has been analyzed separately. Especially, dwelling-6 is investigated with its' large apse called 'basilica' as public space and an area for gatherings. Basilica is also the most huge and distinctive space with its' small lateral spaces organized hierarchically. Thus, a comprehensive spatial analyses and investigations into space organizations have been achieved. Yamaç Ev-2 settlement compromises unique space relations due to the topography such as; the peristyle courtyard of dwelling-6 transforms a scenery to the dwellings units 3-5-7. In addition, entrances of each house exhibit variations such as; 'side-front-back' street entrances also come forward. Each dwelling is unique by its' entrance hall due to the natural use of topography.

At the end, it's aimed to reveal spatiality of peristyle houses as an inter-discipliner study between architecture and archaeology. On the other hand, there is also a dynamic diversity between houses of Ephesus Yamaç Houses 2 and contemporary spatial relations existence will be examined over an antique style housing.

#### 1.1. Exploration of Space and Spatiality

Space architecture is an important dimension that distinguishes it from all other three dimensional production and design branches. (Necdet Teymur) Space is a place of a person or a group of people very simply. Space is an empty place that is determined by structure, material and character of organization where human beings, human relations involved and its' different from the area. (Gür Ş., 1996) On the other hand, Loidl & Bernard (2003) indicated that; "Pure space is an attempt to depict the (intellectual) construct of human space creation pictorially: space as a self-sufficient, inward-looking structure, characterized by equal, continuously closed boundary walls and a uniform, level surface. Space is a unit and we are in the middle of it" (Loidl & Bernard, pg:55, 2003)

Also as expressed by Loidl & Bernard (2003); "Area-unit spatial boundary relates to each other reciprocally: the weaker the 'spatial boundary' is, the more indistinctly it will function as a space-creating criterion, and the area-unit will have to assert itself all the more 'strongly' and clearly (and vice versa). The criteria 'weaker' and 'stronger' or 'clearer' always relate to degree of unity of **area-unit boundary**, or the degree to which they differ from their surroundings" (Loidl & Bernard, pg:50, 2006). Spaces can be defined by different sort of architectural elements physically such as; nodal elements (columns), vertical planes (walls), volumetric forms and level changes. By using planes more strong and enclosed spaces can be defined, whilst, by pointless elements more open, weak and integrated spaces can be determined, thus, the form of architectural elements create spatial degrees between weak to strong (Meiss, 2013). These dynamics between implicit to explicit or infinite to strongly defined borders of spaces create spatiality degree of spaces. The degree of spatiality increases from static to dynamic organizations and revealed into commonly open plan configurations with flexible and adaptable usages, which does not require any constructional changes. Space dividers can be both physical and non-physical.

#### 1.2. Overlapping and Transparency

One method of contemporary space organization is layering which consists of layers that overlap each other in one open space. There can be a total of four, five or six secondary or sub spaces in the same main space yet it appears as only one open space due to the overlapping methods used and the associated daily functions that occur in that space. It's observed that by overlapping, so many different spaces flow



and slide on each other because there is a very weak separation between, thereby is very dynamic space relation.

**Overlapping:** The closure of one of two shapes is a covering event. The rule is that overlapping shape at the front. Design elements such as; 'colour/value/texture' are utilized to further enhance the depth expression of the covering and consists of two types as vertical and horizontal overlapping.

**Transparency:** By transparency the overlapping and covered shape are better understood so that the three-dimensionality of depth and more accurate representation of the shape are provided. Transparency in structures can be provided not only with glass parts but also with the aid of lattice compartments.

### 1.3. Juxtaposition and interpenetration

There are two basic types of spaces that link to another space: juxtaposition and interpenetration. Juxtaposition consists of well-defined closed space sequences such as room, bedroom, cell, hall and corridor, which are all separated from other spaces with high levels of privacy and static. As indicated by Meiss (2010); spatial interpenetration creates continuity from one space to another from the moment an important element of definition; wall, ceiling, floor - appears to belong two or more spaces. (Meiss, pg.139, 2010) (Figure 1)



Figure 1. Exploration of spatial interpretation between 'kitchen-dining-living-work space' within open spaces

### 1.4. Horizontal syntax/juxtaposition

Spaces include density in addition to the depth, which indicates the syntax of spaces side by side, horizontally, which is generally useful when shallow spaces are the case. However, "Density is different from depth where serial visions and the overlapping of different functions appear in one space. Spatial relations can be expressed different sort of methods such as; by using different colors over 2d plans, interior elevations to express different functional spaces, and by using syntactic graphs" (Meiss, 2010) (Figure 2-3-4)



Figure 2. Horizontal overlapping of spaces; sliding light panels are used to create sub-spaces



Figure 3. Exploration of spatial relations by 2d plans and space syntax graph (Source: moddamavisehir.com)



Figure 4. Exploration of space relations

### 1.5. Space Organizations

Public spaces are defined with spaces which strongly have integration relations that all daily activities occur in one place such as; entrance, kitchen, living room, terraces, whilst, private compartments exhibit spaces for night and individual usages generally such as; ‘bedroom, dressing room, bathroom’. (Friedman A, 2012) Public spaces commonly exhibit multi-functional features suchas, a living room usage in daytime can be sleeping space at nights by the help of semi-transparent partitions and mobile furniture. (Figure 5)



Figure 5. Exploration space organization with space syntax method: 1+1.5 type house

## 2. EPHEBUS YAMAÇ HOUSES-2 AS FIELD AREA

### 2.1. Presentation of Ephesus Antique City-Unesco

Ephesus in Turkey’s Western Aegean coast near present day Selcuk in İzmir and is located 70 km güneybatı. While the area essentially lies on the plan in-between Bülbüldağ and Panayırdağ, the Virgin Mary’s house is located on the southern slopes of Bülbüldağ. Ephesus has always occupied an important place in transportation and trade between the Aegean Sea and Central Anatolia in the entire historical period. Having one of the largest ports, it was an economic platform and cultural intersection point between Anatolia and the Mediterranean World from the very beginning. Over time, Ephesus has always served as the main center for it’s surroundings, with fertile hinterland and rich natural resources for agricultural production. (Figure 6-7)

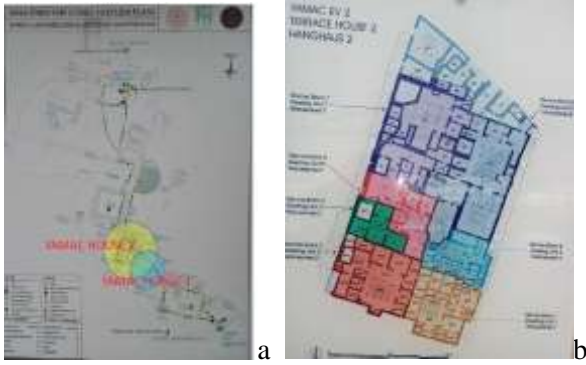


Figure 6. a. Ephesus Archeological Site Plan, b. Map of Yamaç House-2, exploration of 7 dwelling units by colors



Figure 7. a-b-c Recent years pictures of Ephesus Archeological Site, Kuretler Street (photos taken by author)

2012 was the 50.th anniversary of the discovery of slope house in Ephesus. Since its' discovery and especially the construction of the modern protective roof over it, these Roman residences in the center of the ancient city have become a complete attraction. The house group called Yamaç House-2, located in the city center of Ephesus and spread over an area of about 4000 m<sup>2</sup>, consists of seven houses on three terraces. Yamaç House-2 is one of the most scientifically important and remarkable monuments of Roman residential culture, due to its' extremely well preserved nature. In general, with Yamaç house-2, we are faced with a unique finding for the Eastern Mediterranean basin. (Ladstatter S.2013)

## 2.2. Topography and The Connection of Yamaç House 2 with Urban Architecture-Contextual Approach

By Yamaç House-2, we mean a residential complex in the center of the Roman Ephesus. The 4,000 m<sup>2</sup> insula was built on the steep Northern slope of Bülbülbağ located in the South of Ephesus. Yamaç house-2 is bordered by the road called Yamaç house street in the East-West direction to the South and Kuretler street to the North. The irregular route of the old ceremonial procession road, which is today called Kuretler street, which does not match the city's grid plan, is the reason the trapezoidal shape of the insula. On both sides of the building complex, to the East and West, it is limited by two stairways that meet a 27 mt elevation difference and give access to residential units.

In it's original form, the building complex consisted of residential units of almost the same size, with plots varying between 400 and 600 m<sup>2</sup>, closed on three terraces. Just the location of the Yamaç House-2 in the heart of the city center of the Roman Ephesus indicates that the inhabitants of the city were members of the higher layer of the city, who had the financial means to acquire property and property in this distinguished district.

Housing units in Yamaç house-2, are the city residences of famous and wealthy Ephesus citizens. Apart from this private residences, these houses also served the host to carry out their businesses, that is, to receive guests and customers and to show themselves out in general by these families.

Yamaç Houses 2, located with the borders of Ephesus ruins, are a residential area consisting of seven Roman houses of the ancient city. These very well-preserved houses that are built on terraces at the foot of Bülbül Mountain. Ephesus Yamaç Houses-2 area where the notables of Ephesus lived in antiquity, was a cemetery in the Hellenistic period before it was transformed into a living space by the Romans. The houses, whose first construction date was determined as the 1st century AD, were used until the city was abandoned with various additional changes in the following years. (URL 1) (Figure 8)

(source:<https://www.kulturportali.gov.tr/turkiye/izmir/gezilecekyer/efes-yamac-evler>)



Figure 8. Recent year view of houses in the ruins (photos taken by author)

### 2.3. Iconic Peristyle Gardens as Space Explorations

As defined by Cortes (2014); ‘*The second courtyard, where the atrium, which is a courtyard system surrounded by columns within high walls closed to the outside, is opened by an opening with columns on one side is called peristyle*’ (Cortes,2014). The peristyle seen in the 2.nd century BC Hellenistic and Roman architecture is completely open and most of the rooms of the house opened to this area. (Ilgin,2008) A garden was built in the middle of this courtyard, which is the traditional living space of the family and the Romans adapted Greek peristyle gardens to these atrium houses.

According to Özköse; ‘Peristyle was used as a garden in Romans, it was surrounded by rooms reserved for guests or servants’ (Özköse, 1995). Roman peristyle is not a passage court like in the Greek peristyle, it holds the place of the garden and is decorated with a pool. In addition to being a promenade, the galleries with columns increase the splendor and beauty of the courtyard with the decorations of various architectural and sculptural works.(Morkoç 2008)(Cortes A., 2014). According to Farar (1998), Roman peristyle represented the outer space brought to the interior by combining the stone-paved Greek Peristyle with Italian Garden. The peristyle was a central inner garden and was implemented as a domesticated version of the wild nature. The Romans preferred to create an order in their gardens, on nature, whether wild or cultivated. (Cortes A., 2014) (Figure 9)

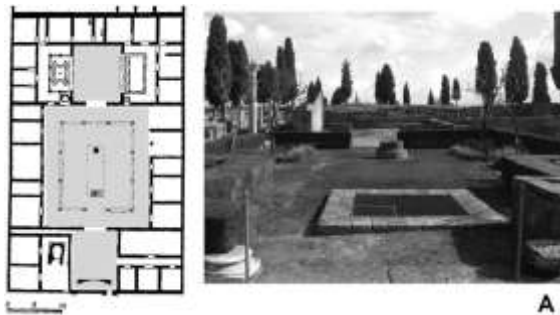


Figure 9. A Roman peristyle house (source: Ada Cortes Vicente)

As indicated by Cortes; ‘*It’s an ongoing and complex discussion to define what a porticated courtyard, atrium, atriolum or peristyle is. For example, in Catalonia one finds examples of houses that could wrongly be identified as atrium houses. After close examination of their architecture and socio-historical context one realizes that they are porticated court houses*’ (Cortes A.,2014).

The peristyle house is essentially the house built around a peristyle, as the main transit area of the domus. As indicated by Cortes(2014), the axial layout consisting vestibule, peristyle and diningroom, is unique to imperial period peristyle houses. This transition space accommodates different porticos inside. Surprisingly, peristyle house may include courts more than one such as; house with two courtyards, but the main distribution of space is happen through peristyle.



In fact, it is important that when identifying this construction style in the bibliography, it is described as **peristyle house** and **porticated court house** without explaining the use of one nomenclature or the other. In Meyer's work (1999), examples of the two typologies appear under the same label: axial peristyle house. (Cortes A., 2014)

Hellenistic style peristyle was a central space and patio, covered with stone mosaic or marble, that ensures link to the backside rooms of the house. But Romans added porticos to this patio and imitated Hellenistic garden with more natural elements and arranged as open public space. (Cortes A., 2014)

### 2.4. Vestibule-peristyle-tirclinium spaces and their relations

Accordingly to Knight; 'Atrium-type dwellings, common in early imperial samples, were arranged on the atrium-tablium axis' (Knight, 1994). In imperial era residences, the atrium is generally positioned between the **vestibule and the peristyle**. The houses examined in Italy since the end of the 2nd century BC show different arrangements according to their axes. In most of these houses, defined as axial peristyl dwellings, the **vestibule-peristyl-tirclinium** sections are positioned in such a way that they can be transitional. (Figure 10)

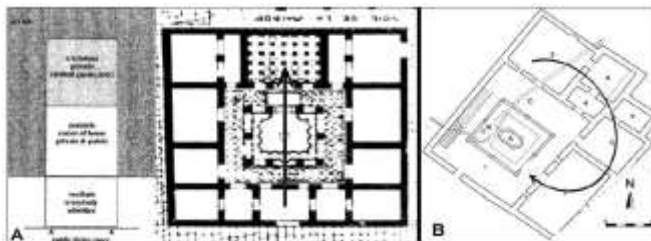


Figure 10. The three axial areas which mark peristyle Roman house from the High Empire (scheme: Meyer 1999) B: view of of the centripetally Greek house (plan: Athens 10, Bonini 2006) (Cortes A., 2014)

The difference between Roman and Hellenistic style peristyle houses comes from their space distribution and use of structural elements such as portico. At Roman houses, space organization consists of a strong link between; 'vestibule (entrance hall)-peristyle courtyard-dining room' spaces axially. But, on the other hand, at Hellenistic houses, spaces organized around courtyard centrally instead of axially. (Zaccaria, 1995) (Meyer 1999)

The difference between two houses reflects a privacy concept of interior organization. However, at Roman peristyle house, privacy of interior spaces are very strong by the help of axially and deep space organization, but on the other hand, at atrium houses by centrality and shallow space organization, interior spaces are open to public. (Ghedini, 2003) (Cortes A., 2014)

This axial organization of vestibule-peristyle-dining room might have variations. And, Roman garden, in addition to its functional use, ensures physical comfort to rooms with green decorations. The peristyle was a central inner garden and was implemented as a domesticated version of the wild nature. (Cortes A., 2014)

### 3. HISTORY OF EFES YAMAÇ HOUSES

As a result of the excavations, ruins have been found showing that the hillside houses were built in the 1st century AD during the Augustus period and were used by repairs and modifications many times until the 7th century AD. Houses underwent major changes in the 2nd century AD. It's understood from the processing of these subjects on the frescoes that the hosts of this period were very interested in fine arts and theater plays. (Ephesus Mz. Directorate Archaeologists, 1995) (Figure 11)



Figure 11. Sample of Peristyle garden

### 3.1.Efes Yamaç House-1

The east of the two islands (insulae) unearthed by excavations were excavated under H.Vettres in 1960-67. The area covered by this insulae, which forms a building block in a modern sense, is approximately 3000 m<sup>2</sup>. There are six sitting units built as three terraces in the slopes of Bülbül Mountain. The seating units have been planned in accordance with the Hellenistic architecture in the form of rooms and other spaces lined up around the peristyle in the center. These houses, which have all the comforts of the era, are also located in an important part of the city. Some even small baths were found during excavations. The spaces are small and there are apses on the narrow sides.

### 3.2.Ephesus Yamaç House-2

The settlement traces on the northern slope of the Bülbül Mountain date back to the Archaic Age (7.th/6.th century BC). At that time, this area was used as a cemetery in the Hellenistic Period (ca 200BC), the slope was divided into parts by numerous terrace walls, and later it was subjected to an unplanned construction consisting of small units. Slope house 2 can be described as an insula ( a house rented to many people) with an area of approximately 4.000 square meters today. There are six different houses on the three terraces, each with separate entrance. There are two streets on both sides of the island, covering a 27.5 meters level difference as topography. The northern side of the hillside house 2 is bordered by a row of taberns (shops) on Kuretler street, and the 'Yamaç Ev street' which conforms to the grid plan of the Ephesus City, forms the southern border.

The seating units, which were built in the Early Roman Imperial Period (around AD 20) are characterized by a multi-storey central courtyard surrounded by rows of columns (peristyle) around which the working spaces for sitting and housekeeping are grouped. Water needs and expenditures were provided by walls, as well as a canal system divided into many branches. While the official reception halls or rooms of the house are decorated with rich decorations, parts of the house for study and use such as the kitchen and toilet have been left simpler. It is thought that the upper floors, which have not survived to the present, and are used for the purpose of hosting and visitin are especially luxurious floors.(Figure 12)



Figure 12. Recent years view from anfi-theater, (photos taken by author)

**\*Dwelling Unit-1:** Dwelling unit-1 indicates last pahase in the 3.rd century AD. Especially, noteworthy in project is the bath (SR3), furnished with a bath tub in the Northeastern part of the room and floor heating, as well as the high quality wall paintings of the theatre room (SR 6). In the main part of these paintings servant figures and theater scenes are displayed a mythological scene is preserved in the upper part. (Ladstatter S.,2013). (Fig 13)





Figure 13. Spatial explorations of dwelling unit-1

**\*Dwelling Unit-2:** In Dwelling Unit-2, the early Roman imperial ground plan was used until the destruction in the 3rd century AD. The entrance in the West leads to a small peristyle courtyard (SR27) whose Western hall was over built by a mill in the early 7th century AD. The main rooms were arranged around the central peristyle courtyard (SR22/23). A luxurious reception room (GEW D) with high quality wall and floor fittings opened onto the Southern hall of the peristyle. During the excavation numerous finds of the last period in the 3rd century AD were found. (Ladstatter S., 2013). (Figure 14-15-16)

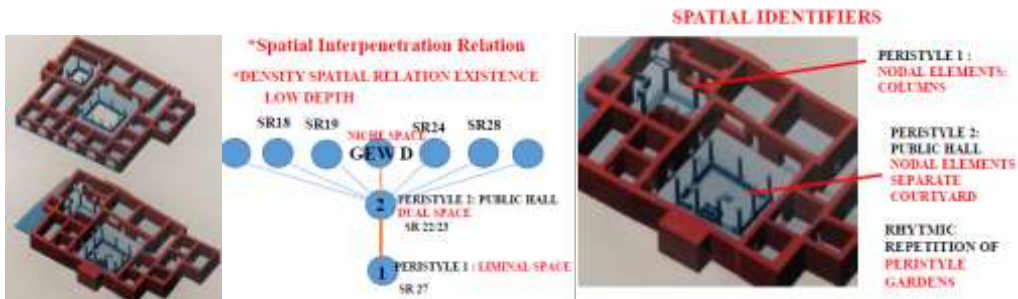


Figure 14. Spatial explorations of dwelling unit-2



Figure 15. Spatial explorations of dwelling unit-2



Figure 16. Recent years views from peristyle courtyard of dwelling unit-2 (photos taken by author)

**\*Dwelling Units 3 and 5:** Originally a single house, units 3 and 5 were split into separate houses in the 2nd century AD. The small unit-3 boasts a rich figurative mosaic embellishment in three rooms and decorative wall paintings in the room of the Muses. (12). The utility rooms of unit-5 were reduced due to the installation of the Basilica (8) in the east but the unit still comprised representative rooms. A fountain was installed at the Southwestern corner of the courtyard. (Ladstatter S., 2013). (Figure 17)



Figure 17. a) Spatial explorations of dwelling unit-3 and 5. b) Reconstruction of peristyle courtyard of dwelling unit-5

**\*Dwelling Unit 4:** Like all the other dwelling units of Yamaç house-2, unit-4 was originally organized as a peristyle house. Due to the extension of unit-6 to the North (erection of the rooms 8 and 31) the area of unit-4 was reduced. The Peristyle courtyard (21) and the water basin installed there were replaced by a walled courtyard divided by pillars. The statue of the goddess Artemis which was originally set up at the basin was transferred to a niche in room. (Ladstatter S.,2013). (Figure 18-19)



Figure 18. Spatial explorations of dwelling unit-4



Figure 19. Peristyle courtyard of dwelling unit-4 (photos taken by author)

**\*Dwelling Unit 6:** In the 2.nd century AD the owners of the spacious unit-6 (surface area 950m<sup>2</sup>) can be identified with the family of C. Flavius Furius Aptus who held municipal and peristyl offices. Comprising the banquet halls on the Southern side, the splendid marble hall (31), the basilica (8) and the stucco room (8a), this dwelling unit resembles a palais. In the 3.rd century a private bath was built into the Eastern hall. This room is one of the areas of unit 6 which were used after demolishment. (Ladstatter S.,2013)(Figure 20)

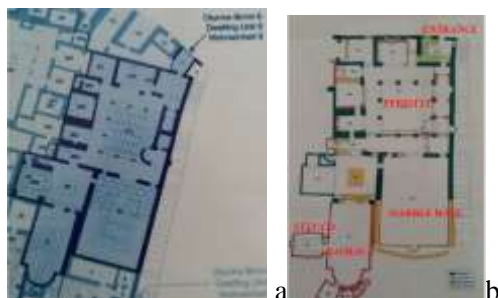


Figure 20. Peristyle courtyard of dwelling unit-6

**\*Basilica (Bazilika):** The basilica was constructed with an apse and a barrel vault. Here, guests and clients were received by the owner. The main and lower parts of the walls bear traces of marble decor, the upper parts of the walls and the barrel vault are decorated with frescoes. The high quality decor of the Room 36 in front of the Basilica features a similar decoration. A water basin is situated in the center of this room which was roofed by a cross vault. (Ladstatter S., 2013).(Figure 21-22)



Figure 21. a) Basilica and the apsed hall of the dwelling unit-6, b) Marble hall of dwelling unit-6



Figure 22. Spatial explorations of dwelling unit-6

**\*Peristyle courtyard:** Originally the peristyle courtyard of dwelling unit 6 featuring 8 columns had at least two floors. The peristyle made accessible the Northern and Western rooms, but also the large hall (31) in the South. Floors and walls are decorated with marble fittings, a basin is installed along the South side of the courtyard. (Ladstatter S., 2013). (Figure 23)



Figure 23. Spatial Identifier of Peristyle courtyard: 4\*4 pillars as nodal elements

### \*Dwelling Unit 7



Figure 24. Spatial explorations of dwelling unit-7

## 4. SOCIAL LIFE OF YAMAÇ HOUSES-2 AND GENERAL FEATURES OF HOUSING UNITS

The first concept of Yamaç house 2 belonging to the Early Imperial Period consists of six residential units located on three terraces, with at least one upper floor approximately the same size (400-600 m<sup>2</sup>) peristyle house types. In the course of their use spanning almost 300 years, the houses have undergone changes that made them very different from their original state. As a result of these changes, the house standing on the middle terrace was divided into two as the 3.rd and 5.th residential units in the



continuation of the 2.nd century AD. And a city house like a palace emerged as the housing unit numbered 6 became imposing. (Ladsatter S.2013) The main entrances of the houses were usually on narrow streets with stairs and these entrances were emphasized as partly marble-covered main gates.

#### 4.1.Repetition of Courtyards

In the first building phase of Yamaç house 2, two types of peristyle houses are distinguished in terms of plan typology. The hallmark of the first type is a central pillared courtyard that can be accessed via narrow entrance. The courtyard was surrounded by galleries that allowed access to other parts of the house. In the second type; although the central peristyle surrounded by colonnaded galleries remained unchanged, another courtyard was placed in front of it, serving as a transition or connection space for relations with side spaces. (Ladsatter S.2013) (Figure 25)



Figure 25. a) 1.st building phase, dwelling unit-2; 1st building phase, b) Exedra of dwelling unit-1

The central peristyle courtyard functioned as the connecting space, communication point, and an ostentatious reception room for guests and clients. For this reason, the center of the house and the place where the heart beats has gained an extremely elaborate and partially magnificent equipment with cut stone architecture, marble and colored, stone wall coverings, very high quality wall paintings, multi-colored mosaic floors and ornamental fountains. (Ladsatter S.2013) Thanks to the reliefs and scultural groups and their decorative display, these columns emphasized the importance of the courtyards as the core parts of the show of houses. Open courtyards also fulfilled the functions of being the light source and ventilation of the house. There were regulations regarding the house cult in the entrances of the houses or in the courtyards. Their form could differ depending on the possibilities preferences and tradition in the family. In this context, there were also many spaces devoted to small cult rituals in which heros and funeral dinner reliefs were placed. Generally in the southern part of the houses, there were places or space groups that were especially prominent with their favorite positions and ambitious equipments. (Ladsatter S.2013)

#### 4.2.Space Organizations

There should be areas of acceptance and service in these areas. Taking advantage of the slope location, small rooms were also opened in the South by carving from the bedrock. These rooms were used for the storage and cooling of food. On the other hand, in the North there are generally large reproduction venues where guests are welcomed and symposiums and conviviums are held. These spaces generally opened to courtyards with wide door and window openings and they were very impressive with their magnificent hard-ware and decorations. (Ladsatter S.2013)

Other spaces with strong equipment were generally located directly opposite the entrances, directly adjacent to the courtyard. These spaces would immediately attract the attention of the visitors. It should be mentioned that there are many side spaces such as cubiculum and cella (bedroom) in addition to these main spaces. These were accessible either from the courtyard galleries or from other rooms. (Ladsatter S.2013)

Their simple decorations were different from the others with their secondary positions in the house layout and they served as bedrooms and refection rooms. In the ancient World, there were no spaces reserved only for children in the Roman period. The children of the hosts either slept in the same room as their parents. Servants slept in the courtyard or in the workshops. Housework, kitchens and latrines were predominantly at the entrance to homes and could be shared by several residential units. In addition, the houses had rooms and bathrooms that were heated to the high standard of living of their inhabitants. (Ladsatter S.2013)

#### **4.2.1. Multi-Layered Spaces & Spatial Depth- Vertical Syntax**

All residential units have an upper floor. It has been proven that residential units 4 and 6 also have a second floor, at least in the end-use phase (260 AD). It is plausible that the plan of the upper floor resembles the lower plan, even for static reasons alone. Access to the upstairs can be both by stairs at downstairs in the courtyards and vestibules, these could have the same entrances directly from the upper floor.

Such a situation has been proven, for example, for the residential unit 4, where a staircase parallel to the 1.st staircase street opens to the first floor of the building. The same is likely to be the case in the housing no 7, the upper floor of which can be accessed from the 3.rd stairway street. This was not a must, as it could be directly linked between the ground floor and the upper floor. Another possibility is that there are workplaces on the upper floors that open to the street side and do not have to have a spatial connection with the house itself.

Although the equipment and items of the ground floor are mostly recovered in situ or where they fell, the reconstruction of the appearance of the upper floors should be done based on the finds in the destruction layer.

#### **4.2.2. Upper floors**

It should be noted that the equipment of the upstairs residences, which partially overshadow the downstairs, is remarkable. The SANATKARE in the dwelling unit-6 with an assertive mosaic floor, stepped fountain and hot air heater are a good example of this.

In addition, on the upper floors, there were all the functional areas needed in a Roman house. These included colonnaded courtyards, show off sections, tricliniums, and partially heated cubiculum as well as workshops or latrines, kitchens or small courtyards.

One of the typical features of Yamaç house-2 is that the individual housing units are connected with the other and some areas are shared. These include especially households, places for water supply and latrines. In this case, it was generally possible to move from the upper floor of one house to another. Another reason for the attractiveness of the upper floors may be that it offers the opportunity to watch the impressive view of the city and its' surroundings with the help of the terraces and windows facing outside. (Ladsatter S.2013)

#### **4.3. Lighting and ventilation**

The natural lighting and ventilation of the houses, especially the ground floors, was provided through the central and open peristyle courtyards. High windows above the doors and the door openings themselves were contributing to the ventilation of the space. (Fig 49) Large glazed window set in wooden frames, for example, courtyards with peristyle (SR 22/23; 38B) in residential units 2 and 7, separated from the adjacent representation spaces. (Fig 26) (Ladsatter S.2013)



Figure 26. a) Window of dwelling unit-6 on the hall, b) Dwelling unit-7 peristyl courtyard relation with neighbour with window

#### **4.4. Roofs**

The galleries on the sides of the colonnaded courtyards, which are the central elements of each housing unit, were covered with inward-sloping roof surfaces, and the middle was open. The gallery roofs could be in the form of a single pitch or gable roof. They allow rainwater to flow into the courtyards with a

slope of 15-20. Flat roofs, on the other hand, are rarely identified and were generally used to cover terraces.(Figure 27) (Ladsatter S.2013)



Figure 27. Roofs of dwelling unit-6

#### 4.5. Spatial Explorations in Ephesus Yamaç House 2

##### 4.5.1. Guest Reception and Entertainment Departments: Engagement Venues

The function of the peristyle rich houses, with some variants of which we encounter in Yamaç house 2, is not limited to being the private living space of the Roman family: it also served as an official stage for the boss in the perception of his social and/or work related duties. Thus, the descriptions played a role in affirming or ensuring clarity of values and cultural ideals while fulfilling tasks such as space arrangements, creating atmosphere and being decorative. The function of the spaces can be understood from the size of the house, their relationship with other spaces, their equipment, the location of the doors and windows, the light and the weather conditions in the room, and also the marble recovered in space. This includes highly emphasized representation spaces that are used especially for reception and entertainment. (Ladsatter S.2013) (Figure 28)



Figure 28. a&b) Courtyard of dwelling unit 4 Red colored courtyard of dwelling unit 1

##### 4.5.2. Welcoming and waiting rooms and the relationship with peristyle

The reception and waiting rooms are adjacent to the courtyard and are located in the core part of the house with these locations. (Figure 29)



Figure 29 Spatiality of **exedra**

In Yamaç House 2, the **EXEDRA** style is often preferred for spaces with this function. This is a niche-like space that opens transversely to the courtyard and can be highlighted with columns and sequins. The reception and waiting rooms are neighboring the peristyl courtyard and located in the core part. With its central location and magnificent decoration, it is aimed to impress those who step here. This influence was additionally provided by consciously formed gaze axes. Its center is marked and with its magnificent language, it is aimed to affect those who step here. This influence was additionally provided by consciously formed gaze axes. Neither the expense nor the trouble was spared in order to respond to the homeowner's need to stage himself, as the latest equipment of the exedra of housing unit 2 impressively demonstrates. Architecture and hardware are here in direct communication with each other; **courtyard and exedra almost talk to each other and melt into each other to form a single space whole.** (Ladsatter S.2013)



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

The venues for receiving and hosting guests in the hillside house 2 are numerous and their forms are also very diverse. These are distinguished by their width, priority position and equipment in the house. On top of that, they could have special symposium, related extensions or furniture. (Fig 30-31) There had to be enough room in these spaces to accommodate the clinics on which the guests lay. (Ladsatter S.2013)



Figure 30. a) Dwelling no-2 no view form triclinium to eksedra, b) Wall niche in the space SR18, c) Eksedra with its rich mosaic decoration



Figure 31. a) The big peristyle courtyard of the dwelling unit-6, b) Reconstruction of the marble hall

Peristyle courtyard as **repetitive spaces**, studies conducted here have shown that there are two different housing groups according to the peristyle and the surrounding areas. In the center of the houses in the first group, there are individual rooms around the peristyle. In the second group; although the peristyle is located in the center of the houses, it has been observed that in front of the courtyard there are spaces for entrance and located a second front courtyard with a welcoming function opening to the neighbors. (Ladsatter S.2013)(Figure 32-33)



Figure 32. a) Peristyle courtyard, b) Fountain at the entrance (SR1) of the house



Figure 33. a&b) Volumetric repetition of peristyle courtyards

The spaces named SR27 and SR22/23 in housing unit 2 in, are an area with two courtyards that provide access to each other. Here, SR 27 area was firstly defined as the entrance area and atrium, and then it was understood that it was peristyle.(Figure 34)

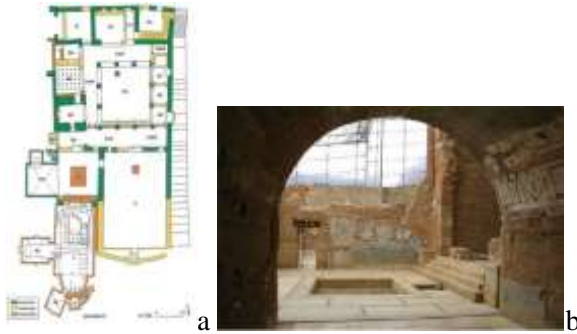


Figure 34.a-b) basilica-atrium-courtyard relation

In addition, at the entrance of the peristyl courtyard of the housing unit 2, there is a relief depicting a hero, presented as a respect for the family cult, just like in the atrium houses. Since the courtyards of the residences located in the South, have a luxurious and spacious decoration, it is thought that they are the areas where the house owners meet their customers and guests. It is thought that the rooms decorated with similar prestige in the northern part are an area where guests are welcomed and banquets are given. (Ladsatter S.2013)

### 5.Conclusions

As consequences, it's aimed to make an investigation of an antique house between the intersection of architecture and archeology. To realize, this research topic, space organizations of contemporary houses have been introduced first, to indicate the core research topic which is; '**space and spatiality**', compromising both today and antique houses, to demonstrate similarities between two different styles by compromising space organizations of contemporary and Ephesus Antique Hillside houses'.

Through analyzes, its' found that spatial features of Yamaç house 2 project indicate highly unique, original space feautres and relations.

1.Firstly, through spatial relations, all seven housing units of Yamaç house-2 project show similar space patterns with shallow space syntax, where the peristyle is the hard at all seven houses and all spaces are organized around this peristyle, which are gathering, socializing, open public spaces. Peristyle courtyards show similarities with the living space of contemporary houses which accomodates all daily activities in one open plan such as; entrance-hall 1-hall 2-hall 3 (even some more designed types)-kitchen-dining-working-living-terraces.

2. The hillside hosues project has especially shown that entrances have a very important place in these ancient houses. So much so that seven residences in the project have a secondary peristyle courtyard, especially at the larger houses. this actually points to an important spatial analysis. As the residences grew larger, comfort was provided with secondary courts inside the residence to ensure that the spaces receive air and daylight. Of course, the Romans achieved this solution, by peristyle courts which enable extensions of houses.

3. It's found that; unlike Hellens, the Romans, two important civilizations, used courtyard solutions in their architectural designs due to their location and being from the Mediterranean. The courtyard solution which is unique to Mediterranean architecture, shows itself in ancient residences. In fact, seeing this peristyle courtyard in Roman and Italian gardens, that is, in an open public space, is a unique feature of Italian garden design. This unique 'perisytle courtyard' concept in Italian gardens was used in paralel with the residences to ensure that the residences received light and air. Thus, especially the large ones of the 7 houses, its' found that, there commonly 2 peristyle courts exist.

4.Unlike the Greeks, the Romans used the peristyle courtyard with porticoes. This created a significant difference between thetwo types of housing, between Roman and Greek houses. This portico architectural element is the reason why the courtyard is read as an atrium in the Greek house and as a

peristyle courtyard in the Roman house. The use of this architectural element increases privacy in the interior spaces of Roman houses.

5. Being from the Mediterranean residential, entrances are provided always from the courtyard, which was an open space for both Romans and Greeks. However, there is an important space organization and linear axis system that distinguishes Roman houses from Hellenistic houses; it starts from the entrance area, passes through the peristyle court, and ends with the reception area; entrance (vestibule)-court(peristyle courtyard)-guest reception/welcoming area(tirclinium /exedra). This unique space organization is found all seven houses.

6. Therefore, the entrance space (vestibule), which is open to everyone, is at the end of the axis in the middle of the peristyle courtyard, only selected people can enter. This reception venue is not available in Helen residences. This linear axis system is present in the space organization of the 7 residences in this Yamaç Evler project. Thanks to this axis system, residential spaces are deepened and privacy is increased with full of daylight.

7. The space syntax graphics and plan drawings adapted to the seven residences in the Yamaç Evler project indicate that the space organizations of these residences have deep tree graphics in relation with privacy concept. It's found that; the first peristyle courtyard in front of the entrance was designed to separate the people entering the house (guests and households) and was more like a courtyard garden for guests, while the second peristyle courtyard was designed to distribute the interior spaces in the background of the house and to solve the light problem in the depths. That's why every house has at least 2 peristyle courts.

8. Upper floors which are not exist today, generally thought to be opposite with downstairs and use for working spaces and constitute the public compartments of the houses with a secondary entrance halls.

9. Generally all 7 houses have at least 1 peristyle courtyard except dwelling unit 4 which has 2 peristyle courtyards where the peristyle act as welcoming hall.

10. All houses show a shallow space organization around the 2.nd peristyle where all spaces open to this area, thus private spaces are very dense and integrated instead of depth. Especially 'vestibule-peristyle-tiricubulum or exedra' axis is very visible and show similarities with contemporary houses where spaces juxtapose openly as 'entrance-hall 1- hall 2-private spaces'

11. The spatial relation of reception rooms (GEW) and exedra with the peristyle is also found in a dynamic way, which exedra transforms a U shape niche space hosts visitors and placed at the end of axial organization, separated from courtyard by nodal elements openly.

12. Finally, when we consider it as an architectural context other than spatiality and space organization, the hillside houses project, as terrace houses, is a project that is extremely compatible with its' context. It is located on the topography between 27.5 meter lower and the upper street, with entrances from the streets on the left and right. The peristyle courtyard gardens at the entrances of the residences also provide a view to the other residences.

These spatial features of the antique dwelling determined that Ephesus Yamaç Evler project is ahead of its' time, uses natural data very well, including a planning that is extremely compatible with the context, and offers a very special planning and settlement in the organization of residential spaces with its' unique spaces such as; exedra and peristyle courtyard.

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TRAVMATİK TORAKAL PSÖDOMENİNGOSEL: NADİR BİR OLGU SUNUMU VE  
LİTERATÜR İNCELEMESİ

TRAUMATIC THORACIC PSEUDOMENINGOCELE: A RARE CASE REPORT AND  
LITERATURE REVIEW

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**ÖZET**

**Giriş:** Psödomeningoseller, beyin omurilik sıvısının (BOS) dural yırtıklardan sızarak ekstradural alanda birikmesiyle oluşan patolojik formasyonlardır. En yaygın oluşum sebepleri arasında cerrahi müdahaleler yer alsa da, bu çalışmada travmaya bağlı nadir bir psödomeningosel vakası sunulmaktadır.

**Olgu sunumu:** İş kazası sonucu travmaya uğrayan 25 yaşındaki erkek hasta başvurduğunda, nörolojik muayenesinde bilinci açık, oryante ve koopere bulguları mevcuttu. Ancak alt ekstremitelerde bilateral paraparezi ve anal refleks zayıflığı gibi klinik bulgulara rastlanmıştır. İlk torakal MR görüntülemesinden bir hafta sonra yapılan ikinci görüntüleme, akciğer apeksine bası oluşturan travmatik bir psödomeningosel tespit edilmiştir. Hastaya T1-T4 seviyesinde posterior enstrümantasyon ve duraplasti cerrahisi uygulanmıştır.

**Tartışma:** Psödomeningoseller, genellikle cerrahi sonrası komplikasyon olarak bilirse de, travmatik torakal psödomeningosel bu çalışmada literatürde nadiren rapor edilen bir durum olarak karşımıza çıkmaktadır. Torakal bölgenin özelliği ve solunumla ilişkilendirilen negatif basınç, psödomeningosel oluşum hızını arttırabilir. Bu sebeple, torakal bölgede travma sonrası oluşabilecek potansiyel psödomeningoseller için erken dönemde kontrol spinal görüntülemesinin önemi vurgulanmıştır.

Vakanın dikkat çeken bir diğer yönü ise dural yaralanmanın travmatik disk seviyesinin bir altında lokalize olmasıdır. Bu, travma sonrası dural yaralanmanın travma seviyesinin hemen altında veya üstünde olabileceğine dair önemli bir bulgudur. Lokal fluorescite kullanımı, dural yaralanma bölgesini belirlemede etkili bir yöntem olarak kullanılmıştır. Özellikle anterior yaralanmalarda bu yöntemin kullanımı kritik öneme sahip olup gereği durumunda intratekal kullanıma da hazırlıklı girilmelidir.

**Anahtar kelimeler:** Psödomeningosel, Travma, torakal kırık

**ABSTRACT**

**Aim:** Pseudomeningoceles are pathological formations that arise from the leakage of cerebrospinal fluid (CSF) through dural tears, accumulating in the extradural space. While surgical interventions are commonly recognized as primary causes, this study presents a rare case of pseudomeningocele due to trauma.

**Case report:** A 25-year-old male patient, who suffered a work-related accident, presented with a neurological examination that revealed he was conscious, oriented, and cooperative. However, clinical findings also indicated bilateral paraparesis in the lower extremities and a weakened anal reflex. A week following the initial thoracic MR imaging, a subsequent imaging revealed a traumatic pseudomeningocele exerting pressure on the apex of the lung. The patient underwent posterior instrumentation and duraplasty surgery at the T1-T4 level.

**Discussion:** While pseudomeningoceles are typically known as post-surgical complications, the traumatic thoracic pseudomeningocele highlighted in this study is a seldom-reported occurrence in the literature. The unique nature of the thoracic region and the negative pressure associated with respiration



may accelerate the formation of pseudomeningoceles. Hence, the importance of early control spinal imaging after thoracic trauma to detect potential pseudomeningoceles is emphasized.

Another intriguing aspect of this case is the localization of the dural injury one level below the traumatic disk. This suggests that post-traumatic dural injuries may be situated just below or above the level of trauma. The use of local fluorescite has been employed as an effective method to pinpoint the location of dural injuries. Especially for anterior injuries, the application of this method is of critical importance. When necessary, one should also be prepared for the use of intrathecal fluorescite.

**Keywords:** pseudomeningocele, trauma, thoracic fracture

### Giriş

Psödomeningoseller, BOS'u araknoid kaplı bir zara veya fibröz kapsüle sızdırmaya devam eden, iyileşmeyen bir dural yırtıktan kaynaklanan ekstradural beyin omurilik sıvısı (BOS) koleksiyonlarıdır. Büyük ölçüde iatrojenik hasarın bir sonucu olan psödomeningoseller aynı zamanda nadiren travmatik de olabilir.(Couture & Branch, 2003; MILLER & ELDER JR, 1968) Küçük psödomeningoseller genellikle asemptomatiktir, bu nedenle gerçek insidans bilinmemektedir ancak %0.07 ila %2 olduğu bildirilmiştir. Psödomeningoseller semptomatik olduğunda postural baş ağrısı, boyun/sırt ağrısı, kusma, nörolojik defisit, palpabl kitleler ve/veya progresif miyelopati ile kendini gösterir.(Ailon et al., 2017; Maiuri, Corriero, Giamundo, Donati, & Gambardella, 1988; Mizuno, Nakagawa, & Iwata, 1986; Schumacher, Wassmann, & Podlinski, 1988)

Bir psödomeningoselin optimal tedavisi tartışmalıdır; uzamış hastanede yatış ve yeniden ameliyat ile ilişkilidirler. Hafif veya hiç semptom göstermeyen vakalar konservatif tedavi alır: yatak istirahati, fokal kompresyon, kesi dikme veya tekrarlayan lomber ponksiyonlar.(Hawk & Kim, 2000) Konservatif tedavide başarısız olan ve tolere edilemeyen klinik semptomlarla başvuran hastalar için revizyon cerrahisi kesin tedavidir. (Ailon et al., 2017) Bir psödomeningoselin onarımı sırasında, cerrahi onarımı zorlaştıran, sıklıkla zayıflamış fasya ve kas, iltihaplı dura ve diğer dokular ve gevşek cilt marjları ile karşılaşılır. Oldukça nadir görülen travmaya sekonder psödomeningosel tanılı bir hasta sunmak istiyoruz.

**Case report:** Bu çalışmada, iş kazası sonucu travmatik torakal psödomeningosel gelişen 25 yaşındaki bir erkek hastayı sunmaktayız. Başvuru nörolojik muayenesi: bilinci açık, oryante, koopere idi. Alt ekstremiteler bilateral paraparetik. Her iki alt ekstremitte motor muayenesi 3-4/5. Anal refleks zayıf.

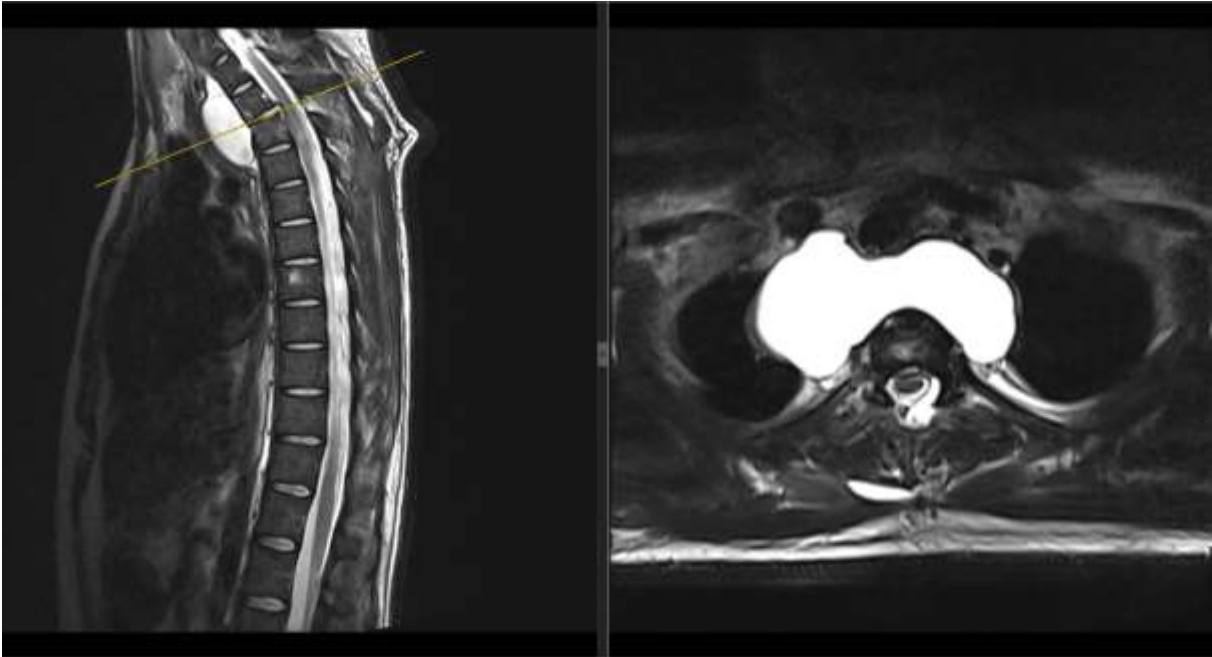
İlk başvuru torakal mr görüntülemesi Şekil 1.





Hasta yoğun bakım takibi sonrası 1. haftada tekrar değerlendirildi. Yapılan torakal mr görüntülemesinde akciğere apekten bası oluşturan travmatik psödomeningosel geliştiği görüldü. (Şekil 2) Hasta T1-T4 posterior enstrümantasyon ve duraplasti cerrahisi gerçekleştirildi.

Şekil 2



**Tartışma:** Psödomeningosel genellikle cerrahi sonrası gelişen, çok nadir olarak travma sonrasında görülebilen bir durumdur.(Couture & Branch, 2003) Olgu bildirimiz travmatik torakal psödomeningosel olarak bildirilen oldukça nadir bir vakadır.(EPSTEIN & EPSTEIN, 1974; Kachooie, Bloch, & Banna, 1985) Özellikle torakal bölgede solunum ile beraber olan negatif basınç sebebi ile psödomeningosel oluşum hızını arttırdığını düşünmekteyiz. Bu negatif basınç sebebi ile torasik bölgedeki spinal travmalarda erken kontrol spinal görüntülemesi yapılması gerekmektedir.

Vakamızda dural yaralanma sol anterolateral bölgede idi. Dural yaralanmanın, travmatik disk seviyesinin bir alt seviyesinde olması dikkat çekicidir. Bu sebeple şüpheli dural yaralanmanın travma seviyesi altında ya da üstünde olabileceği akılda tutulması gerekiyor. Bu vaka sırasında lokal fluorescite kullanarak yaralanma bölgesini belirledik. Özellikle anterior yaralanmalarda dural yaralanma bölgesini belirlemek oldukça zorlu olabilmekte. Bu durumlarda intratekal fluorescite kullanılabilir. Buna da hazırlıklı girmekte yarar görmekteyiz.

**Sonuç:** Spinal yaralanmalarda post-operatif dönemde psödomeningosel açısından dikkatli olunmalıdır. Özellikle torasik yaralanmalarda negatif basınca bağlı olarak psödomeningosel gelişimi açısından dikkatli olunmalıdır.

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**AA7075-T6 HAVACILIK ALAŞIMIN DELİNMESİNDE KESİCİ TAKIM GEOMETRİSİ VE  
KAPLAMANIN SONLU ELEMAN YÖNTEMİYLE ARAŞTIRILMASI**

**INVESTIGATION OF CUTTING TOOL GEOMETRY AND COATING IN DRILLING  
AA7075-T6 AEROSPACE ALLOY BY FINITE ELEMENT METHOD**

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**ÖZET**

Bu çalışmada, yüksek mukavemet ve dayanımın gerekli olduğu yerlerde özellikle de havacılık endüstrisinde yoğun olarak kullanılmakta olan AA7075-T6 alaşımının farklı takım kaplama türleri ve takım uç açıları ile delinmesi sürecinin sonlu elemanlar yöntemi ile ele alınarak değerlendirilmesi ve elde edilen verilerin deneysel sonuçlar ile tutarlılığı üzerinde durulmuştur. Çalışmada kaplamasız karbür matkaplar ve TiAlN kaplamalı karbür matkaplar olmak üzere iki farklı kaplama türünde matkap kullanılmıştır. Matkaplar 120-130-140 derece uç açılarına sahip olacak şekilde seçilmiştir. Kesici takımlar ve AA7075-T6 malzemeye ait veriler Advantedge 7.1 programı vasıtasıyla işlenmiştir. Bu çalışma kapsamında sonlu elemanlar yöntemi ile yapılan uygulamalar neticesinde elde edilen veriler, literatürden elde edilen deneysel veriler ile tutarlı bir sonuç göstermiştir. Buna ek olarak, regresyon ve yapay sinir ağları (YSA) analizleri yapılarak 120-125-130-135-140 uç açıları (Pa) ve 118-122-127-131-138 uç kenar açılarına (Ca) sahip matkapların kesme kuvveti (Fz) performansları karşılaştırılmıştır. Sonuç olarak, en düşük kesme kuvvetleri, kaplamasız ve TiAlN kaplamalı matkaplar için 120/118, 120/122 ve 125/118 (Pa/Ca) tasarımlı matkaplardan elde edilmiştir. Deneysel çalışmalardan elde edilen verilerin sonlu elemanlar ve yapay sinir ağları yöntemleri ile değerlendirilmesi ile, tutarlı sonuçların elde edilerek tahmini ve optimum değerlerin de elde edilmesinin mümkün olduğu görülmüştür. Bu durum ayrıca, deneysel çalışmalarda karşılaşılan hem takım hem işçilik hem de malzeme maliyetlerinin de bilgisayar programları vasıtasıyla güvenilir şekilde bertaraf edilebilerek doğrudan uygulanabilir verilerin elde edilebileceğini de göstermiştir.

**Anahtar kelimeler:** Talaşlı imalat, Delme, AA7075-T6, Sonlu Elemanlar Yöntemi, Regresyon.

**ABSTRACT**

In this study, the drilling process of the AA7075-T6 alloy, which is extensively used in the aviation industry, especially in applications requiring high strength and durability, was examined with different tool coating types and tool rake angles using the finite element method, and the consistency of the obtained data with experimental results was emphasized. Two different types of drills were used in the study: uncoated carbide drills and TiAlN-coated carbide drills. The drills were selected to have point angles of 120-130-140 degrees. Cutting tools and data for AA7075-T6 material were processed using the Advantedge 7.1 program. The data obtained from the applications carried out with the finite element method in this study showed consistent results with experimental data obtained from the literature. In addition, regression and artificial neural network (ANN) analyses were conducted to compare the cutting force (Fz) performance of drills with point angles of 120-125-130-135-140 (Pa) and chisel edge angles of 118-122-127-131-138 (Ca). As a result, the lowest cutting forces were obtained from drills designed with 120/118, 120/122, and 125/118 (Pa/Ca) for both uncoated and TiAlN-coated drills. The evaluation

of experimental data through finite element and artificial neural network methods demonstrated that consistent results were obtained, and it was possible to obtain estimated and optimum values. Furthermore, this approach indicated that both tool and labor costs as well as material costs encountered in experimental studies could be reliably eliminated through computer programs, allowing for the direct acquisition of applicable data.

**Keywords:** Machining, Drilling, AA7075-T6, Finite Element Method, Regression.

### GİRİŞ

Günümüz imalat alanlarının çoğunda üretilen makine ve donanımların hem hafiflik hem de dayanım açısından en üst seviyelerde olması istenmektedir. Özellikle askeri ve sivil havacılık alanında gerçekleştirilen uygulamalarda bu özelliklerin sağlanabilmesi amacıyla çelik türevi ürünler yerine Alüminyum alaşımları ve kompozit malzemeler tercih edilmektedir. Alüminyum alaşımları içerisinde ise birçok farklı alüminyum serisi olmakla birlikte en yaygın olarak üstün yorulma dayanımı, sertliği ve mukavemeti gibi özellikleri sebebiyle 7000 serisi tercih edilmektedir [1], [2]. 7000 serisi içerisinde ise en çok kullanılan ve en önemli olan 7075-T6 alaşımı durumundadır. 7075-T6 yüksek dayanım ve sertlik ile gerilime maruz kalması esnasında gösterdiği yüksek mukavemet özelliği sebebiyle havacılık endüstrisinde çok büyük bir yer kaplamaktadır [3].

7075-T6 malzemenin talaşlı imalatta frezeleme, tornalama ve delme işlemleri üzerine gerçekleştirilmiş çok sayıda çalışma bulunmaktadır [2]–[11]. Özellikle alüminyum malzemelerin genel sorunlarından olan sıvanma eğilimi, her türlü talaşlı imalar aşamasında önemli bir sorun olarak karşımıza çıkabilmektedir. Delme işlemi esnasında da takım kesici kesarlarına ve hatta helis kanallarına yapışan, sıvanan Al malzeme delme performansını olumsuz yönde etkilemekte, esas kesme kuvvetini (Fz) arttırmaktadır [4], [6], [12]. Kuvvet artışı takımın zorlanmasına, delik yüzey kalitelerinde bozulmalara ve ilerleyen süreçte takım kırılmasına kadar sebebiyet verebilmektedir [13]. Bu sebeple kesme parametrelerinin (kesme hızı, ilerleme, kesme derinliği vb.) ve kesici takıma ait verilerin (takım malzemesi, kaplama türü, kesici takım geometrisi vb.) doğru tayin edilmesi büyük öneme sahiptir. Bu verilerin belirlenmesi için genel olarak deneysel çalışmaların gerçekleştirilerek en optimum seviyelerin belirlenmesi gerekmektedir. Ancak, günümüz bilgisayar yazılımları sayesinde yüksek maliyetli deneysel çalışmalar yerine bilgisayar yazılımları ile bu süreç yüksek doğruluk oranları ile gerçekleştirilebilmektedir. Günümüzde birçok malzemenin işlenebilirliği üzerine FEM metodu kullanılarak çalışmalar yapılmaktadır [6], [14], [15].

Bu çalışmada, AA7075-T6 havacılık alaşımının delinmesinde kesici takım geometrisi ve kesici takım kaplamasının delinebilirliği etkisinin sonlu eleman yöntemiyle araştırılması amaçlanmıştır.

### ARAŞTIRMA VE BULGULAR

#### Deneyel Kurulum, Sonlu Elemanlar Yöntemi, Regresyon ve Yapay Sinir Ağları

Delme deneyleri [16] ve sonlu eleman analizlerinde iş malzemesi olarak AA7075-T6 alüminyum alaşım kullanılmıştır. İş malzemesinin kimyasal bileşimi Tablo 1’de gösterilmiştir.

**Tablo 1.** AA7075-T6 alaşımının kimyasal bileşimi (% ağırlık)

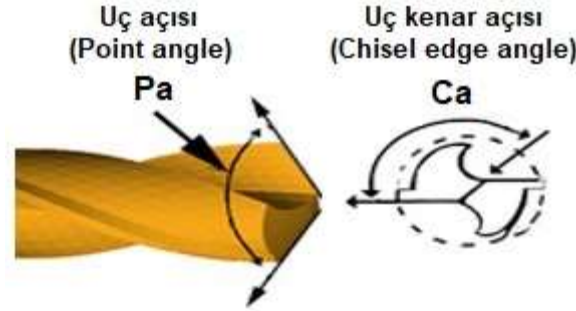
Ana	Fe	Si	Cu	Mn	Mg	Zn	Cr	Zi+Ti	Diğer
Al	0,5	0,5	1,2	0,3	2,1	5,1	0,18	0,25	0,15
			2,0		2,9	6,1	0,28		

İş malzemesinin mekanik ve fiziksel özellikleri ise Tablo 2’de verilmiştir.

**Tablo 2.** AA7075-T6 alaşımın mekanik ve fiziksel özellikleri

Özellik	Değer
Termal iletkenlik (W/mK)	180
Özgül ısı (J/kgK)	910
Termal genleşme katsayısı (1/°C)	2,36E-5
Yoğunluk (kg/m <sup>3</sup> )	2700
Elastisite modülü (GPa)	68,9
Poisson oranı	0,3
Çekme Dayanımı (MPa)	530-570
Sertlik (Brinell)	140-160

Kesici takım olarak kaplamasız karbür ve 0,002 mm kalınlığında TiAlN kaplamalı karbür matkaplar kullanılmıştır [16]. Delme parametrelerinde takım geometrisi açısından farklı matkap uç açısı (Şekil 1) ve uç kenar açısı belirlenmiştir (Tablo 3). Diğer takım geometrisi parametreleri tüm matkaplar için sabit tutulmuştur. Matkap çapı 5 mm, helis açısı 30°, boşluk açısı 14°, ağız yarıçapı 2,9 mm ve öz kalınlığı 1,75 mm olarak sabit tutulmuştur. Delik delme deneyleri, kaplamasız, kaplamalı, 120°, 130°, 140° uç açılı ve 118° uç kenar açılı matkaplar ile sürdürülmüştür. Sonlu eleman analizlerinde tüm matkap geometrileri kullanılmıştır (Tablo 3). Kesme parametreleri olarak 50m/dak kesme hızı ve 0,05mm/dev ilerleme seçilmiştir. Çalışmada kesme sıvısı kullanılmamıştır.



**Şekil 1.** Matkap uç geometrisi

**Tablo 3.** AA7075-T6 alaşımın delme parametreleri

Seviye	Faktör		
	Kaplama k	Uç açısı (point angle) Pa	Uç kenar açısı (chisel edge angle) Ca
1	WC	120	120
2	TiAlN	130	127
3		140	136
Çıktı	Kesme kuvveti, Fz (N)		

FEM analizleri, bilimsel ve ticari amaçlar için geliştirilmiş Third Wave AdvantEdge® yazılımı ile yapılmıştır. Bu yazılım, talaşlı imalat tekniklerinde göre optimize edilmiş bir sonlu eleman yazılımıdır. Nümerik çözümleme sırasında, updated-Lagrangian sonlu eleman metodu ve adaptif yeniden ağ örme teknikleri kullanılır. İş malzemesi ve kesici takımın ağ dokusu, 4 nokta ve 12 serbestlik dereceli elemanlar ile oluşturulmuştur. Talaşlı imalat simülasyonlarında, iş malzemeleri üzerinde sıcaklık değişimine bağlı deformasyon ve yüksek gerilim ve gerinim oranları oluşmaktadır. İş malzemelerinin gerilim-gerinim davranışının yüksek doğrulukta tanımlanması için pekleşme, gerinim oranı ve sıcaklık değişimine bağlı malzeme modelleri kullanılmalıdır [14]. Bu nedenle AA7075-T6 alaşımın mekanik davranışını tanımlamak için, Johnson-Cook malzeme modeli kullanılmıştır. Johnson-Cook malzeme modeli Eş. 1'de ifade edilmiştir. Kesici takım, iş malzemesinin ağ yapısı Şekil 2'de gösterilmiştir.



$$\sigma = \left[ \begin{array}{c} A + B \epsilon^n \\ \text{Elastoplastik} \end{array} \right] \left[ 1 + C \ln \left( \frac{\dot{\epsilon}}{\dot{\epsilon}_0} \right) \right] \left[ 1 - \left( \frac{T - T_{oda}}{T_{erime} - T_{oda}} \right)^m \right] \quad (1)$$

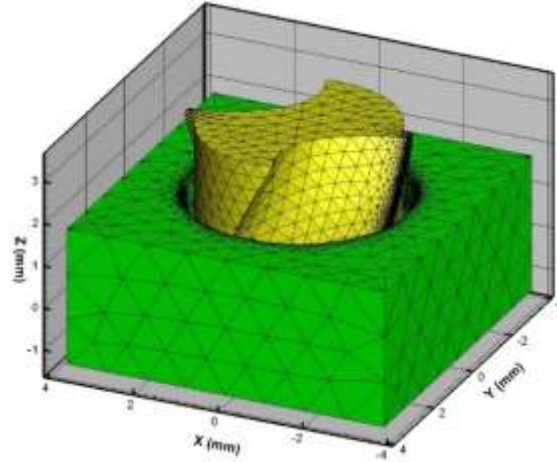
Viskozite Termal Yumuşama

Burada;  $\sigma$ ,  $\epsilon$ ,  $\dot{\epsilon}$  ve  $\dot{\epsilon}_0$  sırasıyla akış gerilimi, plastik gerinim, gerinim oranı ve referans gerinim oranıdır.  $T$ ,  $T_{erime}$  ve  $T_{oda}$  sırasıyla anlık sıcaklık, erime sıcaklığı ve oda sıcaklığıdır. Malzeme ampirik sabitleri: A başlangıç akma dayanımı, B mukavemet katsayısı (pekleşme modülü), C gerinim oranı bağımlılık katsayısı, n pekleşme üsteli, m termal yumuşama katsayısıdır. AA7075-T6 alaşım için Johnson Cook malzeme model parametreleri Tablo 4'te verilmiştir. Sürtünme modeli olarak Coulomb sürtünme modelini kullanılmıştır (Eş. 3). Eşitlikte;  $F_n$ ,  $F_f$  ve  $\mu$  sırasıyla yüzeyler arasındaki normal kuvvet, sürtünme kuvveti ve sürtünme katsayısıdır. FEM analizlerinde sürtünme katsayıları, AA7075-T6 alaşım ile karbür için 0,45, TiAlN için 0,35 olarak belirlenmiştir.

$$F_f = \mu F_n \quad (2)$$

**Tablo 4.** AA7075-T6 alaşımın Johnson-Cook malzeme modeli parametreleri

Parametre	A (MPa)	B (MPa)	n	$T_{erime}$ (°C)	$T_{oda}$ (°C)	m	C	$\dot{\epsilon}_0$ (1/s)
Değer	496	310	0,41	635	20	1,2	0	1



**Şekil 2.** Delme işlemi 3 boyutlu sonlu eleman ağ yapısı

Regresyon analizleri, Minitab® R19 istatistiksel analiz yazılımı ile yapılmıştır. Deneysel sonuçlar ile doğrulanmış FEM sonuçları kullanılarak regresyon modeli kurulmuştur. Regresyon analizleri, kesme kuvvetlerinin ( $F_z$ ), delme parametrelerine diğer bir deyişle bağımsız kontrol faktörlerine bağlı olarak değiştiği kabul edilerek ve 95% güven seviyesi tanımlanarak sürdürülmüştür. Analiz sonucunda elde edilen regresyon eşitliği (Eşitlik 3) kullanılarak, test verilerindeki (Tablo 3) delme parametreleri ile bileşke kesme kuvveti değerleri tahmin edilmiştir. Model özetinde, S 11,5615,  $R^2$  %94,70,  $R^2(\text{adj})$  %93,56 ve  $R^2(\text{pred})$  %91,17 değerleri elde edilmiştir. Kesme kuvvetleri üzerinde delme parametrelerinin etkisi, %63,58 oranla uç kenar açısı (Ca), %29,58 oranla uç açısı (Pa) ve %1,54 oranla kaplama olduğu görülmüştür. Model hata oranı ise %5,30 olarak elde edilmiştir.

$$F_{z_{FEM}} = -542,6 + (11xk) + (2,95xPa) + (4,806xCa) \quad (3)$$

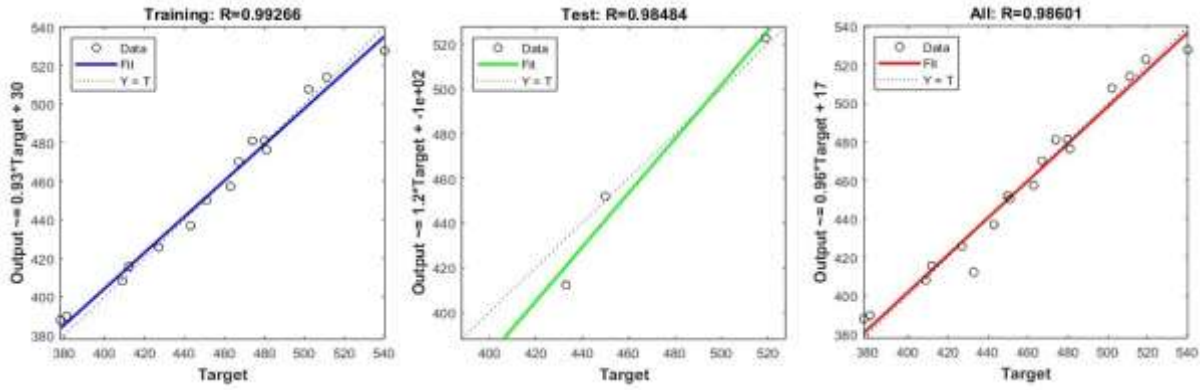


Yapay sinir ağırları (YSA) analizleri, MATLAB® yazılımı ile kodlanarak ve neural networks toolbox kullanılarak yapılmıştır. Analizlerde kullanılan YSA parametreleri Tablo 5’te verilmiştir.

**Tablo 5.** YSA model kurulumu

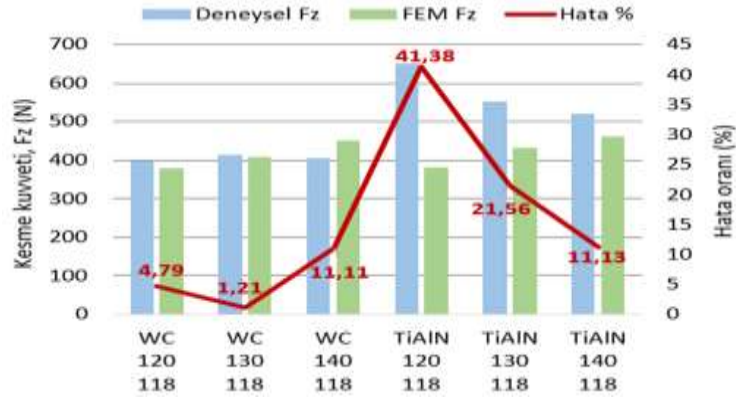
Parametre	Değer
Gizli katman	1
Nöron sayısı	7
İterasyon sayısı (maks)	1000
Öğrenme oranı (lr)	0.0005
Eğitim veri oranı (rastgele)	80%
Test veri oranı (rastgele)	20%
Öğrenme algoritması	trainbr (bayesian regularization)
Transfer fonksiyonu	tansig (tangent sigmoid)
Öğrenme kuralları	Geri yayılım

Analizlerde eğitim algoritması olarak *Bayesian regularization* kullanılmıştır. YSA modelinde 1 gizli katman ve 7 nöron kullanılmış ve 3-7-1 ağ yapısı kurulmuştur. Girdi ve çıktı verileri, *dividerand* fonksiyonu ile eğitim için %80 oranında ve test için %20 oranında rastgele olarak ayrıştırılmıştır. Transfer fonksiyonu olarak hiperbolik tanjant sigmoid transfer fonksiyonu (*tansig*) kullanılmıştır. Kurulan YSA modelinde R değerleri, eğitim verileri için 0.99266 ve test verileri için 0.98484 olarak elde edilmiştir (Şekil 3).



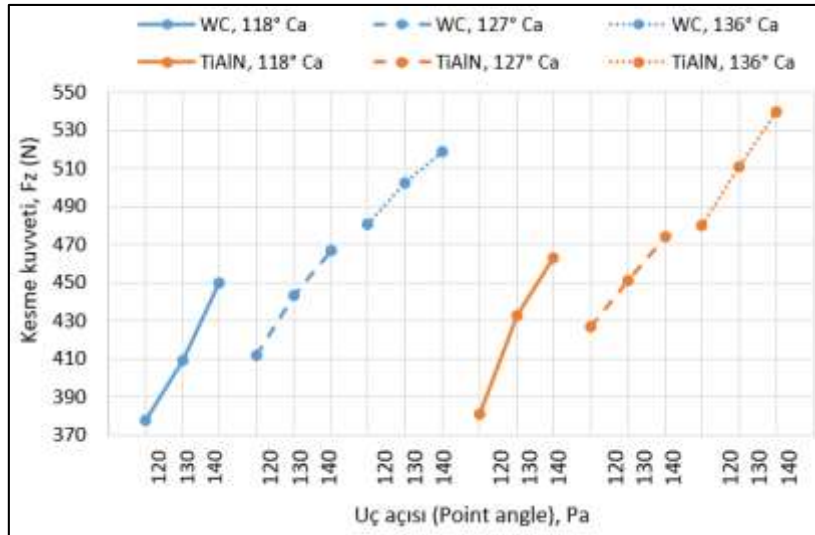
**Şekil 3.** YSA modeli için R grafikleri

Çalışmada daha önceden deneysel olarak gerçekleştiren araştırmalar referans alındığında [6], [13], [16] Şekil 4’te belirtildiği üzere kaplamasız karbür matkaplarda 120° -130° -140° derece uç açılarında elde edilen kesme kuvveti değerleri 400N seviyelerinde tutarlı bir şekilde elde edilmiştir. TiAlN kaplamalı karbür takımlarda ise özellikle 120° ve 118° uç açılına sahip matkaplarda deneysel verilerin 650N civarında olmasına karşın sonlu elemanlar yöntemi ile elde edilen değerlerin 380N seviyesinde olduğu görülebilmektedir. Benzer şekilde TiAlN kaplamalı 130° ve 140° uç açılı matkaplarda deneysel ve sonlu elemanlar yöntemi ile elde edilen kesme kuvveti farkları daha az olacak şekilde elde edilmiştir. Burada TiAlN kaplamalı matkaplarda deneysel kuvvet verilerinin daha yüksek çıkmasının sebebi delme şartlarında yaşanan talaş sıvanması ve talaş tahliyesinde yaşanan sorunlar olarak görülmektedir. Hata oranı incelendiğinde ise en düşük hata oranının WC 130° uç açılı matkapla gerçekleştirilen hem deneysel hem de FEM yöntemi ile elde edilen verilerde olduğu görülmektedir.



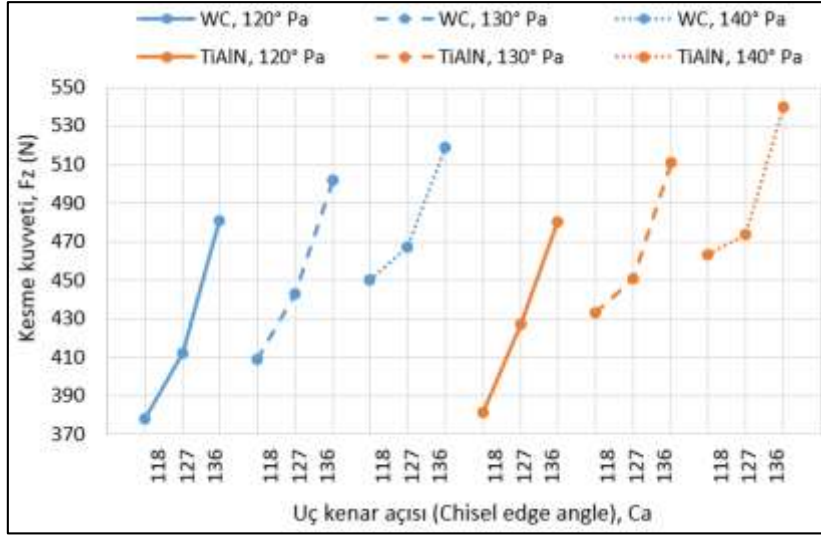
Şekil 4. Deneysel ve FEM sonuçlarının doğrulanması

Şekil 5'te uç açısı (Pa) değişiminin kesme kuvvetleri üzerine etkisi görülmektedir. Sonlu elemanlar yöntemi ile gerçekleştirilen bu grafik neticesinde uç açısındaki artışla kesme kuvvetinde de artış meydana geldiği görülmüştür. TiAlN kaplamalı matkaplarda kesme kuvvetinin kaplamasız karbür matkaplara göre daha yüksek olduğu, özellikle 140° uç açılı matkaplarda kesme kuvveti değerinin 540N seviyelerine ulaştığı görülmektedir.



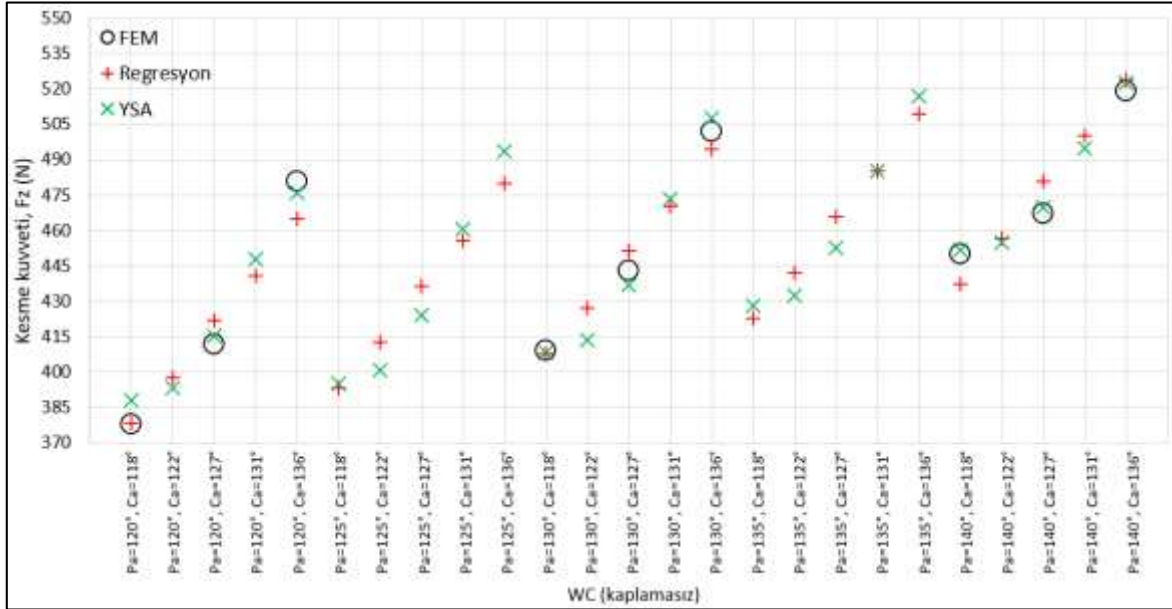
Şekil 5. Uç açısı (Pa) değişiminin kesme kuvvetlerine etkisi

Şekil 6'da ise uç kenar açısı değişimine göre kaplama türü ve matkap uç açısına göre meydana gelen kesme kuvveti değişimleri verilmiştir.

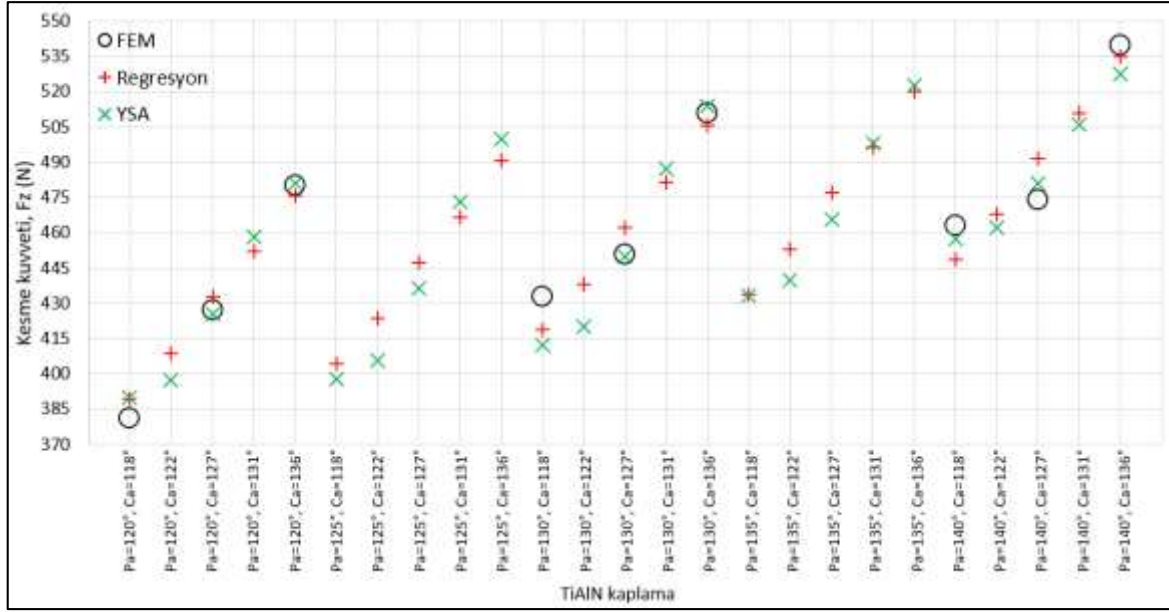


Şekil 6. Uç kenar açısı (Ca) değişiminin kesme kuvvetlerine etkisi

Şekil 7 ve Şekil 8'de sırasıyla WC ve TiAlN kaplamalı matkaplar için FEM, regresyon ve YSA kesme kuvvetleri değerleri verilmiştir.

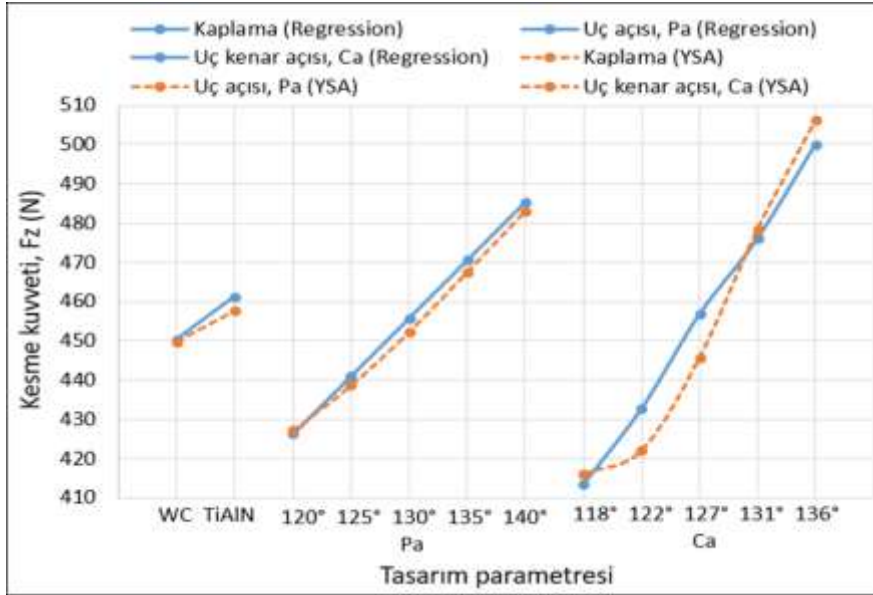


Şekil 7. WC (kaplamasız) matkaplar için FEM, regresyon ve YSA kesme kuvvetleri



Şekil 8. TiAlN kaplamalı matkaplar için FEM, regresyon ve YSA kesme kuvvetleri

Kaplama, uç açısı ve uç kenar açısı değişimin kesme kuvvetine olan etkisi göstermek için etki grafiği oluşturulmuştur (Şekil 9). Şekil 9 incelendiğinde TiAlN kaplamalı matkapta kaplamasız matkaba göre kesme kuvvetinin yükseldiği görülmektedir. Uç açısı ve uç kenar açısını artışı ile kesme kuvvetlerinin belirgin şekilde arttığı anlaşılmaktadır.



Şekil 9. Matkap geometrisinin kesme kuvveti üzerindeki etki grafiği

## SONUÇ

Bu çalışmada, AA7075-T6 havacılık alaşımının delinmesinde kaplamasız karbür ve TiAlN kaplamalı karbür olmak üzere, farklı uç açıları (point angle) ve farklı uç kenar açıları (chisel edge angle) ile tasarlanan matkapların kesme kuvvetleri ve takım geometrisi açısından işleme performansları deneysel, sonlu elemanlar, regresyon ve yapay sinir ağları yöntemleri kullanılarak araştırılmıştır. Elde edilen sonuçlar aşağıdaki gibi özetlenebilir:

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- Deneysel çalışmaların gerçekleştirilmesinde yüksek malzeme, ekipman, işçilik ve zaman maliyeti olması sebebiyle optimizasyon metotlarının kullanılmasının ve böylece deney sayılarının minimum seviyede tutularak çalışmaların gerçekleştirilmesinin büyük bir öneme sahip olduğu,
- Sonlu elemanlar yöntemi ile kesme parametreleri, kesici takım verileri ve işlenecek malzeme özelliklerinin çok net bir şekilde tayin edilerek, böylece elde edilecek sonuçların doğruluğunun ve oluşacak hata paylarının en aza indirilebileceği,
- Johnson Cook malzeme modeli ile AdvantEdge programı vasıtasıyla yüksek tutarlılıkta talaşlı imalat işlemlerinin ön çalışma seviyesinde gerçekleştirilerek ardından deneysel uygulamalara çok daha tutarlı bir şekilde geçilebileceği ve böylece hatalı üretim yapma sonucunda oluşacak maliyetlerin en aza indirilebileceği,
- Kesme kuvvetleri açısından; kaplamasız matkaplar için en düşük kesme kuvvetleri 120° uç açısı ve 118° uç kenar açısına (120°-118°) sahip matkaptan elde edilmiştir. Buna ek olarak 120°-122° ve 125°-118° tasarımlarındaki matkapların da kesme kuvvetleri oldukça düşük olup performansları kabul edilebilir seviyede olduğu anlaşılmıştır. TiAlN kaplamalı matkaplar için en düşük kesme kuvveti 120°-118° tasarımındaki matkaptan elde edilmiştir.
- Takım geometrisi açısından; hem kaplamasız hemde TiAlN kaplamalı matkaplar için uç açısı artışı ile kesme kuvvetlerinin arttığı sonlu elemanlar yöntemi ile gerçekleştirilen çalışma neticesinde de gözlemlenmiştir.
- AA7075-T6 malzemenin çalışmada belirtilen kesici takım ve matkap uç açısı değerlerine göre hem deneysel hem de sonlu elemanlar yönteminde 140° uç açılı matkaplarda kesme kuvvetinin daha yüksek meydana geldiği,
- En yüksek hata oranının özellikle talaş sıvanması ve BUE oluşması sebebiyle TiAlN kaplamalı matkaplarda gerçekleştiği,
- Kesme kuvvetleri üzerinde delme parametrelerinin etkisi, %63,58 oranla uç kenar açısı (Ca), %29,58 oranla uç açısı (Pa) ve %1,54 oranla kaplama olduğu görülmüştür. İlerleyen çalışmalarda farklı takım ve kesme parametreleri belirlenerek kuru kesme şartları haricinde kesme sıvısı tanımlamaları da yapılarak doğrudan imalat alanındaki uygulamalara yönelik çalışmalar gerçekleştirilebilecektir.

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HEMİPARETİK ÇOCUKLARDA AYNA TEDAVİSİNİN EL FONKSİYONLARINA ETKİSİ  
THE EFFECT OF MIRROR TREATMENT ON HAND FUNCTIONS IN HEMIPARETIC  
CHILDREN

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**ÖZET**

Serebral Palsi prenatal, perinatal ve postnatal nedenlerle beyinde ilerleyici olmayan bir lezyon sonucu oluşan, ancak yaşla değişebilen, aktivite kısıtlanmasına yol açan, kalıcı motor fonksiyon, postür ve hareket gelişim bozukluğudur. SP’de ortaya çıkan motor bozukluklar sonucunda, üst ekstremitede sınırlı eklem hareket açıklığı, normal patern içinde gerçekleştirilemeyen izole parmak ve baş parmak hareketleri ile kavrama problemleri görülmektedir. SP’li çocuklarda günlük yaşam aktivitelerini etkileyen önemli unsurlardan bir tanesi etkilenmiş üst ekstremitte fonksiyonlarıdır. SP’li çocuklarda el, günlük yaşam aktivitelerinde çok önemlidir. Etkilenmiş üst ekstremitte fonksiyonları, bu çocuklarda günlük yaşam aktivitelerini etkileyen en önemli unsurdur. Bu nedenle çalışmamızın amacı, hemiparetik serebral palsili çocuklarda ayna tedavisini klasik fizyoterapi yöntemleriyle karşılaştırmak ve üst ekstremitetedavisindeki etkisini belirlemektir. Çalışmaya 30 hemiparetik Serebral Palsi tanılı 6-15 yaş arasındaki çocuklar dahil edilmiştir. Demografik ve tanımlayıcı verilerin yanı sıra çocukların tedavi öncesi ve sonrası üst ekstremitte kas gücü, kavrama kuvveti, iki nokta diskriminasyonu, parmak tanıma, omuz, dirsek el bileğinde pasif hareket hissi değerlendirilmiştir. Çocukların günlük yaşam aktivitelerini değerlendirmek için WeeFIM, üst ekstremitte fonksiyonelliği için Jebsen-Taylor El Fonksiyon testi uygulanmıştır. Çocuklar randomize olarak iki gruba ayrılmıştır. Gruplardan birine ayna tedavisi uygulanırken diğer gruba geleneksel fizyoterapi ve rehabilitasyon programı uygulanmıştır. Tüm çocuklar 6 hafta boyunca 12 seanslık tedaviyi tamamlamıştır. İki grup karşılaştırıldığında tedavi öncesi benzerlik gösteren pronasyon ve supinasyon eklem hareket açıklığında, Jebsen-Taylor El Fonksiyon testinin dolu kutuları hareket ettirme alt testinde anlamlı fark bulunmuştur. ( $p < 0,05$ ) Ayna tedavisinin rehabilitasyon amaçlı kullanılması hemiparetik Serebral Palsili çocukların el fonksiyon becerilerini geliştirmiştir. Ayna tedavisi geleneksel fizyoterapiye alternatif olarak kullanılabilir farklı bir tedavi yönetimi olarak benimsenebilir.

**Anahtar kelimeler:** Ayna Tedavisi, El Fonksiyonları, Hemiparezi, Rehabilitasyon, Serebral Palsi.

**ABSTRACT**

Cerebral Palsy is a permanent disorder of motor function, posture and movement development that occurs as a result of a non-progressive lesion in the brain due to prenatal, perinatal and postnatal reasons, but can change with age, leading to activity limitation. As a result of the motor disorders that occur in CP, limited joint range of motion in the upper extremity, isolated finger and thumb movements that can not be performed in a normal pattern, and grasping problems are observed. Therefore, the aim of our study is to compare mirror therapy with classical Physiotherapy methods in children with hemiparetic cerebral palsy and to determine its effect on upper extremity treatment. 30 children aged 6-15 years diagnosed with hemiparetic Cerebral Palsy were included in the study. In addition to demographic and descriptive data, the children's upper extremity muscle strength, grip strength, two-point discrimination,

finger recognition, passive movement sensation in the shoulder, elbow and wrist were evaluated before and after treatment. WeeFIM was used to evaluate the children's Daily living activities, and the Jebsen-Taylor Hand Function test was used to assess upper extremity functionality. Children were randomly divided into two groups. While mirror therapy was applied to one group, traditional Physiotherapy and rehabilitation program was applied to the other group. All children completed 12 sessions of treatment over 6 weeks. When the two groups were compared, a significant difference was found in the pronation and supination joint range of motion, which were similar before treatment, and in the moving filled box subtest of the Jebsen Taylor Hand Function Test. ( $p < 0,05$ ) Using mirror therapy for rehabilitation purposes improved the hand function skills of children with hemiparetic Cerebral Palsy. Mirror therapy can be adopted as a different treatment method that can be used as an alternative to traditional physiotherapy.

**Keywords:** Mirror Therapy, Hand Functions, Hemiparesia, Rehabilitation, Cerebral Palsy.

## GİRİŞ

Serebral Palsi prenatal, perinatal ve postnatal nedenlerle beyinde ilerleyici olmayan bir lezyon sonucu oluşan, ancak yaşla değişebilen, aktivite kısıtlanmasına yol açan, kalıcı motor fonksiyon, postür ve hareket gelişim bozukluğudur. SP'nin klinik semptomları anormal kas tonusu, derin tendon refleksleri, primitif refleksler ve postüral reaksiyonlarda değişiklikler içerir (1). Anormal nöromotor kontrol, mobilite ve bağımsız hareketlerde azalmaya neden olur (2). Kas kuvvetsizliği SP'nin yaygın bir semptomudur (3). SP'de temel sorun istemli motor kontrolün bozukluğudur. Gövde ve denge reaksiyonlarındaki bozukluk, spastisite, distoni gibi kas tonusundaki değişikliklerden ötürü çocuk hareketlerini kontrol edemez ve dengesini tam olarak sağlayamaz. Çocukta ayrıca motor hareketi planlama zorluğu da izlenir. Yüzeysel duyu çoğu zaman normaldir, buna karşılık kortikal algılama, eklem pozisyon hissi ve hareket hissi bozuktur (4).

SP'de ortaya çıkan motor bozukluklar sonucunda, üst ekstremitede sınırlı eklem hareket açıklığı, normal patern içinde gerçekleştirilemeyen izole parmak ve başparmak hareketleri ile kavrama problemleri görülmektedir. SP'li çocuklarda günlük yaşam aktivitelerini etkileyen önemli unsurlardan bir tanesi etkilenmiş üst ekstremitte fonksiyonlarıdır. SP'li çocukların yaklaşık olarak %60'ında üst ekstremitte problemleri görülür (5). Üst ekstremitenin günlük yaşamdaki kullanımı bağımsız yaşam için önemlidir (6). Spastisitenin sebep olduğu anormal postür ve deformite üst ekstremitte fonksiyonlarını kısıtlar, günlük yaşam aktivitelerinin zorlaştırır ve çocuğa bakım veren kişilerin yükünü artırır (7,8). Ayrıca çocuğun aile, okul ve sosyal aktivitelere katılımını olumsuz etkiler (9).

Hemipareziye bağlı olarak ortaya çıkan fonksiyonellik kaybının giderilmesinde birçok fizyoterapi yöntemi uygulanmaktadır. Bu yöntemlerden biri olan ayna tedavisinin görsel geri bildirim yoluyla beyin fonksiyonlarını düzenlediği savunulmaktadır. Ayna tedavisinde kişi paretik ekstremitesini aynanın arkasında tutar. Sağlam ekstremitesiyle normal eklem hareketleri yapar ve bu sırada aynadan ekstremitesini izler. Hasta aynadaki tarafın paretik taraf olduğunu düşünür böylece görsel proprioseptif girdiler artar. Ayna tedavisi paretik ekstremitenin hareket yeteneğinin artırılmasında bu görsel illüzyonundan yararlanmaktadır.

Ayna tedavisiyle ilgili yapılan çalışmalar daha çok inme sonrası yetişkin hemiparetik hastalar üzerindedir ve fonksiyonelliğin kazanılmasında etkili olduğu bilinmektedir. Hemiparetik çocuklarda ayna tedavisi uygulamasıyla ilgili az sayıda çalışma bulunmaktadır. Bu çalışmalar ayna tedavisinin çocuklarda da uygulanabileceğini ve paretik kolun dinamik işlevini geliştirdiğini göstermektedir.

Planlamış olduğumuz çalışmamızda hemiparetik çocuklarda ayna tedavisini klasik fizyoterapi yöntemleriyle karşılaştırmak ve tedaviye etkisini belirlemek amaçlanmıştır.

Çalışmanın başında ortaya koyduğumuz hipotezler;

H1: Ayna tedavisi, hemiparetik çocuklarda el fonksiyonlarını iyileştirici bir etkiye sahiptir.

H2: Ayna tedavisi, el fonksiyonlarını iyileştirmede klasik fizyoterapiden daha üstündür.

## YÖNTEM

Bu çalışma, hemiparetik SP'li çocuklarda ayna tedavisinin el fonksiyonlarına etkisini belirlemek amacıyla tarihleri arasında İstanbul ve Mersin'de hizmet veren çeşitli özel eğitim merkezlerinde gerçekleştirildi. Çalışmaya 30 Hemiparetik SP tanılı 6-15 yaş arasındaki çocuk katıldı. Çocuklar çalışmaya dahil edilmeden önce kendileri ve aileleri çalışma hakkında bilgilendirildi, katılımcıların ailesine aydınlatılmış onam formu imzalatıldı.

### Çocukların Çalışmaya Dahil Edilme Kriterleri

- ✓ Hemiparezi tanısı almış olması,
- ✓ Yeterli iletişim becerisine sahip olması,
- ✓ Bir objeyi kavrama ve bırakma aktivitesini engelleyecek ölçüde ağır spastisitesi olmaması,
- ✓ 6-15 yaş aralığında olması,
- ✓ Ailenin, çocuğunun çalışmaya katılmasını kabul etmesi olarak belirlenmiştir.

### Çocukların Çalışmadan Dışlanma Kriterleri

- ✓ Çocukta mental retardasyon olması,
- ✓ Çalışmada kullanılacak testleri uygularken çocuğun davranış ve uyum bozukluğu göstermesi,
- ✓ Ağır ve iletişimi engelleyen konvülsyonu olması,
- ✓ Çalışmaya katılmayı engelleyen medikal durumun olması,
- ✓ Görme ve işitme bozukluğunun olması,
- ✓ Son 3 ayda Botoks yapılmış olması şeklinde belirlenmiştir.

## Değerlendirmeler

**Hikaye Alımı:** Bireylerin cinsiyet, yaş, boy, okul durumu gibi kişisel bilgileri kaydedildi. Etkilenmiş tarafları kaydedildi. Bunun yanı sıra doğum hikayeleri, aile hikayeleri, tıbbi hikayeleri, daha önce cerrahi ya da Botoks uygulaması yapıp yapılmadığı, ortez kullanıp kullanmadıkları, şu ana kadar fizyoterapi ve rehabilitasyon hizmeti alıp almadığı, almış ise başlangıç zamanı ve toplam süresi not edildi.

**Üst Ekstremitte Kas Gücü Değerlendirmesi :** Biceps, bilek fleksör ve bilek ekstansör kas kuvveti manuel kas testiyle değerlendirildi.

**Kavrama Kuvveti:** Kavrama kuvveti tansiyon aletinin manşonu ile yapıldı. Ölçüm sırasında Amerikan El Terapistleri Derneği'nin (American Society of Hand Therapist, Fess 1992) standart test pozisyonu kullanıldı. Çocuklar kol dayama imkanı olmayan sandalyeye oturtuldu. Omuz eklemi adduksiyon ve nötral rotasyonda, dirsek 90° fleksiyonda ve ön kol nötral pozisyonda tutuldu. Ölçümlere başlamadan önce tansiyon aletinin manşonu 40 mm Hg'ye ayarlandı. Çocuklar ölçümler sırasında en iyi performansı gerçekleştirmek için motive edildi. Bunun için standart talimatlar sabit ses seviyesinde verildi. Her ölçüm yaklaşık 5 saniye sürdü. Sabit ve tepe kavrama kuvveti test sonucu olarak kaydedildi.

**İki Nokta Diskriminasyonu:** Çalışmamızda bu ölçüm diskriminatör ile yapılmıştır. Bu araç her biri değişen aralıklarla gömülmüş olan çubuklar içeren iki plastik diskten oluşur. Çubuklar arası mesafe 1mm'den 25 mm'ye kadar değişir. Çocuğun iki farklı nokta olarak hissettiği değer kaydedilmiştir.

**Parmak Tanıma:** Çocuğun parmakları numaralandırılarak, çocuğun görme alanı kapalı iken parmağına dokunularak hangi parmağına dokunulduğunu sözel olarak veya göstererek tanıması istenmiştir.

**Omuz-Dirsek ve El Bileğinde Pasif Hareket Hissi:** Çocuğun gözler kapatılır, el parmaklarından biri iki yandan tutularak yukarı ya da aşağı doğru hareket ettirilir. Bu sırada çocuktan hareketin yönünü söylemesi istenir.

**Üst Ekstremitte Fonksiyonelliğin Değerlendirilmesi:** Çalışmada, günlük yaşamda el fonksiyonlarını temsil eden bir seri alt testten oluşan 'Jebsen-Taylor El Fonksiyon Testi' kullanılmıştır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Sağlam ve paretik ekstremiteler için ayrı ayrı test yapılmış ve her bir el için alt testi gerçekleştirme süresi saniye cinsinden kaydedilmiştir. Bu çalışmada testin yazı yazma dışındaki bölümleri uygulanmıştır.

**Üst Ekstremitte Eklem Hareket Açıklığının Değerlendirilmesi:** El bileği fleksiyon, ekstansiyonu ve ön kol pronasyon, supinasyonu gonyometrik ölçüm yapılarak değerlendirilmiştir.

**Günlük Yaşam Aktivitelerinin Değerlendirilmesi:** GYA değerlendirmesi Pediatrik Fonksiyonel Bağımsızlık Ölçeği (Functional Independence Measure for Children- WeeFIM) ile yapıldı. WeeFIM, SP'li çocukların gelişimsel, eğitimsel ve toplumsal açıdan fonksiyonel limitasyonlarını tespit eden kapsamlı bir ölçüm yöntemidir. WeeFIM motor ve kognitif olmak üzere 2 ana başlıkta toplanmaktadır. Kendine bakım (6 alt başlık), sfinkter kontrolü (2 alt başlık), transferler (3alt başlık) ve lokomasyon (2 alt başlık) ile ilgili maddeler motor fonksiyonel düzeyi, iletişim (2 alt başlık) ve sosyal algı (3alt başlık) ile ilgili maddeler ise bilişsel fonksiyonel düzeyi göstermektedir. Ölçek toplam 18 madde içerir. Her bir maddedeki fonksiyonu gerçekleştirirken hastanın yardım alıp almadığı, zamanında yapıp yapmadığı veya yardımcı cihaza gereksinim duyup duymadığına göre 1 ile 7 arasında puanlanmaktadır. Verilen görevi tamamen yardımla yaptığında 1, tamamen bağımsız olarak, uygun zamanda ve güvenli bir şekilde yaptığında ise 7 olarak skorlanır.

## Tedavi Protokolü

Çalışmaya dahil edilen 30 hasta randomize olarak iki gruba ayrılmıştır. Her iki gruba da tedavi haftada 2 gün her seans 30 dakika olmak üzere 6 hafta boyunca uygulanmıştır. Birinci grup ayna tedavisine ikinci grup ise klasik fizyoterapi programına alınmıştır. Ayna grubunda 30 dakikalık seans 10'ar dakikada bir dinlenme periyodu verilerek tamamlanmıştır. Aynada el bileği fleksiyon- ekstansiyon, parmaklara fleksiyon-ekstansiyon, ön kol pronasyon supinasyon ve kavrama-bırakma hareketleri çalıştırılmıştır. Kontrol grubuna ise üst ekstremitte kuvvetlendirme egzersizleri, bilateral üst ekstremitte hareketleri, eklem hareket açıklığı egzersizleri çalıştırılmıştır.

## İstatistiksel Analiz

Hastaların fiziksel özellikleri ortalama, standart sapma, frekans ve yüzde değerleri ile tanımlanmıştır. Gruplar arası kıyaslama yapılırken Ki-kare testi ve Fisher'in kesin Ki-kare testi kullanılmış verilerin normal dağılıma uyup uymadığı Kolmogorov Smirnov testi ile belirlenmiştir. Normal dağılıma sahip değişkenler için bağımlı örneklerde tedavi öncesi ve tedavi sonrası ortalamaları karşılaştırmak için Paired Sample t-test kullanılmıştır. Tedavi etkinliği gruplar arası karşılaştırmada Mann Whitney U testi, grup içi karşılaştırmada ise Wilcoxon Testi ile değerlendirilmiştir. Sonuçlar, anlamlılık  $p < 0.05$  düzeyi kabul edilmiştir.

## BULGULAR

Hemiparetik SP tanısı konmuş, yaşları 6-15 arasında değişen 18'i kız 12'si erkek 30 çocuk çalışmaya dahil edilmiştir. Grupların yaş, cinsiyet, boy, kilo ve etkilenmiş taraflarını gösteren özellikleri Tablo 1'de sunulmuştur.

Tablo 1. Demografik Özellikler

Değişkenler (birim)	Ayna Grubu ort±sd (n=15)	Kontrol Grubu ort±sd (n=15)	Gruplar arası Fark Analizi	
			F/stat=/s.d.	p değeri
Yaş (yıl)	10,33±2,80	11,6±2,5	0,49	0,20
Boy (cm)	139,8±16,80	137,06±9,01	3,15	0,58
Kilo (kg)	41,13±14,40	43,4±10,47	0,28	0,62

Katılımcıların %60'ı kız, %40'ı erkek ve %53,3'ü sağ hemiparetik, %46,7'si sol hemiparetik Serebral Palsi idi.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 2.** Grupların Tedavi Başında Değerlendirme Sonuçları

Değişken	Ayna Grubu ort±sd (n=15)	Kontrol Grubu ort±sd (n=15)	Gruplar arası Fark Analizi*	
			F/stat=/s.d.	p değeri
WeeFIM (18-126) ***	114±6	112±4,50	0,87	0,38
Biceps Kas Gücü (0-5)**	3± 0,25	3±0,50	0	1
Bilek Fleksör Kas Gücü (0-5)**	3± 0,25	3±0,25	0,16	0,90
Bilek Ekstansör Kas Gücü (0-5)**	3±0	3±0,50	0,36	0,77
Bilek Fleksiyon açısı (80-90°)	70±10	70±7,50	0,74	0,48
Bilek ekstansiyon açısı (70-80°)	20±10	20±5	0,38	0,71
Pronasyon Açısı (90°)	60±15	45±5	1,97	0,06
Supinasyon Açısı (90°)	60±25	30±20	2,04	0,04
Kavrama Kuvveti (mmHg)	53±6	62±8	1,43	0,16

Çalışma başında ön test puanları dikkate alındığında ayna ve geleneksel fizyoterapi tedavi grubunun tüm değerlendirme parametrelerinde iki grup arasında anlamlı fark saptanmamıştır. (p>0.05)

**Tablo 3.** Tedavi Sonrası Değerlendirme Sonuçları

Değişken	Ayna Grubu (n=15)			Kontrol Grubu (n=15)			FTR Etki Analizi *	
	İlk D ort±sd.	Son D. ort±sd	Fark (%)	İlk D. ort±sd	Son D. ort±sd	Fark (%)	F/stat=/s.d	p değeri
WeeFIM (18-126)	114±6	119±4,5	%4,38	112±4,5	116±4	%3,57	1,37	0,17
Biceps Kas Gücü(0-5) **	3± 0,25	3±0,5	%0	3±0,5	3,5±0,5	%16,6	0,56	0,62
Bilek Fleksör Kas Gücü (0-5) **	3± 0,25	4±0,25	%33,3	3±0,25	3,5±0,5	%16,6	1,74	<b>0,04</b>
Bilek Ekstansör Kas Gücü (0-5) **	3±0	3,5±0,25	%16,6	3±0,5	3,5±0,25	%16,6	1,06	0,34
Bilek Fleksiyon açısı (80-90°)	70±10	77±7,50	%10	70±7,5	73±5	%4,2	0,68	0,51
Bilek ekstansiyon açısı (70-80°)	20±10	23±11,50	%15	20±5	25±13,5	%25	0,10	0,93
Pronasyon Açısı (90°)	60±15	70±15	%16,6	45±5	48±6	%6,6	2,05	<b>0,04</b>
Supinasyon Açısı (90°)	60±25	60±24	%0	30±20	36±20,5	%20	2,03	<b>0,04</b>
Kavrama Kuvveti (mmHg)	53±6	60±7,5	%13,2	62±8	65±10	%4,8	0,62	0,53
Parmak tanıma 1 (1-0) •	1±0	1±0	%0	1±0	1±0	%0	0	1
Parmak tanıma 2 (1-0) •	1±0	1±0	%0	1±0	1±0	%0	0	1

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Parmak tanıma 3 (1-0) •	1±0	1±0	%0	1±0	1±0	%0	1	0,77
Parmak tanıma 4 (1-0) •	1±0	1±0	%0	1±0	1±0	%0	1	0,77
Parmak tanıma 5 (1-0) •	1±0	1±0	%0	1±0	1±0	%0	1	0,77
Pasif Hareket Hissi Omuz (1-0) ••	1±0	1±0	%0	1±0	1±0	%0	0,59	0,77
Pasif Hareket Hissi Dirsek (1-0) ••	1±0	1±0	%0	1±0	1±0	%0	1	0,77
Pasif Hareket Hissi Bilek(1-0) ••	1±0	1±0	%0	1±0	1±0	%0	1	0,77
İki Nokta Ayrımı	15±5	13±5	%14,4	12±5	12±2,50	%0	0,168	0,87

\* Mann Whitney U

\*\* 0: kasta kontraksiyon yok , 5: kasta maximum dirence karşı hareket açığa çıkar.

\*\*\* 18 : tam bağımlı, 126: tam bağımsız. (Yüksek skor az özürüllüğü ifade eder)

• 1: tanıyor, 0: tanımıyor

•• 1: hissediyor, 0: hissetmiyor

**Tablo 4.** Tedavi Sonrası Jepsen Taylor El Fonksiyon Testi Değerlendirme Sonuçları

Değişken	Ayna Grubu (n=15)			Kontrol Grubu (n=15)			FTR Etki Analizi	
	İlk D. ort±sd.	Son D. ort±sd	Fark (%)	İlk D. ort±sd	Son D. ort±sd	Fark (%)	F/stat=/s.d	p değeri
JTHF 1 sağlam (Saniye)	10±2,5	9±2	%10	10±2,5	9±2	%10	0,02	1
JTHF 2 sağlam (Saniye)	10±2	9±2,50	%10	8±1,5	8±1,5	%0	0,29	0,77
JTHF 3 sağlam (Saniye)	9±1,5	9±1,50	%0	9±1,5	8±1,5	%12,2	0,21	0,83
JTHF 4 sağlam (Saniye)	9±2,5	8±2	%12,2	9±1,5	8±1,5	%12,2	0,33	0,74
JTHF 5 sağlam (Saniye)	7± 1	8±1,50	%14,2	8±10	7±1	%13,5	0,91	0,38
JTHF 6 sağlam (Saniye)	7±1,5	7±1	%0	8±1,5	7±1,5	%13,5	0,91	0,30
JTHF 1 Hasta (Saniye)	15±2	14±1,5	%7,7	14±2,5	14±2	%0	0,10	0,93
JTHF 2 Hasta (Saniye)	15±1,5	15±3	%0	14±2	14±2	%0	0,06	0,96



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

JTHF Hasta (Saniye)	3	15±2	13±1	%14,40	15±1,5	15±2	%0	0,73	0,48
JTHF Hasta (Saniye)	4	15±1,5	13±3	%14,40	16±1,5	14±2	%13,5	0,79	0,43
JTHF Hasta (Saniye)	5	13±2	11 (1,5)	%16,40	14±2,5	13±2	%8,2	2,32	0,21
JTHF Hasta (Saniye)	6	13±1	12 (1)	%8,70	15±1,5	14±1,5	%7,7	2,56	<b>0,01</b>

JTHF 1: Jebsen Taylor El Fonksiyon Testi 1.alt test kart çevirme

JTHF 2: Jebsen Taylor El Fonksiyon Testi 2.alt test küçük cisimleri toplama

JTHF 3: Jebsen Taylor El Fonksiyon Testi 3.alt test fişleri yerleştirme

JTHF 4: Jebsen Taylor El Fonksiyon Testi 4.alt test yemek yeme stimülasyonu

JTHF 5: Jebsen Taylor El Fonksiyon Testi 5.alt test boş kutuları hareket ettirme

JTHF 6: Jebsen Taylor El Fonksiyon Testi 6.alt test dolu kutuları hareket ettirme

Son test puanları dikkate alındığında ise ayna ve geleneksel tedavi yöntemlerinin;

Bilek fleksör kas gücü arasında anlamlı fark bulunmuştur. ( $p<0,05$ )

Pronasyon eklem hareket açıklığı arasında anlamlı fark bulunmuştur. ( $p<0,05$ )

Supinasyon eklem hareket açıklığı arasında anlamlı fark bulunmuştur. ( $p<0,05$ )

Paretik elde JTHF testinin dolu kutuları hareket ettirme alt testinde anlamlı fark bulunmuştur. ( $p<0,05$ )

## TARTIŞMA VE SONUÇ

Serebral Palsi, immatür beyin motor merkezlerinde meydana gelen lezyon sonucu oluşan hareket ve postür bozuklukları ile karakterize ilerleyici olmayan gelişimsel bir bozukluktur. Oluşan motor bozukluklar, kas kuvvet dengesizlikleri, kas-iskelet sistemi problemleri, kontraktürler, eklem çevresindeki sertliklerin artması ve hareket açıklıklarının azalması, spastisite, duyu-algı-motor bütünleme sorunları gibi durumlar postüral kontrol ve denge bozukluklarına neden olmaktadır (10,11,12).

Hemiparetik çocuklarda kuvvet kaybı, spastisite gibi motor bozukluklar aktivitelere katılımı kısıtlayan en önemli faktördür. Hastalık şiddetinden bağımsız olarak, çocuklarda ciddi bir etkilenme olmasa da paretik ellerini kullanmaktan kaçınma eğilimi olduğu, ellerini sadece destek amaçlı kullandıkları bildirilmektedir (13,14).

Hemiparetik bir çocuğun değerlendirilmesinde sadece etkilenmiş taraf değil aynı zamanda sağlam olan kontralateral tarafın da değerlendirilmesi ve karşılaştırılması gerekmektedir. Wendy ve ark. (15) Hemiparetik SP'li 37 (26 erkek, 11 kız) 4-15 yaş arasında çocuk değerlendirilmiş, kavrama kuvveti Jamar el dinamometresi ile ölçülmüş, beceri testi "Box and Block" ile yapılmıştır. Çalışmanın sonucunda, etkilenmiş elin kontralateral ele göre kavrama ve sıkma kuvvetinin önemli derecede daha az olduğu bildirilmiştir. Bizim çalışmamızda kuvvet için dinamometre ve el beceri hızı için Jebsen Taylor El Fonksiyon testi kullanılmıştır. Farklı bir test kullanılmış olsa da sonuçlar benzer niteliktedir ve paretik elin kavrama kuvveti ve beceri hızı daha düşük bulunmuştur. ( $p=0,01$ ,  $p<0,05$ )

Çalışmamızda JTHF testinin ince parmak becerisi gerektiren, altı küçük objeyi (iki para, iki ataç, iki gazoz kapağı) masadan alıp bardağa koyma testi paretik elde diğer testlere göre daha uzun sürmüştür. Bu alt test için ince motor becerinin yeterliliği son derece önemlidir. Sürenin uzamış olması ince motor beceride bir eksikliğe işaret etmektedir. Arnould ve ark.'nın (16) yaptıkları bir çalışmada el becerisi için "Purdue Pegboard Testini kullanmış olup, çalışmalarına dahil ettikleri HP'li çocukların paretik olmayan ellerinde, özellikle ince parmak becerisinde motor bozukluklar sergiledikleri belirtilmiştir. Ayrıca Arnould ve ark.'nın (17) yaptığı başka bir çalışmada 136 SP'li çocuk değerlendirilmiş (35

kuadriplejik, 24 diplejik, 77 hemiplejik). 6-16 yaş aralığındaki bu çocukların her iki eli için altı adet el becerisi ölçülmüştür. Kavrama kuvvetini “Jamar Hand Test”, Gross manuel beceriyi “Box and Block test”, ince parmak becerisini de “Purdue Pegboard Test”i ile değerlendirdikleri çalışmada hemiplejik çocukta non-paretik elin özellikle ince motor becerileri başarmada etkilenmiş olabildiği sonucuna ulaşmışlardır.

Megan ve ark (18) yaptıkları çalışmada hemiparetik serebral palsili çocukların büyük bir kısmında zayıf dokunsal algı olduğu ve bunun fonksiyonel bozukluğa sebep olabileceği sonucuna ulaşmışlardır.

Hoon JR ve ark (19) yaptıkları çalışmada 28 SP’li çocuk ve 35 sağlıklı çocuk üzerinde dokunma duyusu, propriosepsiyon, kas gücü ve spastisiteyi değerlendirmişlerdir. Sensorimotor fonksiyonlar ve thalamo-kortikal anormallikler arasındaki ilişkiyi incelemek amacıyla yapılan bu çalışmada dokunma duyusu ve propriosepsiyon duyusunda kayıplar gözlemlenmiştir.

Çalışmamıza dahil edilen hemiparetik SP grubundaki çocukların etkilenmiş taraflarında dokunma duyusunun eksiklikleri olduğu görülmüştür. Çocuklarda pasif hareket hissinde, iki nokta diskriminasyonunda eksiklikler olduğu saptanmıştır. Gordon ve ark (20) yaptıkları çalışmada 15 hemiparetik ve 15 kontrol grubundan oluşan çocukların üst ekstremitelerine iki nokta ayırımı, spastisite, el becerileri kavrama kuvveti açısından ve Semmes-Weistein duyu filamentlerini kullanarak değerlendirmişlerdir. Semmes-Weistein duyu filamentleriyle yaptıkları değerlendirmede gruplar arasında anlamlı farklılıklar bulmuşlar, fakat taktil duyu ve kavrama kuvveti arasında bir ilişki bulamamışlardır.

Serebral Palsili çocuklara uygulanan tedavi yöntemlerinin temel amacı, ulaşabilecek en üst düzeyde fonksiyonel bağımsızlıklarını kazandırmak ve yaşam kalitelerini arttırmaktır. Bu amaca yönelik olarak birçok tedavi yaklaşımı uygulanmaktadır.

Boinier ve ark (21), hemiparetik SP’li çocuklar üzerinde yaptıkları araştırmada, bu çocukların el fonksiyonlarının çok sınırlı olduğunu ve günlük aktivitelerdeki karmaşık işleri yapmada zorlandıklarını bildirmişlerdir. Levitt ve ark (22) SP’li çocuklarda el fonksiyonlarının önemli olduğunu ve etkilenmiş üst ekstremitel fonksiyonlarının günlük yaşam aktivitelerini etkileyen en önemli faktör olduğunu vurgulamışlardır. Anna ve ark (23), hemiparetik SP’li çocuklarda etkilenmiş taraf üst ekstremitel performansını değerlendirmiş ve hemiparetik SP’li çocukların aktiviteleri yapma hızını düşük bulduklarını ifade etmişlerdir. Biz de çalışmamızda üst ekstremitel fonksiyonelliğini değerlendirmek için Jebsen Taylor el fonksiyon testi uyguladık ve benzer sonuçlara ulaştık. Paretik elde aktivite hızı oldukça düşük bulundu. ( $p=0,021$ ,  $p < 0,05$ )

Gordon ve ark (24), 20 hemiparetik SP’li çocukta yaptığı randomize kontrollü çalışmada bir gruba taktil eğitimi diğer gruba da bimanuel eğitim vermiştir. 8 haftalık eğitimden sonra her iki grupta da paretik elde stereognosis düzelme göstermiştir ancak iki nokta diskriminasyonunda bir değişiklik olmamıştır. Bizim çalışmamızda da ayna tedavisi grubunda iki nokta diskriminasyonunda anlamlı iyileşme gözlenmedi. Çünkü çalışmamızda tamamen motor fonksiyonlar, normal eklem hareketleri çalışıldı, taktil eğitim verilen bir çalışmada dahi gelişim gözlenmemesi gözönüne alınırsa, bizim protokolümüzde iki nokta ayırımında bir farklılık olmaması şaşırtıcı değildir.

Çalışmamıza sadece 6-15 yaş aralığında hemiparetik SP’li çocukları dahil ettiğimizden bu çocuklara ulaşmada zorluklar yaşadık. Diğer taraftan yapılan çalışmalar incelendiğinde ayna tedavisinin hemiparetik çocuklarda uygulandığı bir pilot çalışma bulunmaktadır. Bu çalışma 5 kız 5 erkek 10 çocukla planlanmış ve ayna tedavisi hemiparetik çocuklarda uygulanabileceği söylenmiştir. Bizim çalışmamız da daha fazla katılımcıyla yapılmış ve ayna tedavisinin el fonksiyonlarını iyileştirmede kullanılabileceğini göstermiştir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## İKLİM DEĞİŞİKLİĞİNE UYUM İÇİN STRATEJİK EKOTURİZM YÖNETİMİ: MÜŞTERİ PORTFÖYÜ YAKLAŞIMI

### STRATEGIC ECO-TOURISM MANAGEMENT FOR ADAPTATION TO CLIMATE CHANGE: CUSTOMER PORTFOLIO APPROACH

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#### ÖZET

İklim değişikliği gerçeği altında, iklimsel sorunların tanımlanarak doğru analizlerin yapılması ekoturizm yönetiminin stratejik biçimde ilerlemesini sağlamaktadır. Yerelden hareket ederek doğru kapasitenin ortaya konması amacıyla müşteri portföyüne dayalı bir sistematik belirlenmesi bu çalışmanın ana odak noktasıdır. Müşteri portföyünün doğru tanımlanarak, kimler için tüm ekonomik faaliyetlerin tasarlanacağı ekoturizm işletmesi için yaşamsal önemdedir.

**Anahtar kelimeler:** müşteri portföyü, iklim değişikliğine uyum, stratejik ekoturizm yönetimi

Jel kodu: Q54, Q1

#### ABSTRACT

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Under the fact of climate change, making proper analyses by identifying climate problems ensures strategic progress in ecotourism management. A systematic determination based on the customer portfolio to identify the right capacity from the ground up is the focus of this work. By correctly defining the customer portfolio, whom all economic activities are designed for is vital to the ecotourism business.

**Keywords:** customer portfolio, climate change adaptation, strategic ecotourism management

Jel code : Q54, Q1

#### İklim Değişikliği Gerçeği

İklim değişikliği gerçeği, her geçen gün daha sık karşılaştığımız kentsel ve kırsal alanlarda yaşadığımız iklim kaynaklı olaylardan ortaya çıkan bir olgudur. İklimin değişimi denildiğinde uzun süreli süreçte yaşanan ekstrem olayların sıklığının artması konu edilmektedir. Bu süreçte, ekstrem iklim kaynaklı olaylar; yağış rejimlerinin değişimi (azalması veya şiddetli artması), sel olayları, güneşli gün sayısının artması, yağış miktarının azalması, fırtına ve hava akımlarından kaynaklanan zarar verici iklim bazı aktivitelerin artmasını konu edinmektedir.



İklim değişikliği, kentsel topluma ait bir kavram olup, daha önce yaşanan biyolojik temelli döngüden farklılık arz etmektedir. Bugün yakınılan ekstrem olayların olası sonuçları düşünüldüğünde, kentsel toplumun yaşam biçiminden kaynaklanan nedenlerin buna yol açacağı görülmektedir. Makineleşme süreci ile birlikte, çoklu atölye tipi üretimin geliştirilmesi, bu durumun sanayi devrimine yol açarak kitlesel üretimi ortaya çıkarması ve bu süreçte üretim için daha çok kaynak tüketimi ile doğa zararı oluşturan bir sistemin kurulması, günümüz iklim değişikliği gerçeğinin temelini oluşturmaktadır.

Her ülkenin farklı gelişim süreçleri, iklimi değiştiren olguların farklı hızlarda ortaya çıkmasına neden olmuştur. Örneğin; gelişmiş ülkelerde farklı sanayi seviyelerinde üretimlerin gerçekleştirilmesi (Endüstri 4.0 veya Endüstri 2.0) aslında kaynak kullanımı ve doğa zararının farklı seviyelerde ortaya çıkmasına neden olmaktadır. Endüstriyel üretimin doğa merkezli değil, ekonomik fayda merkezli düşünülerek gerçekleştirilmesi de bu sürecin en önemli düşünsel kaynağıdır.

Artan ekonomik gelişmişlik ile birlikte kaynakların kaynağının sorgulanması ve doğa zararının minimize edilmesi gerekliliği, sürdürülebilir üretimin düşünülmesini ve temel alınmasını getirmiştir. Sürdürülebilir üretim, üretimde zihniyet değişimini temsil etmekte olup, üretimin kaynak temelli ve doğa faydası düşünülerek gerçekleştirilmesini ifade etmektedir. Gelineen noktada, iklim değişikliği gerçeğine Türkiye özelinde bakıldığında;

-Meteoroloji Genel Müdürlüğü'nce gerçekleştirilen 2099 yılına kadarki 3 projeksiyonda ortalama sıcaklık artışının 1,5 – 3,7 °C aralığında artması, yağışın ise, +%3 ile % -12 aralığında olması beklenmektedir. Dolayısıyla, istatistiklere bakıldığında, rakamların ciddiyeti durumu göstermektedir.

İki yüzyıl önce keşfedilen sera gazları çevrimine ilişkin doğal süreç, bir gezegen olarak Dünya'nın sıcaklığını Güneşten gelen enerji ve uzaya bırakılan enerji olmak üzere dengede tutmaktadır(Maslin, 2009). İki önemli sera gazı olan su buharının ve karbon dioksitin varlığı olmasa Dünya'da ortalama sıcaklık -20°C dolaylarında olacaktır(Dow ve Downing, 2006). Öte yandan bu sera etkisi doğuran gazların olması gerekenden fazla olmaları ise, olumsuz sonuçlar doğurmaktadır. İklim değişikliğinin gerçek bir sorun olduğu ise, birçok bilim insanı tarafından kanıtlanmış ve yüksek CO2 konsantrasyonunun daha düşük fayda getirdiği kanıtlanmıştır(Watts, 2007). Yüksek CO2 konsantrasyonu, böcek sayısını artırmakta olup, bitkilerin düşen besin değeri ile birleştiğinde, tarımsal üretimin büyük yara almasına neden olmaktadır(Watts,2007). Dahası sıcaklığın artması durumunda, ekstrem kuralıkların %40 dolayına çıkması beklenmektedir(Fagan, 2008). Kuraklık, dağların sessiz katili olarak isimlendirilebilecektir. Mikrobiyolojik ve böcek kaynaklı hastalıklara bakıldığında ise, sıtma gibi hastalıklar, parazitler ve hastalıkların yayılması hızlanmaktadır.

İnsan kaynaklı(antropojenik) nedenler iklim değişikliğine neden olan başat faktörler olarak sıralanacaktır. İnsan kaynaklı aktiviteler, sera gazları çevrimi sürecini bozmuş olup, temel iklim sorunlarının kaynağını oluşturmaktadır(NRC, 2006). Sera gazı çevriminde bir diğer süreç, karbondioksitin çevrimi olup, karbondioksit çevriminde bozucu etkinin oluştuğunu ve bunun insan kaynaklı olduğunu bilim insanları şu şekilde açıklamaktadır: Doğada, karbon izotopları kimyasal olarak birbirinden farklı atomik ağırlıklara sahiptir. Bu karbon izotopları 3 farklı formda, hepsi de 6 protona sahip olmak üzere, farklı nötron seviyelerinden oluşmaktadır. Atmosferde bulunan yüzde 99 oranındaki karbon, karbon 12 formunda olup, geri kalanın büyük miktarını karbon 13, çok az kısmını radyoaktif olan karbon 14 formu oluşturmaktadır. Bitkiler büyümek için karbon 12 tercih ederler. Bilim insanlarına göre, karbon çevriminin bozulmasını gösteren en önemli kanıt karbon 13/karbon 12 oranıdır. Günümüzde karbon 13 aşırı derecede azalmaktadır(Mann ve Kump,2009) Bu durumun nedeni olarak da fosil yakıt kullanımı gösterilmektedir.

İklim değişikliği gerçeği altında, iklim değişikliğine uyum kavramı gittikçe önem kazanan bir hale gelmektedir. İklimin değişen yapısı, uyum kavramını öne çıkarmakta olup, adapte becerisi olmaksızın gerçekleştirilecek herhangi bir çalışma veya aktivite sonuçsuz kalacaktır. Bu nedenle, adaptasyon iklim değişikliği gerçeği altında tüm organizasyonel süreçleri ilerletmek üzere, disiplin oluşturan bir kavramdır.

### **İklim Değişikliğine Uyum(Adaptasyon) Kavramı**

Uyum kavramı; ekolojik, sosyal ve ekonomik sistemlerde gerçekleşen değişimlere yanıt verebilme becerisini kapsamaktadır. İklim değişikliğine uyum kavramı ise, iklimdeki değişimlere karşı süreçte,



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

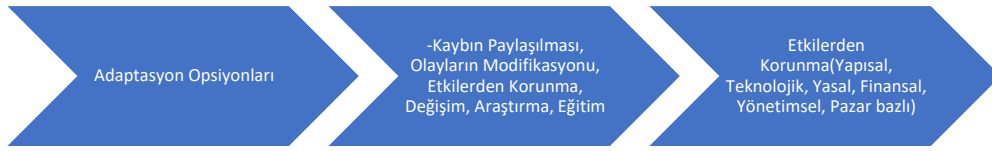
October 13-14, 2023

uygulamalarda ve yapılarda değişim oluşumunu kapsamaktadır. İklim değişikliğine uyum, hem kırılganlık ve etki değerlendirmesi ile iklim değişikliğinin risk ve maliyet tahminini, hem de yanıt verebilme ve strateji geliştirme ile “etkileri azaltma” olgusunu kapsamaktadır(Kane ve Shogren, 2000).

Adaptasyon kapasitesi ise, sistemin, topluluğun veya bölgenin iklim değişikliği etkilerine karşı uyum sağlama potansiyeli veya yeteneğidir. Uyum sağlama kapasitesinin varlığı, kırılganlıkları azaltmakta ve sürdürülebilir gelişimi sağlamaktadır(Munasinghe 2000).

Smit(2000), sistemin karakteristiğinin uyumlaştırılması olarak uyum kavramını tanımlayarak, süreç ve çıktılar ile iklim değişikliğine uyumun oluştuğunu vurgulamaktadır. Ayrıca, iklim değişikliğine uyumun göstergesi olarak ise, değerlendirme kriterlerinin ve göstergelerinin baz alınması gerektiğini belirtmiştir. Uyum kavramına bakıldığında farklı biçimlerde karşımıza çıkması nedeni ile, uyum göstergelerinin de çok çeşitli olduğu görülecektir. Örneğin; planlanmış adaptasyon, farkındalık bilinci olan bir topluluğun önceden kararlaştırılmış politika kararlarına uygun biçimde ilerlemesi ile oluşmaktadır.

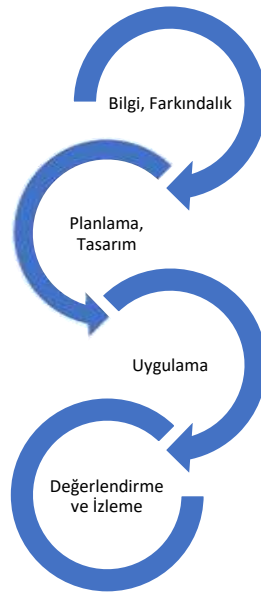
Şekil 1: Adaptasyon opsiyonlarının sınıflandırılması



Kaynak: Burton, 1996

Adaptasyon, iklim değişikliği etkilerini olumlama açısından iki temel alternatiften birisidir. Adaptasyonun karşıtı alternatif, azaltmadır. Adaptasyon opsiyonlarına bakıldığında, azaltma veya adaptasyon kararı verilmesinde temel karar zinciri baz alınmalıdır. Bu karar zinciri daha sonra adaptasyon opsiyonlarının de gelişimini etkileyecektir. Örneğin; yapısal korunma kararları veya Pazar bazlı kararlar verilmesinde adaptasyon kararının en başında verilmesi de etkili olacaktır. Adaptasyon kararının, etki azaltma kararı verilmesi sırasındaki karar örgüsü şu şekilde gösterilebilecektir:

Şekil 2: Adaptasyon veya Etki Azaltma Kararı Verilmesinde Temel Karar Zinciri(Karar Örgüsü)

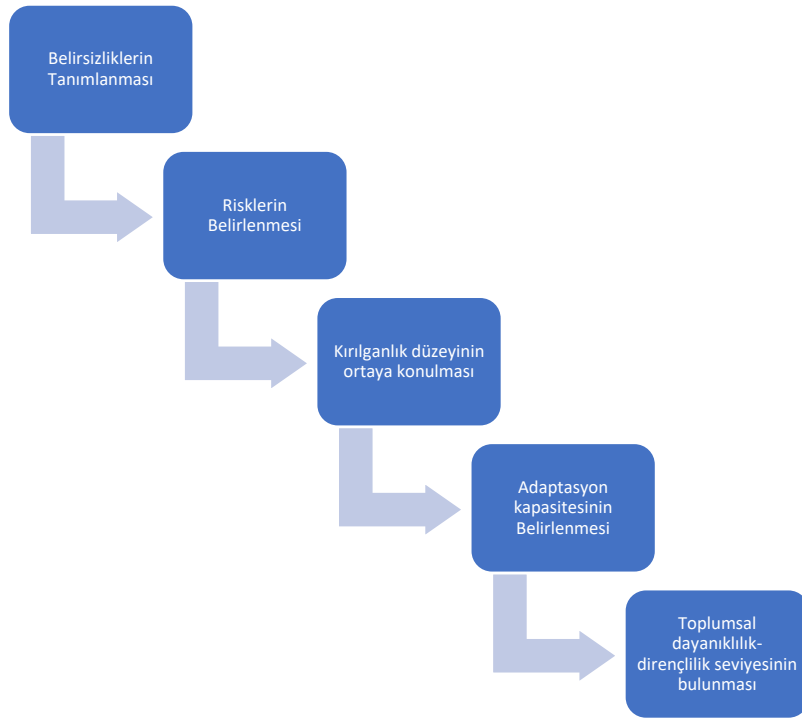


Şekil 2'ye bakıldığında, temel karar zincirinde öncelikle bilgi ve farkındalık ölçümleri gerçekleştirilmeden önce, politika kriterleri oluşturulmalı ve gelişim amaçları da kurulmalıdır. Bu doğrultuda, iklim değişikliğine uyum amaçlı bir plan ve program oluşturmak mümkün olacaktır. Bu kapsamda, iklim değişikliğine uyum amaçlı bir plan ve programda temel eylem politika kriterleri ve gelişim amaçlarının kurularak karar zincirinin bu şekilde denkleme alınmasıdır.

Politika kriterleri kamunun ihtiyaç analizleri doğrultusunda, belirsizlikleri azaltan ve risk yönetimini planlayan bir biçimde oluşturulmalıdır. Bu nedenle, doğru ekoturizm yönetiminin iklim değişikliği gerçeği kapsamında uygulanması amacı ile risklerin doğru analizi ve belirsizlik içeren konuların tanımlanması da gerekmektedir. Risklerin tanımlanması ve analiz edilmesi, belirsizlik içeren tüm durumların çözümlenmesini de gerektirmektedir. Risklerin gerçekçi tanımlanması amacı ile, belirsizliklerin minimize edilmesi önemli bir noktadır.

Belirsizlikler, olası risklerin yönetimi zorlaştırmasına neden olacağından doğru tanımlanmış belirsizliklerin belirli hale getirilebilmesi, iklim değişikliği karşısında toplumsal, yapısal veya alt kırılım olarak birçok farklı noktada kırılabilirlikleri gösterecek olduğundan adaptasyon kapasitesini de doğru tanımlamayı sağlayacaktır. İklim değişikliği karşısındaki kırılabilirlik, risk oluşumuna olan tepki becerisini ifade etmektedir. Dolayısı ile, kırılabilirlik potansiyel olarak içerisinde bulunan yanıt verebilme yeteneği veya yeteneksizliğidir. Her bir yerel değişkenin uyum kapasitesi, riskleri, belirsizlikleri ve kırılabilirlikleri farklılık arz etmektedir. Adaptasyon kapasitesinin gelişimi sonucunda artması veya olumlu ilerlemesi ise, iklim değişikliklerine dirençli bir topluluğun oluşturulması ile ilgilidir.

Şekil 3: Belirsizliklerden İklim Dirençli-Dayanıklı Topluluğa Aşamaları



Kaynak: Yazar tarafından literatürden yararlanılarak geliştirilmiştir.

### İklim Değişikliğine Uyum İçin Stratejik Ekoturizm Yönetimi Nasıl Başarılır?

Ekoturizm, korunan çevreler ve yerel halkın iyi halde olmasını destekleyen sorumlu bir turizm olarak tanımlanmaktadır. Ekoturizm, bu yönü ile doğa ve kültürün karışımını ifade eden misafir doyumluluğunu içermektedir. Öte yandan, sürdürülebilir turizmden farklı olarak turistlerin ihtiyaçlarını karşılamaktan çok ekosistem aktivitelerine odaklanmaktadır.

Stratejik yönetim ise, herhangi bir organizasyonun temel becerilerine ve öz yeterliliklerine göre temellendirilen ve organizasyonun hangi kaynakları kullanarak ne yöne gideceğinin belirlendiği bir üst yönetim metodu olarak tanımlanacaktır. Böylece, stratejik ekoturizm yönetimi ise, ekoturizm konusunda

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

çalışan bir organizasyonun stratejik yönetim ilkelerini uygulayarak kaynak planlaması ve yön analizlerinin yapılmasıdır.

Tablo 1: Stratejik Ekoturizm Yönetimi Aşamaları

Stratejik Ekoturizm Yönetimi Aşamaları
1.Yerel ekosistemin ve ekoturizmin gelişimi konusunda kapasitenin araştırılması(Yerel zenginlikler)
2.Paydaş analizi
3.Gelişim alanının tanımlanması ve uygulama alanlarının belirlenmesi
4.Alanın ana güç odaklarının tam belirlenmesi
5.Doğru deneyimlerin ve etkileşimlerin oluşturulması

Kaynak: Yazar tarafından literatürden yararlanılarak geliştirilmiştir.

2015 senesinde, Birleşmiş Milletler'in uluslararası alanda sürdürülebilir gelişimi bir amaç olarak belirlemesi ile sürdürülebilir gelişim yaygın bir sorumluluk haline gelmiştir. Avrupa Birliği ise bu konuda, Avrupa turizminin sürdürülebilir bir kapsamda ilerlemesinin doğal ve kültürel miraslarına odaklanması ile gerçekleşeceğini ileri sürmektedir.

Ekoturizmin temel aldığı prensipler ise;

- yerleşikleri desteklemek,
- turizmin çevre üzerindeki olumsuz etkilerini minimize etmek,
- çevresel ve kültürel değerler konusunda yerelde farkındalığı artırmak,
- misafirler ve yerleşikler için otantik deneyimler oluşturmak.

Kitlesel veya geleneksel turizm düşünüldüğünde, ekoturizm sıradışı bir deneyim sunmaktadır. Literatürde, ekoturizm tanımlamalarında en çok karşımıza çıkan, kavramlar “doğal çevre-değerler” ve “kültürel değerler”dir. Yerele ilişkin en çok otantik deneyim yaşatacak olan bu iki değer, ekoturizm aktivitelerinin temelini oluşturmaktadır.

Ekoturizmin farklı nitelikleri:

- Ekoturizmin bir yaşam biçimi olması,
- Ekoturizm aktivitelerine katılanların çevre bilinci ve doğa koruma farkındalığı olması
- Turizmin doğaya zarar vermeyeceğini de gösteren bir turizm alt türü olması
- Tüm paydaşlara katkısı bulunması

İklim değişikliğine uyum kapsamında ekoturizmin stratejik yönetiminin başarısı için, odaklanılması gereken ana kavram; yerel doğal ve kültürel değerlerden(sahip olunanlara) yola çıkılması, bu değerlerin yerel topluluk için ifade ettiklerinin iyi anlaşılmasıdır. Ekoturizmin stratejik yönetim başarısında, yerel toplulukların gelişimlerine odaklanıldığında yerel kalkınma ve sosyo-ekonomik temelli ekoturizm hedeflerine ulaşılmış olacaktır. Ekoturizme stratejik yaklaşıldığında, piyasa temelli çözümler değil, kaynak ve insani temelli bir çözüm temel alınmaktadır.

Ekoturizme stratejik yönetim açısından yaklaşıldığında, topluluk geliştirme konseptinin bireyselleştirilmesi baz alınmaktadır. Wheelen ve Hunger(2008), stratejik yönetimi uzun dönemli çevresel tarama, strateji formülasyonu, strateji uygulaması ve değerlendirmeyi içeren performans yönetim kararları ve aksiyonları seti olarak tanımlamıştır. Stratejik yönetimin karar setleri ve aksiyonları, ekoturizmin iklim değişikliğine uyumu açısından değerlendirildiğinde baştan sona planlama

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

yapılmasına imkan tanımaktadır. Stratejik yönetim kararlarının, biyolojik çeşitlilikten ekoturizm aktivitelerinin elementlerine kadar tanımlanmasını içermektedir.

Ekoturizmin stratejik yönetim kapsamında 4 ana amacı bulunmaktadır(Urban Ecotourism Declaration- UED, 2006):

- Doğal ve kültürel mirasın korunması ve yenilenmesi
- Yerel faydaların maksimize edilmesi ve yerel insanların ihtiyaçlarının giderilmesine katkıda bulunması
- Çevresel konularda, tarihsel miras ve değerleri, sürdürülebilirlik başlıklarında kentli insanların ve misafirlerin farkındalığını artırma
- Ekolojik ayak izinin azaltılması

Stratejik yönetim açısından konuya bakıldığında, aksiyon planlarının ve ekoturizme başlama planının yapılması yerelin ihtiyaçları ile başlamaktadır. Öncelikle, korunacak doğal ve kültürel alanların tanımlanması ile birlikte yerelde insanların ihtiyaçları ekoturizmin stratejik yönetimini gerektirmektedir. Korunacak doğal ve kültürel alan zenginliğinin iyi tanımlanması, farklı zenginliklerinin, eksik yönlerinin ve olası geliştirilmesi gereken yönlerinin ortaya konulması gerekmektedir. Ekoturizm, zenginliğe sahip ekolojik alanların sürdürülebilir yöntemlerle yerel ve bölgesel ekonomiye fayda sağlamasına kanalize edilmesi olduğundan yerel zenginliklerin boyutu bilinmelidir.

Yerelde sahip olunanlar bilindikten sonra, amaçlara özgü belirteçlerin belirlenmesi ve bunlara özgü başarı kriterlerinin oluşturulması gerekmektedir. Başarı kriterleri belirlendikten sonra, hedef Pazar segmentasyonun yapılması ise uygulama sürecinin daha doğru ilerlemesini sağlamaktadır.

Tablo 2: Ekoturizmde Farklı Segmentasyon Kurulumunda Öne Çıkan Kriterler

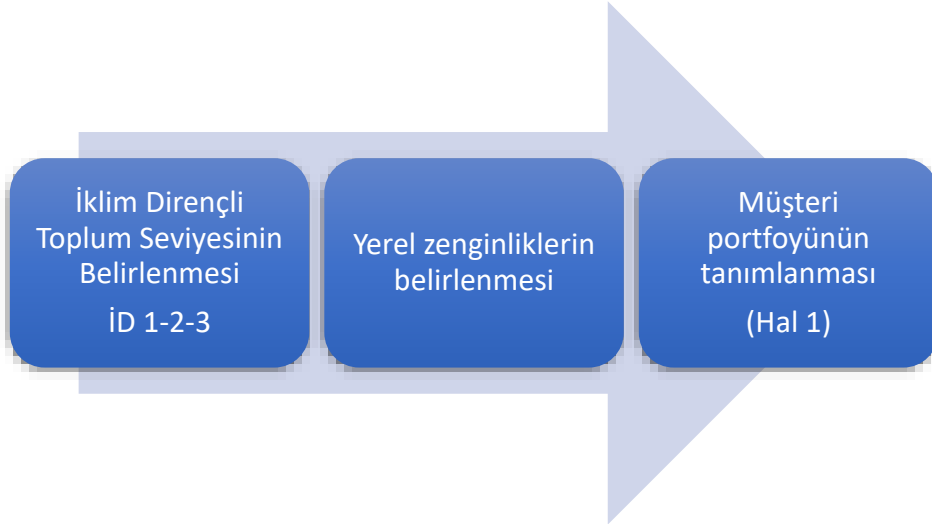
-Yerel Pazar değişkenlerinin bilinmesi
-Uluslararası Pazar değişkenlerinin bilinmesi
-Uluslararası Hedef Grupların tanımlanması
-Ekoturistler için Motivasyon Unsurlarının belirlenmesi
-Aktivitelerin yoğunluğu

Kaynak: Yazar tarafından literatürden yararlanılarak geliştirilmiştir

Uluslararası hedef grupların tanımlanması, turizm aktiviteleri için ana ögedir. Turizm aktivitelerinde, hedef grup müşteri portföyü ve nakit akışı bağlamında en önemli ögedir. Müşteri portföyünün niteliği ve potansiyel misafirlerin ana özellikleri, Ekoturizm işletmesinin tüm stratejik kararlarını yönlendirmektedir. Örneğin; potansiyel misafirlerin tek olmaları, çift olarak gelmeleri, tek çocuklu veya çok çocuklu olmaları stratejik yönetim sürecini etkileyen bir faktördür. Dolayısı ile, Ekoturizm işletmesi için stratejik yönetim uygulamalarının temeli misafir portföyünün oluşumu ile başlamaktadır. Bu portföy tamamen yerel zenginlikler ve geliştirilebilir yönler üzerine inşa edilmektedir.

Belirsizliklerden İklim Dirençli-Dayanıklı Topluluğa Aşamaları'nda tanımlanan direnç seviyesine odaklı bir planlama ile aşağıda belirtilen stratejik yönetim uygulamaları süreci işletildiğinde, iklim değişikliğine uyumlu bir ekoturizm süreci işleyecektir. Bu süreçte öne çıkan, iklim direnci seviyesi olup, bu direncin seviyesi baz alınarak yapılacak çalışmalar Ekoturizm faaliyetlerinin başarısının doğrudan belirleyicisi olacaktır.

Şekil 4: Ekoturizm İşletmesi İçin Stratejik Yönetim Uygulamalarının Temeli: 3 Faktör



Kaynak: Yazar tarafından literatürden yararlanılarak geliştirilmiştir.

Stratejik yönetim literatüründe, işletmelerin iç ve dış çevre analizleri müşteri portföyünün tanımlanması ve müşterilere ulaşmaya odaklı planlanmalıdır. İşletmenin bulunduğu sektör ve ekonominin genel analizinden sonra iç analiz kısmında en öne çıkan noktalar, işletmenin varlıkları ve yetenekleridir. Tüm varlıkları ve yetenekleri, müşteri portföyünün tanımlanması ile birlikte önem kazanmaktadır. Müşteri portföyü, pazarlama planının oluşturulmasını sağlayacağından işletmenin gelir kaynaklarının en önemli aşamasını oluşturacaktır.

Müşteri portföyü odaklı yapılacak olan örgüt yapısı planı, örgütsel kültürün inşa edilmesi, vizyon ve misyon kurulumu, teknik donanım ve kaynak planlaması Ekoturizm işletmeleri için iklim odaklılık ve iklim değişikliğine uyum için de temel arz etmektedir. 3 Faktör sonrasında, Ekoturizm işletmesi kendi amaç ve vizyonuna uygun biçimde;

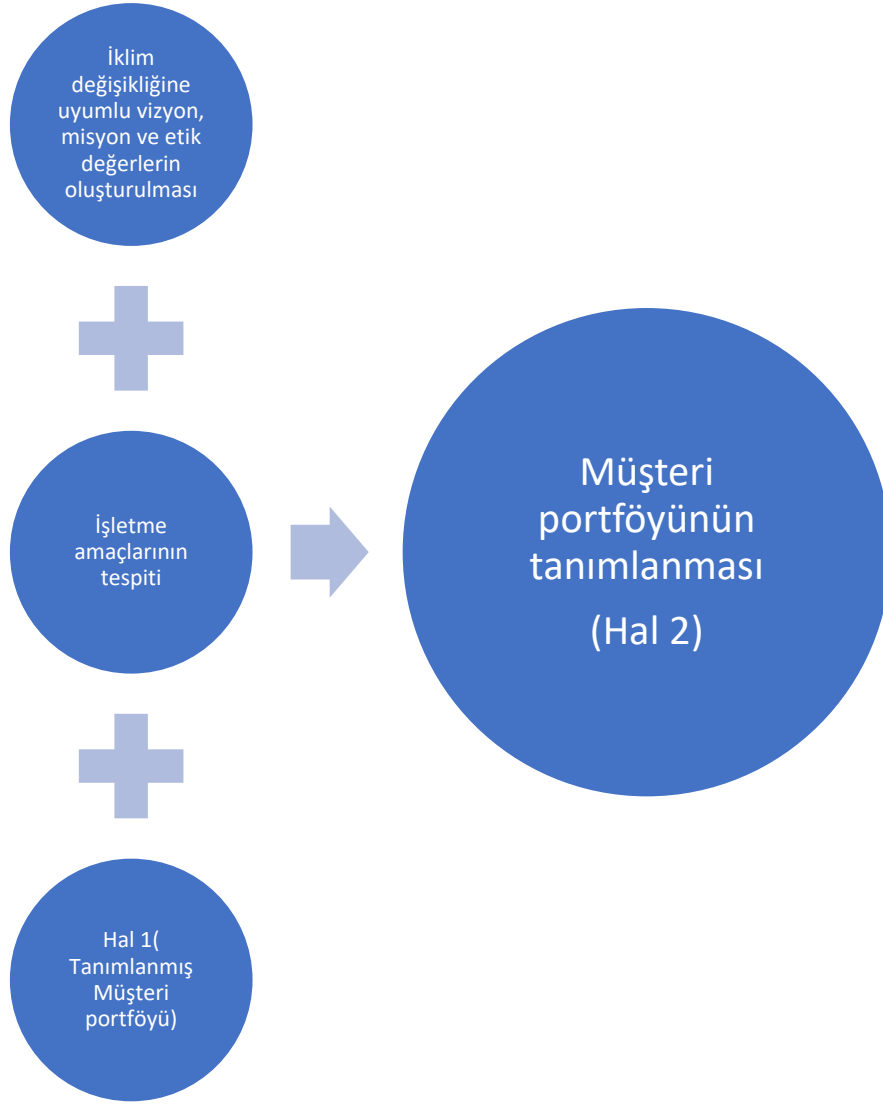
-değer ürettiği

-ikame edilmediği,

-kaynağı nadir bir konuya sahip aksiyonlarını planlaması başarı için elzem koşullardır. Bu durumda, iklim değişikliğine uyumun konuşulduğu bir altyapı oluşacaktır. Öte taraftan, ekoturizm işletmelerinin iklim bazlı düşündükleri, neyi doğru yaptıkları, neyi iyi yapabilecekleri, hangi konularda yarıldıkları ve hangi konuların onlara piyasada sorun yaşatacağını bilmeleri de iklim değişikliğine uyum kapasitelerini iki yönlü etkilemektedir.

İklim bazlı stratejik yönetimde, Şekil 4'te tanımlanan 3 Faktör yaklaşımının ilk ikisi dış faktörleri temsil etmektedir. Diğer 1 faktör ise, işletmenin iç faktörü olup bu faktörün oluşturulmasında aşağıda belirtilen diğer aşamalar da birlikte düşünüldüğünde Ekoturizm işletmesi için iklim değişikliğine uyum temelli bir stratejik planlama süreci oluşturulacaktır.

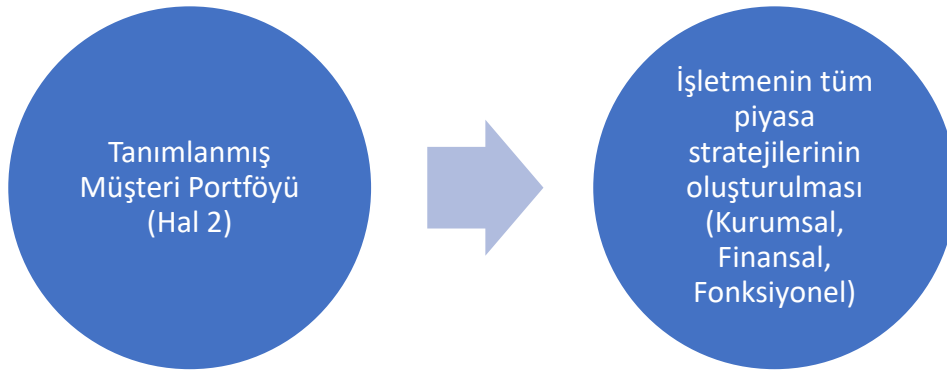
Şekil 5: Bir Ekoturizm İşletmesi İçin Stratejik Yönetim Sürecinin 1. Aşaması



Kaynak: Yazar tarafından literatürden yararlanılarak geliştirilmiştir.

3 Faktör sürecinde tanımlanan müşteri portföyüne, işletmenin kendi içsel öğelerinin eklenmesi ile müşteri portföyü yeni öğeler ile zenginleşmekte ve 3 faktör sürecinde almış olduğu çerçevenin içerisini işletmenin içsel öğeleri, düşünüş biçimi ve kültürü ile donatmaktadır. Hal 2, bu süreci isimlendirmektedir. Hal 2 durumundan hareketle, stratejik yönetim süreci devam etmekte olup işletme piyasaya ilişkin iç ve dış stratejilerini bu yeni müşteri segmentasyonuna göre tanımlayacaktır.

Şekil 6: Bir Ekoturizm İşletmesi için Stratejik Yönetim Sürecinin 2. Aşaması



Kaynak: Yazar tarafından literatürden yararlanılarak geliştirilmiştir.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Dolayısı ile, şekil 5’de öne sürülen biçimde, Müşteri portföyü 1 (Hal 1), özelliklerini çerçeve olarak Ekoturizm temelli içermektedir. Makro boyutta yapılan bu tanımlama, sektöre ilişkin müşteri portföyünü çizerken, müşterilerin tüm ihtiyaç ve diğer özelliklerini barındırdığından, çerçeve faktör niteliğinde 3 Faktörden birisi olarak belirtilmiştir. Şekil 5’te bu çerçeve Hal 1 pozisyonuna, iklim değişikliğine uyumlu vizyon, misyon ve etik değerler ile işletme amaçları da eklendiğinde, Hal 2 olarak isimlendirilecek müşteri portföyü 2’nin oluşturulması anlatılmaktadır. Böylece, Ekoturizm işletmesinde temel stratejilerin kurulmasının müşteri odaklı olması gerektiği vurgulanmaktadır. Şekil 6’da ise, işletmenin tüm piyasa stratejilerini yeni tanımladığı Hal 2 kapsamına uygun biçimde kurması gerektiği belirtilmektedir. Şekillere eklenmeyen tüm öğeler arasında ise, geri bildirim süreci bulunmaktadır. Eğer Şekil 6’da bir değerlendirme olacaksa, önce bu Hal 2’ye daha sonra Hal 1’e inecektir. Öte yandan, düzeltmeler ve yeniden değerlendirmeler bu noktalarda olacaktır.

Geleneksel yaklaşımda, müşteri portföyünü merkezde göremeyiz. Çok daha sonraları analize dahil edilen müşteri odaklılık, ekoturizm sürecinde merkezde bulunmaktadır. Ekoturizm işletmeciliğinde temel konu müşterinin sektörü belirlediğidir. Örneğin; müşteri kamp yapacağı bir alanda aynı zamanda hiking de yapmak istiyor ise, işletmenin fonksiyonel ve finansal stratejilerini bu kapsamda oluşturması elzemdir. Öte yandan, müşterilerin hangi kategorilerde daha çok ziyaretçi oldukları da işletmenin kurumsal stratejileri konusunda fikirler vermektedir. Öte yandan, Ekoturizm işletmesinin iklim değişikliğine uyumu düşünüldüğünde, 3 Faktör’den Hal 1 dışında 2 faktörü tamamen göz önüne alması ve bu 2 faktöre Hal 1’den Hal 2’ye giden süreci de dahil ederek, ortaya kendine özgü bir bağlam ve başarı fonksiyonu çıkartması bu bölümde önerilmektedir. Böylece, her bir Ekoturizm işletmesi, geri bildirim ve sürekli kontrol-iyileştirme süreci ile birlikte kendi iklim değişikliğine uyumlu stratejik yönetim sürecini başarabilecektir.

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**INTERNATIONAL ANKARA CONGRESS ON  
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**İSLAM AHLAK FELSEFESİNDE “KULLUK” ERDEMİ  
THE VIRTUE OF “SERVANTHOOD” IN ISLAMIC MORAL PHILOSOPHY**

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**ÖZET**

Din ve ahlak, insan denen canlı türünün fertlerini yetkinleştirmeyi ve bu sayede de yeryüzündeki bireysel ve toplumsal yaşamı düzene koymayı hedefleyen sistemlerdir. Her iki sistemin de hem inanç ya da varsayımlara/kabullere dayanan bir metafiziksel yönü hem de birtakım eylemlerin icrasına dayanan aksiyon yönü bulunmaktadır. Gerek hedeflerinin ve gerekse yapılarının benzerliği, her ikisi de varlığını öteden beri sürdüren ve sürdürmeye de devam edecek bu inanç ve eylem sistemlerinin birbiriyle bir irtibatı olup olmadığı sorusunu gündeme getirmektedir. O nedenle de dinin ahlak ile nasıl bir ilişki içerisinde bulunduğu meselesi genelde düşünce tarihi ve daha özelde de felsefe tarihi boyunca önemli soruşturma alanlarından biri olagelmıştır. Her ne kadar modernleşme sonrası dönemde bu meseleye olan ilgide ciddi derecede bir artış gözlemlense de klasik dönem geleneklerinde de din ile ahlak arasındaki ilişkiyi konu edinen kayda değer miktarda metne rastlamak mümkündür. Klasik geleneklere ait metinler din ve ahlak gibi hem insan hem de toplum yaşamı açısından son derece mühim iki olgunun birbiriyle münasebetini farklı yönleriyle incelemişlerdir. Bu incelemelerde ikisi arasında irtibat kuranların oranı yüksekse de böylesi bir irtibatın kurulma biçimi çeşitlilik arz etmektedir. Nitekim dini bazıları ahlakî değerlerin yegane belirleyicisi veya belirleyicilerinden biri, bazıları da ahlakî eylemlerin temel motivasyon kaynağı ya da kaynaklarından biri şeklinde değerlendirmiştir. Öte yandan bunun tam tersi şekilde ahlakî dinin kaynağı ya da dini eylemlerin temel motivasyon kaynağı olarak gören filozof ve düşünürlerin varlığından da bahsedilebilir. Elinizdeki tebliğ, din ile ahlak arasında sözü edilen irtibatın İslam ahlak filozofları tarafından nasıl inşa edildiği sorusuna erdem tasnifleri üzerinden bir cevap aramaktadır. Zira erdemler, klasik düşünce açısından ideal ahlakî yaşamın yapı taşlarıdır. Nitekim tebliğ de aradığı cevaba ulaşmak için erdemler içerisinde “kulluk (ibâdet)” şeklinde isimlendirilen erdemi merkeze alarak soruşturmasını yürütecektir. Bu bağlamda tebliğimizde farklı erdem tasnifleri bünyesinde kulluk erdeminin yeri, mahiyeti ve diğer erdemlerle ilişkisi ana hatlarıyla soruşturulacaktır. Böylelikle de İslam ahlak filozoflarının kulluk denilen erdem aracılığıyla din ile ahlak arasında nasıl bir ilişki kurdukları konusunun bir miktar aydınlatılması hedeflenmektedir.

**Anahtar Kelimeler:** İslam Felsefesi, İslam Ahlak Felsefesi, Din, Ahlak, Erdem, Kulluk.

**ABSTRACT**

Religion and morality are systems that aim to perfect the members of the species called human beings and thereby regulate individual and social life on earth. Both of these systems have both a metaphysical aspect based on beliefs or assumptions/acceptances and an action aspect based on the performance of certain activities. The similarity of both their goals and structures raises the question of whether these belief and action systems, both of which have existed and will continue to exist, have any connection with each other. Therefore, the question of how religion relates to morality has been one of the most important areas of inquiry throughout the history of thought in general and the history of philosophy in particular. Although there has been a significant increase in interest in this issue in the post-modern period, it is possible to find a considerable amount of texts on the relationship between religion and morality in classical traditions. The texts belonging to the classical traditions examined the relationship between religion and morality, two phenomena that are extremely important for both human and social life, from different aspects. Although the percentage of those who establish a connection between the two is high, how such a connection is established varies. Indeed, some have considered religion as the sole determinant or one of the determinants of moral values, while others have considered it as the main

motivation source of moral actions or one of them. On the other hand, oppositely, some philosophers and thinkers see morality as the source of religion or the main motivation for religious actions. This paper seeks an answer through the classification of virtues to the question of how the aforementioned connection between religion and morality was constructed by Islamic moral philosophers. For virtues are the building blocks of the ideal moral life in terms of classical thought. To reach the answer it seeks, this paper will conduct its investigation by focusing on the virtue called “servanthood (ibādat)” among the virtues. In this context, this paper will investigate the place of the virtue of servanthood within different classifications of virtues, its nature, and its relationship with other virtues. In this way, it is aimed to shed some light on how Islamic moral philosophers establish a relationship between religion and morality through the virtue called servanthood.

**Keywords:** Islamic Philosophy, Islamic Moral Philosophy, Religion, Morality, Virtue, Servanthood.

## GİRİŞ

Din ve ahlakın varlığı insanlık tarihi kadar eskidir. Gerek dinin ve gerekse ahlakın böylesine kadim olgular olmasının ise kayda değer nedenleri bulunmaktadır. Din için söz konusu edilebilecek en temel neden insanın inanma ihtiyacıdır. Bu ihtiyaca en kapsamlı şekilde ve en üst düzeyde cevap veren kurum da din olmuştur. Nitekim bundan dolayıdır ki insanlık var oldu olalı yeryüzünde bazıları ilahi nitelikli olan fakat bazıları da olmayan pek çok din ortaya çıkmıştır (Taşçı Yıldırım, 2020: 358). Ahlak için söz konusu edilebilecek en temel neden ise insanın yalnızca “yaşamak” ile yetinmeyip bundan bir adım daha öteye gidip “iyi yaşamak” istemesidir. İyi yaşamak ise duygu, düşünce ve davranışlara rehberlik edecek birtakım eylem ilkelerinin varlığını gerektirmektedir. İşte ahlak da tam olarak bu türden ilkeler sunduğu için tıpkı din gibi insanlık var olduğundan bu yana yeryüzünde bulunagelmiştir.

Din ve ahlak ilk ortaya çıktıkları andan itibaren insanı yetkin hale getirmeyi ve yetkinleşmiş insan aracılığıyla da önce insan fertlerinin birlikte inşa ettikleri toplumu ve ardından da yeryüzünü daha iyi hale getirmeyi hedeflemiştir. Her iki olgu arasında hedef dışında başka ortak noktalardan da bahsedilebilir. Şöyle ki; dinin de ahlakın da hem inanç ya da varsayımlara/kabullere dayanan bir metafiziksel yönü hem de birtakım eylemlerin icrasına dayanan aksiyon yönü bulunmaktadır. Diğer bir deyişle, din yalnızca inanma ihtiyacını karşılamak değil aynı zamanda -tıpkı ahlak gibi- eylem rehberliği de yapmaktadır. Öte yandan ahlak da yalnızca eylem rehberliği yapmak değil aynı zamanda -tıpkı din gibi- iyinin ve doğrunun ne olduğunu da ortaya koymaktadır. Din ile ahlak arasında sözü edilen böylesi ortaklıklar, filozofları bunların birbiriyle nasıl bir ilişki içinde olduğu sorusuna yöneltmiştir. Bu büyük sorunun cevaplanmayı bekleyen pek çok alt sorusu bulunmaktadır. Onlar arasında ilk hatıra gelenleri şöyle sıralayabiliriz: Din ve ahlak birbirinden bütünüyle ayrı iki olgu mudur? Din, ahlakın kaynağı mıdır? Din, ahlakın şartı mıdır? Ahlak, dinin olmazsa olmaz bir parçası mıdır? Ahlak, dinin yardımcı mıdır?

Filozofların bazıları din ile ahlak arasındaki ilişkiyi pozitif yönde inşa etmiş ve ahlakın kaynağını din olarak görmüştür. Buna göre, din ve dini buyrukların kaynağı sayılan kutsal kitap ahlakın ilkelerini sunar ve bu ilkelere normatiflik verir. Öte yandan ahlak da söz konusu ilkelerin zaman ve mekan düzleminde somutlaşmasını sağlar (Tatar, 2015: 31). Kaydedilen bu yaklaşımın aksine kimileri de din ve ahlak ikilisinin birbiriyle herhangi bir irtibatının bulunmadığını, hatta bundan da öte dinin ahlakın önünde bir engel olarak yer aldığını yahut ahlakın dine ihtiyacı ortadan kaldırdığını öne sürmüştür (Çakmak, 2019: 11-12). Bununla birlikte, din ile ahlak arasında zorunlu değilse de kuvvetli bir ilişki bulunduğunu ve bunların birbirlerini desteklediğini varsayan üçüncü bir yaklaşım daha bulunmaktadır (Yaran, 2012: 44). Modern döneme gelinceye kadar din-ahlak ilişkisinde daha belirleyici olan yaklaşımın da esasında bu sonuncusu olduğunu söyleyebilmek mümkündür.

Felsefe tarihinde din ile ahlak arasında inşa edilen kuvvetli irtibatları takip etmemize imkan tanıyacak çokça mesele bulunmaz. Bunları incelemek ve filozofların o meseleler etrafındaki görüşlerini tahlil etmek pek çok soruna çözüm bulabilmek yanında din ve ahlak arasında kurulan ilişkilerin aydınlatılmasına da hizmet etmektedir. Böylesi meselelerden biri de erdem meselesidir.

Klasik dönem filozofları bireylerin dinle irtibatlı olmasını, bir dine sahip bulunmasını, o dinin ritüellerini, ibadetleri yerine getirmesini önemsemiş ve bunun ahlaki açıdan önemli olduğunu iddia

etmişlerdir. Bu nedenle de klasik dönemin en önemli ahlak felsefesi geleneklerinden olan antik Yunan felsefesinden itibaren “dindarlık” bir erdem olarak görülmüştür. İslam dünyasına geldiğimizde ise İslam ahlak filozoflarının da benzer bir fikri tavrı sürdürdüklerini görmekteyiz. Zira klasik dönemin bir başka büyük ahlak geleneği olan İslam ahlak felsefesinde de dinin ahlakı ve ahlakın da dini beslediği, beslemesi gerektiği öne sürülmüştür. Yine benzer şekilde bu geleneğin mensubu isimler de antik Yunan filozoflarında görüldüğü gibi dindarlık ve erdemliliği birbirini tamamlayan şeyler olarak değerlendirmiştir. Nitekim bu değerlendirmeye paralel biçimde de antik Yunandaki dindarlık erdemine karşılık buradaki erdem tasniflerinde karşımıza “kulluk” erdemi çıkmaktadır. Şu halde, dindarlık yahut Tanrı’ya kulluk, O’nun emirlerine ve yasaklarına uyup dini emirleri ve yasakları gözetme klasik dünyanın bu her iki büyük geleneğinde de bir erdem olarak görülmüştür. Söz konusu erdem antik Yunan felsefesinde doğrudan dindarlık şeklinde isimlendirilirken, İslam ahlak felsefesinde ise kulluk adıyla yer almıştır. Elinizdeki çalışma, “kulluk” adlı bu erdemi merkeze alacak ve onun erdem tasnifleri içerisindeki yerini, mahiyetini ve diğer erdemlerle ilişkisini inceleyecektir. Böylelikle de İslam ahlak filozoflarının kulluk denilen erdem aracılığıyla din ile ahlak arasında kurdukları irtibatı netleştirmeye gayret edecektir.<sup>1</sup> Ancak İslam ahlak felsefesinde yönelmeden önce bu geleneği besleyen önceki felsefe geleneklerine de başvurmak ve orada karşımıza çıkan dindarlık erdemine ana hatlarıyla göz atmak hem yapacağımız incelemeye iyi bir arka plan sağlayacak hem de kavram takibini kolaylaştıracaktır.

### ANTİK YUNAN VE HELENİSTİK DÖNEM AHLAK FELSEFELERİNDE DINDARLIK ERDEMİ

Antik Yunan felsefesinin önde gelen isimleri inşa ettikleri felsefi sistemler içerisinde dine de önemli bir yer vermiştir. Dahası, bazıları “felsefenin işinin bizi yarı dini bir gerçeklik görüşüne, hatta yarı dini bir yaşam tarzına götürmek olduğunu” dahi ileri sürmüştür (Charlesworth, 2023: 25). Böylesi bir iddianın izini sürebileceğimiz metinlerin başında Platon’un kiler gelmektedir. Platon (ö. MÖ. 348), diyaloglarında konuştuğu Sokrates (ö. MÖ. 399) üzerinden pek çok mesele yanında din olgusunu da farklı açılardan ele almıştır. Bu çerçevede işaret edeceğimiz ilk metin *Protagoras* diyalogudur. Burada Sokrates muhatabı Protagoras ile gerçekte tek bir erdem mi yoksa birden fazla erdem mi bulunup bulunmadığını sorununu, eş deyişle erdemlerin birliği meselesini (Aksu, 2019/2: 176-180) tartışırken dindarlığı da hikmet, adalet, cesaret ve iffet temel erdemleri yanında ayrı bir erdem olarak zikretmektedir (Plato, 1997: 762-763, 329d-330b). Ancak burada, örnek olarak zikretme dışında dindarlık erdemi üzerinde ayrıca durulmamaktadır.

Dindarlık söz konusu olduğunda gündeme gelecek ikinci ve en önemli metin *Euthyphron* isimli diyalogdur. *Euthyphron* doğrudan bu meseleye, bir dine inanmanın ve o dini yaşamının yani dindarlığın ne olduğu meselesine hasredilmiştir. Şöyle ki, eser dindarlık erdeminin hem mahiyetini hem de erdem tasnifi içerisindeki yerini özel olarak tartışmaya açmaktadır. Sokrates’in diğer pek çok diyalogda olduğu gibi burada da kesin bir sonuca ulaştığı görülmez. Bununla birlikte, dindarlığın mahiyetini açığa çıkarma bağlamında özellikle “bir şeyin dine uygun olduğu için mi tanrılar tarafından sevildiği yoksa tanrılarca sevildiği için mi dine uygun olduğu” sorusu üzerinde durulur (Platon, 2011: 53-63, 9D-11E). İlgili soruya ilişkin tartışma, eserin sonlarına gelindiğinde dindarlığın erdem tasnifi içerisinde nerede durduğunu sorgulamaya doğru yönelir. Buna göre; dindarlık adaletin tanrılara hizmetle yani ibadette/kullukla<sup>2</sup> ilgili yönüne verilen addır. Adaletin bir diğer yönü ise insanlara hizmetle ilgilidir (Platon, 2011: 65-67, 12D-E).

Kaydedilen açıklamalardan hareketle şunları söylemek mümkündür: Platon dindarlığa, özü itibarıyla, “tanrılara kullukta adaleti gözetme” anlamı vermektedir. Kendisine verilen böylesi bir anlamının sonucu

<sup>1</sup> Tam bu noktada İslam filozoflarının dindarlık-ibadet-ahlak ilişkisine dair fikirlerini ve yaklaşımlarını inceleyen, fakat bizim burada kullandığımız veri setinden nispeten farklı kaynaklara dayalı olarak gerçekleştirilen yakın tarihli bir çalışmaya işaret etmek gerekmektedir. Bk. Taşçı Yıldırım, 2020: 362 vd.

<sup>2</sup> Çevirinin ana metninde “therapeia” sözcüğü “özen” ile karşılanmışsa da kelimenin diğer anlamları arasında “hizmet, ibadet, refakat” gibi başkalarının da bulunduğu belirtilmiştir. Bk. Platon, 2011, 92, dp. 41. Biz, metnin bağlamı ve çalışmamızın içeriği dikkate alındığında *therapeiayı* (tanrılara) *hizmet* yani ibadet/kulluk şeklinde karşılamanın daha doğru olacağını düşünmekteyiz.



olarak o, her ne kadar *Protagorasta* diğer dört temel erdem yanında ayrı bir erdem şeklinde anılsa da *Euthhyphronda* adaletin bir yönü, başka bir deyişle, adalet temel erdeminin bir alt erdemi olarak değerlendirilmiştir. Platon'un aynı değerlendirmeyi *Devlet* diyalogu başta olmak üzere daha sonraki çalışmalarında da sürdürdüğü ve dindarlık erdemini nihai olarak temel erdemler şemasının dışında bırakıp adaletin altına yerleştirdiği görülmektedir (Annas, 1981: 110-111).<sup>3</sup>

Dindarlığın erdem şemasındaki yerine ilişkin zikredilen bu Platoncu tavır, antik Yunan düşüncesi sonrasında doğup gelişen Helenistik dönem felsefe okullarınca da devam ettirilmiştir. Burada örnek olması bakımından Stoacılığa işaret etmek yerinde sayılacaktır. Nitekim günümüze ulaşan Stoacı metinlerde dindarlığın adaletin alt erdemi şeklinde ele alındığı açıkça görülmektedir:

“(…) Bazı erdemler birincildir, fakat diğerleri onların altında yer almaktadır. Birincil erdemler dörttür: Amelî hikmet (prudence), iffet, cesaret, adalet... Amelî hikmetin alt erdemleri akliselim, iyi hesaplama, çabuk kavrayış, sağduyu ve becerikliliktir. İffetin alt erdemleri iyi disiplin, yakışıklılık, alçak gönüllülük ve kendini kontroldür. Cesaretinkiler tahammül, [öz] güven, âlîcenâplık, neşelilik ve çalışkanlıktır. Adaletinkiler ise *dindarlık* (piety), onurluluk, hakkaniyetlik, dürüstlüktür (L.S., 61H.6-10) (Long ve Sedley, 1987: 380; Aksu, 2018: 79).

Toparlayacak olursak, dindarlık İslam düşüncesi öncesi dönemde tanrılara kulluk ile özdeşleştirilmiş ve kullukta adaleti, hakkı gözetmek, eş deyişle tanrılara karşı adil davranmak şeklinde anlaşılmıştır. Sözü edilen anlayışın doğal sonucu ise dindarlığı temel bir erdem değil adaletin alt erdemlerinden biri kabul etmek olmuştur. Aynı kabul, birazdan daha detaylı inceleyeceğimiz şekilde, İslam ahlak felsefesi tarafından da tevarüs edilmiş ve geliştirilmiş gözükmektedir.

### İSLAM AHLAK FELSEFESİNDE KULLUK ERDEMİ

İslam felsefesi geleneğinde din ve dine dair meseleler daima önemli inceleme konuları arasında yer almıştır. Özellikle Fârâbî'den (ö. 950) itibaren dinin felsefe ile ve daha özelde de ahlakla irtibatı derinlemesine ve farklı boyutlarıyla tahlil edilmiştir. Öyle ki, insanın tabiatı itibarıyla dine, dindarlığa yatkın bir varlık olduğu öne sürülmüş (Taşçı Yıldırım, 2020: 366) ve insanın yer yüzünde bulunma nedenleri arasında Tanrı'ya kulluk da yerleştirilmiştir (İsfahânî, 2010: 84). Bunun yanında dindarlık felsefe başta olmak üzere teorik ilimlerde başarı elde edebilmenin yani nazari yetkinliğin ön şartları arasında zikredildiği gibi (Fârâbî, 1992: 191-192), dahası hakiki anlamda erdemli olabilmenin yani pratik yetkinliğe erişebilmenin de yine ibadetlerde devamlılıktan geçtiği belirtilmiştir (Taşçı Yıldırım, 2020: 366). Fakat din-ahlak ilişkisi açısından bu tabloya bakarak bir noktaya dikkat çekmek gerekmektedir. Burada din (dindarlık/ibadet) ile ahlak iki ayrı alan şeklinde sunulmaktadır ve hem nazari hem de amelî yetkinlik için bu ayrı alana da müracaatın gerekliliği vurgulanmaktadır. Ne var ki, dinin ahlakla irtibatı söz konusu olduğunda İslam ahlak filozoflarının erdem tasnifleri çerçevesinde nispeten farklı bir tabloyla daha karşılaşmak mümkün gözükmektedir. Bu farklı tabloyu ise kulluk denilen erdem aracılığıyla görebilmek ve yorumlayabilmek mümkündür.

Klasik dönem ahlak filozoflarına ait erdem tasnifleri içerisinde kulluk (ibâdet) erdemine ilk rastladığımız tasnif İbn Miskeveyh'e (ö. 1030) ait olandır. İbn Miskeveyh kulluğu -tıpkı Platon gibi- adaletin bir alt erdemi şeklinde sunmaktadır (Miskeveyh, 1966: 23). Filozofun kulluğa çizdiği anlam çerçevesi ise üç ayrı eylem grubunun icrasını içermektedir. Birinci eylem grubu, Allah Teâlâ'nın yüceltilmesini ve O'na itaat edilmesini; ikincisi meleklere, peygamberlere ve büyük mezhep imamlarına hürmet gösterilmesini; üçüncüsü de şeriatın gerektirdikleriyle amel edilmesini içermektedir. Ayrıca İbn Miskeveyh, takvâyı gözetmenin sayılan tüm bu eylem gruplarının icrasını yetkinleştireceğini ve onlardan elde edilmesi umulan neticeyi en üst düzeye çıkaracağını da açıklamalarına eklemektedir (Miskeveyh, 1966: 24).

Kulluk erdemi bağlamında müracaat edeceğimiz ikinci filozof Nasîruddîn et-Tûsî'dir (ö. 1274). Tûsî de İbn Miskeveyh'i takiben kulluğu adaletin alt erdemlerinden saymıştır. Yine kulluğa dair sunduğu tanım da selefi ile hemen hemen aynıdır denilebilir:

<sup>3</sup> Dindarlık ile adalet arasındaki ilişkiye ve dindarlığın temel erdemler şemasının dışında bırakılmasının olası sebeplerine dair ayrıca bk. Weiss, 2012: 133-135.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

“*İbâdet* [kulluk], kişinin Yüce ve Üstün Yaraticıyı ve O’nun Huzuruna yakın kılınan melekleri, nebiler, imamlar ve evliyalı (aleyhisselam) ta’zim edip yüceltmesi, onlara tabi olup şeriat sahibinin emir ve yasaklarına itaat etmesi ve bu anlamda yetkin ve tam olan takvayı kendisine şiar ve örtü edinmesidir.” (Tûsî, 2007: 97).

Ancak Tûsî’nin erdem tasnifi bir noktada İbn Miskeveyh’in tasnifinden ayrılmaktadır. O da şudur: Tûsî’nin adaletin alt erdemleri olarak sundukları arasında kulluk dışında din ve dindarlıkla ilişkili sayılabilecek başka erdemler de yer almaktadır. Bunlar teslimiyet ve tevekküldür. Filozof bunları sırasıyla şu şekilde tanımlamaktadır:

“*Teslimiyet*, kişinin, İsmi Yüce Bâri Teâlâ’ya taalluk eden veya itiraz edilmesi caiz olmayan birisine taalluk eden fiile, doğasına uygun olmasa bile rıza gösterip onu hoşlukla ve güler yüzle karşılamasıdır. *Tevekkül*, beşerin güç ve yeterliliğine havale edilemeyecek ve insanların görüş ve düşüncesinin kendisinde tasarrufta bulunamayacağı işlerde, artırma ve eksiltme, hızlandırma veya ertelemenin istenilmemesi ve (bu şekilde) olan şeylere muhalefet etmeye eğilim gösterilmemesidir.” (Tûsî, 2007: 97).

Kaydedilen her iki erdem de özü itibarıyla kulluk erdemi ile irtibatlandırılabilir, bir anlamda onu tamamlayıcı özellikteki karakter nitelikleridir. Böylesi karakter niteliklerinin sayısının Tûsî sonrasında artırıldığını görmekteyiz. Bu hususu biraz daha açmak adına Taşköprüzâde Ahmed Efendi’nin (ö. 1561) erdem tasnifine yönelebiliriz.

Taşköprüzâdede de diğerleri gibi kulluk adaletin alt erdemleri arasındadır ve tanımı da büyük oranda diğerleriyle benzerdir. Ancak burada müellif, kendisinden öncekilerde rastlamadığımız bir detay sunmakta ve kulluk erdeminin hangi durumda ortadan kalkabileceğine işaret etmektedir:

“On dördüncüsü kulluk, Allah Teâlâ’yı ve peygamberler, evliya ve imamlar gibi ehlullahtan olanları yüceltmek ve O’nun şer’î emirlerine uymak ve şer’î yasaklardan da uzak durmaktır. Bil ki ilimleriyle amel olan alimler de Allah’ın ehliindedir. (...) Ayrıca bilinmelidir ki ibadetin afeti riyadır ve ondan kaçmak lazımdır. (...) Riyakarın dört alameti vardır. Yalnız iken tembel, insanlarla beraber iken gayretlidir, övüldüğü zaman daha fazla çalışır, yerildiği zaman çalışmasını azaltır.” (Taşköprüzâde, 2014: 102-104).

Taşköprüzâde adaletin altında önceki tasniflerde yer alanlardan daha fazla alt erdem zikretmektedir. Bunlar arasında kullukla irtibatlandırılacaklardan ilk ikisi Tûsî’nin de yer verdiği tevekkül ve teslimiyet erdemleri iken, orada bulunmadığını gördüğümüz üçüncüsü ise rıza erdemidir. Bu erdem, her biri Allah Teala’nın takdiri olarak başa gelen musibetlere ve elde kaçan fırsatlara, iyi şeylere üzülmeyi ve bunları olduğu gibi kabullenmeyi ifade etmektedir (Taşköprüzâde, 2014: 102). Böylesi bir anlam dolayısıyla yine rızanın da tevekkül ve teslimiyet gibi kulluk erdemini tamamlayıcı özellikte bir erdem olduğu kabul edilebilir.

Kulluk erdemine dair görüşlerini paylaşacağımız son isim Kınalızâde Ali Çelebi’dir (ö. 1572). Kınalızâde adalet erdeminin alt erdemlerini tasnif ederken kendisinden önceki meşhur ahlakçıları ve bunlar arasında da özellikle Tûsî’yi dikkate aldığını açıkça belirtmektedir. Dolayısıyla onun kulluk erdemine yaklaşımı da yukarıda aktarılanlara paraleldir. Bununla birlikte, kendisinin kulluğa dair açıklaması tüm diğer tanımları ve izahları toparlayıcı ve özetleyici mahiyette olduğundan ötürü onu da ayrıca kaydetmekte fayda vardır:

“İbadet: Kerem ve cömertlik hazinelerinden varlığı bahsettikten sonra açık ve gizli nimet türleri, iç ve dış ihsan çeşitleri ile varlık mülkünü mamur eden Cenabı Hakk’a hizmet ve itaat için çalışman ve gevşeklik göstermemendir. Peygamberler, melekler ve temiz kullardan oluşan Hak dergahının yakınlarına salavat ve teslimat ile yaklaşım şeriatı uyman, emir ve yasaklarını kabul edip uygulamandır. Bu erdem tamamlayıcısı, mükellefin en iyi vasfı ve en güzel huyu olan ve kulun Allah’ın yasakladığı her şeyden sakınıp kaçınması anlamına gelen takvadır.” (Kınalızâde, 2016: 97).

## DEĞERLENDİRME VE SONUÇ

İslam ahlak filozoflarının kulluğu erdem tasnifi içerisinde nerede konumlandıklarına, nasıl tanımladıklarına ve yine bu çerçevede kullukla ilişkilendirilebilecek başka hangi erdemlere tasnifte yer



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

verdiklerine dair yukarıda çizilen tablo, cevaplanması gereken birkaç soruyu gündeme getirmektedir. Bunların en başında gelen iki tanesi kulluğun niçin başka bir temel erdem değil de adaletin alt erdemi olduğu sorusudur. Bir diğeri ise, kulluk şeklinde bir alt erdem varlığını kabul etmenin din-ahlak ilişkisi açısından hangi neticeleri doğurduğudur.

Kulluk erdemi, kaydedilen tüm erdem tasniflerinde adaletin bir alt erdemi olarak sunulmuştur. Ne var ki, hangi sebeple başka bir temel erdemle değil de adaletle irtibatlandırıldığına, adaletin altında, onun bir parçası yahut onun görünümünden biri şeklinde değerlendirildiğine ilişkin açık bir kayıt da - görebildiğimiz kadarıyla- zikredilmemiştir. Şu halde, bu konuda ancak dolaylı yollardan birtakım gerekçeler tespit edebilmemiz mümkün gözükmektedir.

Başlangıç noktası olarak antik Yunandaki dindarlık erdemini hatırlamak iyi olacaktır. O erdeme atıfta bulunmamızın nedeni ise kulluk erdemine İslam ahlak filozoflarının çizmiş olduğu anlam çerçevesi ile antik Yunan'ın dindarlık erdemi arasında neredeyse hiçbir farkın bulunmaması, orada dindarlık şeklinde ifade edilen olgunun İslam ahlak felsefesinde kulluk (ibâdet) terimi ile dile getirilmiş bulunmasıdır. Antik Yunan felsefesinde Sokrates'in ağzından Platon dindarlığı insanın tanrılara karşı bir borcu şeklinde değerlendirmiş ve o değerlendirmenin bir sonucu olarak da onu kısaca "hakkın hak sahibine verilmesi" diye tanımlayabileceğimiz adaletle ilişkilendirmişti. Benzeri bir durumun izini İslam ahlak felsefesi söz konusu olduğunda Kınalızâde Ali Çelebi'nin açıklamaları üzerinden sürebilmek mümkün görünmektedir.

Kınalızâde, Aristoteles'e dayandırdığı fakat kendisinin de benimsediği görüşe göre adaletin üç türünün olduğunu belirtmektedir. Bu türlerden ilki de Cenâb-ı Hakk'a karşı adalettir. O bizlere önceden alınmış yahut verilmiş herhangi bir şeyin karşılığı olmaksızın, hiç hak etmediğimiz halde varlık ve türlü iyilikler ihsan etmiştir. Bu da O'na karşı hizmet ve şükürü yani kulluğu O'nun bizim üzerimizdeki bir "hak" kı haline getirmektedir (Kınalızâde, 2016: 118).<sup>4</sup> Bu düşüncüyü Kınalızâde şu cümlelerle açık biçimde dile getirmektedir:

"Adalet, kulun kendisiyle merhametli Rabb'i arasında olan her hakkı en üstün yol ve en etkin yöntem ile eda etmesini, varlık kırpıntılarını ihlas ve riyazet testisi ve mücahede ve kulluk potasında eritip şekil vermesini gerektirir. Bu, her mükellefin üstüne düşen ve zimmetinde bulunması gereken bir haktır." (Kınalızâde, 2016: 118).

Kulluk erdeminin adaletin bir alt erdemi olması tıpkı antik Yunan düşüncesinde olduğu gibi burada da insanların Tanrı'ya karşı bir "kulluk" borcunun bulunmasına dayandırılmaktadır. Böylesi bir borcun ortaya çıkış gerekçesi ise şudur: İnsanın nasıl ki bu dünyadaki bireysel, toplumsal ve tabii huzur ve düzen için herkese ve her şeye karşı adaletli olması gerekiyorsa, başta bizatihi "var olmak" özelliği gelmek üzere kendisine ihsan ettiği sayısız nimetler dolayısıyla Tanrı'ya karşı da adaletli olması gerekmektedir. Bu adaletin görünürlük kazanma, somutlaşma şekli de O'na kulluk etmektir. Ancak şunu da belirtmek yerinde olacaktır. Antik Yunan düşüncesinde insanın kulluk borcu olduğu pek çok tanrı söz konusu iken İslam ahlak felsefesinde bu borç yalnızca tek bir Tanrı'ya karşıdır.

Kulluğun adalet erdemi ile ilişkisini inceledikten sonra şimdi de kulluğu bir erdem kabul etmenin din-ahlak ilişkisi açısından bizi hangi sonuçlara ulaştırabileceğine bakabiliriz. Din ile ahlakın irtibatı meselesi gündeme geldiğinde cevabı aranan temel birkaç sorudan biri de şudur: Tanrı'ya inanmak ve O'na tabi olmak mı ahlakı doğurmakta yoksa ahlak mı Tanrı'ya, O'na inanıp tabi olmaya sevk etmektedir? Diğer bir ifadeyle, bizler Tanrı'ya inandığımız için mi ahlaklı olmaya gayret ederiz yahut ahlak sahibi olmamız mı doğal olarak bizleri herhangi bir Tanrı inancına yöneltir? (Çakmak, 2019: 11). Kulluk erdemine dair İslam ahlak filozoflarının açıklamaları bu soruya şöyle bir yanıt verebilmemize imkan tanımaktadır: Ahlak, insanı Tanrı'ya inanmaya ve bu inancı yaşamaya sevk etmektedir. Eş deyişle, Tanrı'ya iman ve imanın bir sonucu olarak da O'nun buyruklarına itaat *bir yönüyle* ahlakın sonucudur. Çünkü ahlaklı olabilmek için temel erdemlerin elde edilmesi gerektiği gibi, aynı şekilde temel erdemlerin ve içlerinde de özel olarak adaletin gerçek anlamda, tüm görünümüleriyle/somutlaşma biçimleriyle kişide vücut bulabilmesi için de kulluk gerekmektedir. Yalnız burada Tanrı inancının yalnızca *bir yönüyle* ahlakın sonucu oluşunun altı özellikle çizilmelidir. Bunun nedeni, İslam ahlak

<sup>4</sup> Kulluğun niçin Allah Teâlâ'nın bizim üzerimizdeki bir hakkı olduğuna dair daha detaylı bir gerekçelendirme için bk. Kınalızâde, 2016: 119-123.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

filozoflarının *başka bir yönüyle* de Tanrı'yı, Tanrı inancını ahlakın kaynağı kabul etmeleri gerçeğidir. Bu noktayı biraz daha açacak olursak diyebiliriz ki, İslam ahlak filozofları her ne kadar ahlakın akıl kaynaklı olduğunu düşünseler ve ifade etseler de onlara göre aklın yani insanı diğer tüm diğer canlılardan ayıran yetinin kaynağı da nihai noktada Tanrı'dır. Öyleyse ahlakı, ahlakî olanı belirleyen de en yukarıda Tanrı olmaktadır (Arıcı, 2015: 271). Bu durumda din ile ahlak arasında kurulacak ilişkide kulluk erdeminin nerede durduğuna dair şöyle bir sonuca varabiliriz: İslam ahlak filozoflarına göre Tanrı, Tanrı inancı, din ahlakın kaynağı olduğu kadar aynı zamanda bir neticesidir. Kaynağıdır, çünkü insan akli ahlakî olanın bilgisini yine Tanrı'dan almaktadır; neticesidir, çünkü ahlaklı olmak için Tanrı'ya inanmayı ve O'na itaati bir erdem seviyesine getirmek yani kulluk erdemini elde etmek gerektirmektedir.

Sonuç olarak, İslam ahlak filozofları din ile ahlak arasında çok sıkı bir ilişki kurmaktadır. Yalnız bu bir yönüyle dinden ahlaka, diğer yönüyle de ahlaktan dine doğru işleyen bir ilişkidir. Din-ahlak ilişkisinin dinden ahlaka işleyen ve dinin yani Tanrı'nın, O'nun buyruklarının yahut yine O'nun var ettiği aklın ahlaka kaynaklık etmesi şeklinde beliren ilk yönü çokça inceleme konusu olmuş ve olmaya da devam eden bir husustur. Ancak din-ahlak ilişkisinin ahlaktan dine doğru işleyen yönü üzerinde yeterince durulmamaktadır. Bu tebliğ, böylesi bir gaye ile kulluk olarak isimlendirilen erdemi ana hatlarıyla soruşturmuş, ahlakın Tanrı'ya itaati ve dolayısıyla da bir dine inanmayı gerekli kıldığını göstermiş ve bunun neticesinde de şöyle bir hükme varmıştır: Kulluk erdemi açısından bakıldığında, İslam ahlak filozoflarına göre din ile ahlak birbirinden ayrılabilir iki olgu değildir; aksine bunlar biri diğerinden ayrılmayacak şekilde iç içe geçen ve birbirlerini tamamlayan olgulardır.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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CREATION OF A NOISE MAP OF KONYA /EREĞLİ AND ITS EFFECTS ON HEALTH

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**ABSTRACT**

In this study, noise measurements were made by determining five different points in Konya/Ereğli. From February 2023 to June 2023 noise measurements were made on certain days and at certain times of the week. It has been noted that the regions selected in the measurements are usually at the edge of the intersection and in areas where there is a high density of people. While noise measurement was made at the data collection points, it was also evaluated in the traffic situation and passing vehicles were counted and recorded in three different categories: motorcycle, car and truck-bus-minibus. It was also evaluated whether any noise-reducing measures were taken at the points where the measurements were taken. Subsequently, the collected data were recorded and transferred to a computer environment and interpreted according to the rules set out in the Environmental Noise Assessment and Management Regulation. During the evaluation, the data exceeding the limit values were determined and it was determined how much of the total data exceeded the limit value.

**Keywords:** Noise Map, Noise Measurement, Ereğli Noise Map

**Introduction**

Today, technology continues to develop unabated. These technological developments make our lives easier and the development of machines that started with the industrial revolution is still increasing. All these developments which make our life easier bring with them some problems. One of the most important of these problems is noise. Different ways have been developed to cope with the noise. It can greatly be reduced the quality of people's lives and can cause a lot of psychological and physical damage to health. The cheapest and most effective of the measures to be taken is to take measures in areas where the sound level is high by creating noise maps. It is necessary to create noise maps up to every neighborhood of our country.

After the industrial revolution, the development of machinery in terms of mechanization and technology has gained speed. The first foundation of the engines of today's vehicles was laid with the inventor of the internal combustion two-stroke and water-cooled electric ignition engine Étienne Lenoir (*içten yanmalı motor*, 2023)With these developments, human life has started to become much easier. However, in addition to the advantages of all these technological developments, they have also brought negative consequences to the environment and human health. Noise has been one of the problems that has entered our lives in this regard and is difficult to cope with. Noise has always been a problem throughout history, but after the industrial revolution, this noise problem has become a problem that affects our lives. Noise is inevitably a problem that requires precautions.

Throughout history, managers have tried to take some precautions for noise. Julius Caesar (M.D. 100-44) forbade horse-drawn carriages from going out on the streets in the evening after people had retired to their homes, because the noise of the iron wheels of the horse-drawn carriages disturbed people. In America, while conducting meetings and studies for the constitution in the 18th century, they sprinkled

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

straws on the stones in front of the building so that those who came for the meeting would not be disturbed by the noise(Murphy & King, 2022). As it can be seen, precautions have been tried to be taken to combat constant noise throughout history. 11 th century with 20 th century while noise-related studies have been conducted in 900 years until the middle of 20 th century from the middle of the 21 th century. (Kalıpcı & Bilgen, 2017).

Noise causes not only a feeling of discomfort, but also serious health risks. In addition to psychological discomfort, it can also lead to physical problems. Problems such as heart attacks (myocardial infarction), hypertension, ischemic heart disease may occur due to constant noise exposure and may increase the risk of developing these diseases (Babisch & Van Kamp, 2009). There are tiny hairs inside our ear that help us hear, and incoming sounds make these hairs vibrate. In case of continuous noise exposure, these hairs may be damaged and cause temporary or permanent hearing loss(YAZICI, 2007). Noise also affects people psychologically. Noise can trigger some emotions of people and they can feel several of these emotions at the same time or separately. It has been observed that they can be angry, scared, nervous, sad or stressed(Stansfeld & Clark, 2011). Noise generated in and near educational institutions can cause teaching or learning difficulties (Amine et al., 2017)

Turkey has a rapidly growing population and this increase is causing distorted urbanization. Cities grow in a fringe style and grow more sparsely in all directions to the central dense environment, and this is not a healthy urban growth(Güler & Çobanoğlu, 1994). While cities are growing, it is necessary to plan urban plans in a forward-looking manner because irregular urbanization causes traffic and noise(Yassi et al., 2001). Nowadays, the fact that most people have a motor vehicle has increased the noise problem(Polat et al., 1994). Noise may vary depending on the speed of motor vehicles, the type of vehicle, the road surface and the slope of the road(Affenzeller & Rust, 2005).

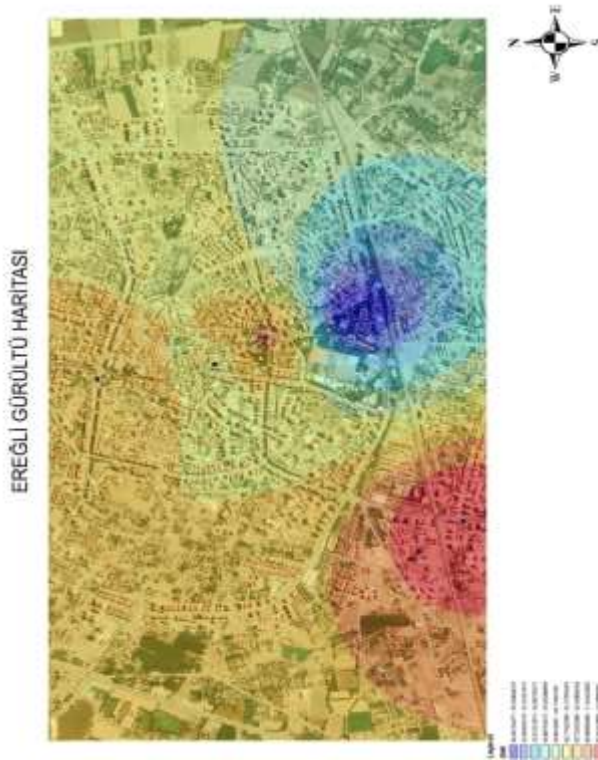


Figure 1 The general noise map of Konya/Ereğli

Figure 1 shows the general noise map of Konya/Ereğli. The red areas show the areas where the noise level is high, while the dark blue areas show the areas where the noise level is low



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

Some steps have been taken to combat noise in Turkey. One of the first works carried out for noise control was the 14th amendment of the law No. 2872, which was enacted in 1983. In accordance with the article, the Noise Control Regulation was prepared in 1986 and entered into force. In this study, noise measurements were made by determining five different points in Konya/Ereğli. From February 2023 to June 2023 noise measurements were made on certain days and at certain times of the week. Obtained results are presented in this study.

## Materials and Method

Ereğli district of Konya province was selected as the area in the research. At the first stage, the places where have been determined and data were collected it has been determined where they may be more suitable. Noise measurements were carried out by determining 5 different points in the district. Sensitive buildings (school-nursery V. Where the selected points have a high density of people.b), attention has been paid to the selection of areas close to the city center and places close to roads and intersections including February-March- April-May-June months. The data were collected at the front of Akbank, Yunus Emre Square, front of Municipality, Oguz Ata Social Facility, Rashid Tolun Hodja underpass. 1.5 Meters above the ground and on designated days 08:00-09:00, 12:00-13:00, 16:00-17:00, 19:00-20:00 hours and measurements were made between the hours of 23:00 and 24:00. The measurements were made with Extech R232/Data Logger 407764 brand sound measuring device. Later, the received data was transferred to digital media and converted into an excell table. The data in these tables were prepared using the IDW method in ArcGIS software and noise maps were created. The measurements were performed for 1 hour and recorded every 10 minutes.. The highest (Lmax) and lowest (Lmin) values were recorded and the equivalent noise measurement level (Leq) was determined. It was measured and recorded in given decibels (dBA). The measured values were compared in decibels based on the Environmental Noise Assessment and Management Regulation (CGDYY). Finally, the measures to be taken are presented. The number of passing vehicles was also observed during the noise measurement. Vehicles passing by in 1 minute were registered in 3 different categories (Truck-bus-minibus).

The measurement values at the selected points were dependent variables and the environmental characteristics, the status of the traffic light, the characteristics of the measurement location and the measurement time are independent variables. Extech R232/Data Logger 407764 brand sound measuring device was used during the measurements. This device is able to measure sounds between 30-130 Decibels. A tripod is mounted to the device and placed at the measuring point at a height of 1.5 meters from the ground. The device memory is able to record 128000 data and these data can then be transferred to the digital environment via a data cable.

The measurements were made between 1 february 2023 and 19 june 2023. Monday, Fridays, Wednesdays measurements were made in front of Akbank. Measurements were made on Thursdays in February and March at Yunus Emre Square and Rashid Tolun Hodja Underpass. Measurements were made on tuesdays in February and March in front of the municipality and Oğuzata social facility. Measurements were made on tuesday in april-may and june at Yunus Emre Square and Rashid Tolun Hodja Underpass. Measurements were made on Thursdays in april-may and june in front of the municipality and Oğuzata social facility Measurement hours in front of Akbank 08:00-09:00, 12:00-13:00, 16:00-17:00, 19:00-20:00, 23:00-24:00. Measurement hours at Yunus Emre Square are 13:00 and 14:00, front of the municipality 13:00-14:00, Rashid Tolun Hodja Underpass 14:00-15:00, Oğuzata social facility 14:0-15:00.

The measurements were made by a single researcher. Sudden very loud and low sounds that occur in the environment during measurements were not included. Attention has been paid to the reflection of the natural acoustic environment of the measuring shit. By taking the average of the Lmax and Lmin values, the ambient sound was accepted as a single numerical value. Since the measurement can affect the measurement in meterological events at the time of measurement, the measurements were postponed when the wind was too high and there was precipitation, and they were made again when the weather improved.

Akbank front has been preferred due to the fact that it is an area where bazaars and shops are dense in the city center, it is a place where there are road arteries and intersections. Yunus Emre Square was



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

preferred because it is a transit route, it is a region where there are arteries and intersections, and it is a region where residential buildings and shops are mixed. The municipality front was preferred because the district is located in an area used for the transition to the intercity road, is close to arteries and intersections, and is a residential-dense area with business places. Raşit Tolun Hoxha underpass has been preferred due to the fact that it is on the way to the state hospital, which is the only hospital in the district, and it is a residential-intensive area. Since the Oguz Ata social facility is an area surrounded by trees and where there is no vehicle traffic, this area was preferred due to determining the change in noise level when there is no vehicle noise and there are objects that can create a barrier for noise, such as trees.

## Analysis of the Data

While interpreting the collected data, it was interpreted according to the assessment of environmental noise and management regulation published in the official gazette No. 27601 on June 4, 2010. Evaluation of environmental noise and according to the management regulation, measurement results that are above the limit values have been determined.

While preparing the noise map, the satellite image of the Ereğli region was taken on a digital screen, and the measurement zones were separated by making a clipraster. The data were entered into the places where measurements were made on the satellite image as point data and a noise map was created using IDW (inverse distance weighted) analysis from spatial analysis options.

The measurement values of the front of the Akbank are given in table 1.1.

**Table 1.1 The measurement values of the front of the Akbank**

Date	Days	08:00-	12:00-	16:00-	19:00-	23:00-
1.02.2023	Wednesday	68,1	67,7	69,5	65,3	50,7
3.02.2023	Friday	71,6	71,3	68,1	69,5	55,6
6.02.2023	Monday	64,5	60,4	68,2	67,4	54,5
8.02.2023	Wednesday	66,6	62,1	66,6	68,7	52,1
10.02.2023	Friday	64,1	63,8	69,1	70,2	51,6
13.02.2023	Monday	63,9	68,6	70,6	70,3	53,3
15.02.2023	Wednesday	63,3	71,9	63,5	62,7	59,9
17.02.2023	Friday	68,7	71,9	68,6	62,2	57,8
20.02.2023	Monday	66,7	63,7	70,1	69,6	57,6
22.02.2023	Wednesday	68,0	68,0	69,9	63,4	56,3
24.02.2023	Friday	69,3	64,3	68,8	64,8	50,0
27.02.2023	Monday	68,1	64,9	63,7	62,9	53,3
1.03.2023	Wednesday	67,9	64,3	69,2	70,8	50,0
3.03.2023	Friday	72,3	66,5	70,3	62,7	57,3
6.03.2023	Monday	70,8	69,0	71,0	67,7	55,4
8.03.2023	Wednesday	69,5	69,5	69,2	63,9	56,3
10.03.2023	Friday	68,2	72,0	69,9	63,5	58,3
13.03.2023	Monday	71,5	65,2	71,1	63,9	55,9
15.03.2023	Wednesday	68,1	66,2	70,6	69,4	52,8
17.03.2023	Friday	71,1	67,0	69,3	66,8	60,5
20.03.2023	Monday	70,8	66,2	71,7	67,5	54,4
22.03.2023	Wednesday	71,9	63,0	69,2	63,6	58,6
24.03.2023	Friday	66,3	64,9	73,3	66,6	60,2
27.03.2023	Monday	66,1	71,2	64,6	64,6	55,0
29.03.2023	Wednesday	72,1	63,6	71,3	63,5	55,6
31.03.2023	Friday	69,6	62,1	71,8	64,9	51,1
3.04.2023	Monday	64,5	65,3	71,2	70,7	56,1
5.04.2023	Wednesday	64,8	71,8	67,7	62,9	59,0

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

7.04.2023	Friday	69,9	66,7	66,0	68,1	58,1
10.04.2023	Monday	63,9	70,3	70,6	70,3	57,4
12.04.2023	Wednesday	72,3	65,6	69,8	67,1	58,1
14.04.2023	Friday	69,3	61,1	72,0	67,1	57,7
17.04.2023	Monday	67,2	69,4	70,1	66,7	55,4
19.04.2023	Wednesday	66,5	68,0	66,7	70,6	59,2
21.04.2023	Friday	71,3	72,3	72,6	68,2	58,2
24.04.2023	Monday	66,2	64,0	65,6	68,8	60,6
26.04.2023	Wednesday	71,2	68,1	64,5	66,0	51,8
28.04.2023	Friday	67,3	65,8	64,9	67,7	54,2
1.05.2023	Monday	63,1	68,1	69,8	67,6	55,8
3.05.2023	Wednesday	70,5	69,3	66,9	69,9	55,3
5.05.2023	Friday	72,0	62,5	63,8	65,6	52,5
8.05.2023	Monday	69,9	71,7	70,3	65,4	54,1
10.05.2023	Wednesday	68,0	61,4	67,6	68,2	53,0
12.05.2023	Friday	66,5	71,3	70,1	63,1	57,8
15.05.2023	Monday	69,0	64,5	71,5	68,5	55,3
17.05.2023	Wednesday	69,5	62,3	64,2	67,1	57,7
19.05.2023	Friday	66,5	69,9	68,9	70,3	54,4
22.05.2023	Monday	69,7	69,2	70,9	68,3	53,5
24.05.2023	Wednesday	67,2	63,5	69,5	63,8	58,3
26.05.2023	Friday	70,4	64,6	70,8	62,3	50,2
29.05.2023	Monday	71,6	67,6	72,0	67,5	53,3
31.05.2023	Wednesday	71,5	72,9	64,5	65,4	56,9
2.06.2023	Friday	66,7	70,8	69,9	68,0	59,2
5.06.2023	Monday	63,5	68,2	70,3	64,2	59,6
7.06.2023	Wednesday	69,1	64,5	64,1	70,6	50,6
9.06.2023	Friday	65,9	72,1	70,2	63,3	57,4
12.06.2023	Monday	66,9	72,4	68,8	67,6	57,7
14.06.2023	Wednesday	68,3	69,9	62,5	62,7	52,6
16.06.2023	Friday	69,7	72,4	65,2	65,4	55,8
19.06.2023	Monday	68,7	70,2	64,1	63,5	57,3

In Table 1.1, the red painted cells show measurement values that exceeded the limit values according to the environmental noise assessment and management regulation. It was observed that 79% of the data exceeded the limit values and 21% was within the determined normal values.

**Table 1.2 The status of exceeding the limit level according to the environmental noise assessment and management regulation in front of Akbank**

Exceeding the limit level according to the no overshoot	08:00-09:00	12:00-13:00	16:00-17:00	19:00-20:00	23:00-24:00	Total
1-2 dBA	9	20	11	0	23	63
2-4 dBA	11	8	6	0	13	38
4-8 dBA	14	9	8	17	17	65
>8 dBA	26	23	34	24	7	114
>8 dBA	0	0	1	19	0	20
<b>Total</b>	60	60	60	60	60	300

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

When we look at the overflow interval in Table 1.2, it is observed that the maximum overflow time is between 19:00 and 20:00 and the maximum overflow interval is between 4-8 dBA. When compared to the average noise value of other months in February, it was observed that it was 1 dBA lower, and it was interpreted that the reason for this may be related to the arrival of people in the region and other affected areas to these regions due to the impact of the Kahramanmaraş-centered earthquake disaster.

The measurement values of Yunus Emre Square are given in table 1.3.

**Table 1.3 The measurement values of Yunus Emre Square**

Date	Days	L <sub>min</sub> (dBA)	L <sub>min</sub> (dBA)	L <sub>max</sub> (dBA)	L <sub>max</sub> (dBA)	L <sub>eq</sub> (dBA)
2.02.2023	Thursday	72,0	76,3	67,7		
9.02.2023	Thursday	62,8	75,6	50,0		
16.02.2023	Thursday	72,6	74,8	70,4		
23.02.2023	Thursday	67,5	71,9	63,1		
2.03.2023	Thursday	68,8	75,5	62,1		
9.03.2023	Thursday	68,0	70	66,0		
16.03.2023	Thursday	70,3	80,6	60,0		
23.03.2023	Thursday	69,6	77,1	62,1		
23.03.2023	Thursday	65,0	80,8	49,2		
30.03.2023	Thursday	66,3	80,2	52,4		
4.04.2023	Tuesday	72,0	70,2	73,8		
11.04.2023	Tuesday	68,9	71,2	66,6		
18.04.2023	Tuesday	69,9	76,5	63,3		
25.04.2023	Tuesday	73,7	74,9	72,5		
2.05.2023	Tuesday	70,1	72,8	67,4		
9.05.2023	Tuesday	68,7	72,3	65,1		
16.05.2023	Tuesday	68,1	72,7	63,5		
23.05.2023	Tuesday	71,0	77,4	64,6		
30.05.2023	Tuesday	67,5	75,5	59,5		
6.06.2023	Tuesday	68,8	70,4	67,2		
13.06.2023	Tuesday	74,9	77,9	71,9		

In table 1.3, it was observed that 95.2% of the data collected in this region exceeded the limit values determined according to the environmental noise assessment and management regulation, and only 4.8% were at the limit values.

**Table 1.4 The status of exceeding the limit level according to the environmental noise assessment and management regulation in Yunus Emre Square**

Exceeding the limit level according to the environmental noise assessment and management no overshoot	13:00-14:00
1-2 dBA	1
2-4 dBA	1
4-8 dBA	13
>8 dBA	5
<b>Total</b>	<b>21</b>

As can be seen in Table 1.4, it is observed that the overflow values are densely stacked between 4-8 dBA.

The measurement values in front of the Municipality are given in table 1.5.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**Table 1.5 The measurement values in front of the Municipality**

Date	Days	L <sub>min</sub> (dBA)	L <sub>min</sub> (dBA)	L <sub>max</sub> (dBA)	L <sub>max</sub> (dBA)	L <sub>eq</sub> (dBA)	L <sub>max</sub> (dBA)
7.02.2023	Tuesday	64,3	76	52,6			
14.02.2023	Tuesday	67,3	78,2	56,4			
21.02.2023	Tuesday	64,8	73,2	56,4			
28.02.2023	Tuesday	63,8	77,1	50,5			
7.03.2023	Tuesday	69,6	73	66,2			
14.03.2023	Tuesday	65,9	73,7	58,1			
21.03.2023	Tuesday	68,5	74,1	62,9			
28.03.2023	Tuesday	66,7	76,1	57,3			
4.04.2023	Tuesday	67,5	77,1	57,9			
13.04.2023	Thursday	65,3	78,2	52,4			
20.04.2023	Thursday	69,7	76,6	62,8			
27.04.2023	Thursday	70,7	74,7	66,7			
4.05.2023	Thursday	69,0	76,3	61,7			
11.05.2023	Thursday	65,8	76	55,6			
18.05.2023	Thursday	67,4	74,3	60,5			
25.05.2023	Thursday	65,8	78,8	52,8			
1.06.2023	Thursday	70,0	72,7	67,3			
8.06.2023	Thursday	66,6	73,3	59,9			
15.06.2023	Thursday	66,8	73,7	59,9			

When we look at the data in Table 1.5, it is observed that none of the data is within the limit values. It has been observed that the noise value is generally in the range of 4-8 dBA.

The measurement values of Raşit Tolun Hodja underpass are given in table 1.6.

**Table 1.6 The measurement values of Raşit Tolun Hodja**

30.03.2023	Tuesday	72,6	81,0	64,2			
4.04.2023	Tuesday	80,3	85,8	74,8			
11.04.2023	Tuesday	74,6	83,6	65,6			
18.04.2023	Tuesday	75,4	83,1	67,7			
25.04.2023	Tuesday	80,2	87,8	72,6			
2.05.2023	Tuesday	69,1	78,7	59,5			
9.05.2023	Tuesday	75,4	85,3	65,5			
16.05.2023	Tuesday	74,3	84,2	64,4			
23.05.2023	Tuesday	73,4	82,4	64,4			
30.05.2023	Tuesday	71,8	80,8	62,8			
6.06.2023	Tuesday	76,1	81,2	71,0			
13.06.2023	Tuesday	79,8	86,3	73,3			

In table 1.6, it is observed that all of the received data exceed the limit values and may pose a serious threat to people's health since there are residential areas in this region.

The measurements in Oğuz Ata social facility are given in table 1.7.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Table 1.7 The measurements in Oğuz Ata social facility**

Date	Days	L <sub>eq</sub>	L <sub>max</sub>	L <sub>min</sub>
7.02.2023	Tuesday	45,0	50,1	39,9
14.02.2023	Tuesday	45,4	49,8	41,0
21.02.2023	Tuesday	47,2	52,2	42,2
28.02.2023	Tuesday	48,6	49,8	47,4
7.03.2023	Tuesday	49,5	53,3	45,7
14.03.2023	Tuesday	49,4	53,4	45,4
21.03.2023	Tuesday	46,1	51,2	41,0
28.03.2023	Tuesday	45,5	50,4	40,6
4.04.2023	Tuesday	48,8	53,6	44,0
13.04.2023	Thursday	50,2	54,8	45,6
20.04.2023	Thursday	49,9	55,0	44,8
27.04.2023	Thursday	48,2	53,3	43,1
4.05.2023	Thursday	46,9	52,0	41,8
11.05.2023	Thursday	48,7	52,2	45,2
18.05.2023	Thursday	46,0	51,1	40,9
25.05.2023	Thursday	48,7	53,7	43,7
1.06.2023	Thursday	49,3	53,8	44,8
8.06.2023	Thursday	49,4	54,0	44,8
15.06.2023	Thursday	49,0	53,1	44,9

It was observed that all the data taken in Table 1.7 were within the limit values, and it was interpreted that the fact that this region is closed to vehicle traffic and surrounded by trees contributes to the measurements being within the limit values.

**Table 1.8 The statue of exceeding the limit level according to the environmental noise assessment and management regulation at all measurement points**

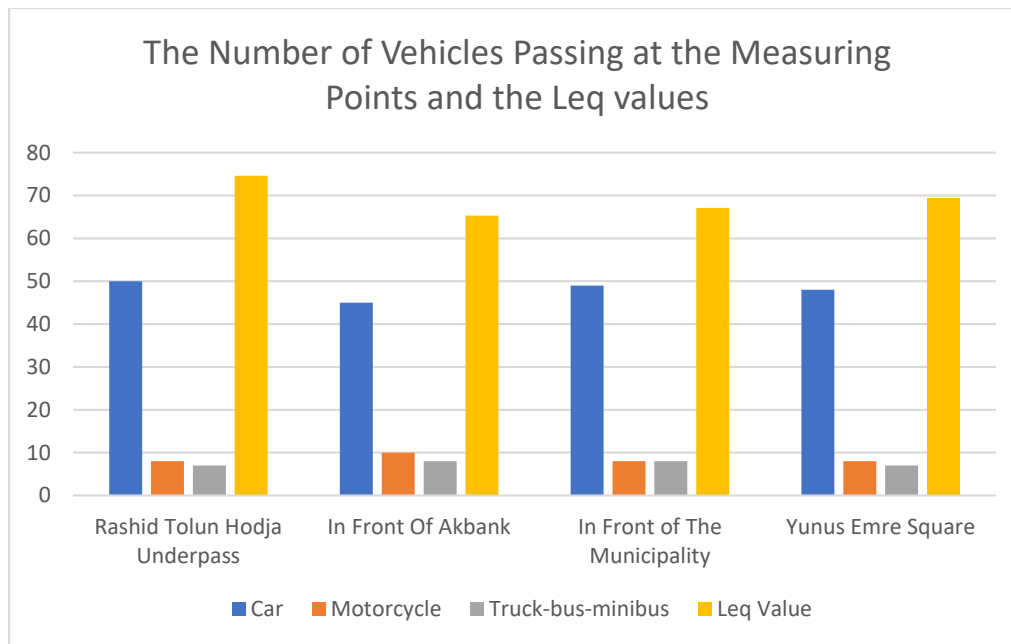
exceeding the limit level according to the environmental no overshoot	In front of Akbank	In front of the municipality	Raşit Tolun Hodja underpass	Oğuz Ata social facility	Yunus Emre square	Total
1-2 dBA	63	0	0	19	1	83
2-4 dBA	38	3	0	0	1	42
4-8 dBA	65	7	0	0	1	73
>8 dBA	114	9	3	0	13	139
Total	20	0	18	0	5	43
	300	19	21	19	21	380

In Table 1.8, it is observed that 21.9% of the 380 data taken in total were within the limit values, while 78.1% exceeded the limit values. It is observed that 36.5% of these exceedances are concentrated between 4-8 dBA.

The total average number of cars passing in front of Akbank throughout the entire measurement is 45, the number of motorcycles is 9, and the number of trucks-buses-minibuses is 8.

The total average number of cars passing in front of the municipality along the entire measurement is 49, the number of motorcycles is 8, and the number of trucks-buses-minibuses is 8.

The total average number of cars passing through Yunus Emre Square throughout the entire measurement is 48, the number of motorcycles is 8, and the number of trucks-buses-minibuses is 7. The total average number of cars passing through the Raşit Tolun Hodja underpass throughout the entire measurement is 50, the number of motorcycles is 8, and the number of trucks-buses-minibuses is 7.



**Figure 2 The number of vehicles passing and the Leq value**

Figure 2 shows the number of vehicles passing and the Leq value. As the number of passing vehicles increased, the average Leq value also increased. The interpretation that there is a direct relationship between the number of passing vehicles and the Leq value has been Deciphered. In general, the most used vehicle is a car.

## CONCLUSION

With this study, the noise level of the central part of the Ereğli district of Konya in general has been determined and the rates of exceeding the legal limit have been determined. A city map has been created for noises, most of which are caused by the road. It was determined that 78.1% of the data collected in this study were above the limit values according to the environmental noise assessment and management regulation, which is set as the legal limit. In general, the average daytime noise level was 68 dBA, while the evening noise level was 66.5 dBA and the night noise level was 55.6 dBA. These values scientifically show that there is noise pollution in the district. It has been observed that the noise level is high in areas close to the city center, and in these regions it is located in noise-sensitive areas such as education, culture, health.

While the daytime and evening noise levels were close to each other, a decrease in the night noise level was observed. The reason for this has been interpreted as the lack of open workplaces and cafes at night in places close to the measurement zones.

The noise level was observed within the legal limits at the Oğuz Ata social facility from the measurement zones. The reason for this is that this area is closed to vehicle traffic and it is surrounded by trees. The surrounding trees also noticeably reduce the noise passing through the surrounding roads.

It has been observed that the average Leq value also increases as the number of vehicles in the measurement zones increases. It has been observed that there is a direct relationship between the Leq value and the number of vehicles. It has been observed that vehicle speeds are on average 20-30 km/h in the city, and the average speed at the Rashid Tolun Hodja underpass is 60 km/h, and the noise level increases as the speed increases or the vehicles do not go and stop running where they are.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## EXAMINATION OF PI3K/AKT/mTOR PATHWAY IN TERMS OF TARGETED THERAPY IN BREAST CANCER TREATMENT

### MEME KANSERİ TEDAVİSİNDE PI3K/AKT/ mTOR YOLAĞININ HEDEFE YÖNELİK TEDAVİ AÇISINDAN İNCELENMESİ

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#### ÖZET

Dünya çapında en sık teşhis edilen ikinci kanser türü olan meme kanseri kadınlarda tüm kanser türleri arasında en yüksek insidansa sahiptir. Meme kanseri moleküler düzeyde belirli hormon ve büyüme faktörlerinin durumuna göre alt gruplara ayrılır ve bu sınıflandırma tanı ve tedavinin temelini oluşturur. Hormon reseptör pozitif tümörler (HR+) östrojen reseptörünü (ER) veya progesteron reseptörünü (PR) eksprese eden tümörlerdir. Bu iki reseptörü de eksprese etmeyip insan epidermal büyüme faktörü reseptörü 2'yi (HER2) aşırı eksprese eden tümörler HER2+ tümörler olarak adlandırılırken; ER, PR HER2'nin üçünden de yoksun tümörler üçlü negatif tümörler olarak adlandırılır. Mevcut kanser tedavisinin yan etkileri, tedaviye direnç gelişmesi ve hastalığın tekrarlamasının yaşam kalitesini bozması ve yaşam süresini kısaltması araştırmacıları kanser tedavisinde yeni tedavi yöntemlerinin geliştirmesine yönelik çalışması yöneltmiş olup, bu çalışmaların çoğu doğrudan moleküler anormalliklere odaklanan hedefe yönelik tedavilere odaklanmıştır. Monoklonal antikorlar, Antikor-ilaç konjugatları, Tirozin Kinaz İnhibitörleri, Anti-anjiyogenikler, Poly (ADP-ribose) polimerase (PARP) inhibitörleri, Cyclin-dependent kinase (CDK) 4/6 inhibitörleri ve PI3K/Akt/ mTOR yolağı inhibitörleri meme kanseri tedavisinde kullanımı ilgili otoriteler tarafından onaylanan hedefe yönelik tedaviler arasında yer almaktadır. Bu çalışmada PI3K/Akt/ mTOR yolağının ve bu yolağı hedefleyen ve meme kanserinde kullanımı yakın zamanda onay almış ajanların (Alpelisib, Everolimus) moleküler açıdan incelenmesi amaçlanmıştır. PI3K/Akt/ mTOR yolağı hücre metabolizması, hücre proliferasyonu, hareketlilik, apoptoz ve anjiogenez gibi temel hücresel süreçlerde önemli bir role sahiptir. Bu sinyal yolağının meme kanseride dahil olmak üzere çok sayıda kanserde anormal biçimde aktive olduğu ve kötü huylu hücrelerin biyolojik özelliklerinin korunmasında önemli bir rol oynadığının bilinmesi çeşitli kanser türlerinin tedavisi için üzerinde çalışılmasına neden olmuş, bu yolağı hedefleyen çeşitli inhibitörler geliştirilmiştir. Alpelisib ilk oral PI3K inhibitörüdür ve 2019 yılında HR+/HER2-, PIK3CA mutasyonlu, ilerlemiş ya da metastatik meme kanseri olan postmenapozal kadınlarda ve erkeklerde endokrin bazlı tedavi sırasında ya da sonrasında ilerleme kaydedilmesini takiben fulvestrant ile kombinasyon halinde kullanılmak üzere FDA tarafından onaylanmıştır. Everolimus, 2012 yılında non-steroidal aromataz inhibitörü tedavisi sonrasında nüksetmiş veya ilerlemiş ileri HR + /HER2- meme kanseri olan postmenopozal kadınlarda eksemestan ile kombinasyon halinde kullanılmak üzere FDA tarafından onaylanmıştır.

**Anahtar Kelimeler:** meme kanseri, hedefe yönelik tedavi, PI3K/Akt/ mTOR, Alpelisib, Everolimus

#### ABSTRACT

Breast cancer, the second most commonly diagnosed cancer type worldwide, has the highest incidence of all cancer types in women. Breast cancer is divided into subgroups at the molecular level according to the status of certain hormones and growth factors, and this classification forms the basis of diagnosis and treatment. Hormone receptor positive tumors (HR+) are tumors that express the estrogen receptor (ER) or progesterone receptor (PR). Tumors that do not express either of these receptors but overexpress human epidermal growth factor receptor 2 (HER2) are called HER2+ tumors; Tumors lacking all three ER, PR HER2 are called triple negative tumors. The side effects of current cancer treatment, the

development of resistance to treatment, and the recurrence of the disease impairing the quality of life and shortening the lifespan have led researchers to work on the development of new treatment methods in cancer treatment, and most of these studies have focused on targeted therapies that directly focus on molecular abnormalities. Monoclonal antibodies, Antibody-drug conjugates, Tyrosine Kinase Inhibitors, Anti-angiogenics, Poly (ADP-ribose) polymerase (PARP) inhibitors, Cyclin-dependent kinase (CDK) 4/6 inhibitors and PI3K/Akt/mTOR pathway inhibitors are among the targeted treatments approved by the relevant authorities for use in the treatment of breast cancer. This study aimed to molecularly examine the PI3K/Akt/mTOR pathway and the agents that target this pathway and have recently been approved for use in breast cancer (Alpelisib, Everolimus). The PI3K/Akt/mTOR pathway has an important role in basic cellular processes such as cell metabolism, cell proliferation, motility, apoptosis and angiogenesis. The knowledge that this signaling pathway is abnormally activated in many cancers, including breast cancer, and that it plays an important role in preserving the biological properties of malignant cells has led to studies on it for the treatment of various types of cancer, and various inhibitors targeting this pathway have been developed. Alpelisib is the first oral PI3K inhibitor and was approved by the FDA in 2019 for use in combination with fulvestrant in postmenopausal women and men with HR+/HER2-, PIK3CA-mutated, advanced, or metastatic breast cancer following progression during or after endocrine-based therapy. Everolimus was approved by the FDA in 2012 for use in combination with exemestane in postmenopausal women with advanced HR+/HER2- breast cancer that has relapsed or progressed after non-steroidal aromatase inhibitor therapy.

**Keywords:** breast cancer, targeted therapy, PI3K/Akt/mTOR, Alpelisib, Everolimus

## GİRİŞ

Meme kanseri hem tüm dünyada en sık teşhis edilen ikinci kanser türü olması hem de kadınlarda görülen ana karsinom türü olması (Dong et al., 2020; Pashayan et al., 2020) nedeniyle en önemli kanser türleri arasında yer almaktadır. Meme kanseri belirli hormon ve büyüme faktörlerinin ekspresyonuna bağlı olarak alt sınıflara ayrılır. Metastatik meme kanseri, hormon reseptörü [HR, östrojen reseptörü (ER) ve/veya progesteron reseptörü (PR)] ve insan epidermal büyüme faktörü reseptörü 2 (HER2) 'nin ekspresyonuna dayalı olarak farklı histopatolojik alt tiplere kategorize edilir. Hormon reseptör pozitif tümörler (HR+) ER veya PR'yi eksprese eden tümörlerdir. Bu iki reseptörü de eksprese etmeyip 'yi HER2'yi aşırı eksprese eden tümörler HER2+ tümörler olarak adlandırılırken; ER, PR HER2'nin üçünden de yoksun tümörler üçlü negatif tümörler olarak adlandırılır (Makena & Rao, 2020; Waks & Winer, 2019). Geleneksel tedavinin bazı olumsuz sonuçları nedeniyle, son yıllarda kanser alanında yapılan çalışmaların çoğu hedefe yönelik tedaviye yoğunlaşmıştır. PI3K/Akt/ mTOR yolağı hücre metabolizması, hücre proliferasyonu, hareketlilik, apoptoz ve anjiogenez gibi temel hücresel süreçlerde önemli bir role sahiptir. Bu sinyal yolağının meme kanserinde dahil olmak üzere çok sayıda kanserde anormal biçimde aktive olduğu ve kötü huylu hücrelerin biyolojik özelliklerinin korunmasında önemli bir rol oynadığı bilinmektedir (Lim, Mayer, & Pawson, 2015; Martini, Santis, Braccini, Gulluni, & Hirsch, 2014). Bu yolağın hedeflenmesi meme kanseri tedavisi için değerli bir seçenek olmuştur. Alpelisib ve everolimus bu yolağı hedefleyen ve HR+/HER2- ileri evre meme kanserinde endokrin tedavi ile birlikte kullanımı ilgili otoriteler tarafından onaylanmış hedefe yönelik ilaçlardır.

## ARAŞTIRMA ve BULGULAR

### 1. PI3K/Akt/mTOR Sinyal Yolağının Yapısı

#### 1.1. PI3K (Phosphatidylinositol 3-Kinase, Phosphoinositide 3-Kinase)

Lipid kinaz ailesinin bir üyesi olan PI3K (Vara et al., 2004) alt grup homolojilerine ve substratlara karşı göstermiş oldukları spesifiteye göre üç sınıfa ayrılmaktadır (Riehle, Cornea, & Degtarev, 2013). Sınıf I PI3K da kendi içinde PI3K sınıf IA, PI3K sınıf IB and PI3K sınıf IC olmak üzere alt sınıfa ayrılmaktadır (Yudushkin, 2019). Sınıf IA PI3K'ler katalitik alt birimlerden ve bunları aktive eden düzenleyici alt birimlerden oluşan heterodimerik bir yapıya sahiptir (Markman, Dienstmann, & Tabernero, 2010). Katalitik alt birimleri sırasıyla PIK3CA, PIK3CB, PIK3CG ve PIK3CD genleri tarafından kodlanan p110 $\alpha$ , p110 $\beta$ , p110 $\gamma$  ve p110 $\delta$ 'dan oluşurken, düzenleyici alt birimler p85 $\alpha$  (p85 $\alpha$ , p55 $\alpha$ , p50 $\alpha$ ), p85 $\beta$  ve p55 $\gamma$ 'dan oluşmaktadır ve bu alt birimler ise sırasıyla sırasıyla PIK3R1, PIK3R2 ve PIK3R3 genleri

tarafından kodlanmaktadır (Cidado & Park, 2012). Sınıf IA PI3K'lar büyüme faktörlerinin tirozin kinaz reseptörlerine bağlanması ile aktive edilir (Engelman et al., 2006) ve tümör oluşumu ile en sık ilişkilendirilen alt birimdir (Riehle et al., 2013). Sınıf IB PI3K'lar da Sınıf IA PI3K'larda katalitik ve düzenleyici alt birimlerden oluşan heterodimerik bir yapıya sahiptir ancak bu yapı Sınıf IA PI3K'lar ile farklılık gösterir. Şöyle ki: Sınıf IB PI3K'lerin p110 katalitik alt birimlerini aktive eden düzenleyici kısmı p101 ve p84 ve p87PIKAP alt birimlerinden (87 kDa'lık PI3Kg adaptör proteini) oluşmaktadır (Balla, 2013; Stephens et al., 1997; Yu, Long, & Shen, 2015). Sınıf IB PI3K'ların G-protein bağlı reseptörler (GPCRs) ile aktive edildiği bilinmektedir (Engelman, Luo, & Cantley, 2006)

Monomerik bir yapıya sahip olan Sınıf 2 PI3K'ların (Markman et al., 2010) üç katalitik izoformu vardır: PI3KC2  $\alpha$ , PI3KC2  $\beta$  ve PI3KC2  $\gamma$ . PI3KC2  $\alpha$  ve PI3KC2  $\beta$  birçok doku ve organda eksprese edilirken; PI3KC2 $\gamma$  sadece hepatositlerde eksprese edilmektedir (Braccini et al., 2015; Odorizzi, Babst, & Emr, 2000).

Sınıf 2 PI3K'ların aksine Sınıf 3 PI3K'lar Vps34 katalitik alt biriminden ve p150 düzenleyici alt biriminden oluşan heterodimerik bir yapıya sahiptir (Odorizzi et al., 2000).

### **1.2. Akt**

Aynı zamanda protein kinaz B (PKB) olarak adlandırılan (Manning & Toker, 2017) Akt AGC kinaz ailesine ait bir serin/treonin kinazdır ve PI3K sinyal yolunun önemli bir aşağı akış parçasıdır (Dummler & Hemmings, 2007; Leroux, Schulze, & Biondi, 2018; Manning & Toker, 2017; Pearce, Komander, & Alessi, 2010). Akt'nin genel olarak insan dokularında sıklıkla eksprese edilen Akt1, Akt2 ve Akt3 olmak üzere üç farklı alt birimi bulunmaktadır (Palumbo, Paterson, Yang, Hood, & Law, 2021; Xia, X. et al., 2019). Detaylı olarak incelemek gerekirse dokuların birçoğunda eksprese edilen Akt1'in yanı sıra, Akt2 karaciğer gibi insüline fazla duyarlı dokularda eksprese edilirken, Akt3 beyin ve testislerde eksprese edilir (Revathidevi, S., & Munirajan, 2019; Szymonowicz, Oeck, Malewicz, & Jendrossek, 2018).

### **1.3. mTOR**

mTOR (rapamisin'in mekanistik hedefi) , PI3K ile ilişkili kinaz (PIKK) ailesinde yer alan bir serin/treonin protein kinazdır (Laplante & Sabatini, 2012; Saxton & Sabatini, 2017). mTOR iki farklı protein kompleksinin katalitik alt birimlerini oluşturur; mTOR Kompleks 1 (mTORC1) ve mTOR Kompleks 2 (mTORC2) (Laplante & Sabatini, 2012; Saxton & Sabatini, 2017). mTORC1 6 protein komponentinden oluşurken, mTORC2 7 protein komponentinden oluşmaktadır. mTOR, dektor, mLST8, tti1/tel2 kompleksi iki mTOR kompleksinde ortak olarak bulunurken; raptor ve pras40 mTORC1 kompleksine spesifik, rictor, mSin1, protor ½ ise mTORC2 kompleksine spesifik proteinlerdir (Laplante & Sabatini, 2012).

## **2. PI3K/Akt/mTOR Sinyal Yolağının Aktivasyonu**

PI3K'nin aktivasyonu için tirozin kinaz reseptörleri ya da G protein-bağlı reseptörlere spesifik ligandların bağlanması gerekir. Spesifik ligandlar tarafından aktive edilen spesifik reseptörler PI3K'yi aktive eder (Lim et al., 2015). Aktive PI3K, fosfatidilinositol 4,5-bisfosfatı (PIP2) 3'pozisyonunda fosforile ederek fosfatidilinositol 3,4,5-trifosfata (PIP3) fosforile eder (Bahrami, A., Khazaei, M., Shahidsales, S., Hassanian, S. M., Hasanzadeh, M., Maftouh, M., ... & Avan, 2018; Slomovitz, B. M., & Coleman, 2012; Tessier & Woodgett, 2006). Bu sürecin negatif düzenleyicisi PTEN (The tumor suppressor phosphatase and tensin homolog deleted on chromosome 10)'dir. PIP3'ü PIP2'ye defosforile ederek PI3K sinyalizasyonunu engellemiş olur (Courtney, Corcoran, & Engelman, 2010; Slomovitz, B. M., & Coleman, 2012). PIP3, PDK1'i, PDK1 ise Akt'yi aktive eder (Dieterle et al., 2014; Hresko, R. C., Murata, H., & Mueckler, 2003). mTORC1 ve mTORC2 Akt tarafından aktive olur. Aktive edilmiş Akt mTORC1'i inhibe eden TSC1/TSC2 (tumor supressor proteins tuberous sclerosis complex 1/ tuberous sclerosis complex 2)'i fosforile ederek inhibe eder. TSC1/TSC2'in inhibisyonu mTORC1 ve mTORC2'nin aktivasyonu ile sonuçlanır (Hresko, R. C., Murata, H., & Mueckler, 2003; Kenna MM, McGarrigle S, 2018). mTORC1'in Akt ile aktivasyonu hücre büyümesi ve protein sentezi gibi kritik süreçlerde rol oynarken, mTORC2 Akt'nin aktivasyonunda rol alır (Karar, J., & Maity, 2011; Slomovitz, B. M., & Coleman, 2012). Aktive edilmiş Akt mTOR'u fosforile ederek hücre büyümesi ve protein sentezi gibi kritik süreçleri kontrol eder (Karar, J., & Maity, 2011).

### **3. PI3K/Akt/mTOR Sinyal Yolağının İnhibitörleri**

#### **3.1. Alpelisib**

Alpelisib (Piqray™) ilk oral PI3K inhibitörüdür. HR+, HER-, PI3KCA mutasyonlu postmenapozal kadınlarda ve erkeklerde, endokrin temelli tedavi sırasında ya da sonrasında ilerlemeyi takiben, estrogen reseptör antagonisti fulvestrant ile birlikte kullanılmak üzere ilgili otoriteler tarafından onaylanmıştır (Verret, Cortes, Bachelot, Andre, & Arnedos, 2019). Son yapılan çalışmalarda Alpelisib'in farmakolojik tedaviyi ve hastaneye yatmayı gerektirebilecek diyare, döküntü ve hiperglisemiye neden olduğu kaydedilmiştir (Miller, Armgardt, & Svoboda, 2022).

#### **3.2. Everolimus**

Aynı zamanda rapamycin olarak bilinen ve bir sirolimus türevi olan Everolimus (RAD001, Afinitor®) mTOR serin/treonin kinaz sinyal iletim yolağını inhibe eden oral bir protein kinaz inhibitörüdür (Laplane & Sabatini, 2012). Everolimus düzenleyici otoriteler tarafından; steroid olmayan bir aromataz inhibitörünün ardından hastalığı ilerleme veya nüks etme göstermiş HR+/HER2- meme kanseri olan postmenapozal kadınlarda aromataz inhibitörü eksemestan ile birlikte kullanılmak üzere onay almıştır (Paplomata, E., Zelnak, A., & O'Regan, 2013). Everolimus ayrıca pankreatik nöroendokrin tümörlerin (PNET), ileri renal hücreli karsinom (RCC) ve tüberoz skleroz (TSC) ile ilişkili subependimal dev hücreli astrositom (SEGA) gibi farklı kanser türlerinde kullanılmak üzere de tedavi onayına sahiptir (Hasskarl, 2018). İlacın kullanımının hiperglisemi, hiperinsülinemi, somatit, bulaşıcı olmayan pnömoni gibi yan etkilerin ortaya çıktığı kaydedilmiştir (Paplomata, E., Zelnak, A., & O'Regan, 2013).

#### **SONUÇ**

Kadınlarda görülen meme kanseri dünya çapında yaygın olarak teşhis edilen kanser türleri içerisinde ilk sırada yer almaktadır (Chhikara & Parang, 2023). Mevcut tedaviye karşı direnç gelişimi, hastalığın nüks etmesi ve yaşam kalitesini bozan yan etkiler nedeniyle araştırmacılar hedefe yönelik tedaviler üzerinde yoğunlaşmıştır.

Hedefe yönelik tedavi kanser gelişimine neden olan moleküler anormallikler doğrudan hedeflenir. Bu şekilde tedavi etkinliğinin artması, daha düşük dozda ilaç kullanılması ve bu sayede yan etkilerin azalması sağlanmaktadır (Chhikara & Parang, 2023). PI3K/Akt/ mTOR yolağı meme kanseri tedavisinde hedeflenen yapılardan birisidir. PI3K/Akt/ mTOR yolağı hücre metabolizması, hücre proliferasyonu, hareketlilik, apoptoz ve anjiogenez gibi temel hücresel süreçlerde önemli bir role sahiptir. Bu sinyal yolağının meme kanserinde dahil olmak üzere çok sayıda kanserde anormal biçimde aktive olduğu ve kötü huylu hücrelerin biyolojik özelliklerinin korunmasında önemli bir rol oynadığı bilinmektedir (Lim et al., 2015; Martini et al., 2014). Alpelisib ve everolimus bu yolağı hedefleyen ve HR+/HER2- ileri evre meme kanserinde endokrin tedavi ile birlikte kullanımı ilgili otoriteler tarafından onaylanmış hedefe yönelik ilaçlardır. Everolimus hiperglisemi, hiperinsülinemi, somatit, bulaşıcı olmayan pnömoni gibi yan etkilere sebep olurken (Paplomata, E., Zelnak, A., & O'Regan, 2013). Son yapılan çalışmalarda Alpelisib'in farmakolojik tedaviyi ve hastaneye yatmayı gerektirebilecek diyare, döküntü ve hiperglisemiye neden olduğu kaydedilmiş bu sonuç ilacın tolere edilebilirliği konusunda endişe uyandırmıştır (Miller et al., 2022).

HR+/HER2- hastalarda CDK 4/6 inhibitörleri, BRCA gen mutasyonu mevcutsa PARP inhibitörleri gibi tedavi seçenekleri de mevcuttur. Yüksek nüks riski taşıyan erken evre meme kanserinde bu tip spesifik tedavi seçeneklerine ihtiyaç duyulmaktadır.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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AİLE KATILIMLI FİZİKSEL AKTİVİTELERİN ERKEN ÇOCUKLUK DÖNEMİNDEKİ  
ÖĞRENCİLERİN FİZİKSEL AKTİVİTE DÜZEYİ ÜZERİNDEKİ ETKİSİ: BİR PİLOT  
ÇALIŞMA

THE EFFECT OF FAMILY PARTICIPATED PHYSICAL ACTIVITIES ON THE PHYSICAL  
ACTIVITY LEVEL OF STUDENTS IN EARLY CHILDHOOD: A PILOT STUDY

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**ÖZET**

Ebeveynlerin çocuklar için fiziksel aktiviteye katılım konusunda temel etkenlerden biri olduğu göz önünde bulundurulduğunda, erken çocukluk dönemindeki öğrencilerin fiziksel aktivite düzeyini arttırmak için aile katılımlı etkinliklerin düzenlenmesi son derece önemlidir. Bu çalışmanın amacı, aile katılımlı fiziksel aktivitelerin erken çocukluk dönemindeki 4-6 yaş arası öğrencilerin fiziksel aktivite düzeyi üzerindeki etkilerini incelemektir. Ön test- son test kontrol gruplu deneysel yöntemin kullanıldığı çalışmaya 16 ebeveyn ve onların 4-6 yaş aralığındaki çocukları katılmıştır. Katılımcılar rastgele bir uygulama (n: 8) ve bir kontrol grubuna ayrılmıştır (n: 8) Uygulama grubunda yer alan ebeveynler ve çocuklara, 8 hafta boyunca haftada üç gün, 30'ar dakika süreyle fiziksel aktivite programı uygulanmıştır. Program süresince uygulama grubundaki ebeveynler çocuklarıyla birlikte haftada bir gün fiziksel aktivitelere birlikte katılırken, haftanın iki günü ise çocuklarının performansını gözlemlemiştir. 8 haftalık aile katılımlı fiziksel aktivitelerin öncesi ve sonrasında Serbest Zaman Egzersiz Anketi aracılığıyla 4-6 yaş aralığındaki çocukların fiziksel aktivite düzeyine ilişkin veriler toplanmıştır. Elde edilen verilerin analizinde SPSS 20.0 istatistik paket programından yararlanılmıştır. Veri setinin sayıca az olmasından dolayı, 4-6 yaş aralığındaki çocukların grup içi ve gruplar arası fiziksel aktivite düzeyinin karşılaştırılmasında Mann-Whitney U testi ve Wilcoxon İşaretili Sıralar testi kullanılmıştır. Bulgular, uygulama ve kontrol grubunda yer alan 4-6 yaş aralığındaki çocukların 8 haftalık program öncesi benzerlik gösteren fiziksel aktivite düzeyinin (U: 22,50, p: 0,309) program sonrası uygulama grubu lehine değişim gösterdiğini ortaya koymuştur (U: 0,00, p: 0,001). Uygulama grubundaki çocukların fiziksel aktivite düzeyinde 8 haftalık aile katılımlı fiziksel aktivite programı öncesi ve sonrası arasında anlamlı farklılıklar olduğu belirlenirken (Z: -2,536, p: 0,011) kontrol grubunun fiziksel aktivite düzeyinde herhangi bir anlamlı farklılık olmadığı saptanmıştır (Z: -0,736, p: 0,461). Bu bulgular sonucunda, aile katılımlı fiziksel aktivitelerin 4-6 yaş aralığındaki çocukların fiziksel aktivite düzeyi üzerinde olumlu yönde bir etki oluşturduğu izlenimi edinilmiştir.

**Anahtar kelimeler:** Aile katılımı, fiziksel aktivite, erken çocukluk.

**ABSTRACT**

Considering that parents are one of the main factors in participation in physical activity for children, it is extremely important to organize activities with family participation to increase the physical activity level of students in early childhood. The aim of this study is to examine the effects of physical activities with family participation on the physical activity level of students aged 4-6 in early childhood. 16 parents and their children aged 4-6 participated in the study, in which the experimental method with pretest-posttest control group was used. Participants were randomly divided into an application (n: 8) and a control group (n: 8). A physical activity program was applied to the parents and children in the

application group for 30 minutes, three days a week for 8 weeks. During the program, parents in the application group participated in physical activities with their children one day a week, and observed their children's performance two days a week. Data on the physical activity level of children aged 4-6 were collected through the Leisure Time Exercise Questionnaire before and after 8 weeks of family-participated physical activities. SPSS 20.0 statistical package program was used in the analysis of the data obtained. Due to the small number of data sets, Mann-Whitney U test and Wilcoxon Signed Rank test were used to compare the physical activity levels of children aged 4-6 years within and between groups. The findings revealed that the physical activity level of children aged 4-6 in the application and control groups, which was similar before the 8-week program (U: 22.50, p: 0.309), changed in favor of the application group after the program (U: 0.00, p: 0.001). While it was determined that there were significant differences in the physical activity level of the children in the application group before and after the 8-week physical activity program with family participation (Z: -2.536, p: 0.011), it was determined that there was no significant difference in the physical activity level of the control group (Z: -0.736, p: 0.461). As a result of these findings, it was obtained the impression that physical activities with family participation have a positive effect on the physical activity level of children between the ages of 4-6.

**Keywords:** Family participation, physical activity, early childhood.

### GİRİŞ

Fiziksel aktivitelere katılım, çocukların tüm gelişim alanları üzerinde olumlu etkiler ortaya çıkarmaktadır. Fiziksel aktivitelere katılan çocukların fiziksel ve motor yeterlilikleri, öz güven düzeyleri, sosyal etkileşim ve iletişim becerileri, ruhsal uyumları, psikolojik dayanıklılıkları ve kişilik gelişimleri olumlu yönde gelişim göstermektedir (Açak, 2006). Fiziksel aktivitelerin çocukların gelişim alanları üzerindeki bu anlamlı etkilere karşın, çocukların sürdürülebilir bir fiziksel aktivite deneyiminden ne düzeyde yararlandığı önemli bir soru işaretidir. Başka bir anlatımla çocuklar düzenli bir şekilde fiziksel aktivitelere ne derece katılım sağlamaktadır? Bu anlamda çocukların sadece okul yaşamındaki sınırlı sayıdaki derslerde fiziksel aktivitelere katılımlarının yanı sıra okul dışı öğrenme ortamlarında da fiziksel aktivitelere katılımı desteklenmelidir. Okul dışı öğretmen ortamlarında çocuklara düzenli bir şekilde fiziksel aktivitelere katılma fırsatının sunulması onların fiziksel aktivitelerin yukarıda bahsedilen faydalarından sürdürülebilir bir şekilde ve tam anlamıyla yararlanmalarını açısından son derece önemlidir.

Çocuklara fiziksel aktivite konusunda okul dışı öğrenme ortamları oluşturma konusunda ailelere büyük sorumluluklar düşmektedir. Araştırmalar ailenin etkinliklerdeki aktif katılımı olmazsa hem çocuk hem de aile açısından etkinliklerin belirlenen amaçlara ulaşamayacağını öne sürmektedir (Diken, 2009). Ailenin etkinlik sürecinde bizzat yer almasının yanı sıra öğretici olarak etkinlikte bulunması sonucunda çocukların sürdürülebilir bir şekilde çeşitli becerileri kazanmalarına katkı sunulmaktadır (Acar, Tekin-İftar & Yıkılmış, 2017).

Ülkemizde çocukların fiziksel aktivitelere katılımını ele alan çalışmalar genelde, fiziksel aktivitelerin çocukların gelişim alanları üzerindeki etkilerini ortaya koymaya yöneliktir (Karakaya vd., 2006). Aile katılımlı fiziksel aktivitelere yönelik yapılan sınırlı sayıda çalışma ise yalnızca özel gereksinimli bireyler üzerinedir (İlhan, Yarımkaaya & Esentürk, 2017; Solomon vd., 2014). Sürdürülebilir bir fiziksel aktivite öğretimi için ebeveynlerin fiziksel aktivitelere çocuklarıyla birlikte katılmaları, fiziksel aktivite örneklerini bizzat görmeleri ve uygama becerisi kazanmasının önemli olduğu düşünülmektedir. Bu bağlamda mevcut çalışmada, aile katılımlı fiziksel aktivitelerin 4-6 yaş aralığındaki çocukların fiziksel aktivite düzeyi üzerindeki etkilerinin incelenmesi amaçlanmıştır.

### YÖNTEM

#### Araştırma Deseni

Mevcut çalışma, Bayburt Üniversitesi Etik Kurulu tarafından 29.03.2023 tarih ve 99 nolu karar ile etik ilkelere uygun görülmüştür. Çalışmada deneysel desen olarak ön test – son test deneysel model kullanılmıştır. Bu modelde bir gruba bağımsız değişken/değişkenler uygulanmaktadır. Hem uygulama öncesi (ön test) hem de uygulama sonrası (son test) ölçümler alınarak elde edilen ölçümler arasında fark

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

meydana gelirse, bunun bağımsız değişken/değişkenler kaynaklı olduğu kabul edilmektedir (Neuman, 2006). Mevcut çalışmanın deneysel desenine ilişkin bilgiler aşağıda Tablo 1’de özetlenmiştir.

**Tablo 1.** Araştırmanın deseni

Grup	Ön test	Uygulama	Son test
Uygulama	Boş Zaman Fiziksel Aktivite Ölçeği	Aile katılımlı fiziksel aktiviteler (8 hafta)	Boş Zaman Fiziksel Aktivite Ölçeği
Kontrol	Boş Zaman Fiziksel Aktivite Ölçeği	-	Boş Zaman Fiziksel Aktivite Ölçeği

Tablo 1’de görüldüğü üzere, mevcut çalışmada ön test son test kontrol gruplu deneysel desene uygun olarak, 8 haftalık aile katılımlı fiziksel aktiviteler öncesi uygulama ve kontrol grubunda yer alan çocukların fiziksel aktivite düzeyi ön test olarak değerlendirilmiştir. Ardından 8 hafta süresince haftada 3 gün ve 30’ar dakika süreyle aile katılımlı fiziksel aktiviteler yürütülmüştür. Bu süreçte kontrol grubu herhangi bir fiziksel aktivite programına katılmamıştır. 8 haftalık aile katılımlı fiziksel aktiviteler sonrası uygulama ve kontrol grubunda yer alan çocukların fiziksel aktivite düzeyine ilişkin son test verileri elde edilmiştir.

## Katılımcılar

Araştırmaya Bayburt ilinde ikamet eden 16 ebeveyn ile onların 4-6 yaş aralığındaki çocukları katılmıştır. Katılımcıların belirlenmes sürecinde, kolay ulaşılabilir örnekleme yöntemi kullanılmıştır. Katılımcılara ulaşmak için İl Milli Eğitim Müdürlüğü’nden destek alınmıştır. Çalışmanın ebeveynlere duyurulması amacıyla İl Milli Eğitim Müdürlüğü koordinesinde rehber öğretmenler nezaretinde bizzat proje içeriği ailelere anlatılarak gönüllülük esası doğrultusunda katılımcılar belirlenmiştir. Katılımcıların demografik bilgileri aşağıda Tablo 2’de sunulmuştur.

**Tablo 2.** Katılımcılara ilişkin demografik bilgiler

		Grup	
		Uygulama (n: 8) n(%)	Kontrol (n: 8) n(%)
Çocuklar	<b>Cinsiyet</b>		
	Kız	3(37.5%)	4(50.0%)
	Erkek	5(62.5%)	4(50.0%)
	<b>Yaş (X+SD)</b>	4.87+0.64	4.90+0.59
Ebeveynler	<b>Cinsiyet</b>		
	Kadın	6(76.1%)	7(66.7%)
	Erkek	2(23.9%)	1(33.3%)
	<b>Yaş (X+SD)</b>	37.49+5.73	38.56+6.81
	<b>Eğitim düzeyi</b>		
	Ortaokul	2(25.0%)	3(37.5%)
	Lise	3(37.5%)	3(37.5%)
	Üniversite	3(37.5%)	2(25.0%)
	<b>Algılanan gelir düzeyi</b>		
	Düşük	1(12.5%)	1(12.5%)
Orta	5(67.5%)	6(75.0%)	
Yüksek	2(25.0%)	1(12.5%)	

Tablo 2 incelendiğinde, çalışmaya katılan uygulama grubundaki çocukların 3’ü kız, 5’i erkek iken ebeveynlerinin 6’sı kadın, 2’si erkektir. Kontrol grubundaki çocukların 4’ü kız, 4’ü erkek iken ebeveynlerinin 7’si kadın, 1’i erkektir. Yaş açısından, uygulama grubundaki çocukların yaş ortalaması 4.87 iken ebeveynlerinin 37.49’dur. Kontrol grubundaki çocukların yaş ortalaması 4.90 iken

ebeveynlerinin yaş ortalaması 38.56'dır. Eğitim düzeyi açısından, uygulama grubundaki ebeveynlerin 2'si ortaokul, 3'ü lise ve 3'ü üniversite mezunu iken kontrol grubundaki ebeveynlerin 3'ü ortaokul, 3'ü lise ve 2'si üniversite mezunudur. Bunun yanı sıra, algılanan gelir düzeyi açısından uygulama grubundaki ebeveynlerin 1'i düşük gelir düzeyinde, 5'i orta gelir düzeyinde ve 2'si yüksek gelir düzeyinde yer almaktayken kontrol grubundaki ebeveynlerin 1'i düşük gelir düzeyinde, 6'sı orta gelir düzeyinde ve 1'i yüksek gelir düzeyinde yer almaktadır.

### Aile Katılımlı Fiziksel Aktiviteler

Çalışma kapsamında, 8 hafta boyunca 1haftada 3 gün 30 dakika süreyle aile katılımlı fiziksel aktiviteler uygulanmıştır. Her bir fiziksel aktivite oturumu şunlardan oluşmuştur: a) yaklaşık 10 dakikalık bir ısınma periyodu, b) yaklaşık 10 dakikalık bir fiziksel aktivite periyodu and c) yaklaşık 10 dakikalık bir soğuma periyodu. Isınma periyodu, hafif yürüyüş ve ekstremitelerdeki (diz ve ayak bileği, kalça, boyun ve omuz) eklemlerin rotasyonunu içermektedir. Fiziksel aktivite periyodunda eğlenceli oyunlar ve parkurlar yer almıştır. Soğuma periyodu ise, nefes alma ve esnetme egzersizleri gerçekleştirilmiştir.

### Veri Toplama Araçları

Çalışma verileri, Kişisel Bilgi Formu ve Serbest Zaman Egzersiz Anketi aracılığıyla elde edilmiştir.

*Kişisel Bilgi Formu:* Çalışmaya katılan ebeveynlerin ve çocukların cinsiyet, yaş, eğitim düzeyi, ve algılanan gelir düzeyleri ile ilgili bilgiler elde etmek amacıyla Kişisel Bilgi Formu kullanılmıştır.

*Serbest zaman Egzersiz Anketi:* Boş Zaman Fiziksel Aktivite Değerlendirme Ölçeği aracılığıyla çocukların müdahale öncesi ve sonrası fiziksel aktivite düzeyi hakkında bilgi elde edilecektir. Boş Zaman Fiziksel Aktivite Değerlendirme Ölçeği son bir haftada en az 15 dakika süreyle; a) Yüksek şiddette fiziksel aktivitelerin, b) Orta şiddette fiziksel aktivitelerin ve c) Hafif şiddette fiziksel aktivitelerin kaç kez yapıldığını belirlemeyi hedeflemektedir (Godin ve Shephard, 1985). Anketin toplam skoru şu şekilde hesaplanmaktadır; haftalık serbest zaman aktivitesi skoru = (9 x yüksek şiddette fiziksel aktiviteler) + (5 x orta şiddette fiziksel aktiviteler) + (3 x hafif şiddette fiziksel aktiviteler) (Godin, 2011). LTEQ'nun Türk kültürüne uyarlama çalışmasında (Yerlisu-Lapa, Certel & Yağar, 2016), Açıklayıcı Faktör Analizi sonucunda (AFA) toplam varyansın %55'ini açıklayan tek faktörlü bir yapı elde edilmiştir. Anketin güvenilirliği kapsamında test-tekrar test analizi gerçekleştirilmiştir. LTEQ'nun Türkçe versiyonu için test-tekrar test güvenilirliği katsayısı anketin geneline ilişkin .84, anketin maddelerine ilişkin ise sırası ile .80, .76 ve .72 olarak hesaplanmıştır. Ayrıca ölçüt geçerliği doğrultusunda "Uluslararası Fiziksel Aktivite Anketi-Kısa Form" ile yapılan korelasyon analizi sonucunda Spearman korelasyon katsayısı .92 olarak bulunmuştur.

### Verilerin Analizi

Çalışma verilerinin analizinde SPSS 20.0 paket programından yararlanılmıştır. Veri setinin sayıca az olmasından dolayı, 4-6 yaş aralığındaki çocukların grup içi ve gruplar arası fiziksel aktivite düzeyinin karşılaştırılmasında Mann-Whitney U testi ve Wilcoxon İşaretli Sıralar testi kullanılmıştır.

### BULGULAR

**Tablo 1.** Uygulama ve kontrol grubundaki çocukların ön test fiziksel aktivite puanlarının karşılaştırılması

Grup	n	Sıra ortalaması	Sıra toplamı	U	p
Uygulama	8	7,31	58,50	22,500	0,309
Kontrol	8	9,69	77,50		

Tablo 1 incelendiğinde, uygulama ve kontrol grubunda yer alan çocukların ön test fiziksel aktivite puanları arasında anlamlı bir farklılık olmadığı belirlenmiştir (U: 22,500, p: 0,309, p>0,05). Bu sonuç, 8 haftalık aile katılımlı fiziksel aktivite programı öncesi uygulama ve kontrol grubundaki çocukların fiziksel aktivite düzeylerinin benzer olduğunu göstermiştir.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 2.** Uygulama ve kontrol grubundaki çocukların son test fiziksel aktivite puanlarının karşılaştırılması

Grup	n	Sıra ortalaması	Sıra toplamı	U	p
Uygulama	8	12,50	100,00	0,000	0,001*
Kontrol	8	4,50	36,00		

\*p<0,05

Tablo 2’de görüldüğü üzere, uygulama ve kontrol grubunda yer alan çocukların son test fiziksel aktivite puanları arasında anlamlı bir farklılık olduğu tespit edilmiştir (U: 0,000, p: 0,001, p<0,05). Bu sonuç, 8 haftalık aile katımlı fiziksel aktivite programı sonrası uygulama ve kontrol grubundaki çocukların fiziksel aktivite düzeyleri arasında uygulama grubu lehine bir artış olduğunu açığa çıkarmıştır.

**Tablo 3.** Uygulama ve kontrol grubundaki çocukların ön test – son test fiziksel aktivite puanlarının karşılaştırılması

Grup	Son test-Ön test	n	Sıra ortalaması	Sıra toplamı	Z	p
Uygulama	Negatif sıra	0	0,00	0,00	-2,536	0,011*
	Pozitif sıra	8	4,50	36,00		
	Eşit	0				
Kontrol	Negatif sıra	1	3,00	3,00	-0,736	0,461
	Pozitif sıra	3	2,33	7,00		
	Eşit	4				

\*p<0,05

Tablo 3 incelendiğinde, uygulama grubunda yer alan çocukların ön test – son test fiziksel aktivite puanları arasında anlamlı bir farklılık olduğu saptanmıştır (Z: -2,536, p: 0,011, p<0,05). Buna karşın kontrol grubunda yer alan çocukların ön test – son test fiziksel aktivite puanları arasında anlamlı bir farklılık ol olmadığı belirlenmiştir (Z: -0,736, p: 0,461, p>0,05). Bu sonuç, 8 haftalık aile katımlı fiziksel aktivite programının uygulama grubundaki çocukların fiziksel aktivite düzeyleri üzerinde olumlu bir etki oluşturduğunu göstermiştir.

## TARTIŞMA VE SONUÇ

Aile katımlı fiziksel aktivitelerin 4-6 yaş aralığındaki çocukların fiziksel aktivite düzeyi üzerindeki etkilerinin incelenmesi amacıyla yapılan bu araştırmadan elde edilen bulgulara göre, aile katımlı fiziksel aktivitelerin 4-6 yaş aralığındaki çocukların fiziksel aktivite düzeyi üzerinde olumlu yönde bir etki oluşturduğu izlenimi edinilmiştir. Fiziksel aktivitelerin düzenli ve sürdürülebilir bir şekilde uygulanarak çocukların gelişim alanları üzerinde olumlu etkiler oluşturması bakımından ailenin fiziksel aktivitelere katılımı son derece önemlidir (Lantz, Nelson & Loftin, 2004). Aile katılımının sağlandığı fiziksel aktiviteler esnasında ortaya çıkan aile-çocuk etkileşimi ile çocuklarda istenilen davranış değişiklikleri için potansiyel bir öğrenme ortamı oluşturmaktadır (Keay-Bright & Boardman, 2006). Literatürde aile katımlı olarak uygulanan fiziksel aktiviteler neticesinde çocukların fiziksel aktivite düzeyindeki artışı ele alan sınırlı sayıda çalışmaya rastlanmıştır (Esentürk & Yarımkaya, 2021). Söz konusu çalışma sosyal etkileşim ve iletişim becerilerinde sorunlar yaşayan özel gereksinimli bireylere yöneliktir.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Ailelerin günlük yaşamlarında fiziksel aktivitelerin sistemli bir şekilde uygulayabilecek seviyeye gelmeleri hem kendileri hem de çocuklarının gelişimlerine önemli katkılar sağlayacaktır. Bu nihai amaç doğrultusunda tasarlanan mevcut çalışmanın, 4-6 yaş aralığındaki çocukların fiziksel aktivite düzeyinin aile katılımı fiziksel aktiviteler aracılığıyla nasıl artırılacağı konusunda paydaşlara rehberlik edebileceği düşünülmektedir.

Çalışma kapsamında ulaşılabilecek sonuçların Milli Eğitim Bakanlığı, Bayburt Üniversitesi ve Bayburt İl Milli Eğitim Müdürlüğü ile paylaşılması hedeflenmektedir. Bu bağlamda, deprezede ailelerin yanı sıra kapsayıcı fiziksel aktivite faaliyetlerini düzenleyen Milli Eğitim Bakanlığı'nın ilgili alt birimleri tarafından kullanılabilmesi değerlendirilmektedir. Bu genel etkinin yanı sıra çalışmanın gerçekleştiği ilin milli eğitim müdürlüğü tarafından da yerel bazda öğretmenlerin kapsayıcı fiziksel aktiviteler konularında faaliyetler düzenlenebileceği öngörülmektedir. Ayrıca çalışma sonuçlarının Bayburt Üniversitesi'nde öğrenim gören beden eğitimi ve spor öğretmenliği, sınıf öğretmenliği ve çocuk gelişimi bölümü öğrencilerinin eğitimlerine de katkı sunabileceği değerlendirilmektedir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## UTILIZING MACHINE LEARNING IN CRYPTOCURRENCY MARKET ANALYSIS KRIPTO PARA PIYASA ANALIZİNDE MAKİNE ÖĞRENİMİNDEN YARARLANMA

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### ÖZET

Finans sektörü hızla dönüşüm geçirmekte olup, Bitcoin fiyatlarını tahmin etmek merkezi bir zorluk haline gelmiştir. Kaggle'dan alınan verileri kullanarak Yapay Sinir Ağı (ANN), Evrişimli Sinir Ağı (CNN) ve Uzun Kısa Vadeli Bellek (LSTM) olmak üzere üç öne çıkan derin öğrenme modelini analiz ettik. CNN, 0.0632 RMSE, 0.0373 MAE ve 0.9469 korelasyon katsayısı ile üstün bir performans sergileyerek, özellikle mekansal desenlerin bulunduğu zaman serisi tahminlerinde yeteneğini öne çıkardı. Buna karşılık, LSTM beklenildiği gibi performans göstermedi, bu da genellikle sıralı veri işleme konusundaki başarısını öven mevcut literatürden sapmaktadır. LSTM'in etkinliğini etkileyen faktörler arasında veri ön işleme, model parametreleri veya Bitcoin fiyatlandırma verisinin benzersiz doğası yer alabilir. Araştırmamız, Bitcoin fiyat tahminleri için CNN'lerin tercih edilebilir olduğunu önermektedir, ancak en uygun model veri nüanslarına, ön işlemeye ve hiperparametrelere bağlı olarak değişebilir. Bu alanları keşfetmek ve potansiyel olarak diğer modelleri veya hibrid teknikleri entegre etmek için daha fazla araştırma yapılması teşvik edilmektedir.

**Anahtar kelimeler:** Derin Öğrenme, Kripto, ANN, CNN, LSTM, Fiyat, Tahmin.

### ABSTRACT

The finance sector is undergoing swift transformations, with predicting Bitcoin prices being a central challenge. We analyzed three prominent deep learning models such as Artificial Neural Network (ANN), Convolutional Neural Network (CNN), and Long Short-Term Memory (LSTM) using data from Kaggle. The CNN showed superior performance with an RMSE of 0.0632, an MAE of 0.0373, and a correlation coefficient of 0.9469, highlighting its aptitude for time-series forecasting, especially when spatial patterns are present. In contrast, the LSTM did not perform as expected, diverging from existing literature that usually praises its sequential data handling. Factors affecting LSTM's efficacy might include data preprocessing, model parameters, or the unique nature of Bitcoin pricing data. Our research suggests CNNs are preferable for Bitcoin price predictions, yet the optimal model can vary based on data nuances, preprocessing, and hyperparameters. Further research is encouraged to explore these areas and potentially integrate other models or hybrid techniques.

**Keywords:** Deep Learning, Crypto, ANN, CNN, LSTM, Price, Prediction.

### INTRODUCTION

This study delves into the intricate aspects of Bitcoin's technical operations. Among the primary focuses are the challenges in key management (Sureshbhai et al., 2020), the emergence and constraints of custodial wallets (Mell et al., 2017), and the usability hurdles that Bitcoin beginners often encounter (Casado-Vara et al., 2019; Clyde, 2020). Our objective is not just to shed light on these challenges but

also to propose potential solutions (Financial Time, 2008; G. Wood., 2016). The foundation of digital currencies can be traced back to Chaum's anonymous payment systems in the 1980s (B.Insider, 2008). However, these initial systems had a dependence on central entities. This centralized approach was subsequently countered by innovations like B-Money by Dai (1998) and Bit Gold by Szabo (2005) (A. Mikhaylov., 2019). Another landmark in the progression of digital currencies was Hal Finney's "Reusable Proofs of Work" in 2004 (Kuo Chuen et al., 2017).

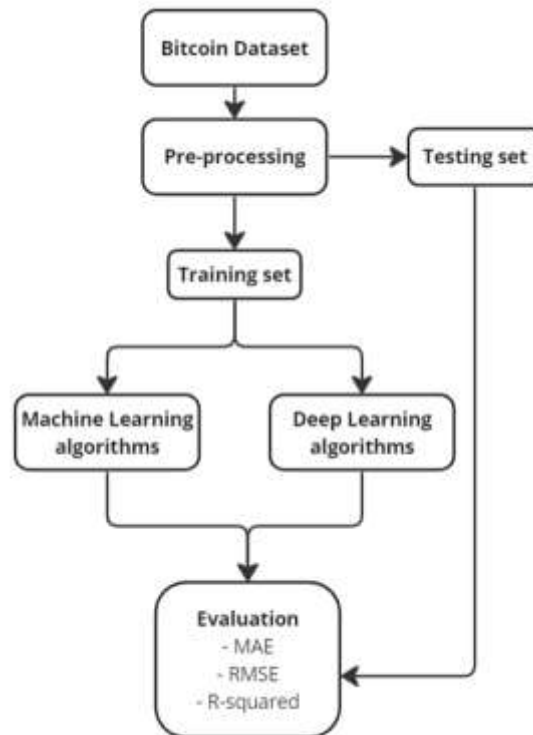
Addressing the unpredictability of the cryptocurrency market, the accurate prediction of Bitcoin Price (BP) remains a daunting task. Conventional models that process extensive datasets in bulk can sometimes risk precision. Also, expansive neural networks are plagued by challenges such as the vanishing gradient dilemma and computational intensiveness. Our study unveils a fresh BP prediction approach that examines data for each individual cryptocurrency prior to its amalgamation (Corbet et al., 2022). This method leverages a fusion of ANN, CNN, and LSTM models (Corbet et al., 2022) with the intent to bolster prediction precision and counteract computational drawbacks. In essence, our research offers a noteworthy advancement in cryptocurrency price prediction endeavors.

### RELATED WORK

In the realm of Bitcoin price predictions through Deep Learning (DL) models, there exists an abundance of literature. (Aggarwal et al., 2019) explored the capabilities of LSTM, reporting an RMSE of 47.91, though the study refrained from linking Bitcoin prices with gold. The innovative WT-CATCN model was introduced by (Jiang, 2020), boasting an RMSE of 19.020. On the other hand, (Saadah & Ahmad Whafa, 2020) accentuated LSTM's proficiency, demonstrating an impressive accuracy of 80% for cryptocurrency predictions. A novel approach by (Jay et al., 2020) presented a stochastic model, which outperformed deterministic models by achieving an RMSE of 4.84833%. The domain of Ether price predictions saw advancements from (Glenski et al., 2021), who registered an accuracy rate of up to 84.2%. Diving deeper into the LSTM's capabilities, (Shin et al., 2021) exhibited an ensemble approach, particularly efficient during volatile phases, resulting in an RMSE of 37.24. Achieving an RMSE of 21.2% through LSTM, the work of (Carbó & Gorjon, 2022) further solidified the model's position. (Kang et al., 2022) ventured into hybrid DL methodologies, revealing promising RMSE figures. Concluding the overview, (WARDAK & RASHEED, 2022) showcased an LSTM RNN's prowess, achieving a staggering 95.7% accuracy when fine-tuned with optimal hyperparameters.

### METHODOLOGY

In our research, we have meticulously constructed a prediction model rooted in data sourced from Kaggle, a renowned platform for datasets. Prior to delving into the intricacies of model implementation, this data undergoes a critical preprocessing phase, where we employ the min-max scaler technique to standardize and normalize the data, ensuring that the range stays consistent and facilitating easier computational processing. Having refined the dataset, we then partition it, allocating 80% for training purposes and the remaining 20% reserved for testing, a distribution that provides a harmonious balance, guaranteeing robust model training while also leaving ample space for rigorous evaluation. Following these initial steps, we introduce and implement three prominent Deep Learning architectures: ANN, CNN, and LSTM. The selection of these models stems from their proven efficiency and prowess in handling diverse data types and structures. To gauge their efficacy and reliability, we have adopted regression-specific assessment techniques, ensuring that the results derived are both accurate and indicative of the models' predictive potential within the realm of cryptocurrency price movement analysis.



**Figure 1.** Proposed Flowchart

In our model development process, we harness the capabilities of three distinct Deep Learning (DL) strategies:

- ANN (Chen et al., 2020): This is a sequential construct comprising four hidden layers. The model relies on the ReLU activation function for these layers. The training process spans 100 epochs to ensure robust model learning.
- CNN (Rathan et al., 2019): Specifically tailored for one-dimensional data sets, this architecture integrates a Conv1D layer, succeeded by Flatten and Dense layers. Similar to the ANN, the training regimen is designed to be executed over 100 epochs.
- LSTM (Borges & Neves, 2020): Recognized for its adeptness in managing sequential data, this model integrates an LSTM layer. This is subsequently followed by a series of three Dense layers, each utilizing ReLU activations. The optimization phase for this model is diligently performed over 100 epochs.

By synergizing the meticulous data preprocessing stages with the incorporation of these diverse DL models, our methodology seeks to provide comprehensive, resilient, and pragmatically applicable perspectives on the nuanced dynamics of cryptocurrency pricing.

## EVALUATION AND RESULTS

In this research, we conducted an exhaustive performance analysis of three deep learning architectures are ANN, CNN, and LSTM, for the purpose of forecasting Bitcoin prices. The evaluation utilized a set of key metrics, namely MSE, RMSE, MAE, and the R2 score. Our models were built using Python version 3.6.1 and executed on a Windows 10 environment, bolstered by an Intel Core i7 CPU with a clock speed of 2.60 GHz, coupled with 16 GB RAM and operating on a 64-bit system. It's worth noting that MSE gauges the average squared differences, whereas RMSE quantifies the average variances between the actual and forecasted values. In addition, the MAE and R2 score provide deeper insights into the reliability and precision of the models. Among the analyzed models, the RF stood out distinctly, registering an MAE of 0.024609, an RMSE of 0.056137, and an impressive R2 value of 0.958287. Other modeling techniques, including DT and XGBoost, showcased commendable outcomes. However, the Lasso regression technique demonstrated a relatively subdued performance. Such results underscore the

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

**October 13-14, 2023**

significance of meticulous model selection and optimization, especially when navigating the unpredictable terrains of cryptocurrency pricing.

**Table 1.** Loss Values of Different Models for Predicting Cryptocurrency Prices

Regressor	MAE	RMSE	R2
Linear Regression	0.065311	0.107985	0.845651
Decision Tree Regressor	0.026540	0.069409	0.936232
RF	0.024609	0.056137	0.958287
SVR	0.062093	0.083781	0.907090
Gradient Boosting Regressor	0.035017	0.066422	0.941602
AdaBoost Regressor	0.055780	0.080166	0.914934
XGB	0.026591	0.058331	0.954962
LGBM	0.029611	0.060188	0.952049
KNN	0.028625	0.059169	0.953658
Ridge	0.065359	0.107970	0.845694

In our evaluation of Bitcoin price predictions, we assessed the capabilities of both ANN and CNN models. The ANN architecture manifested a commendable performance, posting an RMSE value of 0.09349, MAE standing at 0.0612, and a correlation coefficient pegged at 0.8842. Contrarily, the CNN framework eclipsed the ANN, showcasing superior metrics: RMSE of 0.05437, MAE measuring 0.03247, and a striking correlation value of 0.960. Such metrics imply that the CNN not only forecasts with greater accuracy but also aligns more closely with the actual trends.

**Table 1.** Comparative Results ML/ DL

Model (Type)	MAE	RMSE	R
Random Forest (ML)	0.024609	0.056137	0.958287
ANN (DL)	0.061200	0.093494	0.884297
CNN (DL)	0.032474	0.054376	0.960863

In Figure 2, we juxtapose the genuine Bitcoin prices, illustrated by the blue trajectory, against the forecasts produced by our DL architectures, ANN and CNN, represented by the red trajectory. Observationally, the projected values, on an aggregate level, tend to hover above the actual prices. Nevertheless, these predictions emulate the overarching trend with a significant degree of accuracy.

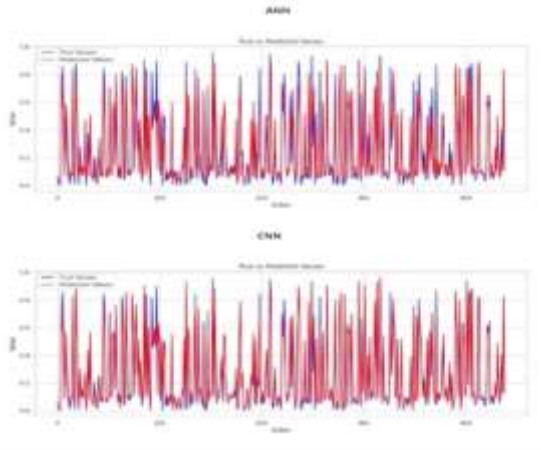


Figure 2. DL True vs Prediction

## DISSCUSSION

In our exploration, both ML and DL architectures were assessed in terms of their proficiency in predicting Bitcoin prices. Within the ML models, Random Forest emerged as the leader, whereas among the DL architectures, CNN took the spotlight. While the outcomes are noteworthy, it's crucial to address the study's constraints. The research leaned heavily on past data, overlooking some external factors that influence Bitcoin prices. Additionally, we were bounded by computational limitations, leading to an incomplete exploration of potential DL hyperparameters. To further refine prediction accuracy, upcoming studies might delve into enhancing model optimization, experimenting with varied neural network configurations, and incorporating expansive datasets.

## CONCLUSION

Our research underscored the significant role of both ML and DL methodologies in forecasting Bitcoin prices. Among the ML techniques, the Random Forest Regressor shone brightly, while within the DL paradigm, CNN outperformed ANN. These outcomes highlight the burgeoning potential of data analytics in deciphering the intricacies of cryptocurrency markets. However, it's imperative to approach the results with a discerning lens given the study's limitations. Subsequent research endeavors should aim to bridge these gaps and further hone the models to capture the nuances of cryptocurrency price movements. Ensuring precise Bitcoin price predictions continues to be of paramount importance for numerous stakeholders in the field.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## COVID-19 PANDEMİ DÖNEMİ SONRASINDA ÜNİVERSİTE ÖĞRENCİLERİNDE ONLINE PLATFORM YORGUNLUĞU: NİTEL BİR ARAŞTIRMA

### ONLINE PLATFORM FATIGUE IN UNIVERSITY STUDENTS AFTER THE COVID-19 PANDEMIC PERIOD: A QUALITATIVE STUDY

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#### ÖZET

Covid-19 salgın süreci 2019 yılının Aralık ayında ortaya çıkmış olup 2020 Mart ayında tüm dünyada pandemi olarak Dünya Sağlık Örgütü tarafından ilan edilmiştir. Bu sürecin başlamasıyla birlikte eğitimden sağlığa, hizmetten üretim sektörüne birçok sektör olumsuz yönde etkilenmiştir. Özellikle eğitim sürecine bakıldığında bütün kademelerde online eğitim süreci kamu otoritesi tarafından kararlaştırılmış ve uzun bir süre bu şekilde devam etmiştir. Salgın sürecinin seyrinin azalmasıyla birlikte online eğitim sürecinden yüz yüze eğitime geçilmiş ve bu süreçte riskin devam etmesi şüphesiyle dolaşımı azaltmak açısından karma eğitim anlayışı bazı yükseköğretim kurumları tarafından benimsenmiştir. Bu süreçte öğrenciler öğrenim gördükleri üniversitelerde bazı derslerini yüz yüze alırken bazı derslerini çevrim içi ortamlarda almışlardır. Covid-19 salgın süreci sonrası üniversite öğrencilerinde yaşanan bu durumdan yola çıkılarak lisans düzeyindeki öğrencilerin online platform yorgunluklarını araştırmak çalışmanın temel amacını oluşturmaktadır. Araştırmanın örneklemini Yozgat Bozok Üniversitesinde 2021-2022 eğitim-öğretim yılında öğrenim gören lisans öğrencileri oluşturmaktadır. Nitel araştırma deseninde oluşturulan çalışmada 20 lisans öğrencisi ile yarı yapılandırılmış görüşmeler gerçekleştirilmiştir. Görüşme yöntemiyle toplanan veriler nitel araştırma yöntemlerinden içerik analizine tabi tutulmuştur. Katılımcılardan elde edilen veriler kategorilere ayrılarak incelenmiştir. Araştırmadan elde edilen bulgulara göre Covid-19 pandemi süreci sonrasında üniversitelerde uygulanan karma eğitim sürecinden öğrencilerin memnun olmadığı, bu durumun eğitim sürecinde aksamalar yaşattığı ve ikisi öğrenim sürecinden birisinin tamamen uygulamaya geçmesi gibi düşüncelerinin olduğu görülmüştür. Üniversite öğrencilerinin yaşadıkları bu sürece ilişkin bireysel, kurumsal ve toplumsal öneriler sunulmaya çalışılmıştır.

**Anahtar Kelimeler:** Üniversite Öğrencileri, Online Platform, Nitel Araştırma

#### ABSTRACT

The Covid-19 pandemic process emerged in December 2019 and was declared by the World Health Organisation as a pandemic all over the world in March 2020. With the start of this process, many sectors from education to health, from service to production sector have been negatively affected. Especially when looking at the education process, the online education process at all levels was decided by the public authority and continued in this way for a long time. With the decrease in the course of the epidemic process, the online education process was switched from the online education process to the face-to-face education process, and with the suspicion of the continuation of the risk in this process, the concept of mixed education was adopted by some higher education institutions in order to reduce circulation. In this process, students took some of their courses face-to-face at the universities where they studied, while some of their courses were taken in online environments. Based on this situation experienced by university students after the Covid-19 pandemic process, the main purpose of the study is to investigate the online platform fatigue of undergraduate students. The sample of the study consists of undergraduate students studying at Yozgat Bozok University in the 2021-2022 academic year. In the qualitative research design, semi-structured interviews were conducted with 20 undergraduate students. The data collected by interview method were subjected to content analysis from qualitative research

methods. The data obtained from the participants were categorized and analyzed. According to the findings obtained from the research, it was observed that students were not satisfied with the mixed education process implemented in universities after the Covid-19 pandemic process, that this situation caused disruptions in the education process, and that they had thoughts such as the complete implementation of one of the two learning processes. Individual, institutional, and social suggestions regarding this process experienced by university students were tried to be presented.

**Keywords:** University Students, Online Platform, Qualitative Research

## GİRİŞ

Günümüzde bireyler, iletişim araçlarının sağlamış olduğu kolaylıkların farkında ve neredeyse internet ve iletişim araçlarına sahip olan herkes bu araçları kullanmaktadır. Bireylerarası iletişim geçmişte yüz yüze iken günümüzde bu sınırlar ortadan kalkmış ve yerini çevrimiçi platformlar aracılığıyla iletişime bırakmıştır. Çevrimiçi platformlar, bireylerin yaşamında, iletişiminde ve onların işbirliği içerisinde olmasında büyük katkılar sunan araçlardır. Özellikle mesafelerin bir öneminin olmadığı çevrimiçi platformlar, oluşturulduğu andan itibaren geliştirilerek insanlık için büyük bir fayda sağlamış ve sağlamaya da devam etmektedir.

Çevrimiçi platformlar genel olarak Zoom, Google Meet ve benzeri uygulamalar ile karşımıza çıkmış olup bireylerin sanal ortamlarda bir araya gelmesine ve görüşmelerini yapmalarına olanak sağlamaktadır. Çevrimiçi platform araçları video konferans yetenekleri ile ön plana çıkmakta, ses ve video özellikleri sayesinde bireylerin görüntülerini ve seslerini karşı tarafa aktarmak suretiyle iletişimi gerçekleştirmektedir. Bunun yanı sıra iletişim kuran bireyler arasında bilgi iletişim teknolojilerinin karşı tarafa iletilmesi, materyallerin sunulması, canlı görüşmenin kayıt altına alınarak sonradan izleme gibi birçok olanağı bünyesinde barındırmaktadır.

Zoom, Google Meet ve benzer şirketlerin oluşturmuş olduğu uygulamalar çevrimiçi görüşmeler sayesinde zamanı etkin kullanma, mekân sınırlamasını ortadan kaldırma, iletişimi daha hızlı erişilebilir hale getirme gibi imkânları sunarken özellikle iş dünyasında büyük bir dönüşüm meydana getirmiştir. İşletmeler, çalışanlarını sürekli bir araya toplamak yerine bu çevrimiçi uygulamalar sayesinde toplantılar düzenleyebilmekte ve stratejik açıdan birçok kazanç elde etmektedirler. İş dünyasının yanı sıra çevrimiçi platformlar eğitim, sağlık, sosyal etkileşimler gibi birçok alanı da kapsama alanına almıştır. Özellikle Covid-19 pandemi sürecinin dünyada etkili olmasıyla birlikte çevrimiçi uygulamalara olan rağbet artmış ve pandemi süreci bitse de bu uygulamalar devam etmiştir.

Bu araştırmanın konusunu oluşturan eğitim sürecinde çevrimiçi platformların etkisi Covid-19 pandemi süreciyle birlikte başlamış olup sürecin bitmesiyle birlikte devam etmiştir. Online platformlar uzaktan eğitimi destekler nitelikte meydana getirilmiş ve sanal sınıflarda eğiticiler ve öğrenciler bir araya gelerek zorunluluk halinde eğitim süreçleri devam etmiştir. Fakat pandemi sürecinden sonra evrilen eğitim sürecinde birçok eğitim kuruluşu çevrimiçi platformların bazı süreçlerde devam etmesi gerektiği kanaatine varmış ve bu uygulamalara devam etmiştir. Her ne kadar zorunluluk halinde kuruluşların ve hizmet alanların kullandığı bu çevrimiçi platformlar, sürecin sonlanması ile birlikte oransal olarak devam etse de bireylerin bu uygulamalara karşı bir önyargılarının olduğu düşünülmektedir. İnsanların alışlagelmiş iletişim tarzlarını bir anda bırakabilmesinin zor olduğu bilinmekte ve özellikle eğitim-öğretim süreçlerinde yüz yüze eğitim-öğretim sürecinin yerini çevrimiçi platformların tutmayacağı anlaşılmaktadır. Bu çalışmada üniversite öğrencilerinin Covid-19 pandemi süreci sonrasında çevrimiçi (online) platformlara karşı düşünceleri elde edilerek literatürdeki bilgi birikimine katkı sunulmaya çalışılmıştır.

## EĞİTİMDE ONLINE PLATFORM YORGUNLUĞU

1 Mart 2020 tarihinde Dünya Sağlık Örgütü tarafından ilan edilen Covid-19 salgını hayatı akışında birçok şeyi etkilemiştir. Covid-19 salgını eğitim ve öğretim alanında da birçok modelin değişimine neden olmuştur. Özellikle yüksek öğretim kurumlarında gelişen çevrimiçi öğrenme olanaklarını derslerin yüz yüze eğitimden online (çevrimiçi) eğitime geçilmesine sebep olmuştur. 2020 bahar dönemi itibari ile öğrencilerin online etkinlik sayıları hızla artmıştır. Bu noktada teknoloji daha önce akla gelmeyecek şekilde kullanılmaya başlanmıştır (Massner, 2021: 19). Üniversiteler bu online

dönemde kendi çevrimiçi eğitim altyapılarıyla, yada Zoom, MicroSoft Teams, Perculus, BigBlueButton, Adobe Connect ve Google Meet gibi görüntülü web görüşme uygulamalarıyla derslerine devam etmeye başlamıştır (Zan & Zan, 2020). Pandemi dönemi alınan karar sonrası her üniversite uzaktan eğitime başlamak zorunda kalmıştır. Yüksek Öğretim Kurumu'nun belirlediği verilere göre 189 üniversiteden 121'i 23 Mart 2020; 41'i 30 Mart 2020 ve 25'i 6 Nisan 2020 tarihlerinde uzaktan eğitim ve öğretime başlamıştır. Açılan derslerin %22'sinde canlı sınıf uygulaması kullanılmış olup, uzaktan eğitimin en fazla etkin olduğu alan Sosyal Bilimler (%91) iken en az kullanıldığı alan ise Sağlık Bilimleri (%54) olmaktadır (Yüksek Öğretim Kurumu, 2020). Sürdürülen uzaktan eğitim programlarında öğrencilerin bir önceki dönemden yüz yüze işlenemeyen dersler nedeni ile bir üst sınıftaki eksiklerini tamamlanmasına öncelik verilmesini içeren genelge yükseköğretim kurulu tarafından yayımlanmıştır. Daha sonra Hibrit eğitim modeline yakın bir uygulamaya geçilmeye karar verilerek, yükseköğretim kurumları kademeli bir şekilde eğitim ve öğretim faaliyetlerine başlamıştır. Hibrit eğitim modeli uzaktan eğitim ve yüz yüze eğitimin bir arada uygulandığı bir model olarak tanımlanmaktadır (Yaman, 2021: 3300).

Çevrimiçi öğretimde, geleneksel öğretimden farklı yöntemlerin kullanılması öğrencilerin genellikle çevrimiçi olarak görüntülü bir şekilde ders almaları online platform yorgunluğuna yol açmıştır (Toney vd., 2021). Bu durum literatürde çevrimiçi eğitimde bilgisayarda geçirilen vaktin, ismini güncel olan video görüşme platformundan Zoom yorgunluğu ya da Zoom tükenmişliği sorunu olarak ele alınmıştır. Toplantılara ve derslere katılımlardan dolayı katılımcılarda yakınlaştırma yorgunluğuna neden olan ve tükenmişlik sendromuna yol açan Zoom yorgunluğu, genel bir zihinsel yorgunluk duygusu olarak ifade edilmektedir (Ateş ve Kanık, 2022:787). Zoom platformunun her yerde kolaylıkla bulunması ile giderek kullanıcı sayısı artarken "Zoom" kelimesi jenerikleşmeye başlamış ve video görüşmeleri yerine "Zoom" kelimesi kullanılmaya başlanmıştır. Bu noktada marka adı olan Zoom video görüşme kategorisi ile eş anlamlı olarak kullanılmaya başlanmıştır (Iqbal, 2020).

Zoom yorgunluğu, sık sık online etkileşimde bulunan kişilerin anksiyete, yorgunluk, gerginlik ve bitkinlik yaşadığı olumsuz bir durum olarak ifade edilmektedir. Video konferans görüşmeleri nedeni ile tükenmişlik hissetme kişilerin hayatında olumsuz etkiler gösterebilmektedir. Bu noktada kişiler olaylar karşısında kötümser ve alaycı bir tutum sergileyebilmektedir. Bu durum kişilerde olumsuz düşünceler ve gelecek kaygısı oluşmasına neden olmaktadır (Bothra, 2020). Uyar ve arkadaşları (2016) araştırmasında, üniversite öğrencileri üzerinde tükenmişlik durumunun, ağır işlerde çalışmak durumunda olan işçiler ile aynı olduğunu vurgulamaktadır. Online platformlar, dijital ortam bağımlılığının gençler üzerinde depresyon, anksiyete ve zihinsel çöküş gibi olumsuz etkileri olduğunu ortaya koymaktadır (Akduman, 2021: 17).

### YÖNTEM

Bu çalışmada üniversite öğrencilerinin Covid-19 pandemi dönemi sonrasında online platformlarla ilgili düşüncelerini belirlemek amacıyla olgu ve davranışların nasıl gerçekleştiğine odaklanan nitel araştırma yöntemlerinden birisi olan fenomenolojik (olgu) deseni tercih edilmiştir. Araştırmada veri toplama amacıyla veri toplanacak kişilerin belirlenmesinde kolay ulaşılabilir durum örnekleme yolu tercih edilmiştir. Yıldırım ve Şimşek (2018)'in ifade ettiğine göre özellikle nitel araştırmalarda var olan durum ile ilgili bilgi vermeyi hedefleyen örnekleme yöntemleri kullanılması gerekmektedir.

Araştırmada Yozgat Bozok Üniversitesinde 2021-2022 eğitim-öğretim yılında öğrenim görmekte olan lisans öğrencileriyle yarı yapılandırılmış mülakatlar gerçekleştirilmiştir. Görüşmeler öncesinde iş kaygısı kavramına ait alan yazın incelemesinin ardından çalışma grubuna yöneltililecek sorular oluşturulmuş ve araştırmacı tarafından 2 lisans ile yaklaşık 1 saat süren pilot görüşmeler gerçekleştirilmiştir. Bu görüşmelerde katılımcılara online platformları bilme durumları, Covid-19 süreçleri, öğrenim gördükleri bölümlerle ilgili sorular ve sürece dair genel sorular yöneltilerek konuya ilişkin verebilecekleri tepkiler üzerinde durulmuştur. İlgili pilot görüşmelerin sonucunda elde edilen ifade kalıplarının içerik açısından değerlendirilmesi için alanında uzman 2 öğretim üyesine danışılmış ve yarı yapılandırılmış görüşme formu üzerinde son düzenlemeler gerçekleştirilmiştir. Son olarak yapılacak örneklem grubu üzerinde uygulamaya geçilmiştir.

Veri toplama aracı olarak çalışma grubunda bulunan öğrencilerle yüz yüze derinlemesine mülakatlar gerçekleştirilmiş olup, mülakatlar esnasında görüşme formunda yer alan soruların mümkün olduğunca

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

açık ve anlaşılır bir şekilde ifade edilmesine özen gösterilmiştir. Ayrıca katılımcılar kesinlikle yönlendirilmemiştir. Her bir görüşme ortalama 45 dakika sürmüş olup elde edilen verilerin araştırma kapsamı dışında kullanılmayacağına dair bilgilendirilmiş gönüllü formu katılımcılarla paylaşılmıştır.

Çalışmaya katılan öğrencilerin yaş ortalaması 21,3 olup, lisans düzeyinde eğitim gören öğrencilerden oluşmaktadır. Çalışma grubunda yer alan öğrencilerin sosyo-demografik özellikler aşağıda ayrıntılı bir şekilde yer almaktadır.

**Tablo 1.** Katılımcıların Sosyo-Demografik Özellikleri

No	Cinsiyet	Yaş	Öğrenim Düzeyi	Sınıf Düzeyi	Bölüm	Kod
1	Kadın	21	Lisans	2. Sınıf	Türkçe Öğretmenliği	KA1
2	Kadın	23	Lisans	1. Sınıf	İlahiyat	KA2
3	Erkek	23	Lisans	4. Sınıf	Hemşirelik	KA3
4	Kadın	20	Lisans	3. Sınıf	Çocuk Gelişimi	KA4
5	Kadın	20	Lisans	1. Sınıf	Psikolojik Danışmanlık ve Rehberlik	KA5
6	Erkek	22	Lisans	3. Sınıf	Edebiyat	KA6
7	Kadın	20	Lisans	1. Sınıf	Hemşirelik	KA7
8	Kadın	21	Lisans	2. Sınıf	Sosyoloji	KA8
9	Kadın	22	Lisans	1. Sınıf	Okul Öncesi Öğretmenliği	KA9
10	Kadın	21	Lisans	2. Sınıf	Sağlık Yönetimi	KA10
11	Erkek	22	Lisans	2. Sınıf	Bilgisayar Mühendisliği	KA11
12	Kadın	21	Lisans	1. Sınıf	Edebiyat Öğretmenliği	KA12
13	Kadın	22	Lisans	3. Sınıf	Ebelik	KA13
14	Erkek	22	Lisans	2. Sınıf	Siyaset Bilimi ve Kamu Yönetimi	KA14
15	Kadın	22	Lisans	3. Sınıf	Tıp	KA15
16	Kadın	22	Lisans	2. Sınıf	Antrenörlük	KA16
17	Kadın	21	Lisans	3. Sınıf	Sanat Tarihi	KA17
18	Erkek	20	Lisans	3. Sınıf	Fen Bilgisi Öğretmenliği	KA18
19	Kadın	21	Lisans	2. Sınıf	Halka İlişkiler ve Reklamcılık	KA19
20	Erkek	20	Lisans	2. Sınıf	İngilizce Öğretmenliği	KA20

KA=Katılımcı

Tablo 1’de görüldüğü üzere araştırmaya 20 adet lisans öğrencisinin katılım sağladığı görülmektedir. Veri toplama sürecinde öğrencilerin ders yoğunlukları, ders dışındaki sosyal yaşantıları göz önünde bulundurulmuş ve görüşmeye en uygun zamanları tercih edilmiştir. Araştırmacı tarafından verilerin tekrar etmeye başladığının saptanması ve 20 katılımcı ile doygunluğa ulaşıldığının görülmesiyle birlikte 20. katılımcıdan sonra veri toplama süreci sonlandırılmıştır. Her bir üniversite öğrencisinin eğitim alma amacının ilk olarak sorulduğu araştırmada “yorgunluk” cevabını vermesi sebebiyle konuya hâkim oldukları düşünülmüş ve ekstradan bir bilgi sunulmamıştır.

Görüşmelerin tamamlanmasıyla birlikte öğrencilerden elde edilen kayıtların analize uygun hale getirilmesi işlemine başlanmıştır. Veri analiz sürecinde katılımcılardan elde edilen veriler içerik analizi yöntemiyle ifade kalıplarına dönüştürülmüş olup, dönüştürülen ifadelerin belirli temalar altında toplanmasını sağlayacak alt temalar belirlenmiştir. Yıldırım ve Şimşek’in (2018) ifade ettiğine göre içerik analizi verilerin kodlanması, kodlanan verilere ait temaların bulunması, kodları ve temaların düzenlenmesi, bulguların tanımlanması, yorumlanması gibi süreçler veri analizi sürecinin zeminin oluşturmaktadır.

## Verilerin Analizi

Öğrencilerle yapılan online platform yorgunluğu konusundaki derinlemesine görüşmeler içerik analizi ile değerlendirilmiştir. Bu amaçla öncelikle öğrencilerle yapılan görüşme kayıtları deşifre edilmiş ve metne dönüştürülmüş, ardından elde edilen verilerdeki benzer ifade kalıpları bir araya getirilerek gruplandırılmış ve temalara dönüştürülmüştür. Aşağıda katılımcılara yöneltilen sorular yer almaktadır.



- 1) Covid-19 pandemi sürecini atlattığımız bu dönemlerde neler yaşadığımızdan biraz bahseder misiniz?
- 2) Öğrenim gördüğünüz üniversitedeki derslerden ve müfredatlardan biraz bahseder misiniz?
- 3) Bildiğiniz üzere birçok üniversite hibrit denilen karma eğitim sistemine devam etmektedir. Bu süreçte bazı dersler yüz yüze yapılırken bazı dersler ise çevrim içi bir şekilde yapılmaktadır. Bu konu hakkında olumlu ve olumsuz düşüncelerinizi öğrenebilir miyiz?
- 4) Covid-19 pandemi süreci neredeyse bitmiş durumda ve artık eski alışkanlıklarımıza dönmeye başlıyoruz. Fakat bu eğitim-öğretim süreçlerinde yapılan çevrim içi dersler ile ilgili görüşlerinizi öğrenebilir miyiz?
- 5) Uzaktan öğretim ile verilen dersler sosyal hayatınızı nasıl etkilemektedir? Bize bunlardan biraz bahseder misiniz?
- 6) Tamamen çevrim içi öğrenim görürken nasıldı, şimdi nasıl? Bize bunlardan biraz bahseder misiniz?
- 7) Çevrim içi eğitim-öğretim süreçlerinin sizlere sağladığı faydalar veya size verdiği zararlar hakkında bizlere nelere söylemek istersiniz?

### **BULGULAR**

Araştırmanın bu kısmında öğrencilerin online platform yorgunluğu ile ilgili tükenmişlik, boşvermişlik hissi, eğitim-öğretim sürecinin sağlıklı olmaması, başarı oranlarının gerçeği yansıtmaması gibi birçok bulgu elde edilmiş ve bu bölümde sunulmuştur.

#### **Katılımcıların Covid-19 Pandemi Süreci İle İlgili Görüşlerine İlişkin Bulgular**

Katılımcılara “Covid-19 pandemi sürecini atlattığımız bu dönemlerde neler yaşadığımızdan biraz bahseder misiniz?” sorusu yöneltilmiş olup, bazı katılımcıların verdikleri cevaplar aşağıya çıkarılmıştır. Verilen cevaplar Covid-19 sürecinin katılımcılar tarafından olumsuz algılandığını göstermektedir.

*Hepimiz için zor bir süreci eve ama atlatmayı başardık tabi tam atlatamasak da. Ekonomik ve manevi anlamda ailemizle birlikte çok sıkıntılı bir dönemden geçtik diyebiliriz. Aslında bizim için sağlığın ne kadar önemli olduğunun farkına varmış olduk. Çok sayıda kayıplar verdik bunun için çok üzgünüm tabi aşının daha erken bir zamanda gelmesini dilerdim (KA1).*

*Benim için çok yorucu bir süreçti. Üniversite sınavına hazırlanmak yeterince stresliyken bir de sağlık kaygısı eklenmişti. Hem kendi sağlığımı hem de ailemin sağlığını riske atmamak için sıkı tedbirler aldım. İkisini bir arada yürütmek benim için zorlu bir süreç oldu (KA5).*

*Pandemi sürecine gelirse eğer, açıkçası pandemi benim açımdan pek olumlu geçtiğini söyleyemem. Çünkü pandemi sürecinde pek çok zorlu şartlar altında geçirdik genel olarak, mesela gelen zamlar, dışarı çıkma yasağı, sağlık sorunları ve psikolojik olarak birçok insanı etkiledi. Yani sürekli dört duvar arasında kaldık ve bu kilo, hastalık (covid-19 hariç), psikolojik sorunları doğurmaya başladı. Bundan ötürü pek olumlu geçmediğini söyleyebilirim (KA11).*

#### **Katılımcıların Öğrenim Gördükleri Üniversitedeki Derslerine ve Müfredatlarına İlişkin Bulgular**

Katılımcılara “Öğrenim gördüğünüz üniversitedeki derslerden ve müfredatlardan biraz bahseder misiniz?” sorusu yöneltilmiş olup, bazı katılımcıların verdikleri cevaplar aşağıya çıkarılmıştır. Verilen cevaplar katılımcıların genellikle yoğun ders müfredatları ile uğraştıklarını göstermektedir.

*Bölümümüze tamamen Arapça hazırlık ile başladık yalnızca Arapça olması zorlarsa da sonrasında müfredat dersleri ve seçmeli dersler bize dünyaya daha geniş çerçeveden bakmamıza katkı sağladı. Bu dersler bizi ne kadar zorlarsa da hayat açısından bize çok fazla fayda sağlayacak (KA2).*

*4 yıllık eğitim sürecinde her dönemde (güz-bahar) tek tek 0-18 yaş arası dönemler işlenmektedir. Ek olarak sağlık alanına ilişkin olan dersler görülmektedir ( mikrobiyoloji farmakoloji) gibi. 2. Sınıftan itibaren olan uygulamalarına çıkılmaktadır. 2. Sınıftan itibaren sahalara çıkmamız ve er dönem farklı bir alanda satj yapma imkânlarımızın olması bizim için önemli ve kendimizi geliştirmek için bir fırsattır (KA4).*



Gördüğümüz alan derslerimiz tamamen gelecek odaklı. Bence bize yardım dokunan ve birbirleri ile bağlantılı dersler. Yetersiz bilgiye sahip olduğun bir ders varsa onunla bağlantılı başka bir derste de başarısız olmamız oldukça yüksek bir ihtimal. Bunun dışında seçtiğimiz bölümle tamamen alakasız ve gereksiz olduğunu düşündüğüm birkaç ders var bize katkısının olmayacağını düşündüğüm dersler. Bu dersler için ekstra zaman ve efor sarf etmek oldukça yorucu (KA7).

### **Katılımcıların Öğrenim Gördükleri Üniversitelerdeki Karma Eğitim Sürecine Yönelik Düşüncelerine İlişkin Bulgular**

Katılımcılara “Bildiğiniz üzere birçok üniversite hibrit denilen karma eğitime devam etmektedir. Bu süreçte bazı dersler yüz yüze yapılırken bazı dersler ise çevrim içi bir şekilde yapılmaktadır. Bu konu hakkında olumlu ve olumsuz düşüncelerinizi öğrenebilir miyiz?” sorusu yöneltilmiş olup, bazı katılımcıların verdikleri cevaplar aşağıya çıkarılmıştır.

Ben bu olay kadar gereksiz ve saçma bir şey görmedim. Resmen oyuncak ettiler bizi hatta ayrımcılık da yaptılar. Allah aşkına bu virüs bulaşacaksa eğer her türlü bulaşacak. Yok efendim hibrit sistemle sınıfların yoğunluğunu azaltacaklarmış. Misal ben Isparta’da yaşıyorum, sekiz dersimden sadece ikisi yüz yüze geriye kalan altısı online ben bu iki ders için ya hiç yoktan yere Yozgat’ta kalıp yurda iki gün için para vereceğim ya da sırf bu iki ders için her hafta Isparta ve Yozgat arası gel git yapacağım. Aşağı tükürsem sakal, yukarıya tükürsem bıyık. Ne anladım ben bu işten. Yani hibrit sistem sayesinde bu virüs bana bulaşmayacak mı? İki gün derse geliyorum bulaşan orda da bulaşır. Ya da sırf iki ders için yurtda o kadar insanla yaşıyorum. Ağzı ağıza e o zaman da bulaşacak (KA8).

Çevrimiçi derslerin olumsuz tarafı, güzel ama vize sınavlarının uygulanması zorluyor. Yani 3 quiz, 1 ödev tek bir vizeyi oluşturuyor. Bu da bizi psikolojik olarak etkiliyor. Yani 1 quizden iyi alıp diğerlerinden kötü alıyorsak bu bizi psikolojik olarak kötü etkiliyor. Bir diğer olumsuz tarafı ise 1 vize sınavının 1-2 ay sürmesi, her hafta, her gün aynı sınav psikolojisiyle ders çalışmak benim için çok zor oluyor. Bu da beni haliyle kötü etkiliyor. Çevrimiçi derslerin olumlu yanları ise hava şartları kötü olduğunda okula gidip gelmek zorunda kalmıyoruz. Hem de vakitten kazancımız oluyor. Çevrimiçi derslerin ders kaydı olduğu için tekrar tekrar dinleyebiliriz (KA13).

Benim okulumda bu sistemi uyguluyor fakat ben memnun değilim tüm derslerimin yüz yüze olmasını isterdim çünkü kendimi çevrim içi derste hiç sınıf ortamında hissetmiyorum ve derse katılımın az olduğunu düşünüyorum. Olumlu yanıyla bazen müsait olamıyoruz okula gidemeyecek şartlarda oluyoruz o zaman istediğimiz her yerde açıp dersi dinleyebiliyoruz (KA16).

Bence gayet mantıklı, çünkü alan derslerimi yüz yüze alırken seçmeli derslerimi online olarak alıyorum. Online derslerde sınıflar çok kalabalık oluyor zaten. Bu şekilde hem okulun yükünü hem otobüslerdeki sıklığı hemde yemekhanelerdeki kalabalığın önüne geçilmiş oldu (KA18).

Ashında bütün derslerin yüz yüze görülmesi taraftarıyım. Sınıf ortamında yapılan dersler, daha kalıcı ve daha sağlıklıdır. Sınıf arkadaşlarımla dersin hocası olan akademisyen ile iletişime geçerek göz teması kumral bir öğrenci için her zaman daha iyi olacaktır. Online dersler hakkında olumlu bir düşüncem yok. Online dersleri sevmiyorum. çünkü göz teması yok, bilgi alışverişi yeterli seviyede değil, yoklama alınır, ders dinlenilmez ve sınavlarda online olunca kopyada kaçınılmaz olmaktadır (KA9).

### **Katılımcıların Eğitim-Öğretim Süreçlerinde Covid-19 Sonrasındaki Uygulamalara Yönelik Düşüncelerine İlişkin Bulgular**

Katılımcılara “Covid-19 pandemi süreci neredeyse bitmiş durumda ve artık eski alışkanlıklarımıza dönmeye başlıyoruz. Fakat bu eğitim-öğretim süreçlerinde yapılan çevrim içi dersler ile ilgili görüşlerinizi öğrenebilir miyiz?” sorusu yöneltilmiş olup, bazı katılımcıların verdikleri cevaplar aşağıya çıkarılmıştır.

Vaka sayılarında ciddi bir düşüş söz konusu ve bu kadar aşılama da yapılmışken online olması uygun değil. Online olan derslerde hak etmeyenlerin hak etmediği puanlar aldığını düşünüyorum online olması dersin ciddiliğini okuduğumuzun ciddiliğini kaybettiriyor yüz yüze hem görerek hem dinleyerek sınıf ortamında alınan verim daha kaliteli olduğunu düşünüyorum. Online olduğu zaman ister istemezden dersten kopmak daha kolay oluyor telefondan girdiğimiz zaman bildirim gelince hemen ona bakıyoruz ve dersten kopuyoruz yerimizden kalkmadan dinlese de verimli olmadığını düşünüyorum (KA3).

Çevrimiçi derslerde sürekli ekrana bakmaktan gözlerimde ağrılar oluyor ve uyku bozukluğu yaşıyorum. Çevrimiçi olduğundan yatarak derslere girdiğimden dolayı vücudum hantal kalıyor ve uyumamak için direniyorum. Hocanın online dersi istediği zaman yapma imkanı olduğu için bazen çok geç bazen çok erken saatlerde yapıyorlar ve uyku düzenimizi tam anlamıyla bozuyor. Kafalarına göre ders koyduklarından bazen dersi unutabiliyorum. Hafta sonu kafamız derse yok diye odaklanmışken bazen hafta sonu ders koymaları mental olarak beni sarstıyor. Cuma günlerinden online derslerin namaza denk gelmesi sebebiyle ya koştur koştur derse girmek zorunda kalıyorum ya da dışarda giriyorum (KA6).

Malum çevrim içi derslere katılırken teknoloji ile iç içeyiz bu durum göz sağlığımızı çok etkiledi. Gözlerim çok etkileniyor, başım ağrıyor artık. Ve masada 2 saat belki 3 saat ders dinlemek omurga ağrılarımı arttırdı. Hocalarım içinde bu durum söz konusu (KA16).

Şuan 8 tane dersimden 5 tanesi çevrimiçi olarak yapılıyor. Derslere katılım gerçekleştiriyorum ve bana verilen ödev Forum gibi etkinlikleri yapıyorum fakat yüz yüze olarak aldığım 3 tane derslerim kadar verimli olmuyor. Çevrimiçi derste merak ettiğim veya takıldığım konularda yazılı olarak kendimi tam ifade edemiyorum. Yüz yüze yaptığımız derslerde ise kendimi ve dersle ilgili fikirlerimi sözlü olarak tam ve net olarak ifade edebiliyorum. Yüz yüze olan derslerin sınavlarına daha çok çalışıyorum, bu durum sadece bende değil neredeyse herkeste aynı durumda. Dersim yüz yüze olduğu zaman okula daha zinde bir şekilde gidiyorum ve sınıf ortamında daha verimli bir ders işliyoruz. Dersim çevrimiçi olduğu zaman ise alarm kurup derse kalkıyorum, uykulu bir şekilde derse giriş yapmak zorunda kalıyorum. Tam olarak kendimde olmadığım için dinlediğim dersten de net olarak Bir şey anlayamıyorum. Gün içinde yüzyüze dersim olursa kendimi ona göre ayarlıyorum fakat çevrimiçi dersim olursa her zaman bu şekilde değil ama bazen dersi kendime uydurmaya çalışıyorum ve bu durum beni ve aldığım eğitimi olumsuz yönde etkiliyor. Online derslerin yoklamasını bile unutuyorum bu bir tek bende mi oluyor yoksa tüm öğrencilerde mi bilmiyorum ama neredeyse tüm alışkanlıklarımızı unuttur olduk (KA14).

### **Katılımcıların Derslerini Uzaktan Öğretim Yöntemiyle Görmesinin Sosyal Hayatı Üzerindeki Etkisine İlişkin Bulgular**

Katılımcılara “Uzaktan öğretim ile verilen dersler sosyal hayatınızı nasıl etkilemektedir? Bize bunlardan biraz bahseder misiniz?” sorusu yöneltilmiş olup, bazı katılımcıların verdikleri cevaplar aşağıya çıkarılmıştır.

Böyle durumlar kesinlikle benim hayatımda oldu. Dediğim gibi zorlu bir süreçten geçtik ve sosyal ortamlardan uzak kalmak zorunda kaldık bu yüzden online dersler artık gözümü ağır gelmeye başladı. Sosyal yorgunluğum okulların yüz yüze eğitime geçmesiyle biraz azaldı ama bu pandemi süreci hayatımda büyük bir leke oldu artık eskisi gibi hissetmiyorum her an okullar online eğitime geçecek diye şüphelerim hala var (KA20).

Evet sosyal bir yorgunluk oldu. Uzaktan öğretim insanı yalnızlaştırıyor. Daha çok içe kapanık olmaya sebep oluyor. Her dersten en az yedi, beş ve üç etkinlik yaptı hocalar bu etkinler kısa sınavlar, ödevler ve forumlar hep zamanımın çoğu bunları yapmakla geçti. İnsan ailesiyle, arkadaşlarıyla, sevdikleriyle zaman geçirmek istiyor (KA19).

Bir önceki cevap da söylediğim gibi bende daha çok sosyal ortam korkusu oluştu. Çünkü okul içerisinde ve dışarısında çoğu kişinin umursamaz ve sorumsuz davranışlarını görmek hala hasta insanların olabileceği düşüncesi geliyor aklıma bu yüzden yalnız kalmak bu süreçte bana daha mantıklı bir davranış gibi geliyor bana. Uzaktan eğitimin sosyal hayatımıza zararı da faydası da olmadı (KA12).

Pandemi sürecinde hep evde kaldığımız için serbest zamanlarda dışarı çıkmak çok zorluyordu beni. Çoğu zaman serbest sıralarda bile evdeydim. Herhangi bir yerde kalabalık görsem içim sıkışıyordu. Pandemi öncesi çok fazla sosyal aktivitelerim vardı. Örneğin; halk oyunlarına, korolara katılıyordum ve arkadaşlarımla geziyordum. Pandemi sosyal hayatımı olumsuz etkiledi, beni asosyal olmaya itti (KA5).

### **Katılımcıların Covid-19 Pandemi Dönemindeki Eğitim Süreçleri İle Karma Eğitim Süreçleri Arasındaki Farklara Yönelik Düşüncelerine İlişkin Bulgular**

Katılımcılara “Tamamen çevrim içi öğrenim görürken nasıldı, şimdi nasıl? Bize bunlardan biraz bahseder misiniz?” sorusu yöneltilmiş olup, bazı katılımcıların verdikleri cevaplar aşağıya çıkarılmıştır.

*Tabii ki motivasyon olarak ve duygusal olarak tamamen zorlu bir süreçti. Dışarıya çıktığımızda insanlarla sohbet etmek iletişime geçmek en azından bizi daha mutlu ediyordu şimdi tek başına veya sadece telefonla, bilgisayarla vakit geçirmek insanı monotonlaştırıyor ve duygusuz hale getiriyor. Eğitim ortamı aslında çok önemlidir ailemizin yanındaydık ve birer ev ortamındaydık bu ders çalışmamıza yahut kendimizi bir şeylere vermemize pek de olanak sağlamadı hatta hiç sağlamadı. Herkesin evde bazı sorumlulukları vardı ve online derslerde fazlaca sınav yapıldı ve ödevler verildi bu da tüm öğrencileri yeterince yordu ve derslere karşı belli bir soğukluk oluştu. Yüz yüze derslerimiz de daha verimli geçerken online derslerimiz verimsiz bir şekilde ilerledi. Online eğitim öğrenmeye dair içimizde heves bırakmadılar (KA2).*

*Tamamen çevrimiçi olduğunda eğitimden yeterli miktarda verim alabiliyor muyum? endişesi yaşamaktayım. Bu da elbette ki motivasyonu düşürmektedir. Şimdi ki eğitim sistemi ise bizler için daha iyi hem derslerden verim alabiliyoruz hem alan uygulamalarımızı gereken şekilde yerine getirebilmekteyiz. Böylece motivasyonumuzda artmakta duygusal olarak da rahatlamaktayız (KA4).*

*Motivasyonel açıdan yorgunluklarım oluyor. Çevrimiçi ders görürken sabah erken saatte de olsa uyuma imkânım oluyor ve uyandığımda ders kaydını daha dikkatli ve anlayışlı bir şekilde dinleyebiliyorum. Fakat şimdi ise sabah erken saatlerde olan derslerime zorla uyanıyorum ve uykulu bir şekilde katılım sağlıyorum. Kendime derse adapte edemediğim için hiçbir şekilde motive olamıyorum ve yararlı bir ders geçiremiyorum. Duygusal açıdan herhangi bir sıkıntı yaşadığımı düşünmüyorum. Ama motivasyonel olarak hiç mutlu değilim. Sınavlara çalışırken bile çevrimiçiye daha verimli çalışma imkanı oluyorken şimdi öyle imkan bulduğumu söyleyemem. Galiba duygusal olarak etkilenmedim dedim ama şuan düşündüğüm de etkilendiğim farkına vardım. Sınavlarımın şu anki eğitim zamanında kötü geçmesi beni üzüyor ve bu üzülmemin sonucunda o üzüntü duygum diğer sınavlarıma da yansıyor (KA6).*

*Genel olarak çevrim içi dersler döneminde ve yüz yüze dersler dönemindeki duygusal yorgunluğun pek bir farkı yok. Pandemi sürecinde de sınavlarım oluyordu yüz yüze dönemde de sınavlarım oluyor. Pandemi sürecinde de arka arkaya birkaç saat ders işlediğim oluyordu yüz yüze dönemde de oluyor. Fakat ikisini karşılaştırdığım zaman online (çevrim içi) dönemde daha fazla yorgunluğum oluyordu. Çünkü sürekli ödevler, sınavlar, etkinlikler veriliyordu. Hocalarımız sanki bizim sürekli boş olduğumuzu düşünüyordu. Halbuki fazlasıyla dersimiz var ve her bir hocanın sisteme yükledikleri etkinlikleri düşününce yetiştirme telaşı, sınavların çakışması gibi sorunlar bizi mental olarak düşürüyordu. Bu ödevlerin yanı sıra aile evinde kaldığımız için farklı problemler de yaşıyorduk. Bu nedenle duygusal olarak ekstra kötü zamanlarımda oldu. Normal hayatımdaki duygusal yorgunluğum algıda seçicilik oluştuğu için beni zorladı. Bazı cümleleri anlamakta ve analiz etmekte güçlük çektim. Bu yetersiz hissetmemde büyük rol oynadı. Eminim benim gibi çoğu kişi aynı sorunları yaşamıştır. Şimdiyi düşündüğümde online eğitim zamanına göre daha az etkinlik oluyor. Hocalarımızla iletişim konusunda kendimizi yüz yüze daha iyi ifade edebiliyoruz, anlatabiliyoruz ve onlarda kısmen anlayış gösteriyor. Arkadaşlarımızla bir araya gelip sorunlara çözüm üretebiliyorum ve bu da beni olumlu yönde etkiliyor (KA10).*

### **Katılımcıların Genel Olarak Çevrimi İçi Eğitim-Öğretim Süreçlerine Yönelik Düşüncelerine İlişkin Bulgular**

*Katılımcılara “Çevrim içi eğitim-öğretim süreçlerinin sizlere sağladığı faydalar veya size verdiği zararlar hakkında bizlere nelere söylemek istersiniz?” sorusu yöneltilmiş olup, bazı katılımcıların verdikleri cevaplar aşağıya çıkarılmıştır.*

*Faydalarını şu şekilde sıralayabilirim; dersi istediğim zaman daha sonra tekrar dinleyebiliyordum, yoklama sıkıntısı olmuyordu ve fiziksel olarak hiç yorulmuyordum pandeminin başlarında fiziksel olarak hiç yorulmadığım için online eğitimi sevsem de biraz zaman geçtikten sonra anladım ki hiç iyi değilmiş. Zararları ise asla verimli geçmiyordu geç saatlerde dersler oluyordu rahat soru soramıyordum ve bazı derslerimiz mesela anatomi gibi maket üzerinde yüz yüze gerçekleşerek pekiştirmemiz gerekirken, maketlerimiz okulda olduğu için anlamakta zorlanıyordum ve o derslerden geçmiş olsam da o dersler benim için pek verimli olmadı (KA15).*

*Biz ilk başta pandemi sürecinde aldığımız çevrimiçi sınavlardan dolayı asosyal olduk. Dışarı çıkmaktan, insanlarla bir araya gelip konuşmaktan çekinir olduk. Covid-19 virüsü bize bulaşır mı diye korkar olduk. Hatta konuşma şeklim bile değişti. Dersler konusunda bize sağladığı zararlar ise; sürekli ödev*

ve sınav yaptığımız için ders çalışmaktan sıkıldık. Bazen bölümümden soğuduğum da oldu. Çevrimiçi eğitim-öğretimin bizlere sağladığı faydalar ise; okula gidip yorgunluğumuz olmuyordu ve derslerin tekrar tekrar dinleniyor olmasıydı. Bir diğeri ise bir sürü online eğitici kursların olması ve sertifika alınan kursların açılması gitmeden sertifika alabiliyor olmam güzel yanlarındandı (KA13).

Çevrimiçi eğitim öğretimin yararı yapılan ödevlerde kullandığımız bilgisayar programlarına daha iyi hakim oldum. Derslerde sunum yapma tecrübesi elde ettim. Zararları ise çok fazla ekran başında durmak göz yorgunluğu baş ağrısı sürekli oturmaktan bel ağrıları yaşamıştım. Sonuç olarak tamamen çevrimiçi eğitimin her ne kadar yararları ve zararları olsa da bizler için bir tecrübe olmuştur (KA4).

Faydaları pek olduğunu sanmıyorum. Zararları ise zaman zaman üşengeçlik halsizlik gibi kolayca kaçma durumları oldu. Bu da derslerimde veya işlerimde pek çok olumsuz etki bıraktı (KA11).

Faydası şu şekildeydi; bir aile ortamındayken rahatlıkla derslere katılabiliyordum ve gerçekten sınavlardan kolaylıkla geçebiliyordum. Aslında bu yanlış oldu çünkü şuan bile online derslerim iyi yüz yüze derslerim kötü olsa pandemi sürecinde kopyayla geçtim derdim ama yoklamadan dolayı böyle söyledim. Şimdi ise derse katılım sağlama zorunluluğu var. Zararı ise rahata alışıp yüz yüze ders görmeye fazla isteğimin olmaması (KA1).

### TARTIŞMA VE SONUÇ

Bu araştırma Covid-19 pandemi dönemi sonrasında üniversitelerde alınan kararlarla eğitim süreçlerinin karma bir şekilde yürütülmesinin öğrenciler üzerindeki etkisini/etkilerini belirlemek amacıyla yapılmıştır. Bilindiği üzere Covid-19 pandemi sürecinde eğitim-öğretim tamamıyla çevrimiçi uygulamalarla gerçekleştirilmiştir. Sadece tıp fakültesi ve bazı sağlık programlarında önemli uygulamalar olduğuna ilişkin getirilen kanaat onların yüz yüze eğitime devam etmesi gerektiği yönünde olmuştur. Genel olarak bakıldığında ise Covid-19 pandemi dönemi sonrasında ise eğitim-öğretim süreçleri, öğrencilere karma bir şekilde sunulmuştur. Bir devlet üniversitesinde öğrenim gören öğrencilerin katılımıyla gerçekleşen bu çalışmada, öğrencilerin eğitimden aldıkları verim, memnuniyet, öğrenim görülen okula karşı güven ve birçok algı derinlemesine ölçülmeye çalışılmıştır.

Literatür incelendiğinde doğrudan bu süreçlere ilişkin bir çalışmaya rastlanılmamış olup sadece pandemi döneminde çevrimiçi uygulamaların gerçekleştiği paket programlar üzerinden bireylerin eğitim-öğretim süreçleri, toplantılar ve benzeri uygulamalarla ilgili çalışmaların yapıldığı görülmektedir (Akduman vd, 2021; Massner, 2021; Toney vd., 2021; Ateş ve Kanık, 2022). Ayrıca Serbest ve arkadaşları (2023) tarafından üniversite ortamında dijital eğitim ortamını değerlendirmek açısından bir ölçek uyarlama çalışması yapılmış olup, bu araştırma ile benzer şekilde olduğunu söylemek mümkündür. Bu durum araştırmanın özgün değerini ortaya koymakta olup literatürdeki bilgi birikimine katkı sağlayacağı öngörülmektedir. Üniversite öğrencilerinde online platform yorgunluğunun, kamu otoritesi tarafından alınan eğitim-öğretim süreçleri kararlarının daha hassas bir şekilde gözden geçirilmesi gerektiği anlaşılmaktadır. Kararlar alınırken toplumun büyük bir kesiminin memnun edecek kararların alınması önemli olup zorunlu haller dışında eğitim-öğretim süreçlerinin online olmaması performansın, başarının ve sürdürülebilirliğin artması noktasında önemli görülmektedir.

Yapılan bu çalışmanın sadece Yozgat Bozok Üniversitesi öğrencileriyle sınırlı olması, araştırmanın en büyük kısıtını oluşturmaktadır. Her ne kadar birçok üniversitede çeşitli bölümlerde öğrenim gören öğrenciler bu çalışmaya dâhil edilmemiş olmasa da Yozgat Bozok Üniversitesi özelinde yapılmış olması literatüre katkı noktasında önemli görülmektedir. Ayrıca daha önce hiç yaşanmamış bir olay olan Covid-19 pandemi süreci sonrasında yapılması da salgının etkilerinin eğitim sürecine etkileri açısından değerlidir. Araştırmada ele alınan online platform yorgunluğu kavramının net olarak etkilerinin ortaya konulabilmesi için farklı üniversitelerden öğrencilerin örneklem olarak ele alınması gelecekte yapılacak çalışmalar için araştırmacılara önerilmektedir. Gelecekte yapılacak benzer çalışmalarda ise nicel araştırmaların benimsenmesi, karma araştırmaların yapılması ve online platform yorgunluğunun sonrasında ortaya çıkan öğrencinin başarı durumu, motivasyonu, kararlarındaki değişiklikler ve benzeri durumların incelenmesinin literatürdeki bilgi birikimine katkı sağlayacağı düşünülmektedir.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## ADVANCEMENTS IN SENTIMENT ANALYSIS FOR E-COMMERCE: A COMPARATIVE STUDY OF BERT, CONV-BERT, AND ELECTRA MODELS USING VIVENSE CUSTOMER REVIEWS

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### ABSTRACT

In the dynamic world of e-commerce, as the market continues to grow, the volume of customer comments grows significantly. Customer comments are of immense importance to potential customers, as they can either increase or decrease the perceived value of a product or service. Consequently, it is crucial for companies that want to increase customer satisfaction while optimizing their offerings to accurately understand and categorize the emotions expressed in these comments. This study aims to analyze the emotions expressed in customer comments on the Vivense e-commerce platform by using natural language processing (NLP) models, specifically Bidirectional Encoder Representations from Transformers (BERT), Convolutional Bidirectional Encoder Representations from Transformers (Conv-BERT) and Electra. To achieve this goal, a dataset was carefully curated consisting of 12.000 customer comments from the e-commerce platform of Vivense, categorized as either positive (for acceptance) or negative (for rejection) emotions. The performance of the developed models has been evaluated using key metrics such as Accuracy, Precision, Recall and F1 score. The results show that BERT model outperforms the Electra and Conv-BERT models in terms of performance.

**Keywords:** Sentiment Analysis, Customer Reviews, Machine Learning, Natural Language Processing

### INTRODUCTION

With the advent of the digital age, the field of e-commerce has undergone a fundamental transformation. The simplicity of online shopping, coupled with a wealth of options, has made the customer experience a critical factor in the success of e-commerce businesses. In this digital marketplace, where products and services are just a click away, the feedback and feelings expressed by customers in their reviews and comments have taken on great importance.

Sentiment analysis, an invaluable component of natural language processing (NLP), is a captivating field that deals with these user-generated comments. Sentiment analysis, also known as opinion analysis, is the art of extracting and understanding the emotions, opinions, and attitudes conveyed by customers through their words. At its core, sentiment analysis is about answering essential questions: what do customers really think about a product, service or shopping experience? Are they satisfied or



dissatisfied? What aspects do they value and where do they encounter problems? By getting to the bottom of these questions, e-commerce companies can gain deep insights into customer satisfaction and, more importantly, uncover actionable information to improve their offerings. In this era where data is abundant, sentiment analysis in e-commerce goes beyond mere feedback analysis. It enables companies to refine their strategies, improve customer relationships, and tailor their products and services to the ever-changing needs and desires of their clientele.

This study aims to analyze emotions on the Vivense e-commerce platform using NLP methods. For this purpose, models were developed using BERT, Conv- BERT and Electra. The performance of the developed models was evaluated using the error metrics Accuracy, Precision, Recall and F1 score.

This paper is organized as follows: Section 2 presents related literature. The materials, methodology and details of the forecast models are presented in Section 3. Results and discussion are presented in Section 4. Section 5 concludes the paper.

### **LITERATURE REVIEW**

In recent years, many methods have been used for sentiment analysis. (Yu Wen et al., 2023) proposed a combination of BERT and the Enhanced Representation through Knowledge Integration (ERNIE) model for sentiment analysis of hotel reviews. BERT layer served as a word vector layer, transforming input text sequences into vectors. The output vectors were then classified using a Softmax Activation Function through a corresponding neural network. Interestingly, ERNIE outperformed BERT in this study. (Saman Iftikhar et al., 2023) focused on classifying Amazon product reviews using a variety of techniques, including machine learning, deep learning, and BERT. They extracted features from text using methods like Term Frequency-Inverse Document Frequency, Bag of Words, Global Vectors, and Word2Vec. Their experimental results highlighted BERT as the top-performing model, achieving an impressive 90% accuracy in one scenario. (Huang Huang et al., 2023) conducted a systematic review of sentiment analysis methods on e-commerce platforms, identifying a growing trend in both machine learning and deep learning techniques being employed for this purpose. (Mala J. B. et al., 2023) explored sentiment analysis in IMDB movie reviews using transformer models like BERT, Transformer XL, and Electra. Electra emerged as the most accurate model with a score of 93.32%. (Hong Fang et al., 2022) introduced a Chinese BERT model with fused neural networks, tailored for e-commerce product reviews. The experimental results demonstrated its high performance. (Laleh Dvoodi and Jozsef Mezei, 2022) conducted a comparative analysis of transformer-based methods using customer reviews from the Trustpilot platform, revealing the superior performance of transformer models with over 98% accuracy. (Hendri Murfi, Syamsyuriani et al., 2022) presented a hybrid deep learning method using BERT for Indonesian sentiment analysis. The results showed that BERT increased Accuracy of hybrid architectures. (Mahmud Hasan Munna et al., 2020) proposed deep learning models for Product Review Classification (PRC) and sentiment analysis, achieving notable accuracies of 0.84 and 0.69, respectively. (Yi Liu et al., 2020) introduced Bert-BiGRU-Softmax, a model combining BERT and other mechanisms for multidimensional product feature extraction from e-commerce reviews, achieving accuracy levels exceeding 95.5%. (Song Xie et al., 2020) devised a Chinese e-commerce sentiment analysis method based on BERT, employing a BIO logic labeling scheme for dataset annotation. Their method significantly improved accuracy and F1-score metrics.

### **METHODOLOGY**

The methodology for this study involved a systematic approach to preparing and expanding the dataset obtained from the Vivense e-commerce platform to ensure its suitability for sentiment analysis. Below is a step-by-step breakdown of the methodology:

1. Data Collection: The original dataset was obtained from the Vivense e-commerce platform and consisted of a large number of customer reviews.
2. Preprocessing of data: A stratified sampling method was used to eliminate data imbalances and ensure a balanced dataset. The result was a curated dataset of 12.000 reviews.
3. Text cleaning: During the pre-processing phase of the data, various text cleaning techniques were applied to improve data quality. These included:
  - Removal of unnecessary characters and special characters from the text.
  - Elimination of URLs and web addresses that do not contribute to sentiment analysis.
  - Removal of numeric values, as they are generally not relevant to sentiment assessment.
4. Tokenization: The cleaned text data was processed using the WordPiece tokenization method. This approach is particularly suitable for words that are not included in a standard dictionary and ensures a more accurate text representation.
5. Data Augmentation: Data augmentation techniques were used to improve the robustness of the dataset and the generalization of the model. Two key techniques were used:
  - Synonym replacement: Certain words in the reviews were replaced with synonyms to diversify the dataset while maintaining the original sentiment. This allows the model to learn from different word choices.
  - Retranslation: The text was translated into another language and then back translated into the original language. This process introduced linguistic variations and helped generate new but contextually relevant text examples.

With this comprehensive methodology, the dataset was carefully prepared to ensure a balanced, clean, and expanded dataset for sentiment analysis. These steps aimed to optimize the dataset for training and testing machine learning or deep learning models to ultimately improve the accuracy and reliability of sentiment predictions for Vivense e-commerce platform reviews.

### 1. BERT

Among contemporary language modeling architectures, BERT stands out as one of the most renowned and widely adopted. Its exceptional generalization capability enables it to flexibly adapt to various downstream tasks, ranging from Named Entity Recognition (NER) and relation extraction to question answering and sentiment analysis. The essence of BERT's architecture lies in its pre-training on vast text corpora, leading to the freezing of parameters in the innermost layers. Conversely, the outermost layers are the ones subjected to task-specific adaptation, a process commonly referred to as fine-tuning (Marco Pota et al., 2020).

### 2. Conv-BERT

Expanding upon the BERT framework, Conv-BERT incorporates convolutional layers designed to adeptly capture local text features. In a manner akin to BERT, this model employs an initialization and fine-tuning strategy. Notably, Conv-BERT goes a step further by optimizing additional hyperparameters specific to the convolutional layers through an exhaustive grid search process.

### 3. ELECTRA

While BERT and its variants have demonstrated exceptional performance on downstream NLP tasks, their effectiveness comes at the cost of substantial computational resources. This resource-intensive nature is primarily due to their reliance on masked language models (MLM), which randomly mask a limited number of words during training and predict only a small fraction of the tokens. Furthermore, because of the arbitrary selection of masked tokens, these models may struggle to capture a wide range of meaningful tokens, including emotional and opinion words crucial for sentiment analysis tasks. As an alternative approach, Electra presents a more efficient pre-training task designed to address these limitations. In light of its efficiency and the potential to compensate for these shortcomings, we

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

introduce Electra as a sentiment classification model for attraction reviews, aiming to achieve enhanced classification performance in sentiment analysis tasks (Hui Fang et al., 2022).

## RESULTS AND DISCUSSION

The performance of the developed models has been evaluated using Accuracy, F1-score, Precision, Recall. The results obtained with the developed models are shown in Table 1.

*Table 1. The results obtained with the developed models.*

Method	Accuracy	F1-score	Precision	Recall
BERT	0.9432	0.9415	0.9235	0.9602
ELECTRA	0.9162	0.9136	0.8962	0.9318
Conv-BERT	0.9203	0.9173	0.9058	0.9290

- The results demonstrate that BERT achieved the highest accuracy of 94.32%, surpassing both ELECTRA (91.62%) and Conv-BERT (92.03%). This indicates that BERT exhibits superior overall performance in sentiment analysis.

- Consistency in F1-score follows a similar pattern, with BERT (0.9415) leading, followed by ELECTRA (0.9136) and Conv-BERT (0.9173). The higher F1 scores suggest that BERT maintains a balance between precision and recall in sentiment classification.

- In terms of precision, BERT (0.9235) still maintains the highest value, indicating its capability to accurately identify positive and negative sentiments in reviews. ELECTRA (0.8962) and Conv-BERT (0.9058) exhibit slightly lower precision values.

- BERT's recall score (0.9602) signifies its effectiveness in capturing a higher proportion of actual positive and negative sentiments within the reviews. ELECTRA (0.9318) and Conv-BERT (0.9290) also perform well but fall slightly behind BERT in this aspect.

## CONCLUSION

In today's business world, e-commerce has become a predominant and highly demanded form of commerce, characterized by immense demand and high turnover. Careful analysis of customer reviews in the field of e-commerce platforms is of great importance and benefits both consumers and sellers. This research project was conducted with the primary objective of studying reviews on the Vivense e-commerce platform. To achieve this, advanced machine learning models were developed, specifically leveraging the capabilities of BERT, Electra, and Conv-BERT in conjunction with a robust dataset of 12,000 reviews. The performance of developed models was evaluated using Accuracy, Precision, Recall, and F1-score. The empirical results of this comprehensive analysis clearly highlight the superior performance of the BERT model on all major assessment metrics, including Accuracy, Precision, Recall, and the F1 score. These results underscore the effectiveness of BERT in extracting valuable insights from e-commerce reviews on the Vivense platform, improving our understanding of sentiment and user experiences in this dynamic digital marketplace.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## TRADITIONAL BREAKFASTS AROUND THE WORLD: REASONS WHY THEY LOOK THE WAY THEY DO

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### ABSTRACT

The purpose of this paper is to look at several examples of traditional breakfasts in various cultures, and to look in history for explanations regarding why certain cultures eat more or less for breakfast. For some cultures, breakfast can be considered the most important meal of the day, since it is meant to be a main meal. The English breakfast is a very hearty meal, which includes cooked food, comparable to the way lunch is considered, traditionally, in Romanian culture, the main meal of the day. A long time ago, hundreds of years away in the past, the British had a simple breakfast, and they only had two meals every day. Social classes and their practices have also influenced the way breakfast looked like. Thus, afterwards, we can find the hearty English breakfast as a means of rich classes to display their social status on important events in someone's life, in the 1700s. Later on, working class members needed to eat well for breakfast since they had to work hard for the day, in the 1800s. A complete, rich English breakfast is now served in restaurants and at hotels in Great Britain. Romanian breakfast also included cooked food and it also is quite a hearty meal traditionally: it included eggs, cooked under many forms, together with bread, cheese, ham, as well as tomatoes since vegetables were around in rural areas' gardens. In rural areas, going to work in the field required a good meal before for endurance. The French breakfast is not considered, even traditionally, the most important meal of the day. In time, for Romanian culture, dinner has become the most important meal of the day. French breakfast only consists, contrary to stereotypical expectations, of croissants during weekends, while otherwise it consists of tartines (toast with something spread on), pastry products, making French breakfast different due to the carbs content, a hot drink and fruit juice. Naturally, nowadays, function of lifestyle, we have all moved away from traditional breakfasts, and only have coffee early in the morning, while conditions allow us to get some pastry products while on our way to work or during breaks. Street food has changed many of our habits, making us differ from the traditional lifestyle. What is more, the presence in supermarkets of cooked food, delivery services, cafes and restaurants serving food often offer us the opportunity to eat out. Traditional breakfasts can be mostly had while on holidays, as hotels pride themselves with the local and specific breakfasts and foods.

**Keywords:** traditions, contemporary times, eating out, delivery services.

### INTRODUCTION

While the world is changing, so do our living conditions, our workplace, and, last but not least, our food. It is not just that our source of food is different than in the past, due to the appearance of supermarkets, delivery services, street food, which did not exist in the past, when everyone would rely on their own harvest and food production. Our habits of eating, the timing and the content of our meals has changed. While, in the past, families would often gather around cooked meals at home, and also spend time together, nowadays we may prefer to eat out, or to eat each other separately while on our way to work and to school.

Our access to traditional breakfasts can be ensured while we are tourists, and are given such meals at the hotel, or at various restaurants where we may stop for it, or even in cafes.

In some cultures, we are told by nutritionists that breakfast is the most important meal of the day (Spence, 2017), since, as we start our daily activity, we may need all the energy we can use. Lunch may



be pushes further on during the day, and not even be a consistent meal, with the current lifestyle we have. At work, we may rely on supermarket food or food from delivery services. The same could be said in the case of schools, especially if they do not provide lunch and have an eating hall, as it is often the case in Romania, where the author of the present paper lives. The same can be said about Romanian universities, where it depends if the students are from other cities, as then their meals may be provided by the canteen services.

We can start by looking at examples of breakfasts from some cultures in order to see how they have changed in time, as well as to see what specific foods they have, function of their availability in their area and local traditions. Additionally, a history of breakfast starting from ancient times could be the starting point to see how various living conditions and circumstances have led to breakfast consisting of certain foods and not others.

### **MATERIALS AND METHODS**

In the past, in some cultures such as the British culture, and for the working classes, breakfast was a hearty meal, very much like traditional Romanian breakfast, which included cooked food, consisting of eggs, ham, vegetables, toast, as, in the latter case, people in rural areas would go to do physical work in the fields and needed strength and energy. According to British Council (2023), the traditional British breakfast consisting of sausages, fried mushrooms, baked beans, fried tomatoes, bacon, hash browns, toast, and it can be considered by foreigners as a heavy meal. It is a hearty meal, according to British Council (2023), since in the 1800s, members of the working classes needed energy for the day at work. Before, breakfast was a simple meal, hundreds of years ago, including bread with cold fat from meat, or with cheese. Afterwards, in the 1700s, members of the upper class took the opportunity to show off their status at various occasions in society by giving a rich breakfast.

Usually, any practice, such as eating breakfast and other meals during the day, is adapted to the needs of the members of the respective culture at the respective historical time, thus taking into consideration their lifestyle and the living conditions, as well as the availability of food in a certain form.

In some cases, as when it comes to Turkish traditional breakfast, various regions, as they have their specific foods that are available easily to them, will have different foods for breakfast (Özden, 2020). According to Özden (2020), Eastern Anatolia is, for example, well-known for its dairy products, which makes their breakfast to contain cheese, yoghurt, as well as grain-based dishes. Mid-Anatolia is famous for its flour-based foods, which include bread and a specific pancake. Corn flour is characteristic of the Black Sea area. A common Turkish breakfast relies, however, traditionally on cheese, meat products, raw vegetables, tea, bread, and others.

Similarly, Romanian culture has variations according to regions with respect to the traditional breakfast, yet among the common elements we find eggs, cheese, bread, zacusca, ham, vegetables (TheWorldinMyPocket.co.uk, 2023). What is more, cultures can influence one another with respect to breakfast, e.g. Romanian breakfast is under influences such as “Slavic, Greek, Hungarian, and Turkish” (Tedesco, 2020).

By looking at traditional breakfasts based on continents, we may find that there is no one common breakfast, but that breakfast varies according to country and area. Wikipedia (2023) provides a very good overview for those curious to visit different countries on different continents for specific breakfasts to different continents and to their different countries. We can have a very good synthesis through reading this article about the traditional breakfasts and the actual contemporary food habits of people from all over the world.

Thus, on the African continent, breakfast varies from one country to another. In Algeria, we notice the influence of France from the time it was their colony. Thus, coffee with milk and pastry product are common breakfast food. To these, they can add a bread filled with date or jam, which is a traditional local food. In Egypt, they have a light breakfast, including a local dish of cooked fava beans, with salt and cuminte as seasonings, and accompanied by vegetables. In Egypt we notice the common presence of pita bread and pastirma which is eaten with fried eggs, which are foods they have in common with Turkish culture. This is due to the fact that these are Middle Eastern influenced cultures. In Malawi, breakfast includes porridge, a common breakfast food in Western cultures as well nowadays. They also



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

have cornbread and boiled vegetables. In Morocco, breakfast includes bread, harcha (a local type of cake), and local pancakes. In Nigeria, due to the presence of more than 250 ethnic groups, we expect variety of foods. Cakes made from ground beans and wheat flour represent a typical breakfast. They can be eaten together with porridge. A porridge made of corn is the usual breakfast of the Southwestern Yoruba population. As we can notice, the crops and vegetables that grow in the area are used for breakfast, together with other available resources from animals around the house, such as eggs. In Senegal, they drink a local spiced coffee with sugar or dried milk, called Touba, or a local tea, kinkeliba. Fruits that are available locally are also eaten for breakfast, such as mangoes and bananas. They can also eat baguette spread with Nutella. In Somalia, they have tea and pancake-like breads with honey or beef jerky, which can be eaten with soups as well. In Tunisia, they have breakfast stew. In Uganda, they have porridge and a dish made from green bananas cooked with a sauce. To this they can add tea or juice.

If we look at Asian countries, once again we can see variety in breakfast traditions. At the same time, we can see the influence of Western culture, as the Japanese have a Western version of breakfast, based on the American type of breakfast, such as corn flakes, milk, hot chocolate, fruit juice, toast with a spread of butter or jam, vegetables, or eggs. Coffee and orange juice is also included in Japanese Western-style breakfast. As for traditional Japanese breakfast, it is often had on weekends, and on days that the Japanese do not work, likely since it is complex and takes a longer time to eat and prepare. Steamed white rice, miso soup, pickles, raw egg and nori (the latter of which are dried seaweed under the form of sheets) around which rice is wrapped, grilled fish and green tea are among the specific Japanese breakfast food items. Rice, soup, steamed eggs, porridge, kimchi, and tofu are among the traditional Korean breakfast foods. In China, we also encounter variation by province. Yet, a general preference is shown towards pancakes, which can be sweet or salty, soup, bread sticks that are deep fried, doughnuts, buns, porridge, noodles that are fried or soup-based, with tea, or soybean milk that has been sweetened as drinks. Tea types and spices that can be had with them vary from province to province. Malaysia and Singapore host a wide variety of populations and races, which, as expected, leads to great variety. Traditional breakfast for Malaysia and Singapore includes foods such as dishes with coconut rice, cucumbers, eggs, fried chicken, roasted peanuts and fried anchovies. What is more, they can have for breakfast a type of Indian flatbread, milk with black tea, bread with coconut milk jam, half-boiled eggs. Toast can be dipped into eggs mixed with a sauce of soya and pepper. Coconut rice with pickled vegetables, or herbs, rice noodles with spicy broth, fishball noodles, fried rice vermicelli and a variety of local small, savoury in taste, pancakes. For Bangladesh, a popular tourist attraction, traditional breakfast staples are flour-based flatbreads, that are eaten together with curry that is made of vegetables, fried potatoes, or scrambled eggs. For Bangladesh, income is the keyword to the way breakfast looks. Additionally, function of area, breakfast differs. Thus, in villages, labourers have, usually, rice and cury. City-dwellers have a slice of bread with spread jam or jelly, due to convenience reasons, since it a breakfast that is fast and easy to prepare and eat. Bangladesh culture members prefer tea instead of coffee with their breakfast. Toasted biscuits and puffed rice served with tea are common. The Philippines have, as breakfast staples, fried eggs, dried fish, fried rice, and they use garlic as seasoning, or a type of local bread spread with cheese, jam, or peanut butter if an uncooked breakfast is considered as saving time and as more convenient. Taiwan breakfast staples include a high use of carbohydrates and protein, e.g. soy milk, rice milk, scallion pancake, eel noodles, milkfish congee, tube ride pudding, turnip cake, beef soup. As for drinks, bubble tea is preferred. Another country with several ethnicities and races is Indonesia, where we can find rice as one of the staples foods for breakfast. They also have congee with shredded chicken with condiments, steamed rice in coconut milk. In Maluku and Papua, they serve sago congee. They also serve porridge, fried rice vermicelli, beans porridge, rice pancake in coconut milk-based soup, a salad with rice cake and peanut sauce, rice and curry, etc. They also like to serve bread, under the form of sandwiches. Hong Kong, situated at the intersection of Western and Asian world, is a former British colony and it is also located close to the Canton region of China. Therefore, breakfast included foods from both cultures, which are actually mixed as hybrids. These foods include milk tea, eggs fried in the pan, noodles from the Cantonese area, macaroni in soup noodles, baby shrimp dumplings, sweet water chestnut cakes, fried and rice-based noodles and cakes. In Myanmar, we once again see the presence of region-related foods, such as in Burma, the fried rice with boiled pears, and green tea, which are staples for the poor social classes. Popular foods also include rice-based dishes, steamed and wrapped in banana leaves, salted toasted sesame, sticky rice with turmeric and onions.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

They also take over Indian foods such as flatbreads, tea, and coffee. They also can have rice vermicelli, fish broth, boiled egg, fried fish cake, as well as lots of spices. When it comes to India, we can count as much as 25 different breakfasts, and for each of them we can be given a choice that ranges starting from 100 foods. India is made up of various states that has different kinds of breakfast, and there is no common type of breakfast that can be called specific to Indian culture. We can divide breakfasts, however, by North and South Indian areas if we want. North India breakfast foods can include vegetable curry, curd, pickles, cottage cheese, and various local food dishes. For South Indian breakfast, we can find various local foods such as idly, vada, dosa, chutney and sambar. Roti and curry are the common breakfast foods for the Bengalis, and they can also have Indian French toast, flaked rice that has been fried in oil, and with added salt, together with boiled eggs. In the case of Iran, breakfast foods that are typical include types of flatbread that are spread with cheese, butter, jam, marmelade, honey, cream, as well as nuts and fruits that are fresh or dried, and as for drinks, they would have black tea or coffee. Sometimes, they can have something simple such as bread with spread butter or jam, and tea. If they want to have cooked breakfast, they can have wheat and chicken or lamb or turkey porridge with cinnamon, sheep's feet, or stomach, green lentil soup, eggs, or omelet with eggs cooked in tomato sauce. As for Israel, their breakfast is influenced by Eastern Europe, Yishuv culture, which is agrarian, North Africa, and Levantine culture. Common foods include cheese (varieties which include local ones), vegetables (cucumbers, tomatoes, red bell peppers, carrots, radishes, onions), scrambled, or fried eggs, bread, with butter, jam or honey that are spread on it. Pickled olives and herring can be served as side dishes. Salad, hummus, Shakshouka, salads of Middle Eastern type can also be included. Meat or dairy based, but not both, dishes can be part of a traditional breakfast in Israel.

The general feature of European breakfast of being light can be related to the Medieval Age, when clerics and doctors were not in favour of a rich breakfast. Habits, however, changed starting with the 16th century, when working classes needed energy to be able to do physical work.

In some cases, we may have a wrong image of another culture's breakfast, due to the popularisation of specific foods. In French culture, we know the stereotypical breakfast, from films and books, consisting of croissants. However, the French may eat croissants for breakfast only during the weekend, and rarely during weekdays, unless they are really in a hurry, while during the week they will usually have tartines (meaning slices of bread with jam or something else spread on it), pastries called viennoiseries, orange juice, and a hot or warm drink. Unlike other cultures that serve savoury foods for breakfast such as cheese, egg, bacon, cold meats, the French serve foods rich in carbohydrates such as pastry products (Alyanak, 2021). For the French, breakfast is not considered the most important meal of the day. For them, lunch is. Around the world, nowadays, we frequently just have a coffee in the morning, then rush to school or work, and get something from the street, e.g. pastry products.

Habits related to breakfast are changing, thus, according to our times, to the point where it can become a light meal and no longer be the main meal of the day (Ozden, 2020).

Even as tourists, we may not always get a traditional breakfast from cafes, or from the hotel, but instead a standard one, or a Swedish buffet. We may be offered continental breakfast, which is a light meal, consisting of "toast, muffins, pastries, yogurt, and coffee," and which is called in this way as it refers to the way such foods could remind of those that "mainland western Europe" people would eat with pleasure (Goldfarb & Fernandez, 2023).

Due to all the changes and variations of breakfasts in various regions of the same country, it may even be difficult to give an exact answer regarding what traditional breakfasts consist of. We may, however, just find some common elements with respect to continents. As an example, we could see the American breakfast as consisting of cereal, while European breakfast can consist of "crepes, waffles, pancakes and pastries with sweet toppings" (The Old European Restaurant, 2023). What is more, for European cultures, we can notice how coffee and tea can be frequently encountered for breakfast. Additionally, other foods have come to the fore and are associated with American culture: dishes containing eggs, waffles, pancakes, toast, egg and cheese sandwich, tacos, and others. In the ancient world, breakfasts were consisting of simple foods such as bread and grains, and, function of social class, some people would not even eat it everyday (The Old European Restaurant, 2023).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

As part of the history of breakfast, according to Ozden (2020), it was introduced as a main, thus most important meal, by the end of the 19th century. Ozden (2020) claims that before the industrialization that occurred in Europe, everyone used to eat two meals every day, lunch, and dinner, while afterwards, people worked for more hours and needed breakfast. According to Kahvaltı Saati (2017), before lunch, in Europe and in the Ottoman Empire, people used to drink coffee and have snacks.

Nowadays, since we live in a culture that recommends healthy eating, we can take over, in any part of the world we live, breakfast foods from other culture that fit in with the description. If we are preoccupied by keeping fit, and practice fitness, we may be led on towards being recommended a breakfast rich in protein, in order to build our muscle. While, in the past, we believed we should have a balanced ratio, according to mainstream science, of protein, carbohydrates and sugars, according to anatomy science, nowadays we resort to low carb and high protein diets instead, claiming that health can be found in a different way. Protein rich diets with absent or reduced to minimum, carbohydrates, are believed to help burn body fat, give more energy to the body, and help improve the feeling of being full for a longer time. Even the way we conceive of nutrition has changed, with a clear taking distance from mainstream science. With low carb diets, we no longer believe that the brain needs sugars to function, but, instead, it can benefit more from protein. Nowadays we can all choose what diet to follow, as well as what to eat for breakfast. There are no more standard rules, but choices.

## RESULTS

We could claim that breakfast follows not only conditions related to the availability of resources, climate, lifestyle, social class status, social occasions conditions, travelling and wish to explore specific gastronomy, but also certain mindsets, such as those related to subcultures, e.g. vegan, vegetarian, raw vegan, fitness, bio, natural, and healthy lifestyle. As a result, breakfast can be chosen function of the situation, but also function of values. Thus, if we are vegan or vegetarian for ethical reasons, or for health reasons, we are going to always be influenced by these principles and values when choosing our food for breakfast. If we admire or wish to explore a certain culture with its traditions, we are going to wish to experiment and try their specific breakfast foods. Additionally, various cultures are proud of their various products, such as coffee, fruits, vegetables, various local and national dishes, which they wish to show to visitors.

We gradually move on from traditions to contemporary lifestyle, since we are no longer, generally, nowadays, short-term cultures, but, instead, we move on towards long-term cultures, based on technology and other developments, which leave traditions behind (Hofstede, 2011).

However, common breakfast foods, with variations based on local traditions and products, can include dairy products, bread, pancakes, jam, honey or butter spreads, yoghurt, cereals, porridge, curry, sandwiches, eggs, cooked in a variety of ways, fruits, vegetables, cold meats, coffee, tea, milk, fruit juice, etc.

Normally, starting the day should include giving the body a boost of energy. We can use energy for both physical and intellectual work. Energy can be provided by caffeine rich drinks, and we can even get some food a bit later, not as soon as we have awakened early in the morning.

## DISCUSSION

Lavish breakfasts are pictures in photographs shared on social media for various cultures, which include almost any possible traditional food. In this way, tourists are presented with an overview of several possible foods, from which they can choose what they want to try. These are likely traditional foods, and the purpose of such arrangements is to present to tourists the food culture of the respective areas. This is very much like a display of food culture and heritage of the respective countries and regions. Breakfast, in such cases, can be considered a cultural product, very much like monuments, episodes in history, objects of art, works of fiction, and others.

We may have some associations between a certain culture and a certain food item due to the way it has been popularized as symbolic of the respective culture, to the extent where we could speak of the soft power of that culture.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Traditional breakfasts are, thus, very common nowadays when we are given access to knowing a different country and culture better. Then, the hosts do everything they can to show us all of their cultural heritage. Otherwise, in practical, everyday life during contemporary times, very frequently the traditions are no longer followed. Practical reasons such as comfort lead people everywhere around the world to benefit from the facilities provided by consumerism, by supermarkets, and delivery services, as well as by the frequent presence of street food. What is more, foods taken over from other cultures can also be widely spread, such as those from American culture, e.g. cereals, which are growing in popularity and which are present in supermarkets everywhere now.

## CONCLUSION

Nowadays, we notice a tendency towards the simplification of breakfast. Generally, very early in the morning, function of the particularity of our job, or school or university schedule, we drink a cup of tea or coffee, have a slice of bread with jam or honey or other spread on it, a bowl of cereal, a yoghurt with berries, pancakes, and we hurry towards our destination. If we have only a cup of coffee, we get along the way some pastry products or we take with us a small yoghurt to eat at work or during school breaks, or we buy a sandwich or take one from home. However, when we are tourists, on holidays, or at scientific events such as a conference, we can be served either a traditional or a continental type of breakfast, if we are there at the respective time of day. We can recall, from films, breakfast in bed, which includes as staple foods, regardless of culture, boiled egg, orange juice, dairy products such as cheese slices, jams, toast, ham, some fruits, vegetables, and others. In some cases, if the characters are French, they are having croissants and coffee. However, such images are just stereotypes, or, at least, commonly recognized breakfast foods so that everyone watching the films can relate and understand what time of day it is.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## HAIKU THERAPY: VARIOUS RELATED ISSUES

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### ABSTRACT

The purpose of this paper is to look at what haiku therapy is, and consider several related issues that can bring about various dilemmas to those finding out about it, especially to those writing high-quality haiku and being very knowledgeable about this type of poem. To them, the attempts done by the patients that are given as examples in popular psychology articles are clearly having nothing in common with the real haiku poem. These are only micropoems to them, and they consider it outrageous to allow patients to write haiku without teaching them how to genuinely do this. The paper will start from the example of a Romanian haiku authors' online community's reaction to an article from a women's magazine about therapy through writing haiku. The post was recent, shared and discussed during September 2023. The author of the present paper has noticed, through the participatory observation method of netnographic research, as she is a haiku author and member of the group herself, two main reactions to the article. The first one was that of outrage, as the therapists promoting this type of poem in therapy have not taken their time to become documented in what this poem actually is. The second one was that of claiming that in therapy the focus is placed simply on the self-expression of the patients, and not on the artistic value of what they write. Art therapy is, after all, a general concept which allows participants to feel relaxed and write various poetry genres or paint, without feeling bad about not being gifted artistically and without being pressured to creating a valuable piece. The user exposing this opinion also claimed that this type of therapy is simply meant for the well-being of the patient. Additionally, the same user claimed that giving examples of genuine haiku poems in the article and writing genuine haiku poems would not have helped the patients express their anxieties and dilemmas, as well as various thoughts and feelings, in a genuine, honest way, so that the therapists would not have been able to help them anymore. Their real problem would not have been addressed. The opinion of the author of the present paper has to do with explaining these types of therapies through the lens of individualism, where patients are encouraged to be themselves, and break any rules when writing, in order to be creative. This helps them break free from constraints and understand what they want, which is beneficial for their psychological balance and well-being.

**Keywords:** well-being, individualism, creativity, self-expression.

### INTRODUCTION

The haiku poem is, originally, a Japanese poem, with a fixed form, 5-7-5 syllables, and three lines. Occasionally, however, it can be two or even one lines. Additionally, in our contemporary world, and since it has been taken over as a practice by Western culture members, even the number of syllables can vary. In the English languages, in particular, it can be shorter than the 5-7-5 syllables (Imaoka, 1996). It can be considered to be made of two parts, in juxtaposition and in direct connection one with the other, or in a strong relationship of contrast. While the haiku poem is not supposed to contain the usual figures of speech and abstract ideas expressed directly as we are used to from Western poetry, it does, indirectly, through the allusions of the two parts, suggest, through visual or auditory images, a deeper meaning than that at the surface. We could say that the haiku poem contains a concrete, real meaning, yet the visual scenes are never randomly selected. They are selected with a precise goal, in order to be about a certain aspect. We should also mention that haiku poems are about the present, or about the here and now, and not about the past, or the future. At least, concerns with these are not expressed directly through words. We can suggest, however, the past by mentioning an old childhood photograph. We anchor traditional

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

haiku poems in the here and now, through references which can be direct or which can be identified as belonging to a certain seasons or to a certain time of day. This element that indicates a season directly or through suggestion, or a time of day, in a similar way, is called *kigo* (Gilbert, 2006) and it is a familiar concept to those versed in writing haiku poems. As an example, a tulip can only be found during spring, therefore we can assume that the respective haiku poem was written during springtime. We can mention multi-coloured leaves, which are clearly associated with autumn. The sun and the moon are associated with daytime, and nighttime, respectively, unless we can spot the moon during daytime as well as it can sometimes happen. Certain fruits, vegetables or flowers that are present during a certain season, snow, rain, ice, a heatwave, can all be included as *kigo* in a haiku poem. However, once a haiku poem is more about the human world than about nature, and if it does not contain a seasonal element, it can be considered a *senryu*. The *senryu* can be humorous or sad. What is more, some poems can be considered a combination of haiku and *senryu*, as they may contain a *kigo* in one of the parts, while in the other part it was have to do with a humorous or sad remark about human life.

When a haiku poem is about nature, we need not distort any detail. We do not create a fantasy world, we do not personify nature, and we need to keep any scene realistic. While in the past haiku poems were written on the spot, with the disciples gathered around the master to discuss the poems after writing them following an outing in nature, nowadays this is no longer possible. We have other activities to do, we need to go to work, our schedule can be too busy, and sometimes weather conditions can be unappealing. This is why we resort to imagining scenes or base our poem on our memories of walks in the past. We need to refrain from attributing to nature human emotions, however, which, as Westerners, we are used to from the many years of poetry written in this style. Westerners need to open their minds and start thinking in a different way, specific to Japan, at least to some extent.

Haiku poems are, traditionally, in Japanese culture, belonging to the Buddhist mindset (Blyth, 1951), which claims that we only have the present moment that is real, and that in this life, which is subjected to change, and that we need to accept the fact that we are going to lose everything and everyone dear to us. We are all ephemeral, and the world around us is ephemeral.

Of course, haiku poems can be adapted to contemporary reality, to the point where it reflects the lifestyle of various cultures other than Japanese, and it can even mention elements related to technology. It is one of the most versatile and adaptive poetic genres. It can be unsurprising how it can fit to both artistic purposes and to therapeutic purposes.

## MATERIALS AND METHODS

The author of the present paper is a haiku author and member of the haiku group Romanian Kukai, led by sensei (the word for teacher) Corneliu-Traian Atanasiu, where we are taught to write good haiku. Atanasiu believes that, in order to write good haiku poems, we need a considerable amount of time, and we are recommended by him to read good haiku, and to start feeling it and reflecting on it. At the same time, we can take examples from our haiku colleagues, who are so-called veterans and write good haiku. Through various contests, we learn and we become “contaminated” by the quality haiku written by the older members. From this point of view, we could claim a netnographic approach to this community, which also includes a Facebook group, not only a blog called Romanian Kukai where information and contests are posted, called Autori de haiku din Romania (Haiku authors from Romania). The author of the present paper could claim that she is doing participatory observation, as she read, on September 23, in a post by Florin Golban (2023), a reference to an article published in *Psychologies* online popular psychology magazine about haiku therapy, how the haiku poems posted as examples are not valuable and, for that matter, even valid attempts at writing haiku. The article claims that haiku poetry can be therapeutic, since it can lead to healing and to emotional balance. The article in the popular psychology magazine does not claim to teach anyone to write genuine and good haiku poems. Instead, it present their therapeutic purpose. Through haiku poems, patients can express themselves in a very concise manner. They do not need to write many unnecessary words, and the advantage could be that of going directly to the core of their issues, whether these are related to wishes, anxieties, uncertainties, worries, anger, etc. Self-expression is considered, nowadays, a usual consequence of the way today’s world is structured. There is, currently, the tendency towards the individualist dimension, and the focus on the individual as being part of a collectivity is gradually fading away. The individual no longer has to submit



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

to the interest of the entire group or community, but he/she can take action to suit their own interests and purpose. The individual is, in the manner of American culture ideals, granted the right for self-expression and self-development. The haiku-type of poem can be used to synthesizing what an individual feels and what an individual is preoccupied with. In the past, Sigmund Freud, the father of psychoanalysis, would recommend patients to write in their diary and to use free associations (Jones, 1990), to the point where they felt free to talk. Eventually, the patients would need to look at ideas repeating themselves, in order to identify issues that preoccupied them and that were a frequent presence. All the work appears to be already done by having patients write haiku poems as therapy.

In the post from September 23, 2023, comments did not take long to appear as a response to Golban's post. Golban condemned the practice of haiku as therapy, since the examples in the *Psychologies* article were not, after all, valid and genuine haiku poems. The therapists proved that they did not know what haiku poems were. Haiku group member Irina Tipordei replies that therapeutic haiku poems have a completely different purpose than writing valid and valuable haiku. The therapeutic version needs to highlight the self-expression of the patient.

We, therefore, in this case, deal with a clash of values. While Irina Tipordei accepts that therapy is something else, Florin Golban and Ion Cuzuioc are very much offended about the examples being posted of haiku poems, since they are not genuine ones. Elena Malec replies that this therapy is an example of consumerist culture, together with the article of popular psychology, and that we need not worry too much as haiku authors. Ion Cuzuioc expresses his wish to write to the *Psychologies* magazine and to explain what true haiku poetry is and that the way it is presented in that article is completely unprofessional.

The truth may be that creative therapy can be more related to the domain of achieving a state of well-being and relaxation, more than being helpful and even genuine therapy. In order to reach the depths of the issues patients are confronted with, psychoanalysis appears the most suitable approach, since it deals with analysis of unconscious material. Meanwhile, simply talking about personal issues, while being related to free associations techniques in psychoanalysis, may not lead to efficient results, if not applied correctly. A good analyst will stop the patient when he/she feels that the patient could develop more of an issue that should not be taken lightly. The psychoanalyst could help the patient continue the train of associations in a certain direction, which is a meaningful or problematic one. Meanwhile, in creative therapy, patients are encouraged to express themselves without caring about the artistic value of their works. They can draw, colour, write poetry, in a relaxed manner, and offer the material for analysis to their therapist. However, each patient is unique and the therapist needs to see what is most suitable for each and every patient as a means of self-expression.

We can see the strength of the beliefs and values of haiku authors such as Florin Golban and Ion Cuzuioc, who believe that we do not need to be superficial, under any circumstances, when it comes to haiku poems. They believe that even therapists need to master the rules of such poems, and not allow their patients to write pseudohaiku poems. Irina Tipordei focuses on the practical use of the creative therapy, and on the way that patients need to be encouraged to express themselves in a very free manner.

Even in the haiku authors' community, various rules, or lack of rules and experimentalism give way to arguing for and against. Some believe that the haiku poem is a fixed form poem, with three lines and 5-7-5 syllable pattern, while others are more open towards experimentalism, as long as the spirit of the haiku poem is preserved.

## RESULTS

It may be difficult to give a final answer regarding the way creative writing therapy should be practiced with respect to the haiku poem. For the time being, we could simply claim that, due to its concise form, it can help patients contract their emotions and their meaningful experiences within a limit. Otherwise, it can become time-consuming for both therapist and patient, especially nowadays, when we believe we live in the century of speed, to highlight the meaningful details within a chain of free associations.

The experience of writing genuine haiku poems is an entirely different one. We can see how old authors, or veterans, can hold onto their values and principles, to the point where they can see even a therapeutic technique as incompatible with haiku poems, if written not as they should be.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

It is difficult to say who is right and who is wrong from the clash of values and principles related, on the one hand, to respect for genuine haiku, and to therapy, on the other hand.

Individualism (Hofstede, 2011) gives rise to self-expression and to self-development, focusing on the needs of the individual, and not of the individual as part of a group or of a community.

## DISCUSSION

Haiku poems are not the only ones that are subject to creative therapy. Haiku poems can be practiced, according to this therapy technique, in order to simply encourage patients to express themselves in a relaxed manner, without caring about rules. In this way, patients are encouraged, after all, to experiment. They are suggested that rules are meant to be broken, in all circumstances. However, the most conservative haiku authors can feel completely offended by such ideas.

The novelty of creative techniques for therapy can be received either with enthusiasm, or with complete opposition, function of mindset and principles, as well as values. Once someone is a haiku author having some years behind in their work, they can feel that this is all a lack of respect towards their work, and a total disregard of quality of haiku poems, which can be achieved only through training that takes a very long time.

The question remains, if haiku is a matter of creativity or a matter of self-expression. We could conclude that, for the group of haiku writers, it is a matter not only of creativity but of knowledge and skill, while for the therapists it is a matter of encouraging their patients' self-expression. We often hear that neurosis and its symptoms can be eased through art, and through patients' expressing themselves. Yet, it all depends on the severity of the issue. For one thing, writing haiku can relax and direct the energy to a higher purpose, that of sublimation, meaning that of transforming instincts into a great artistic expression. However, not everyone can be capable of this. Yet, those that are capable of doing these can witness how their tensions are eased and how they can feel better after expressing themselves in this way.

## CONCLUSION

We could claim that haiku therapy is a simplified form of sublimation. It is more of a form of well-being, actually, than of actual healing process. Besides, in order to be able to get better, an experienced psychoanalyst is required.

Nowadays, therapies have become simplified, or, at least, in some versions of therapies. A wide variety of therapeutic approaches is available today, and patients have a wide array to choose from. What is more, popular psychology articles have popularised information about treatment and the unconscious issues, reminding of Freud's intent to have his psychoanalysis laid up all available to laymen. His work about the *Psychopathology of Everyday Life*, including slips of the tongue and their significance, together with his works on the interpretation of dreams, can both be practiced by the general public, after all, once they become informed about the techniques.

We could claim that the haiku therapy can be accessible to the general public, with no knowledge in literature, Japanese culture and haiku poetry techniques, as well as with no knowledge in interpreting self-expression through art. We can include haiku therapy within a wider category, that of art therapy, which is rendered popular and accessible to anyone, in an attempt to encourage people to express their issues through art. Poetry and art can become similar to the language of dreams, where people can express desires, wishes and fears.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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**IMPROVEMENT OF MICROPROCESSOR CENTRALIZATION SYSTEMS FOR ARROWS  
AND SIGNALS BASED ON DIGITALIZATION OF MODULAR INTERACTION USING  
EXPERIMENTAL METHODS**

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**ABSTRACT**

Experimental methods are based on conducting special tests of a complex of technical means as a whole or its component parts using a real system, its prototype, simulation or physical model. In general, we can distinguish the following methods for determining evidence of safety and reliability within this group:

- testing on simulation models;
- tests on physical models;
- testing under operating conditions.

Tests under operating conditions are the final stage of proving the safety of a set of technical means, but cannot serve as the only experimental method due to the impossibility of recreating a significant part of technological and emergency situations at a real facility, therefore the main burden of experimental research on the reliability and safety of a set of technical means rests with laboratory tests. testing - using simulation and physical models.

**INTRODUCTION**

Bench tests assume maximum proximity to real operating conditions, and therefore their results are considered to be the most reliable of those achieved in laboratory conditions [1 – 3]. Traditional methods of their implementation (TSI) in relation to systems of microprocessor centralization of arrows and signals (MPC) involve complete reproduction of devices of the upper and lower levels, but only partial reproduction of the lower level - by connecting a limited selection of microprocessor object controllers (MPCs) to the stand.

Taking into account the mutual dependencies between management and control objects (CMC) directly controlled by the MPC, in this case limited test coverage of technological situations is provided. To increase it, an increase in the sample is also required, which leads to an increase in the resource intensity of tests [5].

To ensure the necessary test coverage with minimal resources, the development of combined test methods (CTM) as a subtype of bench tests was carried out by synthesizing simulation and physical modeling of the operation of the MTC and CTC [6].

MCIs are carried out under the condition that the operation of part of the MPC is reproduced by real devices, and the OUK connected to them - by physical models (layouts), the other part of the MPC and OUK - by software modules of a specialized simulation model (SIM).

At the same time, as part of the test bench, a set of drivers are used to interact with the lower level: real (for the first part) and virtual (for the second). Taking into account the isomorphism of all three levels

of the MPC on the set (where A, Z and U are subsets, respectively, of the GCP, their connections and properties), established in [8], to achieve the goal of the set of GCP A, their program modules at the level of the logical processing subsystem dependencies (DPL) ML and IPC LL are divided into isomorphic tolerance classes for managing a single group of GCCs and using a common driver type:

$$\left\{ \begin{array}{l} A = \bigcup_{i=1}^n A_i, \bigcap_{i=1}^n A_i = \emptyset, \\ LL = \bigcup_{i=1}^n LL_i, \bigcap_{i=1}^n LL_i = \emptyset, \\ ML = \bigcup_{i=1}^n ML_i, \bigcap_{i=1}^n ML_i = \emptyset, \end{array} \right. \quad \tau \subset \Lambda \times \Lambda : \left\{ \begin{array}{l} \forall A_i \xleftarrow{\gamma_i(\alpha)} \exists! LL_i \subset LL, \\ \forall LL_i \xleftarrow{\gamma_i(\alpha)} \exists! ML_i \subset ML, \\ \forall ML_i \xleftarrow{\gamma_i(\alpha)} \exists! A_i \subset A, \end{array} \right.$$

$$\Lambda = \{\alpha_j\} = \{a_j \in A, ll_j \in LL, ml_j \in ML\}_j$$

– sets of one-to-one elements;

– function implemented by the driver of the i-th group of OUK;

$\tau$  – designation of the tolerance relationship.

The vector nature of the functions is due to the multi-channel nature of the lower-level MPCs, each channel of which is controlled by its own driver component. In general, MCIs are formalized by the following expression:

$$\left\{ \begin{array}{l} \exists(A_i \subset \Lambda) \rightarrow \left[ \begin{array}{l} \exists \left( [a_g \in A_i] \leftrightarrow [ll_{g\eta} \in \vec{ll}_g \in LL_i] \xrightarrow{\gamma_{i\eta}} [ml_g \in ML_i] \right) : \\ (a_g \rightarrow model^1(a_g)) \wedge (ll_{g\eta} \rightarrow model^0(ll_{g\eta})) \wedge (\gamma_{i\eta} \rightarrow model^0(\gamma_{i\eta})) \end{array} \right] \\ \exists(A_v \subset \Lambda) \rightarrow \left[ \begin{array}{l} \exists \left( [a_i \in A_v] \leftrightarrow [ll_i \in \vec{ll}_i \in LL_v] \xrightarrow{\gamma_{in}} [ml_i \in ML_v] \right) : \\ (a_i \rightarrow model^1(a_i)) \wedge (ll_i \rightarrow model^0(ll_i)) \wedge (\gamma_i \rightarrow model^0(\gamma_i)) \end{array} \right] \end{array} \right.$$

$\vec{ll}_i$  и  $\vec{ll}_i$  – MПK, a  $ll_{g\eta}$  и  $ll_{ic}$  – their constituent channels of management and control;

and – OUK connected to the MPC;

and – software modules of the corresponding GCC as part of the POLS software;

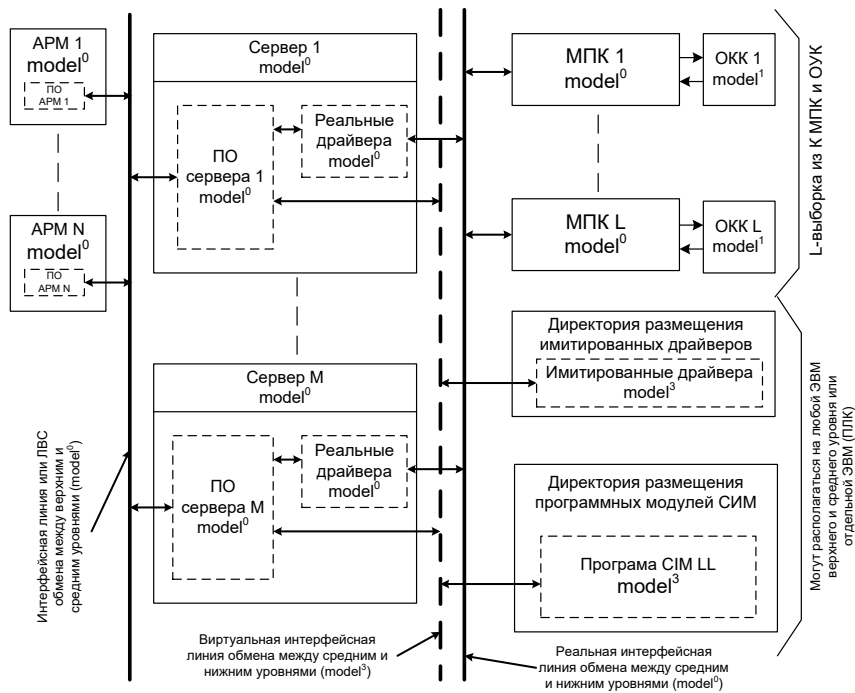
i and v – numbers of groups (tolerance classes) defined by formula (1);

and – numbers of IPC and OUK, respectively, as part of groups i and v;

$\eta$  and are the numbers of channels in the MPC, respectively, and ;

n and m are the number of IPC groups (OUK) and their channels, respectively.

The technical implementation of the MKI is carried out on the basis of a combined testing complex (CTC MTC) [10]. Its general structure, according to formula (2), is shown in Fig. 1.



Rice. 1. Generalized block diagram of the CIC MPC

The application software of each POLS server (channel) interacts with real MPCs and OUK models connected to them via a real interface line and with SIM software modules via a virtual one. In this way, software-spatial differentiation of access to lower-level elements reproduced by models of different orders is performed.

For this, a certain adjustment requires the POLS software, which must be returned to its original state after the end of the tests. Therefore, it is preferable for MCIs to be used in relation to themselves by MPCs with a single software core of POLS servers, the adaptation of which to a specific station and various interface lines is carried out by editing configuration files [11]. This architecture (from the standpoint of software replication) is recommended by the requirements of leaflet R-843 [12].

### CONCLUSION

The proposed methods make it possible to increase the efficiency of the experimental methodology for proving the safety of MPC systems by increasing test coverage and reducing material resources. At the stage of bench testing, this is achieved by minimizing the sample of MPC, OUC and using the capabilities of SIM.

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October 13-14, 2023**

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BÖBREK HÜCRELİ KARSİNOMDA NEFROMETRİ SKORLAMA SİSTEMLERİNİN  
TÜMÖRÜN AGRESİVİTESİNİ ÖNGÖRMEDEKİ YERİ

THE ROLE OF NEPHROMETRY SCORING SYSTEMS IN PREDICTING TUMOUR  
AGGRESSIVITY IN RENAL CELL CARCINOMA

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ÖZET

Renal kitle tanısı alan hasta sayısı günümüzde giderek artmakla beraber renal kitle saptandığında patolojik belirsizlik devam etmektedir. Bu belirsizliği öngörebilmek amacıyla preoperatif değerlendirmeler ve buna göre tedavi planları yapılmaktadır. Bu amaçla bugüne kadar çeşitli klinik bulgular, patolojik öngörü modelleri ve perkütan biyopsiler de dahil olmak üzere preoperatif çeşitli tanıya yardımcı araçlar kullanılmıştır. Renal kitle anatomisini tanımlayabilmek için objektif anatomik skorlama sistemleri: R.E.N.A.L. nefrometri skoru (RNS), Padua skoru (PS) ve C-indeks geliştirilmiştir. Çalışmamızda RNS, PS ve C- indeksin T1 böbrek tümörlerinde patolojik agresiviteyle ilişkisini ortaya koymak böylece anatomik bilginin dışında patolojik bilgi vererek renal kitlelerin tedavi yönetiminde yardımcı olup olmayacağını göstermeyi amaçladık. Preoperatif klinik evrelendirmeye göre evre 1 (T1N0M0) 83 berrak hücreli renal hücreli karsinom (cRCC) hastası değerlendirildi. Patolojik sonuçlarına göre hastalar iki gruba ayrıldı: Fuhrman derecesi 1 veya 2 (FG1-2) olan hastalar (Non-agresif grup (NAG)) ve FG3-4 ve/veya TNM Evre 3 olan hastalar (Agresif grup (AG)). Her hastanın RNS, PS ve C-indeks puanları hesaplandı ve nefrometri skorları ile patolojik agresivite arasındaki ilişki karşılaştırıldı. Ortalama RNS, 7.3±2.4 olarak hesaplandı. Toplam RNS, AG'de (9.2±1.2) NAG'den (6±2.2) anlamlı derecede yüksekti (p=0.000). RNS, patolojik agresif hastalığın bağımsız bir öngörücüsüydü [0.863 (0.785-0.940)] (p < 0.001). En yüksek eğri altı alan için RNS' nin eşik değeri 8 olarak bulundu [0.807 (0.710-0.905)] (p < 0.001). Ortalama PS, 8.1±1.6 olarak hesaplandı. PS ayrıca patolojik agresif hastalığın bağımsız bir öngörücüsüydü [0.846(0.762-0.929)] (p < 0.001). En yüksek eğri altı alan için PS'nin eşik değeri 8 olarak bulundu [0.761(0.653-0.868)] (p < 0.001). AG'nin ortalama C-indeks puanı (1.4 ± 0.4), NAG' den (2.7±2.0) anlamlı derecede düşüktü (p=0.000). C-indeks, patolojik agresiviteyi tahmin etmede anlamlıdır [0.787(0.690-0.883)] (p < 0.001). Çalışmamızda daha yüksek RNS ve PS puanları ile düşük C-indeks puanlarının böbrek tümörlerinin tümör agresivitesi ile ilişkili olduğunu gösterdik. RNS, PS ve C-indeks renal kitlelerin agresifliğini preoperatif olarak tahmin ederek tedavi kararını vermeye yardımcı olacaktır.

**Anahtar Kelimeler:** Böbrek hücreli karsinom, Padua, C-indeks, R.E.N.A.L. nefrometri, tümör agresivitesi, Fuhrman Derecesi

ABSTRACT

The rising number of renal mass diagnoses brings about uncertainty. Preoperative assessments and treatments aim to address this. Diagnostic tools like clinical findings, prediction models, and biopsies are used. Anatomical scoring systems (R.E.N.A.L. nephrometry score - RNS, Padua score - PS, and C-index) describe renal mass anatomy. Our study explores their connection to T1 kidney tumor aggressiveness, revealing if anatomical data aids renal mass management alongside pathology. We evaluated 83 patients with stage 1 (T1N0M0) clear cell renal cell carcinoma (cRCC) according to

preoperative radiological and pathological staging. Patients were divided according to pathological results of cRCC into two groups: Patients with Fuhrman grade 1 or 2 (FG1-2) (Non-aggressive group (NAG)) and patients with FG3-4 and/or TNM Stage 3 (Aggressive group (AG)). RNS, PS and C-index scores were calculated for each patient. Finally, the relationship between nephrometry scores and pathological aggressivity were compared. The mean RNS was calculated as  $7.3 \pm 2.4$ . Total RNS was significantly higher in AG ( $9.2 \pm 1.2$ ) than in NAG ( $6 \pm 2.2$ ) ( $p = 0.000$ ). RNS was an independent predictor of pathological aggressive disease [0.863 (0.785-0.940)] ( $p < 0.001$ ). The cut off value of RNS at the highest area under curve was 8 [0.807 (0.710-0.905)] ( $p < 0.001$ ). The mean PS was calculated as  $8.1 \pm 1.6$ . PS was also an independent predictor of pathological aggressive disease [0.846(0.762-0.929)] ( $p < 0.001$ ). The cut off value of PS at the highest area under curve was 8 [0.761(0.653-0.868)] ( $p < 0.001$ ). The mean C-index score of AG ( $1.4 \pm 0.4$ ) was significantly lower ( $p = 0.000$ ) than NAG ( $2.7 \pm 2.0$ ). C-index is significant in predicting pathological aggressiveness [0.787(0.690-0.883)] ( $p < 0.001$ ). Our results suggested that higher RNS and PS scores, lower C-index scores were associated with tumour aggressivity of renal tumours. RNS, PS, and C-index aid preoperative treatment decisions by predicting renal mass aggressiveness.

**Keywords:** Renal cell carcinoma, Padua, C-index, R.E.N.A.L. nephrometry, tumour aggressivity, Fuhrman Grade

### INTRODUCTION

The number of patients diagnosed with renal masses is increasing with the widespread use of cross-sectional imaging methods(1). Pathological uncertainty exists when an incidental renal mass is identified. Preoperative counselling and treatment planning are often made in the context of this uncertainty, even though 20-30% of these lesions ultimately prove benign and only 10-30% are found to be potentially aggressive (2–5). Preoperative variables, percutaneous biopsy and pathologic predictive models have been made to guess this uncertainty (6–8).

Evidence of the relationship between the pathology and anatomy of the renal mass began to be shown in various publications in the literature (9–11). Objective anatomical scoring systems: R.E.N.A.L. nephrometry score (RNS), Padua score (PS) and C-index have been developed to identify renal mass anatomy(12–14). Radiographic anatomical attributes are used in these systems.

Preoperative determination of preoperative tumour aggressivity is the mainstay of the management of treatment. In our study, we aimed to reveal the relationship between RNS, PS and C-index with tumour aggressivity in T1 renal tumours and thus to show pathologic information besides anatomic information and that would help us in the management of the treatment.

### MATERIAL AND METHODS

The records of patients who underwent renal surgery due to T1 renal mass from February 2008 to February 2016 were collected from the electronic medical database.

Radical nephrectomy (RN) (62.6%) or partial nephrectomy (PN) (37.4%) have been performed in 102 patients. 83 (81.4%) patients had clear cell pathology. Fuhrman Grade (FG) is of prognostic value only in clear cell pathology; therefore, 19 (18.6%) patients with other pathological diagnoses were excluded, including 4 with papillary RCC (3.9%), 5 (4.9%) with chromophobe RCC, 5 (4.9%) with angiomyolipoma, 5 (4.9%) with oncocytoma.

Clinical characteristics, pathological slides, and computed tomography (CT) images were retrieved for all patients. All specimens were reviewed by a pathologist. Only patients with a clear cell carcinoma (cRCC) (83 patients) were included and those with other renal cell carcinoma subtype (19 patients) were excluded. Preoperative CT images were reviewed by a urologic surgeon (AÖ); RNS, PS and C-index were calculated as previously described (12–14).

Patients were divided according to postoperative pathological results of cRCC into two groups: Patients with FG 1-2 were considered as non-aggressive group (NAG) and those with FG 3-4 and/or TNM Stage 3 were considered as aggressive group (AG).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

RNS, PS, C-index scores and components were compared between patients with aggressive vs. non-aggressive group. Descriptive statistics for the data encompassed mean, standard deviation, median, minimum, maximum, frequency, and ratio values. To assess the distribution of variables, the Kolmogorov-Smirnov test was employed. Quantitative data were analysed using the Mann-Whitney U test and independent sample t-test. Qualitative data were subjected to analysis using the Chi-square test, with the Fischer exact test being applied when the conditions for the Chi-square test were not met. The determination of effect level and cut-off values was carried out through the utilization of the ROC curve. Statistical analyses were conducted using SPSS 22.0 software.

## RESULTS

Among the included 83 patients, the median patient age was 58.7 years (range 22-79) with a male predominance (54.2%). The ages were divided into aggressive group (AG, n = 48, 58%) and nonaggressive group (NAG, n = 35, 42%) according to the pathology results as described. Age and gender distribution of patients were similar ( $p > 0.05$ ). The RCCs were removed by radical nephrectomy in 52 (62.7%), and partial nephrectomy in 31 (37.3%). Table 1 presents a comprehensive overview of the detailed pathological examinations. Collecting system and / or renal sinus invasion were observed in 2 (2.4%) cases; In 3 (3.7%) cases lymph node positivity was observed; 11 cases (13.3%) were pathological stage 3; 9 patients were pathologically diagnosed as T3A (10.8%) (Table 1). 2 of stage 3 tumours were pathologic stage 3 due to lymph node positivity and the other 9 cases were stage 3 due to extracapsular spread and / or collecting system and / or renal sinus invasion (Table 1).

		NAG (n=48)		AG(n=35)		TOTAL	P
Age, year		57.5 ± 10.3	(Med=58.2)	57.2 ± 14.0	(Med=59.0)	57.4±11.9 (Med=58.7) (22-79)	0.896
Gender,n(%)	Male	22	(45.8%)	23	(65.7%)	45 (54.2%)	0.073
	Female	26	(54.2%)	12	(34.3%)	38 (45.8%)	
Tumour size (mm)		35.4 ± 16.9	(Med=32.0)	55.9 ± 11.7	(Med=55.0)		<b>0.000</b>
Surgical modality,n(%)	RN	20	(41.6%)	32	(91.4%)	52 (62.6%)	
	PN	28	(58.4%)	3	(8.6%)	31 (37.4%)	
Fuhrman Grade,n(%)	I	15	(31.2%)	-		15(18.1%)	
	II	33	(68.8%)	8	(22.8%)	41 (49.4%)	
	III	-		25	(71.4%)	25 (30.1%)	
	IV	-		2	(5.8%)	2 (2.4%)	
Collector system /renal sinus involvement, n(%)		-		2	(5.7%)	2 (2.4%)	
Pathological (T) Stage	T1A	34	70.8%	8	21%	42 (50.6%)	
	T1B	14	29.2%	18	51.4%	32(38.5%)	
	T3A	-	-	9	27.6%	9(10.8%)	
Pathological(N) Stage	N0	48	100%	32	91.4%	80 (96.3%)	
	N1	-	-	3	8.6%	3 (3.7%)	

Table 1: Demographic and pathological features of the cases.

The mean RNS for all patients was  $7.3 \pm 2.4$  (median = 8). According to the components of the RNS: Tumours with increased diameter (R) ( $p=0.000$ ), endophytic nature (EII-III) ( $p<0.05$ ), distance to the collecting system or sinus  $< 4$  mm (N III), posterior location of tumour (P) ( $p<0.05$ ) and with a central location within the polar lines of the kidney (LII-III) ( $p<0.05$ ) were significantly higher in AG than in NAG. Total RNS was significantly higher in AG ( $9.2 \pm 1.2$ ) than in NAG ( $6 \pm 2.2$ ) ( $p < 0.05$ ) (Table 2). RNS was an independent predictor: of pathological aggressive disease [0.863 (0.785-0.940)] ( $p < 0.001$ ). The cut off value of RNS at the highest area under curve was 8 [0.807 (0.710-0.905)] ( $p < 0.001$ ). Sensitivity was 88.6%, positive predictive value was 70.5%, specificity was 72.9%, negative predictive value was 89.7% (Figure).

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

		NAG		AG		P
		Mean.±s.d./n-%	Median	Mean.±s.d./n-%	Median	
(R)adius	I	32	66.7%	6	17.1%	<b>0.000</b>
	II	16	33.3%	29	82.9%	
(E)xophytic/endophytic	I	32	66.7%	4	11.4%	<b>0.000</b>
	II	15	31.3%	19	54.3%	
	III	1	2.1%	12	34.3%	
(N)earness	I	28	58.3%	2	5.7%	<b>0.000</b>
	II	7	14.6%	4	11.4%	
	III	13	27.1%	29	82.9%	
(A)nt/Post	A	17	35.4%	4	11.4%	<b>0.013</b>
	P	31	64.6%	31	88.6%	
(L)ocalisation	I	27	56.3%	4	11.4%	<b>0.000</b>
	II	12	25.0%	15	42.9%	
	III	9	18.8%	16	45.7%	
<b>Renal Score</b>		6.0 ± 2.2	5.0	9.2 ± 1.2	9.0	<b>0.000</b>
<b>Renal Rim</b>						
Lateral	1	41	85.4%	23	65.7%	<b>0.035</b>
Medial	2	7	14.6%	12	34.3%	
<b>Tumour size (cm)</b>						
≤4	1	32	66.7%	6	17.1%	<b>0.000</b>
4.1-7	2	16	33.3%	29	82.9%	
>7	3	-	-	-	-	
<b>Renal sinus</b>						
Not involved	1	48	100.0%	32	91.4%	0.071
Involved	2	0	0.0%	3	8.6%	
<b>Polar Location</b>						
Superior/Inferior	1	30	62.5%	8	22.9%	<b>0.000</b>
Middle	2	18	37.5%	27	77.1%	
<b>Collecting system</b>						
Notinvolved	1	46	95.8%	33	94.3%	1.000
Dislocated/infiltrated	2	2	4.2%	2	5.7%	
<b>Exophytic rate</b>						
≥50%	1	32	66.7%	5	14.3%	<b>0.000</b>
<50	2	15	31.3%	20	57.1%	
Endophytic	3	1	2.1%	10	28.6%	
<b>Padua Total</b>		7.3 ± 1.4	7.0	9.2 ± 1.1	9.0	<b>0.000</b>
<b>Tumour diameter (mm)</b>		35.4 ± 16.9	32.0	55.9 ± 11.7	55.0	<b>0.000</b>
<b>C (mm)</b>		40.2 ± 10.3	40.0	39.2 ± 11.3	40.0	0.691
<b>R (mm)</b>		19.0 ± 8.7	17.5	28.4 ± 6.5	30.0	<b>0.000</b>
<b>C-index Total</b>		2.7 ± 2.0	2.2	1.4 ± 0.4	1.3	<b>0.000</b>

Table 2: Nephrometries and features

The mean PS for all patients was  $8.1 \pm 1.6$  (median = 8). According to the components of the PS: tumour with medial localization (M), polar localization and tumour size between 4-7 cm were significantly higher in AG than in NAG ( $p < 0.05$ ); Collector system and renal sinus involvement were although higher in AG than in NAG but not statistically significant ( $p > 0.05$ ); The rate of exophyticity (Exophyticity II-III) was significantly higher than that of NAG ( $p < 0.05$ ). PS AG ( $9.2 \pm 1.1$ ) was significantly higher than NAG ( $7.3 \pm 1.4$ ) ( $p < 0.05$ ). PS is significant in predicting pathological aggressiveness [0.846 (0.762-0.929)] ( $p < 0.001$ ) (Table 2). The cut off value of PS at the highest area under curve was 8 [0.761 (0.653-0.868)] ( $p < 0.001$ ). Sensitivity was 77.1%, positive predictive value was 69.2%, specificity was 75.0%, negative predictive value was 81.8% (Figure ).

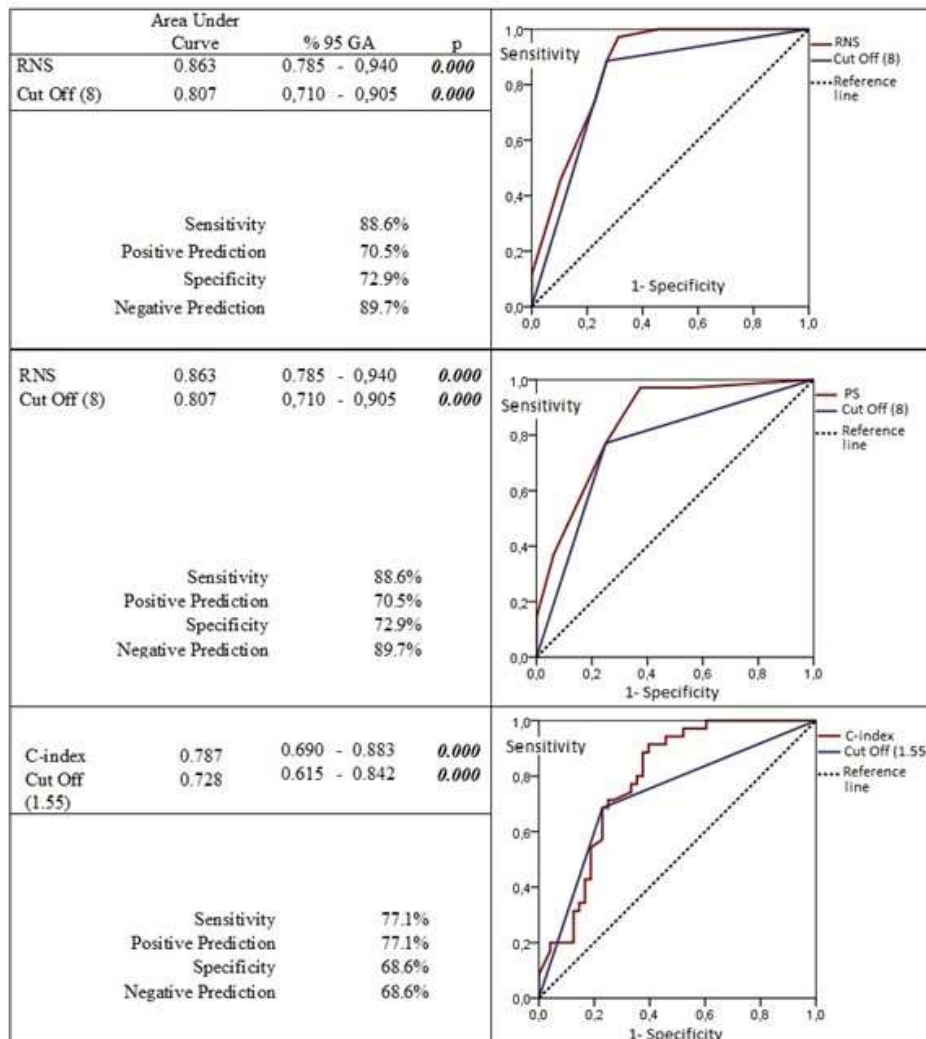


Figure: ROC curve, area under curve and Cut off value of RNS, PS, and C-index

The C-index value was calculated for each patient. All patients had a mean age of  $39.8 \pm 10.7$  mm (20 mm-65.7 mm), a mean r (mm) of  $22.9 \pm 9.1$ mm (5 mm - 35 mm) and a mean C-index of  $2.2 \pm 1.7$  (0.7-12.0, median = 1.6). When parameters are considered separately, c (mm) in AG was not significantly different from NAG ( $p > 0.05$ ), r (mm) in AG was significantly higher than NAG ( $p < 0.05$ ). The C-index in AG ( $1.4 \pm 0.4$ ) was significantly lower ( $p < 0.05$ ) than in NAG ( $2.7 \pm 2.0$ ) (Table 2). C-index is significant in predicting pathological aggressiveness [0.787 (0.690-0.883)] ( $p < 0.001$ ) The highest cut off value for the sub-curve area was 1.55. Sensitivity was 77.1% positive predictive value was 77.1%, specificity was 68.6% and negative predictive value was 68.6% (Figure).

### DISCUSSION

The diverse nature of enhancing renal masses presents a multifaceted clinical challenge, with varying biological characteristics. Achieving the alignment of renal mass biology with an optimal treatment



approach continues to be a challenging objective in contemporary urologic oncology (15). For patients in good health with T1 tumours suitable for nephron-sparing surgery, partial nephrectomy is presently considered the established standard of care. Nevertheless, the American Urological Association includes thermal ablation and active surveillance as potential choices for patients with tumours measuring 7 cm or smaller (16). The prevalence of small tumours, particularly in elderly or comorbid patients, is on the rise. The utilization of observation/surveillance approaches and ablative treatments that could be deemed safer for less aggressive cancers has gained prominence, primarily due to the limited availability of short- to medium-term oncological outcomes (17). The widespread hesitance surrounding the adoption of percutaneous biopsy, driven by concerns over potential complications or its inherent limitations in accurately determining grading, further underscores the potential applicability of a system capable of precisely predicting malignancy or aggressiveness (18). Because of these purposes various systems were designed by using nomograms (7,8). RNS, PS and C-index have been used to predict warm ischemia time, urine leak, blood loss, urine leakage hospital length stay and patient recovery time for PN previously. Recently there have been some studies to correlate nephrometry scores especially RNS with tumour biology and pathology.

Kutikov et al (19) based on some results which correlated the anatomical features of the tumour with pathological findings, have created a nomogram which integrates age, sex with some elements of RS with high predictive ability. However, the patients taken into this study had a high proportion of advanced and/or large tumours (>25 cm) and the malignancy or aggressiveness of such tumours were not required to be predicted, because of the high grade in nearly all the cases and that was the flaw of the study. Whereas in our case all patients had T1 and clear cell pathology tumours. Wang et al. (20) affirmed a robust predictive capability for high-grade tumours when analyzing an exclusively malignant tumour cohort that exhibited similarities to the Kutikov cohort. Conversely, Bagrodia et al. (21) reported a weak predictive performance for malignancy but an exceptionally high predictive accuracy for tumour grading in a small patient cohort with tumours up to 8 cm who underwent partial nephrectomy. In contrast, Koo et al. (22) examined an extensive cohort of clinically T1 renal tumours and found an acceptable predictive performance for malignancy but a notably poor performance in predicting high-grade tumours. On the other hand, Antonelli et al. (23) and Mullin et al. (24) failed to identify any correlations between malignancy or high-grade pathology in large cohorts of cT1a patients (506 patients and 754 patients), possibly due to the lower nephrometry scores of the tumours. A limitation of these studies lies in the heterogeneity of the patient groups included in their analyses.

Pathological aggressivity is not only due to nuclear grading there are also some prognostic parameters according to pathological results. We should use not only nuclear grading but also add upstaging (from stage 1 to stage 3) to make pathological aggressivity from this point of view our study is different from the others (25–27).

Kutikov et al. (19) and Chen et al. (28) compared individual components of the RNS with nuclear grade and their results showed that R score, E score and L score were strongly associated with high-grade pathology. It has also been reported that a high percentage of endophytic tumours were associated with clear cell histology and higher grade tumours (29,30). That is consistent with our study. We demonstrated that in RNS, tumours with increased diameter (R) ( $p < 0.05$ ), endophytic nature (EII-III) ( $p < 0.05$ ), distance to the collecting system or sinus  $< 4\text{mm}$  (N III), posterior location of tumour (P) ( $p < 0.05$ ) and with a central location within the polar lines of the kidney (LII-III) are associated with aggressive pathology. The components of the PS demonstrated that larger tumours (4-7 cm) ( $p < 0.05$ ), location relative to the polar lines and endophytic tumours (Exophyticity II-III) ( $p < 0.05$ ) were more likely to be classified as aggressive pathology diagnosed with cRCC. In previous studies there is not any cut off point about RNS, PS and C-index for predicting aggressivity of RCC we demonstrated that when RNS and PS upper than 8 and c-index lower than 1.55 aggressivity risk is rising.

## **CONCLUSION**

Overall, this study uncovered that there is a relationship between nephrometry scores (RNS, PS and C-index) and final aggressive tumoral pathology. The prediction of malignant and metastatic potential of the tumour alters the management of T1 renal tumours. This is of great practical importance for preoperatively predicting renal masses aggressivity. Using these data, which will help urologists choose

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

appropriate therapies for patients. RNS, PS and C-index represents a novel tool that can help for preoperatively prediction of aggressivity of renal masses and making therapeutic decisions. However, well designed randomized controlled trials are needed to make comparable results.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## PAUL FEYERABEND FELSEFESİNDE BİLİM VE SİYASET İLİŞKİSİ THE RELATIONSHIP BETWEEN SCIENCE AND POLITICS IN THE PHILOSOPHY OF PAUL FEYERABEND

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### ÖZET

17. yy Aydınlanma Dönemi'nde, aklın başat konumu ve bilimsel bilginin akıl yoluyla inşa edilmesi, bilimsel yöntem ve rasyonel düşünme ilkelerinin bilimlere ortaya çıkarması ve teknolojik gelişmeleri etkilemesi ile Sanayi Devrimi yaşanmıştır. Olgular dünyası ile sınırlandırılan bilim artık toplumdaki tüm sorunlara çözüm üretecek en geçerli alan statüsüne yükseltilir. Sanayi Devrimi ile gelen sanayideki makineleşme süreci insanın manevi yönünün göz ardı edilmesiyle insan yaşamına da yansımaktadır. Bu makineleşme sürecinin ve akla dayalı bilimsel üstünlüğün felsefe ve bilim tarihindeki belki de birer isyana dönen eleştirisi ve çözüm önerisi 20. yüzyılda Paul Feyerabend ile zirvesini yaşamıştır. Feyerabend bilim üstünlüğünün toplumdaki birçok alanı etkilediği gibi, demokrasi için bir tehdit oluşturacak denli siyasal alanı da etkilediği kanısındadır. Ona göre, bilimsel yasalar ve onları ortaya çıkaran toplumsal düzen arasında bağlantı vardır. Devlet, bilimin sunduğu imkanlar vasıtasıyla geliştirdiği, sosyal denetim mekanizmalarıyla birlikte düşünce özgürlüğünü tehdit eder bir boyut kazanmıştır. Feyerabend'e göre din ve devletin birbirinden ayrılarak laik bir yapıya bürünme süreci, bilim ile devlet arasında da gerçekleştirilmelidir. Çünkü ona göre, bilim dinsel bir kurum haline gelmiş ve toplumda çeşitli problemler ortaya çıkmıştır. Bu problemlerin ortadan kalkması için bilim ve devletin birbirinden ayrılması gerekmektedir. Çünkü bilimin devlet tarafından desteklenmesi toplumsal alandaki gücünü daha da artırmıştır. Devlet eliyle güçlenen ve eleştiri kabul etmeyen bilim; insan, toplum ve evren ile alakalı bilgiler ortaya koyan bağımsız bir disiplin olma özelliğinden uzaklaşmaktadır. Bilimin de toplumdaki diğer gelenekler gibi bir gelenek olduğunu dile getiren Feyerabend'e göre devlet özgür bir toplum oluşturmak için tüm geleneklere eşit şans tanınmalıdır. Ancak bu şekilde bilimden siyasi alana yansıyan demokrasi tehdidi önlenecektir. Feyerabend, bilimsel yöneme ve kurama eleştiri getirdiği için bazı kişilerce bilim anarşisti olarak tanımlanmıştır. Onun amacı bilimsel alanda bir anarşi yaratmak değildir; bilimin otoriter, baskıcı, hükmedici tavrını ifşa ederek, devletten ayrılması gerekliliğini ortaya koymaktır. Feyerabend'e göre ancak devletten ayrılan bilim özgürce gerçekleşecek ve toplum için bir özgürlük aracı haline gelecektir.

**Anahtar Kelimeler:** Bilim, Devlet, Akıl, Siyaset, Pozitivizm, Post-pozitivizm.

### ABSTRACT

In the 17th century Enlightenment Period, the Industrial Revolution took place with the dominant position of the mind and the construction of scientific knowledge through reason, the scientific method and the principles of rational thinking revealed the sciences and influenced technological developments. Science, which is limited to the world of facts, is now elevated to the status of the most valid field that will produce solutions to all problems in society. The process of mechanization in industry that came with the Industrial Revolution is also reflected in human life by ignoring the spiritual aspect of man. The criticism and solution proposal of this mechanization process and reason-based scientific superiority, which perhaps turned into a rebellion in the history of philosophy and science, reached its peak in the 20th century with Paul Feyerabend. Feyerabend is of the opinion that the superiority of science affects many areas in society, as well as the political area, to the extent that it poses a threat to democracy. According to him, there is a connection between scientific laws and the social order that reveals them. The state has gained a dimension that threatens freedom of thought with the social control

mechanisms it has developed through the opportunities offered by science. According to Feyerabend, the process of separating religion and state from each other and adopting a secular structure should also be carried out between science and the state. Because, according to him, science has become a religious institution and various problems have arisen in society. In order to eliminate these problems, science and the state must be separated from each other. Because the support of science by the state has further increased its power in the social field. Science that is strengthened by the state and does not accept criticism; It moves away from being an independent discipline that reveals information about humans, society and the universe. According to Feyerabend, who stated that science is a tradition like other traditions in society, the state should give equal chances to all traditions in order to create a free society. Only in this way will the threat to democracy reflected from science to the political sphere be prevented. Feyerabend has been defined by some people as a scientific anarchist because he criticized the scientific method and theory. His aim is not to create anarchy in the scientific field; It is to reveal the necessity of separating science from the state by revealing its authoritarian, oppressive and dominating attitude. According to Feyerabend, only science separated from the state will occur freely and become a tool of freedom for society.

**Keywords:** Science, State, Mind, Politics, Positivism, Post-positivism.

## GİRİŞ

Günümüz felsefesinde her felsefi problem kendi özgün kavramları ve bağlamı içerisinde ele alınmakta ve kendi çözüm önerisi ile değerlendirilmektedir. Felsefi bilginin sürekliliğinden dolayı, her felsefi ekol kendi argümanlarını oluştururken gerek yanında yer alması ile gerek eleştirisi ile başka felsefi ekollerden etkilenmektedir. 20. yüzyılın önemli filozoflarından olan Paul Feyerabend, eleştirel felsefe yöntemi ile birçok filozofun felsefi ekollerini önce benimseyip açıklamış olsa da çok ciddi şekilde eleştirerek kendi felsefi önerisini sunmuştur. Eleştiri sürecine tez danışmanı Victor Kraft, hocası sayesinde üyesi ve öğrenci lideri olduğu Viyana Çevresi eleştirisi ile başlamıştır. Daha sonra bir dönem asistanlığını yaptığı ve pozitivistten post-pozitivizme geçişte bir köprü görevi gören Karl Popper'i, fikirlerinden fazlasıyla etkilendiği Thomas Kuhn ve kendisini dogmatik uykusundan uyandırdığını iddia ettiği Ludwig Wittgenstein'i eleştirerek kendi kuramını önermiştir.

Dünyayı kendi resmettiği kadar, sadece olgular ile kabul eden Pozitivizm eleştirisi ile başlayan eleştiri süreçlerinde Feyerabend, dünyanın bu şekilde resmedilişinin eksik ya da hatalı olduğunu dile getirmektedir. Feyerabend, Pozitivizm eleştirisi ile sadece akıl ile yapılan bilimin toplum gözünde yüceltilmesini eleştirerek felsefi ya da bilimsel alanda tüm dikkatleri üzerlerine çekip birçok kişinin ya da ekolün eleştirisine maruz kalarak *bilim düşmanı* ya da *anarşist* olarak itham edilmiş, yaklaşımıyla bilim felsefesine ilişkin tartışmalarda farklı bir bakış açısı ortaya koymuştur. Viyana Çevresi pozitivistiminin ya da Karl Popper'in "eleştirel akılcılığının" önce açıklayıcısı sonrasında çok sert eleştiricisi olarak adını duyurmuş ve yirminci yüzyılın en ünlü bilim felsefecilerinden biri haline gelmiştir. Ona göre bilimde kullanılan tümevarım, yanlışlamacılık ve her türlü rasyonalist görüş toplumsal yapı için tehlike oluşturmaktadır. Çünkü bu ilkeler bilimi insaüstü bir otorite haline getirerek, bilimin toplum üzerinde bir baskı oluşturmamasını sağlayarak demokrasiyi tehdit etmektedir.

Feyerabend, bilim adına hüküm veren ve değişmez kabul edilen görüşleri eleştirerek bunu "*bilim kilisesi*" olarak tanımlamıştır. Ona göre, nasıl ki kilise kendi doktrinine uygun gelmeyen her görüşü aforoz ediyor ve din dışı bırakıyorsa bilimde kendi yapısına uygun olmayan düşünceyi kabul etmeyip yok saymaktadır. Feyerabend'in "Bir zamanlar insana, kendisini zorba bir dinin yarattığı korkulardan ve önyargılardan kurtaracak fikirleri ve gücü vermiş olan aynı girişkenlik, şimdi o insanı kendi çıkarlarının kölesi haline getiriyor" (Feyerabend, 1999). söyleminden anlaşılacağı üzere bilim Orta Çağ'daki skolastik düşünce ile yaşadığı mağduriyetin acısını çıkarmaya çalışmaktadır. Skolastik düşüncede din adamlarının söyledikleri esas alınırken, bilim ve düşünceye izin verilmemekte, özgür bir bilimden söz edilememektedir. Kilisenin tek egemen güç olduğu Orta Çağ'ın karanlık halini bilimin ve aklın tek egemen güç olduğu pozitivist süreç almıştır. Orta Çağ'da kilisenin emirlerine karşı gelmenin ağır cezaları olduğu gibi, Pozitivist süreçte de bilimin çalışmaları dışında çalışma yapmak bilim sayılmamak ile eş değer kabul edilmekte bilim adamı cezalandırılmaktadır. Bilimin kendisi dışındaki tüm açıklama modellerini aforoz etmekte olduğu Sunay'ın şu cümlelerinden de anlaşılabilir: "Nasıl



dün insanlar papazların ve kardinallerin kozmolojisini tartışmasız kabul etmek zorunda ise bugün de sıradan insan, bilim adamlarının kozmolojisini tartışmadan, düşünmeden kabul etmek zorundadır” (Sunay, 2020). Bu çalışma “*bilim kilisesi*” kavramının tarihsel kökenine inilerek nasıl olgunlaştığının ele alınması, kavramın anlaşılmasına ve niçin eleştiri sahnesinde başrol oynadığına açıklık getirmeye çalışacaktır. Daha sonra kavramın siyaset ile ilişkisi, bu ilişkinin toplum üzerindeki etkisi incelenmeye çalışılacaktır.

### “BİLİM KİLİSESİ”NİN KAYNAĞI

19. yüzyılda, bilim göz kamaştırıcı bir çıkış ile incelenmesi gerekenin yalnızca emprizmin etkisiyle ortaya çıkan olgular olduğuna değinmektedir. Burada söz konusu olan şüphesiz ki önce Saint Simon tarafından geliştirilen daha sonra August Comte tarafından sistemleştirilen Pozitivizm’dir. Klasik ve Sistematik olarak ikiye ayrılan Pozitivizm; klasik dönemde Comte’un öncülüğünde toplum incelemesi ile, Sistematik dönemde ise Kraft öncülüğünde bilim incelemesi ile çalışmalarını yürütmüştür. 19. yüzyıl felsefesinde, bilimin metafiziksel unsurlardan tamamen temizlendiği Pozitivizm ile karşımıza çıkan temel unsurlar; tümevarım, emprizm, doğrulamacılık, metafiziğin reddiyle başrol olan akıl’dır. Comte göre Pozitivizm ile bilim aracılığıyla 19. Yüzyılda yaşanan kültürel ve toplumsal tüm sorunlara çözüm bulunacak, bilim toplumun evrilişine önyak olacaktır. Pozitivizm’e göre insanın doğaya karşı gücünü gösteren temel unsur sadece deneydir ve tüm yüce gizemler insan zihnine yasaklanmıştır. 19. yüzyıl boyunca bilimsel çalışmalara sonsuz güven duyulmuş, bilimsel çalışmalar Pozitivizmin temel yasalarına göre devam etmiş ve bilim doğaya bütünüyle egemen olmuş, akıl ve bilim ayrıcalıklı bir konuma yerleşmiştir.

Feyerabend, akademik hayatının başında içinde bulunduğu Viyana Çevresi’nin etkisiyle sıkı bir pozitivism savunuculuğu yapmış olsa da zamanla bu görüşlerin en sert eleştisini yapmıştır. Metafiziğin tamamen bilim dışına atılarak, gereksiz olduğu görüşü ile Pozitivizme ait şüphe duymaya başladığını şu ifadelerinde bulabilmekteyiz; “Walter bilimsel araştırmaların gerçekliğe göre yürütüldüğüne işaret ederek başladı. Buna karşılık ben de bilim adamlarının ne yazık ki metafizik kabuklarını hala atamadıklarını söyledim. “Metafizik ya da değil” dedi Walter, “bilim adamları, pozitivistler de dahil, herkesin kabul ettiği sonuçlara ulaşıyorlar, oysa antiseptik bir dil ve katı bir mantık benimsemiş olsalardı asla bir yere varamazlardı.” Bu, bir süre sesimi kesti; ama bir kuşku tortusu kaldı” (Feyerabend, 1994). Bilimin tamamen olgusal olup metafiziği dışlaması ile ilgili şüpheleri Popper’in tümevarım eleştirisi ile daha da derinleşmiştir. Konu ile alakalı bir dönem kafa karışıklığı yaşamış, metafizik ve bilim arasındaki ilişkiyi sorgulamaya başlamıştır. “Ad hocçuluğun modası geçti; böylece, sıkı bir ampirik uyum gerekliliğinin yerini delillerin mümkün olduğunca ötesine geçme gerekliliği almalıdır. Metafizik, bilinen olguların ötesine geçmekte ve olgularla sık sık çelişmektedir. Bunun anlamı bilimin metafizik olduğu mudur? Hayır; bilimsel hipotezler çürütülebilir, metafizik sistemlerde bu mümkün değildir” (Feyerabend, 1994). Feyerabend, bilimin metafizik olduğu gibi bir fikir ileri sürmüş değildir, bilim ve metafiziğin bahsedildiği gibi keskin çizgiler ile birbirlerinden ayrılmış olduklarına dair şüphelere sahiptir.

Feyerabend, pozitivismin temel unsurlarından olan doğrulamacılık ilkesinin de geçerliliği hakkında şüphelere yine Popper sayesinde ulaşmıştır. Pozitivizme göre bir önermenin doğrulanması, doğrudan gözlemlenebilir olgular hakkında olması ve mantıksal düşünme kurallarına aykırı olmaması gerekmektedir. Doğrulanan bilimsel gerçeğin tek ve mutlak olduğunu savunan pozitivistler, bilimsel teoriler geliştirmek için temel yöntem olarak da tümevarımı kabul etmişlerdir. Popper’a göre ampirik bilimlerdeki teorileri ispatlamak mümkün değildir, bu teoriler ancak yanlışlanabilmektedirler. Popper bu görüşüyle pozitivismin temel unsuru olan doğrulamacılık görüşü ve doğrulamacılık ile varılan tümevarım yöntemini eleştirerek reddetmiş, yerine yanlışlanabilir ilkesini getirmiştir. Feyerabend, Popper’ın bu eleştirinden ve yerine gelen yanlışlanabilirlikten başlarda çok etkilenmiştir. “Beni sonunda ikna eden argüman tümevarımın bir uydurma olduğunu söylüyordu. Popper, üst düzey kanunlar çoğunlukla alt düzey kanunlarla çelişir ve bu yüzden de onlardan türetilemezlerdi; öncüllere ne kadar varsayım eklenirse eklensin sonuç değişmeyecekti. Yanlışlamacılık artık gerçek bir seçenek gibi duruyordu, ben de avlandım” (Feyerabend, 1994). Feyerabend daha sonra bu etkiden kurtulma sebebini “Popper’in fikirleri çok baştan çıkarıcıydı ve ben de tuzağa düşmüştüm.” Daha sonra bu etkiden kurtularak “Yanlışlamacılık, diyordum herhalde, iyi olabilir; ama neden ona sanki kutsal bir şeymiş gibi davranayım?” (Feyerabend, 1994)



Feyerabend, pozitivistimin temel unsurlarının toplum tarafından tek geçerli yöntem olarak mutlaklaştırılmasının, bilim ve bilime dayalı tüm teknolojilerin diğer tüm girişimleri hükümsüz kılacağını savunmaktadır. Feyerabend eleştirdiği bilimi şu şekilde tanımlamaktadır; “ “Bilim” ile kastettiğim çoğu bilim adamının ve geniş bir bölümüyle okumuş yazmış çevrelerin anladığı anlamda teorik ve uygulamalı doğa ve toplum bilimleridir: nesnellik amacı güden, sonuçlarını gözleme (deneye) ve zorunluluk yüklü gerekçelere dayandıran, sağlam bir şekilde tanımlanmış ve mantıksal olarak kabul edilebilir kurallar rehberliğinde yürütülen bir araştırma olarak bilim” (Feyerabend, 1995). Feyerabend, genel anlamda bilime karşıt değildir; aksine yaptığı çalışmaların büyük bir çoğunluğu fizik, mekanik gibi bilimler ile ilgilidir. O bilimin toplumdaki diğer girişimleri hükümsüz kılması, toplum üzerinde baskı oluşturarak demokrasiyi tehdit etmesi özelliğine karşı çıkmaktadır. Ona göre bilimin kendisinin özgür olması ve özgürce eleştirilmesi gerekmektedir, ancak özgür bir şekilde yapılan bilim toplumu özgürleştirmektedir.

Feyerabend’in “Bir zamanlar insana, kendisini zorba bir dinin yarattığı korkulardan ve önyargılardan kurtaracak fikirleri ve gücü vermiş olan aynı girişkenlik, şimdi o insanı kendi çıkarlarının kölesi haline getiriyor” (Feyerabend, 1999). söyleminden anlaşılacağı üzere bilim Orta Çağ’daki skolastik düşünce ile yaşadığı mağduriyetin acısını çıkarmaya çalışmaktadır. Skolastik düşüncede din adamlarının söyledikleri esas alınırken, bilim ve düşünceye izin verilmemekte, özgür bir bilimden söz edilememektedir. Kilisenin tek egemen güç olduğu Orta Çağ’ın karanlık halini bilimin ve aklın tek egemen güç olduğu pozitivist süreç almıştır. Orta Çağ’da kilisenin emirlerine karşı gelmenin ağır cezaları olduğu gibi, Pozitivist süreçte de bilimin çalışmaları dışında çalışma yapmak bilim sayılmamak ile eş değer kabul edilmekte bilim adamı cezalandırılmaktadır. Bilimin kendisi dışındaki tüm açıklama modellerini afroz etmekte olduğu Sunay’ın şu cümlelerinden de anlaşılmalıdır: “Nasıl dün insanlar papazların ve kardinallerin kozmolojisini tartışmasız kabul etmek zorunda ise bugün de sıradan insan, bilim adamlarının kozmolojisini tartışmadan, düşünmeden kabul etmek zorundadır” (Sunay, 2020).

20. yüzyılın başından itibaren pozitivistime getirilen eleştiriler ve yönelimlerle ortaya çıkan post-pozitivistim ile bilgi ve bilimsel alanda yürütülen tartışmalar bilimsel, düşünsel ve kültürel alanı etkilemiştir. Bu etkilenme üzerinden fikirlerini inşa eden Feyerabend’e göre bilim toplumdaki temel güç haline gelirse toplumsal değerler zarar görecektir. Çünkü ona göre; “Gücün yolu basit ve oldukça sık tutulan bir yoldur. Tartışma yoktur; anlama çabası yoktur; gücü elinde bulunduran yaşam biçimi kendi kuralını koyar ve ona ters düşen davranışı yok eder.” (Feyerabend, 1995). Feyerabend, bilim ile kesin kurallar konması düşüncesinin farklı toplumların değerleri ile uyuma göstermediğinde ne yapılabileceği üzerine sorgulamaya girmekte, bilimi bu dayatmacı tavrından dolayı ortaçağ dönemindeki kilise yapısına benzetmektedir. Ona göre bilimsel çalışmalar içerisinde yer aldığı toplumsal değerler ile değerlendirilmekte; kabul görüldüğü edilmektedir. “Kürtaj, ötenazi, genlerle oynama, suni dölleme ve farklı kültürler arası (entellektüel, politik, ekonomik, askeri) alışverişler hakkındaki tartışmalar değerlerin düşünme, tutum ve eylemlerimizi nasıl etkilediğini göstermektedir.” (Feyerabend, 1995). Feyerabend, bilimin söylemlerinin evrensel bir kıtas haline gelmesini, tek ve mutlak bilgi kaynağı olarak görülmesi ile toplumda elde ettiği güç ile demokrasi ve özgürlük için bir bilim kisisesi haline dönüştüğünü vurgulamaktadır. Ona göre, yapılması gereken bilim kilisesinin deşifre edilerek, bilimin ve toplumun özgürleştirilmesidir.

Feyerabend içinde yer aldığı post-pozitivistimi, bilimin üstünlüğünü reddi ve tek bir yöntemin varlığını kabul etmediği kuramsal anarşist tavrıyla zirvesine taşımıştır. Feyerabend’e göre bilim Ortaçağ’daki dinsel yapının halini almış, bilim adamları ise din adamlarının eleştirilemez, mutlak, dogmatik tutumuna bürünmüştür. Bilimin bu yönüyle *epitemolojik bir hastalığa* yakalandığını, bu hastalığın ilacının hastalık geçene kadar kullanılacak olan *yönteme hayır* söylemidir. Buradan kasıt yöntemsiz bilim değil, bilimin ilerlemesi için tek bir yönteme saplanıp kalmak yerine bilimsel ilerlemeyi sağlayacak olan *ne olsa uyar* ilkesiyle gelen duruma uygun olan her ilkenin geçerliliğidir. Bilim, tahakküm edici özelliği ile toplumdaki demokrasi ve düşünce özgürlüğünü kısıtlayarak amacı dışına çıkmaktadır. Ona göre, bilim insanlığa hizmet etmeli, insanlığın mutluluğu için çalışmalıdır. Bilimin değeri, insanın özgürleşmesi ve mutluluğuna yaptığı katkı ile ölçülmelidir. Oysa çağdaş bilim, başka geleneklerin varlığına engelleyerek, baskıcı siyasal iktidarlardan beslenmekte ve kendisi de bu iktidarlara beslenmektedir. Feyerabend’e göre bu durumda hem bilim, hem bilim felsefesinin hasta olduğunu ifade ederek bilimin anarşist bir çaba olduğunu kuramsal anarşizm ile açıklamaktadır. “Bilim aslında anarşist bir çabadır:

Kuramsal Anarşizm, yasa ve düzen öngören diğer seçeneklerinin yanında daha bir insana yakın, daha çok ilerlemeyi yüreklendiricidir” (Feyerabend, 1989). Feyerabend, bilimin sözkonusu hastalığından bahsedilen anarşizm ile kurtulacak, insancıl hale gelecektir. Çünkü feyerabend bilim felsefesi ile uğraşma gerekçesini, “felsefenin bu “saldırgan” dalıyla uğraşmasının gerekçesini, “daha insancıl” bir bilim görüşü ortaya koymak diye açıklar” (Güzel, 1996).

### BİLİM KİLİSESİNİN SİYASİ YAPIYA ETKİSİ

Feyerabend’e göre “Bilim konusundaki her tartışmada ortaya çıkan iki soru vardır:

(A) *Bilim nedir?* –nasıl ilerler, sonuçları nelerdir, standartları, usulleri, sonuçları öteki alanların standartlarından, usullerinden, sonuçlarından ne bakımdan farklıdır?

(B) *Bilimi bu kadar yüce yapan nedir?* –bilimi öteki varoluş biçimlerine kıyasla daha yeğlenir yapan ve bunun sonucu olarak da farklı standartlar kullanmasını ve farklı sonuçlar elde etmesini sağlayan nedir?” (Feyerabend, 1991).

Feyerabend, bu soruların cevabını araştırarak işe başlamıştır. Birinci sorunun cevabının tek bir yanıtının olmadığı, her ekole göre farklı cevaplar bulabileceğini ifade ederek, kendi tanımını “bilim insan tarafından geliştirilmiş olan pek çok düşünme biçimlerinden yalnızca biridir, en iyisi de olmak zorunda değildir” (Feyerabend, 1995). şeklinde yaparak ikinci sorunun yanıtına geçmiştir. Amacı zaten ikinci sorunun irdelenmesi ve toplumda geçerli olan bilim anlayışının eleştirilerek deşifre edilmesidir. Çünkü ona göre ikinci soruyu sorup cevap arayan pek kimse yoktur. “Soru B’yi soran hemen kimse yoktur. Bilimin kusursuzluğu varsayılır, kanıtlanmaz. Bu konuda bilim adamları ve bilim felsefecileri, kendilerinden önce biricik Roma Kilisesi’nin savunucuları nasıl davrandırlarsa öyle davranırlar: Kilise öğretisi hakikattir, bunun dışında kalan her şey pagan saçmalıklardır” (Feyerabend, 1991). Ona göre, bir dönemler dinde yer alan kabuller ve üstü kapalı ikna yöntemleri bilimde kendini gösterip toplumu etkilemektedir. Bilimin söylemleri, yapılan bilimsel çalışmaların önüne geçerek eşeltilirip sorgulanmamaktadır. “Dahası, bilim artık tikel bir kurum değildir; Kilise bir zamanlar nasıl toplumun temel dokusunun bir parçası idiye, şimdi de bilim demokrasinin temel dokusunun bir parçası olmuştur. Kilise ile Devlet artık elbette birbirlerinden özenle ayrılmışlardır. Oysa Devlet ve Bilim iç içedirler” (Feyerabend, 1991).

Feyerabend, bilim ve devlet yapısının bir arada olduğu görüşünü ileri sürerek bilimsel alanda yaşanan baskıcı ve otoriter tutumun siyasal alan için bir tehdit oluşturacağını savunmaktadır. Feyerabend, bilimin insan için olduğunu, insanı geliştirip özgürleştirilmesi gerektiğini, bilimsel etkinliklerin bu düşünceyle yapılmasını vurgulamıştır. “Kendi bilim felsefesinde vurguladığı temel şey, bilimin insan için olduğu; bilimsel etkinliklerde insanın gözardı edilmemesi gerektiğidir.” (Güzel, 2013). Feyerabend, bilimin ve bilim adamlarının tek otorite olup toplumu yönlendirerek bilimin bilim için yapılmasını, insanlığa hizmet etmemesini eleştirilmiştir. Ona göre, bilim adamları ve usalcılar savundukları görüşleri ve söylemleri ayrıcalıklı konuma getirip topluma dayatarak özgür toplum yapısına engel olmaktadır. “*Ussalcılar ve bilim adamları kendi gözde ideolojilerinin ayrıcalıklı konumunu ussal olarak (bilimsel olarak) gerekçelendiremezler. Ama diyelim ki gerekçelendirdiler –bundan, bu ideolojilerin artık herkese dayatılması gerektiği sonucu mu çıkar?*” (Feyerabend, 1991)

Feyerabend’e göre bilim, tek başına hüküm sürmektedir ve bunun nedeni ise “Bilimin günümüzdeki egemenliği, sahip olduğu kıyaslamalı üstünlüğünden değil, yarışmanın onun kazanacağı biçimde düzenlenmiş olmasından ileri gelir” (Feyerabend, 1991). Bilimin egemenliği devlet tarafından güçlenmekte, söz konusu güç yarışı bilimin galip geleceği şekilde devlet tarafından desteklenmektedir. Feyerabend, bilimsel olmayan düşüncelere eşit rekabet şansı verilmesiyle bilim karşısında güçlü bir rakip haline gelebileceklerini, hatta belki bilimin eksikliklerini açığa çıkaracaklarını savunmaktadır. Feyerabend’e göre özgür bir toplum içinde var olan bütün geleneklere eşit haklar verilmeli ve her gelenek güç merkezi olan devlete ulaşmada eşit konumda olmalıdır. Ona göre bilimin toplumda üstün olması yönteminden ya da elde ettiği sonuçlardan gelmemektedir. Bilimin baskıcı tavrından dolayı bilim dışındaki geleneklerin ne yaptıklarını bilmediğimiz için bilimi üstün görmekteyiz. “Biz bilimin ne yaptığını biliyoruz, ama öteki geleneklerin bundan çok daha iyisini yapıp yapamayacağına ilişkin en ufak bir fikrimiz yok. Öyleyse bunu anlamamız gerekiyor” (Feyerabend, 1991). Feyerabend, bunu anlamının yolunun toplumdaki bütün geleneklerin bir arada özgürce gelişmesiyle mümkün olacağını savunmaktadır. “Toplum hiçbir zaman tikel bir gelenekle özdeşleştirilemez ve devlet ile gelenekler her zaman ayrı tutulurlar” (Feyerabend, 1991).

Feyerabend'e göre özgür bir toplumda yaşamak için toplumda yer alan bireylerin belirli bir olgunluğa sahip olması gerekmektedir. Ona göre toplumda yaşayan bir çok birey henüz bu olgunluğun farkına varmamış, bu olgunluğa erişmemiştir ve böyle bir duyarlılığa toplumda en çok ihtiyacı olanlar bilim adamları ve öteki ussalcılardır. Sözü edilen olgunluk akılsal olmayıp, duyarlılık ile farklı geleneklerin amaçlarını ve üyelerinin yaşamındaki yerini anlamaya çalışarak gerçekleşmektedir. Feyerabend'e göre bu duyarlılık eğitim yolu ile öğretilecek bir şey olmayıp özgür bir toplum yapısı içerisinde gerçekleşmektedir. "Bu, okullarda öğretilemez ve gereksindiğimiz bilgeliği "toplumsal araştırmalar"ın yaratmasını beklemek de boşunadır. Ama bu, vatandaş girişimlerine katılmakla edinilebilir" (Feyerabend, 1991). Feyerabend, bilimsel yasalar ve onları oluşturan toplumsal düzen arasında bir bağlantı olduğu düşüncesiyle hareket ederek; hangisinin diğerini yönlendirdiğini, eleştirdiğini, gerektiğinde değiştirip değiştiremediğini sorgulamaktadır. Çünkü ona göre bilim de diğer gelenekler gibi eleştirilmeli, gerektiğinde değiştirilmelidir. "Bir zamanlar, bilimsel yasalar iyice oturmuş, bir daha düzeltilemez yapılar olarak görülüyorlardı. Bilginler olguları, yasaları keşfederler, böylece de güvenilir, kuşku duyulamaz bilgiyi arttırırlardı. Oysa Feyerabend'e göre, bilimsel yasalar kısmen değil bütünüyle bile yanlış olabilirler, yerine göre düzeltilebilirler de. Her ilke eleştirilebilir" (Güzel, 2013).

Feyerabend, bilimsel alandaki ilerlemenin bilim içerisinde yapılan eleştiriler ve çatışmalar ile gelişebileceğini düşünmektedir. Bilimin ilerlemesi ve gelişmesi için farklı geleneklerin bir arada, eşit değerde ve duyarlılık ile yaşaması gerektiğini vurgulamaktadır. "Görüyorsunuz ya -bilimler çatışmalarla doludur. Tek bir sesle konuşan BİLİM adlı tek bir canavar ise propogandacılar, indirgemeciler ve eğitimciler tarafından oluşturulan bir kolajdır" (Feyerabend, 1999). Feyerabend'e göre, bilim değişmez genel geçer kurallar ile işlememekte, böyle bir bilimsel düşünce bilimsel ilerlemeye zarar vermektedir. Bu durumda bilimin sonuçlarına güvenilmemeli mi ya da bilim bırakılmalı gibi yeni sorgulamalara girerek bu duruma bir çözüm getirmeye çalışmaktadır. " "Bilim bırakılmalı mı yoksa kullanılmalı mı?" soru budur. Feyerabend'e kalırsa bu soruya bilgikuramsal anarşizm yanıt verir." (Güzel, 2013). Feyerabend'in getirmiş olduğu bilgikuramsal anarşizm, bilim alanındaki bütün geleneklere eşit değer verilmesi sürecinden hareket ederek özgür bir toplum düşüncesine evrimini sunmaktadır. Onun anarşizm kavramından kastı klasik siyasi bir anarşizmi içermemektedir. "Feyerabend'in anarşizmi, toplumu eleştiren duygu ya da düşüncelerde değil, katı kuralların tamamen reddedilmesinde ve başkaldırının, farklı oluşun ve sorgulayan bir bilincin davet edilmesinde yatıyordu. Siyasi anarşistlerin (ve şiddet karşıtı anarşistlerin!) aşırı uçlarda yer almalarının ve öfkelerinin ardında yatan nedenlerin anlaşılmasını sağlamak için, günlük yaşamdaki mücadelelerde farklı kişiliklere bürünen insanlara yeteri kadar yakın değildi" (Feyerabend, 2007).

Feyerabend'e göre, her geçen gün kendini kutsallaştırarak, toplumda ayrıcalıklı bir yere konumlandırılan bilim, bunu yaparken devlet tarafından desteklenmektedir. Bilimin toplumsal yapı üzerindeki gücünü devlet sağlamakta ve bağımsız olması gereken yapıya ters düşmektedir. Devlet, bilimin evren ve dünyaya ilişkin geçerli bilgiyi sağlayabilecek tek kaynak olduğunu topluma empoze etmektedir. "Öte yandan, günümüzde devlet ve kilise arasında bir ayırım olmasına rağmen devlet ve bilim arasında bir ayırım olmadığını düşünen Feyerabend'e göre, geçmişteki devlet ve kilise ayırımı günümüzde devlet ve bilim ayırımıyla tamamlanmalıdır" (Saygılı, 2019). Feyerabend'e göre, devlet her disipline eşit yaşama hakkı vererek gerek bilimin, gerek dinin ya da bir başka baskıcı unsurun toplum üzerinde mutlak güç olmasına engel olacaktır. Bilime uygun olan yaşamalı, uygun olmayan yok olmalı biçimindeki bilim şovenliğinin üstesinden gelmek için devletin müdahalesine ihtiyaç vardır. "Ne kadar eski ve saçma olursa olsun bilgimizi geliştiremeyecek düşünce yoktur. Tüm düşünce tarihi bilimce emilir ve tek tek her kuramın geliştirilmesinde kullanılır. Siyasal müdahale de reddedilmez. Statükoya alternatiflerin direnç gösteren bilim şovenliğinin üstesinden gelmek için bu müdahaleye ihtiyaç duyulabilir" (Feyerabend, 1999). Feyerabend'e göre, devlet herhangi bir bilgi türünün karşısında ya da yanında yer almamalı tarafsız olmalıdır. "Devlet, bireysel seçim hürriyetini her türlü boyunduruktan esirgemek amacıyla bir paradigmayı diğerine, örneğin bilimi dine, dini bilime, üstün tutmaktan kaçınmalı ve her vatandaşa kendisine uyanı tanıma, kullanma ve geliştirme imkanı vermelidir" (Delacampagne, 2010).

## SONUÇ

Feyerabend *bilim kilisesi* söylemiyle; bilimin yetkeci, köleleştirici, farklılıkları dışlayıcı özelliklerinin eleştirisini yapmakta ve bilime insani bir karakter kazandırma arzusunu taşımaktadır. Ona göre bilim toplumda asli görevini yitirerek baskıcı bir role ve dinsel bir kılığa bürünerek bilim adamlarının özgür

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

çalışmasının önüne geçmiştir. Toplumdaki diğer geleneklerden hiçbir ayrıcalığı olmaması gereken bilimin dünyanın her yerinde rakipsiz bir egemenlik kurduğunu dile getiren Feyerabend, bu durumun nedenini bilimin akılsal oluşu ya da işsel üstünlüğünde değil, devletle bütünleşerek bütün diğer kültürleri, değerleri, yöntemleri, usulleri, akıldışı veya bilimdışı ilan ederek yok etmiş olmasından kaynaklandığını savunmaktadır. Bilimin bu tutumunun bilim dışı alanları haksız bir zaferle baskı altında tuttuğu, bilimsel doğrular konusunda tekelci bir konuma getirdiğini dile getirmektedir. Bilimin bu tekelci konumunu ve yegâne bir bilgi aracı olma özelliğini kabul etmeyip bu durumun yaşamdaki, bilimdeki değişme ve gelişmeyi göz ardı etmek olduğunu söylemektedir.

Feyerabend bilimin modern insan üzerinde, Hıristiyanlığın Ortaçağ insanı üzerindeki nüfuzuna benzer bir statü kazandığını savunmuş, putlaştırılan bilimin insanın gözündeki yüksek statüsünü kurumlaşmış bir baskı sayesinde koruduğunu belirtmiştir. Bu baskıyla bilim adamlarının da toplumun yapısını belirleyen, neyin doğru olup olmadığı konusunda fetva veren din adamlarına dönüştüğünü dile getirmektedir. Ona göre kilisenin Orta Çağ'daki baskı ve egemenliğini çağımızda bilim kurmuştur. Bilimin bu bağınaz yapısı hem bilimsel gelişim için hem de toplumsal ilerleme için bir tehdit oluşturduğunu dile getirerek, özgür bir toplum için bilimsel çalışmaların halkın denetimine açılması gerektiği ve bilim ve devletin birbirinden ayrılması gerektiği hususuna değinmektedir. Feyerabend'e göre bilim; din, ideoloji, astroloji hatta falcılık gibi uygulamalardan sadece biri olarak kabul edilmelidir. Çağdaş bilimin üstün bir özelliğe sahip olduğunun kabul edildiği; dogmatik, dayatmacı ve kör bir zihniyetin bilimde egemen olduğunu dile getirip bu durumu sert bir şekilde eleştirmiştir. Ona göre bir bilginin bilimsel olması, ona insanların itaatini zorunlu kılmaz, aksine bilim insan için yapılmalı, insancıl olmalıdır.

Feyerabend de metafiziği diğer bilgi türleri gibi değerli olduğu düşüncesiyle felsefe tarihindeki yerini sağlamlaştırmıştır. Bilimde sadece aklın temel alınması, aklın egemen olması fikrine de benzer karşı çıkışlarda bulunan Feyerabend *ne olsa uyar* ilkesi ile daha plüralist bir yaklaşım sergilemiştir. Feyerabend eleştirileri ile gerek bilim camiasında gerek felsefe camiasında acımasızca eleştirilmiş *bilim düşmanı* ya da *anarşist* olarak ithamlara maruz kalmıştır. Burada amacı da bilim düşmanlığı değildir, amaç sadece akıl ile yapıldığı kabul edilen bilim için tek bir yöntem kabulünün ve bilgiyi tekelleştiren bir bilim anlayışının reddidir. Feyerabend, devlet tarafından desteklenerek kısır bir döngü içerisine düşen bilimin içine düştüğü kısır döngüden kurtulması için yeni bir bilim felsefesi arayışına girmiş ve bu arayışta kendine özgü bilim önerisi getirmiştir. Ona göre, bilim tek ve evrensel bilgi üretme biçimi olmayıp bilgi elde etmek için bilgi türlerinden sadece biridir. O, Bilimin bu özelliğini bilime verecek yapı onu yücelterek mutlaklaştıran devlettir görüşünü savunmuştur. Önerdiği bilim önerileriyle toplumda bilimin doğru anlaşılmasına, özgür bir şekilde uygulanmasına ve her türlü bilimcilik ya da bilim bağınazlığına karşı bilinçli olunmasına yardımcı olacaktır. Feyerabend'e göre, bilimin toplum karşısında mutlak otorite haline gelmesini sağlayan devlet, bilimden ayrılıp tüm geleneklere eşit mesafede durarak bilimi tekrar olması gerektiği yere getirecektir. Daha insancıl hale gelen bilimsel çalışmalar, artık toplumun özürleşmesi için çalışacak demokrasi ve ifade özgürlüğünü destekleyecektir.

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October 13-14, 2023

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ZENGEZUR KORİDORUNUN BÖLGE AÇISINDAN SİYASİ VE EKONOMİK ÖNEMİ  
POLITICAL AND ECONOMIC IMPORTANCE OF THE ZENGEZUR CORRIDOR FOR  
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ÖZET

Ülkemizin Avrasya jeo-ekonomik haritasında kazandığı şanlı zaferin yarattığı yeni fırsatlar, uluslararası ulaştırma sisteminin topyekün yeniden şekillenmesi gerçeğini yarattı. Özellikle Orta Asya ülkelerinin yeni pazarlara erişiminde Zengezur koridorunun ekonomik önemi vurgulanmalıdır. Dünya ekonomisinin ana lokomotiflerinden biri olarak kabul edilen Çin'den Orta Asya güzergahı üzerinden mal taşınması potansiyelinin yanı sıra Süveyş Kanalı üzerinden deniz taşımacılığı güzergahına alternatif bir ulaşım koridoru oluşturulması potansiyeli Azerbaycan'ın ve Zengezur koridorunun önemli bir ulaşım arterine dönüşmesi için koşullar yaratıyor. Son döneme baktığımızda Evergreen gemisinin Süveyş Kanalı'nda kazası, 5,1 milyar doları batıya, 4,5 milyar doları doğuya giden kargo olmak üzere toplam 9,6 milyar dolar kayba neden oldu. Dünya ticaretinin yaklaşık yüzde 12'sinin bu kanal üzerinden gerçekleştirildiği dikkate alındığında, Zengezur Koridoru'nun da aralarında bulunduğu alternatif ulaşım arterlerinin Avrasya'nın ulaşım altyapısında ekonomik önemini görebiliriz. Zengezur koridorunun bir parçası olacak hem demiryolu hem de otoyolun inşaatı ile ilgili çalışmalar hızla yürütülüyor. Böylece 101,9 km 2 trafik şeritli "Zafar Yolu"nun inşası, Azerbaycan'ın da dahil olduğu Karabağ bölgesinin ulaşım koridorlarına erişimi çeşitlendirerek içinden geçecek hatların önemini artıracak. Cumhurbaşkanı Recep Tayyip Erdoğan'ın Azerbaycan'a resmi ziyareti çerçevesinde 25 Eylül'de Azerbaycan Cumhuriyeti ile Türkiye Cumhuriyeti Arasında "Kars-Nahçıvan Demiryolu Projesine İlişkin Niyet Protokolü" imzalanması Zengezur koridorunun açılmasına yönelik ciddi adımlardan biri sayılmaktadır. Bölgede hayata geçirilecek diğer projeler değerlendirilirken Zengezur koridoru bölge ülkelerine göre daha ucuz bir alternatif görevi görüyor. İran ve Ermenistan üzerinden geçmesi beklenen 3,5 milyar dolar değerindeki yeni demiryolu hattını uzun yıllardır uluslararası finans kuruluşları, yabancı ülkeler ve hatta Ermenistan devleti bile finanse edemiyor. Zengezur koridorunun oluşmasıyla oluşacak yeni ekonomik konjonktürün Asya ve Avrupa'nın ulaştırma altyapısında özel bir önem taşıyacağı sonucuna varılabilir.

**Anahtar Kelimeler:** Zengezur koridoru, Karabağ, Azerbaycan, Türkiye, Avrasya jeo-ekonomik haritası

ABSTRACT

The new opportunities created by our country's glorious victory on the Eurasian geo-economic map have created the reality of a total reshaping of the international transportation system. The economic importance of the Zengezur corridor, especially in the access of Central Asian countries to new markets, should be emphasized. The potential to transport goods from China, which is considered one of the main locomotives of the world economy, via the Central Asian route, as well as the potential to create an alternative transportation corridor to the maritime transportation route via the Suez Canal, creates conditions for Azerbaijan and the Zengezur corridor to turn into an important transportation artery. When we look at the recent period, the accident of the Evergreen ship in the Suez Canal caused a total loss of 9.6 billion dollars, of which 5.1 billion dollars was cargo going west and 4.5 billion dollars was cargo going east. Considering that approximately 12 percent of world trade is carried out through this channel, we can see the economic importance of alternative transportation arteries, including the Zengezur Corridor, in the transportation infrastructure of Eurasia. Work on the construction of both the railway and the highway, which will be a part of the Zengezur corridor, is being carried out rapidly.



Thus, the construction of the "Zafar Road" with 101.9 km 2 traffic lanes will diversify access to the transportation corridors of the Karabakh region, which includes Azerbaijan, and increase the importance of the lines passing through it. "Protocol of Intent on the Kars-Nakhchivan Railway Project" was signed between the Republic of Azerbaijan and the Republic of Turkey on September 25, within the framework of President Recep Tayyip Erdoğan's official visit to Azerbaijan. The signing of the "Protocol of Intent on the Kars-Nakhchivan Railway Project" between the Republic of Azerbaijan and the Republic of Turkey on September 25, within the framework of President Recep Tayyip Erdoğan's official visit to Azerbaijan, is considered one of the serious steps towards opening the Zangezur corridor. While other projects to be implemented in the region are being evaluated, the Zangezur corridor serves as a cheaper alternative compared to the countries in the region. International financial institutions, foreign countries and even the Armenian state have not been able to finance the new railway line worth 3.5 billion dollars, which is expected to pass through Iran and Armenia, for many years. It can be concluded that the new economic conjuncture that will occur with the formation of the Zangezur corridor will be of particular importance in the transportation infrastructure of Asia and Europe.

**Keywords:** Zangezur corridor, Karabakh, Azerbaijan, Turkey, geo-economic map of Eurasia

### Giriş

Ülkemizin Avrasya jeo-ekonomik haritasında kazandığı şanlı zaferin yarattığı yeni fırsatlar, uluslararası ulaştırma sisteminin topyekün yeniden şekillenmesi gerçeğini yarattı. Pek çok Asya ülkesi bu yeni fırsatların zaten farkında. Özellikle Orta Asya ülkelerinin yeni pazarlara erişiminde Zangezur koridorunun ekonomik önemi vurgulanmalıdır. Dünya ekonomisinin ana lokomotiflerinden biri olarak kabul edilen Çin'den Orta Asya güzergahı üzerinden mal taşınması potansiyelinin yanı sıra Süveyş Kanalı üzerinden deniz taşımacılığı güzergahına alternatif bir ulaşım koridoru oluşturulması potansiyeli Azerbaycan'ın ve Zangezur koridorunun önemli bir ulaşım arterine dönüşmesi için koşullar yaratıyor. Son döneme baktığımızda Evergreen gemisinin Süveyş Kanalı'nda kazası, 5,1 milyar doları batıya, 4,5 milyar doları doğuya giden kargo olmak üzere toplam 9,6 milyar dolarlık kayba neden oldu. Dünya ticaretinin yaklaşık yüzde 12'sinin bu kanal üzerinden gerçekleştirildiği dikkate alındığında, Zangezur Koridoru'nun da aralarında bulunduğu alternatif ulaşım arterlerinin Avrasya'nın ulaşım altyapısında ekonomik önemini görebiliriz. Stratejik güvenlik açısından Zangezur koridoru bölgedeki siyasi dengeleri etkileyebilir. Nahçıvan'ı Azerbaycan'a bağlayan koridor, Azerbaycan'ın bölgesel gücünü artıracak ve Ermenistan'ı bölgesel entegrasyona dahil edecektir. Bu, barışçıl çözümlere ve bölgesel işbirliğine elverişli bir ortam yaratacak ve çatışma riskini azaltacaktır.

### Araştırma ve bulgular

Özbekistan ve Türkmenistan cumhurbaşkanları düzeyinde Güney Asya ve Güney Kafkasya'nın ulaştırma ve lojistik imkanlarının tartışılması, Orta Asya ülkelerinin, Azerbaycan'ın transit imkânları da dahil olmak üzere yeni ulaşım koridorlarının kullanılmasına büyük ilgi gösterdiğini ortaya koyuyor. Zangezur Koridoru ile ilgili önemli noktalardan biri de Aşkabat Antlaşması'nın ülkelerin Avrupa'ya yeniden entegrasyonu konusunda yeni perspektifler yaratmasıdır. Avrasya bölgesindeki ulaşım bağlantılarının geliştirilmesi ve diğer ulaşım koridorlarıyla ortak faaliyetin sağlanması amacıyla Türkmenistan, Özbekistan, Kazakistan, İran, Umman, Hindistan ve Pakistan arasında Aşkabat Anlaşması imzalandığını belirtmek isterim. Uluslararası yüklerin bu ülkeler üzerinden Zangezur koridoru üzerinden Avrasya pazarlarına ulaştırılması Karabağ bölgesinin ekonomik potansiyelinin artırılmasında özel bir rol oynayabilir. (Belyayev, 2023, s.15)

Zangezur koridorunun bir parçası olacak hem demiryolu hem de otoyolun inşaatı ile ilgili çalışmalar hızla yürütülüyor. Tarihi topraklarımızdan geçecek koridor, Karabağ bölgesindeki karayollarını birbirine bağlama çalışmasının karmaşık bir yapıyla yürütüldüğünü gösteriyor. Yani 101,9 km 2 trafik şeritli "Zafar Yolu"nun inşası, Fuzuli bölgesini Şuşa şehrine bağlayarak Karabağ bölgesindeki sosyo-ekonomik ilişkilerin canlanmasına fırsat yaratacaktır. 123,8 km ve 4-6 trafik şeritli Horadiz-Cebrayl-Zangilan-Ağband yolu, 70 km ve 4 trafik şeritli Hudafarin-Gubadlı-Laçın yolu, 73 km ve 2 trafik şeritli Kelbecer-Laçın yolu, 13 km ve 4 trafik şeritli Fuzuli trafik şeritleri - Hadrut yolu, 45 km ve 4 trafik şeritli Barda-Ağdam yolunun inşası, Azerbaycan'ın da dahil olduğu Karabağ bölgesinin ulaşım koridorlarına erişimi çeşitlendirerek içinden geçecek hatların önemini artıracaktır. (Bədirxanlı, 2023, s.4)

Güney Kafkasya ülkeleri Azerbaycan, Ermenistan ve Gürcistan ile komşu ülkeler Türkiye, Rusya ve İran, "3+3" formatında jeopolitik iş birliğiyle iletişim hatlarını yeniden kurarak uluslararası transit taşımacılığında yeni bir ekonomik ağırlık merkezi oluşturabilirler. (Kamal, 2023, s.2) Elbette bu iş birliği içerisinde Zengezur koridorunun siyasi ve ekonomik önemi yadsınmaz. Bölgede hayata geçirilecek diğer projeler değerlendirilirken Zengezur koridoru bölge ülkelerine göre daha ucuz bir alternatif görevi görüyor. İran ve Ermenistan üzerinden geçmesi beklenen 3,5 milyar dolar değerindeki yeni demiryolu hattını uzun yıllardır uluslararası finans kuruluşları, yabancı ülkeler ve hatta Ermenistan devleti bile finanse edemiyor.

Zengezur Koridoru, Güney Kafkasya'ya açılan stratejik bir kapı olarak seçilmiştir. Nahçıvan Özerk Cumhuriyeti Azerbaycan'ı anavatanına bağlayan ve Ermenistan'ı bölgesel ekonomik entegrasyona dahil eden bir ulaşım ve ticaret yoludur. (Rza, 2022, s.21) Zengezur koridorunun önemi bölgedeki siyasi, ekonomik ve güvenlik dinamikleriyle birlikte değerlendirilmelidir. Çünkü Sovyetler Birliği'nden önce Zengezur, nüfusunun çoğunluğunun Müslüman Türklerin olduğu bir bölgeydi. 1920'li yıllarda Sovyetler Birliği tarafından Ermenistan'a ilhak edilmesinin ardından bölgenin demografik yapısı değişmeye başladı. Zengezur Koridoru tarihsel olarak bölgedeki farklı kültürler, etnik gruplar ve devletler arasında bir temas noktası olmuştur. Şu anda Nahçıvan Özerk Cumhuriyeti, Azerbaycan'ın ana topraklarından Megri bölgesi ile ayrılmıştır. Dolayısıyla Zengezur koridoru Nahçıvan'ı Azerbaycan'a bağlayacak ve bu bölgenin Azerbaycan'ın siyasi, ekonomik ve sosyal yapısına entegrasyonunu sağlayacaktır. Koridor, Azerbaycan'ın toprak bütünlüğünü güçlendirmenin yanı sıra Nahçıvan'ın dış dünyaya açılması ve bölgesel işbirliğine katılım için de koşullar yaratacak. Ekonomik açıdan Zengezur koridoru bölgede ticaret ve taşımacılığın canlanmasında stratejik bir rol oynayabilir. Koridor, Azerbaycan ve Türkiye ile sınırlı coğrafi konumuna rağmen Nahçıvan'ın Karadeniz ve Avrupa'ya erişimini kolaylaştıracak. Bu, Nahçıvan'ın bölgesel ekonomik entegrasyonda aktif rol oynamasına olanak sağlayacaktır. Aynı zamanda Nahçıvan'dan geçen Zengezur koridoru, Orta Asya ve Güney Asya ülkelerinin Avrupa pazarlarına erişimini kolaylaştıracak. Bu, bölgesel ticaretin artmasına ve ekonomik büyümenin teşvik edilmesine katkıda bulunacaktır. (Türk dünyasının Zəngəzur dəhlizi, 2021, s. 5)

Ayrıca Zengezur koridoru enerji politikası açısından stratejik bir rol oynayabilir. Bölgedeki enerji kaynakları bu koridor aracılığıyla Avrupa pazarlarına taşınabilecek. Azerbaycan'ın zengin petrol ve doğal gaz kaynakları, bölgenin enerji güvenliğini sağlayan Zengezur koridoru aracılığıyla uluslararası enerji projelerine entegre edilebilecek. Bu, Batı'nın enerji kaynaklarını çeşitlendirmesine olanak tanıyacak ve bölge ülkelerinin ekonomik ve siyasi istikrarını destekleyecektir.

### Sonuç

Sonuç olarak Zengezur koridorunun Güney Kafkasya'da stratejik bir geçiş güzergahı olduğunu ve bölgenin siyasi, ekonomik ve güvenlik dinamikleri açısından önemli rol oynama potansiyeline sahip olduğunu belirtelim. Koridor, Nahçıvan'ı Azerbaycan'a bağlayarak bölgesel işbirliğini ve ekonomik entegrasyonu teşvik etmenin yanı sıra enerji politikası ve stratejik güvenlik açısından da önem taşıyor. Koridor bu anlamda bölgesel ilerlemeye giden yol olarak tanımlanabilir. Zengezur koridorunun oluşmasıyla oluşacak yeni ekonomik konjonktürün Asya ve Avrupa'nın ulaştırma altyapısında özel bir önem taşıyacağı sonucuna varılabilir.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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BÜKÜM KATSAYISI DEĞİŞİMİNİN LYOCELL İPLİK MUKAVEMETİ ÜZERİNDEKİ  
ETKİSİNİN ARAŞTIRILMASI

INVESTIGATING THE IMPACT OF TWIST COEFFICIENT VARIATION ON THE  
STRENGTH OF LYOCELL YARN

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**ÖZET**

Sürdürülebilir ve çevre dostu bir tekstil malzemesi olan Lyocell ipliği, yüksek mukavemet ve nem emme özellikleri de dahil olmak üzere mükemmel özellikleri nedeniyle son yıllarda büyük ilgi görmüştür. İplik üretiminde kritik bir parametre olan büküm katsayısı, ipliğin mekanik özelliklerinin ve dolayısıyla üretim sürecindeki enerji tüketiminin belirlenmesinde önemli rol oynar. Bu makale, büküm katsayısını değiştirmenin Lyocell ipliğinin mukavemeti üzerindeki etkisini araştırmayı amaçlamaktadır ve hem iplik mukavemetini hem de enerji verimliliğini arttırmak için en uygun büküm katsayısını belirlemektedir.

Çalışma, elyaf tipi, iplik numarası gibi diğer parametreleri sabit tutarken büküm katsayısını değiştiren kapsamlı bir deneysel yaklaşım kullanıyor. Farklı büküm katsayılarına sahip 7 farklı Lyocell ipliği üretildi. İpliklerin düzgünlüğü, kusurları ve tüylülüğü bir Uster® Tester-5 kullanılarak değerlendirildi. Hassasiyet ayarları neps için +%200, kalın yerler için +%50 ve ince yerler için %50 idi. Her deneme için on test yapıldı ve sonuçların ortalaması alındı. TS EN ISO 2062'ye göre iplik çekme mukavemeti ve uzaması ölçüldü.

Çalışmanın sonuçları, büküm katsayısı ile Lyocell iplik mukavemeti arasında belirgin bir ilişki olduğunu göstermektedir. Büküm katsayısındaki bir artış genellikle lifler arasındaki bağı güçlendirdiğinden dolayı iplik mukavemetinde bir artışa yol açar. Ancak aşırı büküm ipliğin kırılma hızına ve dolayısıyla mukavemetinin azalmasına neden olabilir. Bu nedenle enerji kullanımını en aza indirirken iplik mukavemetini artırmak ve sürdürülebilir üretim süreçlerini desteklemek için optimum büküm katsayısı belirlendi.

**Anahtar kelimeler:** Lyocell iplik, İplik büküm katsayısı, İplik mukavemeti, Sürdürülebilirlik

**ABSTRACT**

Lyocell yarn, a sustainable and environmentally friendly textile material, has gained significant attention in recent years due to its excellent properties, including high strength and moisture absorption capabilities. The twist coefficient, a critical parameter in yarn production, plays an important role in determining the yarn's mechanical properties and, consequently, the energy consumption during the manufacturing process. This paper aims to explore the effect of varying the twist coefficient on the strength of Lyocell yarn and identifies the optimal twist coefficient for enhancing both yarn strength and energy efficiency.

The study employs a comprehensive experimental approach, changing the twist coefficient while keeping other parameters constant, such as fiber type, yarn count. 7 different Lyocell yarns with different twist coefficients were produced. The unevenness, imperfections, and hairiness of the yarns were evaluated using an Uster® Tester-5. The settings for sensitivity were +200% for neps, +50% for thick spots, and 50% for thin places. The unevenness (U%) and co-efficient of variation (CVm%) were used to express mass variation. While the CVm% was calculated using the standard deviation (SD) of the yarn's mass per unit length, the U% was based on the mean deviation. Ten tests were performed for each

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

trial, and the results were averaged. According to TS EN ISO 2062, yarn tensile strength and elongation were measured.

The results of the study show distinct correlation between the twist coefficient and Lyocell yarn strength. An increase in the twist coefficient generally leads to an enhancement in yarn strength due to improved fiber interlocking and cohesion. However, excessive twisting may cause the yarn to become brittle, thereby reducing its strength. Therefore, to enhance yarn strength while minimizing energy use and support sustainable production processes, the optimum twist coefficient was determined.

**Keywords:** Lyocell yarn, Twist coefficient, Yarn strength, Sustainability

## INTRODUCTION

Many people believe that there are only two types of fabrics: natural fibers such silk, wool, hemp, cotton, and ramie and synthetic fibers made from petrochemicals like nylon and polyester (Dhir,2022). Conventional synthetic fibers are often made from polymers derived from petroleum, and their widespread use has caused significant environmental issues (Mangal, 2023). As a result, the creation of biodegradable and environmentally friendly fibers for both fashion and industrial uses has recently received a lot of attention.

Lyocell is an environmentally friendly recycled fiber manufactured from wood pulp, mostly eucalyptus, that was developed in the 1980s. This fiber's 100% biodegradability and renewable source of raw material, which led to its further development as TENCEL, are some of its environmental advantages. Like other regenerated cellulose fabrics, it is soft, drapes nicely, and has good absorbency. Additionally, it is wrinkle-resistant and has exceptional durability. The cost and energy consumption of manufacturing is still a problem.

The aim of the study is to investigate the influence of varying twist coefficients on the properties of lyocell yarn. Emphasizing the importance of low twist for reduced energy consumption is a key focus of this study.

## MATERIAL AND METHOD

Properties of lyocell fibers were given in Table 1.

**Table 1.** Properties of lyocell fibers

	<b>Fiber length (mm)</b>	<b>Fiber fineness (dtex)</b>	<b>Breaking Tenacity (cN/tex)</b>	<b>Elongation (%)</b>	<b>Breaking Tenacity (BISFA-modulus) (cN/tex)</b>	<b>Whiteness (CIE)</b>
<b>Lyocell</b>	38	1.30	3.80	12.00	2.20	68.00

Fiber properties were conducted following these standards: fiber length (mm) according to DIN 53808-1, fiber fineness (dtex) in accordance with ISO 1973, breaking tenacity (cN/tex) and elongation (%) according to ISO 5079, and whiteness (CIE) based on ISO 11475.

100% lyocell ring yarns with a count of Ne 30 were spun on an industrial ring spinner. 7 different Lyocell yarns with different twist coefficients were produced. 7 lyocell yarn types were given in Table 2.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Table 2.** Lyocell Yarn Types

Lyocell Yarn	Yarn Count (Ne)	Yarn Twist (t/m)	Twist Coefficient ( $\alpha$ )
L-1	30	910	4.2
L-2		860	4.0
L-3		820	3.8
L-4		770	3.6
L-5		730	3.4
L-6		690	3.2
L-7		650	3.0

Before testing, the yarns were conditioned under a temperature of  $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$  and a relative humidity of  $65\% \pm 2\%$  (Booth, 1996). A Uster® Tester-5 was used to determine the unevenness, imperfections, and hairiness of the yarns. The sensitivity settings were  $-50\%$  for thin places,  $+50\%$  for thick places, and  $+200\%$  for neps. Mass variation was expressed using unevenness (U%) and co-efficient of variation (CVm%). Yarn strength and elongation were measured according to TS EN ISO 2062.

## RESULTS AND DISCUSSION

Physical Properties of Lyocell yarns were given in Table 3.

**Table 3.** Lyocell yarn properties

	Unevenness (U%)	Coefficient of Variation of Mass (CVm%)	Thin Place -50%	Thick Place +50%	Neps +200%	Hairiness	Elongation %	Breaking Force (cN)	Yarn Tenacity Rkm
L-1	8.681	10.952	1	4.1	25.7	5.439	9.126	554.887	28.747
L-2	8.637	10.901	0	3.3	19	6.601	8.606	577.919	29.598
L-3	8.733	11.025	0	5.1	21.2	5.659	8.379	561.702	29.099
L-4	8.764	11.069	0	6	35.4	5.921	8.656	562.126	29.121
L-5	8.738	11.022	0	4	19.7	6.436	8.41	557.128	28.863
L-6	8.653	10.904	0	2.5	19	6.771	8.606	570.84	29.573
L-7	8.74	11.01	0	3.5	8	7.288	8.312	536.577	27.799

As seen in Table 3, the unevenness of the yarn ranged from 8.637% (L-2) to 8.764% (L-4). The change in twist coefficient did not show a significant impact on yarn unevenness. Similar to unevenness, there was minimal variation in CVm due to the twist coefficient change. L-4 had the highest thick place value,



**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

suggesting a lower yarn quality. The highest increase was observed in L-7, with a 200% increase in neps. In addition, L-7 exhibited the highest hairiness, indicating a less smooth yarn surface. Moreover, the twist coefficient change had a minor impact on yarn elongation. Furthermore, L-2 exhibited both the highest breaking force and the highest yarn tenacity.

The decrease in twist coefficient from 4.2 to 3 resulted in several notable changes in yarn properties. The yarn became more prone to neps formation and had a higher hairiness, especially in L-7, indicating that lower twist can lead to reduced yarn smoothness. Thick places were more prominent in yarns with lower twist, suggesting potential issues in fabric quality. Despite these changes, yarn unevenness and CV<sub>m</sub> remained relatively stable, indicating that the overall mass distribution was not significantly affected. Yarn elongation, breaking force, and tenacity varied, but the differences were not substantial among the samples.

As a result, L-2 had the highest yarn tenacity, highest breaking force, L-2 had the lowest unevenness. However, increasing twist in yarn production can indeed lead to higher energy consumption, as it requires more energy to twist the fibers together tightly. Considering energy efficiency is important in textile manufacturing. Therefore, L-6 can be an alternative for an optimum twist value while maintaining good yarn properties and lower energy consumption.

L-6 has a moderate unevenness value, which is acceptable for many applications. Besides, L-6 has moderate hairiness. Furthermore, L-6 has a good breaking force value and yarn tenacity.

#### **CONCLUSION**

It can be concluded that L-6, with its moderate twist level, is likely to consume less energy during production compared to higher twist levels like L-1 or L-2. L-6 can be a viable alternative. It offers a good balance between yarn quality and energy efficiency.

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MUTFAK ÇALIŞANLARININ PİŞİRME UYGULAMALARI VE DAVLUMBAZ  
KULLANIMLARININ DEĞERLENDİRİLMESİ

EVALUATION OF KITCHEN STAFF'S COOKING PRACTICES AND RANGE HOOD  
USAGE

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**ÖZET**

Mutfak çalışanlarının çeşitli pişirme uygulamaları ve davlumbaz kullanımlarının değerlendirilmesi amacıyla planlanan bu çalışma, Ankara'da toplu yemek üretiminde çalışan toplam 88 gönüllü erkek bireyle yürütülmüştür. Aşçı ve aşçı yardımcıları ile servis personelleri çalışmaya dahil edilmiştir. Aşçı ve aşçı yardımcılarının iş yerinde pişirme ile meşgul oldukları ortalama süre 3,7±1,9 saattir. Aşçı/aşçı yardımcıları ve servis personellerinin evde bir günde yemek pişirmeye ayırdıkları ortalama süre benzer bulunmuştur (sırasıyla, 0,6±0,6 karşın 0,5±0,7, p>0,05). Bir günde pişirme için ayrılan toplam zaman (iş ve ev toplamı) sıcak mutfak çalışanlarında servis personeline göre anlamlı şekilde yüksek bulunmuştur (p<0,001). İş yerinde en sık tercih edilen pişirme yöntemleri arasında derin yağda kızartma, kavurma, ızgara ve fırında pişirme yer almaktadır. Aşçı/aşçı yardımcıları evde en sık kendi suyunda pişirme (%71,4) yöntemini kullanırken servis personelleri fırında pişirme (%47,1) ve kavurma (%29,4) yöntemlerini daha sık tercih etmektedir. Sıcak mutfak çalışanlarının dörtte biri pişirme işleminden önce kullanılacak yağın dumanının çıkmasını beklerken; %93,8'i kızartma işlemleri bittikten sonra sıcak yağ içeren ekipmanları ağız açık olarak pişirme yapılan alanda soğutmaktadır. Bireylerin tamamına yakını davlumbazları pişirme işlemi boyunca çalıştırmaktadır. Aşçılar ve aşçı yardımcılarının %60,4'ü pişirme alanındaki iklimlendirmeyi yeterli bulmuştur. Mutfakların sadece %40,0'ında davlumbazlar düzenli olarak temizlenmektedir. Toplu yemek hizmeti yöneticileri, havalandırma sisteminin etkin çalışma durumunu kontrol etmelidir. İlgili ekipmanların bakım planlarını hazırlamalıdır. Toplu yemek üretimi yapılan mutfaklarda çok yaygın olarak kullanılan kızartma, kavurma, ızgara gibi kuru ısıda pişirme işlemleri azaltılarak sulu ısıda pişirme yöntemleri artırılmalıdır.

**Anahtar Kelimeler:** pişirme emisyonu, pişirme dumanı, mutfak çalışanı, aşçı, davlumbaz.

*Bu çalışma Semra Navruz Varlı'nın doktora tezinden üretilmiştir.*

**ABSTRACT**

This study, planned to evaluate various cooking practices and hood usage of kitchen workers, was conducted with a total of 88 male volunteers working in mass food production in Ankara. Cooks, assistant cooks and service personnel were included in the study. The average time that cooks and assistant cooks spend cooking at work is 3.7±1.9 hours. The average time spent by cooks/assistant cooks and service personnel at home cooking per day was found to be similar (0.6±0.6 vs. 0.5±0.7, p>0.05, respectively). The total time allocated to cooking in a day (total of work and home) was found to be significantly higher in hot kitchen employees than in service personnel (p<0.001). The most commonly preferred cooking methods at work include deep-frying, roasting, grilling and baking. While cooks/cook assistants most frequently use the method of cooking in their own water (71.4%) at home, service

personnel more frequently prefer baking (47.1%) and roasting (29.4%) methods. While a quarter of the hot kitchen workers are waiting for the oil to smoke before cooking; 93.8% of them cool the equipment containing hot oil in the cooking area with their mouths open after the frying process is completed. 43.8% of individuals stated that they used a mask while cooking, and 95.8% stated that they left the hoods open throughout the entire cooking process. 60.4% of cooks and assistant cooks stated that ventilation was sufficient in the cooking area and 81.2% in other kitchen areas. Hoods are cleaned regularly in only 40% of kitchens. Catering managers should check whether the ventilation system is working properly. Dry heat cooking processes such as frying, roasting and grilling, which are widely used in kitchens where mass food production is made, should be reduced and wet heat cooking methods should be increased.

**Keywords:** cooking emission, cooking fume, kitchen worker, cook, kitchen hood.

*This study was produced from Semra Navruz Varlı's doctoral thesis.*

## GİRİŞ

Pişirme dumanı maruziyeti yemek pişirme işleriyle uğraşan kişileri etkileyen önemli bir halk sağlığı sorunudur. Bu çevresel faktör özellikle aşçılar ve aşçı yardımcıları gibi sıcak mutfak çalışanlarında önemli bir sağlık riski oluşturmaktadır (Bordado et al., 2012).

Pişirme dumanı maruziyetinin azaltılmasında havalandırma önemli bir yer tutmaktadır. Bir çalışmada, yetersiz havalandırma, kapalı alan ve tavada pişirme gibi faktörlerin yemek pişirilen ortamlarda iç mekân hava kirliliğini daha da kötüleştirdiği belirtilmiştir (Yu et al., 2015). Mutfaklardaki davlumbazların emiş gücünün pişirme işlemine açığa çıkan partikül madde miktarını doğrudan etkilediği ve partikül madde konsantrasyonunun orta emiş gücüne kıyasla yüksek emiş gücünde %65'ten fazla azaltılabileceği belirtilmiştir (Lu et al., 2019). Pişirme dumanında bulunan benzoapiren düzeylerinin davlumbazlar çalıştığı ortalama %75 azaldığı belirlenmiştir (Chiang et al., 1999). Bir müdahale çalışmasında, davlumbazların içine yerleştirilen bir cihaz aracılığıyla yakalama verimliliği artırılmıştır. Aşçıların pişirme dumanından şikayetçi olduğu altı mutfaka bu cihaz kurulmuş ve mutfak havasındaki partikül seviyelerinin cihazlar takıldıktan sonra ciddi düzeyde azaldığı belirlenmiştir (Pan et al., 2011).

Bu çalışmanın amacı mutfak çalışanlarının çeşitli pişirme uygulamaları ve davlumbaz kullanımlarının değerlendirilmesidir.

## ARAŞTIRMA VE BULGULAR

Çalışma verileri Ocak 2018-Eylül 2019 tarihinde Ankara'da toplanmıştır. Çalışma grubu 18-65 yaş aralığında yer alan gönüllü 48 sıcak mutfak çalışanı (aşçıbaşı, aşçılar ve aşçı yardımcıları), kontrol grubu ise 40 servis personelinden oluşmuştur. Araştırma, Ankara'da toplu yemek üretimi yapılan beş farklı mutfakta gerçekleştirilmiştir.

Çalışanların sosyo demografik bilgileri, iş ve çalışma ortamıyla ilgili bilgiler, yemek pişirme yöntemlerinin sıklığı gibi bilgiler bir anket formu aracılığıyla alınmıştır. Evde yemek pişirme durumları ve sıklıkları, evde yemek pişirirken en sık uyguladıkları pişirme yöntemleri sorgulanmıştır.

Araştırma için Gazi Üniversitesi Klinik Araştırmalar Etik Kurulu onay vermiştir (No: 603, Tarih: 25/12/2017). Gazi Üniversitesi Bilimsel Araştırma Projeleri birimi araştırmanın bütçesini karşılamıştır (47/2019-09).

Aşçıların iş yerinde çalıştıkları süre boyunca yemek pişirdikleri ortalama süre  $3,7 \pm 1,9$  saat/gündür. Evde yemek pişirmeye ayrılan ortalama süre her iki grupta benzerdir (sırasıyla,  $0,6 \pm 0,6$  karşın  $0,5 \pm 0,7$  saat/gün,  $p > 0,05$ ). Pişirmeye ayrılan toplam zaman ise çalışma ve kontrol grubunda sırasıyla  $4,3 \pm 1,9$  ve  $0,5 \pm 0,7$  saat/gündür ( $p < 0,001$ ). Çalışma grubundaki bireylerin %58,3'ü, kontrol grubundaki bireylerin ise %42,5'i evde yemek pişirmektedir ( $p > 0,05$ ). Evde yemek pişirirken çalışma grubu en sık kendi suyunda pişirme (%71,4) ve fırında pişirme (%17,9) yöntemlerini, kontrol grubu ise en sık fırında pişirme (%47,1) ve kavurma (%29,4) yöntemlerini kullanmaktadır.

Toplu yemek üretiminde, besinlere yaygın olarak pişirme işleminden önce ön kızartma işlemi uygulanmaktadır. Bu nedenle kızartma sonucu oluşan maruziyet toplu yemek üretiminde artmaktadır. Endüstriyel mutfaklarda kavurma, yağda kızartma gibi hatalı pişirme yöntemlerinin daha sık uygulanmasının büyük miktarlarda pişirilen yiyeceklerin tat, lezzet, doku, görünüm gibi subjektif kalite parametrelerinin iyileştirilmesi amacıyla olduğu düşünülmektedir.

Çalışma grubundaki bireylerin %25,0'i pişirme işleminden önce kullanılacak yağın dumanının çıkmasını beklediğini; %93,8'i kızartma işlemleri tamamlandıktan sonra sıcak yağ içeren ekipmanları ağız açık olarak soğuttuğunu belirtmiştir. Bireylerin %43,8'i çalışma esnasında pişirme işlemi yapılırken maske kullandığını, %95,8'i davlumbazları tüm pişirme işlemi boyunca açık bıraktığını belirtmiştir. Çalışma grubundaki bireylerin %60,4'ü pişirme alanında havalandırmanın yeterli olduğunu, %81,2'si diğer alanlarda havalandırmanın yeterli olduğunu düşünmektedir. Mutfakların sadece %40,0'ında davlumbazlar düzenli olarak temizlenmektedir.

### **SONUÇ VE ÖNERİLER**

Mutfak çalışanları pişirme dumanı oluşumunun azaltılması için davlumbaz kullanımını önemsemektedir. Çalışanlar sıcak yağın soğutulması sırasında ortama yayılan duman kaynaklı maruziyetinin farkında değildir. Araştırma yapılan mutfaklardaki davlumbazlar nicelik olarak yeterlidir ancak nitelik bakımından ihtiyacı tam olarak karşılamamaktadır.

Toplu yemek hizmeti yöneticileri, havalandırma sisteminin düzgün çalışıp çalışmadığını kontrol etmelidir. Havalandırma ile ilgili ekipmanların rutin bakımları planlanmalı, mutfak yöneticilerinin filtre değişimleriyle ilgili farkındalıkları artırılmalıdır. Toplu yemek üretimi yapılan mutfaklarda çok yaygın olarak kullanılan kızartma, kavurma, ızgara gibi kuru ısıda pişirme işlemleri azaltılarak sulu ısıda pişirme yöntemleri artırılmalıdır.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## YALIN İÇ LOJİSTİK VE GIDA SEKTÖRÜNDE BİR UYGULAMA LEAN INTERNAL LOGISTICS AND AN APPLICATION IN THE FOOD INDUSTRY

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### ÖZET

Günümüz dünyasında çeşitlilik, piyasadaki rakip sayısının fazlalığı ve artan müşteri odaklılık işletmelerin piyasaya tutunmasını güçleştirmiştir. Şirketlerin sürekli iyileştirme ve gelişme ihtiyacı, süreçlerin maliyetlerini azaltacak yönetim araçlarının araştırılmasına neden olmuştur. Prosedürlerin ve süreçlerin sürekli iyileştirilmesi konusu, birçok şirketi “yalın” felsefe stratejilerine yönlendirmiştir. Yalın felsefesinin temel kavramları ilk olarak 50’li yıllarda Japon şirketlerinde ortaya çıkmıştır. İşletmeler müşteri istek ve taleplerine cevap verebilecek şekilde en az kaynakla, en düşük maliyetle, en az israfla, üretim faktörlerini optimal kullanarak süreçleri iyileştirmeyi hedeflemiştir.

Sürekli iyileştirme gerektiren önemli alanlardan biri de iç lojistik faaliyetleridir. Üretim lojistiği olarak da tabir edilen iç lojistik; gelen malzeme ve parçaların mamule dönüştürülmesi esnasında yapılan taşımaları ve ara depolamaları içerir. Standart ve takip edilebilir olmayan bir iç lojistik sistemi, işletmelerde stok hareketlerinde dengesizliğe ve katma değersiz faaliyetlere sebep olmaktadır. Yüksek miktarda stok birikimi ya da malzemenin zamanında tedarik edilememesi, taşıma sistemindeki taşıma yapan aracın etkin kullanılmamasından dolayı operatörlerin katma değersiz işler yapması işletmeler için önemli bir maliyet unsurudur.

Bu çalışmada, bir gıda firması için iç lojistik faaliyetlerinde karşılaşılan problemlere yalın tekniklerden olan değer akışı haritalama, PUKÖ döngüsü ve spagetti diyagramı uygulanarak iyileştirmeler yapılmıştır. İlk olarak, süreçte yaşanan aksaklık ve değer katmayan işlemleri tespit etmek için değer akışı haritalamadan faydalanılmıştır. Bu uygulamaya sonucunda; proses akış süresi 265 dk.’dan 191 dk.’ya, katma değer süresi ise 434 dk.’dan 284 dk.’ya düşürülmüştür.

**Anahtar Kelimeler:** Yalın iç lojistik, süreç iyileştirme, değer akışı haritalama, PUKÖ döngüsü

### ABSTRACT

In today's world, diversity, the abundance of competitors in the market, and the increasing customer focus have made it challenging for businesses to thrive. The need for continuous improvement and development has led companies to explore management tools that reduce costs in their processes. The continuous improvement of procedures and processes has directed many companies towards the "lean" philosophy strategies. The fundamental concepts of lean philosophy first emerged in Japanese companies in the 1950s. Businesses aimed to improve processes by using minimal resources, minimizing costs, reducing waste, and optimizing production factors to respond to customer requests and demands.

One of the important areas that require continuous improvement is internal logistics activities. Internal logistics, also referred to as production logistics, includes the transportation and intermediate storage of incoming materials and components during the transformation into finished products. A non-standard



and untraceable internal logistics system can lead to imbalances in inventory movements and valueless activities within businesses. Accumulating a high volume of inventory or failing to supply materials on time due to inefficient use of transportation systems can result in operators performing valueless tasks, which is a significant cost factor for businesses.

In this study, improvements were made to the internal logistics activities of a food company by applying lean techniques such as value stream mapping, PDCA cycle, and spaghetti diagram to address the problems encountered. First, value stream mapping was used to identify bottlenecks and non-value-added processes in order to eliminate them. As a result of this application, the process flow time was reduced from 265 minutes to 191 minutes, and the value-added time was reduced from 434 minutes to 284 minutes.

**Keywords:** Lean internal logistics, process improvement, value stream mapping, PDCA cycle

## GİRİŞ

Yalın felsefesinin temel kavramları ilk olarak 50'li yıllarda Japon şirketlerinde ortaya çıkmıştır. (Antunes ve Sousa, 2013). Firmaların müşteri isteklerine en az maliyetle, en az israfla, kaynakları gereksiz kullanmadan en iyi üretimi yapabilme fikridir (Yangınlar ve Bal, 2019).

İsraflar Yalın Üretim'de en önemli konulardandır. Taiichi Ohno tarafından 1988 yılında 'Yedi Ölümcül İsrâf' başlığı altında "gereksiz üretim, fazla bekleme, üretimde hata, fazla stok, gereksiz taşıma, gereksiz işler ve gereksiz hareketler" olarak tanımlanmıştır (Topuz, 2021).

İşletmeler sektörde tutunmak için sürekli iyileşmek ve gelişmek zorundadır. Gelişme ve iyileştirme ihtiyacı da maliyetleri azaltacak yönetim araçları ve yöntemlerin incelenmesine yol açmaktadır. Bu ihtiyaçlar işletmelerin yalın düşünce sistemini anahtar olarak ele almasına yol açmıştır. Yeni yönetim kavramları ve süreç iyileştirmedeki süreklilik yalın felsefenin vurguladığı temel konulardan biri olmuştur (Antunes ve Sousa, 2013).

İşletmeler bünyesinde yalınlaşmaya gidilecek bir konu da lojistik faaliyetlerdir. Fabrika içinde yalın lojistik yaklaşımı üretilen ürünlerin az maliyetle ve kısa sürede işletme içerisinde taşınmasıdır. Bu da iç lojistik kavramı olarak karşımıza çıkmaktadır. (Topuz 2021) Standart ve takip edilebilir olmayan bir iç lojistik sistemi, işletmelerde stok hareketlerinde dengesizliğe ve katma değersiz faaliyetlere sebep olmaktadır. Yüksek miktarda yarımamül birikimi ya da malzemenin zamanında tedarik edilememesi, taşıma sistemindeki taşıma yapan aracın etkin kullanılmamasından dolayı operatörlerin katma değersiz işler yapması işletmeler için önemli bir maliyet unsurudur (Küçüköğlü vd., 2018).

Yalın düşünce kapsamında israfları yok ederken belli başlı araç ve yöntemler kullanılır. Bunlar 5S, SMED, Değer Akışı Haritalama, Sphagetthi Diyagramı, Milkrun, Hoshin Kanri, Poke-Yoke, A3, PUKÖ, Just In Time, Kök Neden Analizidir.

## ARAŞTIRMA VE BULGULAR

Çalışmanın uygulama aşaması paketli ekmek üretimi yapılan bir gıda işletmesinde gerçekleştirilmiştir. Firmanın iç lojistik süreçleri incelenmiş ve hammadde depodan malzeme transferleri sürecine ağırlık verilerek yalınlaşmaya gidilmiştir. Bu çalışmada aşağıdaki yöntemlerden faydalanılmıştır:

### Değer Akışı Haritalama

Değer Akışı Haritalama (DAH) israfların gün yüzüne çıkarılarak elimine edildiği bir yalın araçtır. İşletmelerde performansı arttırmak için ve değer yaratmak için kullanılır. DAH, bir kuruluşun mevcut ve gelecekteki senaryosunu gösterdiği için çeşitli yalın araçlar arasında önemlidir. DAH üretim hızını artırma, maliyetlerde ve süreçlerde fazla harcanan zamanı azaltma da önemli fırsatlar doğrudur (Batwara vd., 2023).

Haritalamada belirlenen süreçler, semboller ile gösterilir. Seçilen ürün ailesi veya sürecin ardından mevcut durum haritası çizilir. Ardından gelecek durum haritalandırılarak bir faaliyet planı hazırlanır (Sarı, 2018).

DAH'da bazı zaman ölçütleri kullanılmaktadır:



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Çevrim süresi(C/T): Bir prosesin tamamlanma sıklığıdır. İşleme süresine ek olarak yükleme, boşaltma ve hazırlık süreleri de dahildir.

Katma Değer Süresi (V/ A): Müşterinin değer olarak tanımladığı iş elemanlarının süresidir.

Akış Süresi (L/T): Bir üretim veya hizmet prosesinin başlangıç ve bitişi arasında geçen süredir.

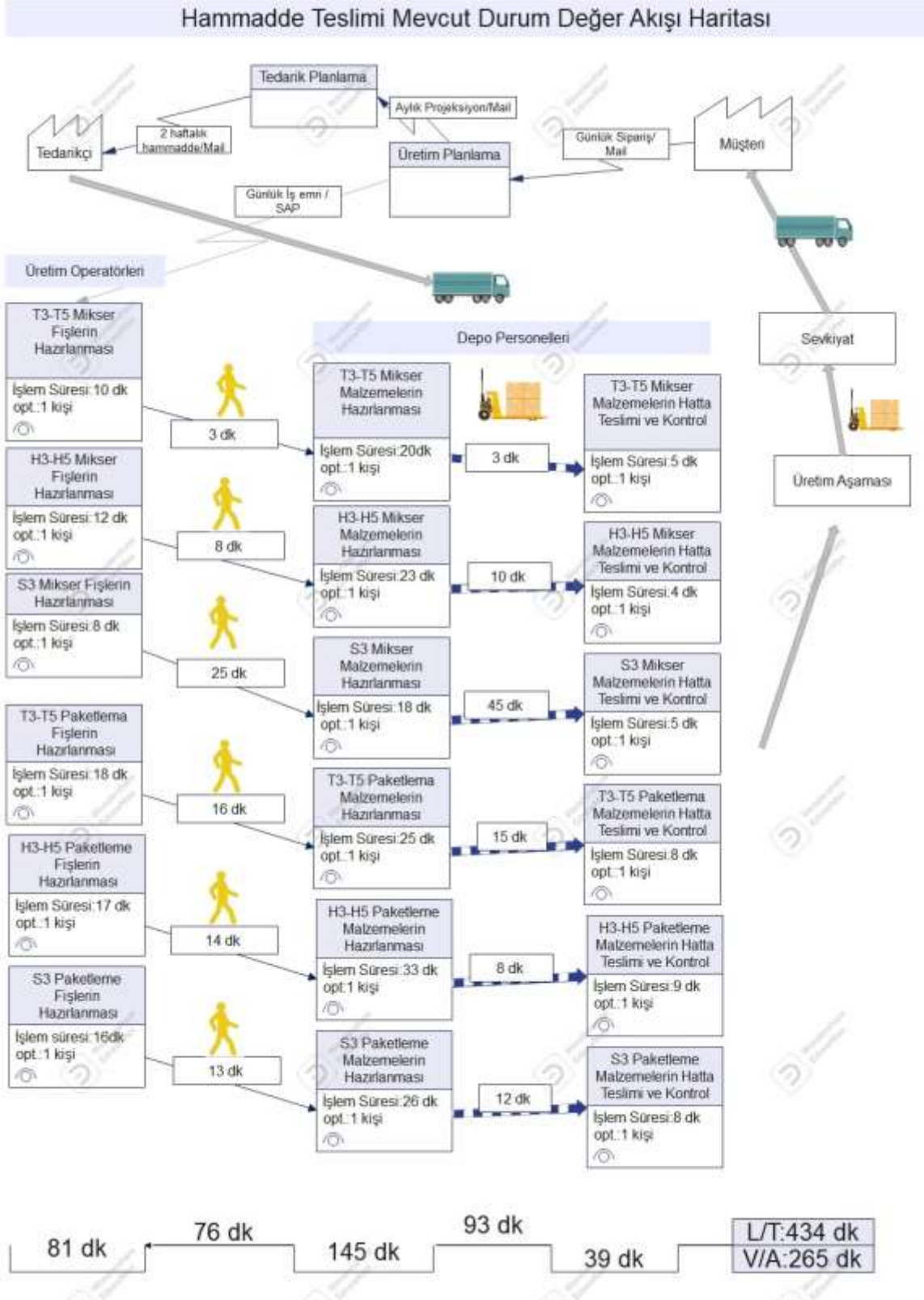
## **PUKÖ Döngüsü**

W. Edward Deming, firmalarda planlama ve araştırma, tasarlama, üretim aşaması ve satışın birbirini takip eden bir çevrim olduğunu ortaya koymuştur. Deming'in bu çevriminden esinlenen Japon yöneticiler, Deming'in bu çevrimini yönetimin tüm aşamalarına uygulayarak buna PUKÖ (Planla-Uygula-Kontrol Et-Önlem A1) döngüsü adını vermişlerdir (Efil, 1994).

Yalın yönetim sisteminde mükemmelliği aramanın ve ulaşmanın temelinde de PUKÖ döngüsü yatar. PUKÖ, süreçlerde iyileştirmenin önerilmesi, ilgili iyileştirmenin hayata geçirilmesi için uygun eylemlerin yapılması konusunda yol gösterici bir araç, bilimsel metoda dayalı bir iyileştirme çevrimidir (Akyüz ve Çetin, 2019).

## **Uygulama Çalışması**

Üç vardiya çalışma sistemine sahip olan bir gıda işletmesinde uygulama aşaması gerçekleştirilmiştir. Hammadde depodan üretim hatlarına olan transfer süreçleri incelenmiş ve iyileştirmeler yapılmıştır. Mevcut durumda üretim cep depolarına hammadde transferleri 16:00-00:00 vardiyasında gerçekleşmekte olup depo personellerine operatörler tarafından gelen ihtiyaç listelerine göre yapılmaktaydı. Her hattın operatörü öncelikle cep depo stoklarını kontrol ederek ihtiyaç listesini oluşturup depoya malzeme fişi götürmekteydi. Fişteki malzemeleri hazırlayan depo personeli, ilgili hatlara malzemeleri transpalet yardımı ile transfer etmekteydi. Süreçte manuel yapılan işler ve gereksiz taşımaların olduğu gözlemlenmiştir. Bu esnada katma değersiz faaliyetlerin tespiti için öncelikle değer akışı haritalama yönteminden faydalanılmıştır. Sahada kâğıt üzerinde elle çizilen çalışma, EdrawMax programına aktarılıp haritalandırılmıştır. Mevcut durum değer akışı haritası Şekil 1'deki gibidir.

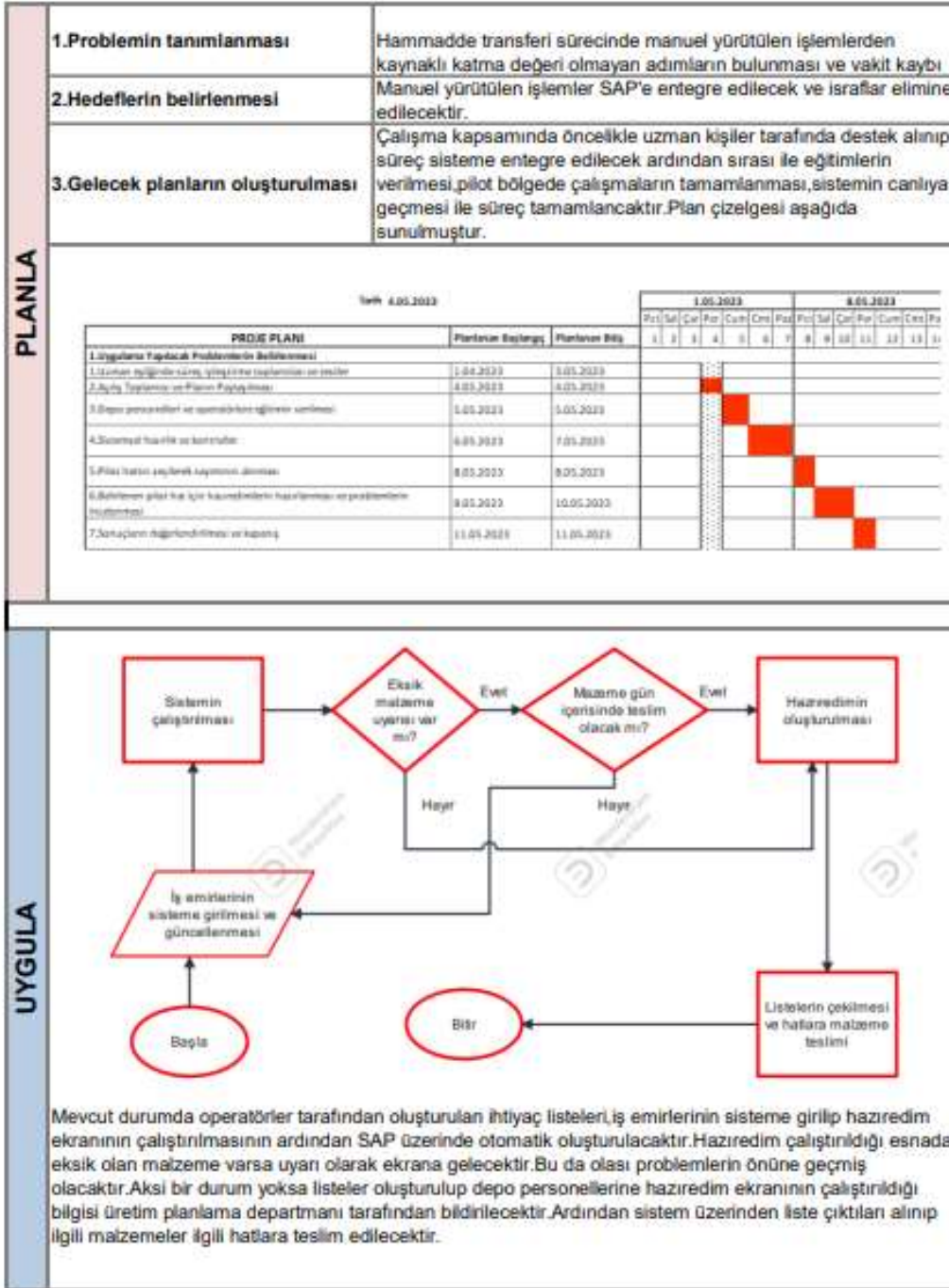


Haritalama ve saha gözlemleri sonucunda operatörlerin manuel olarak fiş hazırlamaya harcadığı zaman ile fişleri depoya teslim ederken harcarcadığı zamanların minimize edilmesi üzerine çalışma yapılmıştır. Bu kapsamda manuel yürütülen işlemlerin SAP ile yürütülmesi ve günlük gelen iş emirlerine göre doğrudan ihtiyaç listelerinin oluşturulması üzerine SAP uzmanları ile çalışılmıştır. Sistemde yapılacak değişikliklerin ilgili birimlere de aktarılması ve sürekliliğin sağlanması yönünde PUKÖ döngüsünden

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

faaydalanılmıřtır (řekil 2 ve řekil 3). Sırası ile planlama, uygulama, sũreç kontrolũ ve ˆnlemlerin alınması ile alıřma sistemindeki deęiřiklik yaklařık ũ ayı almıřtır. Pukˆ dũngũsũ uygula ařamasında gelecek durum iin iř akıř řeması oluřturulmuřtur.



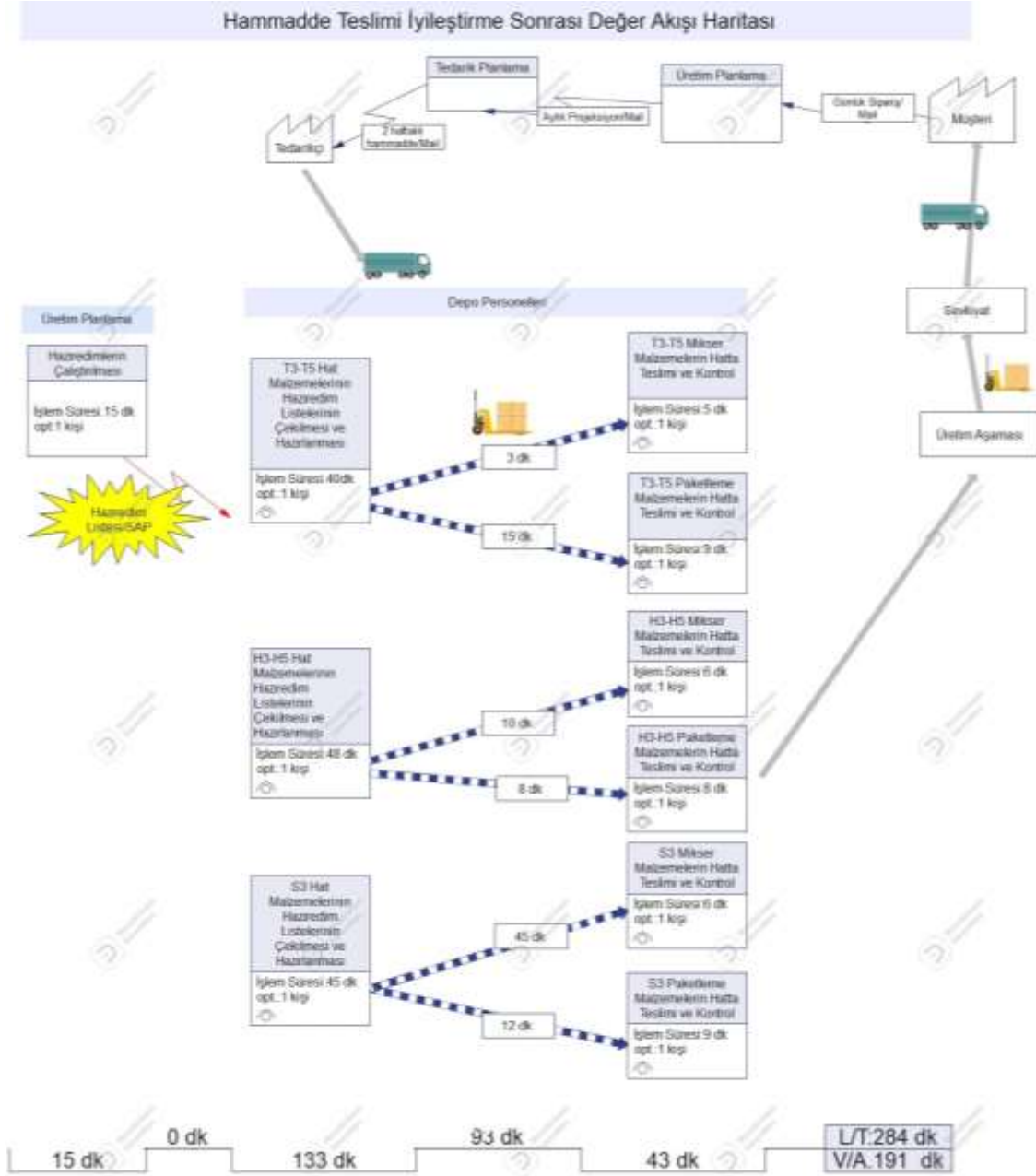
řekil 2. PUKˆ dũngũsũ "Planla" ve "Uygula" ařamaları

<p>Yapılan eğitimler, sistem iyileştirmeleri ve sürecin standartlaştırılmasının ardından sistemde yaşanan teknik sıkıntılar üzerine yoğunlaşılıp kontroller sağlanmıştır. Gün içerisinde sistemden çekilen ihtiyaç listeleri dışında ek malzeme ihtiyaçları olduğu farkedilmiş ve incelemeler yapıldığında problemin temel kaynağının sistemsel ve fiziksel cep depo stoklarındaki uyumsuzluk olduğu tespit edilmiştir. Bunun üzerine ekip olarak kök-neden analizi yaparak problemin kaynağına inilmiş ve aksiyonlar alınmıştır.</p>									
<b>TARİH:</b>									
KAYITLAR: Proje Zaman, Yeterli Planlama, Üretim Raporlama ve Takip, Zamanlı Analiz									
<b>KONTROL ET</b>	PROBLEM: Cep Depo Stoklarındaki Uyumsuzluk					ALINAN AKSİYONLAR	SÜREMLER	TAMAMLANAN BÜYÜKLER	
	NEDEN - 1	NEDEN - 1.1	NEDEN - 1.1.1	NEDEN - 1.1.1.1	NEDEN - 1.1.1.1.1				
	Malzeme Teyidinin Verilmemesi	Cep Depo Stoklarında Sistemsel Yetersizlik	Depocu Malzeme Transferinin Yapılmaması	İrsaliye alınması için mal girişi yapılmaması		İlgili tedarikçiler uyarılarak irsaliyelerin zamanında ulaştırılması konusunda bilgilendirme yapılmıştır.	Tedarik Planlama Departmanı		
	NEDEN - 2	NEDEN - 2.1	NEDEN - 2.1.1	NEDEN - 2.1.1.1	NEDEN - 2.1.1.1.1				
	Malzeme Teyidinin Verilmemesi	Cep Depo Stoklarında Sistemsel Yetersizlik	Depocu Malzeme Transferinin Yapılmaması	Ürün Kalite Stoklarında Olduğu İçin Sistemsel Transfer Yapılmaması	Kalite kontrolü amacıyla malzeme olduğuna şüpheye girilmesi	İlgili sistem için kalite kontrolünde olan her malzeme için sistem tarafından uyarı mesajı gelecektir.	İç Uygulamaları Departmanı		
	NEDEN - 3	NEDEN - 3.1	NEDEN - 3.1.1	NEDEN - 3.1.1.1					
	Malzeme Teyidinin Reçetede ki miktarla geçmediği olması	Tedarikçi verisi sisteme girilmediği için sistemden toplam miktar bilgisinin alınmaması	Operatörlerin tüm cep depo stoklarını kontrol edebilecek kadar zamanında denetimi			Fire oranını yüksek olan malzeme gruplarının barınacağı ilgili hammaddelerde stokları için her vardiyaya barında sayım alınması	Üretim Raporlama Operatörleri		
	<p>Yapılan kontrollerin ve kök-neden analizinin ardından aşağıdaki aksiyonlar sürekli hale getirilip süreçte yaşanabilecek aksaklıkların önüne geçmek için önlem alınmıştır.</p> <p><b>ÖNLEM AL</b></p> <p>1-Cep depo stoklarındaki uyumsuzluğun önüne geçmek için fire oranları yüksek olan hammaddeler tespit edilmiş ve her vardiyaya sonunda sayımları alınıp fire hammadde çıkışları yapılarak sistem stoklarının kontrol altına alınması hedeflenmiştir.</p> <p>2-Depo tarafından her mal girişi yapıldığında kalite onayı için ilgili birimlere mail düşmesi üzerine çalışma yaparak, kalite onayında uzun süre malzeme kalmasının önlenerek fiziksel olarak üretim hattında teslim edilen malzemenin sistemsel olarak hatlara transferleri sağlanmış olup teyit süreçleri daha sağlıklı hale getirilecektir.</p> <p>3-Tedarikçinin geç irsaliye yönlendirmesi kaynaklı mal girişinin gecikmesi probleminin önüne geçmek için ilgili tedarikçilerin uyarılması ve takibin sıklaştırılması</p>								

Şekil 3. PUKÖ döngüsü “Kontrol Et” ve “Önlem Al” aşamaları

Çalışmaların ardından malzeme fişlerinin SAP’ye aktarılma süreci tamamlanmıştır. Günlük gelen iş emirlerinin üretim planlama departmanı tarafından sisteme aktarılmasının ardından SAP hazıredim ekranı her bir hat için çalıştırılacaktır. Bu işlemlerin ardından depo personellerine verilen bilgi ile ihtiyaç listeleri doğrudan depo personeli tarafından çekilecektir. Yapılan iyileştirme ile operatörlerin stoklarını kontrol edip malzeme fişi hazırlaması, depo teslim etmek için kat ettiği yol ve harcanan zaman ortadan kaldırılmıştır. İyileştirme sonrası değer akışı haritalama tekrar çizilmiştir (Şelik 4). Mevcut durumda toplam 434 dakikada yürütülen bu işlem iyileştirme sonrası 284 dakikaya düşmüştür. Operatörlerin malzeme transferine harcadığı atıl zaman ve yol minimize edilmiştir.





Şekil 4. İyileştirme sonrası değer akışı haritası

## SONUÇ

Çalışma kapsamında işletmeye ait iç lojistik süreçleri incelenmiş ve süreçler israflardan arındırılmaya çalışılmıştır. Başlangıçta malzeme transferi işlemi için sahada bir değer akışı haritalama yapılmış ve bunun sonucunda manuel yürütülmüş olan işlemlerin SAP üzerinden takibi üzerine bir iyileştirme çalışması yapılmıştır. Bu çalışma çıktısı sonuçlarında personellerin toplam 434 dakikasını alan bu süreç 265 dk'ya düşmüştür. Zaman açısından elde edilen kazancın yanında aşağıdaki faydalar da sağlanmıştır:

- Üretim cep depo stoklarının düzenli kontrol edilmesi görevi operatörlere verilerek personele sorumluluk bilinci aşılanmıştır.
- Malzeme teslim süreçlerinde personel kaynaklı hatalı veya eksik malzeme alımının önüne geçilmiştir.
- Depodan eksik malzeme talep etme kaynaklı ani malzeme ihtiyaçlarının ve bu ihtiyaç kaynaklı üretimde yaşanan aksaklıklar önlenmiştir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- Çalışma kapsamında personeller ile yapılan kök-neden analizi çalışması sonucu personeller problem çözme yolunda kendilerini geliştirmiş ve bu çalışmayı sahada kullanmaya başlamışlardır.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SMSM' nin LQR VE TORK GÖZLEYİCİ TABANLI KONUM KONTROLÜ POSITION CONTROL OF PMSM BASED ON LQR AND TORQUE OBSERVER

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### ÖZET

Sabit mıknatıslı senkron motorlar (SMSM), yüksek tork/ağırlık oranı ve yüksek dinamik performans gibi üstünlüklerinden dolayı hassas konum veya hız kontrolü gerektiren savunma sanayi ürünleri ile birçok endüstriyel cihazda yaygın olarak kullanılmaktadır. SMSM'nin doğrusal olmayan dinamikleri, motorun yük torku ve mekanik parametre değişimleri, geleneksel oransal+integral (PI) kontrolörlerin SMSM'nin yüksek hassasiyetli kontrolünü önemli ölçüde kısıtlar. Bu nedenle lineer kvadratik regülatör (LQR) gibi durum uzay yaklaşımları, bulanık mantık (BM), yapay sinir ağları (YSA), bulanık sinir ağları (BSA) gibi yapay zekâ algoritmaları ile SMSM'nin konum/hız kontrolüne yönelik çalışmalar yoğunlaşmaktadır. Bu çalışmada, değişen yük torku ve parametre değişimleri etkisindeki mekanik bir düzeneği (nöbetçi robot) tahrik eden Sabit Mıknatıslı Senkron Motorun (SMSM)' nin LQR tabanlı konum kontrolü gerçekleştirilmiştir. SMSM'nin matematiksel modeli kullanılarak tasarlanan LQR yönteminin, SMSM'nin konum kontrolüne uygulandığındaki farklı yaklaşımların sonuçları değerlendirilmiştir. Diğer taraftan bilinmeyen yük torku ve parametre değişimlerinin etkisini minimize etmek amacıyla motorun  $i_q$  akımının, motorun yük torkunu temsil ettiği dikkate alınarak motorun  $i_q$  akımı, pozitif geri besleme yapmak suretiyle basit bir yük torku gözleyici tasarlanmış ve ileri besleme tork kontrolörü olarak eklenmiştir. Öncelikle kontrol sisteminin Matlab/SIMULINK ortamında benzetimleri yapılmıştır. Benzetimi yapılan kontrol sistemi, Texas Instruments dijital sinyal işlemcisine (DSP-TMS320F28379D) yüklenerek SMSM'nin konum kontrolü deneysel olarak gerçekleştirilmiştir. Önerilen SMSM konum kontrol sisteminin etkinliğini gösteren benzetim ve deneysel sonuçlar, PI kontrolör sonuçları ile karşılaştırmalı olarak verilmiştir. Yük torku ve parametre değişimleri altındaki motor yükleri için LQR+ $i_q$  ileri besleme kontrol yöntemi ile dayanıklı bir kontrol sisteminin elde edilebileceği gösterilmiştir. Bu bildirinin giriş bölümünden sonra ikinci bölümünde SMSM'nin durum uzayında d-q eksenli modeli çıkarılmıştır. Üçüncü bölümde LQR kontrolörün tasarım yaklaşımları açıklanmış ve yük torku gözleyicisinin tasarımı verilmiştir. Dördüncü bölümde SMSM'nin PI, LQR, LQR+ $i_q$  kontrolör için benzetim ve deneysel sonuçları karşılaştırmalı olarak sunulmuştur. Beşinci bölümde benzetim ve deneylerden elde edilen sonuçlar değerlendirilmiştir.

**Anahtar kelimeler:** SMSM, LQR, yük torku gözleyici, konum kontrolü.

### ABSTRACT

Due to their advantages such as high torque/weight ratio and high dynamic performance Permanent Magnet Synchronous Motors (PMSM) are widely used in many industrial applications as well as defense industry products that require precise position or speed control. The nonlinear dynamics of the PMSM, the load torque and mechanical parameter variations of the motor significantly limit the high-precision control of the PMSM by conventional proportional+integral (PI) controllers. For this reason, studies on the position and/or speed control of PMSM are intensified with state space approaches such as Linear Quadratic Regulator (LQR), artificial intelligence algorithms such as fuzzy logic (BM), artificial neural networks (ANN), fuzzy neural networks (FNN).

In this study, position control of the Permanent Magnet Synchronous Motor (PMSM) based on Linear Quadratic Regulator (LQR) was carried out, which drives a mechanical mechanism (sentry robot) under the influence of changing load torque and parameter changes. The results of different approaches in the application of the LQR method to position control of PMSM were evaluated, which was designed using the mathematical model of PMSM. On the other hand, to minimize the effect of unknown load torque and parameter variations, a simple load torque observer was designed by using the motor's  $i_q$  current as a feedforward torque controller, considering that the motor's  $i_q$  current represents the motor's load torque.

Firstly, the proposed control system was simulated in Matlab/SIMULINK environment. The simulated control system was loaded into a Texas Instruments digital signal processor (DSP-TMS320F28379D) and the position control of the PMSM was carried out experimentally. Simulation and experimental results showing the effectiveness of the proposed PMSM position control system are given in comparison with the PI controller results. It has been shown that a robust control system can be obtained with the LQR+ $i_q$  feedforward control method for motor loads under load torque and parameter changes.

After the introduction part of this article, in the second part, the d-q axis model in the state space of PMSM is derived. In the third section, the design approaches of the LQR controller are explained and the design of the load torque observer is given. In the fourth section, simulation and experimental results of PMSM for PI, LQR, LQR+ $i_q$  controllers are presented comparatively. In the fifth section, the results obtained from simulations and experiments are evaluated.

**Key words:** PMSM, LQR, Load Torque Observer, position control.

## 1. GİRİŞ

Sabit mıknatıslı senkron motorlar (SMSM), yüksek tork/ağırlık oranı, yüksek dinamik performans, bakım gerektirmemeleri gibi avantajlarından dolayı, yüksek performans gerektiren endüstriyel uygulamalarda yaygın şekilde kullanılır [1]. Bununla birlikte SMSM'nin sahip olduğu doğrusal olmayan dinamikler, ölçülemeyen yük torku ve parametre değişimlerine karşı duyarlı olması, geleneksel oransal+integral (PI) kontrolör ile yüksek hassasiyetli kontrolünü kısıtlar [2-4]. Bu problemin üstesinden gelmek için uyarlamalı kontrol [5,6], bulanık mantık (BM) [7], yapay sinir ağları (YSA) [8], bulanık sinir ağları [9], kayan kipli kontrol (KKK)[10] gibi yüksek performanslı SMSM sürücülerin geliştirilmesi önerilmiştir.

Optimal kontrol tekniklerinden olan lineer kvadratik kontrol (LQR) tabanlı kontrolörler de motor sürücülerine uygulanmaktadır [11-13]. LQR kontrolörler, kontrol edilecek sistemin doğrusal durum uzay modelinden yararlanarak durumlardan geri besleme yapılmak suretiyle tasarlanır. LQR'nin en önemli avantajı durum geri besleme kontrol kazanç matrisinin sistematik bir şekilde bulunmasıdır [14]. Bununla birlikte LQR kontrolörün referans konum ve yük torku değişimlerinde performansının geliştirilmesi amacıyla yük torkunun tahmin edilmesi sürücü performansında önemli artış sağlar [15].

Tork gözleyiciler kontrol sistemlerinde bozulma ve belirsizliklerden kaynaklanan sorunları ortadan kaldırmak için telafi edici olarak çalışırlar [16]. Literatürde kalman filtresi [17], yapay sinir ağları [18], bulanık mantık [19], kayan modlu kontrol [20], tabanlı tork gözleyicilere rastlamak mümkündür. Bu çalışmada, değişen yük torku ve parametre değişimleri etkisindeki mekanik bir düzeneği (nöbetçi robot) süren SMSM'nin LQR tabanlı konum kontrolü gerçekleştirilmiştir. SMSM'nin matematiksel modeli kullanılarak tasarlanan LQR yönteminin, SMSM'nin konum kontrolüne uygulandığındaki farklı yaklaşımların sonuçları değerlendirilmiştir. Diğer taraftan bilinmeyen yük torku ve parametre değişimlerinin etkisini minimize etmek amacıyla motorun  $i_q$  akımının, motorun yük torkunu temsil ettiği dikkate alınarak motorun  $i_q$  akımı, bir kazanç katsayısı ile çarpılarak pozitif geri besleme yapılmak suretiyle basit bir yük torku gözleyici tasarlanmış ve ileri besleme yoluna tork kompanzatorü olarak eklenmiştir.

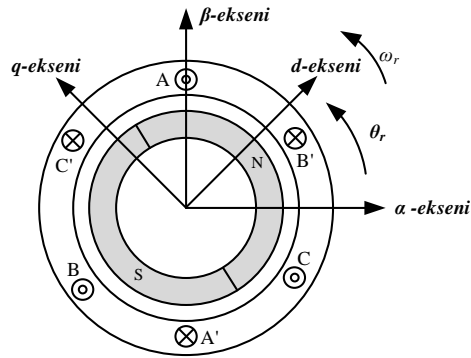
Öncelikle kontrol sisteminin Matlab/SIMULINK ortamında benzetimleri yapılmıştır. Benzetimi yapılan kontrol sistemi, Texas Instruments dijital sinyal işlemcisine (DSP-TMS320F28379D) yüklenerek SMSM'nin konum kontrolü deneysel olarak gerçekleştirilmiştir. Önerilen SMSM konum kontrol sisteminin etkinliğini gösteren benzetim ve deneysel sonuçlar, PI kontrolör sonuçları ile karşılaştırmalı

olarak verilmiştir. Yük torku ve parametre değişimleri altındaki motor yükleri için LQR+ $i_q$  ileri besleme kontrol yöntemi ile dayanıklı bir kontrol sisteminin elde edilebileceği gösterilmiştir.

Bu makalenin giriş bölümünden sonra ikinci bölümünde SMSM'nin durum uzayında d-q eksenli modeli çıkarılmıştır. Üçüncü bölümde LQR kontrolörün tasarımı yaklaşımları açıklanmış ve yük torku gözleyicisinin tasarımı verilmiştir. Dördüncü bölümde SMSM'nin PI, LQR, LQR+ $i_q$  kontrolör için benzetim ve deneysel sonuçları karşılaştırmalı olarak sunulmuştur. Beşinci bölümde benzetim ve deneylerden elde edilen sonuçlar değerlendirilmiştir.

## 2. SMSM'nin MATEMATİKSEL MODELİ

Bu çalışmada, rotoru yüzey montajlı sürekli mıknatısa sahip bir SMSM kullanılmıştır. 3 fazlı SMSM Şekil 1'de gösterildiği gibi stator referans düzlemi durağan ( $\alpha$ - $\beta$ ) ve rotor referans düzlemi ise dönen çerçeveye (d-q) dönüştürülerek incelenir [21].



**Şekil 1.**  $\alpha$ - $\beta$  stator referans düzlemi ve d-q rotor referans düzlemi.

3 fazlı SMSM'nin 3 faz denklemlerinin dönen referans düzlemine (d, q) dönüşümünden aşağıdaki eşitlikler elde edilir [22].

$$V_d = R_s i_d + L_d \frac{di_d}{dt} - \omega_e L_q i_q \quad (1)$$

$$V_q = R_s i_q + L_q \frac{di_q}{dt} + \omega_e L_d i_d + \omega_e \lambda_m \quad (2)$$

Denklem 1-2 de,  $V_d$  ve  $V_q$ , d-q eksen gerilimlerini (volt),  $i_d$  ve  $i_q$  d-q eksen akımlarını (A),  $\lambda_d$  ve  $\lambda_q$  ise d-q eksen akılarını (weber),  $\omega_e$  elektriksel hızı (rad/s),  $\lambda_m$  ise sabit mıknatısların neden olduğu manyetik akıyı göstermektedir.

Motorun ürettiği tork ise,

$$T_e = \frac{3}{2} P \{ \lambda_m i_q + (L_d - L_q) i_d i_q \} \quad (3)$$

Yazılabilir. Yüzey montajlı SMSM'lerde karşılıklı endüktanslar ( $L_d$  ve  $L_q$ ) genellikle eşit kabul edilir ve bu durumda Denklem 3'teki tork ifadesi, aşağıdaki gibi doğrudan  $i_q$  eksenli akımına bağlı hale gelir.

$$T_e = 1.5 P \lambda_m i_q = K_t i_q \quad (4)$$

Burada,  $K_t = 1.5 P \lambda_m$  tork sabitini göstermektedir. Motorun mekanik denklemi ise aşağıdaki eşitliklerde verilmiştir.

$$J \frac{d\omega_r}{dt} + B \omega_r = T_e - T_L \quad (5)$$

$$\frac{d\theta}{dt} = \omega_r \quad (6)$$

Burada  $\omega_r$  mekanik hız,  $T_e$  motorun ürettiği tork,  $T_L$  yük torku,  $J$  atalet momenti,  $B$  ise sürtünme katsayısıdır. Eşitlik (7)'de elektriksel hız ve mekanik hız arasındaki ilişki verilmiştir.  $P$  ise motordaki kutup çifti sayısıdır. Buna göre mekanik ve elektriksel hız ilişkisi aşağıdaki gibi elde edilir.

$$\omega_e = P\omega_r \quad (7)$$

Buradan vektör kontrollü motor için  $i_d = 0$  olacağından SMSM için motor konumu çıkış alınmak üzere SMSM' nin durum uzay modeli aşağıdaki gibi elde edilir.

$$\frac{d}{dt} \begin{bmatrix} \theta \\ \omega_r \\ i_q \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & -\frac{B}{J} & \frac{K_t}{J} \\ 0 & -\frac{P\lambda_m}{L} & -\frac{R}{L} \end{bmatrix} \begin{bmatrix} \theta \\ \omega_r \\ i_q \end{bmatrix} + \begin{bmatrix} 0 & 0 \\ 0 & -\frac{1}{J} \\ \frac{1}{L} & 0 \end{bmatrix} \begin{bmatrix} v_q \\ T_L \end{bmatrix} \quad (8)$$

$$\theta = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} \theta \\ \omega_r \\ i_q \end{bmatrix} \quad (9)$$

Diğer taraftan, vektör kontrollü SMSM'nin elektriksel devresi ve dolayısıyla akım kontrolörleri ideal alınabileceğinden  $i_q = i_q^*$  alınabilir ve buna göre Denklem 8-9'daki SMSM modeli elektriksel devresi ihmal edilerek,

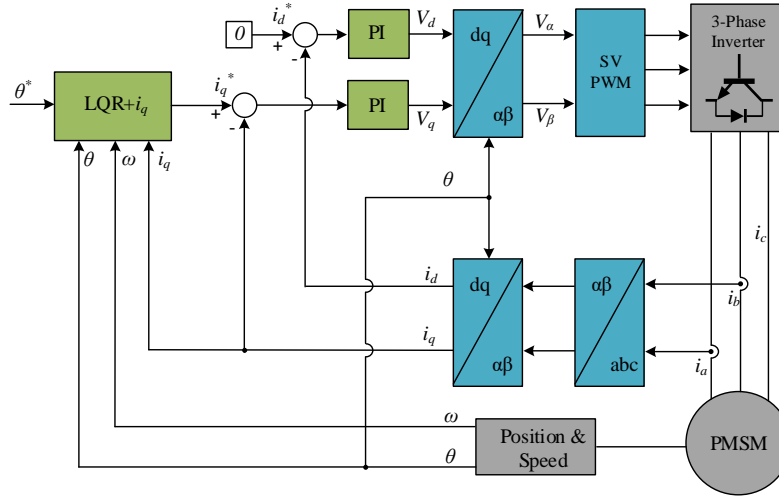
$$\frac{d}{dt} \begin{bmatrix} \theta \\ \omega_r \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & -\frac{B}{J} \end{bmatrix} \begin{bmatrix} \theta \\ \omega_r \end{bmatrix} + \begin{bmatrix} 0 & 0 \\ \frac{K_t}{J} & -\frac{1}{J} \end{bmatrix} \begin{bmatrix} i_q^* \\ T_L \end{bmatrix} \quad (10)$$

$$\theta = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} \theta \\ \omega_r \end{bmatrix} \quad (11)$$

Olarak yazılabilir. Dolayısıyla vektör kontrolü ile denetimi yapılacak motorlarda, Denklem 10 -11'e göre kontrolör tasarlamak yeterli olacaktır.

### 3- SMSM için LQR TABANLI KONUM KONTROLÜ

AA motorlarda olduğu gibi SMSM'de de alan yönlendirmeli kontrol (AYK) kullanılarak motorun tork ve akı bileşenleri DA motorlardakine benzer şekilde ayrıştırılarak, SMSM'nin hız veya konumu kontrolü gerçekleştirilebilir [8]. AYK yönteminin esası, üç fazlı SMSM'nin faz akımlarını clark dönüşümü ile iki fazlı sabit referans çerçeveye, ardından park dönüşümü ile iki fazlı dönen referans çerçeveye dönüştürmektir. Elde edilen  $i_d$  akımı motorun alan akımına,  $i_q$  akımı ise tork akımına denk gelir. Motorda nominal hızın üzerine çıkılmayacaksa vektör kontrol yönteminde referans alan akımı  $i_d^* = 0$  çekilebilir ve motorun torku ve dolayısıyla hızı/konumu  $i_q$  akımı tarafından kontrol edilebilir [22,23]. Referans tork akımı  $i_q^*$  ise arzu edilen hız ya da konum referansını sağlayacak şekilde hız/konum kontrolöründen elde edilir. Şekil 2'de vektör kontrollü SMSM'nin LQR kontrolör tabanlı konum kontrol prensip şeması verilmiştir.



**Şekil 2.** Vektör kontrollü SMSM'nin LQR+i<sub>q</sub> tabanlı konum kontrol şeması.

Şekil 2'de konum kontrolörü olarak LQR kontrolör kullanılmıştır. Motorun torku ile orantılı olan  $i_q$  akımı, yük torku etkisini minimize etmek amacıyla, LQR kontrolöre pozitif geri beslemeli olarak eklenmiştir. Akım çevriminde ise geleneksel PI kontrolörler kullanılmıştır. PI kontrolör çıkışlarından elde edilen  $V_{dq}$  gerilimleri ters park dönüşümü yapılarak üç fazlı modülasyon sinyalleri elde edilmiştir.

Denklemler 10, durum uzayında,

$$\frac{d}{dt}x(t) = Ax(t) + Bu(t) \quad (12)$$

İle gösterilebilir. Bu sisteme,

$$u(t) = -Kx(t) \quad (13)$$

Durum geri beslemesi yapılarak elde edilen,

$$\frac{d}{dt}x(t) = (A - BK)x(t) \quad (14)$$

Sistemde, kontrol taleplerini karşılayacak şekilde geri besleme  $K$  kazanç matrisinin belirlenmesi durum geri beslemeli kontrol sistemi olarak bilinir. Optimal kontrol teorisi ise optimizasyon teorisinin kontrol sistemlerine uygulanması sonucu ortaya çıkan kuramlar bütünüdür [14]. Optimal kontrol yöntemlerinden olan LQR, durum geri beslemeli sistemlerde aşağıdaki gibi bir performans fonksiyonunu minimize edecek şekilde geri besleme kazanç matrisinin ( $K$ ) belirlenmesini ihtiva eder.

$$J = \frac{1}{2} \int_0^{\infty} (x^T Q x + u^T R u) dt \quad (15)$$

Bu minimizasyon problemi farklı yöntemlerle çözülebilir ancak genellikle problemin çözümü Matrisel Riccati denkleminin çözümüne indirgenebilir.

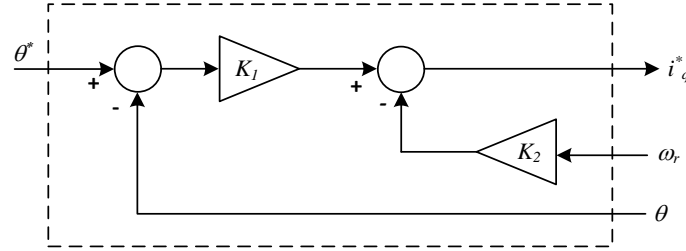
$$A^T P + P A - P B R^{-1} B^T P + Q = 0 \quad (16)$$

Denklemler 16'nın çözümünden bulunan  $P$  matrisi yardımı ile optimum geri besleme kazancı aşağıdaki gibi hesaplanır [11,14,24].

$$K = R^{-1} B^T P \quad (17)$$

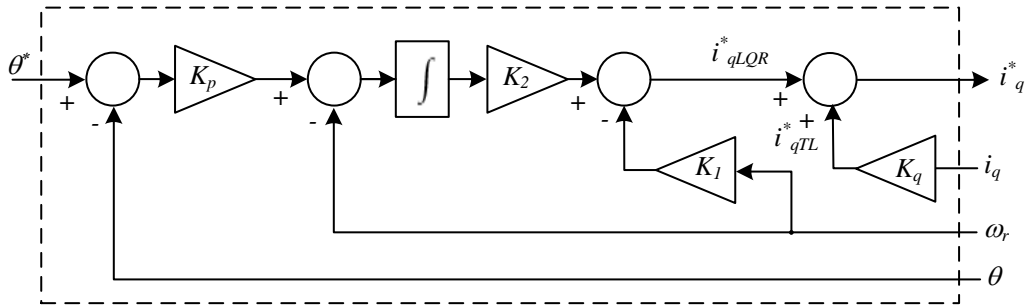
LQR yönteminin kontrol performansı, performans fonksiyonundaki  $Q$  ve  $R$  ağırlık parametrelerine bağlıdır. Köşegen ve pozitif tanımlı seçilen durum değişkenleri boyutundaki  $Q$  kare matrisi ve girişler boyutundaki  $R$  matrisi denemelerle bulunabilir.

Denklem 8-9'da modeli çıkarılan SMSM için farklı LQR tasarım yaklaşımları incelenebilir. Denklem 8-9 yerine yukarıda açıklandığı gibi Denklem 10-11'deki SMSM modeli kullanılarak kontrolör tasarlamak yeterlidir. Denklem 10-11'e göre konum çıkışı için sistem Tip 1'dir. Tip 1 sistemlerin LQR tasarım esasına göre konum kontrolörü Şekil 3'teki gibi belirlenebilir.



Şekil 3. LQR kontrolör yapısı.

Bu yaklaşımda, LQR kontrolör sabit motor parametrelerine göre tasarlandığından sabit motor parametreleri için kontrol performansı oldukça iyi olmakla birlikte parametre değişimleri ve yük torkuna karşı kontrol sisteminin duyarlı olduğu gözlemlenmiştir. Parametre değişimlerine ve yük torkuna karşı dayanıklılığı iyileştirmek amacıyla motorun hızı çıkışı alınarak Tip 0 olan hız çıkışı için bir LQR tasarlanabilir. Hız çıkışı için sistem Tip 0 olduğundan hız hatasına eklenecek integral kontrolör sistemi Tip 1'e yükseltecektir.



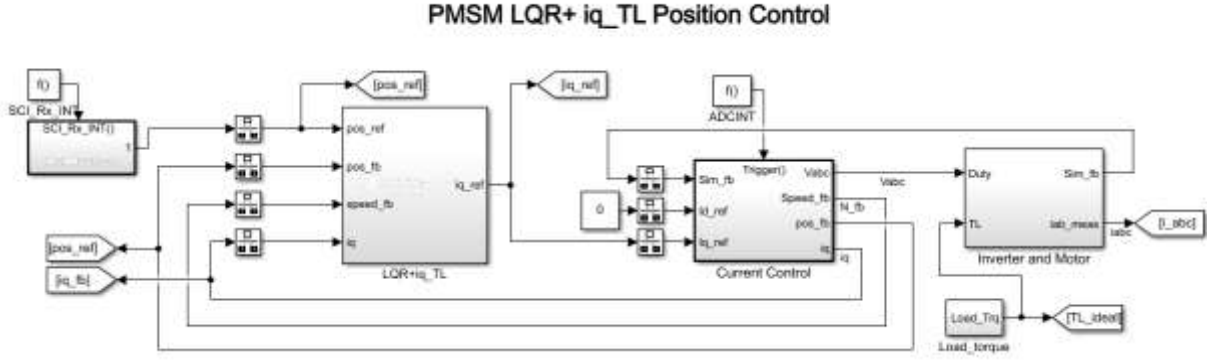
Şekil 4. SMSM'nin konum kontrolü için geliştirilen LQR+iiq kontrolör.

$K_1$  ve  $K_2$  Kazançları LQR kontrolör tasarımı ile belirlenir,  $K_p$  konum kontrolörü ise deneme-yanılma ile seçilebilir. Ayrıca yük torkunun etkisini minimize etmek amacıyla bir tork gözlemleyici tasarlanabilir. Ancak, motorun nominal parametreleri için çektiği akım  $i_{q0} \cong 0$  alınırsa motorun  $i_q$  akımının motor torkunun temsil ettiği anlaşılır. Dolayısıyla motorun referans  $i_q^*$  akımı,  $i_q^* = i_{qLQR}^* + i_{qTL}^*$  alınarak yük torkunun etkisi minimize edilebilir.

#### 4. BENZETİM VE DENEYSEL ÇALIŞMALAR

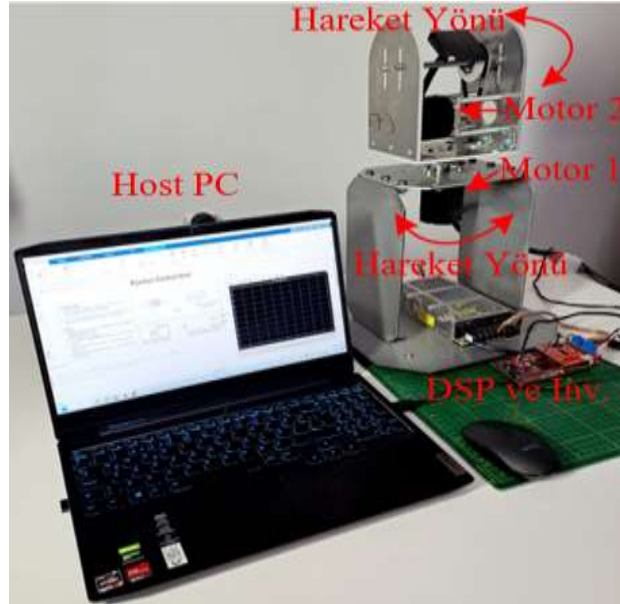
Şekil 5'te, deneysel çalışmada kullanılacak olan DSP ile de uyumlu olacak şekilde SMSM'nin Şekil 4'te verilen LQR ve tork gözleyici tabanlı vektör kontrolünün Matlab/SIMULINK ortamında oluşturulması verilmiştir.





Şekil 5. SMSM konum kontrolü için Matlab/SIMULINK kurulumu.

Diğer taraftan, Şekil 6'da uygulama çalışması yapılacak deney düzeneği verilmiştir. Deney düzeneğinden de görüleceği gibi, iki eksende hareket edebilen servo mekanizmanın tahriki SMSM'ler tarafından sağlanmaktadır. Ayrıca motorlarda devir/tork düşürücü/yükseltici mekanizmalar da kullanılmıştır. Deney düzeneğinde y eksenini hareketini sağlayan üst motor, üst motora bağlı mekanizmanın yükünü tahrik ederken, x eksenini hareketini sağlayan alt motor sistemin bütün yük torkunu karşılamak durumundadır.



Şekil 6. SMSM tahrikli iki eksenli hareket edebilen deney düzeneği

Çalışmada kullanılan motorun parametreleri;

Stator direnci  $R_s = 0,36 \Omega$ , d-q eksen endüktansları  $L = 0,2 mH$ , çift kutup sayısı  $P = 4$ , atalet momenti  $J = 7,06 \times 10^{-6} kg - m^2$ , motor sürtünmesi  $B = 2,36 \times 10^{-6} kg - m^2/s$ , zıt emk sabiti  $K_e = 4,64 Vpp/krpm$ , tork sabiti  $K_t = 0,0384 Nm/A$  şeklindedir. Üç fazlı sürücü giriş gerilimi 24 V DA'dır.

Şekil 5'teki LQR kontrolör için motorun nominal parametreleri kullanılarak denemelerle seçilen  $Q$  ve  $R$  matrislerinin uygun değerler  $Q = [0,12 \ 0; \ 0 \ 170]$ ,  $R = 0,5$  olarak elde edilmiştir. Buna göre MATLAB/lqr fonksiyonu ile hesaplatılan kazanç matrisi yaklaşık  $K = [0,5 \ -18]$  olarak bulunmuştur. Ancak,  $Q$  ve  $R$  matrislerinin seçimine göre kontrol performansının değişeceği de hatırlanmalıdır. Konum kontrolörünün kazancının en uygun değeri ise  $K_p = 0,2$  olarak, tork kompanzatorü olarak kullanılan  $i_q$  akım geri beslemesinin kazancı ise  $K_p = 0,6$  olarak elde edilmiştir.

Benzetim ve deneysel çalışmalarda LQR yerine PI, LQR ve LQR+ $i_q$  kontrolörlerin değişen bir konum referansını izleme performansı verilmiştir. Benzetim çalışmasında referans konum,  $-0,5 PU (-180^\circ)$

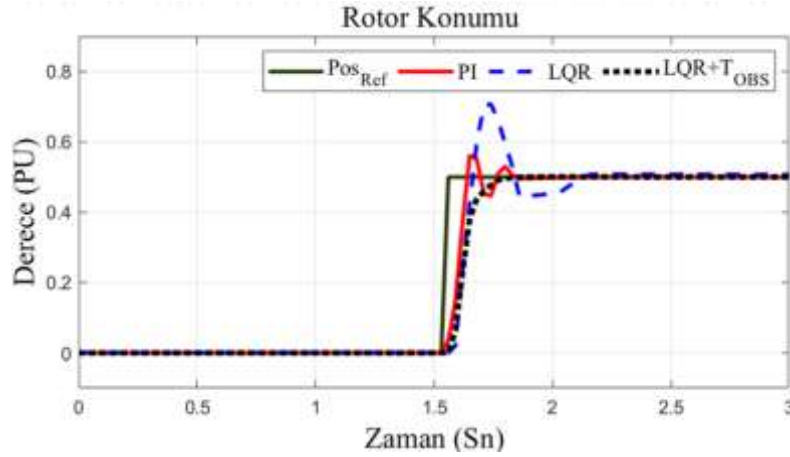




Şekil 9. TMS320F28379D DSP ve DRV8301 model üç fazlı sürücü

Kullanılan geliştirme kartının diğer bir avantajı ise izolasyonlu USB bağlantısı (JTAG) sayesinde gerçek zamanlı uygulamalarda PC ile arasında ek bir izolasyon arayüzüne ihtiyaç duymamasıdır. TMS320F28379D model geliştirme kartı Texas Instrument firması tarafından geliştirilen Code composer studio (CCS) ile programlanabileceği gibi hızlı prototipleme amacıyla kullanılabilen ve C/C++ kodlarını üretebilen Altair Embed, PSIM, Matlab/SIMULINK Embedded gibi programlar vasıtası ile de programlanabilir [25,26]. Bu çalışmada, Matlab/SIMULINK Embedded kullanılmış, oluşturulan SIMULINK modelinden C/C++ kodları elde edilmiş ve geliştirme kartına yüklenerek SMSM'nin farklı kontrolörler için konum kontrolü gerçekleştirilmiştir.

Şekil 6'daki servo mekanizmayı tahrik eden SMSM'nin sırasıyla PI, LQR ve LQR+i<sub>q</sub> kontrolör ile gerçek zamanlı olarak referans konumu takip performansı Şekil 10'da verilmiştir. Uygulama her bir kontrolör için 3 saniyelik periyotlar için tekrarlanmıştır. 1,5. saniyede konum referansı 0'dan 0,5 PU yani 180 dereceye arttırılmıştır. Benzetim çalışmasında yük torku başlangıçta %20'de tutulmuş ardından 1.sn'de %50'ye yükseltilmişti. Deneysel çalışmada ise servo sistemin yük torku belirsiz ve değişkendir.

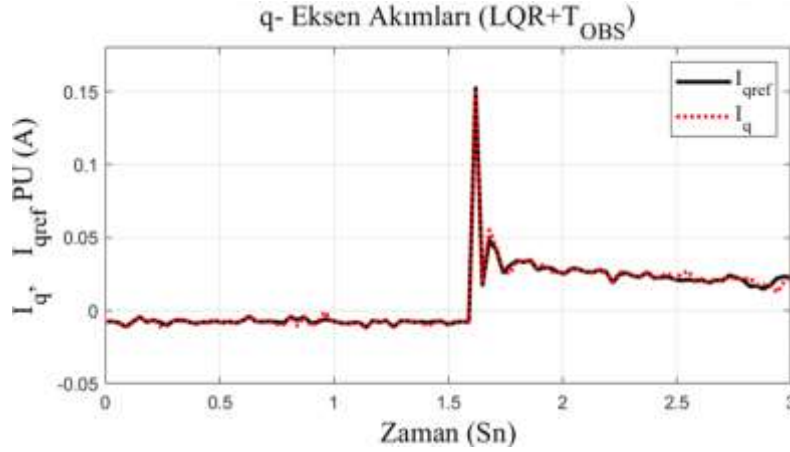


Şekil 10. SMSM'nin, PI, LQR, LQR+i<sub>qTL</sub> kontrolör ile referans konumu

Gerçek zamanlı izleme performansı

Şekil 10'dan, LQR+i<sub>q</sub> kontrolörün bilinmeyen bir yüke sahip motorun konumunu izleme performansının PI ve LQR kontrolöre göre çok daha tatmin edici olduğu görülmektedir. Ayrıca PI kontrolörün performansının, benzetim sonuçlarına göre kötüleştiği de gözlemlenmiştir.

Şekil 11'de LQR+i<sub>q</sub> kontrolör devrede iken ölçülen q eksen referans akımı ve q eksen akımı verilmiştir. Çizdirilen q eksen akımlarına göre vektör kontrolü yapılan motorun akım kontrolörlerinin yeterince uygun olduğu anlaşılmaktadır. Ayrıca bu akımın mekanik düzenekteki motor yükünü temsil ettiği de belirlenebilir.



Şekil 11. Gerçek zamanlı, q- eksen ve q- eksen referans akımı

## 5. SONUÇLAR VE TARTIŞMA

Denklem 10-11'e göre konum çıkışı için SMSM, Tip 1 sistem olduğundan PI kontrolörlerin doğrudan konum kontrolörü olarak kullanılması sistemi karasızlığa sürükler. Bu durum geleneksel kontrol teorileri ile kolayca gösterilebilir. Bu nedenle konum kontrolörü oransal ve içteki hız kontrolörü ise PI kontrolör olarak tasarlanır. Bu yapıya göre elde edilen yukarıdaki benzetim ve deneysel sonuçlardan ani binen yük torkunu toparlaması kabul edilebilir.

LQR kontrolörler, sistemin nominal parametrelerine göre tasarlandığından nominal parametrelerdeki kontrol performansı son derecede iyidir. Ancak parametre ve yük torku değişimlerinde önemli ölçüde bozulmalar ortaya çıkmaktadır. Bu bozulmaları azaltmak için konum kontrolörü olarak oransal, içteki hız kontrolörü için ise LQR kullanmak makul bir seçenektir. Bu yapıda da ani binen yük torkunda konumun toparlanmasının tatmin edici olmadığı görülmektedir. Bu durumda, bir yük tork gözleyici tasarlanarak motora binen yük torku hesaplanabilir ve bu torku karşılayacak kadar bir akım, motorun referans  $i_q^*$  akımına eklenebilir. Burada, motorun yüksüz  $i_{q0}$  akımının yaklaşık sıfır olduğu kabul edilirse motorun  $i_q$  akımının doğrudan yük torkunun karşılığı olduğu söylenebilir. Dolayısıyla ayrıca bir tork gözleyici tasarlamak yerine motorun  $i_q$  akımı, bir kazanç çarpanı üzerinden motorun referans  $i_q^*$  akımına eklenebilir. Sonuç olarak, benzetim ve deneysel sonuçlara göre önerilen yöntemin oldukça iyi performans gösterdiği görülmektedir. Eğer, motora binen gerçek yük torkunu en doğru hesaplayacak şekilde bir gözleyici tasarlanırsa sistemin konum kontrol performansının çok daha iyileşeceği de belirlenebilir.

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**INTERNATIONAL ANKARA CONGRESS ON  
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October 13-14, 2023**

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ANALYSIS OF METHODS FOR IMPROVING THE TEACHING OF MACHINE DESIGN AND MECHANICAL TECHNOLOGIES

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### ABSTRACT

It is the duty of the teacher of each subject to make the study of technical subjects, including the subject "Machine Design" more effective, to determine more modern, proven methods in the teaching process and to bring the student's knowledge and skills to a high level. Machine design is the foundation of the engineering industry.

Machine building is the leading industry of the national economy and is a very complex, labor-intensive field. Providing students with the necessary level of science and technology in the training of future specialists requires multifaceted work. The knowledge and skills of mechanical engineers in all areas of production are invaluable experience. Studying and mastering the science of machine design and mechanical engineering in general, both require students to study mathematics, resistance of materials, mechanics, machine parts, etc. Applying the knowledge they have acquired in such subjects in the real process requires deep knowledge and skills from them. These requirements set great goals and responsibilities for the teachers who teach the subject. It is the responsibility of the teachers and laboratory assistants to acquire perfect knowledge and skills for discovering and solving problems that may arise in their future work for students studying in machine design, including engineering design.

University auditoriums are equipped with high-level teaching equipment, which enables the use of advanced technology and new teaching methods. Studying theory in lectures, testing knowledge in practical classes, conducting experiments in laboratory classes, group research work and virtual resources are great opportunities to achieve teaching effectiveness. These opportunities are expected to provide teachers with a wider range of teaching methods for teaching engineering and students to acquire the desired competencies.

**Key words:** machine design, engineering, teaching of technical subjects, lecture, curriculum

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**INTRODUCTION:** In modern times, various constructions, very complex construction objects, bridges, roads, technological, transport, information machines, etc. are already an integral part of our life. A large number of specialists specialized in engineering are involved in the realization of these structural solutions with complex functions. Engineering, and specialists engaged in the process of machine design (projecting) in particular, the design of machines and structures, various powerful engines, construction examples, mechanisms, transmissions, etc. create and implement.

Teaching the student the concepts of the machine design process has a number of objectives as an important starting point: to demonstrate how a structure works, why it is used, to determine what conditions its operation depends on and what it affects, with modern examples based on the basic scientific principles of engineering to introduce etc.

The following can be mentioned about machine building according to its connection with other fields and the purpose of its products:

- 1) it is the largest user of ferrous and non-ferrous metals and products of a number of other manufacturing sectors;
- 2) provides other industries with machinery and equipment;
- 3) depending on the purpose of the manufactured equipment, machine building mainly includes these large groups:
  - a) technological equipment for industry;
  - b) energy machines, vehicles;
  - c) agricultural machines, equipment for road construction;
  - d) devices and equipment for healthcare, etc;
- 4) provides significant employment of human resources;
- 5) plays a key role in the improvement of machines and the creation and production of new equipment;
- 6) realizes the achievements of scientific and technical progress by producing modern tools;
- 7) ensures comprehensive mechanization and automation of production.

**RESEARCH AND FINDINGS:** The engineering industry accounts for about 25% of the value of fixed assets and 20% of industrial output.

The fact that students know such information is a motivation in their study of mechanical engineering, assimilation of knowledge not only increases their worldview, but also in the future. They would like to see themselves as builders of society and production and can determine their jobs according to their qualifications.

The knowledge and skills of mechanical engineers in all areas of production are invaluable experience. Studying and mastering the science of machine design and mechanical engineering in general, both require students to study mathematics, resistance of materials, mechanics, machine parts,

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

etc. Applying the knowledge they have acquired in such subjects in the real process requires deep knowledge and skills from them. These requirements set great goals and responsibilities for the teachers who teach the subject. It is the responsibility of the teachers and laboratory assistants to acquire perfect knowledge and skills for discovering and solving problems that may arise in their future work for students studying in machine design, including engineering design. Communicating the process of machine design to students at a high level and encouraging them to solve problems plays a major role in the development of future engineers. The machine design process is the process of developing a project aimed at solving a specific technical problem.

At the initial stage of the project, work is carried out such as identification of potential problems in the machine, planning of work to be done, selection of prototypes. The next stages include product testing and design evaluation. The result of the product test can be positive or negative compared to the prototype. This indicates how correct the approach to solving the problem is. The student must accept the existence of these failures and start using other approaches.

Teachers should pay great attention to the process of machine design, because the process of machine design is a knowledge-summing process. As we mentioned, here students are required to have both mathematical, technological and engineering knowledge, and to successfully apply this knowledge in the design process.

Involving students in the teaching of "Machine design" subject in real conditions can greatly help them to get to know the construction materials well, to know the conditions of the processes, to absorb informative information and to keep the knowledge they received in their memory for a long time. The teaching of the subject "Machine design" should generally include the following stages:

1. Introduction to the topic. At this stage, the teacher should inform the students about the goals and objectives of the subject, what knowledge and skills they will have by studying this course. Also, at this stage, he can show examples of machines and discuss what problems there may be in their design and the importance of solving them.
2. The stage of studying the theoretical base. At this stage, students should learn basic theoretical information about the construction of technological machines. For example, they should learn the structural elements of machines (mechanisms, nodes, etc.), the working principles of structural elements and systems, their design and calculation methods. It is also important to give students practical skills to work with software materials used for machine design.
3. It should be noted that it is a great opportunity for "Machine Design" teachers to deliver the design process to students virtually during class. Several consistent approaches can be used to master the subject: (John A. Marshall, June E., 2005, p. 29)
4. Studying the purpose of the machine or a certain part of it and investigating its working principle;
5. Analysis of the malfunctions in the machine or a certain part and the defects detected in the work or product as a result;
6. Analysis of the operating mode of the investigated object, average values of work productivity;
7. Determination of the cause of the problem;
8. Discussion of the solution of the problem with students, examination of their suggestions for solving this problem;
9. Selection of prototype equipment and organization of a testable solution;
10. Finding a more efficient solution by changing the test conditions;
11. Mathematical processing of test results;
12. Completing the design process and compiling the results.

Below is an approximate plan of the lesson to explain a certain topic: Topic: Belt transmission, their use in machines and constructions.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Here, first, the information in the theoretical part: "Introduction. Geometric structure of the belt transmission, types of the transmission, characteristics, types of the belts, manufacturing material, various structural solutions of the belt transmission, purposes of their use in machines, calculation, defects in belts, etc.

In the practical part, the operation of the belt drive in installed equipment or virtual material should be demonstrated based on examples and changing conditions.

In the final part, an overview of theoretical and practical knowledge, giving results, evaluating the lesson with a discussion of the degree of achievement of the goal, and announcing the next topic.

Preparation of tests and use of written works are applied to each subject to study the subject and check the students' mastery level. In written tests, the student has the opportunity to demonstrate the ability to describe and explain, which plays a large role in self-examination and mastering the material. This approach is a very effective step in the machine design process. The questions in the tests can be devoted to ways of solving this or that problem. In small subgroups created in the group, it is possible to investigate the given problem, determine the reasons that created it, and then discuss and summarize the answers and suggestions of all group members. (J. E. Shigley, C. R. Mischke, and R. G. Budynas, 2003. p.57)

One approach is for the teacher to present a problem and then guide the students to find a solution to the problem. In this approach, the teacher sets certain conditions for solving the problem. One of these limitations is that students can use only certain materials, certain sizes, movement trajectories, etc. is that

In the reverse approach to the problem, the teacher presents the answer to the problem to the students, and the students analyze the answer and determine how it solves the problem. For example, a teacher shows a technological scheme to a student. The student determines how the machine works and what it can do. Here, the student can collect information from the teacher about the structural elements of the machine by asking certain questions and then give his opinion. The student begins the explanation by looking at a diagram or picture of the product, determining what they do and what the problem is. Then, they determine what the solution is or how the problem is solved. One of the main discussions here is the choice of materials and consideration of their properties. (John A. Marshall, June E., 2005, p. 32). It is also important for students to consider the physical requirements of the product. Physical requirements are indicators such as weight, size and structure. Students should be able to apply the function of the product they analyzed and the methods of finding a solution to the encountered problem to other products.

Studying the machine design process can be close to, or even simpler than, the traditional design problem approach. If the solution already exists, that is, if the students have already developed their own ideas about how to solve the problem, then only ways to move to the next stage are sought. Students can apply the research strategy for solving the problem in the machine design process to other products.

There are many points to consider when teaching the machine design process, so the engineering design process can be an excellent introduction to engineering problem solving. The teaching strategies of the subject usually involve practical learning such as design problem projects (Dr. Ahmadi Begum.2019, p.36). Carrying out these projects helps students to use the knowledge they have acquired in different stages of the design process. It is appropriate to do them in this order: Visual presentation of the studied object (machine part, mechanical transmission, etc.) and analysis of several suitable examples. When explaining a new topic, the visual presentation of the object helps the students to understand the lesson. While some students can grasp new information by hearing, others have difficulty visualizing the construction (mechanism, detail, etc.) and must see it. At this stage, the purpose of the given topic and the advantages and disadvantages of the studied object compared to others are brought to the student's attention.

For certain explanations, the teacher is also required to make a report on the board, draw a diagram and in many other cases provide a model. For example, when teaching a mathematical calculation, it is usually appropriate to demonstrate it on the board. Otherwise, students will miss the point without understanding it. In some cases, it is necessary to explain the same information several times or give

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

several examples. Demonstrating several different examples ensures that new knowledge is transferred to memory more effectively. The active participation of the student in solving the example, making the calculation on the calculator and giving the answers, affects their focus on the topic during the lesson. In between, the teacher also tests their attention by deliberately making mistakes (A. J. Dutson, Jan. 1997, pp. 17-28).

1. The teacher deliberately makes mistakes in giving examples and their properties and checks how focused the student's attention is.

When the teacher presents the plan of the lesson, of course, he collects the right material and presents it to the student. But the concept of making mistakes on purpose is a great approach for them to be careful. Praising the student who finds the error motivates others to be careful and competent as well. For example, applying the advantages of a belt drive to a gear drive or vice versa should raise a question and a negative thought in the student and he should join the argument. This creates excitement among students and leads to deep discussion.

2. Working in small groups, assigning them to solve the same problem.

This is an effective strategy where every small group aspires to be a leader. The lead student appointed in that group leads the task and distributes the work among the group members. It will be better if the students themselves choose the members of the group. They draw up a work plan together with the teacher, and then divide the work among themselves. The teacher sets a certain time limit for completing the task. The teacher supports them as needed and monitors the level of performance. This support includes the provision of literature, calculation methods, etc. as it may be.

1. To encourage the student to learn from experience.

For deeper understanding of lectures and seminars, students' contact with production should be organized as soon as possible. They describe the operation of mechanisms in real conditions, their application areas, structural features, material they are made of, sound they create, vibration, etc. seeing them will be an invaluable help in learning the educational material. In the next lesson, they gain the effectiveness of having basic knowledge by supplementing and generalizing the practical knowledge they received with theoretical knowledge.

Discussing what they have learned in a group and describing what they see on paper will greatly help students to understand how mechanisms transfer power and motion and perform related calculations. This knowledge will give them self-confidence and strong motivation to study the subjects.

2. To train students to prepare a report after the experiment and demonstrate their knowledge.

Students should prepare a report on the processes they see in production and how they are implemented by mechanisms and submit it to the teacher. The use of theoretical resources in the essay can also present the work using virtual material. This task can be given to students individually or by dividing students into groups. The goal of this approach is to demonstrate students' acquired knowledge, develop their skills, and lay the foundation for future inventions and improvements.

1. To use innovative interactive technology in teaching.

The use of innovative-interactive technologies in teaching in the subject "Machine design" greatly helps teaching and student understanding. Learning, of course, has many ways and means. Students' abilities and skills are as varied as they are. Some students master the theoretical part easily, the formulas do not scare them, and even if some students show weakness in the theory, the practical and logical side makes it stronger. To discover these, the teacher should make them talk, exchange ideas and determine what percentage of the material the student should master during the lecture. Just giving the lecture once may not give a good result in the student's understanding of the subject. That is why, before moving on to the next topic, the teacher should revisit the previous topics with the students, discuss the forgotten points again and make sure that they understand them to the maximum extent (R. L. Norton, p. 78).

Studies show that the student's thinking and understanding speed is several times lower than the teacher's lecturing speed. When the student takes time to absorb the information he heard, the teacher gives other information. The student's mind is already distracted. By the end of the lesson, the percentage of



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

knowledge acquisition is 10%. For this, the teacher should ask the students after each piece of information whether they have any questions or not, and make sure that they fully understand the information. A lecture given quickly is absorbed by the student late, that is, the student should be given time to pause and think at certain points ( R. L. Norton, 2006. p. 44)

The use of computers, laptops and tablets of the class allows to improve the educational activity. Thus, watching educational videos or completing a virtual task, using access to scientific resources with the help of browsers provides the student with great information opportunities. As a result, students use these resources to their advantage and their motivation to study the subject increases. They should be able to speak and write about the subject they have learned, present it at the appropriate level and sequence, know the fields of application of their knowledge and personalize those knowledge and skills (V. K. Meti, 2016, p. 76)

In the teaching of "machine design" and other technical subjects, the research authors recommend that the teacher ask the following questions to the students at the end of the lesson and answer them in writing. The first question is " What was the most important thing they learned from today's lesson ? ", and the second question is " What are the unclear points ? ". While examining these answers, the teacher should review his teaching technique and work on its further improvement.

## CONCLUSION:

Preparation for teaching should be done taking into account the following points: Checking the students' basic knowledge and determining what level it is will help the teacher to choose a strategy for mastering the subject taught by the teacher. Being aware of the students' mathematical and engineering knowledge, better connecting the subject's content with their previous knowledge when delivering the subject will give positive results. can Students should be aware of their theoretical and logical thinking levels in order to make the right decision about teaching methods. For the subject to be successful, students should be taught how to acquire data collection skills, how to use databases, and how to work in groups. Students should be taught what kind of teaching strategies to use in order to achieve good results. They should be taught to cooperate with others in small or large groups, and to solve problems and tasks. To keep students' attention for a long time during the lesson, providing a variety of teaching aids: oral explanation, video material, doing a small calculation, discussing the problems together, asking questions, announcing the next topic and completing the lesson can be considered more correct sequence.

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GELENEĞİN IŞIĞINDA İLHAN KEMAL ŞİİRLERİ

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**ÖZET**

İlhan Kemal (d. 13 Eylül 1968/ö. -) Adanalı bir şair olup şiir ve edebiyata olan ilgisi nedeniyle hayatı boyunca edebî çevrelerde bulunmuştur. Asıl adı Kemal Kaplan'dır. Şiir ve yazıları çeşitli dergi, fanzin ve antolojilerde yer almıştır: *Aykırısanat, Adalya, Akatalpa, Amanos Edebiyat, Bahçe, Çayyolu, Babylon Şiir Kenti, Budala, Dize, Ecinniler, Eliz, Etken, Hayal, Heves, İmgelem Çocukları, Kavram Karmaşa, Kurşunkalem, Kum, Kıydili, Lül Sanat, Mazruf, Mühür, Mortaka, Nordik, Patika, Papirüs, Sadece Şiir, Sanat ve Hayat, Söylem, Sincan İstasyonu, Şiiri Özlüyorum, Şiirsaati, Ücra, Varlık, Yeniyazı, Yom Sanat*. Bazı şiirleri ise İngilizce'ye çevrilerek *Destine Literare* (2015/Kanada), *World Antholog of Poetry* (2016/Taiwan), *Salt boundaries* (2017/İtalya), *Miletus* (2019/Amerika) gibi seçki, antoloji ve dergilerde yayımlanmıştır. Deneme, söyleşi, inceleme yazıları ve şiir üzerine eleştirileri de bulunur. *Türkiye Yazarlar Sendikası (TSY)* üyesi olan İlhan Kemal, *İmgelem Çocukları* ve *Lül Sanat* dergilerinin kurucularındandır. Ayrıca *Çukurova Edebiyatçılar Derneği* ve *Ötekileriz Kültür Sanat Girişimi*'nin üyeleri arasında bulunmuştur. Şimdilerde ise yayın hayatına yeni başlayan *Teş Dergi*'nin sanat danışmanlığını yapmaktadır. Aşk, çocukluk, gençlik, özlem temalarının hâkim olduğu şiirleri imgelerle örülüdür. Mısra uzunluğu ve noktalamadaki keyfi tutumu şiirlerinin ilk dikkat çeken yönüdür. Şairin imla ve noktalamadaki tavrı bir yandan akıcılığı sekteye uğratarken bir yandan da şiire bir sayıklama hâli verir. 2020 yılında yayımlanan *Çavlan Sözler* ismini taşıyan kitabı ise İlhan Kemal'in sekiz şiir kitabının (*Mağnum/Ocak 2006, Hiç, Kimsenin Bildiği/Nisan 2007, Ücra Söz/Ağustos 2009, Değişik/Haziran 2011, Yağmur Konalgası/Eylül 2012, Beni Güzlerimden Öp/Mart 2014, Ağır Çıvgın/Mayıs 2016*) gözden geçirilerek bir araya getirildiği eseridir. Eser, altı asır yaşamış divan edebiyatı geleneğinin izlerine rastlanması bakımından ilgi çekicidir. Şairin şiirlerinde âşık kimi zaman solgun benizli ve vuslatı arayan yolcu kimi zaman mumun etrafında dönen pervanedir. Sevgili kılıç kuşanmış ve gamze oklarıyla âşığı hedef alan bir vefasızdır. Bu çalışmada *Çavlan Sözler*'deki âşık ve sevgili tipi ile divan şiirindeki âşık-maşuk tipleri arasındaki ortaklıklara dikkat çekilecektir.

**Anahtar Kelimeler:** İlhan Kemal, Çavlan Sözler, Gelenek, Divan Şiiri.

**ABSTRACT**

İlhan Kemal (b. 13 September 1968/d. -) is a poet from Adana and has been in literary circles throughout his life due to his interest in poetry and literature. His real name is Kemal Kaplan. His poems and writings have appeared in various magazines, fanzines and anthologies: *Aykırısanat, Adalya, Akatalpa, Amanos Kitap, Bahçe, Çayyolu, Babylon Poetry City, Budala, Dize, Ecinniler, Eliz, Etken, Hayal, Heves, İmgelem Çocukları, Concept Karmaşa, Kurşunkalem, Kum, Kıydili, Lül Sanat, Mazruf, Seal, Mortaka, Nordic, Trail, Papyrus, Only Poetry, Art and Life, Discourse, Sincan Station, I Miss Poetry, Poetry Hour, Remote, Being, New Writing, Yom Sanat*. Some of his poems have been translated into English and published in selections, anthologies and magazines such as *Destine Literare* (2015/Canada), *World Antholog of Poetry* (2016/Taiwan), *Salt boundaries* (2017/Italy), *Miletus* (2019/America). He also has essays, interviews, reviews and criticisms on poetry. İlhan Kemal, a member of the Writers' Union of Turkey (TSY), is among the founders of *İmgelem Çocukları* and *Lül Sanat* magazines. He is also a member of the *Çukurova Literary Association* and the *Others Culture and Arts Initiative*. Nowadays, he works as the art consultant of *Teş Magazine*, which has just started its publishing life. His poems, dominated by the themes of love, childhood, youth and longing, are woven with images. The first striking aspect of his poems is the length of the lines and his arbitrary style of punctuation. The

poet's attitude in spelling and punctuation, on the one hand, interrupts the fluency and, on the other hand, gives the poem a state of delirium. His book, *Çavlan Sözler*, published in 2020, is a compilation of İlhan Kemal's eight poetry books (*Mağmum/January 2006, Nothing, Nobody Knows/April 2007, Ücra Söz/Ağustos 2009, Changed/June 2011, Yağmur Konalgası/September 2012, Kiss Me From My Eyes./March 2014, Ağır Çıvgın/May 2016*) has been revised and brought together. The work is interesting in that it contains traces of the divan literature tradition that has existed for six centuries. In the poet's poems, the lover is sometimes a pale-skinned traveler looking for reunion, and sometimes he is a moth revolving around the candle. The lover is an unfaithful person who is armed with a sword and targets the lover with dimple arrows. In this study, attention will be drawn to the similarities between the lover and beloved type in *Çavlan Sözler* and the lover-beloved types in divan poetry.

**Keywords:** İlhan Kemal, *Çavlan Sözler*, Tradition, Divan Poetry.

### Giriş

İlhan Kemal (d. 13 Eylül 1968/ö. -) Adanalı bir şairdir. Edebî çevresi kendisine “İlhan” adını müstear isim olarak verir. Asıl adı Kemal Kaplan olsa da şiirlerini İlhan Kemal ismiyle yayımlar. İlk şiiri *Aykırısanat* dergisinde çıkar. Bundan sonra onun şiirleriyle çeşitli edebiyat dergisi ve antolojilerinde karşılaşılır. Şiirlerinden bazıları ise İngilizce’ye çevrilir (Ezik, 2019; Işık 2017, İlhan Kemal 2020).

İlhan Kemal’in yayımlanmış şiir kitapları şöyle sıralanabilir: *Mağmum* (Ocak 2006), *Hiç, Kimsenin Bildiği* (Nisan 2007), *Ücra Söz* (Ağustos 2009), *Değişik* (Haziran 2011), *Yağmur Konalgası* (Eylül 2012), *Beni Güzlerimden Öp* (Mart 2014), *Ağır Çıvgın* (Mayıs 2016), *Yalnızlık Karnavalı* (Mart 2018), *Yitik Kitap* (Haziran 2019), *Şehrazat’ın Düğünü* (Mayıs 2020)<sup>1</sup>. *Çavlan Sözler* (2020, Toplu Şiirler), *İnci Buğusu/İssiz Yara* (2021), *Hüsün Kitabı* (2022), *Aşkla Çattığım Dünyadır* (2023).

Şairin imgelerle örülü şiirlerinde uzun mısraları tercih ettiği, hemen her kelimeyi küçük harfle kaleme alıp noktalama işaretlerinde kural tanımadığı görülür. Bu durum şairin özgünlüğü yakalama noktasındaki arayışını ve farklı bir tarzı olduğunu gösterir. Bununla birlikte şiirleri incelendiğinde altı asır süren divan şiiri geleneğine ait unsurlara sıklıkla başvurduğu, divan şiiriyle ilişkili kullanımlara gittiği görülür. Şairin gazel nazım şekline benzer şiirleri de vardır<sup>2</sup>.

Şiirde gelenek “*Türkçe’nin, İslâm estetiğine dayalı altı asırlık tecrübesini, yani halk ve divan şiirinin müşterek estetik zeminini karşılar*” (Macit, 1996, s. 11). Divan şiiri geleneğinin izi şu şairlerin mısralarında görülür: Âsaf Hâlet Çelebi (Apaydın, 2001; Aydemir, 2014; Coşkun, 2013; Günay & Koreli, 2019; Nayir Ekinci, 2019; Şen & Akgül, 2009; Uz, 2012), Ahmet Hikmet Müftüoğlu (Akgün, 2023), Behçet Necatigil (Arslan, 2018; Fedai, 2017; Uz, 2015); Abdullah Öztemiz Hacıtahiroğlu, Ali Günvar, Atillâ İlhan, Beşir Ayvazoğlu, Ebubekir Eroğlu, Sezai Karakoç, Hilmi Yavuz (Aka, 2012), Hüsrev Hatemi (Macit, 1996); Akif İnan, M. Nejat Sefercioğlu, Osman Sarı, Şahin Uçar, Turgut Uyar, Zemçi Çetinkaya (Ataman, 2016). 21. yüzyılda Çukurovalı bir şairin dizelerinde divan şiiri geleneğinin sıklıkla ve başarılı bir şekilde işlenmesi ise merak uyandırıcıdır.

*Çavlan Sözler*, şairin sekiz şiir kitabının gözden geçirilmiş ve yayımlanmış hâlidir. Eser, geleneğe ait birçok unsur barındırmaktadır. Bu çalışma ise İlhan Kemal şiirlerindeki âşığa ve sevgiliye ait özelliklerin gelenek kapsamında araştırılmasıyla sınırlandırılmıştır.

### İlhan Kemal’in Şiirlerinde Sevgili

Sevgili divan şiirinin “başkişisi” ve ıstırabın kaynağıdır. Âşığın acı içinde olması ona zevk verir. Cevr oku atar, âşığın canına kasteder. Gönlü taşa benzer ve merhameti yoktur (Pala, 1989, s. 437). Fitneler koparıp ortalığı birbirine katar.<sup>3</sup> Sevgili gamze okları, kılıç veya hançerle âşığı katlettiğinden bir celladı andırır (Nalçacıgil Çopur, 2020, s. 63). İlhan Kemal’in mısralarında da sevgili divan şiirindeki maşukun özelliklerine bürünür.

<sup>1</sup> bk.: İlhan Kemal (2020). *Çavlan Sözler Bütün Şiirler I 1999-2018*. Ankara: Klaros Yayıncılık.

<sup>2</sup> Şairin gazelleri başka bir çalışmada değerlendirilecektir.

<sup>3</sup> Geniş bilgi için bk.: Batislam, H. D. (2003). Divan şiirinde âşık, sevgili, rakip üçlüsü ve ölüm. *Folklor/Edebiyat*, 9, 186-199.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Şair kalbini “hançer uçlar”a, “ok eller”e emanet eder, akasya altında dünyaya gözlerini döker gibi ağlar, kanatıcı şeyleri (hançer ve ok kullanmada mahir) ustadan/sevgiliden öğrendiğini sezdirir. Sevgilinin kirpikleri hançer, elleri oktur:

*Kalbim, seni hançer uçlarına, ok ellerine*

*emanet etme hünerini hangi ustadan*

*öğrenmiştim. Şu kıyıda ağlayan akasya altında*

*dünyaya gözlerimi dökmeyi bir de...*

*İyi öğrenirim kanatıcı şeyleri,*

*aferin bana...*

(Kalbime, s. 212)<sup>4</sup>

Sevgili haindir. Âşık ise hâlâ ona inanır:

*Kınından aşk çıkaracaktı sevgili, hani, nerede!*

*Hain sözlerde deniz mi aramışım, ah aklım*

(Yollara, s. 214)

Can Bardak şiirinde sevgili, âşığın düşlerini yerle bir etmek için barbar rüzgârlar tasarlar. Bu durum şairi mahveder. Sevgili onu ok yağmuruna tutmasın diye yalvaran şair kan atlasında direnmenin kolay olmadığını söyler. Barbar, “kaba saba, ilkel” (Türkçe Sözlük, 2005, s. 199) anlamındadır. “Çöl” Mecnun’u, “barbar, ok yağmuru” Leylâ’yı hatırlatır. Kan atlası ise dünyanın kana bulanmış hâlini anımsatmak için kullanılmış olmalıdır. Sevgilinin oka benzeyen bakışları âşıkları kan içinde bırakır.

Müge “inci çiçeği” (Türkçe Sözlük, 2011, s. 1723) manasındadır. Gelenekte gözyaşı inciye benzetilir. İlhan Kemal’in “Unutma ki mahvıma mügeler açtırmak bezginiyim” sözündeki “müge”den kastının gözyaşı dökmekle ilgili olduğu söylenebilir. Hem ağlamaktan bezgin düşmeye hem de her mahvoluşta yeniden umuda tutunmaya işaret edilir. Şiirin “*Sen bağbancıysan ben bahçeyim, ne işe yararsın olmazsam?*” dizesinde ise sevgili “bağban”, âşık “bahçe”dir. Divan şiirinde bahar gelince bahçeler çiçek ve kuşlarla bezenir. Sevgili ancak bahar gelince dolaşmaya çıkar. Bu bahçede şairler kendini mutlu hissederler. Bahçe daima taze ve suya kanmış olmalıdır. Bir bahçivana ihtiyaç duyulur ve bu kişi sevgili olur (Pala. 1989, s. 67). İlhan Kemal de gelenekteki gibi sevgiliyi bahçivana kendini bahçeye benzetir. Âşık ancak sevgiliyle tazelenacaktır:

*düşlerimi yerle yeksan etmek için barbar rüzgârlar tasarlama!*

*unutma ki mahvıma mügeler açtırmak bezginiyim.*

*bir de sen vurma ok yağmurlu bu çölde, bunu yapma!*

*kolay değildi direnmek kan atlasında, anlıyorsun değil mi?*

...

*sen bağbancıysan ben bahçeyim, ne işe yararsın olmazsam?*

(Can Bardak, s. 28)

İlhan Kemal, âşık olmazsa sevgili ve onun güzelliğinin bir önemi olmadığını söyleyerek Âşık Veysel’in şu mısralarını akla getirir:

*Güzelliğin on par’ etmez*

*Bu bendeki aşk olmasa*

*Eğlenecek yer bulaman*

<sup>4</sup> Şiirler şu kaynaktan doğrudan alınmıştır: İlhan Kemal (2020). *Çavlan Sözler Bütün Şiirler I 1999-2018*. Ankara: Klaros Yayıncılık.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

*Gönlümdeki köşk olmasa*

(Âşık Veysel)<sup>5</sup>

Gözlerinin iriliği ve siyahlığı, ürkek oluşu gibi nedenlerle ceylan divan şiirinde sevgiliye benzetilir (Pala, 1989, s. 25). Şu dizelerde sevgili giz/sır dağından inmiş bir ceylandır. Âşığın yaraları eskise de yarayı (yaraya yakışacak şekilde) kör bıçakla deşmek için bekleyen bir sevgili vardır:

*sanırsınız, şehre ürkek bir ceylan inmiş giz dağından,  
sol gözünden kalbimi taşmış, en işlek caddede. –aaa!*

...

*solan güldeki eski yarayı, deşer mi bir kör bıçak, hâlâ*

(Deşer Eski Yarayı Bir Kör Bıçak, s. 108)

Sevgilinin dudakları kırmızıdır, ateşe benzer:

*Kıyısındaım şimdi kuruyarak akan tüm nehirlerin*

*Gözlerinde albatros şaşkınlığı büyütme*

*Bu, hiç bilmediğimdi daha önceleri*

*Çok şey değişmiş olmalı göğün altında*

*Yooo nar çatlamış dudaklarından söz etmeyeceğim.*

(Sular Öldüğünde, s. 157)

Siyah saçları nedeniyle kâfir, put vb. ilişkilerle divan şiirinde geçen sevgili İlhan Kemal'in şiirlerinde genellikle esmer bir güzel olarak öne çıkar. Siyahlık-kesret ilişkisiyle hareket edilen mısralarda sevgili dört kitapta olmayan "esmer sure"ler okur. Şairin sevgiliyi esmerliğinden dolayı "çingene kızı" olarak nitelenmesi ise geleneği dönüştürdüğüne bir örnek teşkil eder:

*uzatmış çiçek ellerini mahcup nar çingene kızı*

*esmer sureler okuyordu zamana dört kitap dışı*

(Güneş Saati, s. 31)

Maşuk'un kirpikleri ateş, gözleri rüzgâr olunca bakışları yangın yerine döner. Rüzgâr ateşi daha da artırır. Aslında kirpiklerin ateş olmasının nedeni gözlerdir. Gözler ateşi körüklemektedir:

*beyazın mihrabı, avuçların. kim doldurmuşsa ona, kül gülü?..*

*ateş asılmış kirpiklerine. gözlerin, rüzgâr. bakışların, yanıyor!*

*savrulmak! unutulmuş ezber, yeniden hatırladığın. neden-*

(Son Atlar, s. 144)

Vefasız sevgilinin kapısına kurşunlar kuruludur ve sevgili âşığı pusuda bekler. Şair "Kalk, yaya gidelim" derken hem cesurca buradan geçmeyi hem de "ok, yay" ilişkisiyle sevgilinin yaya benzeyen kaşlarına ulaşmayı hayal eder:

*sofana kurulmuş kurşun. burada vefa, yok. kalk, yaya gidelim*

(Son Atlar, s. 144)

### **İlhan Kemal'in Şiirlerinde Âşık**

Âşık "düta (iki büklüm), kararsız, sabırsız, yüreği kanla dolu, gözü kan ağlar, çaresiz, mest, şûride, gam yiyen, hayran ve kendinden geçmiş, başı dönmüş, sadık, gönlü kırık, inleyen, güçsüz, zayıf, takatsız,

<sup>5</sup> [https://www.siir.gen.tr/siir/a/asik\\_veysel/guzelligin\\_on\\_paretmez.htm](https://www.siir.gen.tr/siir/a/asik_veysel/guzelligin_on_paretmez.htm) Erişim: 09.10.2023/13:50.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

ayağı bağlı, esir, gözü yaşlı” biri olarak divan şiirinde tasavvur edilir (Pala, 1989, s. 50). İlhan Kemal’in şiirlerinde gelenekteki âşığa ait özelliklerin hemen hepsine rastlanır.

Geleneğin şiirinde kan yutan, hasta ve divane âşığın derdine deva olabilecek kişi ancak sevgilidir. Aşağıdaki dizelerde de âşığın ilacı sevgilinin ardında bıraktığı şarap tortusudur. Kalan son damlayı içmek için sevgili elbet gelecektir. Bu ihtimal âşığı hayata bağlar.

Eskiden içki şişesinin dibinde kalan yudumu içmek âdetti. Son yudumu içmenin şarabın mucidi Cem’in hakkı olduğuna inanıp yere dökerlerdi. Bu şekilde Cem’in ruhunun şad olacağına inanılırdı (Pala, 1989, s. 108). İlhan Kemal’in şiirinde ise şarabın son yudumu âşığın yaralarına dökülmektedir. Sevgili için saklanan son yudumun yaraya dökülmesi sevgiliye kavuşmak demektir:

*ardında bıraktığın şarap şişesindeki son damla? –ilaç, açık yaralarım*

(Dilfigâr, s. 78)

Şair sarhoşluktan sallanır ve yatağı sevgilinin kapı eşiğidir:

*kaç gül dökümü yaptın koydun masaya, kaç almanak:*

*hep keskin virajlarda çektiirdiğin buğulu fotoğraf,*

*vaktin ellediği saçlarında çıkan yangınlı kasırga,*

*burgaç<sup>6</sup> yıllarda sallanarak yürüdüğün sarhoş yol*

*günü düinden güzel kılma andında dilinde pelesenk, hep*

...

*dağların ardında, uğultu ormanlarında, dipte kalmış huzur:*

*gözler yatırılmış dikenli uzağa, ufuk gözlenmiş sürgit,*

*eşikmiş şairin yatağı, kalakalmış. hep, esmer dizeler...*

(Tedirgin, s. 138)

Aşk şair için “sevgilisiz ve yorgansız üşünen yol” demektir. Soğuk gecelerde kalbine ateş dökülen şair, yaşamayı da “çırılçıplak sürgün edilen yurt” olarak tanımlar:

*Kar: gecenin yatağında yükselen ateş!*

*Beyaz: Karanlığa doğru tutulan fener!*

*Aşk: Üşüdüğümüz diyar yarsız yorgansız!*

...

*Ne derler sizin orada kalbe nâr dökülmesine?*

*Bıçak: Dilimizi buzla kesen bir fırtına makamı!*

*Yaşamak: Sürgün edildiğimiz yurt, çırılçıplak!*

*Her şeyi biz söyledikse, sana ne kaldı?*

(Fırtına Makamı, s. 163)

İlhan Kemal’in şiirlerinde âşık acıdan zevk alır. Ruhunda oluşan kesikler çıldırsa da acının devam etmesini ister:

*burası neresi, bu nasıl bahçe, ümit etmenin gülünü yontuyor*

*bir taş cambazı, bıçaklara itiyor beni. çıldırıyor ruhumdaki kesik!*

*kan ağıyor dünyanın barbar şakağına, dudaklarımın kıvrımlarından!*

<sup>6</sup> Burgaç: “beklenen hızından farklı bir biçimde ve beklenmeyen yönlerden gelen şiddetli hava akımı, türbülans”. bk.: *Türkçe sözlük* (2011) [haz.: Şükrü Halûk Akalın vd.]. Ankara: TDK Yay., s. 414.



*eskiden rüzgârı geçerdi atım, şimdi, kim dokunsa düşecek!*

...

*devam et kalbimi bıçak dudaklarınla öpmeye, aşkın arafta*

(Araf, s. 113)

*Leylâ ile Mecnûn* mesnevisinde de Mecnun aşk derdinin artması için dua eder:

*Sal gönlüme derd-i aşkdan gam*

*Her lahza vü her zamân ü her dem*

*Her handa ki 'âlem içre gam var*

*Kıl gönlümü ol gama giriftâr*

*Endişe-i 'akldan cüdâ kıl*

*'Aşk ile hemîşe âşinâ kıl*

*Artur mana zevk u şevk-i leylî*

*Dâim mana anda kıl tecellî*

*Çohdur Benî Âdem içre bîdâd*

*Et gönlümi vahşet ile mu'tâd*

(Leyla ile Mecnun, b. 1114-1119)<sup>7</sup>

İlhan Kemal'in şiirlerinde *Leylâ ile Mecnun* mesnevisine göndermeler yapılır. Âşık Mecnun, sevgili Leylâ'dır:

*bilinmez mi? –terleyen; nar soluğun; aşkın bin dalında, bir!*

*bu eğlenti konağında, az kalsın çok olan; odalardan taşan isyân hikâyesi!*

*burası da yalnızlık, leylâsızlık. her yer hüsrân berzahı, leyli leyli*

(Nar Terlemesi, s. 137)

*günler kırılmış hale. aşk, arasında. gelme. mecnun, bahtımda de-  
sen olur*

(Yüzüme Basarak Seyrettin Kenti, s. 121)

*Zamanın kaydını tutamadım, yırtıktı sayfası aklımın*

*Buradan sana bir yol çıkamadım, yüzünden çıkaramadım*

*Kimdi o, kollarında sarışın bir hüzne yer açmış tanıdık*

*Leyli! Ağlasam yağmur susmalı... Seversem aşk...*

(Zamana, s. 213)

*Çavlan Sözlere*'de varlık-yokluk, hiçlik, birlik/teklik vb. ifadelerle rastlanır. İlahî aşka kapı aralayan dizelerde âşık bir vuslat yolcusudur:

*ama biz hasar onarma töreniyiz,*

*iki kişilik: bir 'liğe çoğalırız!*

*işimiz yok ikilikle!*

(Hasar Onarma Töreni, s. 265)

<sup>7</sup> bk.: Onan, N. H. (1955). *Fuzuli, Leylâ ile Mecnun*. İstanbul: Maarif Basımevi.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

*içten şarkılar söylemek iradesi! önünde eğildiğimiz muhteşem he-  
ves! evet öyle.*

*dur! suskuyla gelecek, buruk bir sabah bırakmaya; ikimizli cerenler,  
suftı gecelerin penceresine! tüneyen güvercinler, vurulmuş düşler görecek,  
(Merhaba Kanatma’k, s. 120)*

*Var mı erimekten daha sonrası. Bu bizim  
Varlar ortasında yok kaldığımızın hikayesi  
Sevgili! Uzaklar tül değil ki çekivereyim görünesin  
(Uzun hikaye, s. 154)*

*Âşık, mumun etrafındaki pervanedir:  
inceden düşler büyüttü odalarında,  
bu kalpgâh. sakladı sedefköşesini  
edahlı varlığına: -kal orada asırlarca!  
zifir şehirdeki tek lâmbam, pervanensem  
dönüyorsa başım, itekle, aydınlığına d*

*ü  
ş  
e  
y  
i  
m.  
-ne güzel düşmektir bu!-*

(Göz Kapısı, s. 252)

Efsaneye göre Şirin, Hüsrev tarafından bir dağın arkasına hapsedilmiştir. Ferhad ise ona kavuşmak için dağı delmiş ve Şirin’in emriyle “Cûy-ı Şîr” isimli suyu getirmiş veya süt akıtmıştır. Ardından kazmasını havaya atıp altına başını tutmuş, beyni parçalanarak ölmüştür (Kurnaz, 2009, s. 193). *Çavlan Sözler’de* Âşık, Şirin’e kavuşmak için dağları delen bir Ferhad’dır:

*ferhad! bir daha savur külüngünü, yaşasın ölmek, orada kal  
(Ey Ferhad, s. 139)*

Şu mısralarda “deşmek, saklamak, dağ, ferhad, taş, baş, kız” kelimeleri birbiriyle uyumlu kullanılır, bağlam Ferhad ile Şîrîn hikâyesine bilinçli bir göndermedir. Ayrıca meşhur halk hikâyesi *Aslı ile Kerem*<sup>8</sup>’in sonunda yanarak ölen Kerem hatırlatılır:

*tarihin karnını deş, sor, sorgula: -neden saklamış zerdüşt’ü sabalan  
dağı, ferhad efkârını niçin taşlara işlemiş, yanmış kerem, ne’den?..  
yanıt, başucunda. uzansan dokunursun, bir kızın göğsü erir.  
yanıldıkça anlıyorsun, şu sonsuz uzamda insan insanın kıskacı!  
(Hayat: Pespayelik Kitabı, s. 69)*

<sup>8</sup> bk.: Duymaz, A. (2001). “Kerem”. <https://teis.yesevi.edu.tr/madde-detay/kerem-mdbir> Erişim: 14.10.2023/11:49.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Âşık, divan şiirinde olduğu gibi yanar kül olur, külleri rüzgârda savrularak yok olur. Şu mısralarda şair, ateşin içine çılgınlığını düşürür ve sözcükler kor olur. “Köz olmaya, kül olmaya ne kadar var, yetmez mi” diyen şair artık köz ve kül hâline gelip rahatlamak ister. “bekle dedin bekledik bir mümkününe kaç var?” sözüyle ise sevgiliye kavuşma ihtimali için beklediği, aşk ateşine bunun için katlandığı anlaşılmaktadır:

*ateşin ortasına çılgılığımı düşürdüm, yandım çok,  
sözcüklerim korardı, yetmez mi daha, köze kaç,  
küle kaç var? kalbim! var imkansıza, ona sor:  
bekle dedin bekledik bir mümkününe kaç var?*

(Vira Vira, s. 36)

Şair, aşağıda “*bu yüzden işte bu yüzden külden sayıldı gül*” diyerek hem “kül” ve “ateş” ilişkisini hem “kül” (كول ve “gül” (كول kelimelerinin eski harflerle yazımındaki benzerliği çağrıştırır<sup>9</sup>. Yanmaktan hastalığı iyice derinleşen âşık, her şey birbirinin yerine koyulsa da tek sevgilinin aynı kaldığını çeşitli kelime oyunlarıyla anlatır:

*sayrısı derindir yaşadığımız günlerin  
bu yüzden işte bu yüzden külden sayıldı gül  
tümünden sayıldı avucumuzda biriktirdiklerimiz  
bir senin sahiciliğın etmedi, inan buna çingene kızı  
sen bir güneş saati hep aydınlığı gösteren*

(Güneş Saati, s. 31)

Âşığın ahı “soluğunda duman gülleri” oluşturur. Yaşadığı yer ise “küllenen ah ocağı”dır:

*görölmüş! bir ateş yolculuktan sarkmışsın bu konalgaya,  
köz kokan soluğunda duman gülleri, açmaktaymış, rengini silerek  
ardında küllenen ah ocağında zelil bahçe, yanık dünlere delil*

(Yağmur Konalgası, s. 96)

## Sonuç

İlhan Kemal’in *Çavlan Sözler* isimli kitabında âşığa (hastalık, divanelik, kan içinde olma, yaralanma, acıdan zevk duyma, sevgiliye kavuşma isteği, sarhoşluk, yersiz yurtsuz ve yaralı olma) ve sevgiliye (öldürücülük, vefasızlık, ulaşılmaz olma, hainlik, tuzak kurma, tabiplik/derde deva olma, fiziki özellikler) ait unsurlar divan şiirindeki âşık-maşuk tipine ve ikisi arasındaki ilişkiye oldukça benzer. Şair aşkın anlatımında en fazla *Leylâ ile Mecnûn*’dan yararlanır. Leylâ sözcüğüne “leyli” şeklinde de yer veren şair, gece ile “leyl” arasında çağrışımlar yapar. Ok-sevgili-göz; ateş-şarap, dudak; çöl, barbar; bağban-bahçe/sevgili-âşık vb. birbiriyle bağlantılı kelimeleri geleneğe uygun kullanır. Bu durum İlhan Kemal’in divan şiiri geleneğine hâkim olduğunu gösterir.

Çukurova’nın yetiştirdiği şair, günümüz şiirini köklü bir gelenekle yoğurur ve dönüştürür. Şiirlerinde yerel dile ait söylemler veya unsurlarla divan şiiri geleneğini bir araya getirmesi İlhan Kemal’in şiirlerini farklı kılar.

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<sup>9</sup> “Kül” ve “gül” arasındaki yazım benzerliği çağrışımından birçok şiirde yararlanır. Sadece eski harfli yazımda değil, günümüz Türkçesinde de bu kelimelerin imlasi benzerlik gösterir. Sözcüklerin birbirine karıştırılması ise sıklıkla eski harfli okuma sırasında olur.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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INDUSTRY 5.0

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**ABSTRACT**

James Watt's invention of steam engines and the resulting implementation of machines in factories marked a turning point in production, facilitating the transition from workshop-based production to factory-based production. In 2011, Industry 4.0 was defined, signalling the emergence of a rigorous digital transformation process across all sectors and systems that worked collaboratively within its scope.

Following the Industry 4.0 process, the Industry 5.0 process has gained popularity. This approach prioritises both people and the environment, as fully elaborated in the Industry 4.0 process. Ergo, Industry 5.0 can be expressed as Industry 5.0 = Industry 4.0 + Human + Environment.

In addition to data and information, understanding the Industry 5.0 process is crucial for employees to adapt and collaborate with digital technologies and robots during the digital transformation of businesses.

This study will provide an overview of industrial revolutions and an in-depth analysis of the Industry 5.0 process.

**Keywords:** Industry 5.0, Information Systems and Technologies, Information Management, Sustainability

**ÖZET**

James Watt'ın buharlı makineleri ortaya çıkarması ve ardından makinelerin fabrikalarda kullanılmaya başlaması üretimde yeni bir sayfa açılmışını, atölye tipi üretimden fabrika tipi üretime geçilmesini sağlamıştır. 2011 senesinde Endüstri 4.0 süreci ile hem geçmiş sanayi devrimleri tanımlanmış hem de tüm sektörlerde yoğun bir dijital dönüşüm süreci başlamış ve bu süreç kapsamında iş birliği içerisinde çalışan sistemler ortaya çıkmıştır.

Endüstri 4.0 sürecinden sonra Endüstri 5.0 süreci de popüler olmaya başlamıştır. Endüstri 5.0 süreci Endüstri 4.0 sürecinde tam olarak açıklanmaya insana ve aynı zamanda çevreye odaklanmıştır. Yani Endüstri 5.0 süreci, Endüstri 5.0 = Endüstri 4.0 + İnsan + Çevre olarak ifade edilebilir.

İşletmelerin dijital dönüşümünde veri ve bilginin öneminin yanında, çalışanlarında bu sürece uyum sağlaması, robotlar ve dijital teknolojiler ile iş birliği içerisinde çalışabilmesi çok önemli olduğundan Endüstri 5.0 sürecinin iyi anlaşılması önemlidir.

Bu çalışmada genel olarak sanayi devrimleri anlatılmaya ve detaylı olarak da Endüstri 5.0 süreci incelenmeye çalışılacaktır.

**Anahtar Kelimeler:** Endüstri 5.0, Bilişim Sistemleri ve Teknolojileri, Bilgi Yönetimi, Sürdürülebilirlik

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## Entrance

Industries are expected to take an active role in resolving the societal challenges, such as preserving global resources, addressing climate change, and achieving social stability. In this context, Industry 5.0 promotes practices to train and enhance employees' qualifications. This enables them to adopt digital technologies, choose circular production models and encourage sustainable production. As a result, natural resources can be preserved, and sectors can be better prepared for unanticipated threats, such as Covid-19 [1].

The Industry 5.0 process has also prioritised human and environmental considerations, which were not previously addressed in Industry 4.0. Like previous industrial revolutions, Industry 5.0 is driven by the emergence of disruptive technology. However, this latest revolution builds on the harmony between technology, humanity and the environment, achieved through the application of cutting-edge technology. When examined within this framework, the Industry 5.0 process may also be referred to as neo-Industry 4.0.

This paper will elucidate the Industry 5.0 process within the confines of this investigation.

### 1. Before Industry 5.0

Beginning in approximately 1780, Industry 1.0, commonly known as the Industrial Revolution, centred on industrial production using steam and water-powered machines. This marked the transition from workshop-style to factory-style production. In the early 1900s, Industry 2.0 began with the introduction of mass production through industrial production, electricity, and assembly lines. However, machines have also begun to replace the work of unskilled workers. During the 1970s, the third industrial revolution, known as Industry 3.0, emerged with the implementation of computer, electronic, and automated systems in manufacturing. This revolution was bolstered by globalization, which involved moving production to low-cost countries. It involved internal and external enterprises collaborating through the use of data and information as well as technologies like artificial intelligence and digital twins. In 2011, the Industry 4.0 process started to emerge. Moreover, the Industry 4.0 process led to the emergence of definitions and names for the 2nd and 3rd industrial revolutions. In summary, Industry 4.0 and the two subsequent industrial revolutions were named after the initial one, known as Industry 1.0 [2], [3].

### Industry 5.0 Process

Approximately a decade after the introduction of Industry 4.0, the concept of Industry 5.0 emerged. This transition represents a shift towards a sustainable, resilient, and human-centric industry. In contrast to Industry 4.0, Industry 5.0 places a greater emphasis on the human aspect, which is not fully elaborated upon in its predecessor. This new process can also be referred to as the neo-Industry 4.0 process. According to Rifkin, there exists a connection between energy and industrial revolutions. The energy link in the third industrial revolution is centered on sustainable energy. The Industry 5.0 process also prioritizes the concepts of carbon footprint and a sustainable environment, within this context. Moreover, given the predicted efficiency of systems in Industry 5.0, it is reasonable to suggest that there will be a more efficient use of energy [4] [2] [5] [6].

The Industry 5.0 process prioritises durability, human-centricity, and sustainability. Resilience denotes the capacity of a system to endure disruptions while maintaining safety and sustainability. Achieving resiliency presupposes critical interactions between humans, AI components, and low-level automation. The proposed concept of resilience initiates decision flow from human operators, developed through decision support components and then extends to AI-driven autonomous control components, and finally to low-level automation controls. By following this process, which covers all three situations, it is predicted that problems that may arise on a working system can be resolved more easily [4].

This process can be defined as follows. Industry 5.0 = Industry 4.0 + people (employees and society) + sustainability (environment and energy) + Resilience

This equation can be schematized as follows:





**Figure -2:** Industry 5.0 Process [4], [7]

**a. Industry 4.0 Process:**

The primary aim of Industry 4.0 is to optimize the internal environment of enterprises, including their units, employees, machinery, and equipment, with the help of data-driven technology. This process also facilitates collaboration with the external environment, which entails suppliers, customers, and government institutions, among others. The strategic incorporation of data and information underpins these goals. Technical terms are explained when they are first used, and there is a logical flow of information with causal connections between ideas. The language is objective, value-neutral, and free from bias and ornamental verbiage. Spelling and grammar follow British English conventions, while the vocabulary contains British English and subject-specific terms, where appropriate. This collaboration can be defined as a form of horizontal and vertical integration. Cyber physical systems define the virtual counterparts of physical systems in this process [8], [9].

The lights go out in factories of enterprises that operate in adherence to the Industry 4.0 process, as the level of autonomy of data and knowledge-based automation increases during production. In essence, unskilled workers in the production process are removed from the work setting.

The Industry 4.0 process can be briefly schematized as follows.



**Figure-1:** Industry 4.0 Process

**b. Employee & Society**

**Employee:**

In the Industry 5.0 process, the employee's status has been explicitly defined in accordance with the Industry 4.0 process. The aim is for human capabilities to collaborate with system capabilities, such as software, hardware, robotics, and others. This is in order for businesses to maximise the potential of their employees and reap greater benefits. The objective is to enhance the physical health, morale, and motivation of employees through employer investment [7].

This is not a cost for businesses operating within Industry 5.0, but a valuable asset. Achieving business goals requires investment in employees. Increasing their abilities and well-being can positively impact the strengthening of the business-employee value chain. In this context [10], it is anticipated that employees will acquire additional qualifications to enhance their

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

proficiency in the Industry 5.0 operation. While tedious and strenuous manual tasks are delegated to robots, the automation systems at this plant are deemed capable of collaborating with personnel, leveraging their expertise and contributing to overall productivity. Adequate training for employees to effectively collaborate with robotic technology is imperative. Newly developed technologies are being designed to enhance employees' ease of use [6], [10], [11].

Industries should prioritise education, training, and enhancing employee capabilities to acquire the skills required for digital transformation. It is crucial to have qualified human resources for a successful digital transition. However, it is not feasible for every employee to adapt to this process. If any employees are excluded during this process, it is imperative that the state takes measures to locate suitable employment opportunities that will prevent them from becoming marginalized due to social policies. Otherwise, there is a risk of social issues arising [10].

During the Industry 5.0 process, it is probable that companies will provide value-added solutions in order to attract skilled employees [12].

The types of robotic technology currently adopted in the workplace include robotic arms, autonomous cars and robotic machinery. Depending on developments in robot technology, there is a possibility that workplaces may soon use robots that resemble humans and can communicate like them. How these human-like robots will interact with human employees in the workplace is still uncertain, including employees' reactions to this situation, how social interaction with robots will be, what actions can be taken in case of artificial intelligence support, and the likelihood that artificial intelligence will perform incorrectly. Human resource departments responsible for staff-related matters may also have responsibility for robots [11].

One study that addresses employees is human cyber-physical systems (HCPS). Cyber-physical systems, implemented in the Industry 4.0 approach, embody representations of physical world objects in the virtual world. Through the Industry 5.0 method, human cyber-physical systems that form the infrastructure for the depiction of individuals in the physical world to the virtual world may unify human, physical, and virtual systems. Human cyber-physical systems aim to represent not only the physical appearance of individuals, but also their abilities, personality, and sensitivity in a virtual environment [7]. For instance, it is possible to assign suitable job roles to employees based on their abilities and predict the likely alternatives for employees who may fall ill in the future.

Thanks to human cyber-physical systems, it is possible that in the future, scenarios could occur where the conduct of business by employees may be commercialized amongst different companies. Thanks to human cyber-physical systems, it is possible that in the future, scenarios could occur where the conduct of business by employees may be commercialized amongst different companies. To illustrate, when identifying and repairing personnel machinery failures is delegated to a digital domain utilizing human-driven cyber-physical systems, this can act as a model for staff at other enterprises. However, the task of integrating the tacit knowledge of employees - recognized as one of the most challenging elements in the development of organisational memory within business settings - can be accomplished.

## **Society:**

Industry 5.0 has emerged as a vision for the future of industry that seeks to uphold human values and meet the essential needs of society, going beyond mere efficiency. The focus is on placing the well-being of workers at the heart of the manufacturing/production process, along with other key human values relating to employees, customers, and wider society [13].

It aligns with the principles of Industry 5.0 and promotes a society centred around humans that reconciles economic development with addressing societal issues through the integration of cyber and physical systems [14]. The concept of Society 5.0 was introduced by Keidanren, the leading business federation of Japan, in 2016 and has since garnered support from the Japanese government. Japan's dimensions of digitalisation and transformation are based on a comprehensive national strategy and policy, mainly focused on individual organisations and certain segments of society.

Society 1.0 and 2.0 correspond to pre-industrial times, up until the late 18th century. Society 3.0 marks the start of an industrial society and broadly corresponds to aspects of the first, second and third industrial revolutions. Society 4.0 strives to enhance the benefits obtained from technological

advancements in information gathering, sharing, storage, and preservation, without subjective evaluations. Society 5.0 seeks to achieve a balance between economic growth and addressing social and environmental challenges through a logical and comprehensible structure, clear, objective language, and a formal register. Throughout the document, technical term abbreviations shall be promptly explained, and grammatical correctness will be ensured. Society 5.0 is not confined to the manufacturing sector. It encompasses a society in which daily life is enriched by advanced information technologies, internet of things technology, robots, artificial intelligence and technologies like augmented reality, leading to outcomes such as rapid acquisition, sharing and analysis of information. The benefits are primarily enjoyed by every citizen, in fields including, but not limited to, industry and healthcare. Economic gain is not the primary goal [10].

**c. Sustainability and Environment**

Sustainable production is facilitated through circular production models aided by efficient resource utilization technologies. To mitigate a business's impact on the natural environment, measures can be implemented to minimize carbon footprint and the use of natural resources, toxic materials, and other harmful substances. Furthermore, active measures can be taken to eliminate waste, as well as to promote reforestation and repair of environmental damages [15], [16].

It is imperative for businesses to maximise their resource usage in the production of goods and services, enhancing their efficiency. Resource efficiency entails optimising the product output to the resource input ratio [10].

Businesses that adopt sustainable practices cultivate a positive customer perception, making them a more preferred choice among consumers [12].

Another aspect of sustainability in the Industry 5.0 process is Environmental Social Governance (ESG). ESG refers to the regulatory standards that organizations follow to safeguard the environment, mitigate climate change, and address social concerns such as discrimination and human rights abuses. ESG scores have recently gained prominence as a measure of a business's financial status [17].

The rise in popularity of concepts such as sustainability, environment and climate change can be attributed to the growing awareness of technology's negative impact on the environment and human health, including physical and nervous system health. Nevertheless, comparative analysis of past climate and environmental data, when technological influence was less pervasive, could considerably enhance research on these topics.

**Durability**

Resilience aims to enhance the durability of industrial production, enabling it to withstand disruptions and provide and sustain vital infrastructure during emergencies. According to [18], geopolitical crises, cyber security threats such as cyber attacks, wars, humanitarian crises, and similar factors, exert a significant influence on global industries and the economy, especially on Industry 4.0 and smart manufacturing. During the Covid-19 pandemic, worldwide production processes faced significant challenges. In order to overcome such obstacles, a heightened degree of process adaptability, production sustainability, and quality decision-making are essential. Our efforts are focused on sustaining this approach with Industry 5.0 [13].

The role of data-driven technological advancements in enhancing enterprises' resilience cannot be overstated. These technological advancements have resulted in a detrimental progression in acquiring, storing, analysing, sharing, and preserving data and information vital to businesses. It is important to note that these technologies being linked online also increases the likelihood of vulnerability to cyber attacks. It is just as imperative to conduct research in the field of cyber security as it is to carry out work in other areas for businesses to maintain their resilience [10].

**Result**

Industry 5.0 centres on the human factor, both in terms of employees and society, a concept that was not fully emphasised in the Industry 4.0 process. Consequently, there is a concerted effort to promote collaboration between people and smart technologies. It is evident that each industrial era has been instigated by technological advancements. However, the fifth industrial revolution, in contrast,

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

prioritises the wellbeing of both employees and the environment in addition to technological advancements. Building upon the Industry 4.0 process, the fifth revolution adopts and progresses the existing technology. At its core, this revolution places a heightened emphasis on addressing the environmental impact caused by human activity and protecting the rights of employees within the business world and society at large. [10]

Through the application of Industry 5.0 technologies, future enterprise corporate memories may access employee-based implicit knowledge and experiences.

This process values the welfare of both employees and society. As His Holiness Şeyh Edebali, one of our elders, famously stated: "Let the people live so that the state can live."

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**INTERNATIONAL ANKARA CONGRESS ON  
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YOZGAT/SORGUN LİNYİT KÖMÜRÜNÜN FLOTASYONUNDA FARKLI  
KÖPÜRTÜCÜLERİN PERFORMANSININ ARAŞTIRILMASI

AN INVESTIGATION INTO THE PERFORMANCE OF DIFFERENT FROTHERS IN THE  
FLOTATION OF YOZGAT/SORGUN LIGNITE COAL

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**ÖZET**

Kömür flotasyonu, ince kömürden (-500 µm) kül ve kükürtün uzaklaştırılması için en yaygın kullanılan yöntemdir. Bu yöntemde, ince kömür tanecikleri (-500 µm), çeşitli reaktiflerin eklendiği sulu çözeltilerde oluşan hava kabarcıklarına tutunarak yüzeye taşınır ve istenmeyen minerallerden (gang) ayrılır. Flotasyon yönteminde; köpük oluşturmak, köpüğü stabil tutmak, tanecik-hava kabarcığı temasını arttırmak ve istenilen minerallerin köpük ile taşınabilmesini sağlamak için köpürtücü reaktifler kullanılır. Bu çalışmada, linyit kömürü flotasyonunda farklı köpürtücülerin performansı incelenmiştir. Flotasyon deneylerinde köpürtücü reaktif olarak çamyacı, Dowfroth-250 ve Metil izobütil karbinol (MIBC) kullanılmıştır. Bu köpürtücüler deneylerde 25, 50, 75, 150, 250, 500 ve 1000 g/t miktarlarında test edilmiştir. Flotasyon deneylerinin sonuçları; verim (%), yanabilir verim (%) ve kül uzaklaştırma (%) ile birlikte değerlendirilmiştir. En iyi sonuçlar, 500 g/t Metil izobütil karbinol (MIBC) ile %61.56 verim, %63.01 yanabilir verim ve %40.73 kül uzaklaştırma ile elde edilmiştir. Metil izobütil karbinol (MIBC) Yozgat/Sorgun linyit kömürünün flotasyonu için en uygun köpürtücü olarak seçilmiştir.

**Anahtar kelimeler:** Flotasyon, kül uzaklaştırma, linyit kömürü, verim, yanabilir verim.

**ABSTRACT**

Coal flotation is the most widely used method of removing ash and sulphur from fine coal (-500 µm). In this method, fine coal particles (-500 µm) are carried to the surface by clinging to air bubbles formed in aqueous solutions to which various reagents are added and separated from unwanted minerals (gangue). In the flotation method; frothers reagents are used to create foam, to keep the foam stable, to increase particle-air bubble contact and to ensure that the desired minerals can be transported by foam. In this study, the performance of different frothers in lignite coal flotation was investigated. Pine oil, Dowfroth-250 and Methyl isobutyl carbinol (MIBC) were used as frother reagents in the flotation experiments. These frothers were tested in the experiments at 25, 50, 75, 150, 250, 250, 500 and 1000 g/t. The results of the flotation experiments were evaluated together with yield (%), combustible recovery (%) and ash rejection (%). The best results were obtained with 500 g/t Methyl isobutyl carbinol (MIBC) with 61.56% yield, 63.01% combustible recovery and 40.73% ash rejection. Methyl isobutyl carbinol (MIBC) was selected as the most suitable frother for flotation of the Yozgat/Sorgun lignite coal.

**Keywords:** Flotation, ash rejection, lignite coal, yield, combustible recovery.



## GİRİŞ

Kömür; bitkisel kökenli organik maddeler ile inorganik minerallerin yüksek basınç ve sıcaklığın etkisiyle sıkışması ve katılaşması sonucu oluşan tortul bir kayadır. Bir kömürün fiziksel ve kimyasal özellikleri, kömürlerin sınıflandırılması ve kalitesinin belirlenmesinde kullanılmaktadır. Kömür; ASTM (The American Society for Testing and Materials) standartına göre dört sınıfa ayrılır: linyit, alt bitümlü kömür, taş kömürü ve antrasit.

İnce kömürlerin (-500 µm) temizlenmesinde yaygın olarak kullanılan flotasyon yöntemi 1920'lerden beri taş kömürü ve antrasitlere uygulanmaktadır. Kömürün içerdiği, kullanım ve temizlemede önemli safsızlıklar üç grupta toplanmaktadır: kül, kükürt ve nem. Kömür flotasyonunda, kömürden kül yapıcı maddeler ve inorganik kükürt uzaklaştırılmaktadır. Kömür hidrofob (suyu sevmeyen) özellik gösterdiğinden, kömürün flotasyon ile yüzdürülmesi kolaydır. Buna rağmen, değişik kömür cinsleri farklı flotasyon özelliği göstermektedir. Linyit kömürü; yüksek nem, kül ve uçucu madde içeren düşük kalorifik değere sahip bir kömürdür. Bu nedenle linyitler en zor flote edilen kömürlerdir. (Drzymala, 2007; Laskowski, 2001)

Flotasyonda kömür ve istenmeyen minerallerin (gang) yüzey özelliklerindeki farklılığa bağlı olarak bir ayırma gerçekleşir. Kömür doğal hidrofobik (suyu sevmeyen) özellikte olduğundan pülpe ilave edilen toplayıcı reaktif ve köpürtücü sayesinde, kömür taneciklerinin yüzeyleri ince bir hidrokarbon tabakası ile kaplanır ve hava kabarcıklarına yapışarak köpüklerle birlikte temiz kömür (konsantre) olarak alınır (Glombotskii, Klassen and Plaksin, 1972).

Köpürtücüler, bir polar grup ve hidrokarbon gruptan oluşan, hava-su arayüzeyinde adsorbe olabilen heteropolar yüzey aktif bileşiklerdir. Köpürtücülerin flotasyondaki görevi, köpük oluşturmak, hava-su arayüzey gerilimi azaltarak istenilen minerallerin hava kabarcığına yapışarak köpük ile birlikte taşınmasını sağlamak ve oluşan köpüğün direncini arttırmaktır. Flotasyonda kullanılan köpürtücüler üç gruba ayrılabilir: alkol, alkoksi ilaveli parafinler ve poliglükoller (poliglükol ve poliglükol eter). Çamaşığı ve kresilik asit en yaygın kullanılan doğal alkol tipi köpürtücülerdir. Metil izobütil karbinol (MIBC) en yaygın kullanılan yapay alkol tipi köpürtücüdür. Dowfroth-250 ise poliglükol eter tipi köpürtücüdür (Khoshdast and Sam, 2011; Sis ve Yekeler, 2022).

Bu çalışmada çamaşığı, Dowfroth-250 ve Metil izobütil karbinol (MIBC) köpürtücülerinin linyit kömürü flotasyonunda etkisi incelenmiş ve bu köpürtücülerin flotasyon performansları karşılaştırılmıştır.

## MATERYAL VE METOD

### Materyal

Bu çalışmada Yozgat/Sorgun linyit işletmesinden alınan kömür numuneleri kullanılmıştır. Tablo 1'de deneylerde kullanılan kömür numunesinin kısa analiz sonuçları verilmiştir.

**Tablo 1.** Yozgat/Sorgun linyit kömür numunesinin kısa analiz sonuçları

Analiz	Kül (%)	Nem (%)	Kalorifik değer (kcal/kg)
Değer	38.66	6.59	3563

Flotasyon deneylerinde köpürtücü olarak çamaşığı, Dowfroth-250 ve Metil izobütil karbinol (MIBC) kullanılmıştır. Test edilen köpürtücülerin kimyasal bileşimi ve yoğunluk değerleri Tablo 2'de verilmiştir.

**Tablo 2.** Test edilen köpürtücülerin kimyasal bileşimi ve yoğunluk değerleri (Khoshdast and Sam, 2011)

Köpürtücü reaktif cinsi	Kimyasal bileşim	Yoğunluk (g/cm <sup>3</sup> )
Çamaşığı	CH <sub>10</sub> H <sub>17</sub> OH	0.875
Dowfroth-250	CH <sub>3</sub> (C <sub>3</sub> H <sub>6</sub> O) <sub>4</sub> OH	0.980
Metil izobütil karbinol (MIBC)	(CH <sub>3</sub> ) <sub>2</sub> CHCH <sub>2</sub> CHOHCH <sub>3</sub>	0.808

### Metod

Kömür flotasyonu deneylerinde Denver tipi flotasyon makinası kullanılmıştır. Deneyler; 1.2 L'lik flotasyon selülünde, %10 ağırlıkça katı oranında, 1100 rpm karıştırma hızında ve pülpün ortam pH değerinde (pH: 3-3.5) yapılmıştır. Bastırıcı olarak 750 g/t sodyum silikat ( $\text{Na}_2\text{SiO}_3$ ), toplayıcı olarak 750 g/t gazyağı kullanılmıştır. Köpürtücü olarak çamyağı, Dowfroth-250 ve Metil izobütil karbinol (MIBC) reaktifleri kullanılmıştır. Her bir reaktif ilave edildikten sonra 5 dakika kondisyon süresi verilmiştir. Flotasyon işlemi tamamlandıktan sonra yüzen (temiz kömür) ve batan (artık) ürünler susuzlandırılmıştır. Yüzen ürünler (temiz kömür)  $105 \pm 5$  °C'de etüvde kurutulmuş ve ASTM D3174 standartına göre kül analizi yapılmıştır. Verim (%), yanabilir verim (%) ve kül uzaklaştırma (%) aşağıdaki formüller kullanılarak hesaplanmıştır:

$$\text{Verim (\%)} = \frac{\text{Temiz kömür ağırlığı (g)}}{\text{Beslenen kömür ağırlığı (g)}} * 100$$

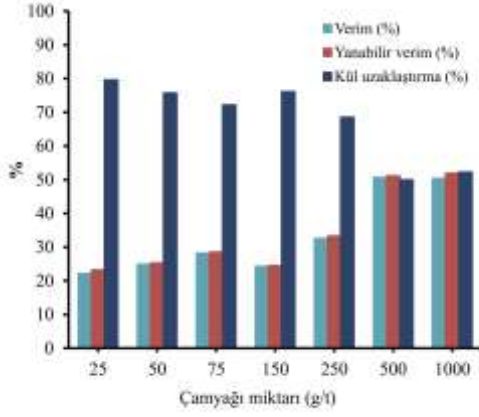
$$\text{Yanabilir verim (\%)} = \left( \frac{\text{Temiz kömür ağırlığı (g)}}{\text{Beslenen kömür ağırlığı (g)}} \right) * \left( \frac{100 - \text{Temiz kömür külü (\%)}}{100 - \text{Beslenen kömür külü (\%)}} \right) * 100$$

$$\text{Kül uzaklaştırma (\%)} = \left[ \frac{\text{Beslenen kömür külü (\%)} - \left( \text{Temiz kömürün külü (\%)} * \frac{\text{Temiz kömür ağırlığı (g)}}{\text{Beslenen kömür ağırlığı (g)}} \right)}{\text{Beslenen kömür külü (\%)}} \right] * 100$$

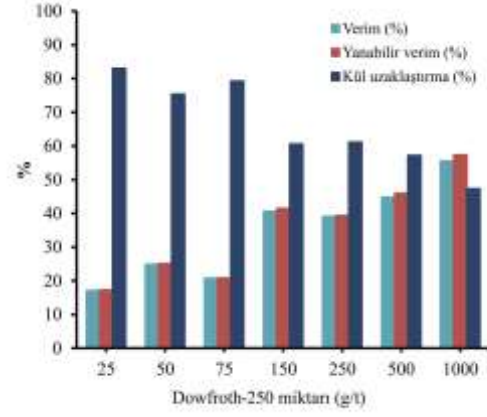
### BULGULAR

Bu çalışmada Yozgat/Sorgun linyit kömürünün flotasyonunda farklı köpürtücülerin performansı araştırılmıştır. Kullanılan köpürtücüler; kömür flotasyonunda yaygın olarak kullanılan, çamyağı, Dowfroth-250 ve Metil izobütil karbinol (MIBC)'dür. Flotasyon deneylerinde bu reaktifler 25, 50, 75, 150, 250, 500 ve 1000 g/t miktarlarında kullanılmıştır.

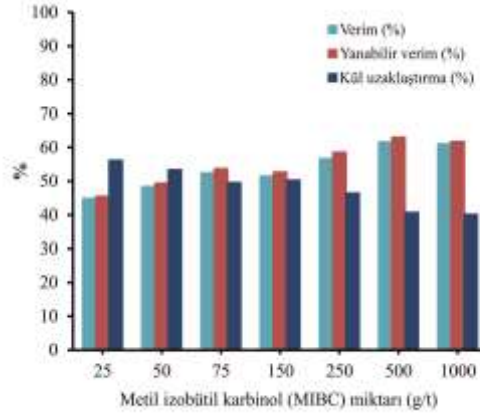
Şekil 1'de çamyağı miktarının flotasyon performansına etkisi, Şekil 2'de Dowfroth-250 miktarının flotasyon performansına etkisi, Şekil 3'de ise Metil izobütil karbinol (MIBC) miktarının flotasyon performansına etkisi gösterilmiştir. Çamyağı, Dowfroth-250 ve Metil izobütil karbinol (MIBC) miktarları arttığında, verim (%) ve yanabilir verim (%) değerleri artmıştır. En yüksek verim (%) ve yanabilir verim (%) değerleri; 500 g/t Metil izobütil karbinol (MIBC) kullanıldığında, %61.56 verim ve %63.01 yanabilir verim ile elde edilmiştir. Metil izobütil karbinol (MIBC) ile diğer iki köpürtücüden daha yüksek verim (%) ve yanabilir verim (%) elde edilmesi, bu köpürtücünün aynı zamanda toplayıcı özelliği sahip olması ile açıklanabilir. Test edilen her üç köpürtücünün miktarı arttığında, kül uzaklaştırma (%) değerlerinin ise azaldığı görülmektedir. En yüksek kül uzaklaştırma (%) değeri Dowfroth-250 ile 25 g/t kullanıldığında %83.04 olarak elde edilmiştir. Bu ilave miktarında Dowfroth-250 ile %17.15 verim ve %17.27 yanabilir verim ile en düşük değerler elde edilmiştir. Verim (%) değerlerindeki artış ile elde edilen temiz kömürün kül içeriği arttığından kül uzaklaştırma (%) değerleri azalmaktadır.



Şekil 1. Çamyağı miktarının flotasyon performansına etkisi



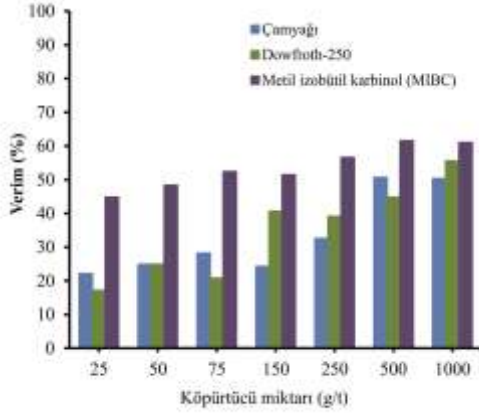
Şekil 2. Dowfroth-250 miktarının flotasyon performansına etkisi



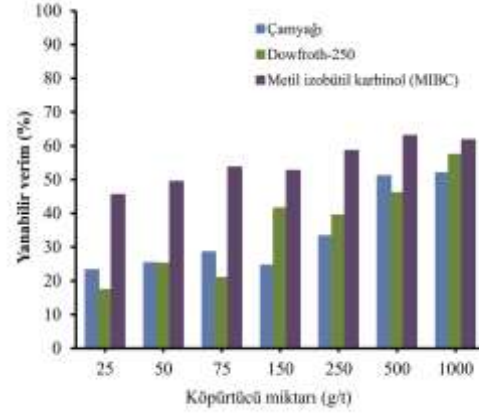
Şekil 3. Metil izobütil karbinol (MIBC) miktarının flotasyon performansına etkisi

Şekil 4’de köpürtücü cinsi ve miktarının verim üzerine etkisi, Şekil 5’de köpürtücü cinsi ve miktarının yanabilir verim üzerine etkisi, Şekil 6’da ise köpürtücü cinsi ve miktarının kül uzaklaştırma üzerine etkisi gösterilmiştir. En yüksek verim (%) ve yanabilir verim (%) değerleri sırasıyla; Metil izobütil karbinol (MIBC), Dowfroth-250 ve çamyağı ile elde edilmiştir. Kül uzaklaştırma (%) değerleri incelendiğinde ise; en iyi sonuçlar sırasıyla; çamyağı; Dowfroth-250 ve Metil izobütil karbinol (MIBC) ile elde edilmiştir.

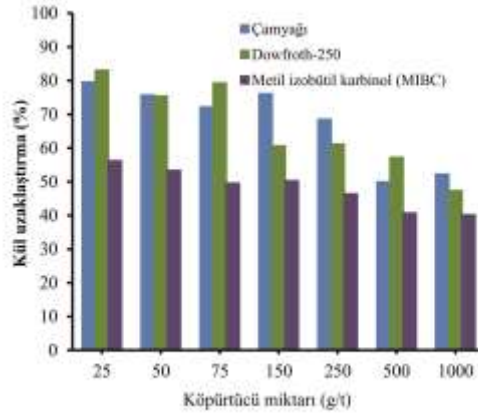
Flotasyon deney sonuçları; verim (%), yanabilir verim (%) ve kül uzaklaştırma (%) ile birlikte değerlendirilmiştir. Test edilen köpürtücüler arasında en iyi sonuçlar, 500 g/t Metil izobütil karbinol (MIBC) kullanıldığında %61.56 verim ve %63.01 yanabilir verim ve %40.73 kül uzaklaştırma ile elde edilmiştir.



Şekil 4. Köpürtücü cinsi ve miktarının verim üzerine etkisi



Şekil 5. Köpürtücü cinsi ve miktarının yanabilir verim üzerine etkisi



Şekil 6. Köpürtücü cinsi ve miktarının kül uzaklaştırma üzerine etkisi

## TARTIŞMA VE SONUÇ

Bu çalışmanın odak noktası Yozgat/Sorgun linyit kömürünün flotasyonunda farklı köpürtücülerin performansının araştırılmasıdır. Çalışmada; çamyacı, Dowfroth-250 ve Metil izobütül karbinol (MIBC) köpürtücü olarak kullanılmıştır. Test edilen köpürtücüler farklı miktarlarda (25, 50, 75, 150, 250, 500 ve 1000 g/t) kullanılarak flotasyon performansları incelenmiştir. Metil izobütül karbinolün (MIBC) flotasyon performansının test edilen diğer iki köpürtücüden daha iyi olduğu görülmüştür. En uygun köpürtücü 500 g/t miktarında Metil izobütül karbinol (MIBC) seçildiğinde, %61.56 verim ve %63.01 yanabilir verim ve %40.73 kül uzaklaştırma elde edilmiştir. Deneysel sonuçlar, Yozgat/Sorgun linyit kömürü için en uygun köpürtücünün Metil izobütül karbinol (MIBC) olduğunu göstermiştir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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BAP POLİMERİNDE REAKTİF MAVİ 19 BOYASININ ADSORPLANMASI

ADSORPTION OF REACTIVE BLUE 19 DYE ON BAP POLYMER

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**ÖZET**

Bu çalışma, reaktif mavi 19 maddesinin atık sulardan BAP polimeri yardımıyla etkin bir şekilde giderilmesi üzerine odaklanmaktadır. Reaktif mavi 19, tekstil endüstrisinde yaygın olarak kullanılan bir boya maddesidir ve çevresel etkileri nedeniyle önemli bir kirletici olarak kabul edilir. Çalışmanın kavramsal çerçevesi, reaktif mavi 19'un kimyasal özellikleri ve atık sulardaki varlığıyla ilgili bilgileri içermektedir. Ayrıca, atık su arıtımında kullanılan yaygın yöntemler ve bu yöntemlerin reaktif mavi 19'un giderilmesindeki etkinliği hakkında da bilgi sağlanmaktadır. Boyarmadde renk giderimi genellikle maliyetli bir süreç olabilmektedir. Bu nedenle, düşük maliyetli ve etkili yöntemler bulunması önem arz etmektedir. Adsorpsiyon, ucuzluğu, kullanım kolaylığı ve yüksek verimliliği nedeniyle atık suların arıtılmasında en etkili süreçlerden biri olarak düşünülebilir.

Çalışmada, boyarmaddenin uzaklaştırılması için farklı pH değerlerinde (3, 5, 7, 9) deneyler yapılmıştır. Ayrıca, boyarmaddenin uzaklaştırılması UV-VIS spektrofotometresi kullanılarak analiz edilmiştir. Bu spektrofotometre, bir çözümün belirli dalga boylarında ışığı absorbe etme yeteneğini ölçer. Bu çalışma, reaktif mavi 19 maddesinin atık sulardan giderilmesi konusunda daha ileri araştırmaların yapılmasına ve daha etkili arıtma yöntemlerinin geliştirilmesine yol açabilecek önemli bir adımdır. Sonuçlar, endüstriyel atık sulardan kaynaklanan reaktif mavi 19 kirliliğinin azaltılmasına yönelik çevresel koruma çabalarına katkı sağlayabilir.

**Anahtar kelimeler:** Reaktif mavi 19, Atık su, Adsorbsiyon, Polimer

**ABSTRACT**

This study focuses on the efficient removal of reactive blue 19 from wastewater with the help of BAP polymer. Reactive blue 19 is a widely used dyestuff in the textile industry and is considered as a major pollutant due to its environmental impacts. The conceptual framework of the study includes information on the chemical properties of reactive blue 19 and its presence in wastewater. It also provides information on the common methods used in wastewater treatment and their effectiveness in the removal of reactive blue 19. Dyestuff color removal can often be a costly process. Therefore, it is important to find low-cost and effective methods. Adsorption can be considered as one of the most effective processes in wastewater treatment due to its cheapness, ease of use and high efficiency.



In this study, experiments were conducted at different pH values (3, 5, 7, 9) for the removal of dyestuff. Furthermore, the removal of dyestuff was analyzed using UV-VIS spectrophotometer. This spectrophotometer measures the ability of a solution to absorb light at specific wavelengths. This study is an important step that could lead to further research on the removal of reactive blue 19 from wastewater and the development of more effective treatment methods. The results can contribute to environmental protection efforts to reduce reactive blue 19 pollution from industrial wastewater.

**Keywords:** Reactive blue 19, Wastewater, Adsorption, Polymer

## GİRİŞ

Su, yaşamın devamı için hayati bir kaynaktır. Ancak, endüstriyel faaliyetlerin artmasıyla birlikte atık suların kalitesi ciddi bir sorun haline gelmiştir. Atık sular, çeşitli kirleticiler içerdiği için çevre ve insan sağlığı açısından potansiyel tehdit oluşturur. Bu kirleticilerden biri de reaktif mavi 19 maddesidir. Reaktif mavi 19, tekstil endüstrisinde boyama işlemlerinde yaygın olarak kullanılan bir boya maddesidir. Yüksek renklilik özelliği nedeniyle tercih edilir, ancak çevresel etkileri nedeniyle önemli bir kirletici olarak kabul edilir. Reaktif mavi 19, atık sularla birlikte su kaynaklarına yayılarak su ekosistemlerinde olumsuz etkilere neden olabilir.

Bu nedenle, reaktif mavi 19'un etkili bir şekilde atık sulardan giderilmesi büyük bir önem taşır. Bu çalışma, reaktif mavi 19 maddesinin atık sulardan giderilmesi üzerine odaklanmaktadır. Amacı, farklı arıtma yöntemlerinin reaktif mavi 19'un giderilmesindeki etkinliğini değerlendirmektir. Çalışmanın kavramsal çerçevesi, reaktif mavi 19'un kimyasal özellikleri, atık sulardaki varlığı ve çevresel etkileri hakkında bilgi sağlamaktadır. Ayrıca, atık su arıtımında yaygın olarak kullanılan yöntemler ve bu yöntemlerin reaktif mavi 19'un giderilmesindeki etkinliği hakkında da bilgi verilmektedir.

Deneyler, farklı arıtma yöntemlerinin reaktif mavi 19'un giderilmesi üzerindeki etkisini belirlemek amacıyla gerçekleştirilmiştir. Deneylerde, farklı koşullar altında reaktif mavi 19'lu çözeltiler hazırlanmış ve adsorpsiyon yöntemiyle arıtma verimliliği değerlendirilmiştir. Bu çalışmanın sonuçları, reaktif mavi 19 maddesinin atık sulardan etkili bir şekilde giderilmesinde kullanılabilir arıtma yöntemleri hakkında önemli bilgiler sunacaktır. Bu bilgiler, endüstriyel atık suların arıtılması ve su ekosistemlerinin korunması konusunda ilerlemeyi teşvik edebilir. Ayrıca, gelecekteki araştırmalar için temel oluşturarak daha etkili arıtma yöntemlerinin geliştirilmesine katkıda bulunabilir.

## 1. BOYAR MADDELER

Boyalar, uygulandıkları yüzeye kimyasal reaksiyona girerek yüzeyi renklendiren maddelerdir. Boyaların renklendirici özellikleri, genellikle reaktif grupların yüzeydeki substrat molekülleriyle etkileşime girmesiyle ortaya çıkar. Bu reaksiyonlar sonucunda boyalar, yüzeyde kalıcı bir renk oluştururlar (Sevimli, 2000).

Boyaların renk verme mekanizmaları çeşitli olabilir. Örneğin, organik boyalar, kovalent bağlar oluşturarak yüzey molekülleriyle kimyasal reaksiyona girerler. Bu reaksiyonlar sonucunda boyalar, yüzeyde kalıcı bir bağ oluşturur ve renklenme gerçekleşir. Diğer bir mekanizma ise inorganik pigmentlerin yüzeyde çökelerek renk oluşturmasıdır. Bu pigmentler, yüzeyin üzerine yapışarak renkli bir tabaka oluştururlar (Uzun, 1997).

Boya belirli bir renk tonuna sahip olmalı ve yüzeye sıkıca yapışabilmelidir. Boya, pigment adı verilen renkli bir toz ile bir bağlayıcının karışımıdır, ancak çözünmez. Bu nedenle yüzeyleri dış etkilerden koruyarak daha güzel veya renkli hale getirmek için kullanılan maddelerdir. Boyalar uygulandıkları yüzey üzerinde bir film tabakası oluştururlar ancak yüzeye reaksiyona girmezler. Bu nedenle yüzeyden kazınarak kolayca çıkarılabilirler (Zollinge, 1991).

1856 yılında Henry Perkin ilk sentetik boyayı keşfetti. Anilini potasyum dikromat ile oksitleyerek "mauveine" veya "anilin moru" adı verilen siyah bir ürün elde etti. Bu durum birçok kimyager için umutsuz görünse de, daha sonra bu maddeyi çözücünden çıkarmayı başardı ve patentini aldı (Zollinge, 1991).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Patentini 1876 yılında aldı. Witt, boyaların kimyasal yapısının iki gruptan oluştuğunu öne sürdü. Boyanın ilk grubu, yani rengi veren kısmı kromofor grubu olarak adlandırılır. Kromofor grupları genellikle doymamış bağlara sahiptir ve ışığı belirli bir dalga boyunda absorbe eder. Azo, nitro, nitroso, karbonil vb. içeren yapılar bu gruba örnektir. Diğer grup ise renk arttırıcı anlamına gelen oksikromik gruptur. Oksikrom grubu aynı zamanda suda çözünürlük sağlar. Bunlar karboksilik asit, hidroksil, metoksil, sülfonik asit, amino ve benzeri gruplardır (Zollinge, 1991).

Bu iki fonksiyonel grup boyanın yüzeye uygulanmasını kolaylaştırır ve renklendirme gücünü artırır. Bir kromojen, kromofor ve oksikrom gruplarının birlikte bulunduğu bir bileşiktir. Boyalar, spektrumun görünür bölgesinde 400 ile 800 nm arasında bir absorpsiyon piki oluştururlar. Bu dalga boyunda ışığı emen maddeler, emdikleri rengin tamamlayıcısı olan bir renkte görünürler. Örneğin, soğurma tepesi 425 ile 450 nm (mor) arasında olan bir maddenin görünür rengi sarı-yeşildir. Işığın soğurulan kısmı soğurulan renk, yansıyan kısmı ise tamamlayıcı renktir. İnsan gözü tarafından algılanan renk bu tamamlayıcı renktir (Vigo 1994, Sevimli 2000).

**Tablo 1** Absorblanan ve Yansıyan Renkler (Needles 1986)

Absorblanan Işığın Dalga Boyu (nm)	Absorblanan Renk	Komlementer Renk
400-435	Mor	Sarı-yeşil
435-480	Mavi	Sarı
480-490	Yeşil-mavi	Turuncu
490-500	Mavi-yeşil	Kırmızı
500-560	Yeşil	Eflatun
560-580	Sarı-yeşil	Mor
580-595	Sarı	Mavi
595-605	Turuncu	Yeşil-mavi
605-700	Kırmızı	Mavi-yeşil

## 1.1. Boyar Maddelerin Çevre ve İnsan Sağlığı Üzerine Etkileri

Tekstil endüstrisinden kaynaklanan atık su, içerdiği boyalar ve çeşitli kimyasallar nedeniyle arıtılması en zor olan atık sudur. Bu atık suyun arıtılması en zor olanıdır çünkü çevreye deşarj edilir ve çeşitli organik maddeler, çözünmüş tuzlar, ağır metaller, bulanıklık ve farklı pH değerleri içerir. Bu atık suların arıtılması, kullanılan boyalara eklenen yardımcı maddeler nedeniyle karmaşık bir hal almaktadır. Bu maddeler genellikle toksik, kalıcı ve oldukça kimyasaldır.

Boya, atık su çevreye (alıcı ortama) deşarj edilmeden önce giderilmesi gereken bir kirleticidir. Su kirliliği gölleri, nehirleri vb. renklendirir. Işık geçirgenliğinde ve suyun gaz çözünürlüğünde azalmaya neden olur. Ayrıca görsel olarak zayıf görüntülere neden olur (Banat, Nigam ve ark. 1996). Tekstil endüstrisi atık sularının biyolojik oksijen ihtiyacı, kimyasal oksijen ihtiyacı, askıda katı madde miktarı ve pH değeri çok yüksektir. Bu atık suların temiz su ile teması çirkin ve temiz sudaki canlı organizmaların yaşamını etkileyecek şekilde ışık geçirgenliğini bozar (Çeşmeli, 2011).

Krom boyalar çoğunlukla halı, kilim ve yün tekstil üretiminde kullanılmaktadır. Üretim sürecinde, ürünlerin boyanması ve yıkanmasından kaynaklanan atık sular doğaya, yani toprağa ve temiz su kaynaklarına boşaltılmaktadır. Bu durum, suda yaşayan organizmalar ve toprak verimliliği üzerinde olumsuz bir etkiye sahiptir. Boyaların ağız yoluyla vücuda emilmesi canlı organizmada ağrı, kusma ve ishale neden olabilir.

## 1.2. Boyar Maddelerin Sınıflandırılması

Boyaların kimyasal yapısı incelendiğinde katyonik, anyonik ve noniyonik gibi farklı yapılara sahip oldukları görülmüştür. Boyalar, boyanın sudaki çözünürlüğü, kimyasal yapısı, boyama özellikleri ve kullanım yerleri gibi birçok farklı özelliğe göre sınıflandırılabilir. Ancak genel olarak kimyasal yapılarına ve boyama özelliklerine göre sınıflandırılırlar.

### **Boyar Maddelerin Boyama Özelliklerine Göre Sınıflandırılması**

- Küp boyarmaddeler
- Reaktif boyarmaddeler
- Dispers boyarmaddeler
- Direkt boyarmaddeler
- Asit boyarmaddeler
- Bazik boyarmaddeler

### **Boyar Maddelerin Sudaki Çözünürlüklerine Göre Sınıflandırılması**

- Suda çözünen boyarmaddeler: Anyonik, katyonik ve noniyonik boyarmaddeler
- Suda çözünmeyen boyarmaddeler

### **Boyar Maddelerin Kimyasal Yapılarına Göre Sınıflandırılması**

- Azo boyarmaddeler
- Kükürt boyarmaddeler
- Nitro ve nitrozo boyarmaddeler
- Karbonil boyarmaddeler

Endüstride sıkça kullanılan bazı boyar maddelerin sınıfları, tanımları, kimyasal yapısı ve kullanım alanlarına göre sınıflandırılması Tablo 2’de belirtilmiştir (Husain, 2006).

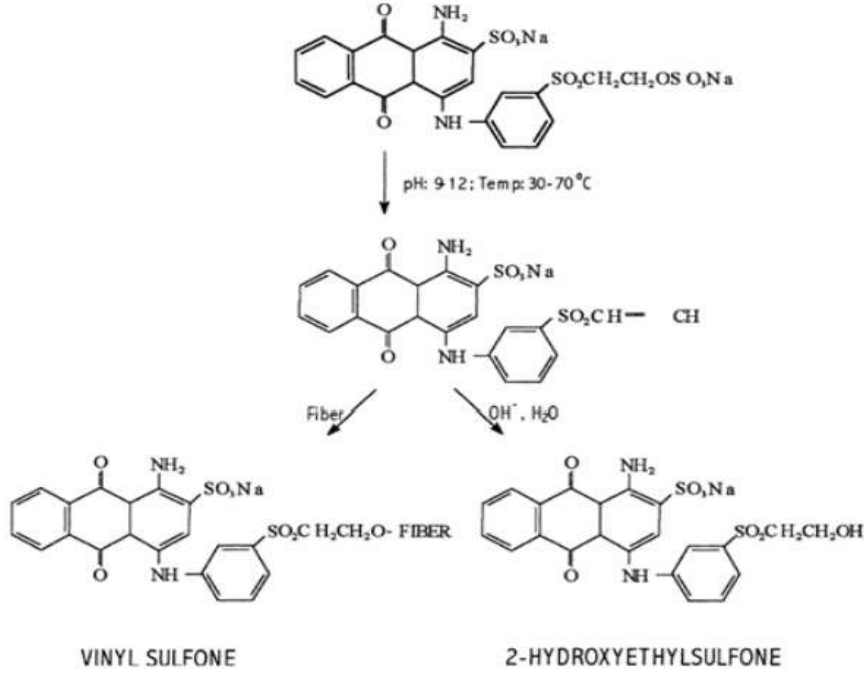
**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**Tablo 2** Endüstride sık kullanılan boyar maddelerin sınıflandırılması (Husain, 2006).

<b>Boyar Madde Sınıfı</b>	<b>Kullanım Alanı</b>	<b>Kimyasal Tipi</b>
Asit	Naylon, ipek, deri	Azo, nitro ve nitrozo, trifenilmetan, azin ve ksanten
Bazik	Kağıt, poliakrilonitril modifiye naylon, Polyester ve mürekkepler	Siyanin, azo, azin, triarilmetan, ksanten, oksazin ve antrakınon
Direkt	Pamuk, rayon, kağıt, deri ve naylon,	Azo, ftalosiyanın, stilben ve oksozin
Dispers	Polyester, poliamid, akrilik ve plastikler	Azo, antrakınon, stiril ve nitro
Reaktif	Pamuk, yün, ipek ve naylon	Azo, antrakınon, ftalosiyanın, formazon, oksazin ve bazik
Sülfür	Pamuk ve rayon	Bilinmeyen yapılar
Vat	Pamuk, rayon ve tahta	Antrakınon (polisiklik guaninler içerir) ve indigoidler

#### 1.2.1.Reaktif Mavi 19

Reaktif Mavi 19, antrakınon yapılı bir vinil sülfon boyadır. Tekstil endüstrisinde selüloz ipliklerin boyanmasında kullanılır. Kimyasal kararlılığı ve düşük biyolojik bozunabilirliği nedeniyle, genellikle endüstride ve araştırmalarda atık sulardan boyaları uzaklaştırmak için kullanılır. Selüloz ipliklerin boyanmasında kullanılır. Reaktif formu (vinil sülfon) ve 2-hidroksietil sülfon formu arasındaki fark nedeniyle, selüloz ile düşük bağlanma enerjisine (%75-80) sahip olduğu için birçok çalışmada model olarak kullanılır. Şekil 1, 2-hidroksietil sülfonun selüloz liflerine tamamen bağlanamadığını göstermektedir (Siddique, 2011).



Şekil 1 RM 19'un reaktif ve hidrolize formu arasındaki ilişki (Siddique, 2011)

Uygun analiz yapılmadığı takdirde RB 19 doğada uzun süre kalabilir. pH 7'deki yarılanma ömrü 46 yıldır. Kimyasal kararlılığı ve düşük biyolojik parçalanabilirliği nedeniyle, atık sulardan boyaları uzaklaştırmak için araştırmalarda sıklıkla kullanılır (Siddique, 2011).

## 2. ATIKSULARDAN BOYA GİDERİM YÖNTEMLERİ

Günümüzde boyarmadde endüstrisindeki yaygın kullanım, renkli atık suların miktarında artışa neden olmaktadır. Boyaların karmaşık karışımlarını içeren bu atık sular, gıda, tekstil, kağıt, deri, kozmetik, plastik ve biyomedikal endüstrilerinde kullanılan boyaların yaklaşık %10-15'ini içermektedir. Bu atık suların arıtılması, önemli bir çevresel zorluktur. Atıksu arıtma tesislerinde, boyaların aromatik içeriğinin bozunmaya karşı dirençli olması nedeniyle birincil ve ikincil arıtma süreçleri boyaların tamamen giderilmesinde zorluklar yaşamaktadır. Bu durum, boyaların çevreye zarar veren etkilerini azaltmak için geliştirilmiş atık su arıtma yöntemlerinin araştırılmasını gerektirmektedir (Vikrant vd., 2018).

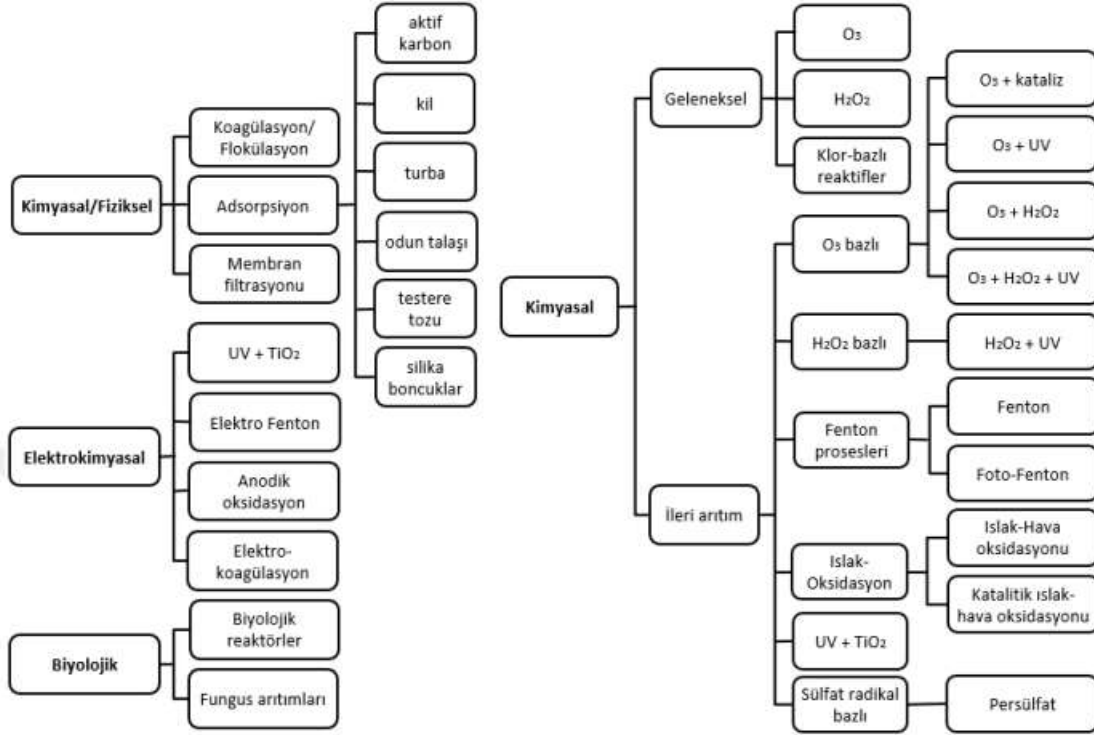
Su kütlelerindeki aşırı boya seviyeleri, ekoloji ve su kaynaklarının bozulması üzerinde çeşitli etkilere sahip olabilir (Vikrant ve ark., 2018). Boya atıklarının içerdiği kanserojen ve mutajen maddeler toprak ve su kaynaklarının kirlenmesine neden olarak çevresel bozulmaya yol açmakta ve canlı organizmalar için tehdit oluşturmaktadır. Boya atık sularının ekosisteme deşarjı, estetik olmayan kirliliğe, ötrofikasyona ve su ortamının bozulmasına yol açmaktadır (Moura vd., 2017). Bu nedenle, boya atık sularının etkisi çevreye deşarj edilmeden önce en aza indirilmelidir.

Araştırmacılar, atık sularından boyaları uzaklaştırmak için enerji tasarruflu, maliyet etkin, çevresel olarak güvenli ve yüksek verimli yeni yöntemler ve malzemeler geliştirmek üzerinde çalışmaktadır. Günümüzde, atık sulardan organik kirleticilerin giderilmesi için birçok biyolojik, fiziksel ve kimyasal yöntem kullanılmaktadır. Bu yöntemler, su kalitesini iyileştirmek ve çevresel etkileri en aza indirmek amacıyla yaygın olarak uygulanmaktadır (Silva vd., 2016).

Biyolojik arıtma sistemleri, mikroorganizmaların organik kirleticileri doğal olarak parçalayarak giderdiği proseslerdir. Örneğin, aktif çamur prosesi ve biyolojik filtreleme gibi yöntemler, organik maddelerin mikroorganizmalar tarafından metabolize edilerek çözülmüş organik bileşikleri ve biyokimyasal oksijen ihtiyacını azaltır. Fiziksel yöntemler arasında filtrasyon ve membran filtrasyonu bulunur. Filtrasyon, kirleticilerin suyun fiziksel engellerle ayrıştırıldığı bir süreçtir. Membran filtrasyonu ise mikrofiltrasyon veya ultrafiltrasyon gibi membranlar aracılığıyla partiküllerin ve organik

bileşiklerin ayrıştırılmasını sağlar. Ters ozmoz ise basınç uygulanarak suyun bir membran üzerinden geçirilerek organik kirleticilerin ve tuzun uzaklaştırıldığı bir prosesdir (Silva vd., 2016).

Şekil 2'de (Collivignarelli vd., 2019) atık suların boyaların gideriminde kullanılan yöntemler gösterilmektedir. Bu yöntemler arasında aktif karbon adsorpsiyonu, membran teknolojileri, fotokataliz, ileri oksidasyon işlemleri, biyolojik arıtma ve çökeltme/flokülasyon gibi farklı prosesler bulunmaktadır. Bu çalışmaların amacı, boyaların atık sularından etkin bir şekilde uzaklaştırılmasını sağlayacak daha verimli, sürdürülebilir ve çevre dostu arıtma yöntemlerini geliştirmektir.



Şekil 2 Atıksulardan boya giderim yöntemleri (Collivignarelli vd., 2019).

### 2.1. Adsorpsiyon

Atomların, iyonların veya moleküllerin bir katının yüzeyine yapışmasına adsorpsiyon, bu parçacıkların yüzeyden uzaklaştırılmasına ise desorpsiyon denir. Başka bir deyişle adsorpsiyon, yüzeydeki temas etkileri ve gerilme kuvvetleri nedeniyle bir maddenin başka bir maddenin yüzeyinde veya bir ara yüzeyde konsantrasyonunun artması olarak tanımlanmaktadır (Ateş, 2009). Adsorpsiyonda, adsorbe olan katıya adsorban, yüzeyde adsorplanan maddeye ise adsorbat denir.

Adsorpsiyon ve absorpsiyon birbirleriyle karıştırılmamalıdır. Absorpsiyonda emilen madde adsorbantın içine difüze olur. Adsorpsiyonda ise adsorbat adsorbantın ara yüzeyinde birikir. Adsorpsiyon derecesi, adsorbantın hidrofilik veya hidrofobik yapısına ve katı içindeki oranına bağlıdır. Sulu sistemlerde her iki koşul birlikte değerlendirilir. Adsorpsiyonu etkileyen bu koşullar büyük önem taşımaktadır (Aksu ve Gönen, 2000).

Çevre kirliliğini önlemek için teknik ve ekonomik olarak uygulanabilir yöntemlere ihtiyaç vardır. Bu nedenle doğal ve sentetik adsorbantlar üzerinde çok sayıda araştırma yapılmış ve son yıllarda adsorpsiyona dayalı ayırma işlemleri önem kazanmıştır (Aksu ve Gönen, 2000). Adsorpsiyon esas olarak toksik ve biyolojik olarak parçalanabilen maddelerin giderilmesinde kullanılır. Bu proses, özellikle biyokimyasal proseslerle arıtılmayan veya arıtılması çok zor olan kirleticilerin giderilmesinde alternatif bir yöntem olarak önem kazanmaktadır.

Adsorpsiyon, atık su arıtımında yaygın bir proses olmasa da, gelişmiş bir yöntem olarak tercih edilerek arıtılmış atık suyun kalitesini iyileştirmek için kullanılmaktadır. Gelecekte özellikle koku, organik maddeler, ağır metaller ve boyalar gibi kirleticilerin gideriminde etkili bir yöntem olarak kullanılması



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

beklenmektedir. Adsorpsiyon, endüstriyel atık sularında düşük konsantrasyonlardaki kirleticilerin gideriminde etkili olması ve düşük maliyeti nedeniyle tercih edilen bir yöntemdir.

Adsorpsiyon işleminin daha ucuz ve aktif olarak kullanılabilir hale getirilmesi için birçok araştırmacı, daha ucuz ve tekrar kullanılabilir adsorbent malzemelerin sentezlenmesi üzerine çalışmaktadır (Şahan, 2007). Aktif karbon, nanomalzemeler, polimerler, reçineler, alümina, jeller, silikatlar, talaş, killer ve zeolit gibi birçok farklı malzeme yaygın olarak adsorbent olarak kullanılmaktadır (Şahan, 2007).

**Tablo 3** Endüstrilerde Ticari Olarak Kullanılan Adsorbent Çeşitleri (Şahan 2007)

KARBON ADSORBANLAR	MİNERAL ADSORBANLAR	DİĞER ADSORBANLAR
<ul style="list-style-type: none"><li>• AKTİF KARBONLAR</li><li>• AKTİF KARBON FİBERLER</li><li>• MEZOKARBON MİKROTANELER</li><li>• MOLEKÜLER KARBON ELEKLER</li><li>• KARBONLU NANOMATERYALLER</li><li>• FULLERENLER</li><li>• HETEROFULLERENLER</li></ul>	<ul style="list-style-type: none"><li>• SİLİKAJEL</li><li>• AKTİF ALÜMİNYUMOKSİT</li><li>• METAL OKSİTLER</li><li>• METAL HİDROKSİTLER</li><li>• ZEOLİT</li><li>• KİL MİNERALLERİ</li><li>• KATMANLI KİLLER</li><li>• GÖZENEKLI KİLLER</li><li>• İNORGANİK NANOMATERYALLER</li></ul>	<ul style="list-style-type: none"><li>• POLİMERLER</li><li>• KOMPOZİT ADSORBANLAR: (KOMPLEKS MİNERAL – KARBON Zn, Ca İÇERİKLİ)</li><li>• KARIŞIK SORBENTLER</li></ul>

## LİTERATÜR TARAMASI

Smith, J. et al. (2010). "Polymeric materials for dye removal from wastewater." Environmental Science and Pollution Research. Bu çalışma, polimerik malzemelerin atık su arıtımında boyar maddelerin giderilmesinde kullanımını incelemektedir. Farklı polimerik yapılar, adsorpsiyon kapasitesi, mekanizmaları ve uygulamaları üzerine ayrıntılı bir literatür taraması yapılmıştır.

Hu, J. et al. (2011). "Polymer nanofibers for water purification: a review." Journal of Membrane Science. Bu derlemede, polimer nanofiblerin su arıtımında kullanımı incelenmektedir. Çeşitli polimerlerin nanofibleri ve bunların boyar maddelerin giderilmesi için kullanımı üzerine yapılmış çalışmalar değerlendirilmiştir.

Wang, S. et al. (2014). "Adsorption of organic pollutants by graphene nanosheets: a review." Journal of Hazardous Materials. Bu derlemede, grafen nanosheetlerin organik kirleticilerin giderilmesindeki potansiyeli incelenmektedir. Boyar maddelerin adsorpsiyonu da dahil olmak üzere farklı organik kirleticilerin adsorpsiyon mekanizmaları ve uygulamaları üzerine bir literatür taraması yapılmıştır.

Crini, G. (2015). "Non-conventional low-cost adsorbents for dye removal: a review." Bioresource Technology. Bu derlemede, düşük maliyetli ve yaygın olarak bulunan doğal adsorbentlerin boyar maddelerin giderilmesinde kullanımı incelenmektedir. Polimerik malzemelerin yanı sıra, bitkisel atıklar, kitin, zeolitler gibi farklı adsorbentlerin kullanımı üzerine yapılan çalışmalar değerlendirilmiştir.

Zhang, S. et al. (2019). "Polymeric membranes for dye removal: a review." Journal of Membrane Science. Bu derlemede, polimerik membranların boyar maddelerin giderilmesindeki potansiyeli incelenmektedir. Farklı polimer türleri, membran yapıları, membran hazırlama yöntemleri ve boyar maddelerin membranlara adsorpsiyon mekanizmaları üzerine yapılan çalışmalar değerlendirilmiştir.

Kara, A. (2004). Çalışmasında poli(EGDMA-VIM) boncuklar şişme çalışmaları ve taramalı elektron mikroskobu (SEM) ile karakterize edilmiştir. Şişme oranı %78 olan bu poli(EGDMA-VIM) boncuklar ağır metal giderim çalışmaları için kullanılmıştır. Boncukların seçilen metal iyonları, yani Cd(II), Hg(II) ve Pb(II) için şelasyon kapasitesi, bu iyonların farklı miktarlarını (10-750mg/l) içeren sulu ortamda ve farklı pH değerlerinde (3.0-7.0) araştırılmıştır.

Kara, A. (2006). Çalışmasında poliamid içi boş fiberler taşıyan Reaktif Yeşil HE 4BD, klorofenollerin (yani fenol, o-klorofenol, p-klorofenol ve 2,4,6-triklorofenol) uzaklaştırılması için boya afiniteli adsorbanlar olarak araştırdı. Klorofenollerin adsorpsiyon oranları çok yüksekti. Dengeye yaklaşık 30 dakikada ulaşıldı. Sahte birinci derece ve sözde ikinci derece modeli içeren iki kinetik modelin uygulanabilirliği, ilgili hız parametrelerinin, denge kapasitesinin ve korelasyon katsayılarının karşılaştırmalı analizine dayanarak tahmin edilmiştir. Sonuçlar, kemisorpsiyon işleminin adsorpsiyon işleminde hız sınırlayıcı adım olabileceğini göstermektedir.

### ARAŞTIRMA VE BULGULAR

Bu çalışmada öncelikle pH 3, 5, 7 ve 9 olmak üzere NaOH ve HCl kullanarak çözeltiler hazırlandı. Her biri 250 ml olan dört adet balon jöjeye 0,0250 g tartılmış reaktif mavi 19 boyarmaddesi eklendi. Üzerlerine pH' ları 3, 5, 7 ve 9 olarak hazırlanan 100 ppm'lik çözeltiler eklenerek tamamlandı.



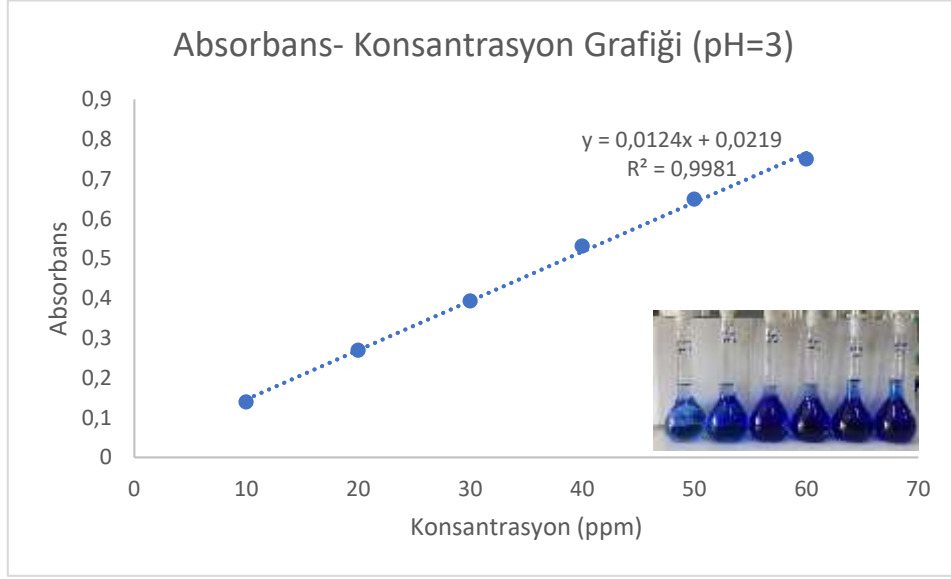
**Resim 1** pH 3, 5, 7 ve 9 dan 100 ppm hazırlanmış RM19

Bu 100 ppm'lik dört çözeltilerden 3, 5, 7 ve 9 pH' larında 10, 20, 30, 40, 50 ve 60 ppm olmak üzere yirmi dört çözeltiler balon jöjeye hazırlandı.

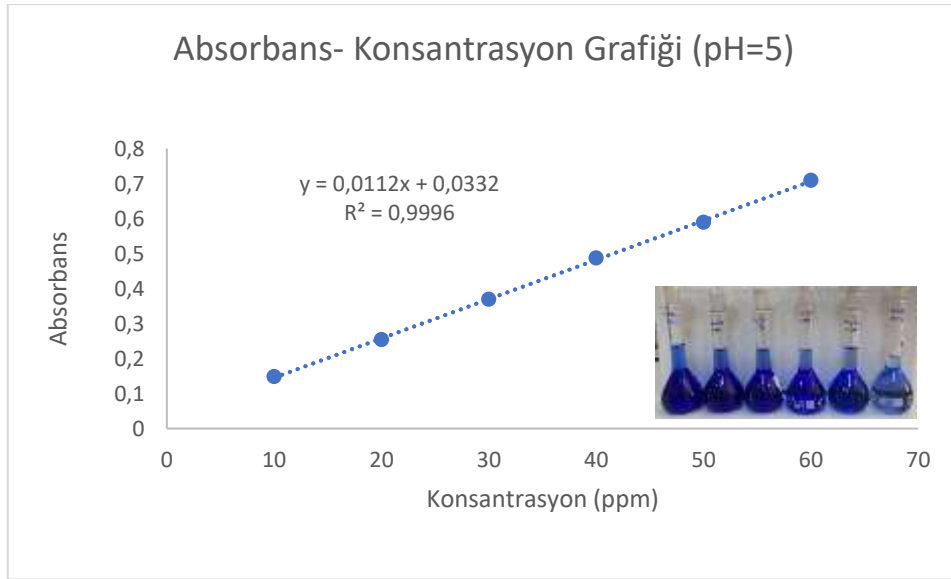


**Resim 2** pH=3,5,7 ve 9 için hazırlanmış 10, 20, 30, 40, 50 ve 60 ppm'lik reaktif mavi 19 boyarmaddesi çözeltileri

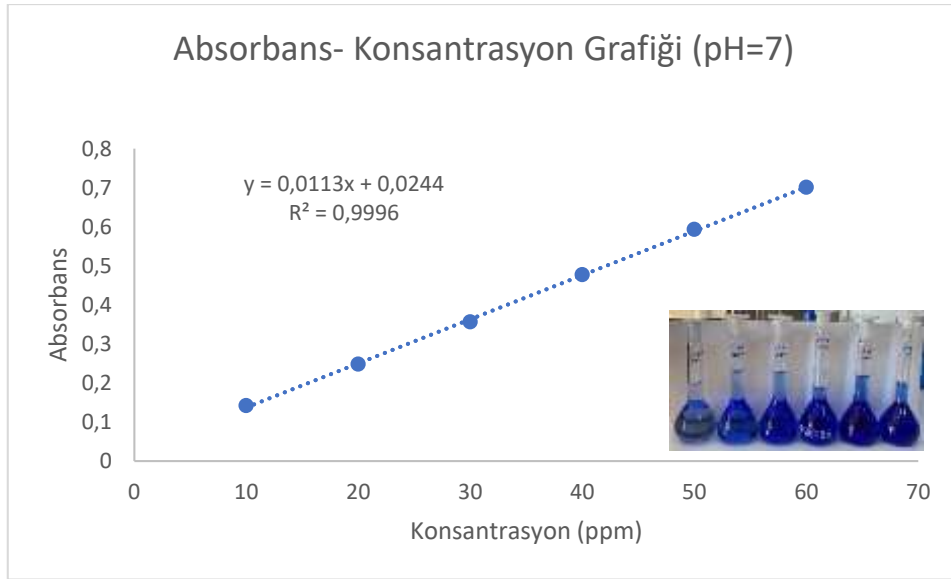
Reaktif mavi 19 boyarmaddesinin UV-VIS spektrofotometresinde 592 nanometre dalga boyunda maksimum değeri verdiği ölçülmüştür. Çözeltilerin absorbands değerleri UV-VIS spektrofotometresinde ölçülerek tabloya ve grafiğe aktarıldı.



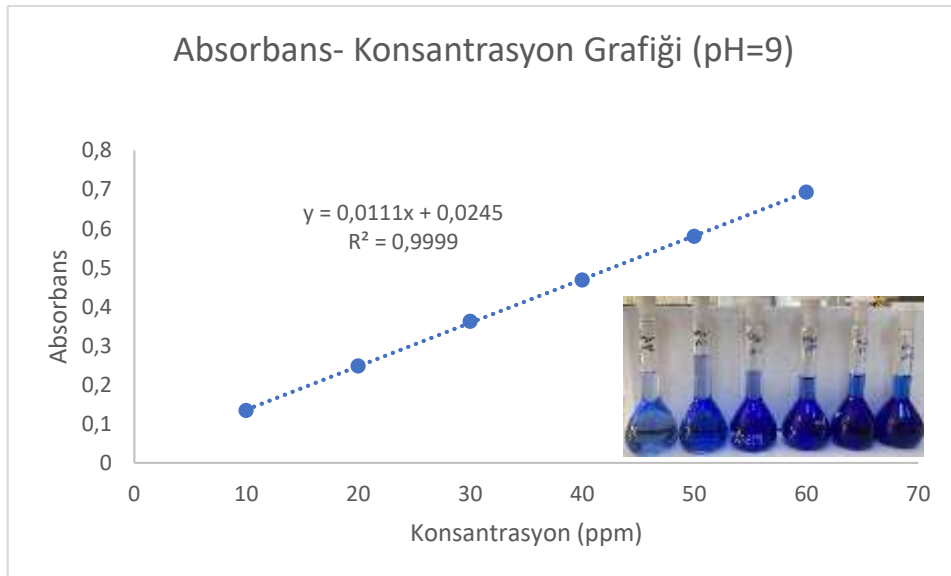
Şekil 3: Absorbans- Konsantrasyon Grafiği (pH=3)



Şekil 4: Absorbans- Konsantrasyon Grafiği (pH=5)

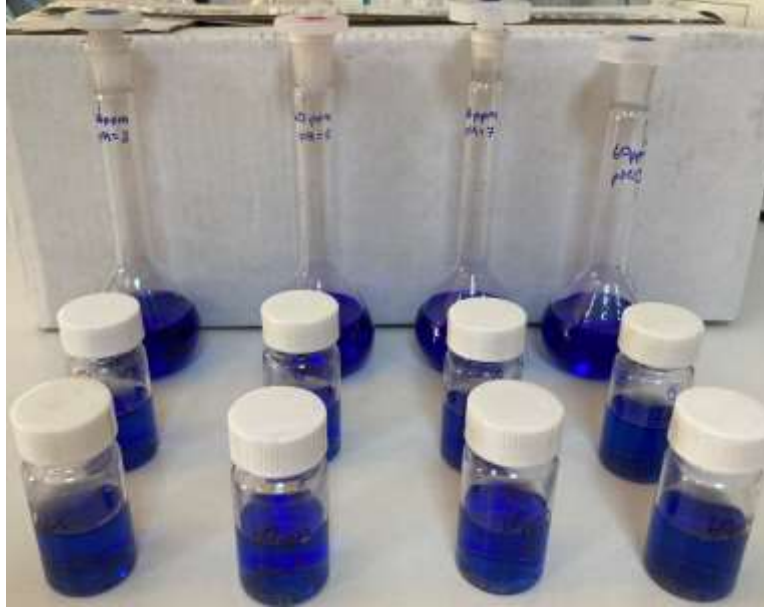


Şekil 5: Absorbans- Konsantrasyon Grafiđi (pH=7)



Şekil 6: Absorbans- Konsantrasyon Grafiđi (pH=9)

Bir sonraki aşamada BAP polimerinden 0,01 g tartılarak 8 adet vial e ayrı ayrı aktarıldı ve üzerlerine 60 ppm' lik pH' ları farklı çözeltilerden 10 ml alınarak eklendi.

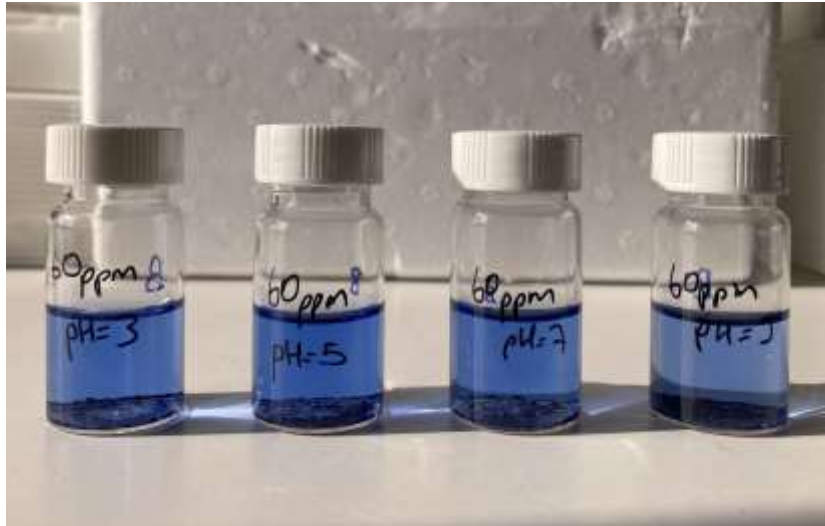


**Resim 3** Viallere alınmış RM19 ve BAP polimeri

Vialler karanlık ortamda 24 saat bekletildi. 24 saat geçtikten sonra UV-VIS spektrofotometresinde absorbans değerlerinin değişimi kontrol edildi. Bu değerler tablo ve grafiğe aktarıldı.

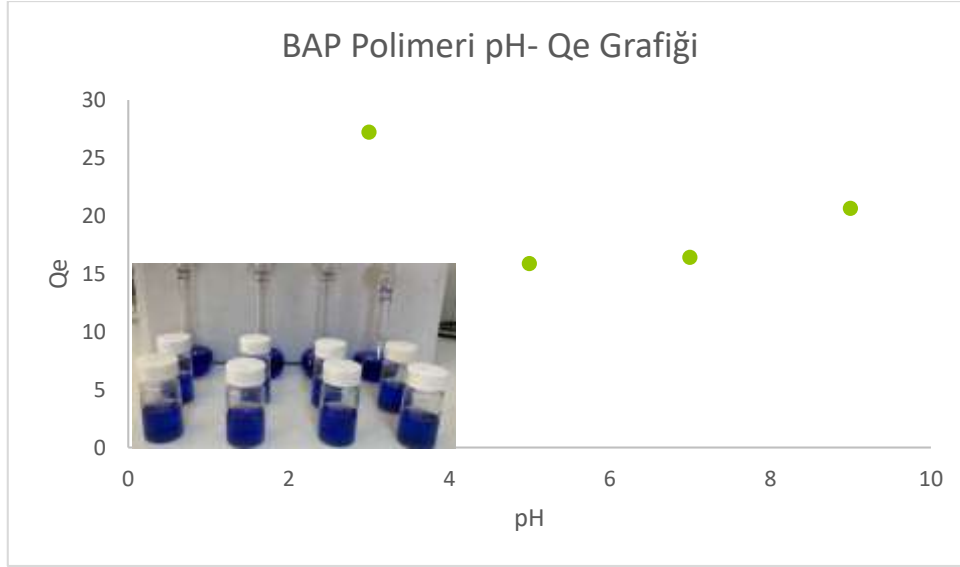
#### TARTIŞMA VE SONUÇ

Bu çalışmada atık sulardan BAP polimerinden yararlanarak reaktif mavi 19 boyarmaddesinin giderilmesi amaçlanmıştır. Absorbans değerleri ölçülmek üzere 24 saat karanlık ortamda bırakılan vialler UV-VIS spektrofotometresinde ölçüldü. Bu ölçülen değerlerden yola çıkılarak Qe değerleri hesaplandı ve Qe-pH grafiği oluşturuldu. Grafik sonuçlarına göre boyarmadde gideriminin pH=3' te maksimum olduğu görüldü.



**Resim 4** RM19 ve BAP polimerinin deney sonundaki görüntüsü





Şekil 7: BAP Polimeri pH- Qe Grafiđi

### Acknowledgement

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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ATIKSULARDAN REAKTİF TURUNCU-122 BOYARMADESİNİN POLİMER MADDE  
İLE GİDERİMİ

REMOVAL OF REACTIVE ORANGE-122 DYE FROM WASTEWATER USING POLYMER

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**ÖZET**

Gıda endüstrisinden tekstil, ilaç ve mobilya endüstrilerine kadar birçok sektörde boyaların kullanımı artmış olup, atık sularda görünür kirleticiler haline gelmelerinin yanı sıra giderilmeleri de güncel bir sorundur. Boyalar, alıcı ortamdaki ışığın iletimini azaltarak fotosentetik yaşamı dolaylı olarak etkiler. Tekstil ve hazır giyim sektörü gelişmekte olan ülkelerin ilk tercihi olup, sanayileşme sürecinde önemli rol oynayan sektörlerden biridir. Her alanda olduğu gibi teknolojinin gelişmesi tekstil sektörünün de gelişmesine yol açmış ve çevre sorunlarının ortaya çıkmasına neden olmuştur. Bu sektördeki farklı üretim yapılarından dolayı oluşan atık su ve özellikleri de üretimde kullanılan yöntem ve proseslere bağlı olarak farklılık göstermektedir. Ayrıca bu atıksular biyolojik olarak toksik kimyasallar içermekte, alıcı ortamdaki organizmaları tehlikeye atmakta, toprak kirliliği yoluyla bitkilerde birikmekte, hayvan ve insan gıdalarına karışarak ekosistemde toksikolojik riskler oluşturmaktadır. Boyarmaddeler toprak yüzeyine nüfuz ederek yeraltı suyuna karışırlar. Boyalar kimyasal yapılarına bağlı olarak azo, diazo, bazik, asidik vb. olarak sınıflandırılır.

Bu çalışmada, boyarmadde olan reactive orange-122'nin atık sudan absorpsiyon değeri, polimerik malzeme olan YAP polimeri sayesinde UV-VIS spektrofotometre kullanılarak okunup hangi pH'ta boyanın ne kadar giderildiği tespit edilmiştir. Bu yöntemin amacı atık suyun yeniden kullanılmasına olanak sağlamaktır. Reactive Orange-122 için 3,5,7 ve 9 pH değerleri dikkate alınarak çözeltiler hazırlanmıştır. Absorbans değerleri sonucunda reaktif Orange-122 boyasının 496 nm'de uzaklaştırılmasının pH=3'te en iyi sonuçları verdiği görülmüştür.

**Anahtar Kelimeler:** Polimer madde, Atık su, Boyarmadde, Reaktif Orange-122, UV-VIS Spektrofotometresi

**ABSTRACT**

The use of dyes has increased in many sectors, from the food industry to the textile, pharmaceutical and furniture industries, and their removal is a current problem, as well as becoming visible pollutants in wastewater. Dyes indirectly affect photosynthetic life by reducing the transmission of light in the receiving environment. Textile and ready-made clothing sector is the first choice of developing countries and is one of the sectors that play an important role in the industrialization process. As in every field, the development of technology has led to the development of the textile industry and caused the emergence of environmental problems. The wastewater and its properties resulting from different

production structures in this sector also vary depending on the methods and processes used in production. In addition, these wastewaters contain biologically toxic chemicals, endanger organisms in the receiving environment, accumulate in plants through soil pollution, and mix with animal and human foods, creating toxicological risks in the ecosystem. Dyes penetrate the soil surface and mix with groundwater. Dyes can be classified as azo, diazo, basic, acidic, etc. depending on their chemical structure. It is classified as.

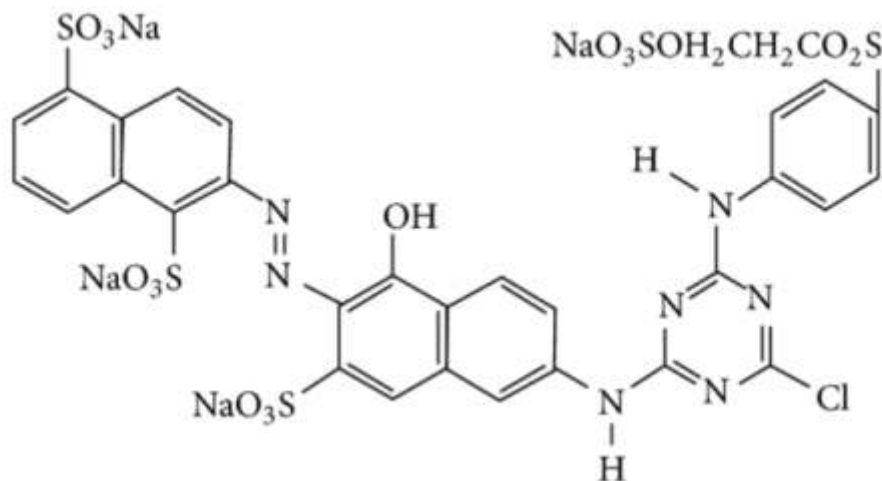
In this study, the absorption value of the dyestuff reactive orange-122 from wastewater was read using a UV-VIS spectrophotometer, thanks to the polymeric material YAP polymer, and it was determined how much dye was removed at which pH. The purpose of this method is to enable the reuse of wastewater. Solutions were prepared for Reactive Orange-122, taking into account pH values of 3, 5, 7 and 9. As a result of the absorbance values, it was seen that the removal of the reactive Orange-122 dye at 496 nm gave the best results at pH = 3.

**Keywords:** Polymer substance, Wastewater, Dye, Reactive Orange-122, UV-VIS Spectrophotometer

### GİRİŞ:

Bugünün dünyasında, renk indeksine 9000'den fazla farklı boya türü dahil edilmiştir ve bu kimyasal bileşenler tekstil, deri, kâğıt, kozmetik, plastik, ilaç, gıda ve daha birçok alanda geniş ölçüde kullanılmaktadır. Bu boyaların içerildiği atık sular genellikle doğrudan yakındaki kanalizasyon sistemlerine, nehirler, göletler ve lagünler gibi su kaynaklarına deşarj edilir. Boyaların su kaynaklarına salınması, su teminini ve kalitesini tehlikeye atan, su ekosistemine ve çevrenin biyolojik çeşitliliğine ciddi zararlar verecek bir dizi soruna yol açar. [3][4] Bu boyalar, zorlu koşullar altında çözünmeyen, toksik, biriken ve besin zinciri boyunca yayılan bileşikler içerdiği için ciddi bir tehdit oluşturur. Ayrıca atık sular, canlı organizmalara ve insan sağlığına zararlı, kanserojen ve mutasyona sebebiyet veren etkilere neden olan belirgin renklere sahip olmasıyla bilinir. Boyaların yapısındaki karmaşık aromatik bileşenler, onları çözünmesi ve ayrıştırılması zor aynı zamanda kararlı hale getirir, bu da sorunun çözümünü daha da karmaşıklaştırır. [4]

Azo boyalar tüm boyalar arasında en yaygın kullanılan boyalardır. Bunların tüm boyaların yüzde 60 ila 70'ini oluşturduğu tahmin edilmektedir. Tekstil endüstrisinde yaygın olarak kullanılan azo boyaları aromatik gruplarında karakterizesi  $-N=N$  bağlarının bulunmasıyla elde edilir. Bu bağlara kromoforlar denir, boyanın renginden ve boyanın bozulmaya karşı direncinden sorumludurlar. [5] Aşağıdaki şekil-1'de verilen bileşik bir azo boya olan Reactive Orange 122 boyarmaddesidir.



(Şekil-1) [6]

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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Reaktif boyalar, selüloz liflerine kovalent bağların bağlanması için kullanılır. Bunlar selülozun hidroksil grupları (-OH) ile reaksiyona giren suda çözünebilir anyonik boyalardır. [7]

Reaktif boyarmaddelerin diğer boyalara göre bazı avantajları vardır. Bunlar; parlak renkler, çeşitli boyama yöntemleriyle tekrarlanabilirlik, düzgün renk gelişimi, geniş renk aralığı ve boyanın elyaf içerisine hızlı difüzyonu ve kovalent bağ oluşumu nedeniyle güvenilir özellikleridir. Düşük enerji ihtiyacı, kolay uygulama ve yüksek dayanıklılık gibi avantajlara da sahiptirler. Reaktif boyaların dezavantajları ise şunlardır: Kolayca hidrolize edilir ve atık sularda bol miktarlarda bulunur. Boyama işleminde büyük miktarda kimyasal ve su kullanılmasına sebep olur. [8]

Reaktif boyarmaddelerin atık sulardan giderimi için filtrasyon, koagülasyon/flokülasyon, iyon değişimi, adsorpsiyon, fenton reaktifi, ozonlama, fotokatalitik yöntemler, aerobik bozunma ve anaerobik bozunma kullanılmaktadır. Aşağıda verilen çizelge-1'deki gibi fiziksel, kimyasal ve biyolojik yöntemler başlıklarında üçe ayrılarak incelenmektedir. [9]

Fiziksel yöntemler	Kimyasal yöntemler	Biyolojik yöntemler
Adsorpsiyon	Fenton reaktifi	Aerobik bozunma
İyon değişimi	Ozonlama	Anerobik bozunma
Filtrasyon	Fotokatalitik yöntemler	
Koagülasyon/Flokülasyon		

(Çizelge-1, [9])

Atık sularda boyaların zararlı etkileri bu yöntemler kullanılarak azaltılabilir. Fiziksel yöntemlerden biri olan adsorpsiyon yöntemi bu çalışmada kullanılmıştır.

Adsorpsiyon, atomların, iyonların veya moleküllerin katı bir yüzeye bağlanmasıdır. Metaller ve plastikler de dahil olmak üzere tüm katılar, kristal yapıya sahip olsun ya da olmasın az ya da çok adsorpsiyon kapasitesine sahiptir. Yüksek adsorpsiyon kapasitesine sahip doğal katılar arasında karbon, kil, zeolit ve çeşitli metal tomurcuk formları bulunur. Yapay katılar arasında aktif karbon, yapay zeolitler, silika jeller, metal oksitler, katalizörler ve bazı özel seramikler bulunur. Boyaların sulu ortamlardan adsorpsiyonla uzaklaştırılması için çeşitli optimal koşulların sağlanması gerekir. Adsorpsiyon yöntemi, kullanılan malzemenin türü, ortam sıcaklığı ve çözeltinin pH'ı gibi fizikokimyasal faktörlerden etkilenir. Sulu bir çözeltiden adsorpsiyon sırasında katı ve sıvı fazlar temas eder. Adsorban katılar hem çözünen maddeleri hem de çözücülerini adsorbe edebilir. Yalnızca çözünen maddenin adsorbe edildiği adsorpsiyona pozitif adsorpsiyon denir. Bazı durumlarda adsorbanlar katı solventleri de adsorbe edebilir. Bu durumda çözeltinin konsantrasyonu artar. Bu olaya negatif adsorpsiyon denir.[10]

## LİTERATÜRDEN BENZER ARAŞTIRMALAR:

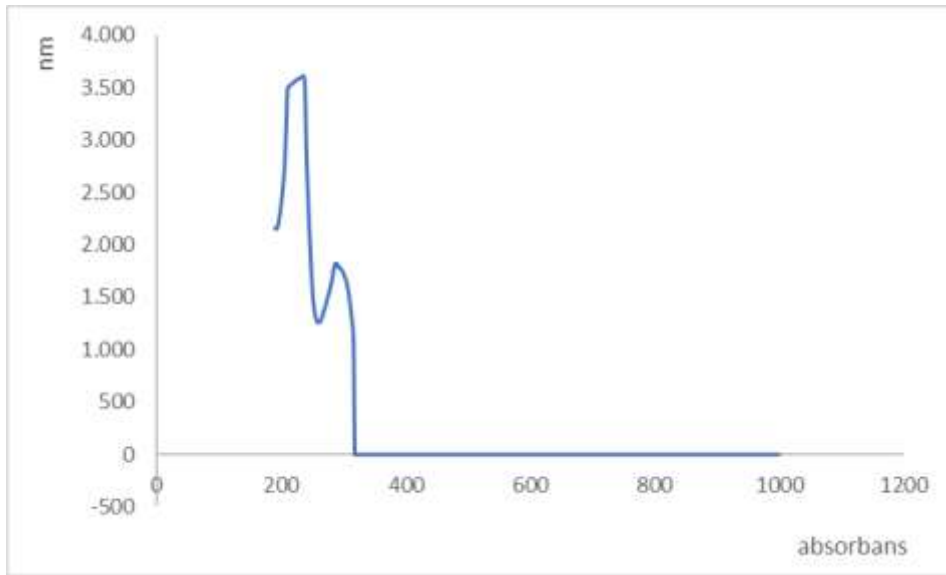
Benzer bir çalışmada, asidik bir boyarmadde olan Asit Mavi 193 (Isolan Dark Blue 2S-GL-03)'ün sulu çözeltiden yeni sentezlenen poli(Akrilamid Vinilimidazol) (poli(AAm-VI)) hidrojelini kullanılarak adsorpsiyon ile giderimi incelenmiştir. Sentezlenen hidrojelini SEM, FTIR ve TGA yöntemleri ile karakterizasyonu yapılmıştır. Adsorpsiyon prosesi üzerine boyarmaddenin başlangıç derişimi, çözeltinin başlangıç pH değeri, hidrojel miktarı, temas süresi ve karıştırma hızının etkileri araştırılmıştır.[11]

Polimer maddesinin yer aldığı başka bir çalışmada, poli(EGDMA-VIM) taneciklerinin, atık sulardan Pb(II)'nin uzaklaştırılmasında etkili bir adsorban olarak kullanılabileceği belirlenmiştir. Pb(II)'nin adsorpsiyonu büyük ölçüde yatak derinliğine ve akış hızına bağlıdır. Poli(EGDMA-VIM) verimli bir şekilde yeniden üretilebilir ve birkaç kez tekrar kullanılabilir. Poli(EGDMA-VTAZ)'ın rejenerasyonu ve daha sonraki kullanımı, adsorpsiyon işleminin kolon işlemi kullanılarak uygulanabileceğini göstermektedir. Bu, poli(EGDMA-VTAZ) kullanılarak Pb(II)'nin uzaklaştırılmasında ekonomik olma seçeneğini artıracaktır.[12]

Bir diğ er çalışmada ysa, m-poli(etilen glikol dimetakrilat-vinil imidazol) [m-poli(EGDMA-VIM)] mikro tanecikler reaktif siyah boya için adsorban olarak kullanılmıştır. 5. m-poli(EGDMA-VIM) hazırlanıp giderim işlemine uygulanmıştır. Sulu çözeltilerden reaktif siyah 5'in sıcaklık etkileri m-poly(EGDMA-VIM) üzerinde adsorpsiyonla incelenmiştir. M-poli(EGDMA-VIM) mikro boncukları, taramalı elektron mikroskobu (SEM), Fourier dönüşümü kızılötesi spektroskopisi (FTIR) çalışmaları ve şişme çalışmaları ile karakterize edilmiştir. Bu çalışmada sıcaklığın adsorpsiyona etkisi araştırılmıştır. Sıcaklığın adsorpsiyon üzerindeki etkisi pH=2 ve pH=12'de detaylı olarak incelenmiştir. Yapılan deneylerde m-poli (EGDMA-VIM) mikrokürelerine maksimum reaktif siyah 5 adsorpsiyonu pH 2,0'da gözlemlenmiştir. Sonuçlar m-poli'nin (EGDMA-VIM) iyi reaktif siyah 5 adsorbanlar olabileceğini ve çevre korumada büyük potansiyel uygulamalara sahip olabileceğini göstermektedir.[13]

## ARAŞTIRMA VE BULGULAR:

Bu çalışmada öncelikle deney süresince kullanılmak üzere pH'ları 3, 5, 7 ve 9 olacak şekilde saf su 1M NaOH, 1M HCl ve 0,01M NaOH damlatılarak pH ölçüm cihazında ayarlandı. Devamında Reactive Orange 12 boyarmaddesi 0,0250 g tartılarak 250 mL'lik pH'ları 3, 5, 7 ve 9 olacak şekilde dört adet balon jodede ayrı ayrı hazırlandı. 100 ppm 250 mL'lik balon jodelerdeki bu stok çözeltiler 10, 20, 30, 40, 50 ve 60 ppm olacak şekilde sırasıyla 5, 10, 15, 20, 25 ve 30 mL halinde 50 mL'lik balon jodelerde seyreltildi. Bu hazırlananlardan bir tanesi UV-VIS spektrofotometresinde absorban değeri belirlenmek üzere ölçüldü ve grafik-1'de gösterildiği gibi dalgaboyu taraması yapılarak  $\lambda=496$  nm olarak belirlendi.



(Grafik-1: Dalgaboyu taraması,  $\lambda=496$  nm)

Bu sayede aşağıda verilen tablolardaki gibi 50 mL'lik çözeltilerin absorban değeri ppm değerlerine göre ölçüldü.

pH=3		pH=5		pH=7		pH=9	
ppm	absorban	ppm	absorban	ppm	absorban	ppm	absorban
10	0,178	10	0,199	10	0,196	10	0,192
20	0,334	20	0,364	20	0,359	20	0,355
30	0,481	30	0,521	30	0,521	30	0,517
40	0,64	40	0,674	40	0,686	40	0,678
50	0,785	50	0,839	50	0,843	50	0,845
60	0,932	60	0,993	60	1,007	60	1,002

(Tablo-1)

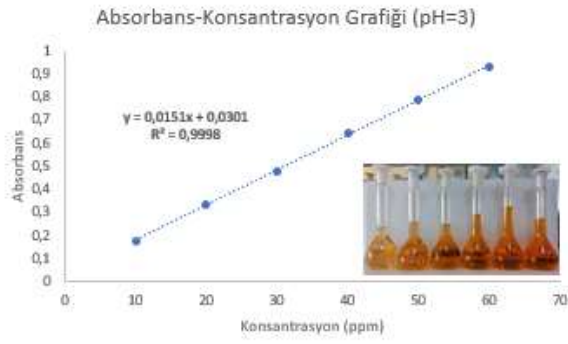
(Tablo-2)

(Tablo-3)

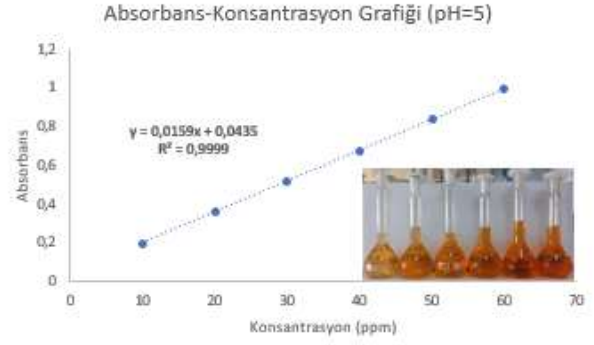
(Tablo-4)

Bu ölçümler doğrultusunda deney esnasında kullanılmak üzere kalibrasyon grafikleri her pH için ayrı olacak şekilde aşağıdaki gibi oluşturuldu.

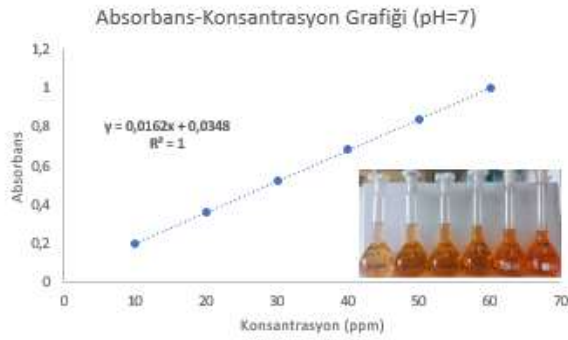




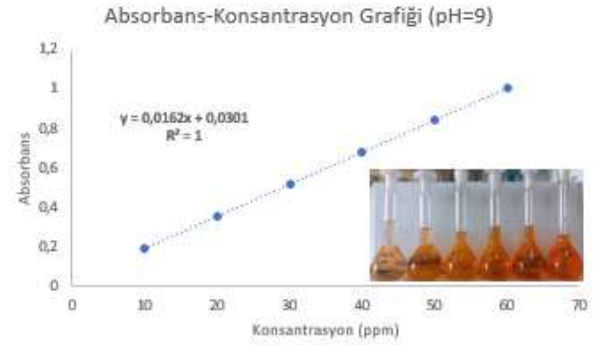
(Grafik-2)



(Grafik-3)



(Grafik-4)



(Grafik-5)

Bir sonraki ařamada YAP polimer maddesi 0,01 g tartılıp ikiřer adet olacak řekilde 50 ppm pH 3, 5, 7 ve 9 boyarmadde bulunan řözeltile bir vialde 0,01 g polimer ve 10 mL řözelti halinde toplam 8 vialde buluřturuldu. (řekil-2)



(řekil-2)

Iřıktan izole bir ortamda YAP polimer maddesi bulunan řözeltile absorbans deđerlerindeki deđiřime bakılmak üzere 24 saat bekletildi.

Ertesi gün pH'ları göz önünde bulundurularak UV-VIS spektrofotometresinde 8 ayrı vialin de absorbans deđerleri sırasıyla ölçüldü;



pH=3'te 0,232 nm ve 0,217 nm

pH=5'te 0,254 nm ve 0,273 nm

pH=7'de 0,340 nm ve 0,329 nm

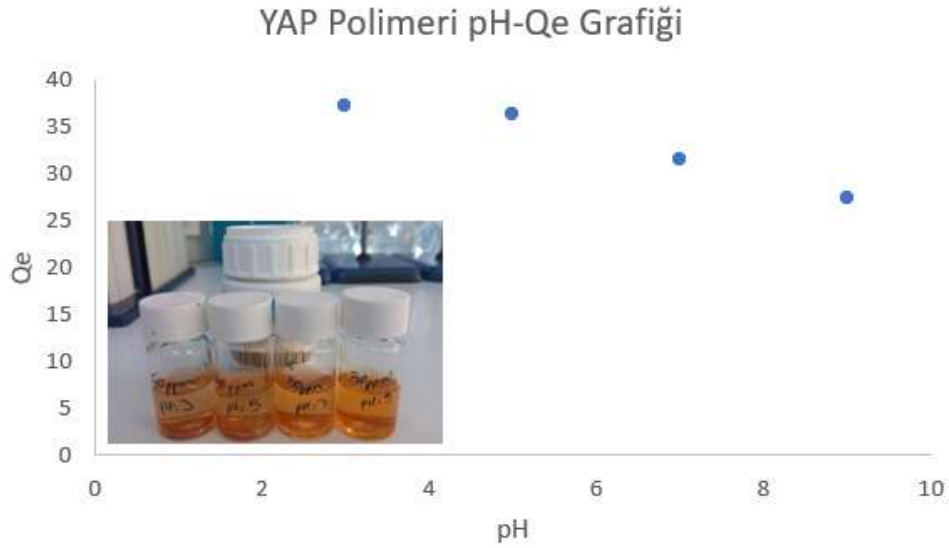
pH=9'da 0,308 nm ve 0,485 nm

değerleri bulundu ve her pH'ın ayrı olacak şekilde absorbans değerlerinin ortalaması alındı.

50 ppm için 24 Saatlik Süre Sonucu						
pH değeri	C <sub>0</sub>	abs değeri (24 saat sonra)	C <sub>son</sub>	polimer miktarı	Q <sub>e</sub>	
3	50	0,2245	12,87417219	0,01	37,12582781	
5	50	0,2625	13,77358491	0,01	36,22641509	
7	50	0,3345	18,5	0,01	31,5	
9	50	0,3965	22,61728395	0,01	27,38271605	

(Tablo-5)

Kalibrasyon grafiklerinde bulunan y denklemlerinden hareketle tablo-5'teki değerler bulundu ve bunun üzerine aşağıdaki YAP Polimeri pH-Q<sub>e</sub> Grafiği çizildi.



(Grafik-6)

## SONUÇ

Deney boyunca YAP polimerinin Reactive Orange 122 boyarmaddesini atık sudan temizleyip temizleyemediği ve hangi pH'ta temizlediği amaçlanmıştır. Bulgular sonucunda pH=3'teyken YAP polimerinin 24 saatlik bekleme sonucunda Reactive Orange 122 boyarmaddesini diğer pH'lara göre daha iyi temizlediği gözlemlenmiştir.



(Şekil-3)

Deney bitiminden sonra bu vialler tekrar karanlık ortama alınmış ve 4 gün sonra şekil-3'te görüldüğü gibi kontrol edildiğinde boyarmaddenin YAP polimerinin etrafında konumlanıp çöktüğü incelenmiştir.

#### Acknowledgement

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October 13-14, 2023

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REAKTİF SARI 186 BOYAR MADDESİNİN EAP POLİMERİNİ ADSORPLANMASI  
REACTIVE YELLOW 186 DYESTATE IN EAP POLYMER ADSORPTION

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**ÖZET**

Kentsel alanlardaki popüler arama ve genişleme faaliyetleri ile artan endüstriyel faaliyetler, atık su üretiminin artmasından sorumlu olan temel faktörlerdir. Nüfus artışı doğal su kaynakları üzerindeki olumsuz etkiyi de arttırmaktadır. Bütün bu faktörler içme suyunun toksisitesine yol açar. Tekstil, gıda, kağıt, deri ve kozmetik endüstrisinde oluşan ihtiyaç nedeniyle sanayide boyar madde kullanımı da arttı. Bu durum aynı zamanda endüstriyel faaliyetlerden kaynaklanan atık su oluşumunu da arttırmaktadır. Çevre kirliliğine neden olan bu faktörlerin azaltılması için gerekli önlemlerin alınması gerekmektedir. Dolayısıyla güncel araştırmalar tekstil atıksularından boyarmaddelerin ayrılması için fizikokimyasal yöntemlerin geliştirilmesi üzerinde yoğunlaşmıştır. Bu yöntemler arasında kimyasal yükseltgenme, membran filtrasyonu ve adsorpsiyon teknikleri sayılabilir. Yükseltgenme ve adsorpsiyon tekstil atıksularının işlenmesinde kullanılan ana teknolojilerdir. Kullanılan farklı yöntemlerin arasında adsorpsiyon, uygulama kolaylığı, düşük enerji tüketimi ve düşük maliyeti nedeniyle önemli bir yere sahiptir. Adsorpsiyonun atık sudan boya maddesinin uzaklaştırılmasında etkili bir yöntem olduğu kanıtlanmıştır. Yapılan çalışmada; EAP polimerinin tekstil atık sularında yaygın olarak bulunan Reaktif Sarı 186 boyar maddesinin adsorpsiyonları incelenmiştir. Başlangıç pH'ının boya giderimine etkisi incelenmiştir. pH :3,5,7 ve 9 da çalışılmıştır. Bu değerler aralığında en iyi renk giderimi pH:3'te gerçekleşmiştir. Yapılan taramalı UV ölçüm sonuçları. Maksimum absorbans Reaktif Sarı 186 için  $\lambda=426$  nm olarak belirlenmiştir.

**Anahtar Kelimeler:** Reaktif Sarı 186, EAP polimeri, adsorpsiyon, boyarmadde, atık su, UV-VIS

**ABSTRACT**

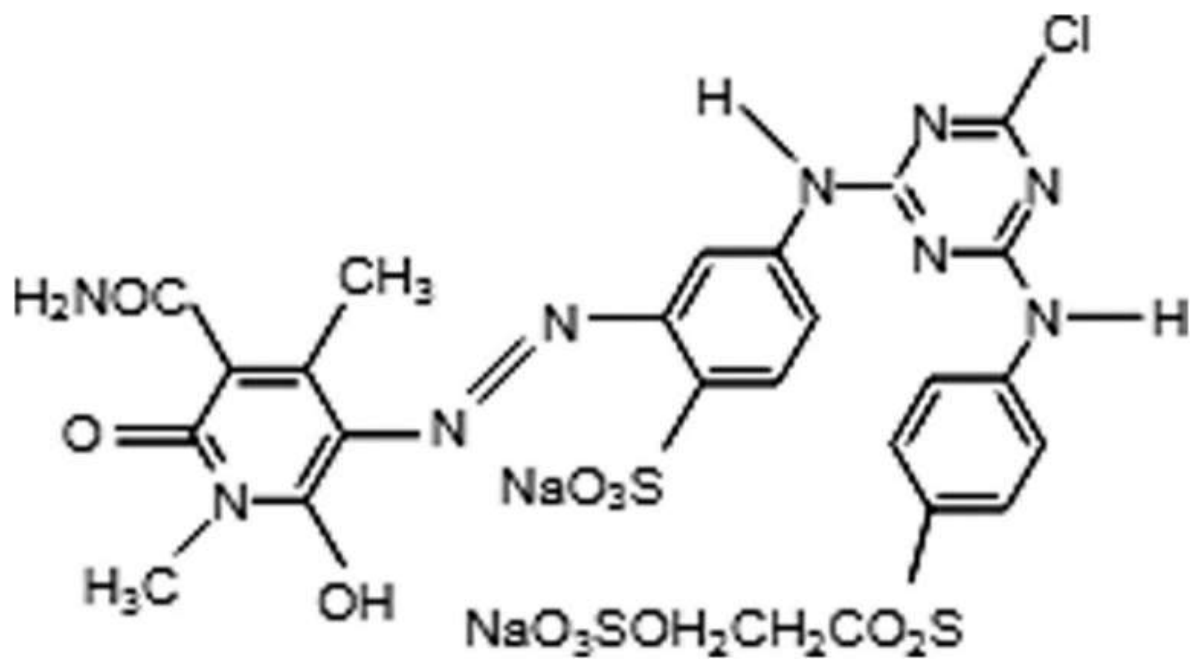
Popular exploration and expansion activities in urban areas and increasing industrial activities are the main factors responsible for the increase in wastewater production. Population growth also increases the negative impact on natural water resources. All these factors lead to toxicity of drinking water. Due to the need in the textile, food, paper, leather and cosmetics industries, the use of dyestuffs in the industry has also increased. This situation also increases wastewater generation resulting from industrial activities. Necessary measures must be taken to reduce these factors that cause environmental pollution. Therefore, current research has focused on the development of physicochemical methods for the separation of dyestuffs from textile wastewater. These methods include chemical oxidation, membrane filtration and adsorption techniques. Oxidation and adsorption are the main technologies used in the treatment of textile wastewater. Among the different methods used, adsorption has an important place due to its ease of application, low energy consumption and low cost. Adsorption has proven to be an effective method for removing dyes from wastewater. In the study, the adsorption of EAP polymer and

Reactive Yellow 186 dyestuff, which is commonly found in textile wastewater, was examined. The effect of initial pH on dye removal was examined. It was studied at pH:3, pH:5, pH:7, pH:9. Within these values range, the best color removal was achieved at pH:3. Scanned UV measurement results. Maximum absorbance was determined as  $\lambda= 426$  nm for Reactive Yellow 186.

**Keywords:** Reactive Yellow 186,EAP polymer,adsorption,dyestuff,wastewater,UV-VIS

## GİRİŞ

Hızlı nüfus artışı, sanayileşme ve plansız kentsel büyüme nedeniyle temel yaşam ihtiyacını karşılayan doğal kaynaklar yenilenemeyecek kadar azalmakta ve çevre sorunlarını da beraberinde getirmektedir. Bu sorunlardan birisi de su kirliliği olup, çevre sorunlarının önemli bir bölümünü oluşturmaktadır [3,4]. Dünyada ekonomik büyümenin ve gelişmenin temel göstergelerinden birisi de içme ve sanayi suyu tüketimidir [4]. Birçok endüstri dalı suya büyük ihtiyaç duymaktadır. Fabrikasyon, yıkama, buharlaştırma, kurutma ve enerji üretimi gibi alanlarda çok miktarlarda su kullanılmaktadır. Endüstride su tüketimi her on yılda bir iki katına çıkmaktadır. Bu nedenle su bilinçli bir şekilde tüketilmeli ve gerekli önlemler alınmalıdır [5]. Endüstriyel atık sular nehirlere, göllere, okyanuslara veya diğer alıcı ortamlara boşaltılır. Uygulamadan önce çeşitli şekillerde arıtılması ve atık su mevzuatına uygun olması gerekmektedir. Toksik maddelerin ve inhibitörlerin belli bir oranda uzaklaştırılması gerekir[6]. Aksi halde bu kirlilik doğanın dengesini bozmakta ve canlı yaşamını tehdit etmektedir[7]. Boyar maddeler, endüstriyel atık sularında bulunan yüksek orandaki organik maddelerdir. Karmaşık aromatik moleküler yapıları boyar maddelerin stabilitesini artırır ve biyolojik yöntemlerle bozunmayı önler. Dünya piyasasında 10.000'den fazla ticari boyarmadde mevcuttur [8]. Başta tekstil olmak üzere kağıt, deri, gıda ve kozmetik endüstrisinde kullanılan pek çok doğal ve sentetik boyar maddeler vardır. Günümüzde kullanılan boyaların çoğu, petrol veya kömür katranından elde edilmektedir[9]. Reaktif boyarmaddeler tipik olarak farklı tiplerde reaktif gruplar ile bağlanmış, azo temelli kromoforlardır. Diğer boyarmaddelerle aralarındaki en temel fark tekstil liflerine kovalent bağlarla bağlanmasıdır [10]. Azo boyaları, kullanılan tüm tekstil boyalarının %60-70'ini oluşturan en yaygın kullanılan boyalardır ve boya atıklarındaki başlıca kirleticilerdir[11]. Azo boyalar çözelti içinde kolay çözünürler ve klasik arıtım teknikleriyle arıtılmaları zordur[12]. Birçok fizikokimyasal süreç (koagülasyon, flokülasyon, aktif karbon, adsorpsiyon, ters osmoz) azo boya atık suyundan rengin giderilmesi için biyolojik arıtma prosesleri ve ileri oksidasyon ve biyolojik arıtma kombinasyonları uygulanmıştır. Uygulanan bu yöntemlerin birçok dezavantajı ve avantajı vardır. Fotostabilitesi yüksek boyaları uzaklaştırmak için geleneksel biyolojik işlemler kullanılır. Çok etkili olmasa da fiziksel ve kimyasal işlemler çamur ve adsorban oluşumuna yol açmaktadır. Yenilenme ihtiyacı gibi dezavantajları nedeniyle boyanın uzaklaştırılmasında yetersiz kalmaktadır [7]. Boyarmaddelerin tekstil atıksulardan uzaklaştırılmasında adsorpsiyonun etkili bir işlem olduğu tespit edilmiştir [13].





# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

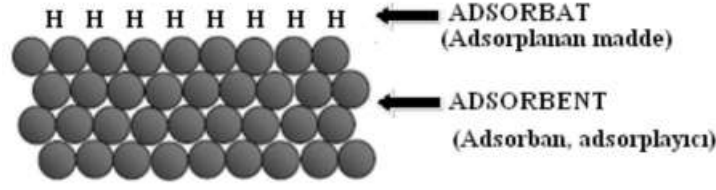
October 13-14, 2023

Yöntem	Avantaj	Dezavantaj
Ozonlama	Atık çamur oluşmaması ve atıksuyun arıtıldıktan sonra tekrar kullanılabilmesi.	Yüksek maliyet ve ozonun yarılanma süresinin kısa oluşu.
Fotokimyasal yöntem	Atık çamur oluşmaması.	Yan ürün oluşumu.
Sodyum hipoklorit (NaOCl) ile yükseltgenme	Azo bağının kırılmasını sağlar.	Klorun çevre üzerindeki olumsuz etkileri.
Elektrokimyasal yöntem	Atık çamur oluşmaması.	Elektrik enerjisinin fazla kullanımı.
Membranla ayırma	Sistemin sıcaklığa, beklenmedik bir kimyasala ve bakteriyel aktiviteye karşı dirençli olması.	Yüksek maliyet, membranın tıkanma olasılığı ve rejenerasyonunun gerekliliği.
İyon değişimi	Rejenerasyonla iyon değiştirici kaybının olmaması ve çözünebilir boyarmaddelerin etkin şekilde giderilebilmesi.	İyon değiştiricilerle arıtılarak olumlu sonuç alınan boyarmadde sınıfının kısıtlı olması ve yüksek maliyet.
Fenton	Ekipman basit ve kullanım kolaylığı COD'nin azaltılması (Reaktif boyarmaddeler dışında).	Çamur oluşumu, uzun reaksiyon süresi, tuz oluşumu, tehlikeli atıklar.
Fenton çamur geri kazanım sistemi (FSR)	Ekipman basit kullanım kolaylığı (Reaktif boyarmaddeler dışında).	Tuz ve gaz oluşumu.
UV/H <sub>2</sub> O	Çamur, tuz oluşur işletme kolaylığı ve güvenlik.	Tüm boyalara uygulanmaz, askıda kalan partiküllerinin ayrılması.
O <sub>3</sub> /H <sub>2</sub> O <sub>2</sub>	Çamur ve tuz oluşmuyor. Kısa reaksiyon süresi (Reaktif boyalar için çok kısa reaksiyon süresi).	Tüm boyalara uygulanmaz, toksit, tehlikeli ve problemli kontrol, COD azaltılmaz.

Ticari olarak uygulanan adsorpsiyon işlemleri (Çizelge-1[14])

## ADSORPSİYON

Sıvı faz aktifleştirilmiş katı ile temas ettiğinde sıvı fazın bir kısmının (veya bazı bileşenlerinin) katı tarafından tutulduğu gözlenir. Katının yüzeyinde gerçekleşen tutunma adsorpsiyon olarak adlandırılır. Adsorpsiyon olayında katı faz adsorplayıcı, akışkan faz da adsorplanan olarak adlandırılır.[15]



Şekil-1[14]

Boyar maddeler gibi parçalanması zor veya imkansız olan organik maddeler atık su malzemelerinin uygun adsorbanlar üzerinde adsorpsiyon yoluyla uzaklaştırılmasıyla olur. Bazen adsorpsiyon mekanizması yüksek oranda çözüdür boyarmaddeleri ile renk giderimi daha zor olmaktadır.[16] Aktif karbon, organik maddeleri adsorbe etme kapasitesinin yüksek olması nedeniyle en çok kullanılan adsorbandır. Ancak yüksek dozlarda kullanıldığından kullanımı sınırlıdır, bu da maliyetleri artırır, bu da daha ucuz ve etkili maddeler arayışlarına yol açar. Son yıllarda polimer araştırmaları hızla gelişti. Özellikle poliakrilamid su arıtımında, biyolojik araştırmalar, tekstil endüstrisi ve yağ çıkarma gibi farklı alanlarda çeşitli amaçlarla kullanılmaktadır. Araştırmalarda adsorban olarak poliakrilamid kullanılarak aktif karbona göre daha düşük maliyetle daha yüksek verim elde edilebilmektedir.[17]

## LİTERATÜR ÇALIŞMALARI

Benzer çalışmada;Endüstriyel ve tekstil atık suları büyük miktarda kimyasallar ve boyarmaddeler içermelerinden dolayı dikkat çekiyorlar. Bu boyar maddeler su kaynaklarında, nehirlerde ve okyanuslarda işlenmeden kaldığında, suda yaşayan hayvanları ve besin zincirini olumsuz etkilenmektedir. Bu zararlı etkileri azaltmak için endüstriyel atık suyun arıtılması hayati biyolojik öneme sahiptir. Bu çalışmada, akrilik elyafların boyanmasında kullanılan iki farklı bazik karakterdeki tekstil boyar maddesi (Basic Blue 41-BB41 and Basic Red 46-BR46) farklı pH, süre, sıcaklık ve başlangıç boyar madde konsantrasyonlarında sülfonik asit esaslı polimerik membran ile çözelti ortamından % 75 ile % 100 aralığında boyar madde giderme yüzdesi ile giderildi. Gibbs serbest enerjisi ( $\Delta G$ ) değerleri BB41 ve BR46 boyar maddeleri için 318 K'de sırası ile -5.2 kJ/mol ve -5,52 kJ/mol olarak bulundu. Adsorpsiyon izotermeleri incelendiğinde her iki boyar maddenin polimer membranına adsorpsiyonunun Freundlich izotermine uyduğu tespit edildi.[18]

Bir diğer benzer çalışmada;Atık suyun rengi tekstil terbiye sektörünün karşılaştığı sorunlardan biridir. Bu konuda yasal sınırlamalar mevcuttur. Manyetik polimerler, güçlü adsorpsiyona sahip olmaları ve dış manyetik alandan kolayca ayrılabilme özellikleri nedeniyle etkili bir adsorpsiyon sergilerler. Manyetik polimerler, genellikle güçlü adsorpsiyon ve indirme etkinliğine sahiptir. Üstün yüzey ve kütle aktarım özellikleri, onu seçici ayırma ve uzaklaştırma işlemleri için uygun hale getirir. Kimyasal bileşim sayesinde, atık sulardan arındırılması etkili bir şekilde gidermede önemli bir rol oynar.Bu araştırmada, sulu çözeltilerden Reaktif Siyah 5 ve Reaktif Turuncu 16 adlı reaktif boyaların uzaklaştırılmasının pH etkileri üzerindeki adsorpsiyonunun, poli (divinilbenzen-1-vinilimidazol) [poli (DVB-VIM)] ve manyetik poli (divinilbenzen-1-vinilimidazol) [mpoli (DVB-VIM)] ile seçildi. Poli (DVB-VIM) ve manyetik poli (DVB-VIM) mikroküreler sentezlendi ve büyütüldü; Lineer regresyon analizi ile pH etkilerinin adsorbana etkisi araştırıldı. Poli (DVB-VIM) mikroküreleri, divinilbenzenin (DVB) ve 1-vinilimidazol (VIM) ile kopolimerleştirilerek hazırlanır. Taramalı elektron mikroskobu (SEM), fourier-transform spektroskopisi (FTIR) çalışmaları ve şişme çalışmaları ile poli (DVB-VIM) ve manyetik poli (DVB-VIM) mikroküreler yapıldı. Bu mümkün, adsorpsiyon üzerindeki pH etkilerinin lineer regresyon analizi, pH değerleri arasında [2 ile 12 arasında] ayrıntılı bir şekilde incelendi. [19].

Son benzer çalışmada ise ;Poli(etilen glikol dimetakrilat-2-vinil piridin)-TiO<sub>2</sub> [poli(EGDMA-2-VP)] -TiO<sub>2</sub> mikro küreleri, tekstil boyar maddelerinin sulu çözeltilerden fotokatalitik renk giderimi için süspansiyon polimerizasyon yöntemi ile sentezlendi. Sentezlenen çapraz bağlı [poli (EGDMA-2-VP)] -TiO<sub>2</sub> mikro küreleri, taramalı elektron mikroskobu (SEM), X-ışını difraktometresi (XRD) ve fourier dönüşümlü kızılötesi spektroskopisi (FTIR) ile karakterize edildi. Elde edilen mikro kürelerin boyar madde renk gidermede kullanılabilirliğini araştırmak için pH, polimer miktarı, zaman ve boya konsantrasyonu parametreleri, hem güneş ışığı altında hem de 366 nm UV ışığı altında incelendi. Boyar maddenin maksimum fotokatalitik renk gideriminin meydana geldiği optimum koşullar pH 3, polimer miktarı 0.05 g, boya konsantrasyonu 30 mg/L ve süre 5 saattir[20].

### ARAŞTIRMA VE BULGULAR

#### Boylar ve kimyasallar

Reactive Yellow 186 (RY 186) (IUPAC adı: benzensülfonik asit,2-[2-[5-(aminokarbonil)-1-etil-1,6-dihidro-2-hidroksi-4-metil- kullanılarak araştırıldı. 6-okso-3-piridinil]diazetil]-4-[[4-kloro-6-[[3-[[2-(sülfoksi)etil]sülfonil]fenil] amino]-1,3,5-triazin-2 -il]amino]-, sodyum tuzu (1:2)).

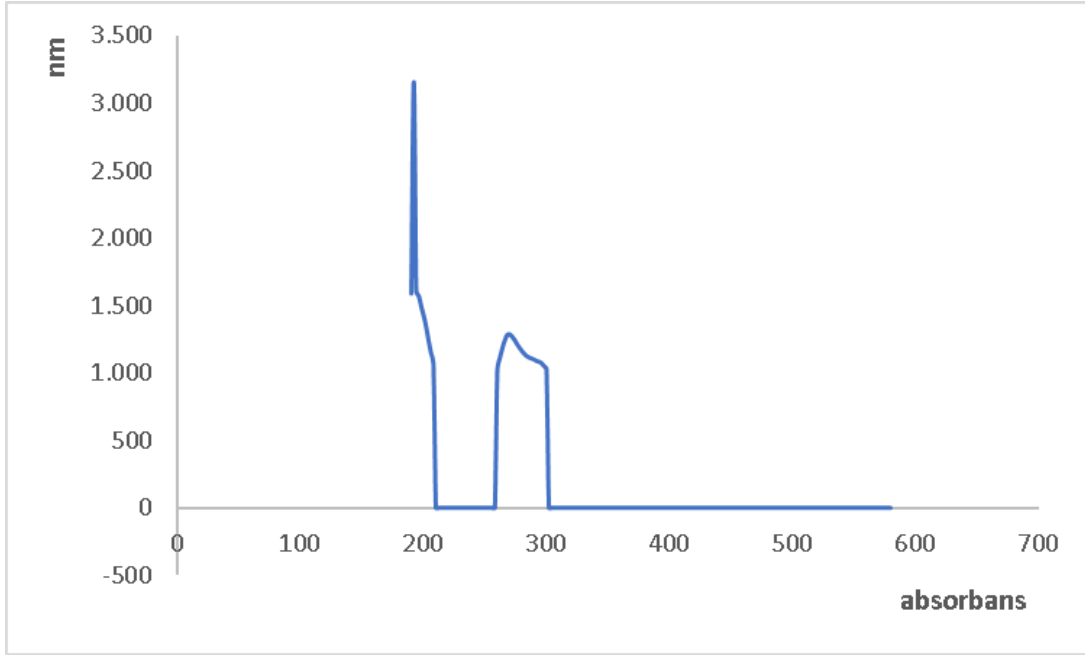
HCl ve NaOH, pH'ı ayarlamak için geniş ölçüde kullanıldı.

Kimyasal yapı	Moleküler formül	Moleküler ağırlık	Amaks (nm)	CAS Numarası:	Safılık (%)
	C <sub>26</sub> H <sub>24</sub> ClN <sub>9</sub> Na <sub>3</sub> O <sub>12</sub> S <sub>3</sub>	832.1494	426	84000-63-5	98

(Çizelge-2[21])

Bu çalışmada ilk olarak deney boyunca kullanılacak pH'ları 3,5,7ve 9 olacak şekilde saf su ile 1M HCl, 1M NaOH damla damla eklenerek pH ölçüm cihazında ayarlandı.Ayrıca 0,01M NaOH kullanılarak daha doğru bir pH incelemesi için ince ayar yapılmıştır.Reactive Yellow 186 boyarmaddesi 0,0250 g tartılarak 250 mL'lik pH'ları 3,5,7,9 olacak şekilde balon jöjelerde ayrı ayrı hazırlandı.100 ppm 250 mL'lik balon jöjelerde stok çözeltiler hazırlanıp 10,20,30,40,50 ve 60 ppm de 5,10,15,20,25,30 mL halinde 50 mL'lik balon jöjelerde seyreltme işlemi yapıldı.Bu hazırlanan çözeltiler UV-VIS spektrofotometresinde absorbans değeri belirlemek için viallere eklendi.Çıkan ölçüm sonuçlarına göre maksimum absorbans değeri için  $\lambda = 426$  nm olarak belirlenmiştir.





(Grafik1)

50 ml 'lik balon jöjelerde hazırlanmış olan boyar madde çözeltilerinin absorbanları aşağıda verilen tablolarda görüldüğü gibi ölçüldü ve değerler kaydedildi. Veriler doğrultusunda ppm ve absorban değerleri için pH ları ayırt edilerek Absorbans-Konsantrasyon Grafikleri çizildi.

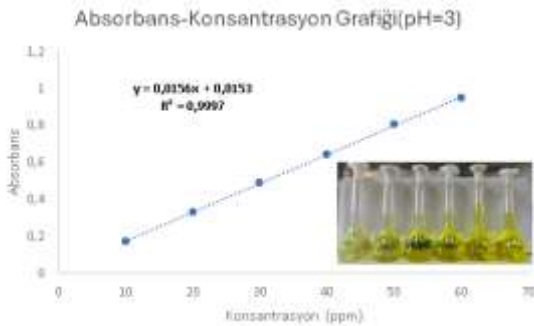
pH=3		pH=5		pH=7		pH=9	
ppm	absorban	ppm	absorban	ppm	absorban	ppm	absorban
10	0,168	10	0,185	10	0,168	10	0,153
20	0,33	20	0,324	20	0,324	20	0,294
30	0,488	30	0,472	30	0,478	30	0,447
40	0,638	40	0,621	40	0,627	40	0,582
50	0,805	50	0,762	50	0,776	50	0,724
60	0,948	60	0,911	60	0,926	60	0,861

(Tablo 1)

(Tablo 2)

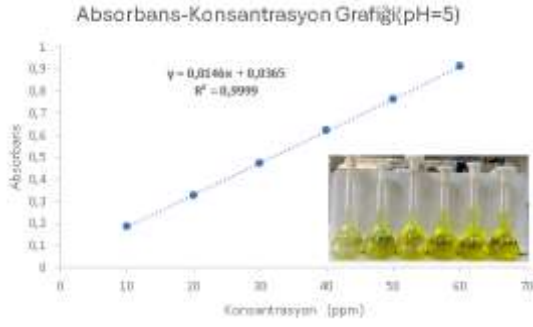
(Tablo 3)

(Tablo 4)



(Grafik 2)





(Grafik 3)



(Grafik 4)



(Grafik 5)



Sonraki aşama EAP polimer maddesi 0,01 g tartıldı iki adet olacak şekilde 50 ppm pH=3,5,7 ve 9 boyarmadde bulunan çözeltilerle vialde 0,01 g EAP polimer ve 10 ml çözelti halinde toplam 8 vialde toplandı.



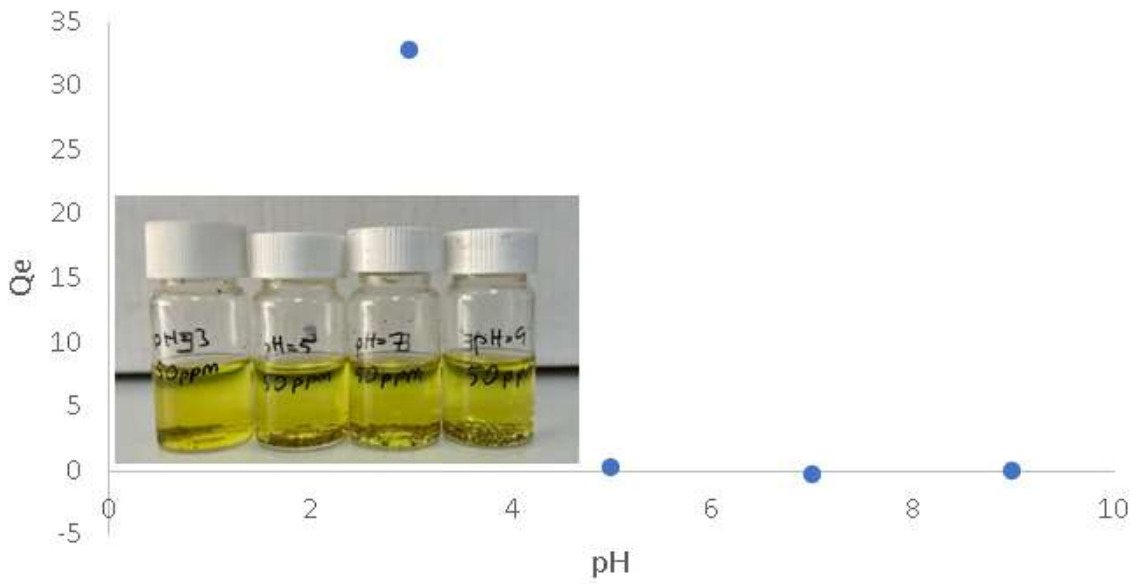


50 ppm için 24 Saatlik Süre Sonucu					
pH değeri	C0	abs değeri(24 saat sonr	Cson	polimer miktarı	Qe
3	50	0,284	17,22436	0,01	32,77564
5	50	0,764	49,82877	0,01	0,171233
7	50	0,78	50,31126	0,01	-0,31126
9	50	0,725	50,09155	0,01	-0,09155

(Tablo 5)

Kalibrasyon grafiklerinde bulunan y denklemlerinden hareketle Tablo 5 'teki değerler bulundu ve bununla beraber aşağıdaki EAP polimeri pH-Qe Grafiği çizildi.

### EAP Polimeri pH-Qe Grafiği





### SONUÇ

EAP polimerinin Reactive Yellow 186 boyarmaddesinin tekstil atık suyundan temizlenip temizlenmediğini ve temizlendiyse de hangi Ph'ta temizlendiği amaçlandı. Bulgular sonucunda pH=3'te EAP polimerinin karanlık ortamda 24 saat boyunca bekleme sonucunda Reactive Yellow 186 boyarmaddesini pH=5,7,9 a göre daha iyi temizlendiğini gözlemlenmiştir.



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PS/PVC/Bi<sub>2</sub>O<sub>3</sub> KOMPOZİT YÜZEY ÜRETİMİ: ELEKTROSPINNING VE SOLVENT  
CASTING YÖNTEMLERİNİN KIYASLANMASI ÜZERİNE DENEYSEL BİR ÇALIŞMA  
MANUFACTURING OF PS/PVC/Bi<sub>2</sub>O<sub>3</sub> COMPOSITE SURFACES: A COMPARATIVE  
STUDY ON SOLVENT CASTING AND ELECTROSPINNING METHODS

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## ÖZET

Polimerler, üç boyutlu geometrik dizilime sahip moleküllerden oluşan ve doğal yollarla ya da yapay üretim teknikleri ile üretilen malzemelerdir. Uygun takviye malzemesi ilavesi ile fiziksel ve kimyasal davranışları geliştirilebilmektedir. Farklı üretim tekniklerinin kullanılabilir olması mühendislik uygulamalarında polimerlerin popüler hale gelmesine yol açmıştır. Bu çalışmada amorf karaktere sahip olan iki farklı polimerin kombinasyonu sonucu üretilen yüzeyler üzerinde üretim yönteminin etkisi incelenmiştir. Hazırlanan polimer çözeltisinden solvent casting ve elektrospinning yöntemleriyle yüzey üretimi gerçekleştirilmiştir. Bu yüzeylerin morfolojik özellikleri SEM, XRD ve FTIR analizleri ile incelenmiş ve kalınlıkları kıyaslanmıştır. Solvent casting yöntemiyle daha ince ve yarı kristalin ancak kusurlu yüzey özelliklerine sahip kırılğan bir film eldesinin sağlandığı görülmüştür. Elektrospun yüzeyin ise daha yumuşak, kalın, gözenekli ve geçirgenliği yüksek yüzey özelliklerine sahip olduğu tespit edilmiştir. Üretilen farklı yüzeylerde PS ve PVC polimerlerinin karakteristik piklerinin korunduğu ancak solvent casting yöntemiyle üretilen yüzeyde elektrospun yüzeye kıyasla benzer dalga boylarında daha derin pik oluşumlarının gözlemlendiği tespit edilmiştir. Solvent casting yöntemiyle üretilen yüzeyin %T değerinin daha düşük olduğu ve elektrospun yüzeylerde mevcut olan lifsi yapının yüzey özelliklerinin geliştirilmesinde etkili olduğu tespit edilmiştir.

**Anahtar kelimeler:** bismut oksit, elektrospinning, polistiren, polivinil klorür, solvent casting

## ABSTRACT

Polymers are materials having molecules embedded in three-dimensional geometry and synthesized by naturally or artificial manufacturing techniques. Their physical and chemical properties can be improved by addition of proper reinforcing agent. Practicability of polymer with various different manufacturing techniques has increased popularity of polymeric materials in engineering applications. This study examines the effect of manufacturing technique on surface properties of structure produced by combination of two different amorphous polymers. Morphological properties of solvent casted or electrospun surfaces are investigated by SEM, XRD and FTIR analysis and also thickness of these surfaces are compared. By the help of solvent-casting technique, thinner and semi-crystalline films with imperfect surface characteristic are manufactured. With respect to solvent-casted film, electrospun mat is softer, thicker and has high porosity and transmittance value. Characteristic peaks of PS and PVC polymers are available in different surfaces but more intensive peaks are observed in solvent casting with respect to electrospun surface at similar wavelengths. Transmission percentage of solvent casted surfaces are found as lower than that of electrospun surfaces and fibrous structure of electrospun surface improves surface characteristic properties of manufactured en product.

**Keywords:** bismuth oxide, electrospinning, polystyrene, polyvinyl chloride, solvent casting

### GİRİŞ

Polimerler farklı üretim tekniklerinde kullanılabilirliklerinden olayı odak noktası haline gelmiştir. Polimer esaslı malzemelerden nanolif mat, film ve hidrojel gibi farklı formlarda malzeme üretimi söz konusu olmaktadır [Walicova et.al., 2016; Ahmed et.al., 2017]. Elektrospinning ve solvent casting yöntemleri polimer esaslı film üretiminde yaygın şekilde kullanılan iki farklı üretim tekniğidir. Elektrospinning işleminde lif yayılımının ve lif çapının kontrol edilebilir olması bu üretim yönteminin popüler olmasındaki en büyük etkenlerdir [Fridrikh et. al., 2003; Zhu et. al., 2017; Rashid et.al., 2012]. Lifsi yapılardan oluşan film eldesini mümkün kılan elektrospinning yöntemi, hafif ve dayanıklı malzemelerin üretilmesinde tercih edilen basit bir üretim tekniğidir. Solvent casting yöntemi ise çok katmanlı yapıların üretilmesinde kullanılan basit bir teknik olarak bilinmektedir. Üretim prosesinin kısa ve basit olması, elektrospinning yöntemine göre bir avantaj gibi gözükse de solvent casting yöntemiyle üretilen ürünlerde çözücü tipine göre değişmekle birlikte zararlı kalıntılar bulunabilmektedir. Bu yüzeylerin kırılman olmaları, düşük yüzey alan/hacim oranına sahip olmaları ve düşük oranda takviyelendirilmeye müsait olmaları nedeniyle elektrospun yüzeylere kıyasla dezavantajlı duruma düşmektedirler [Chachlioutaki et.al., 2020]. Solvent casting yöntemiyle esnek film eldesi sağlamak için plastifiyan malzemelere ihtiyaç duyulmasına karşın, elektrospinning yönteminde üretilen yüzeylerin lifsi yapıda olmaları nedeniyle esnekliği artırıcı yardımcı kimyasallar kullanılmaksızın kırılmanlığı düşük film üretimi mümkün olmaktadır [Zu et.al., 2002; Rabek et.al., 2014; Ghosal et.al., 2018] İlaveten elektrospinning yöntemiyle yumuşak, düzgün yüzey özelliklerine sahip ve orta düzeyde mukavemet özellikleri sergileyen film üretimi mümkün olmaktadır [Yin et.al., 2016; Li et.al., 2014]. Literatürde bu iki tekniğin kıyaslandığı ve farklı polimerler kullanılarak yapılan çeşitli çalışmalar mevcuttur. Ghosal et. al. (2018) polikaprolakton polimeri kloroform içerisinde çözerek %12 polimer konsantrasyonuna sahip çözeltilerden solvent casting ve elektrospinning yöntemiyle filmler üretmiştir. Rohani Shirvan et.al.(2021) yaptığı çalışmada fenilalalin aminoasit NT içeren kitosan/PVA elektrospun ve solvent-casted filmlerin özelliklerini incelemiştir. Kalınlık ve ağırlıkça yakın değerlere sahip olduklarını ancak elektrospun filmlerin, solvent casting yöntemiyle üretilen filmlere kıyasla katlanma dayanımının yüksek olduğunu, daha hidrofobik karakter sergilediklerini, gözenekli yapıya sahip olduklarını rapor etmişlerdir. Elektrospun yüzeylerde NT kaplama etkinliğinin daha yüksek olduğunu tespit etmişlerdir. Feng et.al. (2019) polilaktik asit/TiO<sub>2</sub> kompozit yapıların çekme dayanımını kıyaslamışlardır. Solvent casting ve elektrospinning yöntemiyle üretilen yüzeylerin çekme dayanımlarının sırasıyla 14.5 MPa ve 2.71 MPa olduğunu rapor etmişlerdir. Kwak et. al. (2017) kafein takviyeli jeatin yüzeylerin özelliklerinin üretim yöntemine göre değişimini incelemiştir. Solvent casting yöntemiyle üretilen yüzeylerde sadece 5 katlamadan sonra kırılma ya da çatlak oluşumunun gözlemlendiğini ancak elektrospun yüzeylerde herhangi bir kırılmanın var olmadığını ifade etmişlerdir.

Bu çalışmada amorf karaktere sahip olan PS ve PVC polimerleri ikili çözücü içerisinde çözülmüştür. Hazırlanan PVC/PS polimer çözeltilerine Bi<sub>2</sub>O<sub>3</sub> takviyesi yapılmış ve solvent casting ve elektrospinning işlemi ile yüzey üretimi gerçekleştirilmiştir. Elde edilen yüzeylerin morfolojik özellikleri SEM, XRD ve FTIR analizleri ile incelenmiş ve kalınlıkları kıyaslanmıştır. PS ve PVC polimerlerinin bir arada bulunduğu polimer çözeltisi ile belirtilen üretim yöntemleri ile yüzey eldesinin sağlanmamış olması bu çalışmanın özgünlüğünü ifade etmektedir.

### MATERYAL VE METOT

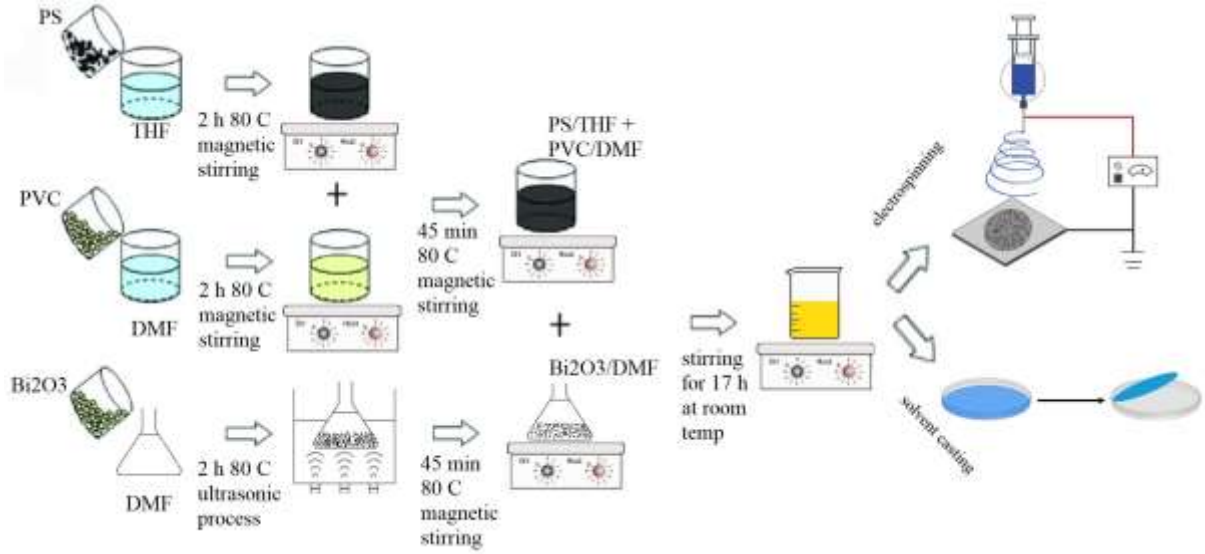
#### Materyal

Çalışmada kullanılan polimerler olan PS (CAS: 9003-53-6; Mw: 35.000 g mol<sup>-1</sup>) ve PVC (CAS: 9002-86-2; Mw: 80.000 g mol<sup>-1</sup>) polimerleri ile bu polimerleri çözmek için kullanılan THF (C<sub>4</sub>H<sub>8</sub>O; % 99.9 saflık, CAS: 109-99-9) ve DMF (C<sub>3</sub>H<sub>7</sub>NO, % 99.8 saflıkta, CAS: 68-12-2) çözücüleri Sigma Aldrich firmasından temin edilmiştir. Bizmut oksit tozu (Bi<sub>2</sub>O<sub>3</sub>, %99,9 saflık, 8.9 gr cm<sup>-3</sup>, CAS: 1304-76-3) ise Acros Organics firmasından temin edilmiştir.

#### Metot

Solvent casting ve elektrospinning işlemi için toplamda 50 gr lık polimer çözeltisi hazırlanmıştır. %35 PS polimer konsantrasyonuna sahip 20 gram PS/THF ve %15 polimer konsantrasyonuna sahip 20 gram PVC/DMF çözeltileri [Huang et. Al., 2003] 80 C sıcaklıkta 2 sa manyetik karıştırıcıda karıştırılmıştır. Bu sırada katı madde oranı %25 olan Bi<sub>2</sub>O<sub>3</sub>/DMF karışımı 2 sa 80 C sıcaklıkta ultrasonik banyoda

karıştırılarak homojen bir karışım elde edilmiştir. PS ve PVC polimerlerinin aynı çözücülerde çözüldüğü bilindiğinden, PS/THF ve PVC/DMF polimer çözeltileri tek bir beherde birleştirilerek 80 C 45 dk süresince manyetik karıştırıcıda karıştırılmıştır ve polimerlerin çapraz çözeltiler içerisindeki çözünürlüğü artırılmaya çalışılmıştır. Ultrasonik banyodan alınan  $\text{Bi}_2\text{O}_3$ /DMF homojen çözeltisindeki olası çökelmeyi önlemek için, aynı süre ve sıcaklık değerinde manyetik karıştırıcıda işleme tabi tutulmuştur. Belirtilen süre sonunda  $\text{Bi}_2\text{O}_3$ /DMF çözeltisi polimer çözeltiline ilave edilerek 17 sa boyunca oda sıcaklığında karıştırılmıştır.  $\text{Bi}_2\text{O}_3$  katkılı polimer çözeltisinin 25 gramı 22 ml (70 mm) petri kabına dökülmüş ve 3 sa 100 C sıcaklıkta etüvde bekletilmiştir. Geri kalan 25 gram çözelti enjektöre çekilerek dikey eksenli elektrospinning işlemine tabi tutulmuştur. Elektrospinning işlemi 21 G iğne ve distile su dolu kollektör kullanılarak 16 kV voltaj değeri, 1.25 ml/h besleme hızı ve 13 cm kollektör mesafesinde yapılmıştır.



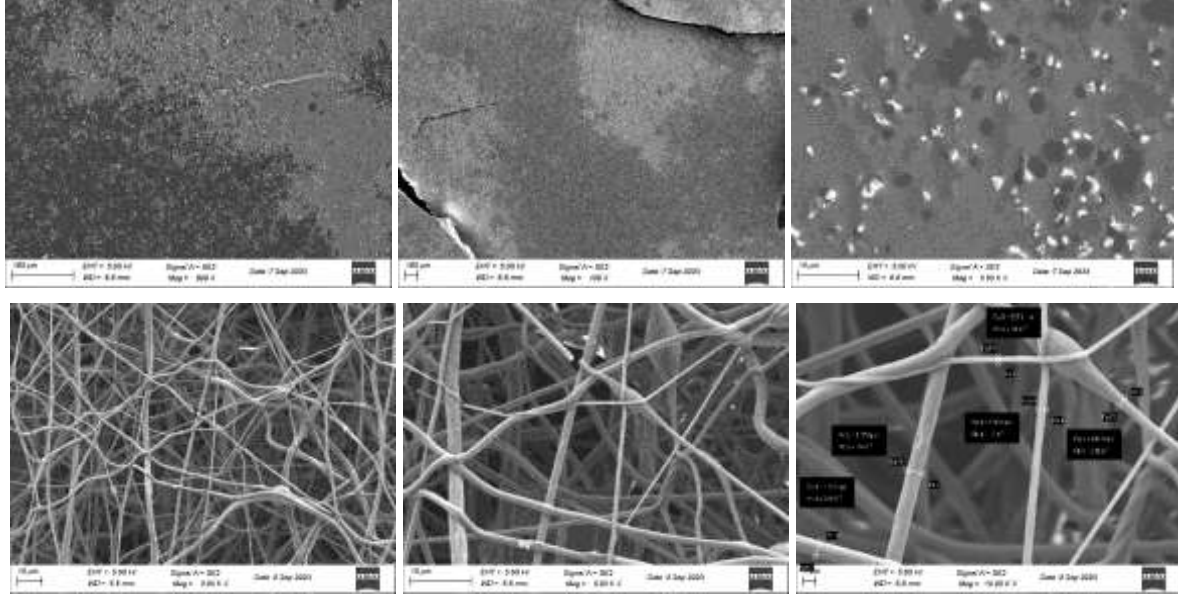
Şekil 1. Numune üretiminde takip edilen proseslerin şematik gösterimi

## BULGULAR

### SEM Analizi

Şekil 2 de eş değer hazırlık sürecine tabi tutulan polimer çözeltilerinden elde edilen solvent-casted ve elektrospun filmlerin SEM mikrografileri verilmiştir. Elektrospun filmlerde lif oluşumunun gözlemlendiği ve ortalama lif çapının 979.18 nm olduğu tespit edilmiştir. Polimer çözeltisi içerisine eklenen  $\text{Bi}_2\text{O}_3$  tozunun partikül boyutunun 650.4 nm-1.754  $\mu\text{m}$  arasında değiştiği ve ortalama partikül çapının 1.246  $\mu\text{m}$  olduğu [Aygün ve Alma, 2020] dikkate alındığında, elektrospinning işleminin elektrostatik alan farkı vasıtasıyla çekilen polimer çözeltileri ile partikülleri kapsüle ettiği görülmektedir. Boncuk oluşumunun gözlemlendiği 10 farklı noktadan alınan çap ölçümlerine göre ortalama boncuk çapının 3.583  $\mu\text{m}$  olduğu (S.D.: 0.345) ve durumun partikül boyutunun küçültülmesi için daha uzun süre ultrasonik işleme tabi tutulması yada polimer çözeltisi içerisindeki  $\text{Bi}_2\text{O}_3$  konsantrasyonunun azaltılması sonucu aşılacağı kanaatine varılmıştır [Zhu et. al., 2022; Kolahi et. al., 2022; Wang et. al., 2008] Solvent-casting yöntemiyle üretilen filmlerde ise, 10 farklı noktadan alınan ölçümlere göre 0.741  $\mu\text{m}$  den 2.569  $\mu\text{m}$  e değişen ölçülerde ortalama büyüklüğü 1.692  $\mu\text{m}$  (S.D.:0.035) düzensiz kristalin partiküller gözlemlenmiştir. Bu filmlerin daha sert ve pürüzlü yüzeye sahip kırılğan filmler oldukları tespit edilmiştir. Elektrospun yüzeylerin nanolifler arasında gözlenen amorf yapılarının yüzey esnekliğine katkı sağladığı, solvent casting filmlerde bu durumun olmamasının kırılğanlığı artıran faktör olduğu bilinmektedir [Gosal et. al., 2018].

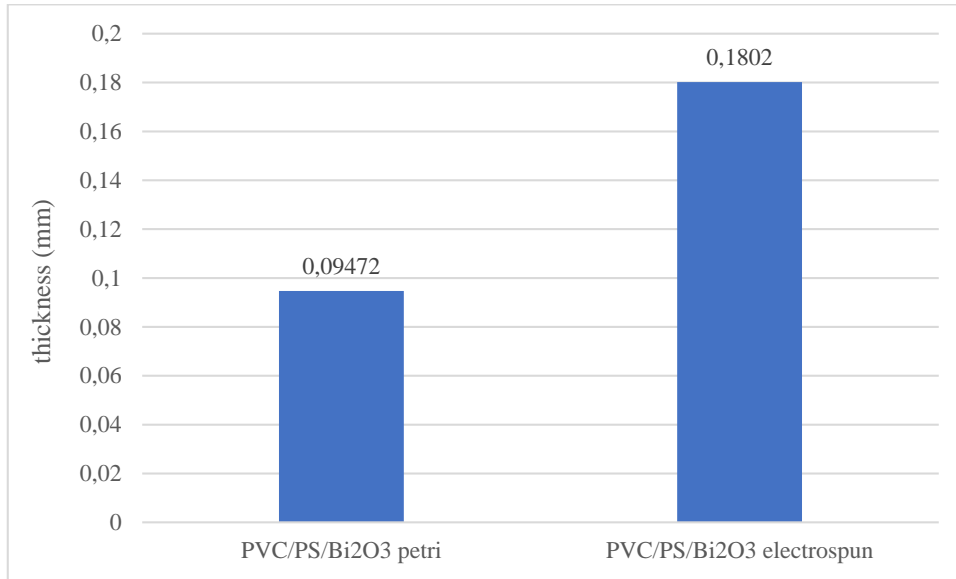




Şekil 2. Solvent-casting ve elektrospinning yöntemleri ile üretilen filmlerin SEM görüntüleri

### Numune kalınlığının ölçümü

Şekil 3 de solvent-casted ve elektrospun filmlerin kalınlıkları kıyaslanmıştır. 5 farklı ölçüm alınarak hesaplanan ortalama kalınlık değerlerine göre, solvent-casting yöntemiyle daha ince film üretiminin gerçekleştiği görülmektedir. Her bir üretim tekniği için kullanılan polimer çözeltisi miktarının 25 g olduğu dikkate alındığında, 1 sa eğirme işlemi sonrasında elde edilen elektrospun film kalınlığının solvent-casting yöntemiyle üretilen numuneye kıyasla %90 oranda daha kalın olduğu görülmektedir.



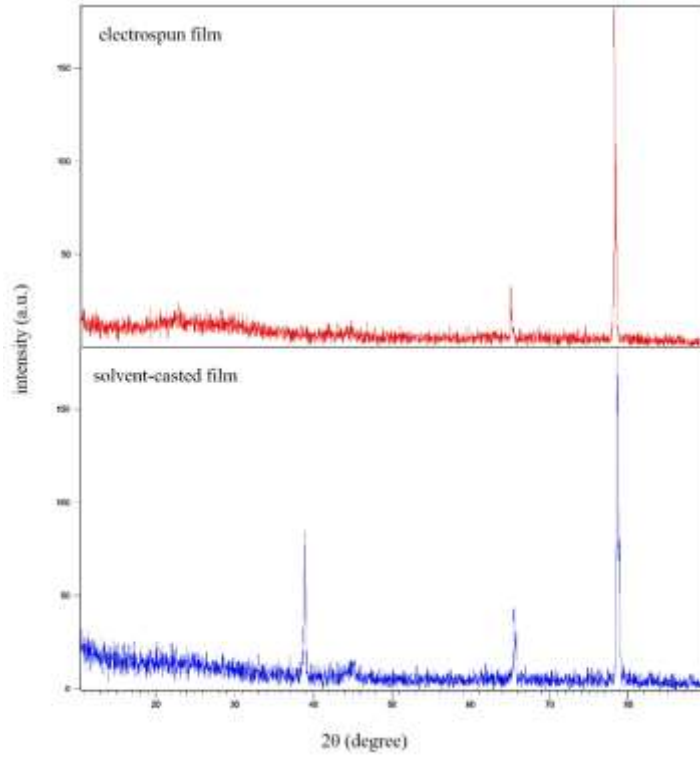
Şekil 3. Casted ve elektrospun filmlerin kalınlıklarının kıyaslanması

### XRD analizi

Şekil 4 de üretilen yüzeylerin XRD grafikleri kıyaslamalı olarak verilmiştir. Solvent casting yöntemiyle üretilen yüzeyin elektrospun yüzeye kıyasla daha kristalin yapıda olduğu görülmektedir. Bu yüzeylerde 78.56, 38.83 ve 65.56 2θ derecelerinde sırasıyla 186 (D spacing: 1.2166), 85 (D spacing: 2.3169) ve 44 (D spacing: 2.02191) şiddetlerinde dar aralıklı güçlü piklerin mevcut olduğu tespit edilmiştir. 2θ: 44.78 derecesinde ise düşük şiddetli (16 a.u.) zayıf bir pik görülmektedir. Elektrospun yüzeylerin ise daha amorf yapıda oldukları ve 2θ: 78.31 derecesinde 260 a.u. şiddetinde dar aralıklı (D spacing: 1.2182) bir pik verdikleri gözlenmiştir. Bu yüzeylerde 65.58 (D spacing: 1.4299) 2θ derecesinde görülen diğer pikin şiddeti ise 46 a.u. olarak ölçülmüştür. PVC ve PS elektrospun yüzeylerin sırasıyla 2θ:12°-35° ve 2θ:~21°



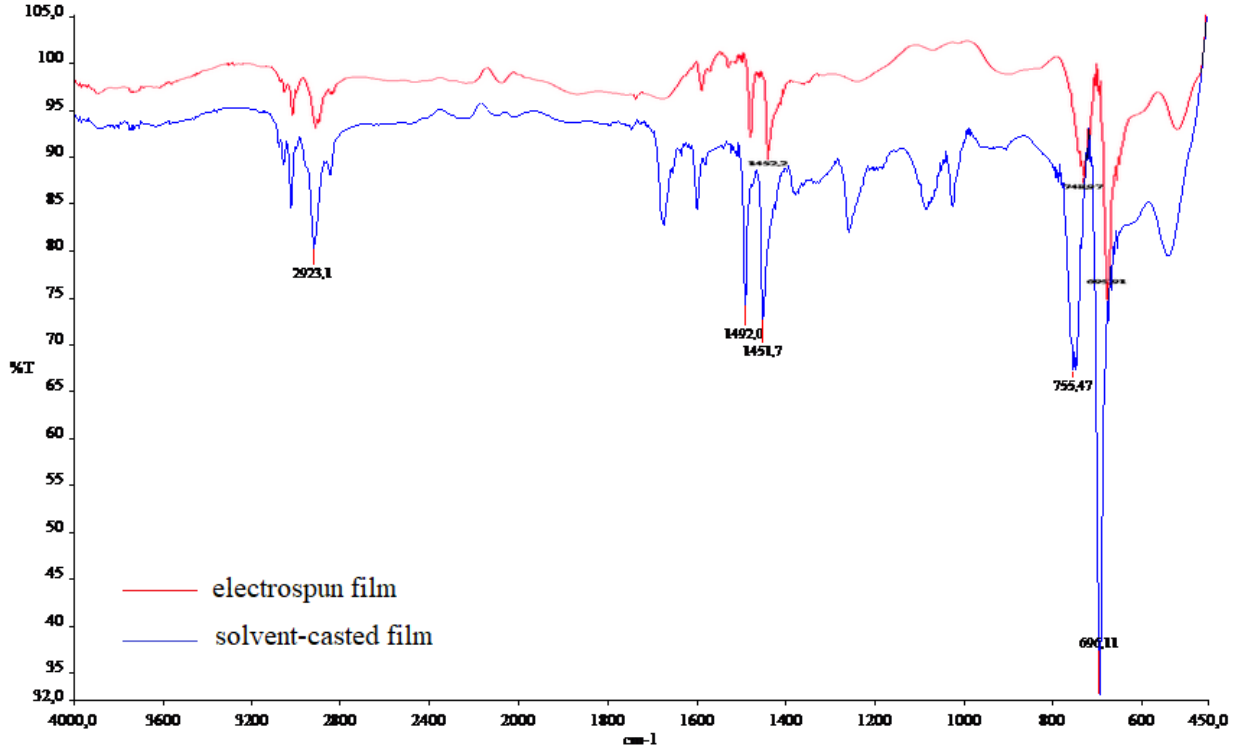
geniş pikler sergiledikleri ve amorf karakterde oldukları rapor edilmiştir [Zulfi et.al., 2023; Huang et.al., 2012]. Solvent casting yöntemiyle elde edilen PVC ( $2\theta: \sim 17-25^\circ$ ) ve PS filmlerin ise geniş pikler sergiledikleri ve herhangi bir kırılma piki sergilemediklerinden dolayı amorf karakterde oldukları tespit edilmiştir [Ancharya et.al., 2019; Taha, 2018]. XRD grafiklerinde görülen piklerin  $\text{Bi}_2\text{O}_3$  ihtivasından kaynaklandığı [Taha, 2018; Sindhu et.al., 2015], elektrospinning işleminde partiküllerin polimerik yapı ile kaplandığı ancak solvent casting yönteminde partikül kaplama ve dağılım sorununun olmasının bu sonucu ortaya çıkardığı alınan SEM görüntüleri ve XRD grafiklerinden anlaşılmaktadır. Üretim yönteminin üretilen yüzeyin kristalin yapısı üzerinde önemli bir etkiye sahip olduğu görülmektedir.



Şekil 4. Üretilen numunelerin XRD grafikleri

### **FT-IR analizi**

PVC/PS/ $\text{Bi}_2\text{O}_3$  içeren numunelerin FTIR spektrumu incelendiğinde, solvent casting yöntemiyle üretilen numunenin % geçirgenlik (%T) değerinin elektrospinning yöntemiyle üretilen numuneden daha az olduğu görülmektedir. Elektrospun numunede  $1491,18 \text{ cm}^{-1}$  ve  $1452,3 \text{ cm}^{-1}$  dalga boyları PS polimerin benzen halkasındaki C-C bağlarının gerilim titreşimlerini,  $749,05 \text{ cm}^{-1}$  ve  $696,89 \text{ cm}^{-1}$  ise sırasıyla CH katlanması ve aromatik halka deformasyonunu ifade etmektedir [Martin et.al., 2017; Esmaili et.al., 2017; Liang ve Krimm, 1958; Imhof, 2002; Huang et. al., 2012].  $2908,85 \text{ cm}^{-1}$ ,  $1427 \text{ cm}^{-1}$ ,  $964 \text{ cm}^{-1}$  ve  $613 \text{ cm}^{-1}$  deki düşük şiddetli ve geniş aralıklı pikler ise PVC polimer zincirinden kaynaklıdır ve sırasıyla C-H gerilimi,  $\text{CH}_2$  deformasyonu, CH salınımını ve C-Cl gerilimini göstermektedir. [Da Silva et.al., 2011; Ul-Hamid et.al., 2015, Ramesh et. al., 2007; Le Quoc et. al., 2021]  $1385,32 \text{ cm}^{-1}$  dalga boyunda gözlenen geniş aralıklı pikin ise O-O gerilmesinden kaynaklandığı düşünülmektedir [Aygün ve Alma, 2020; Wang et. al., 2014]. Solvent casting ve elektrospinning yöntemleri ile üretilen numunelerin benzer spektrumlar sergilediği ve üretim yöntemine özgü herhangi bir karakteristik pik göstermedikleri görülmüştür. Bu durum PVC ( $\text{C}_2\text{H}_3\text{Cl}$ )<sub>n</sub>, PS ( $\text{C}_8\text{H}_8$ )<sub>n</sub> ve  $\text{Bi}_2\text{O}_3$  bileşenlerinin yapısal özelliklerini koruduklarını ve yüzeylerde üretim yöntemine göre yapısal bir değişiklik sergilenmediğini ortaya koymaktadır.



Şekil 5. Üretilen numunelerin FTIR spektrumlarının kıyaslanması

## TARTIŞMA VE SONUÇ

Elektrospinning yöntemi ile PVC/PS polimerleri ile  $\text{Bi}_2\text{O}_3$  tozlarının kapsüle edildiği görülmüştür. Elektrospun yüzeyde kontinü lif üretiminin sağlandığı, yer yer boncuk oluşumunun gözlemlendiği ve üretilen liflerin nano boyutta olduğu tespit edilmiştir. Elektrospinning işlemi ile gözenekli ve kalınlığı yüksek yüzey eldesi sağlanmışken, solvent casting ile üretilen filmlerin yüzey özelliklerinin düzgün olmadığı ve gözenekli yapı özellikleri sergilemediği görülmüştür. Solvent casting yöntemi ile üretilen ince filmin, elektrospun yüzeye kıyasla yüksek kristalin özellik sergilediği, düşük % geçirgenlik değerine sahip olduğu ve daha kırılğan olduğu görülmüştür. Plastifiyan kullanımı olmaksızın PVC/ PS yüzey üretimi elektrospinning yöntemiyle sağlanmış ancak bu polimerlerin kombine kullanımında solvent casting yöntemi ile film üretimi yapılmak istenmesi halinde mutlak suretle plastifiyan kullanımının gerekli olduğu görülmüştür.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## RUBRİK TÜRLERİNİN KARŞILAŞTIRILMASI: HOLİSTİK PUANLAMA MI ANALİTİK PUANLAMA MI?

### A COMPARISON OF RUBRIC TYPES: HOLISTIC SCORING VS. ANALYTIC SCORING

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#### ÖZET

Holistik ve analitik rubrik türleri hakkında literatürdeki tartışmalar, paydaşlara sağladıkları geribildirim düzeyi, kullanım kolaylığı açısından puanlama süresi, puanlayıcılar içi (intra-rater) ve puanlayıcılar arası (inter-rater) güvenilirlik düzeyleri ve ölçülen performansları birbirlerinden ne kadar iyi ayırtılabildiği üzerine süregelmektedir. Bu tartışmalardan hareketle, bu çalışmada literatürde yer alan ve sözü geçen konuları teorik değil uygulamalı olarak ele alan çalışmaların incelenmesi ve sonuçlarının karşılaştırılması amaçlanmıştır. Bir doküman inceleme çalışması olan bu çalışmada hakemli bilimsel dergilerde yayımlanmış sekiz araştırma makalesi incelenmiştir. Makalelerin seçilmesinde kriter olarak aynı performansı ölçmeye yönelik hazırlanmış holistik ve analitik rubriklerin uygulama sonrası elde edilen veriler üzerinden karşılaştırılmasını içeren bir araştırma tasarımına sahip olması aranmıştır. Bu kriter doğrultusunda ulaşılabilen ve rubrik türlerini çeşitli bağlamlarda karşılaştıran araştırmaların sonuçları analitik rubriğin pek çok açıdan daha avantajlı olduğunu göstermiştir. Özellikle geribildirim sağlama ve performansları birbirinden ayırt etme konularında analitik rubriğin elde ettiği üstünlük onun eğitimde ve sınıf içi uygulamalarda kullanımını daha fazla önerilir hale getirmektedir.

**Anahtar Kelimeler:** analitik rubrik, holistik rubrik, güvenilirlik, geribildirim

#### ABSTRACT

Debates in the literature regarding holistic and analytic rubric types continue to revolve around the level of feedback they provide to stakeholders, the ease of use in terms of scoring time, intra-rater and inter-rater reliability levels among raters, and how effectively they can differentiate measured performances from each other. Building upon these discussions, this study aims to examine and compare studies that address the aforementioned issues theoretically and, more importantly, through practical applications. This study, which is a document review, analyzed eight research articles published in peer-reviewed scientific journals. The criteria for selecting these articles included having a research design that involved comparing holistic and analytic rubrics prepared to measure the same performance using post-application data. In line with these criteria, the results of the studies that compared rubric types in various contexts have shown that analytic rubrics have several advantages. Particularly, the superiority of analytic rubrics in providing feedback and distinguishing performances from each other makes them more recommended for use in education and in-class applications.

**Keywords:** analytic rubric, holistic rubric, reliability, feedback

#### GİRİŞ

Etimolojide "rubrik" terimi, kökenini "kırmızı" anlamına gelen Latince "ruber" kelimesinden alır. Çağdaş pedagojik bağlamda rubrik, öğrencilerin çalışmalarını değerlendirmek için açık kriterleri kapsayan, bu kriterlere uygun performans kalitesinin değişen düzeylerinin açıklamalarıyla zenginleştirilmiş tutarlı bir çerçeve rolünü üstlenir. Bir renkle ilişkilendirilen bir kelimenin bir dizi kriteri veya bir eğitim kılavuzunu ifade eden bir yapıya bürünmesi, Avrupa tarihine bakıldığında Orta

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Çağ'a kadar uzanan süreçte, belirli hizmetlere ilişkin kuralların genellikle kırmızı mürekkeple yazıldığı bilgisine bakılarak açıklanabilir (Brookhart, 2013).

Sadece sonuçlara değil sürece de odaklanması, ortaya konan performansın ve ürünün kişiye özgüllüğü ve özgünlüğü üzerine kurgulanan günümüz eğitim sistemlerinde, objektif değerlendirmeler yapabilmek için farklı değerlendirme araçlarına ihtiyaç duyulmaktadır. Çünkü artık gözlem gerektiren ve ölçülmesi gereken durumlar eskisine göre çok daha çeşitli, karmaşık ve bireyseldir. Bu nedenle, rubrikler yaygın olarak kullanılan bir araç haline gelmiştir. Rubrikler, öğrenci çalışmalarının değerlendirilmesinde subjektifliği bertaraf etmenin yanısıra öğretmenlere, öğrencilere ve paydaşlara somut geribildirimler sağlar ve onlara kılavuzluk eder. Rubrikler yazma çalışmaları, projeler, sözlü sunumlar, tartışmalar, laboratuvar raporları, portfolyolar, posterler, grup çalışmaları, uygulama performansları gibi çok sayıda iş ve ödev için kullanılabilir (Stevens & Levi, 2005). Rubrikler bir iş veya ödevle ilgili beklentileri ortaya koyduğu için öğrencilere yol gösterir ve bu bakımdan hem öğrenme düzeyini hem de ortaya çıkan işin ya da ürünün niteliğini artırabilir. Bunun yanısıra rubrikler öğrencilerde değerlendirmenin adil olacağı hissi yaratırken öğretmeni de ödevle ilgili uzun açıklamalar yapmaktan kurtarır. Puanlanması bakımından rubrikler “holistik” ve “analitik” olarak ikiye ayrılır.

## Holistik Rubrik

Holistik (bütüncül) rubriklerde yapılması beklenen iş ya da performans bir bütün halinde en iyiden en kötüye doğru seviyelere ayrılır. Holistik rubrikteki değerlendirme sonucu ürünün veya performansın bütünsel olarak karşılık geldiği seviyenin puansal karşılığı olan tek bir puan şeklinde belirlenir. Eğer ölçülecek olan ürün, performans vb. kendisini meydana getiren farklı bileşenlerin toplamından oluşmuyorsa bu tür bir puanlama tercih edilebilir (de Boer vd., 2021). Bu durumda sorun, ölçülecek performansın toplamda kendisini yansıtacak bileşenlere ve kriterlere net bir şekilde ayrıştırılamıyor olması veya bileşenlerin ağırlıkları (toplama etkileri) arasında önemli farklar olması olabilir. Tablo 1’de holistik rubriklere bir örnek verilmiştir.

**Tablo 1.** Makale değerlendirmeye yönelik holistik rubrik örneği

Puan	Kriter
4	Makale, konuya özgün bir bakış açısı sunarak önemli bir katkı sağlamaktadır. Literatür taraması eksiksiz ve kapsamlıdır ve konuyla ilgili genel bağlamı ustalıkla ele almaktadır. Makalenin amacı ve önemi açıkça belirtilmiştir. Analizler, belirlenen hedeflerle uyumlu ve doğru bir şekilde gerçekleştirilmiştir. Sonuçlar ve tartışma, diğer araştırmaların sonuçlarıyla karşılaştırmalı şekilde sunulmuştur ve gelecekteki araştırmalara yol gösterecek şekilde zengin ve kapsamlıdır.
3	Makale, alana önemli bir katkı sağlar, ancak yeterince özgün değildir. Literatür taraması yeterlidir. Makalenin amacı ve önemi açıkça ifade edilmiştir ancak daha fazla detay ve bağlam gereklidir. Analizler çoğunlukla hedeflerle uyumludur, ancak bazı alanlarda düzeltmeler gerekebilir. Sonuçlar ve tartışma, konuyu daha iyi anlamamıza ve ileriye yönelik araştırmalara temel sağlar.
2	Makale, ilgili alana sınırlı bir katkı sağlar ve özgünlük eksikliği veya literatür taramasının yetersizliği dikkat çekmektedir. Makalenin amacı ve önemi belirtilmiştir, ancak daha fazla açıklama ve bağlam gereklidir. Analizler, hedeflerle tutarlılık konusunda sorunlar içerebilir ve düzeltilmesi gereken hatalar bulunmaktadır. Sonuçlar ve tartışma eksik veya yetersizdir.
1	Makale, ilgili alana anlamlı bir katkı sağlamaz ve konusu özgün değildir. Literatür taraması yetersiz veya hatalıdır. Makalenin amacı ve önemi belirsiz veya açıkça ifade edilmemiştir. Analizler hedeflerle uyumsuz veya yanlıştır. Sonuçlar ve tartışma eksik veya anlamsızdır.

\*Rubriğin hazırlanmasında ChatGPT’den faydalanılmıştır.

## Analitik Rubrik

Analitik (çözümçül) rubriklerde değerlendirilmesi amaçlanan ödev, performans vb. onu meydana getiren bileşenlerine ayrıştırılır ve her bir bileşen ayrı ayrı seviyelendirilir. Sınıf içi amaçlar için, analitik rubrikler daha iyi bir seçenektir. Bileşenlere tek tek odaklanmak, geribildirim için daha verimlidir çünkü



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

öğrenciler çalışmalarının hangi yönlerinin ne tür bir dikkat gerektirdiğini görebilirler (Brookhart, 2013; de Boer vd., 2021). Algısal olarak analitik rubriklerin çok sayıda bileşene ait kriterlerin ayrı ayrı puanlanmasını gerektirdiği için holistik rubriklere göre daha yavaş puanlandığı ve hız bakımından dezavantajlı olduğu düşünülmektedir. Öte yandan analitik rubriklerde kriterler daha belirgin ve işaret ettiği yönler daha net olduğu için bir puanlama kolaylığı sağlayacağı da düşünülebilir. Tablo 2’de analitik rubriklere bir örnek verilmiştir.

**Tablo 2.** Makale değerlendirmeye yönelik analitik rubrik örneği

Bileşen/ Puan	1	2	3	4
Analiz, Bulgular ve Tartışma	Bulguların sunumu genellikle belirsiz ve düzensizdir, grafiklerin kullanımı yetersiz veya hatalıdır. İstatistiksel belirlemeler hatalıdır. Tartışmalar araştırma soruları veya hipotezlerle yeterince ilişkilendirilmemiştir.	Bulguların sunumu düzenlidir fakat bazı belirsizlikler vardır. Grafikler ve tablolar iyileştirilebilir. Tartışmalar araştırma soruları ile ilişkilendirilmiştir fakat bu ilişkiler belirsizdir.	Bulguların sunumu düzenli ve anlaşılırdır. Grafik ve tablolar etkili kullanılmıştır. İstatistiksel işlemler doğrudur. Tartışmalar hipotezlerle açık bir şekilde ilişkilendirilmiştir.	Bulguların sunumu son derece düzenli ve anlaşılırdır. Grafik ve tablolar ustalıkla kullanılmıştır. Tartışmalar araştırma sorularıyla açık ve derinlemesine bir ilişki içerir.
Metodoloji ve Araştırma Tasarımı	Metodoloji araştırma sorularını cevaplama konusunda yetersizdir. Örnekleme yöntemi zayıftır. Belirtilen analiz yöntemleri yetersizdir.	Metodoloji ve araştırma tasarımında bazı eksiklikler göze çarpmaktadır. Örnekleme yönteminin uygulanmasında hatalar vardır.	Metodoloji ve araştırma tasarımı açık ve yeterli görünmektedir. Örnekleme yöntemi uygundur ve iyi uygulanmıştır. Veri analiz yöntemleri araştırma için uygundur.	Metodoloji ve araştırma tasarımı mükemmel dizayn edilmiştir. Örnekleme yöntemi ve örneklem kusursuzdur. Veri analiz yöntemleri problemin çözümü noktasında son derece işlevseldir.
Literatür taraması ve argümantasyo	Literatür taraması yetersiz argümanlar özgün değil, zayıf ve tutarsızdır.	Literatür taraması kapsamlı fakat güncel değil. Argümanlar zayıf fakat tutarlıdır.	Literatür taraması kapsamlı ve güncel, argümanlar açık ve tutarlıdır.	Literatür taraması kapsamlı ve güncel, argümanlar özgün, güçlü ve tutarlıdır.
Alana katkı ve özgünlük	Makale alana katkı sağlamamaktadır ve özgün değildir.	Makale alana sınırlı katkı sağlamaktadır ve yeterince özgün değildir.	Makale alana önemli katkı sağlamaktadır ancak yeterince özgün değildir.	Makale alana önemli katkı sağlamaktadır ve yeterince özgündür.
Yazım ve dil bilgisi	Makale yazım ve dil bilgisi konusunda çok sayıda hata içermektedir.	Makale yazım ve dil bilgisi konusunda bazı hatalar içermektedir.	Makale yazım ve dil bilgisi konusunda hatasızdır.	Makale yazım ve dil bilgisi hatasızdır.

\*Rubriğin hazırlanmasında ChatGPT’den faydalanılmıştır.

Bu iki rubrik türü hakkında literatürdeki tartışmalar, paydaşlara sağladıkları geribildirim düzeyi, kullanım kolaylığı açısından puanlama süresi, puanlayıcılar içi (intra-rater) ve puanlayıcılar arası (inter-rater) güvenilirlik düzeyleri ve ölçülen performansları birbirlerinden ne kadar iyi ayrıştırabildiği üzerine

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

süregelmektedir. Bu tartışmalardan hareketle bu çalışmada literatürde yer alan ve bu konuları teorik değil uygulamalı olarak ele alan çalışmaların incelenmesi ve sonuçlarının karşılaştırılması amaçlanmıştır.

## YÖNTEM

Bu çalışma bir doküman inceleme çalışması olup çalışma kapsamında hakemli bilimsel dergilerde yayımlanmış sekiz araştırma makalesi incelenmiştir. Makalelerin seçilmesinde aranan kriterler aynı performansı ölçmeye yönelik hazırlanmış holistik ve analitik rubriklerin uygulama sonrasında elde edilen istatistikler üzerinden karşılaştırılmasını içeren bir araştırma tasarımına sahip olması olarak belirlenmiştir. Yapılan literatür taraması sonrasında ulaşılan çalışmalardan sekizinin (Badia, 2009; Çetin, 2011; Ghalib & Al- Hattami, 2015; Imbler vd., 2023; Koizumi vd., 2020; Ounis, 2017; Wahyuni vd., 2020; Wiseman, 2011) sözü edilen kriterlere uyduğu belirlenerek çalışmaya dahil edilmiştir.

## Verilerin Analizi

İncelenen araştırmalarda holistik ve analitik rubriklerin farklı bağlamlarda birbirleri ile karşılaştırılmış olması ve aynı bağlamda yapılan karşılaştırmalarda bile farklı istatistiksel tekniklerin kullanılmış olması gibi nedenlerle araştırma sonuçlarını istatistiksel olarak bir araya getirmenin mümkün olmadığı düşünülmüştür. Bu düşünceden hareketle incelenen araştırma sonuçları “Daha iyi” ve “Benzer” olmak üzere iki kategoride özetlenmiş ve anlaşılır olması bakımından şekilleştirilmiştir.

## Bulgular

İncelenen çalışmalardaki karşılaştırmalar, ortaya çıkan sonuçları ortaklaştırmak adına basitleştirilmiş ve Şekil 1’de sunulmuştur.

Şekil 1. Çeşitli bağlamlarda holistik ve analitik rubriğin karşılaştırılması

Holistik Rubrik	Daha İyi	Benzer	Daha İyi	Analitik Rubrik
	Sağlanan Geribildirim			
	-	-	2	
	Puanlama Zamanı			
	-	1	-	
	Puanlayıcılar İçi Güvenirlik (Kararlılık)			
	-	1	1	
	Puanlayıcılar Arası Güvenirlik (Tutarlılık)			
	4	-	1	
	Performansı Ayırt Etme			
	-	-	3	

Şekil 1 incelendiğinde, iki farklı rubrik türünün öğrencilere, öğretmenlere ve velilere sağladığı geribildirimlerin yeterliği bakımından karşılaştırdığı iki çalışma olduğu ve bunların ikisinde de analitik rubriğin geribildirim sağlama konusunda daha iyi olduğunun rapor edildiği anlaşılmaktadır.

Bu iki rubrik türünü değerlendiricilerin ilgili performansı puanlamak için harcadıkları süre bakımından karşılaştıran bir çalışma vardır ve bu çalışmada ortalama puanlama sürelerinin birbirine çok yakın olduğu sonucuna ulaşılmıştır.

Puanlayıcılar içi güvenilirliğin karşılaştırıldığı iki çalışmanın birinde puanlayıcıların aradan bir süre geçtikten sonra aynı performansı analitik rubrikle tekrar puanladıklarında yaptıkları puanlamaların holistik rubriğe göre birbirine daha yakın olduğu görülmüş ve analitik rubrik önerilmiştir. Diğer çalışmada ise her iki rubrik türünün de benzer kararlılıkta olduğu belirlenmiştir. Puanlayıcılar arası güvenilirlik karşılaştırıldığında yani farklı puanlayıcıların aynı rubriği kullanarak aynı performansı değerlendirdikleri durumda holistik rubrikle yapılan puanlamaların daha tutarlı olduğu sonucunu ortaya koyan çalışma sayısı dördür. Yalnızca bir çalışmada bu konuda analitik rubriğin daha iyi olduğu belirlenmesi yapılmıştır.

İncelenen sekiz çalışmanın üçünde hangi rubrik türüyle yapılan değerlendirmelerin performanslar arasındaki farkları daha iyi ortaya koyduğu incelenmiş ve üç çalışmada da bu konuda analitik rubriğin daha hassas olduğu ortaya konulmuştur. Analitik rubrikte puanlayıcıların performansın bileşenlerini tek tek ele aldığı ve değerlendirdiği düşünüldüğünde bu tür rubrikle elde edilen puanların varyasyonunun daha fazla olmasının beklenen bir durum olduğu söylenebilir.

### SONUÇ VE TARTIŞMA

Bu çalışma kapsamında ulaşılabilen ve rubrik türlerini çeşitli bağlamlarda karşılaştıran sekiz çalışmanın sonuçları analitik rubriğin pek çok bağlamda daha avantajlı olduğunu göstermiştir. Özellikle geribildirim sağlama ve performansları birbirinden ayırt etme konularında analitik rubriğin elde ettiği üstünlük onu eğitimde ve sınıf içi uygulamalarda daha önerilir hale getirmektedir. Holistik rubriğin analitik rubriğe göre daha üstün olduğu tek bağlam değerlendiriciler arası güvenilirlik olmuştur. Holistik rubrikte performansa verilebilecek puan ranjının çok daha az olduğu ve bu durumun puanlar arası varyasyonu azaltarak performanslar arasındaki daha küçük ayrımları göz ardı edeceği düşünüldüğünde puanlayıcılar arası güvenilirliğin analitik rubriğe göre daha yüksek olması anlaşılabilir bir durumdur. Fakat performanslar arası ayrımları görmezden gelmenin öğrencilerin eksik yönlerini görmelerine ve gelişimlerine olumsuz etki edeceği unutulmamalıdır.

Değerlendiricinin puanlama için daha az zaman harcaması literatürde yaygın olarak holistik rubriğin avantajı olarak belirtilmektedir (Brown, 2017; Hunter vd., 1996; Jonsson & Svingby, 2007). Bu çalışmada incelenen ve iki rubrik türünü puanlama zamanı bakımından karşılaştıran tek karşılaştırmada puanlamaya harcanan ortalama zamanların benzer olduğu sonucuna ulaşılmıştır. Yaygın düşüncenin tersine holistik rubriklerde kriterlerin iç içe geçmişliğinden dolayı puanlama zamanı artabilir. Oysa analitik rubriklerde bileşenler ve kriterlerin ayrı ve daha belirgin olması karar vermeyi kolaylaştırabilir (Badia, 2019).

Daha detaylı geribildirim sağlama ve performansları daha iyi ayırt etme gibi nitelikleri bakımından eğitim ortamlarında eğer özetleyici değerlendirme yapılması amaçlanmıyorsa analitik rubriğin kullanılması önerilebilir. Bu konuda araştırma yapmak isteyen diğer araştırmacılara puanlayıcılar içi ve puanlayıcılar arası güvenilirliğin rubriğin farklı niteliklerinden nasıl etkilendiği konusunda araştırma yapmaları önerilebilir.

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October 13-14, 2023

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EVALUATION OF TRANSFERABLE EMBRYO RATES AFTER USING CONVENTIONAL  
AND SEXED SEMEN: A RETROSPECTIVE STUDY

KONVANSİYONEL VE SEXED SPERMA KULLANIM SONRASI TRANSFER EDİLEBİLİR  
EMBRİYO ORANLARININ DEĞERLENDİRİLMESİ: RETROSPEKTİF ÇALIŞMA

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**ABSTRACT**

The present investigation entailed the examination of historical data obtained from a cohort of 40 cattle within a single institution. The objective of this study was to investigate the impact of conventional semen and sexed semen on transferrable embryo counts in dairy Holstein cattle. The research utilized a cohort of 40 cattle that were in good health as the subjects for the investigation. The study implemented an estrus synchronization technique to divide the cow population into two distinct groups: the conventional semen group (C, n= 20) and the sexed semen group (S, n=20). The division was based on factors such as age, body condition score, lactation number, and live weight. Cattle in parts C and S were subjected to artificial insemination using conventional semen and sexed semen, respectively. Embryo recovery was conducted on cows in all experimental groups on the seventh day following insemination. The findings of the embryo recovery experiment yielded values of 5.40 and 4.50 for the C and S groups, respectively. There was no statistically significant difference observed between groups C and S ( $P>0.05$ ). In summary, the results of the present investigation suggest that there is no substantial discrepancy in the number of transferable embryos when using conventional sperm compared or sexed sperm during insemination.

**Keywords:** Cattle, Embryo, Superovulation, Sexed Semen

**ÖZET**

Mevcut araştırmada, tek bir kurumdaki 40 büyükbaş hayvandan oluşan bir gruptan elde edilen veriler incelenmiştir. Bu çalışmanın amacı, sütçü Holştayn sığırlarında konvansiyonel sperma ve cinsiyeti belirlenmiş spermanın transfer edilebilir embriyo sayılarının üzerine etkisini araştırmaktır. Araştırmada, araştırma konusu olarak sağlık durumu iyi olan 40 adet inek kullanılmıştır. Çalışmada, inek popülasyonunu iki farklı gruba ayırmak senkronizasyon protokolü uygulandı. Gruplar; konvansiyonel sperma grubu (C, n=20) ve sexed sperma grubu (S, n=20) şeklinde oluşturuldu. Grupların oluşturulmasında yaş, vücut kondisyon skoru, laktasyon sayısı ve canlı ağırlık gibi faktörler dikkate alındı. C ve S gruplarındaki sığırlar sırasıyla konvansiyonel ve sexed sperma kullanılarak suni tohumlama işlemlerine tabi tutuldu. Tüm deney gruplarındaki ineklerde tohumlamayı takip eden yedinci günde embriyo yıkama işlemleri gerçekleştirilmiştir. C ve S gruplarında sırasıyla, ortalama, 5.40 ve 4.50 transfer edilebilir embriyo elde edilmiştir. C ve S grupları arasında istatistiksel olarak anlamlı bir fark gözlenmedi ( $P>0.05$ ). Sonuç olarak, mevcut araştırmanın sonuçları tohumlama sırasında sexed sperma ile konvansiyonel sperm karşılaştırıldığında elde edilen transfer edilebilir embriyoların sayısında önemli bir fark olmadığını göstermektedir.

**Anahtar Kelimeler:** Sığır, Embriyo, Süperovulasyon, Cinsiyeti Belirlenmiş Sperma.

## INTRODUCTION

Sexed semen is commonly utilized in farms as a means to secure the birth of female progeny, hence facilitating the expansion of the herd through the addition of newborn females or enhancing corporate profitability through the sale of heifers. Sexed semen, a technology that enhances herd growth and productivity, does possess several drawbacks. Sexed semen straws typically exhibit a reduced quantity of spermatozoa in comparison to regular semen straws, typically about  $2 \times 10^6$ /straw (Siedel, 2014). In commercial enterprises that employ the use of sexed sperm for insemination purposes, it is possible to face unfavorable outcomes, such as reduced fertility rates (Oikawa et al., 2019; Siedel, 2014). According to available reports, a reduction in the number of transferrable embryos has been seen in animals who underwent superovulation protocols when inseminated with sexed sperm (Schenk et al., 2006).

The current study involved the analysis of retrospective data from a sample of 40 cows within a single organization. The study aimed to assess the quantity of transferable embryos achieved through superovulation, taking into consideration the type of sperm used. Additionally, the impact of sexed sperm on the quantity of transferable embryos was examined.

## MATERIAL AND METHODS

The present investigation was conducted in accordance with the established ethical guidelines of Bursa Uludağ University, adhering to Protocol no. 2021-13 and Decision number: 02. The study utilized a sample size of 40 records from healthy cows as the animal material. The cows were separated into two distinct groups: the conventional semen group (C, n=20) and the sexed-semen group (S, n=20). Cows in groups C and S were subjected to artificial insemination using conventional semen and sexed-semen, respectively. Embryos were obtained from each of the donor cows. The donor cows utilized in this study were between the ages of 3 and 4 years. These cows had body condition scores ranging from 2.75 to 3.25, indicating their overall physical condition. Additionally, these cows demonstrated consistent estrus patterns, further confirming their reproductive health. Identical bovine straws were utilized in the artificial insemination of donor animals.

The superovulation and estrus synchronization methods, as well as the embryo recovery protocol, were implemented following the methodology outlined by Alcay et al. (2022).

### Statistical Analysis

The data acquired from the study were analyzed utilizing IBM SPSS software, version 28.0 (Chicago, IL, USA). The data were expressed in terms of the mean value plus or minus the standard deviation. The Shapiro-Wilk test was employed as a means of assessing the normality of the data. The semen variables were analyzed using the Kruskal-Wallis test to determine the means of obtaining them. The Mann-Whitney U test was utilized to ascertain the statistical disparities among the mean values of the different treatment groups. Statistical significance was attributed to differences with values of  $p < 0.05$ .

## RESULTS

The number of follicles, corpus luteum and transferable embryos resulting from superovulation according to groups are given in Table 1.

**Table 1.** Comparison of conventional and sexed semen in the number of transferable embryos

	Conventional Semen (n=20)	Sexed Semen (n=20)
<b>Number of Follicles</b>	13.20±0.64	12.20±0.61
<b>Corpus Luteum Count</b>	9.60±0.44 <sup>a</sup>	9.40±0.42 <sup>a</sup>
<b>Transferable Embryo Count</b>	5.40±0.43 <sup>a</sup>	4.50±0.26 <sup>a</sup>

<sup>a</sup>: Values with different superscripts in the same line for each variable are same ( $P > 0.05$ ).



There was no statistical difference in the number of corpus luteum and transferable embryos between the groups ( $p>0.05$ ).

## **DISCUSSION**

Embryo transfer, an assisted reproductive procedure, contributes to the enhancement of herd quality by facilitating the transfer of embryos from high-yielding and healthy animals to carrier cows with lower-yielding capabilities (Yüceer and Özbeyaz, 2007). The enhancement of herd productivity through increased genetic value yields favorable economic outcomes for breeders. Dairy farms employing sexed semen have the potential to expedite genetic advancements in their female livestock and achieve elevated rates of live births, primarily attributable to the facilitated parturition process of female offspring (Holden and Butler, 2018; Siedel, 2014). Nevertheless, the utilization of sexed semen in reproductive processes presents a potential hazard for enterprises, as it may result in decreased fertility rates (Boneya, 2021).

Various rates of pregnancy outcomes have been documented following the utilization of sexed sperm during insemination. Several studies have documented comparable pregnancy rates between insemination using sexed and conventional sperm (Bayrıl, 2023). However, a separate study documented that conventional semen attained a pregnancy rate of 56%, while sexed semen achieved a pregnancy rate of 39% (Norman et al., 2010). The research conducted by Oikawa et al. (2019) revealed that the pregnancy rate following insemination with conventional sperm was 56.9%, while the pregnancy rate following insemination with sexed sperm was 47.3%. The researchers' study findings indicated a statistically significant fall in the pregnancy rate when insemination was performed using sexed sperm. In a separate investigation, the efficacy of sexed semen at a concentration of  $2 \times 10^6$  and conventional semen at a concentration of  $40 \times 10^6$  was assessed in Holstein breed heifers undergoing superovulation. The findings indicated that the group utilizing conventional semen exhibited a greater proportion of transferable embryos compared to the group utilizing sexed semen (Schenk et al., 2006). In the study being presented, it was shown that among the groups where a comparable number of corpus luteum were acquired during superovulation, a statistically similar number of transferrable embryos were obtained following insemination with both conventional and sexed sperm. Nevertheless, it is important to highlight that there is a quantifiable reduction in the quantity of embryos acquired following insemination using sex-selected sperm. Numerous variables exert influence on the processes involved in embryo formation. The above description encompasses various elements that can be considered, including the AMH level of the donor animal, age, race, genetics, quality of the sperm utilized in insemination, as well as the timing and location of the insemination procedure (Mikkola et al., 2020). It is hypothesized that the observed disparities in the research outcomes may be attributed to these aforementioned causes.

In conclusion, the findings of the current study indicate that there is not a significant disparity in the quantity of transferrable embryos following insemination with conventional sperm versus sexed sperm. Nevertheless, it is essential to conduct further comprehensive investigations prior to the widespread adoption of sexed semen as a substitute for conventional semen, unless specific circumstances necessitate its utilization.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SOĞUTUCU SİSTEM EMNİYET VALFLERİNDE KARŞILAŞILAN YÜKSEK SICAKLIKLARDA ERKEN AÇMA PROBLEMİNİN İNCELENMESİ VE İYİLEŞTİRME ÇALIŞMALARI

### INVESTIGATION AND IMPROVEMENT STUDIES OF THE EARLY OPENING PROBLEMS IN REFRIGERATION SYSTEM SAFETY VALVES AT HIGH TEMPERATURES

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## ÖZET

Emniyet valfleri, CO<sub>2</sub> (karbondioksit) akışkanların kullanıldığı soğutma sistemlerinde, sistemin güvenliği ve verimliliği açısından son derece kritik bir rol oynamaktadır. Bu tesislerde, çevresel duyarlılıklarıyla bilinirler ve özellikle transkritik çevrimler sırasında yüksek sıcaklık ve basınçta çalışan soğutucu akışkanlar kullanılmaktadır. Bu yüksek basınçlı koşullar altında, emniyet valfleri, sistemdeki basınç artışlarına karşı güvenlik sağlamak için hayati öneme sahiptir. Bu çalışma, CO<sub>2</sub> tabanlı soğutma sistemlerinde karşılaşılan yüksek sıcaklık sorununu ayrıntılı bir şekilde ele almaktadır. Bu sorun, istenmeyen basınç değişikliklerine ve soğutucu sıvı kaybına neden olarak sistem performansını olumsuz etkileyebilir ve ciddi arızalara yol açabilir. Sistemdeki sıcaklık probleminin kökenini anlamak ve çözmek için CO<sub>2</sub> akışkanının kullanıldığı soğutma sistemlerindeki maksimum sıcaklık ve basınç değerleri araştırılmıştır. Ayrıca, emniyet valfleri bileşenlerinin yüksek sıcaklıklarda nasıl çalıştığını incelemek amacıyla parçalar, üç boyutlu tasarım programları kullanılarak modellenmiştir.

Bu çalışma, üç boyutlu akış modellemesi üzerinden yapılan analizleri de içermektedir. Bu analizler, hava akımı için süreklilik, Navier-Stokes denklemi, viskoz kayma gerilmesi, entalpi ve kinetik enerji hesapları, Nusselt sayısı hesapları gibi temel akışkan dinamiği prensiplerini ele almaktadır. Elde edilen simülasyon verileri, çözüm yöntemlerini belirlemek ve iyileştirmek için kullanılmıştır. Sonuçlar, tasarım önerileri olarak konik yaylar, özel conta tasarımları ve gövde değişikliklerini sunmuştur. Bu tasarım değişikliklerinin, yüksek sıcaklık sorununu etkili bir şekilde çözdüğü ve sistem performansını iyileştirmeye yardımcı olduğu görülmüştür. Farklı parçalar üzerinde yapılan iyileştirme denemelerinin

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

sonuçlarında, nihai tasarımda birleştirilerek istenmeyen basınç düşüşlerini ve soğutucu sıvı kaybını minimize etmeye katkı sağlamıştır. Tasarım değişikliklerinin termal dayanıklılığı artırarak sistem güvenliğini daha da sağlamlaştırdığını göstermiştir. Emniyet valfleri üzerinde yapılan tasarım değişiklikleri, CO2 tabanlı soğutma sistemlerinde yüksek sıcaklık sorununun üstesinden gelmek ve sistem verimliliğini artırmak için kritik öneme sahiptir. Yapılan iyileştirmeler, üretilen prototip mamul üzerinde de yapılmıştır ve sıcak ortam testlerindeki ısınma ve ısı taşınımı performansında %14 oranında iyileşme görülmüştür.

**Anahtar kelimeler:** R744 transkritik soğutma, Emniyet valfleri, Termal analiz, Isı transferi, Taşınım

## ABSTRACT

Safety valves play a critical role in ensuring the safety and efficiency of cooling systems using CO2 (carbon dioxide) refrigerants. These systems are renowned for their environmental sensitivity and are particularly used in transcritical cycles where refrigerants operate at high temperatures and pressures. Under such high-pressure conditions, safety valves are vital in providing security against pressure increases within the system. This study comprehensively addresses the issue of high temperatures encountered in CO2-based cooling systems. This problem can adversely affect system performance by causing undesirable pressure fluctuations and refrigerant loss, potentially leading to serious malfunctions. To comprehend the root causes of temperature issues within the system and find solutions, this study investigates the maximum temperature and pressure values in cooling systems employing CO2 refrigerants. Furthermore, components of safety valves are modeled using three-dimensional design software to examine their performance under high-temperature conditions.

This study also includes analyses conducted through three-dimensional flow modeling. These analyses delve into fundamental fluid dynamics principles, including continuity for airflow, the Navier-Stokes equation, viscous shear stress, enthalpy, kinetic energy calculations, Nusselt number calculations, and other essential aspects. Simulation data are utilized to identify and enhance solution methods. The results propose design recommendations such as conical springs, special gasket designs, and body modifications. It is observed that these design alterations effectively resolve the high-temperature issue and contribute to the improvement of system performance. Improvement trials conducted on various components have been consolidated into the final design to minimize unwanted pressure drops and refrigerant loss. Moreover, these design changes are demonstrated to enhance thermal durability, further bolstering system safety. The design modifications made to safety valves are critically important in overcoming the high-temperature issue in CO2-based cooling systems and enhancing system efficiency. The improvements were also made on the prototype product produced, and a 14% improvement was observed in the heating and heat transfer performance in hot environment tests.

**Keywords:** R744 transcritical refrigeration, Safety valves, Thermal analysis, Heat transfer, Convection

## GİRİŞ

Emniyet valfleri, tesisat sistemlerinde kullanılan gaz, buhar ve yüksek sıcaklıktaki sıvı akışkanların olası durumlardaki basınç artışının sistem komponentlerine zarar vermeden güvenliğini sağlamak amacıyla kullanılan güvenlik cihazlarıdır. Yüksek basınç veya sıcaklık koşullarında otomatik olarak etkinleşerek fazla basıncı tahliye eden emniyet valflerinin temel işlevleri, tehlikeli durumların önlenmesi veya yönetilmesi, böylece tesislerin ve süreçlerin güvenli ve sorunsuz bir şekilde işlenmesini temin etmektir. Bu valfler içerisindeki yayın akışkan basınç kuvvetine denk gelecek şekilde ayarlanarak üretilmektedir. Sistemde bir basınç artışı olduğunda, ayarlanan basınç değerinin üzerine çıkılırsa, valf otomatik olarak açılır ve güvenlik sağlar. Bir miktar akışkan boşaldıktan sonra, tesisattaki basıncın düşmesiyle klape tekrar kapanır. Bu valfler, sistemin içinde oluşabilecek muhtemel zararları sınırlandırır, patlama riskini en aza indirir ve işçi güvenliği için esas bir rol oynar. Ayrıca, süreçlerin ve tesislerin kesintisiz işlenmesini desteklerler. Bu nedenle, emniyet valflerinde ortaya çıkan erken açılma sorunları, ciddi bir endişe

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

kaynağıdır ve bu bildiri, bu sorunun giderilmesine yönelik adımları ele alacaktır (Yan, Zhou ve Yu, 2020).

Kompresörler, soğutma sistemlerinde soğutucu akışkanın sıkıştırılarak yüksek basınçlara çıkartılma görevini üstlenen kritik bir elemandır. Sistemin temel elemanı olan kompresörler, evaporatörden gelen düşük basınçlı gazı sıkıştırarak yüksek basınçlı gaz haline getirirler. Bu basıncı yükseltmiş gaz, ardından kondansatöre gönderilir, burada ısısını dış ortama vererek sıvı hale dönüşür. Sıvı fazdaki akışkan genleşme vanasında faz değiştirerek buharlaşma basıncına kadar basıncı düşer ve evaporatöre geçerek sistemdeki ısıyı içine çekerek döngü devam eder. Yüksek basınçlı soğutucu akışkanı sıkıştırmak, sıcaklığın ve basıncın artmasına neden olur ve yüksek basınçlara erişmek için de güçlü kompresörlerin kullanılması gerekmektedir. Bu nedenle, bu tür sistemlerde aşırı basınç ve sıcaklık koşullarıyla başa çıkmak için kompresör çıkışlarında veya kompresör üzerine montajlanan emniyet valflerine ihtiyaç duyulur. Emniyet valfleri, bu tür aşırı koşullarda fazla basıncın tahliye edilmesini sağlayarak sistem güvenliğini sağlar çünkü yüksek basınçlı CO<sub>2</sub> gazının kontrolsüz bir şekilde boşalması tehlikeli olabilmektedir (Çengel, 2000).

Soğutucu sistemlerde, geçmişte sıkça kullanılan CFC ve HCFC gazları, çevreye (özellikle ozon tabakasına) zarar verdiği için 1987'de imzalanan Montreal Protokolü ile sınırlamalara tabi tutulmuştur. Bu zararlı gazların yerine doğal bir alternatif olan CO<sub>2</sub> (R744), özellikle orta büyüklükteki soğutma sistemlerinde kullanılmaktadır (Sapçı ve Heperkan, 2018). CO<sub>2</sub>'nin ozon delme potansiyeli diğer gazlara göre çok daha düşüktür. R744, karbondioksit (CO<sub>2</sub>) gazının soğutma sistemlerinde kullanılan çevre dostu bir soğutucu akışkanıdır. Düşük global ısınma potansiyeline (GWP) sahiptir, bu nedenle ozon tabakasına zarar vermez ve sera gazı etkisi minimaldir. Yüksek basınçlara kadar çıkartılarak verim alınabilen CO<sub>2</sub> gazının bu tür uygulamalarda güvenli bir şekilde işlemesi ve kontrol edilmesi için emniyet valfleri, sistemlerin bütünlüğünü ve işçi güvenliğini sağlamak için hayati bir öneme sahiptir. CO<sub>2</sub> sistemleri, enerji verimliliği ve çevresel sürdürülebilirlik açısından önemli avantajlar sunsa da bu tür uygulamalarda doğru işleyiş ve güvenlik son derece önemlidir.

Transkritik çevrim süreci, kompresör yardımıyla sıkıştırma işlemiyle başlar ve bu işlem sırasında sistem sıcaklığı önemli ölçüde artar, CO<sub>2</sub> için sıcaklık yaklaşık 150°C'ye ulaşabilir. Özellikle yüksek basınçlarda (120 bar ve üzerinde) ve 150°C civarındaki sıcaklıklarda çalışabilen CO<sub>2</sub> akışkanlı sistemler için emniyet valfleri gereklidir. Bu tür aşırı koşullar için özel olarak tasarlanmış emniyet valfleri ve parça serileri geliştirilmelidir. Tasarım ve geliştirme süreçlerinde valf yayları ve hammaddeleri, elastomerler gibi tüm iç parçaların yüksek sıcaklıklarda nasıl çalıştığı ve işlevlerindeki değişiklikler dikkate alınmalıdır (İyim, Altıntaş ve Almış, 2019).

Emniyet valflerinde görülen kusurlar araştırıldığında, karşılaşılan en büyük teknik sorunlardan birisi de valfin erken açma problemi. Erken açılma gibi yaygın bir problem, valflerin hassas ayarlarına odaklanarak ele alınabilir. Ayrıca, sızıntı sorunları, valflerin malzeme seçimi ve tasarımının iyileştirilmesi ile önlenmeye çalışılır. Bakım eksikliği sonucu meydana gelen sorunları ele almak için daha dayanıklı valf bileşenleri ve azaltılmış bakım gereksinimlerine sahip gelişmiş valf tasarımları kullanılır. Yanlış ayarlama gibi ayarla ilgili sorunlar, valflerin daha hassas ayarlanabilirlik özelliklerini içeren yeni nesil valf tasarımları ve otomasyon ve ayar tezgahlarının yatırımlarıyla çözülebilir. Ülkemizdeki eski ağırlık yüklemeli emniyet valflerinin, yay yüklemeli ve pilot işletimli valflerle değiştirilmesi gerekmektedir. Emniyet valfleri, statik ekipmanlar gibi değil, dinamik ve termal streslere maruz kalır, bu nedenle dikkatli seçilmelidir. (Özgül, 2007). Sadece basınçlı sistemlerde değil, tüm önemli faktörler göz önüne alınarak en uygun valf seçilmelidir. Teknik iyileştirmeler ve teknik sorunların giderilmesi, emniyet valflerinin daha güvenli ve sağlam bir şekilde çalışmasını sağlamak için hayati öneme sahiptir ve sistemlerinin güvenilirliğini artırır. (Lim, Park ve Jang, 2004).

Huang, Ding ve Quack (2007) tarafından yürütülen araştırma, CO<sub>2</sub> soğutma sistemlerindeki emniyet valfleri için özgü bir sorunu ele almıştır. Bu sorun, katı CO<sub>2</sub> oluşumu ve emniyet valfinin tahliye yolunun tıkanmasıyla ilgilidir. Araştırma, farklı emniyet valfi tiplerinin tıkanma özelliklerini deneysel olarak incelemiş ve mansap hattında ciddi tıkanmalara yol açabilecek bu tür bir tıkanmanın sistemi tehlikeye atabileceğini belirlemiştir. Bu nedenle, katı CO<sub>2</sub>'nin tıkanmasını önlemek için emniyet valflerinin tasarımı ve mansap hattının dayanıklılığı önemlidir.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Yüksek sıcaklık ve basınçlarda çalışan emniyet valflerindeki erken açma probleminin sebepleri irdelendiğinde, yüksek ısının valf komponentleri üzerindeki termal etkilerinden kaynaklanan sorunlar en önde gelmektedir. Isı iletimi yoluyla oluşan termal gerilmeler ve malzeme özelliklerindeki değişimler genellikle vana elemanları, basınç kontrol havası, ortam havası ve akışkan arasında gerçekleşir (Zong, Li, Zheng, Chen, Li ve Song, 2022). Özellikle R744 gibi yüksek sıcaklık ve basınç altında çalışan bir akışkanın valf klapesi tarafından açıldığında ortaya çıkan ısı transferi ve geçişi, ısı yüksek hızlı türbülans akıştan dolayı ısı taşınımı olarak adlandırılır. Bu durum, akışkanın yüksek hızda valfin içinden geçtiği bir iletişim anında meydana gelir, bu da ısı transferinin zorlanmış bir türüdür. Aynı şekilde, emniyet valfi ile vana gövdesi arasındaki ısı transferi doğal ısı taşınımı olarak kabul edilir. Vana elemanları, katı bir yapıya sahiptir ve soğutucu akışkan R744 ile iç valf iç boşlukları, akışkanın temas ettiği bir alan olarak tanımlanır. Bu çalışma, temelde ısı iletimi ve ısı taşınımı yöntemlerine odaklanarak katı parçalar ile gaz akışkanı ve gaz ortamı arasındaki termodinamik özellikleri ele alır. Çalışmamızda, kompresör tarafından üretilen ısı ve dış ortamın aşırı sıcak durumları göz ardı edilmiştir ve vana ile çevresel ortam arasındaki ısı radyasyonu ihmal edilebilir olarak kabul edilmiştir.

Prasad, Babu, ve Raj (2018) yapmış oldukları araştırmalarda montajı yapılan emniyet valfinin, valf girişindeki akışkanın ısısına maruz kalması, yüksek termal yüklerin oluşmasına neden olur ve bu durum da valfin arızasına yol açar. Bu nedenle, valfi optimum termal koşullarda tutarak sıcaklık artışlarını azaltmak veya valfin ısı koşullarını optimize ederek ısı transferi etkisini artırmak için bir soğutma önlemi gereklidir. Soğutma önlemleri, valfi içi boş hale getirerek sodyum ile doldurmak veya valfin dış yüzeyine ısı bariyeri kaplamaları uygulayarak sağlanır. Tam yük koşulları altında valf geometrisi üzerinde farklı yaklaşımlarla termal analiz yaparak soğutma öneminin incelenmesi amaçlanmıştır. Valf geometrisi, CAD yazılımı kullanılarak modellenmiş ve ısı analiz, FEA temelinde Ansys kullanılarak sabit durumda gerçekleştirilmiştir. Beklenen sonuçlar arasında sıcaklık değişimi, ısı akışı ve ısı transfer hızı bularak tasarımsal optimizasyon sonucu termal etki gözle görülmüştür. Üç farklı materyalden yapılan egzoz valf sapındaki termal iletim hızının malzeme cinsine göre değişimi net bir şekilde görülmüştür. Toplam ısı akışı, valf sapının ucuna ve egzoz valfinin baş bölgesine yakın bir bölgede en düşük olarak gözlenir. Alüminyum nitrit için maksimum toplam ısı akışı fazlayken, silikon nitrit için aynı değer daha düşüktür ve malzemelerin mekanik özelliklerine ve ısı dağılımına dayanarak, silikon nitrit malzemesi motor egzoz valfi için en uygun seçenek olarak öngörülmüştür. Bu çalışmadan yapılan çıkarım ile emniyet valflerindeki yaylarda malzeme araştırmaları yapılması kararlaştırılmış ve mevcut kullanılan yay çeliği yerine Inconel Alloy X-750 malzeme ile üretilen bası yayının denemeleri yapılmıştır. Yay katsayısının sıcaklığın artmasıyla yay katsayısının düşerek yayın daha da sünekleştiği fakat bu azalmanın inconel malzemedeki daha az olduğu görülmüştür (Mehan, 1959).

Bu çalışma kapsamında, yüksek sıcaklıklarda erken açılma sorununu daha iyi anlamak ve olası çözüm yollarını araştırmak amacıyla gerçekleştirilmiştir. Deneyler sayesinde erken açılma problemleri saptanmış ve oluşan müşteri şikayetlerinin azaltılması ve mevcut üründeki ürün geliştirme çalışmalarına başlanmasına ön ayak olmuştur. Valf komponentlerinin malzemeleri ve tasarımlarındaki değişikliklerin termal iletime olan etkileri incelenmiştir. Ayrıca, farklı çözüm önerileri sunulmuş ve her birinin avantajları ve dezavantajları değerlendirilecektir. Akışkanın valf açılma basıncı öncesinde valfe aktardığı ısının valf üzerindeki etkisi ve her parçalardaki ısı akışının miktarı değerlendirilerek tasarımlar arası karşılaştırmalar yapılmıştır.

## ARAŞTIRMA VE BULGULAR

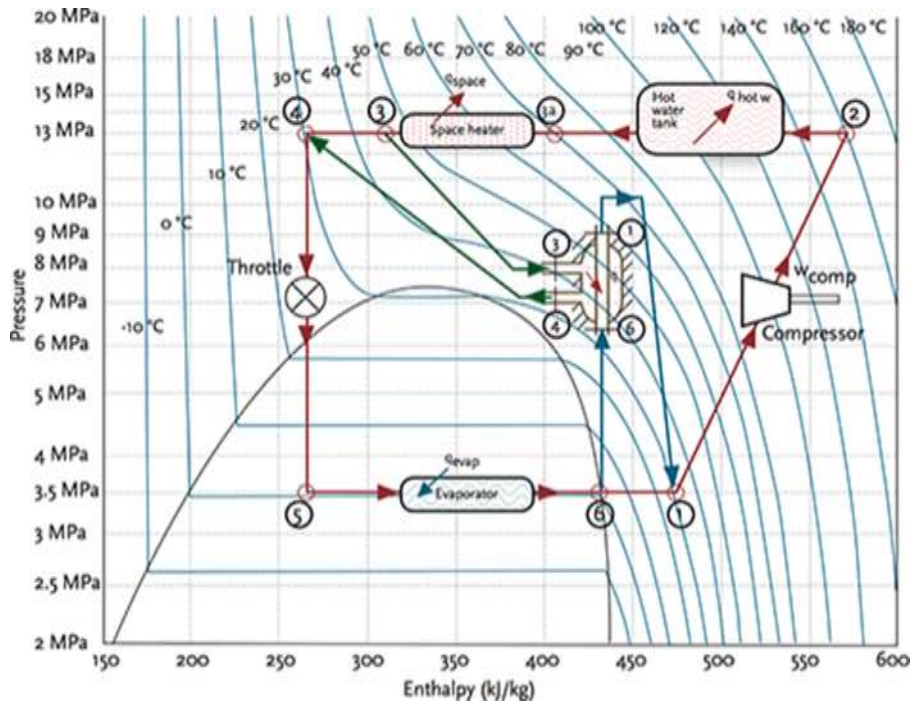
Soğutma sistemlerinde kompresörler yardımıyla gaz akışkan sıkıştırılır ve basıncı artırılır. Sıkıştırma işlemi sırasında akışkanın termal değişimine ek olarak kompresörde de ısınma meydana gelmektedir. Meydana glene ısı üretimi fan aracılığıyla dışarıya dağıtılmaktadır. Kompresörün basıncıyla sıvılaşan gaz, kompresörün basıncını düşürerek gaz haline döner. Endüstriyel Soğutma (gıda, kimya, gaz, çimento, çelik vb. sanayi uygulamaları) sektörlerinde yaygın kullanılan R744 gazının kullanımı çevreci olması sebebiyle son yıllarda artmıştır.

## CO<sub>2</sub> Akışkanların Kullanıldığı Soğutma Çevrimleri

Soğutma sistemlerinde, sistem elemanları, farklı gereksinimlere uygun olarak tasarlanır ve üretilir. Transkritik karbondioksit çevrimleri gibi yeni sistemlerde, özellikle valf sistemleri üzerinde odaklanmak



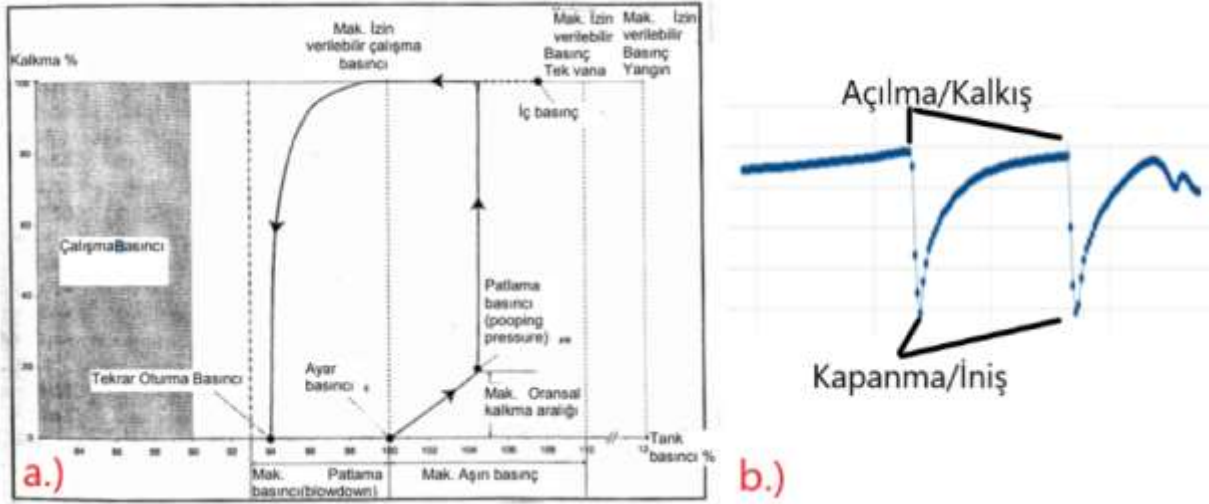
önemlidir. Bu sistemlerin ilk yatırım maliyetleri küçük sistemler için yüksek olabilir, bu nedenle genellikle orta ve büyük ölçekli sistemlerde tercih edilirler. Birden fazla kompresör ve evaporatör içeren sistemler, daha basit soğutma sistemlerine göre daha yaygındır ve valf sayısını artırır. Yüksek basınca dayanıklı sistemdeki bileşenler de buna göre tasarlanmalıdır. Şekil 1’de transkritik karbondioksit soğutma çevrimi P-h diyagramı verilmiştir. Subkritik çevrimler daha geleneksel ve düşük maliyetli, transkritik çevrimler ise yüksek verimlilik ve çevresel sürdürülebilirlik potansiyeline sahiptir. Temel fark, basınç ve sıcaklık koşullarının kritik noktanın aşılmamasında yatar. Subkritik çevrimler düşük basınçta çalışırken, transkritik çevrimler kritik noktayı geçebilir ve basınç değişimi ile ısıl işlem kontrol edilir. Transkritik sistemlerde, kompresör çıkışında kızgın buhar fazındaki gaz akışkanın maksimum 135 bar basınca ve 150°C derece sıcaklığa kadar ulaştığı bilinmektedir. Bu sebeple, kompresör emniyet valflerinde sıcaklığa dayanıklı valf yayı ve elastomerler kullanılması önerilir (Toth, 2015).



Şekil 1. Transkritik karbondioksit soğutma çevrimi P-h diyagramı (Toth, 2015)

### Emniyet Valflerinin Çalışma Prensibi

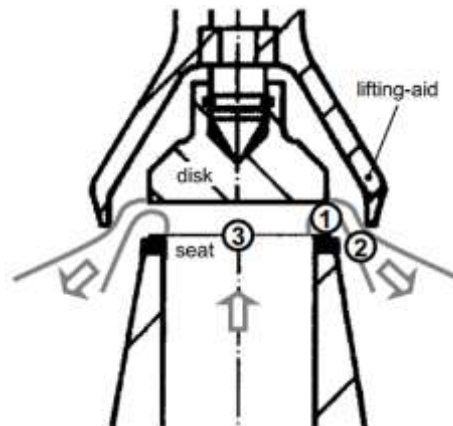
Emniyet valfinin yüksek basınca erişilmesi sonucunda açılıp kapanırken, akış karakteristiği ve basınç değerleri gibi önemli faktörlerin dikkate alınması gerekmektedir. Ayar basıncı, valfin açılacağı belirli bir basınç değerini temsil eder ve bu değere yaklaşıldığında emniyet valfinin açılma komutu verilir. Emniyet ventili üreticileri, korunacak tankın dayanıklılık sınırına yakın bir ayar basıncı seçerler.



Şekil 2. a.) Emniyet Ventili çalışma çevrimi ve açma kapama tanımları, b.) açılma ve kapanma basınç değişimi (Aydemir, 2013)

Aşırı basınç, emniyet valfinin bu ayar basıncının yüzdesi olarak ifade edilen bir değerdir ve bu değer üreticiler tarafından sağlanır. Emniyet ventili işleyişi sırasında iç basınç da büyük önem taşır. İç basınç, emniyet valfi için oldukça kritik bir parametredir çünkü ayar basıncı ile aşırı basıncın toplam değeri ya eşit ya da daha büyük olmalıdır. Bu, valfin güvenilir çalışmasını temin eder. Ayrıca, geri basınç da unutulmamalıdır, bu basınç emniyet valfi akışkanı atarken valf ve atma donanımı üzerinde oluşur ve valfin doğru işleyişini etkiler. Son olarak, tekrar oturma basıncı, emniyet valfinin kalkışının tam olarak sıfır olduğu basınç seviyesini ifade eder ve aşırı basınç azaltılması için akışkanın bir kısmını atmış olan valfin tekrar yerine oturduğu anlamına gelir. Bu da valfin güvenli çalışmasını sağlama noktasında büyük bir öneme sahiptir. Bu nedenle, bu faktörler, emniyet valflerinin güvenilir ve etkili bir şekilde işlenmesini sağlamak için göz önünde bulundurulmalıdır.

Gaz akışı kritik ve kritik altı durumlarında meydana gelir. Her iki akış türünde de emniyet valfi akışın ideal bir lüle içinde gerçekleştiği ve adyabatik olduğu kabul edilir, bu nedenle enerji kaybı genellikle göz ardı edilir. Bu koşullarda, özgül hacim ile basınç arasındaki ilişki aşağıdaki gibi ifade edilir. Gazlar ve buharlar genellikle gaz olarak adlandırılır. Buhar fazı, sıvı fazı ile dengededir ve buharın sıvı, gaz veya katı halde bulunma durumu, bulunduğu basınca bağlıdır. Eğer gaz, saf bir tek tip gaz veya gaz karışımı değilse, o zaman ideal bir gaz olarak kabul edilir. Kızgın buharın sıkışması ile emniyet valfinin açılma teorisi ele alındığında, bu çalışmadaki yüksek sıcaklık ve basınç altındaki R744 gazının, emniyet valfinin içinden geçerken 40 m/s ile 60 m/s hızlarda türbülans akış ile contayı kaldırarak valf iç hacminden tahliye deliklerine geçiş yapmaktadır.



Şekil 3. Emniyet Valfi Çalışma Prensibi

### Soğutucu Akışkanların Termodinamik Özelliklerinin Hesaplanması

Soğutucu akışkanların termodinamik özellikleri, modern teknolojik gelişmeler ve bilgisayar tabanlı hesaplama yöntemleri sayesinde oldukça erişilebilir hale gelmiştir. Bu bilgilere bilgisayar ortamında kolayca ulaşmak, ısı transferi ve soğutma işlemleri gibi ısı proses hesaplarını yapmayı büyük ölçüde kolaylaştırırken, sayısal proses optimizasyonunu hızlandırmaktadır. Soğutucu akışkanların termodinamik özelliklerini hesaplamak için kullanılan denklemler, genellikle bu amaç için tasarlanmış yazılımlar aracılığıyla kullanılır. Bu yazılımlar, farklı sıcaklık, basınç ve kompozisyon koşullarında akışkanın entalpi, entropi, yoğunluk, viskozite gibi özelliklerini hesaplamak için geliştirilen matematiksel denklemleri içerir. Bu sayede mühendisler, tasarım ve optimizasyon süreçlerinde doğru ve güvenilir termodinamik verilere erişebilirler, bu da enerji verimliliği, malzeme tasarrufu ve proses performansı açısından önemli avantajlar sağlar.

Soğutucu akışkanların termodinamik özelliklerinin hesaplanmasında kullanılan denklemler allta verilmiştir.

- Maxwell ve Classius -Clapeyron Bağlantıları
- ISO17584:2005 (E) Helmholtz Hal Denklemi (*R744 – CO2 Soğutucu akışkan için*)
- Martin-Hou Hal Denklemi
- Benedict-Webb-Rubin Hal Denklemi
- Peng-Robinson-Stryjek-Vera Hal Denklemi
- Japon Soğutma Derneği Hal Denklemi
- Su Buharı ve Amonyak için Geliştirilen Helmholtz Hal Denklemi
- R. D. Goodwin Tarafından Geliştirilen Hal Denklemi

### ISO 17584:2005 (E) Helmholtz Hal Denklemleri

Uluslararası standartlar enstitüsü (ISO) soğutkanların termodinamik özelliklerini hesaplayan çok çeşitli formüller olması nedeniyle ve bu özelliklerdeki değişmelerin uluslararası ticareti etkileyebileceğini göz önüne alarak standart hal denklemleri yayınlamış ve mümkün olduğuna bu denklemlerin kullanılmasını istemiştir.

$P = RT\rho\left(1 + \delta \frac{\partial \phi_r}{\partial \delta}\right)$	Doyma bölgesi denklemleri hal denkleminde $P(\tau, \delta_{suv}) = P(\tau, \delta_{gaz})$
$u = RT\left(\tau \frac{\partial \phi_{id}}{\partial \tau} + \tau \frac{\partial \phi_r}{\partial \tau}\right)$	$g(\tau, \delta_{suv}) = g(\tau, \delta_{gaz})$
$h = RT\left(1 + \tau \frac{\partial \phi_{id}}{\partial \tau} + \tau \frac{\partial \phi_r}{\partial \tau} + \delta \frac{\partial \phi_r}{\partial \delta}\right)$	$s = R\left(-(\phi_{id} + \phi_r) + \tau \frac{\partial \phi_{id}}{\partial \tau} + \tau \frac{\partial \phi_r}{\partial \tau}\right)$
$C_p = C_v + R \frac{\left(1 + \delta \frac{\partial \phi_r}{\partial \delta} - \delta \tau^2 \frac{\partial^2 \phi_r}{\partial \tau \partial \delta}\right)}{1 + 2\delta \frac{\partial \phi_r}{\partial \delta} + \delta^2 \frac{\partial^2 \phi_r}{\partial \delta^2}}$	$g = RT\left(1 + \phi_{id} + \phi_r + \delta \frac{\partial \phi_r}{\partial \delta}\right)$
	$C_v = R\left(-\tau^2 \frac{\partial^2 \phi_{id}}{\partial \tau^2} - \tau^2 \frac{\partial^2 \phi_r}{\partial \tau^2}\right)$

Şekil 4. ISO 17584:2005(E) Helmholtz Hal Denklemleri (Atalay ve Çoban, 2005)

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Termodinamik hesaplamalar, genellikle entalpi farklılıklarına dayanır, yani  $\Delta h$  (entalpi) veya  $(h_2-h_1)$  değerlerine dayalıdır. Bu nedenle, farklı sıfır entalpi noktaları olsa bile, entalpi farkı olan  $\Delta h$ ,  $(h_2-h_1)$  her zaman aynıdır ve yazarlar arasındaki farklar genellikle %1'den daha düşüktür. Termal analizde kullanılan bu entalpi farklarını hesaplamak, özellikle karışık kaynaklardan gelen farklı sıfır entalpi noktalarıyla uğraşırken, termodinamik denge ve enerji akışlarının doğru bir şekilde belirlenmesinde önemlidir. Steady-state veya sürekli durum, termal analizde kullanıldığında, sistemin dengede ve enerji akışının sürekli olduğu bir durumu ifade eder. Bu, enerji dengesi ve entalpi değişikliklerinin doğru hesaplanması için önemlidir, özellikle makineler, ısı değiştiriciler ve diğer termal sistemlerin tasarımı ve iyileştirilmesi için yaygın kullanılmaktadır.

Property	Value	Unit	Property	Value	Unit
Medium :	carbon dioxide		Specific isochor heat capacity : cv	0.83936	[ kJ / kg K ]
state of aggregation :	overcritical fluid		Isobar coefficient of thermal expansion :	4.4948	[ 10 <sup>-3</sup> (1 / K) ]
Pressure :	120	[ bar ]	Heat conductance	34.678	[ 10 <sup>-3</sup> (W / m * K) ]
Temperature :	150	[ Celsius ]	Dynamic viscosity :	23.88	[ 10 <sup>-6</sup> (Pa s) ]
Density :	180.96	[ kg / m <sup>3</sup> ]	Kinematic viscosity :	0.13196286472149	[ 10 <sup>-6</sup> m <sup>2</sup> / s ]
Specific Enthalpy :	561.86	[ kJ / kg ]	Thermal diffusivity :	1.519	[ 10 <sup>-7</sup> m <sup>2</sup> / s ]
Specific Entropy :	2.0518	[ kJ / kg K ]	Prandtl-Number :	0.91702	
Specific isobar heat capacity : cp	1.332	[ kJ / kg K ]	Coefficient of compressibility Z :	0.83614	
			speed of sound :	301.56	[ m / s ]

Şekil 5. R744 Soğutucu akışkanının mekanik ve termodinamik özellikleri (Peace Software)

## Steady-State Termal Analiz

Çalışma kapsamında emniyet valfine yapılacak olan iyileştirmelerde ısı transferinin komponentlere olan etkisinin araştırılması oldukça önemlidir. Bu ısı transferi, soğutucu akışkan, vana elemanları, basınç kontrol havası ve ortam havası arasında gerçekleşir. İç içe geçerek montajlanmış bir vana elemanı çifti veya tek bir vana elemanı içinde, ısı transferi esas olarak ısı iletimi yoluyla gerçekleşir. Soğutucu akışkan, emniyet valfi klapesinden çıktığında ortam havası ile vana elemanları arasında ısı transferi süreci yaşanır ve bu durum ısı taşınımı olarak adlandırılır. Akışkan, doğrudan vana elemanlarına temas ettiğinde, ısı iletimi gerçekleşir fakat yüksek sıcaklık ve basınçta çalışan R744 akışkanı, valften 40-60 m/s gibi yüksek hızda geçtiğinden, soğutucu akışkan ile vana elemanları arasındaki ısı transferi, zorlanmış ısı taşınımı olarak kabul edilir. Emniyet valfi veya ortam havası ile vana gövdesi arasındaki ısı transferi ise doğal ısı taşınımı olarak kabul edilir. Vana elemanları katı malzemelerden oluşur ve soğutucu akışkan R744 ile iç valf iç boşlukları akışkan bölgesi olarak kabul edilir. Bu çalışma, temel olarak ısı iletimi ve ısı taşınımı yöntemlerini ele almaktadır ve katı parçalar ile gaz akışkan ve gaz ortam arasındaki termodinamik özellikleri incelemektedir. Ayrıca, kompresör tarafından üretilen ısı ve dış ortamın aşırı sıcak koşulları göz ardı edilmiştir. Vana üzerinden çevreye ısı radyasyonu da ihmal edilebilir bir faktördür. İlk olarak, emniyet valfinin yapıldığı malzemenin termal özellikleri, özellikle ısı iletkenlik katsayısı (k) olmak üzere dikkatlice belirlenmelidir. Ayrıca, işlem sırasında valfin altından giriş sıcaklığı ile çıkış sıcaklığı arasındaki sıcaklık farkı ( $\Delta T$ ) hesaplanmalıdır, bu da valf üzerindeki ısı transferini önemli bir şekilde etkiler. Isı transfer hızı, Fourier'un ısı iletkenlik denklemi kullanılarak hesaplanır. Soğutma akışkanının valf etrafındaki etkileri de dikkate alınmalıdır, bu akışkanın özellikleri ısı transferini etkiler ve Newton'un soğutma yasasına dayalı olarak ısı transferi yeniden hesaplanır. Simülasyon sırasında, emniyet valfi kapalı pozisyonda akış tahliyesi yapılmadığı kabul edilir. Valf tahliye delikleri ve ayar vidası üst boşluğunun doğal konveksiyon koşulu olarak kabul edildiği bu analizde, yüksek sıcaklıktaki soğutucu akışkana maruz kalan valf gövdesi ve conta yüzeyleri için belirlenen sınır koşulları da hesaba katılır. Bu bilgiler, termal analizin doğru bir şekilde gerçekleştirilmesi ve emniyet valfinin performansının iyileştirilmesi için temel teşkil eder.



$$Re = \frac{U_{max} \times d_0}{\gamma} = \frac{\rho \times U_{max} \times d_0}{\mu}$$

Kinematik Viskozite @120 °:  $14,4 \times 10^{-6}$

Dinamik Viskozite @120 °:  $19,38 \times 10^{-6}$

D: 7 mm

Yoğunluk: 115 kg/m<sup>3</sup>

U<sub>max</sub>: 60 m/s

Re:  **$14,5 \times 10^6$**

Şekil 6. Reynolds Sayısı Hesaplaması

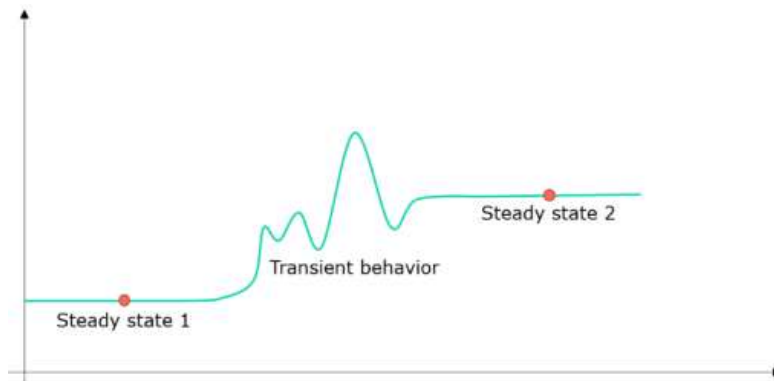
Simülasyon sırasında, emniyet valfi kapalı pozisyonda akış tahliyesi yapılmadığı durum kabul edilir. Dış ortam havasıyla temas eden valf tahliye delikleri ve ayar vidası üst boşluğu doğal konveksiyon durumu olarak kabul edilir. Yüksek sıcaklıktaki soğutucu akışkana maruz kalan valf gövdesi ve conta yüzeyleri için belirlenen sınır koşulu doğal konveksiyon koşulu için Reynold sayısı  $14,5 \times 10^6$  (türbülans akış) ve Prandtl sayısı 0,75'tir. Pilot kontrollü basınçlı hava ve ortam havası için konveksiyon katsayısı  $h_c$ 'nin aynı olduğu ve  $10,07 \text{ W}/(\text{m}^2 \cdot ^\circ\text{C})$ 'ye eşit olduğu hesaplanabilir. Zorlanmış konveksiyon koşulu için diğer değerler CO<sub>2</sub> gazı için elde edilen Şekil 5'te verilmiştir. Yüksek sıcaklığın parçalar üzerindeki dağılımı farklı tasarımlara göre Şekil 6'da verilmiştir. Emniyet valfinin sıcaklık dağılımı, termal gerilimi ve termal gerilimi simülasyonda daha ayrıntılı olarak hesaplanabilir ve hesaplanan değerler termal akış hesaplamasında da kullanılabilir. Toplam ısı transferi, logaritmik ortalama sıcaklık farkı ve toplam ısı transfer katsayısı sırasıyla:

$$Q_{top} = \dot{m}c_p(T_{c2} - T_{c1}), \quad \Delta T_{ln} = \frac{(T_w - T_{c1}) - (T_w - T_{c2})}{\ln\left(\frac{T_w - T_{c1}}{T_w - T_{c2}}\right)}, \quad U = \frac{Q_{top}}{A_{top} \Delta T_{ln}}$$

Şekil 7. Isı transferi, logaritmik ortalama sıcaklık farkı ve toplam ısı transfer katsayısı sırasıyla (Kucur ve Yağız, 2007)

Şeklinde ifade edilir. Burada,  $\dot{m}$  akışkanın kütleli debisi,  $c_p$  akışkanın özgül ısısı,  $T_{c1}$  ve  $T_{c2}$  sırasıyla akışkanın giriş ve çıkış sıcaklıkları,  $T_w$  boru yüzey sıcaklığı,  $A_{top}$  toplam ısı transfer yüzey alanıdır.

Analiz çalışması boyunca, analizin adım süresi ve toplam süresi deneysel ve teorik olarak tahmin edilemediğinden sistem steady-state koşullarında (ANSYS'de steady-state thermal modülünde) incelenmiştir. Valfin açılmadan önceki kapalı pozisyonundaki ısı transferi inceleneceği için steady-state analiz yapılır. Altaki şekilde süreye bağlı olarak değişen ısı iletiminin steady-state bölümde doğrusal ve sabit olduğu görülmektedir (Shakya ve Dhakar, 2018).



Şekil 8. Zamana bağlı ısı iletimindeki değişim (Shakya ve Dhakar,2018).

Emniyet valfinde kullanılan parçaların malzemeleri ve bu malzemelerin ısı iletim katsayıları öncelikli olarak programa tanıtılır. Emniyet valfinden geçecek olan CO<sub>2</sub> akışkanının basınç ve sıcaklık değerleri analize başlamadan önce atanarak girdi parametreleri tanımlanır. Proje kapsamında oluşturulan altı farklı tasarımda her bir model tek tek incelenerek emniyet valfinin maruz kaldığı ısı akıları ve ısı transferi değerleri çıktı olarak elde edilir.

### Boşaltma Kapasitesi-Debisi Hesaplamaları

Yapılacak olan tasarımlarda emniyet valfi elemanlarının tasarımlarında yapılacak olan değişikliklerin boşaltma debisini etkilememesi için debi hesaplamaları da kontrol edilmiştir. Bu hesaplamalar sonucunda emniyet valfinin olası durumda açılmasıyla birlikte birim zamanda tahliye edeceği akışkan miktarı hesaplanmıştır (Özgül, 2007; Aydemir, 2013).

**Emniyet Valfi Boşaltma Kapasiteleri**

$$Q_m = 0,2883 \times C \times A \times K_{dr} \times \sqrt{\frac{P_0}{V_0}}$$

**C değeri ile ilgili olarak:**

$$C = 3,948 \times \sqrt{k \times \left(\frac{2}{k+1}\right)^{(k-1)/(k+1)}}$$

$$Q_m = \text{Boşaltma Kapasitesi} \left(\frac{\text{kg}}{\text{h}}\right)$$

$$k = \frac{c_p}{c_v} = \text{Isı sığası oranı}$$

$$A = \text{Akış Geçiş Alanı}$$

$$K_{dr} = \text{Belgelendirilmiş düşük boşaltma katsayısı}$$

$$K_d = \text{Boşaltma Katsayısı}$$

$$K_{dr} = 0,9 \times K_d$$

$$P_0 = \text{Gerçek basınç tahliyesi (bar)}$$

$$P_0 = 1,1 \times P_{set} + P_{atm} \text{ (bar)}$$

$$V_0 = \text{Özgül Hacim} \left(\frac{\text{m}^3}{\text{kg}}\right)$$

Şekil 9. Emniyet valfi boşaltma kapasitesi hesaplamaları

Nominal Pressure:	120	bar
DN:	7	mm

1. Calculation of Specific Volume CO2 @20°C, Humidity: %0		
Rel. Pressure (bar)	Density (kg/m³)	Specific Volume (m³/kg)
133,01	115	0,008695652

2. Calculation of Isentropic Coefficients k=1.3 for CO2 @20°C	
k	c
1,23	2,580144

3. Calculation of Derated Discharge Coefficient Please check EN ISO 4126-1 for discharge coefficient	
K <sub>d</sub>	K <sub>dr</sub>
0,85	0,765

4. Calculation of Discharge Capacity						
Nominal Pressure (bar)	Actual Rel. Pressure (bar)	V <sub>0</sub> (m³/kg)	C	A (mm²)	K <sub>dr</sub>	Q <sub>m</sub> (kg/h)
120	133,01	0,008696	2,580144	38,48451	0,765	2708,489
Discharge Capacity:		2708 kg/h				

Şekil 10. Emniyet valfi boşaltma kapasitesi hesaplamaları (Aydemir, 2013)

### Optimize Tasarım Çalışmaları

Emniyet valfi tasarımı için elimizde bulunan ilk valf tasarımında yaptığımız iyileştirmeler ve değişiklikler sonucunda Solidworks 3D tasarım programı kullanarak 7 farklı emniyet valfi tasarımı gerçekleştirmiştir. Yaptığımız mevcut tasarıma ek tasarımlar alttaki gibidir:

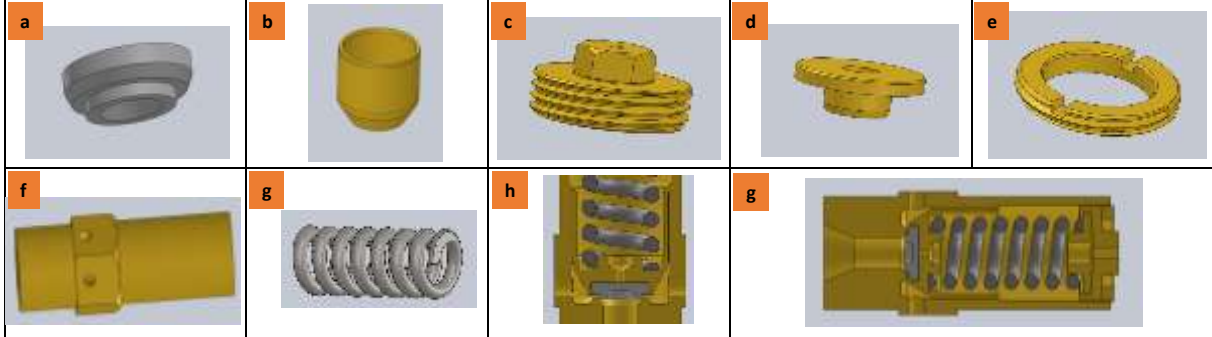
- 3 adet conta (Conta 1, Conta 2, Conta 3)
- 2 adet yay (Helisel yay, Konik yay)
- 2 adet yay tutucu (Yay tutucu 1, Yay tutucu 2)
- 3 adet conta yuvası (Deliksiz conta yuvası, 2 Delikli conta yuvası, 4 Delikli conta yuvası)



5. 2 adet gövde (4 Delikli gövde, 6 Delikli gövde)

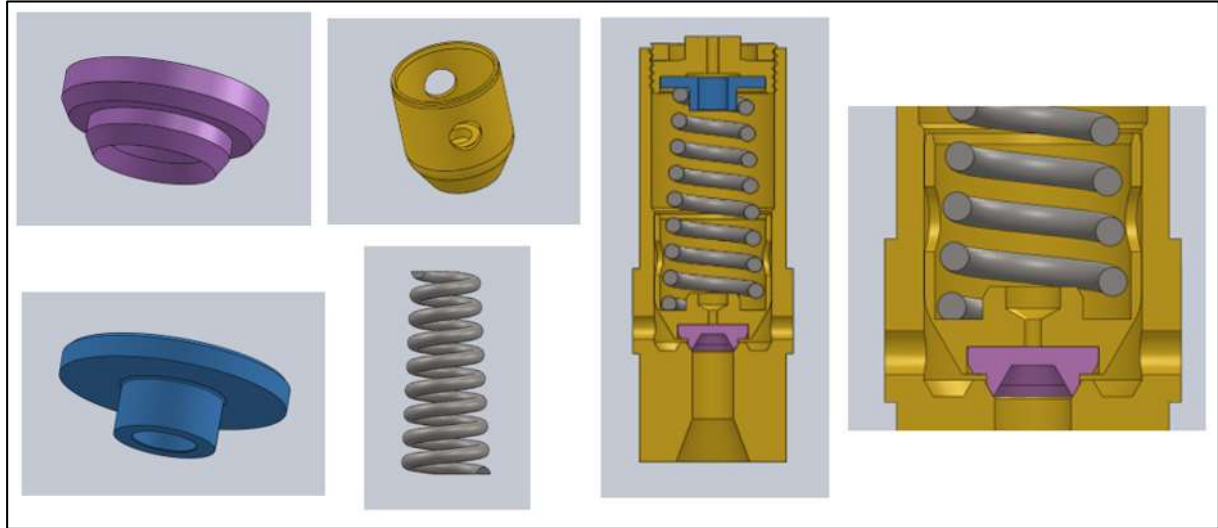
**Model 1**

Mevcut emniyet valfinin parçalarının 3D tasarımları alttaki gibidir.



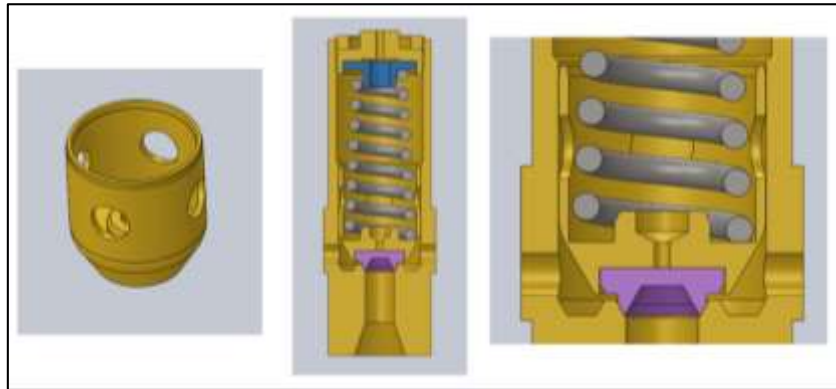
Şekil 11. a) a) Conta, b) conta yuvası, c) kapak, d)yay tutucu, d) yay tutucu, e)ayar vidası, f) gövde, g)yay, h) klape görüntüsü, g) montaj görüntüsü

**Model 2**



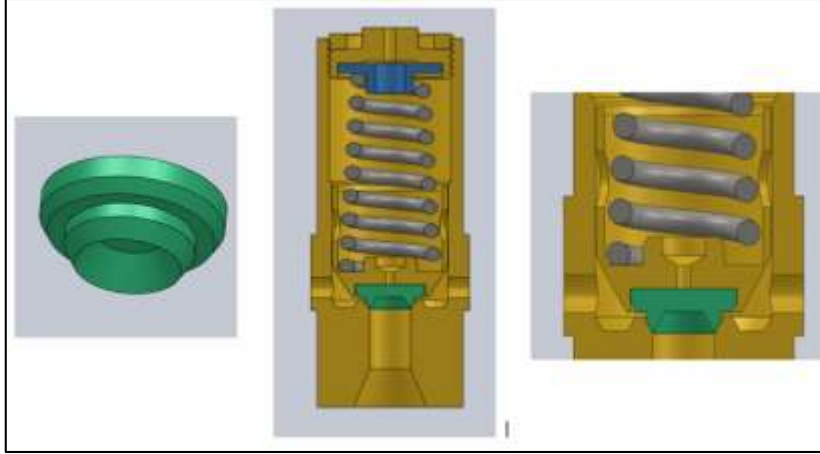
Şekil 12. Conta 2, 2 Delikli conta yuvası, Revize yay tutucu 2, konik yay

**Model 3**



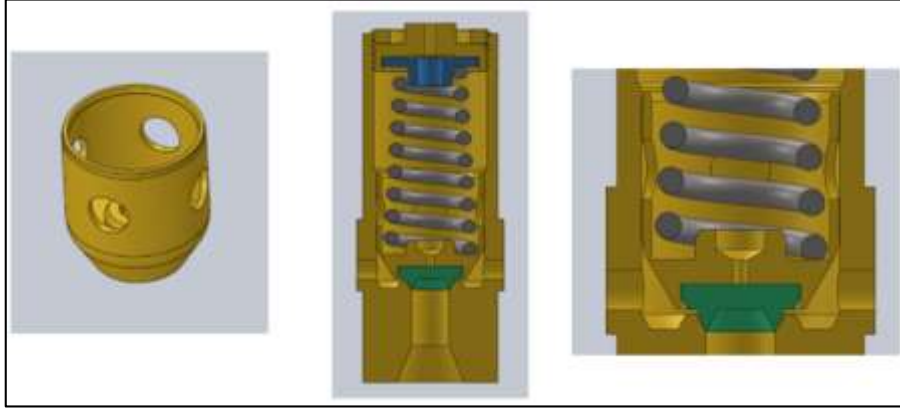
Şekil 13. 4 Delikli conta yuvası, Montaj görüntüsü, Ayrıntılı montaj görüntüsü

Model 4



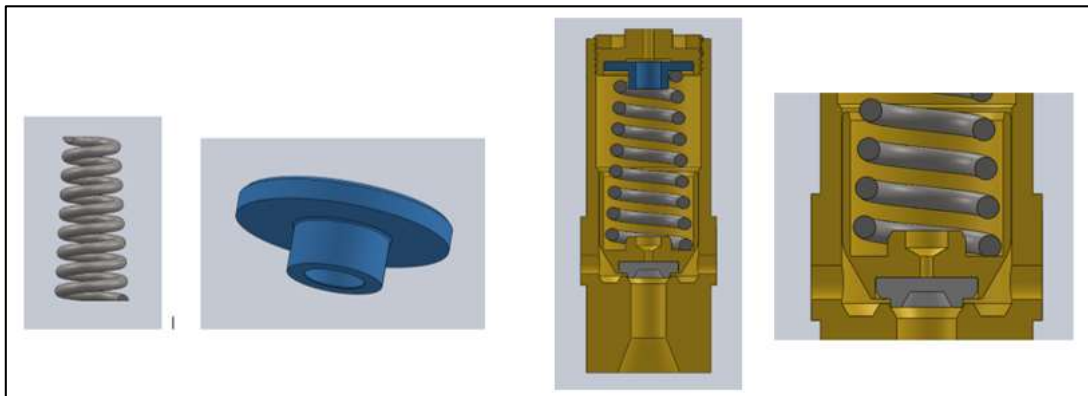
Şekil 14. Figürlü Conta, Montaj görüntüsü, Ayrıntılı montaj görüntüsü

Model 5



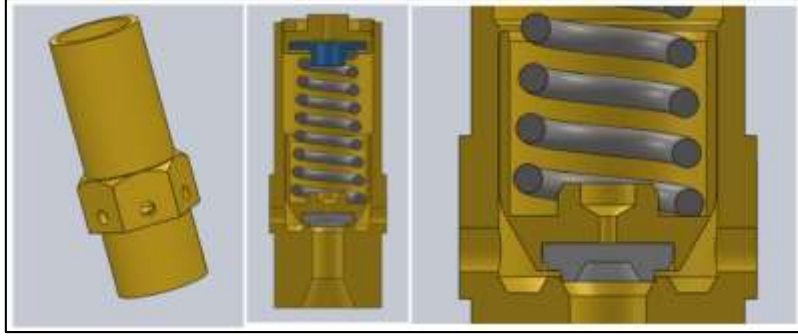
Şekil 15. 4 Delikli Conta Yuvası, Montaj görüntüsü, Ayrıntılı montaj görüntüsü

Model 6



Şekil 16. Konik Yay, Kalınlaştırılmış Yay Yuvası, Montaj görüntüsü, Ayrıntılı montaj görüntüsü

Model 7

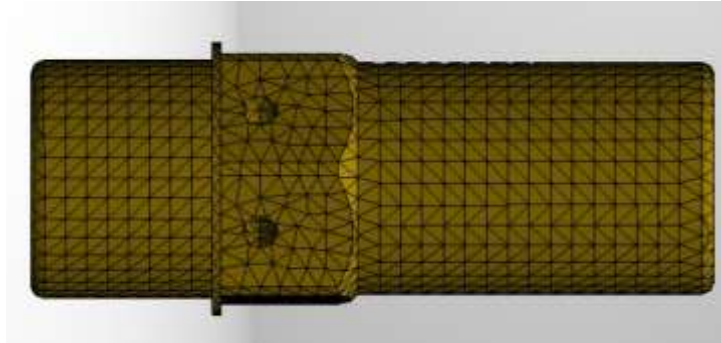


Şekil 17. 6 delikli gövde tasarımı, Montaj görüntüsü, Ayrıntılı montaj görüntüsü

Mesh Örgü Modeli

Mesh örgü modeli, sonlu eleman analizlerinin temelini oluşturan bir yapı veya sistem analizi yöntemidir. Bu model, karmaşık yapıları veya sistemleri daha küçük ve matematiksel olarak analiz edilebilir parçalara böler. Her parça, sonlu eleman olarak adlandırılır ve geometri, malzeme özellikleri ve sınırlayıcı koşullarla tanımlanır. Sonlu eleman analizi, mühendislerin gerçek dünya problemlerini sayısal olarak çözmelerine ve çeşitli fiziksel olayları simüle etmelerine yardımcı olur. Mesh örgü modeli, bu elemanların birbirleriyle nasıl etkileşime girdiğini ve nasıl bağlandığını tanımlar, böylece sonuçlar hesaplanabilir. Bu yöntem, mühendislik tasarımı, yapısal analiz, ısı transferi, akışkan dinamiği ve diğer birçok uygulamada kullanılır.

Gösterilen şekil, bir yapısal sürecin bir parçası olarak ANSYS analizi için kullanılan rijit malzemenin örgülü modelini temsil eder. Statik bir analiz bağlamında, flanş bağlantısının davranışını incelemek amacıyla sonlu elemanlar yöntemi (FEM) kullanılır. Bu analiz için, ANSYS yazılımında üçgen şeklinde ağ tipi bir mesh kullanılır. Bu meshleme işlemi sırasında toplamda 71,441 sonlu eleman ve 122,228 düğüm kullanılır.



Şekil 18. Mesh Örgü Modeli

Materyallerin Tanımlanması

Gövde

Gövde, emniyet valfinin ana yapısını oluşturan ve dayanıklılığını sağlayan kritik bir bileşendir. Gövde, genellikle yüksek kaliteli ve dayanıklı metallere imal edilir. Emniyet valfi gövdesi, basınç altında çalışacak şekilde tasarlanır ve sızdırmazlık sağlamak için sıkı toleranslara sahip olmalıdır. Basınca dayanıklı yapısı, sistemdeki yüksek basınçlara karşı güvenilir bir koruma sağlar. Ayrıca, yüksek sıcaklık ve agresif kimyasallara karşı dayanıklı olmalıdır. Sızdırmazlık elemanları ve kapatma mekanizmasıyla birlikte çalışarak, emniyet valfinin güvenilir ve etkili bir şekilde çalışmasını sağlar. Çalışmada gövde malzemesi olarak bakır-kurşun alaşımlarından biri olan CuZn40Pb2 diğer adıyla C38500 malzemesini kullanılmıştır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 1.** Pirinç Malzeme Bilelenlerinin % oranları

ALAŞIM	ELEMENT (% KÜTLE)						
	Zn	Pb	Cu	Fe	Sn	Ni	Al
CuZn40Pb 2	39,	2,3	57,	0,2	0,2	0,	0,0
	5	8	4	8	9	1	3

**Tablo 2.** Pirinç Malzeme Bilelenlerinin Özellikleri

ÖZELLİK	DEĞERLER	BİRİMLER
Elastikiyet Modülü	9,00E+10	N/m <sup>2</sup>
Poisson Oranı	0.28	Yok
Yırtılma Modülü	3.3e+010	N/m <sup>2</sup>
Kütle Yoğunluğu	8400	kg/m <sup>3</sup>
Gerilme Mukavemeti	430000000	N/m <sup>2</sup>
Sıkıştırma Mukavemeti		N/m <sup>2</sup>
Akma mukavemeti	250000000	N/m <sup>2</sup>
Termal Genişleme Katsayısı	1.7e-005	/K
Termal İletkenlik	384	W/(m·K)
Özgül Isı	390	J/(kg·K)
Malzeme Sönüm Oranı		Yok

## Conta Malzemesi

Valfin conta malzemesi fiber partikül takviyeli PTFE ortotropik bir malzemedir. İzotropik malzeme olarak tanımlanarak daha doğru sonuçlar elde edilmek amaçlandı . Kompozit olarak tanımlanmamıştır. PTFE malzemesi seçilmiştir. PTFE (Politetrafloroetilen), yaygın olarak bilinen marka adıyla Teflon, teflon kaplamaları ve yalıtım malzemeleri gibi çeşitli endüstrilerde kullanılan bir polimer malzemedir. PTFE kimyasal olarak inert ve zararsız olmasına rağmen, -240°C'lik kriyojenik sıcaklığın altında ve 260°C'nin üzerindeki sıcaklıklarda bozulmaya başlamakla birlikte erime sıcaklığı ise 327°C olup, 350°C'nin üzerinde yapısı tamamen bozulur.

**Tablo 3.** Conta Malzemesinin Özellikleri

ÖZELLİK	DEĞERLER	BİRİMLER
Özgül Isı	0.25	J/g·°C
Kütle Yoğunluğu	2320	kg/m <sup>3</sup>
Gerilme Mukavemeti	7580000	N/m <sup>2</sup>

## Yay Malzemesi

Yay malzemesi olarak AISI 301 (1.4310) bir diğer ismiyle X10CrNi188 olan paslanmaz yay çeliği malzemesi kullanılmıştır. AISI 301 paslanmaz yay çeliği, yaygın olarak kullanılan bir malzemedir ve

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

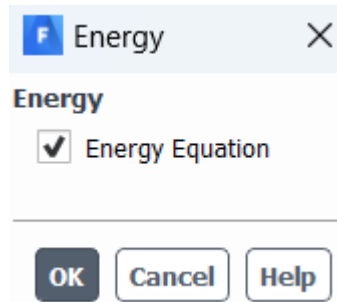
çeşitli endüstrilerde geniş bir kullanım alanına sahiptir. Yüksek mukavemeti, iyi korozyon direnci ve yüksek esneklik özellikleriyle bilinir. Bu özellikler, AISI 301'in birçok uygulamada tercih edilen bir seçenek olmasını sağlar. AISI 301 paslanmaz yay çeliğinin ana bileşeni, krom ve nikel içeren bir alaşımdır. Genellikle %17-19 krom ve %7-9 nikel içerir. Bu alaşım, malzemeye mükemmel bir korozyon direnci sağlar ve paslanmaz özelliğini korumasına yardımcı olur. Ayrıca, AISI 301'in yüksek mukavemeti, çelik yayların uzun süre dayanabilmesini sağlar.

**Tablo 4.** Yay Çeliği Özellikleri

ÖZELLİK	DEĞERLER	BİRİMLER
Elastikiyet Modülü	2,00E+11	N/m <sup>2</sup>
Poisson Oranı	0.28	Yok
Yırtılma Modülü	7.9e+010	N/m <sup>2</sup>
Kütle Yoğunluğu	7900	Kg/m <sup>3</sup>
Gerilme Mukavemeti	500000000	N/m <sup>2</sup>
Sıkıştırma Mukavemeti		N/m <sup>2</sup>
Akma mukavemeti	195000000	N/m <sup>2</sup>
Termal Genişleme Katsayısı	1.1e-005	/K
Termal İletkenlik	14	W/(m·K)
Özgül Isı	440	J/(kg·K)
Malzeme Sönüm Oranı		Yok

## Analiz

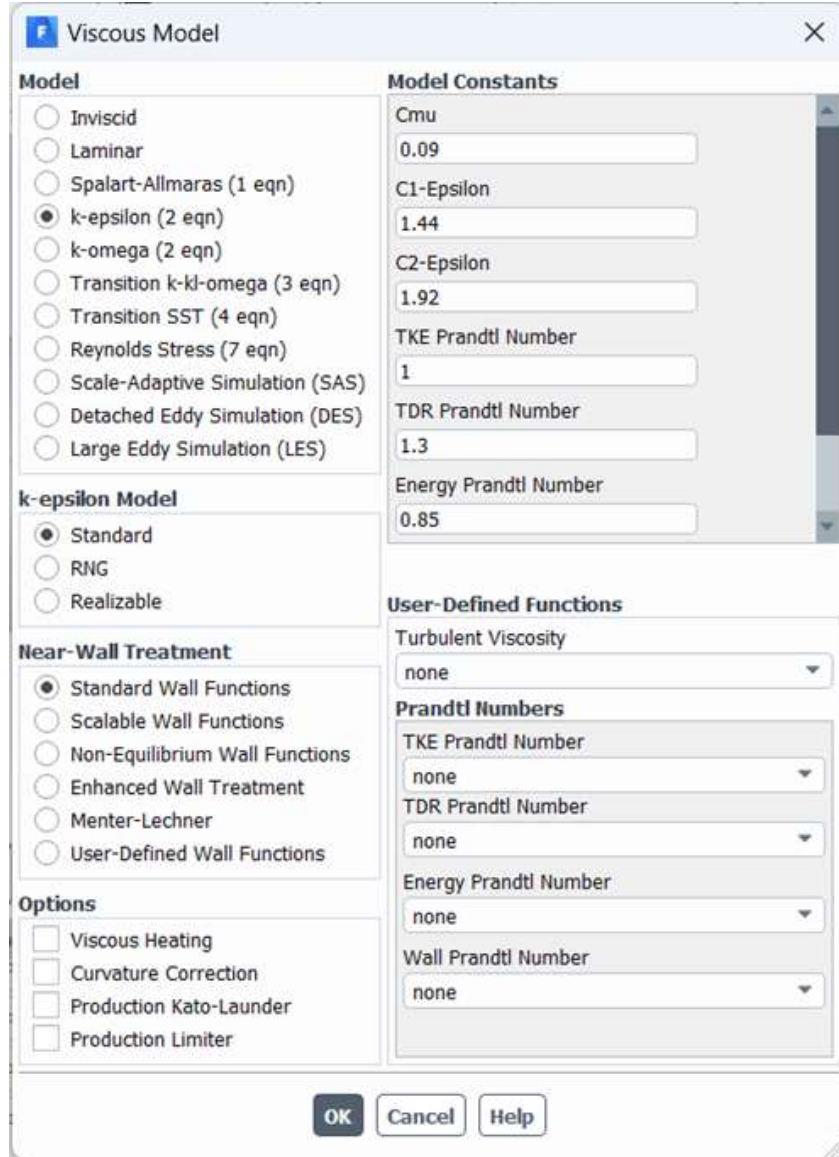
Bu çalışmada önerilen, ANSYS WORKBENCH programı CFD POST modülüne geçmeden önce, üç boyutlu akış modelinde hava akımı için kullanılan süreklilik ile Navier-Stokes denklemi, viskoz kayma gerilmesi, akış boyunca entalpi ve kinetik enerjinin hesaplaması için kullanılan Reynold ortalamalı enerji denklemi, toplam ısı transferi, Nusselt sayılarının hesabı, sürtünme faktörü ile ilgili temel hesap yöntemlerinin teorisine bir giriş yapılarak, ayrıntılı olarak incelenecektir ve daha sonra ANSYS WORKBENCH programı CFD POST modülünde yapılan analiz yöntem ve sonuçları açıklanacaktır.



**Şekil 19.** Enerji Equation seçeneği onayı

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023



Şekil 20. Akış modeli seçimi



Şekil 21. Akışkan cinsini belirtilmesi



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Solid

Zone Name  
govde\_6\_delikli\_govde\_6\_delikli

Material Name  Edit...

Frame Motion  Source Terms  
 Mesh Motion  Fixed Values

Reference Frame Mesh Motion Source Terms Fixed Values

Rotation-Axis Origin Rotation-Axis Direction

X (m) 0 X 0  
Y (m) 0 Y 0  
Z (m) 0 Z 1

Apply Close Help

Şekil 22. Malzeme cinsinin tanımlanması

Pressure Inlet

Zone Name  
inlet

Momentum Thermal Radiation Species DPM Multiphase Potential UDS

Reference Frame Absolute

Gauge Total Pressure (pascal) 1200000

Supersonic/Initial Gauge Pressure (pascal) 0

Direction Specification Method Normal to Boundary

Prevent Reverse Flow

Turbulence

Specification Method Intensity and Viscosity Ratio

Turbulent Intensity (%) 5

Turbulent Viscosity Ratio 10

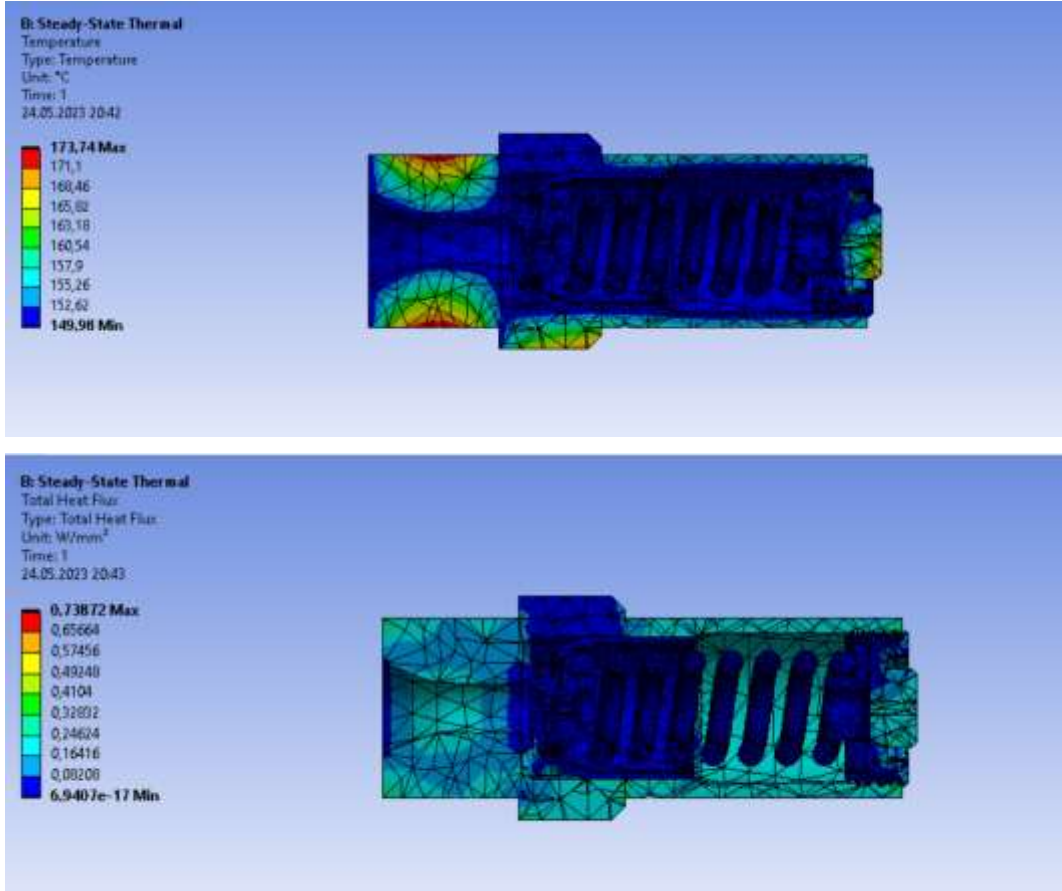
Apply Close Help

Şekil 23. Giriş basıncını tanımlanması

## SONUÇ

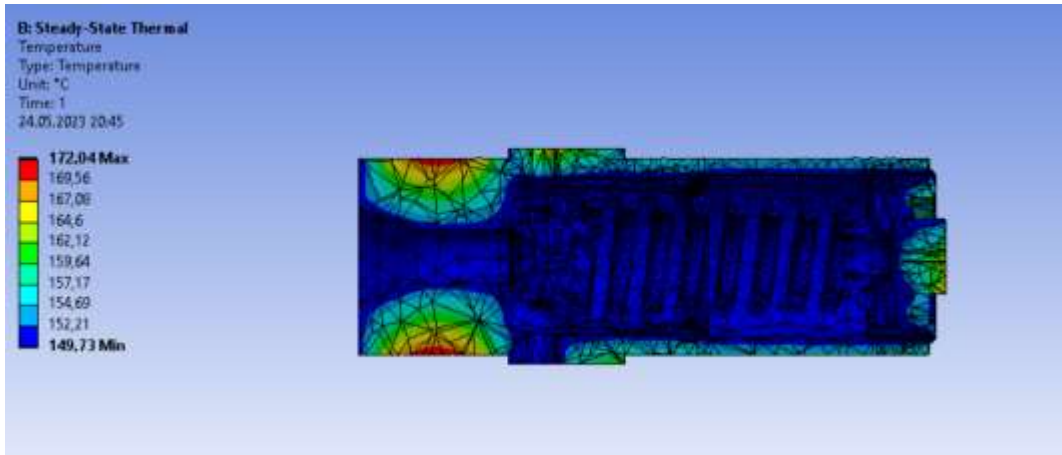
Görmek istediğimiz sıcaklık ve ısı transferi miktarı için sonuçları seçiyoruz. Temperature bölümünden emniyet valfinin ne kadar sıcaklıkta kaldığını, Total Heat Flux ile toplam ısı transfer miktarını görüyoruz.

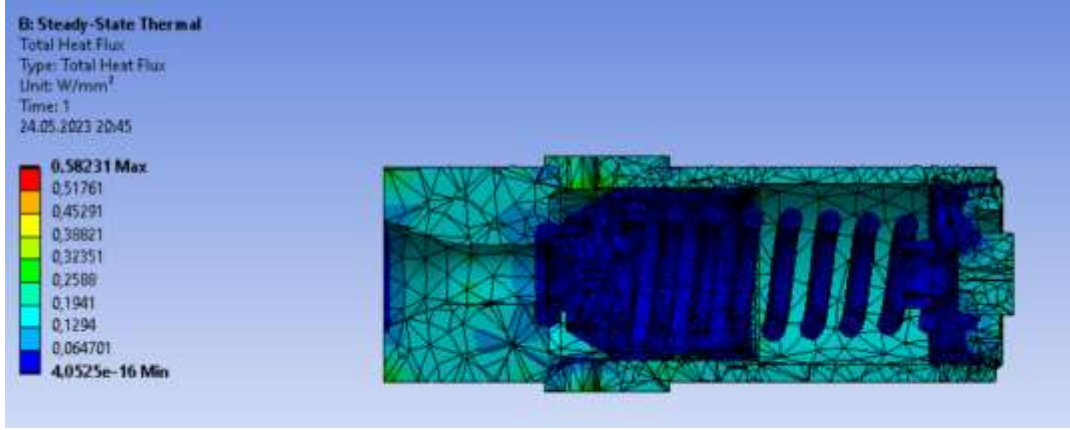
Model 1 Analiz Sonuçları



Şekil 24. a) Temperature analizi, b) Total heat flux analizi

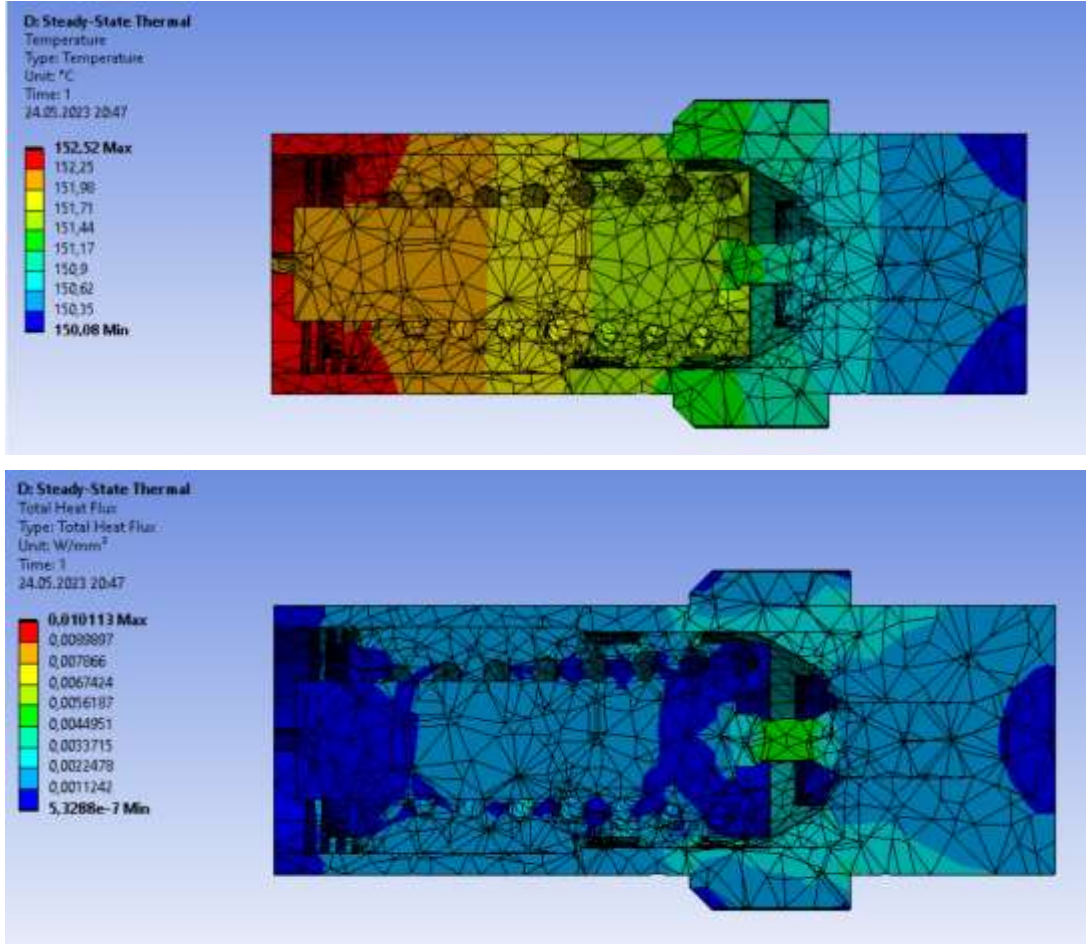
Model 2 Analiz Sonuçları





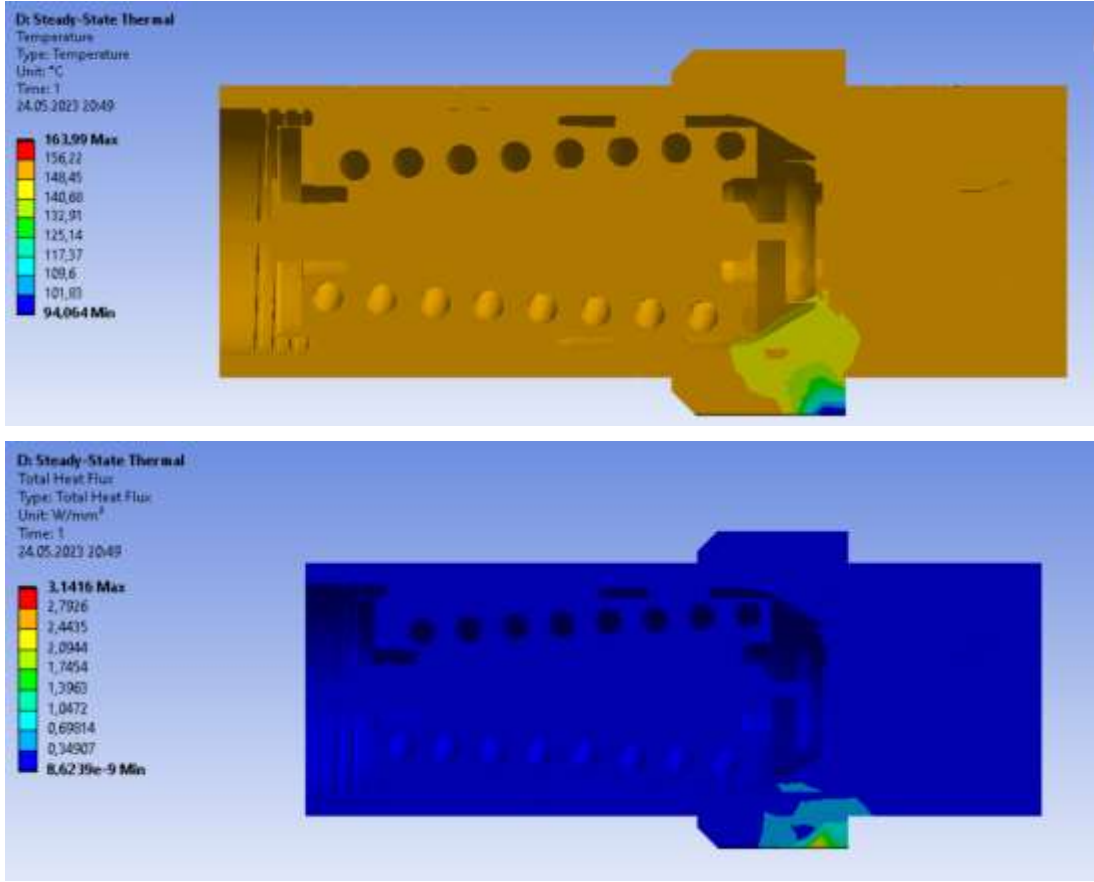
Şekil 25. a) Temperature analizi, b) Total heat flux analizi

### Model 3 Analiz Sonuçları



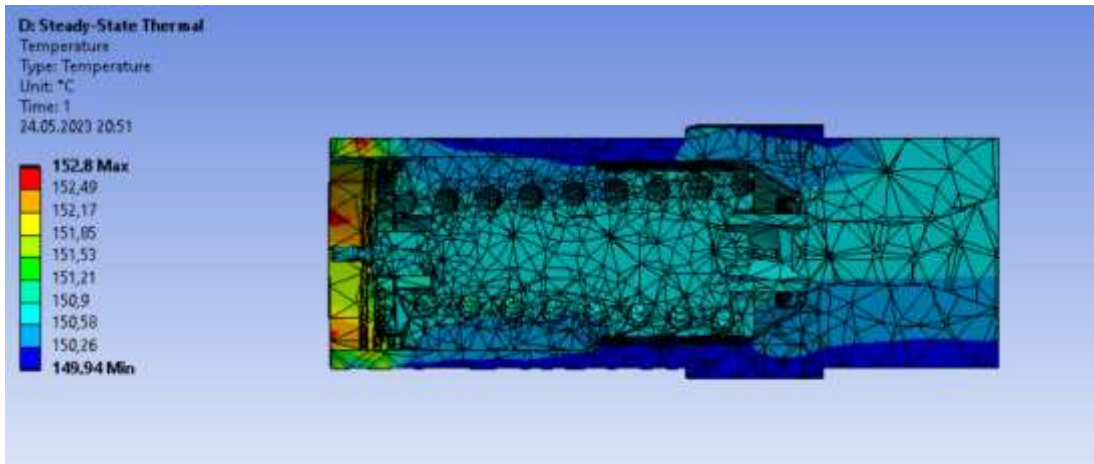
Şekil 26. a) Temperature analizi, b) Total heat flux analizi

Model 4 Analiz Sonuçları

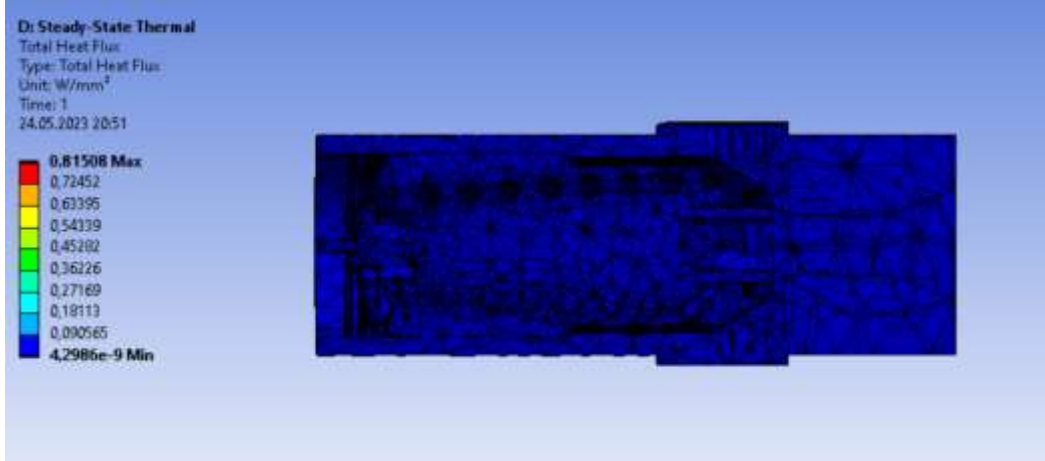


Şekil 27. a) Temperature analizi, b) Total heat flux analizi

Model 5 Analiz Sonuçları

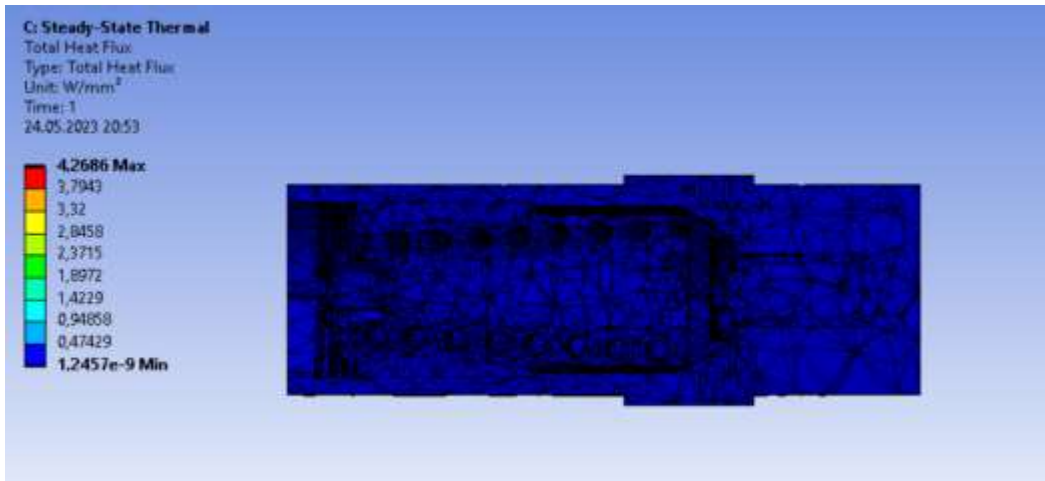
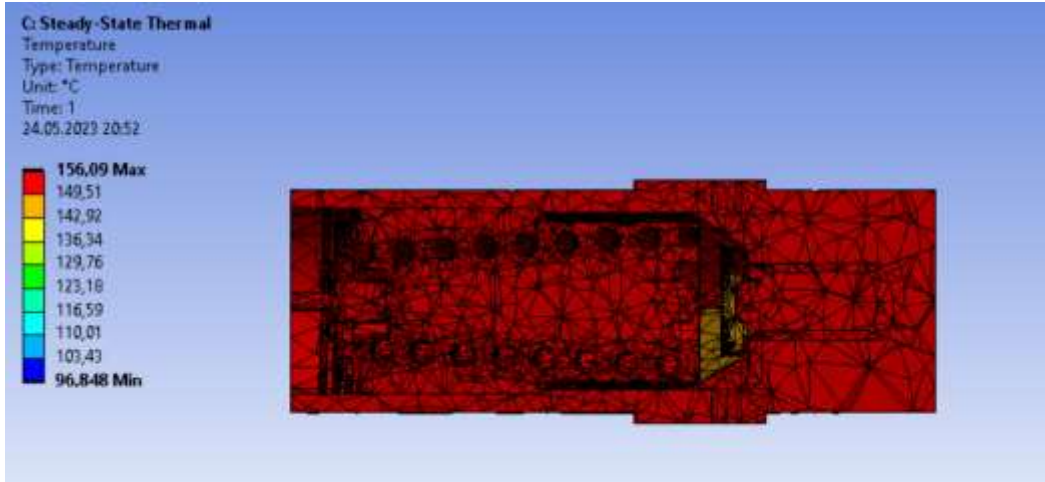






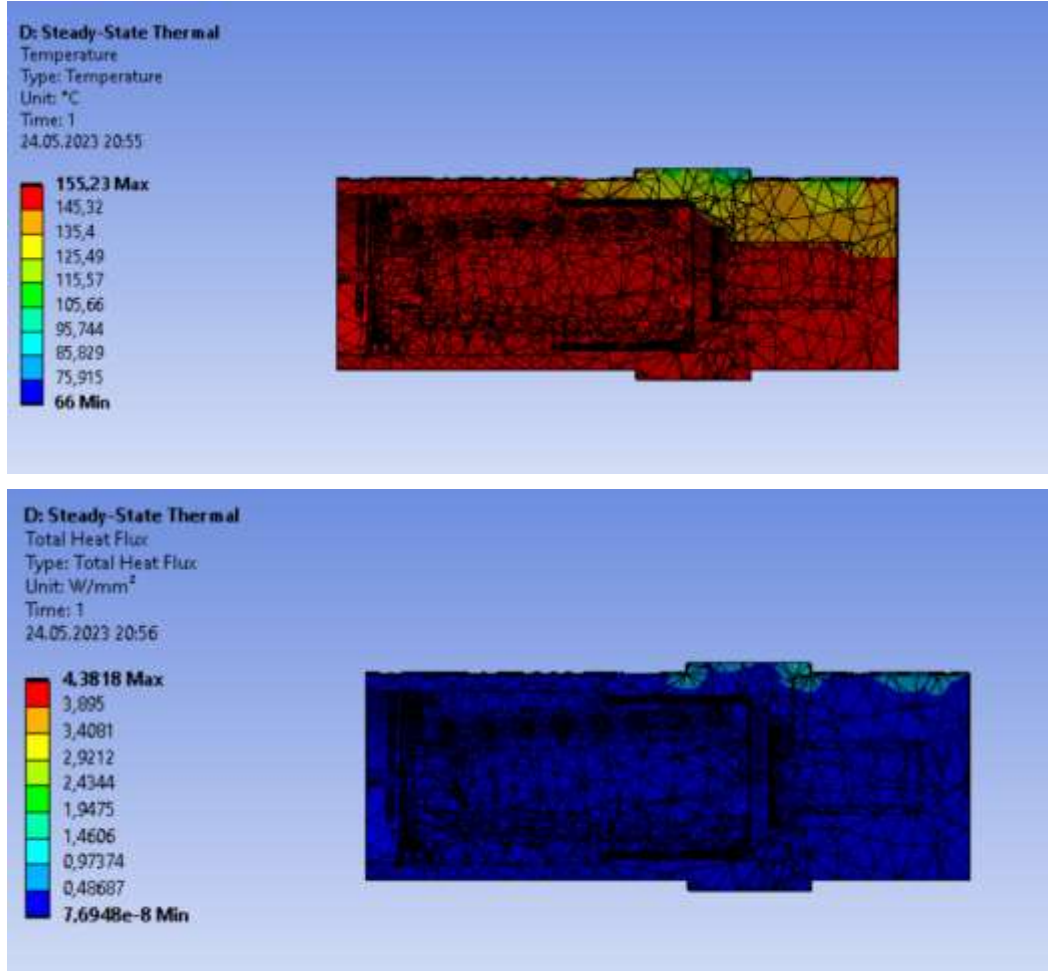
Şekil 28. a) Temperature analizi, b) Total heat flux analizi

### Model 6 Analiz Sonuçları



Şekil 29. a) Temperature analizi, b) Total heat flux analizi

Model 7 Analiz Sonuçları



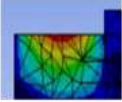

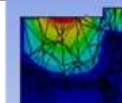
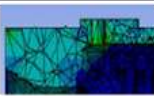

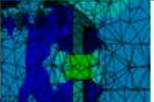







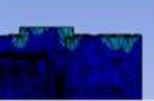
Şekil 30. a) Temperature analizi, b) Total heat flux analizi

Bu çalışmada, soğutucu sistemlerin güvenliği ve performansı açısından önemli bir sorun olan yüksek sıcaklıklarda erken açma problemini anlamak ve çözüm yöntemleri geliştirmek için bir adım olmayı hedeflemiştir. Emniyet valflerinde yüksek sıcaklıklarda erken açma probleminin gerçek bir sorun olduğunu ve soğutucu sistemlerin performansını ve güvenliğini olumsuz etkileyebileceğini doğruladık. Bu sorun, istenmeyen basınç düşüşlerine ve soğutucu sıvı kaybına yol açarak sistemin verimliliğini azaltabilir ve arızalara neden olabilir.

Yapılan analiz ve simülasyonlar, yüksek sıcaklıklarda erken açma problemini doğrulamış ve bu sorunun temel nedenlerini belirlememize yardımcı olmuştur. Özellikle, yüksek sıcaklık ortamında malzeme genişmesi ve termal etkilerin emniyet valflerinin erken açılmasına yol açtığını gözlemledik. İstatistiksel analizler ve veri değerlendirmesi sonucunda, erken açma probleminin çözümü için çeşitli yöntemlerin önerilebileceğini belirledik. Örneğin, emniyet valflerinin termal etkilere karşı daha dayanıklı malzemelerle üretilmesi veya emniyet valfi bölümleri üzerinde yapılan tasarımsal değişiklikler gibi çözümler üzerinde durulabilir. Bu değişikliklerden birincisi; yay seçimi ve yay seçiminde etken olan yay katsayısıdır.



**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

Model No	Tasarım Bileşenleri	Sıcaklık [°C]		Isı akısı [W/mm <sup>2</sup> ]		Max. Sıcaklık Bölgesi	Max. Isı Akısı Bölgesi	Açıklama
		max	min	max	min			
1	Mevcut Tasarım	173.74	149.98	0.73872	6,9407x10 <sup>4</sup> (-17)			<ul style="list-style-type: none"> <li>•max sıcaklık gövde dış bağlantısında görüldü.</li> <li>•max ısı akısı tahliye deliğine yakın bölgede görüldü.</li> </ul>
2	2 numaralı conta+ 2 delikli conta yuvası+ helical yay	172.04	149.73	0.58	4,05x 10 <sup>4</sup> (-16)			<ul style="list-style-type: none"> <li>•max sıcaklık gövde dış bağlantısında görüldü.</li> <li>•max ısı akısı tahliye deliğinde görüldü.</li> </ul>
3	2 numaralı conta+ 4 delikli conta yuvası+ helical yay	152.52	150.08	0.010113	5,3288x10 <sup>4</sup> (-7)			<ul style="list-style-type: none"> <li>•max sıcaklık kapak ve yay tutucu bağlantısında görüldü.</li> <li>•max ısı akısı conta ve conta yuvasının birleşim bölgesinde görüldü.</li> </ul>
4	3 numaralı conta+ 2 delikli conta yuvası+ helical yay	163.99	94.064	3.1416	8,6239x10 <sup>4</sup> (-9)			<ul style="list-style-type: none"> <li>•max sıcaklık genel olarak valfin her bölümünde aynı görüldü.</li> <li>•max ısı akısı tahliye deliğinde görüldü.</li> </ul>
5	3 numaralı conta+ 4 delikli conta yuvası+ helical yay	152.8	149.94	0.81508	4,2986x10 <sup>4</sup> (-9)			<ul style="list-style-type: none"> <li>•max sıcaklık kapak bağlantı bölgesinde görüldü.</li> <li>•max ısı akısı genel olarak valfin her bölümünde aynı olduğu görüldü.</li> </ul>
6	Kendi contası + kendi conta yuvası + helisel yay	156.09	96.848	4.2686	1,2457x10 <sup>4</sup> (-9)			<ul style="list-style-type: none"> <li>•max sıcaklık conta bağlantı bölgesi hariç valfin geri kalan bölümlerinde görüldü.</li> <li>•max ısı akısı genel olarak valfin her bölümünde aynı olduğu görüldü.</li> </ul>
7	Kendi contası + kendi conta yuvası +Gövde 6 delikli+ helisel yay	155.23	66	4.3818	7,6948x10 <sup>4</sup> (-8)			<ul style="list-style-type: none"> <li>•max sıcaklık genel olarak valfin her bölümünde aynı görüldü.</li> <li>•max ısı akısı tahliye deliğinde görüldü.</li> </ul>

Yay katsayısı ise; tel çapı, eksen çapı ve sarım sayısı gibi parametrelere bağlıdır. Bir anlamda yay katsayısı seçilerek, yay üzerine etkiyen kuvvete göre yayın sıkışma miktarı, dolayısıyla da vananın basınç değeri belirlenir. Bu bakımdan yay, emniyet vanasının çalışma basıncı değerlerini ve limitlerini belirleyen en önemli etkenlerden biridir. Çalışmamızda kullandığımız 2 farklı yay türü arasında yaptığımız incelemeler ve analizler doğrultusunda konik yay'ın daha verimli ve istediğimiz sonuçlara daha yakın olduğunu gözlemlenmiştir.

Yapılan bir diğer değişiklik ise klapeyi dolduracak şekilde uç figürlü conta tasarımı üzerinde olmuştur. Conta üzerinde yapılan değişiklikler doğrultusunda contanın gövdeye temas ettiği açı artırılarak contanın merkeze daha düzgün bir biçimde oturması sağlanmıştır. Ayrıca contanın temas ettiği yüzey alanı da artırılmıştır. Temas yüzey alanının büyük olması, aynı kuvvete karşında birim alana düşen kuvvetin azalmasına yani basıncın azalmasını sağlar. Yapılan çalışmalar ve analizler doğrultusunda tasarlanmış olduğumuz temas yüzey alanı en büyük olan "Conta 3" ün daha verimli ve istediğimiz sonuçlara daha yakın olduğunu gözlemledik. Yaptığımız son değişiklik ise gövde tasarımı üzerinde gerçekleştirilmiştir. Analizleri incelediğimizde "4 delikli gövde" yerine "6 delikli gövde" tasarımı kullanılmasının daha verimli ve istediğimiz sonuçlara daha yakın olduğunu gözlemlenmiştir. Bu sayede emniyet valfi içerisinde çıkan soğutucu akışkanın daha stabil ve eşit bir şekilde deliklerden çıktığı gözlemlenmiştir. Farklı çözüm önerilerinin avantajları ve dezavantajları üzerine tartışmalar yaptık. Her bir çözümün maliyeti, uygulanabilirliği ve etkinliği gibi faktörleri dikkate alarak, hangi yöntemin belirli bir soğutucu sisteme en uygun olduğunu değerlendirilmiştir.

Sonuç olarak, yapılan analizler ve değerlendirmeler sonucunda, konik yay, 3 numaralı conta ve 6 delikli gövdenin bulunduğu emniyet valfi tasarımının yüksek sıcaklıklarda erken açma probleminin çözümü için en iyi sonucu sağladığı görülmüştür. Bu tasarım, termal etkilere karşı daha dayanıklıdır ve istenmeyen basınç düşüşlerini ve soğutucu sıvı kaybını en aza indirirken, sistem performansını olumsuz etkileme olasılığını azaltmaktadır. Ancak, bu tasarımın avantajları ve dezavantajları detaylı bir şekilde değerlendirilmeli ve özellikle sistemin gereksinimlerine ve çalışma koşullarına uygunluğu dikkate alınmalıdır. Çalışmanın endüstriyel uygulamalarda soğutucu sistemlerin verimliliğini artırmaya ve güvenlik standartlarını iyileştirmeye yönelik katkı sağladığına inanılmaktadır. Emniyet valflerinde yüksek sıcaklıklarda erken açma probleminin daha iyi anlaşılması ve çözüm yöntemlerinin geliştirilmesi, bu sistemlerin güvenli ve verimli bir şekilde çalışmasını sağlamak için önemli bir adımdır. Gelecekteki araştırmaların, bu sorunu daha da derinlemesine incelemek ve yeni inovatif çözümler sunmak için yapılması gerektiğine inanılmaktadır.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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**INTERNATIONAL ANKARA CONGRESS ON  
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October 13-14, 2023**

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İNSAN ZEKÂSI MI YAPAY ZEKÂ MI?

INTELLIGENCE PROBLEM IN TRANSLATION: HUMAN OR ARTIFICIAL  
INTELLIGENCE?

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**ÖZET**

Yapay zekâ John McCarthy'in 1956 yılında dile getirdiği bir kavram olarak hayatımıza dahil olmuş, günümüzde en çok konuşulan konuların başında gelmeye başlamıştır. Gerek yapay zekâ programları ve yapay zekâ ürünleri robotlar gerekse yapay zekâ kullanılarak oluşturulan sanal haber spikerleri bazı meslek grupları açısından düşündürücü bir etki oluşturmuştur. Bu etki, çeviri alanı için de önemli bir yer teşkil etmektedir. Nitekim, zekâ kavramının bile tartışıldığı günümüz dünyasında yapay zekâ kavramı doğru anlaşılabilir mi? Bununla birlikte yapay zekâ programları insan zekasının, yani çevirmenlerin yerini alabilir mi? Yapay zekâ denilince akla robot çevirmenlerin gelmesi doğru bir düşünce midir? Söz konusu programlarla yapılan çeviriler yeterli ve kabul edilebilir çeviriler mi? Diller mekanikleşme tehlikesiyle karşı karşıya mı? gibi tartışma soruları oldukça fazla tartışılmakta ve bu tartışmalar zaman zaman yapay zekanın pozitif etkileri olduğu kadar büyük bir sorunsal haline gelmeye başladığına da dikkat çekmektedir. Söz konusu bu çalışmada önce yapay zekâ kavramının ortaya çıkışına değinilecek, insan zekâsı ve yapay zekâ arasındaki farklılıklar ve varsa benzerliklere değinilecek bu kapsamda yapay zekanın insan zekasının yerine geçebilme ihtimalinin olup olmadığı konularından bahsedilecektir. Çeviri alanında yapay zekâ kullanımlarına değinilen bölümden sonra, insan zekâsı ile çevrilmiş olan bazı çevirilerin birtakım yapay zekâ uygulamalarındaki çevirileri gösterilecek, böylelikle aradaki farklar ve eşdeğerlik sorunları ortaya konacaktır.

**Anahtar Kelimeler:** Çeviri, İnsan çevirisi, Yapay zekâ çevirisi.

**ABSTRACT**

Artificial intelligence entered our lives as a concept expressed by John McCarthy in 1956 and has become one of the most talked about topics today. Both artificial intelligence programs, robots, artificial intelligence products and virtual news anchors created using artificial intelligence have created a thought-provoking effect for some professional groups. This effect is also important for the field of translation. So, can the concept of artificial intelligence be understood correctly in today's world, where even the concept of intelligence is discussed? So, can artificial intelligence programs replace human intelligence, that is, translators? When it comes to artificial intelligence, do robot translators come to mind? Are the translations made with these programs sufficient and acceptable? Are languages in danger of becoming mechanistic? Such discussion questions are widely discussed, and these discussions point out that artificial intelligence, in addition to its positive effects from time to time, is starting to become a big problem. Following the section where the uses of artificial intelligence in the field of translation are explained, translations of some translations translated by human intelligence in some artificial intelligence applications will be shown, thus revealing differences and equivalence problems.

**Keywords:** Translation, human translation, artificial intelligence translation.



### GİRİŞ

Gelişen ve değişen dünya ihtiyaçları birçok alanda teknolojinin kullanımının da artmasıyla yenilikçi yöntemlerle karşılanmaya başlanmıştır. Bu yöntemlerden en önemlilerinden biri de yapay zekâ ürünleri olmuştur. Endüstriden mühendisliğe, sağlıktan matematiğe pek çok alanda etkin bir rol oynayan yapay zekâ, yabancı dil çevirisi söz konusu olduğunda da benzer bir öneme sahip olmaktadır. Özellikle daha ucuz ve daha hızlı olması bakımından yayıncıların ilgisini çeken yapay zekâ konusunu bu çalışmada çeviri açısından ele alacağız.

Yapay zekâ kavramı ilk olarak 1956 yılında Dortmund Konferansı'nda John McCarthy, Marvin L. Minsky, Nathaniel Rochester ve Claude E. Shannon tarafından sunulan bir öneri mektubunda dile getirilmiştir. Ancak bu kavramın öncüsü olarak John McCarthy kabul edilmektedir (Alpaydın, 2013). McCarthy (2004, s.7) zekâyı, "Dünyada hedeflere ulaşma yeteneğinin hesaplayıcı bir parçasıdır. Değişen türde ve derecede zekâ insanlarda, birçok hayvanda ve bazı makinelerde görülür" şeklinde tanımlarken, yapay zekâyı, "insan benzeri zeki makineler özellikle de zeki bilgisayar programları yapma bilimi ve mühendisliği" olarak ifade etmiştir. Bu tanıma göre, bir bilgisayarın akletme, sorun çözme, anlam çıkarma ve genelleme gibi insansı, üst seviye bilişsel becerileri kullanması yapay zekâ olarak tanımlanabilir.

Yatırımlar ve teknolojik gelişmelerle yapay zekâ uygulamaları, maliyet açısından gün geçtikçe düşerken, performans ve bilinirlik bakımından her geçen gün artmaktadır. Günlük hayatımızda bazen arka planda kalsa da etki bakımından bütünlük, yaygın ve kaçınılmaz olmuştur. Ve bu teknoloji, Siri'den, dijital gazeteciliğe, hisse senedi hareketleri tahmininden suçu tahmin etmeye, yüz tanımadan tıbbi teşhislere kadar çok farklı alanlarda etkin şekilde kullanılmaktadır (Holmes ve diğerleri, 2019).

Yapay zekâ, ilgilendiği alanlar bakımından üç başlıkta toplanabilir. Bunlar, veri tabanlı (data-based), mantık tabanlı (logic-based) ve bilgi tabanlı (knowledge-based) yapay zekâ yaklaşımlarıdır. 1980'lerden 2000'li yıllara kadar, yapay zekanın eğitimsel uygulamaları çoğunlukla bilgi tabanlı bir yaklaşıma dayanıyordu (Sleeman ve Brown, 1982). Belirtilen dönemde araştırma alanları, çoğunlukla akıllı öğretim sistemleri adı altında, domain, öğrenci ve pedagojik olmak üzere üç modülden oluşan yapılar üzerineydi (Woolf, 2009). Bugün eğitimde yapay zekâ çalışmalarına bakıldığında, "sadece bilgi-tabanlı değil, veri ve mantık-tabanlı ve yapay zekâ uygulamalarının hemen hemen her alanda yer aldığı farklı uygulamalar görülebilir. Bunlar arasında, kişiselleştirilmiş eğitim veya diyalog eğitim sistemleri, öğrencilerin makale analizleri, akıllı ajanlar, chatbots, otomatik test oluşturma sistemleri vb yer almaktadır" (Arslan, 2020, s.81).

### Çeviri ve Yapay Zekâ

Yapay zekanın hayatımızın her alanına nüfuz ettiği günümüzde etki alanına girdiği diğer bir çalışma alanı çeviri hususu olmuştur. İnsansı tepkiler ve düşünceler üretebilen makineler her geçen gün karşımıza farklı farklı şekillerde çıkmaktadır. En son Kuveytte bir medya kuruluşunun yapay zekâ ile oluşturduğu "Fedha" adlı spiker ve gelişmiş yapay zekâ, bilgisayar ve robotik teknolojilerinin birleşimiyle gerçekleşmiş olan "Sophia" isimli robot, dikkatleri yapay zekâ ile üretilen bu sistemlerin insanların yerini alıp alamayacağına yönelmiştir. Temmuz 2023'te Cenevrede Birleşmiş Milletlerin düzenlediği "İyilik için yapay zekâ" zirvesine katılan robotların vermiş olduğu "dünyayı insanlardan daha iyi yönetebilecekleri" mesajı da dikkat çekici olmuştur. Bu ve benzeri gelişmelerle birlikte yapay zekâ gelecekte çevirmenlerin yerine de geçebilecek mi sorusunu akıllara getirmiştir. Çeviri işlemi yazılı ve sözlü olarak ayrılan, zorlu ve zahmetli bir iştir. Özellikle kültürel ifadelerin, bağlamın, kaynak ve hedef dile tam hakimiyetin çok önemli olduğu bu alanda yapay zekanın ne kadar ileri gidebileceği belirsizdir. Bu çalışmada da yazılı çevirinin en zorlu dallarından biri olan şiir çevirisi üzerinden bir inceleme yapılmıştır. Şiir çağrışımlarla yüklü, yan anlamlar barındıran, içerisinde çokça sözcük oyunları olan, duygu yüklü bir edebi türdür. Bu durum, çeviride ciddi sorunlara yol açmaktadır (Yıldırım & Durmuş, 2019).

Eleştirmen Maurice Blanchot, şiiri çevirmenin zorluğunu şu sözleriyle dile getirmektedir: "Şiirin anlamı, şiirin bütün kelimelerinden, bütün devinimlerinden, bütün vurgularından ayrı oluşamaz. Şiirin anlamı, sadece bu bütün içerisinde var olur ve onu, şekil aldığı bu biçimden ayırmaya çalıştığımız anda kaybolur. Şiirin neyi ifade ettiği, olduğu şey ile tamamen uyuşmaktadır" (Yıldırım & Durmuş, 2019, s.39).





Ve kıyı, senin yanında sessizce uzandığını bilir misin?

Ve nehirler, kendilerinin senden sana aktığını bilirler mi?

Dalgaların isyan ettiği zaman ne dediğini bilmiyorum."

Söz konusu çeviriler incelendiğinde kaynak metinde var olan كَمْ مَضَتْ أَلْفٌ عَلَيْكَ cümlesindeki sorusunun yapay zekâ çevirisinde olmadığını görmekteyiz. Aynı zamanda "ve kıyı, senin yanında sessizce uzandığını bilir misin?" çevirisinde cümlenin diziminde ve anlamında hatalar olduğu açıktır. مَا الَّذِي وَشَرِبْنَاكَ وَقُلْنَا قَدْ أَكَلْنَا الثَّمَرَا أَمْ أَصَوَابٌ مَا زَعَمْنَا أَمْ ضَلَالٌ لَسْتُ أَدْرِي şeklinde çevirdiği cümlede özne yüklem uyumsuzluğunun olduğu görülmektedir.

### İnceleme 3

تُرْسِلُ السُّحْبَ فَتَسْقِي أَرْضَنَا وَالشَّجَرَا  
وَقَدْ أَكَلْنَاكَ وَقُلْنَا قَدْ أَكَلْنَا الثَّمَرَا  
وَشَرِبْنَاكَ وَقُلْنَا قَدْ شَرِبْنَا الْمَطَرَا  
أَصَوَابٌ مَا زَعَمْنَا أَمْ ضَلَالٌ لَسْتُ أَدْرِي  
إِلَهِي أَبِومَضَى لِي طَالِمْ

### İnsan Çevirisi (Prof. Dr. Rahmi Er)

Göndererek bulutları sularsın toprağımızı ve ağaçları,

Aslında biz seni yeriz de meyve yedik deriz,

Seni içeriz de yağmur suyu içtik deriz,

Doğru mu bu söylediklerimiz, yoksa yanlış mı? Bilmiyorum!

### Yapay Zekâ Çevirisi (ChatGpt)

"Bulutları gönderir ve topraklarımızı ve ağaçlarımızı sulatırsın,

Seni yedik ve şöyle dedik: 'Meyveleri yedik.'

Seni içtik ve şöyle dedik: 'Yağmuru içtik.'

Doğru bir şey mi iddia ettik yoksa bir sapıklık mı, bilmiyorum."

Çeviriler incelendiğinde kaynak metinde kullanılan mazi fiil ifadelerinin insan çevirisinde şiirin duygusunu hedef okura hissettirmek amacıyla çevirinin geniş zaman kipiyle yapıldığı düşünülmekte, aynı cümleler yapay zekâ çevirisinde kaynak dildeki gibi mazi fiil kipinde çevrilmiştir. Ancak her ne kadar zaman uyumunda birebirlik söz konusu olsa da eş değerlik sağlanmış denilememekte, şiirin düz yazı türü gibi çevrildiği görülmektedir. زَعَمْنَا ضَلَالٌ أَمْ أَصَوَابٌ مَا زَعَمْنَا أَمْ لَسْتُ أَدْرِي "iddia ettik", ضَلَالٌ "sapıklık" olarak çevrilmiş, kelime anlamları doğru olsa bile, kaynak şiirde kullanılan anlamın bozulduğu ve anlam düzeyinde eş değerliğin sağlanamadığı görülmüştür.

### İnceleme 4

سَجَل  
أَنَا عَرَبِي  
أَنَا اسْمُ بِلَا لَقَبِ  
صَبُورٌ فِي بِلَادِ كُلِّ مَا فِيهَا  
يَعِيشُ بِفُورَةِ الْغَضَبِ  
جَذُورِي  
وَقَبْلَ تَفْتَحِ الْحَقْبِ  
وَقَبْلَ السَّرْوِ وَالزَّيْتُونِ

وقبل ترعرع العشب ..  
قبل ميلاد الزمان رسنث  
(محمدود درهوش بطقه وية)

**İnsan Çevirisi (Prof. Dr. Rahmi Er)**

Yaz! Ben bir Arabım  
Yok benim bir lakabım, soyadım  
Öfkeyle dolup taşan bir ülkede  
Çok sabırlı biriyim  
Dal budak salmıştı köklerim benim  
Daha doğmadan zaman  
Açılmamışken henüz tarihin çağları,  
Henüz yokken servi ve zeytin ağaçları  
Boy atmamışken çimenler

**Yapay Zekâ Çevirisi (ChatGpt)**

"Kayıt  
Ben bir Arap'ım  
İsim taşımayan bir soyum  
Bir ülkede sabırla yaşayan  
Öfkenin hızıyla yaşar  
Köklerim...  
Ve dönemin açılmasından önce  
Ve selvi ağaçları ve zeytinlerden önce  
Ve ot yeşermesinden önce  
Zamanın doğuşundan önce yerleşti.

Çeviriler incelendiğinde kaynak metinde yer alan سچل emir fiil kipinde gelmiş olan ve “yaz, kaydet” gibi anlamlarda kullanılan bir ifadedir. Yapay zekâ çevirisine bakıldığında “kayıt” anlamının verildiği görülmüş, bu da sistemin kelimenin çekimini algılayamadığı, kelimeyi bir fiil olarak değil de isim haliyle çevirdiği anlamına gelmektedir. Aynı zamanda كئل مافي ه صيورفي بلاد كئل مافي ه cümlesindeki كئل مافي ه da algılayamamış görülmektedir. Öyle ki كئل مافي ه denildiğinde “ondaki herkes” anlamı barınmakta sonra gelen beyit bu ifadenin anlamını sürdürmektedir. Böylece “orada yaşayan herkes öfkeyle dolup taşar” gibi bir anlam barındıran cümlenin eş değerliği yapay zekâ çevirisinde sağlanamamıştır. قبل فتح ليل ب cümlesinde de قبل ليل ب kelimesi tarihin çağları anlamını barındırmakta ancak yapay zeka çevirisinde bu dönem olarak çevrilmiştir. Genel olarak bakıldığında kaynak metnin duygusunu hedef okura geçiremediği barizdir.

**İnceleme 5**

سچل  
أل عربي  
سريت كروم أجدادي  
وأرض ألقنت فلقه ه

أنا وجهيغ أولادي  
ولمحتتريكنا.. ولكنا أخصادي  
سوى هذي لصخور..  
فهل سبت أخذها  
حكوتك.. كم اقوى لا؟  
(محمود درويش بطقه ويوة)

### İnsan Çevirisi (Prof. Dr. Rahmi Er)

Yaz! Ben bir Arabım.  
Sen atalarımın bağlarını,  
Çocuklarımla ekip işlediğimiz  
Toprağımızı gasp ettin.  
Bize ve bütün torunlarıma  
Bıraka bıraka bu kayaları bıraktın  
Hükümetiniz onları da alacakmış,  
Doğru mu?

### Yapay Zekâ Çevirisi (ChatGpt)

"Kayıt  
Ben Arap'ım  
Atalarımın bağlarını ve bereketli toprakları aldınız  
Ben ve tüm çocuklarım  
Ve tüm torunlarım için sadece bu kayaları bıraktınız  
Acaba hükümetiniz bunları alacak mı, denildiği gibi?

Çevirilere bakıldığında bir diğer örnekte olduğu gibi burada kaynak metinde yer alan **سجل** fiil kipinde gelmiş olan ifade “kayıt” şeklinde çevrilmiş, eş değerlik hem anlam hem yapı düzeyinde sağlanamamıştır. **سجل** ile başlayan beyitte ise **سجل** fiili yağmalamak, gasp etmek, zorla almak gibi anlamlara sahiptir. Yapay zekâ çevirisinde her ne kadar “aldınız” kelimesi kullanılsa da kaynak metindeki anlamı ve vurguyu tam olarak taşımamaktadır.

وأرض ألقنت فقلخ ه  
أنا وجهيغ أولادي

Beyitinde ise “çocuklarımla ekip biçtiğimiz toprağımız” anlamı mevcuttur ancak yapay zekâ çevirisinde “ekip biçtiğimiz toprağımız” kısmı yer almamaktadır.

فهل سبت أخذها  
حكوتك.. كم اقوى لا؟

Söz konusu bu beyitte ise yapay zekâ çevirisi insan çevirisine göre kaynak metne daha sadık bir çeviri yapmış ancak şiir söz konusu olduğunda amaç kaynak metne sadık kalmak mıdır? Kaynak okurun hissettiğinin hedef okurunda hissetmesi midir? Sorularına binaen insan çevirisinde kaynak metindeki anlamın ve vurgunun daha etkili verildiği görülmektedir. Yapay zekâ programının şiiri, şiir türünün özelliklerini bilerek değil düz yazı-şiir ayırt etmeksizin çevirdiği, verilen tüm örneklerde görülmektedir. Böylelikle denilebilir ki, insan çevirisinin yaptığı çeviriler yüzde yüz başarılı olmasa bile henüz insandan daha iyi bir şiir çevirisi yapacak bir yapay zekâ sistemi kurulamamıştır. Bu ilerde çevirmenlere

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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rakip olmayacağı anlamına gelmemekle birlikte, Arapçada ضرب kelimesi gibi farklı söylemlerle göre çok farklı anlamlar kazanabilen kelimeleri bu programların nasıl algılayacağı da merak konusudur. Zira söz konusu bu sözcük çeşitli sözlüklerde “bir şeyi bir şeye vurmak” anlamda olsa da yağmurun yağmasını ifade etmek الرضبالمطر şeklinde de kullanılabilir ve bu ifadenin vurmakla bir ilgisi yoktur. Ayrıca, para basmayı ifade etmek üzere ضرب الدرهم para darp etmek” şeklinde bir kelime vardır ki bu kelime Türkçeye “darphane” olarak geçmiştir. Ancak kelime Arapçada “dayak atılan yer manasını” taşımaya müsait olmakla beraber böyle bir anlamla hiç alakası yoktur. Arapça özelinde bu ve bunun gibi binlerce örnek verilebilecek olup, söz konusu bu programlar insan zekasının yerini alsa da özellikle edebi çevirilerde anlamın farklı katmanlarını nasıl ayırt edeceği bir belirsizlik olarak kalmaya devam etmektedir.

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İKİ BÖLGELİ ÇOK KAYNAKLI ELEKTRİK GÜÇ SİSTEMLERİNDE FREKANS  
REGÜLASYONU İYİLEŞTİRMESİNE YÖNELİK BULANIK PID DENETLEYİCİ  
TASARIMI

DESIGN OF FUZZY PID CONTROLLER FOR ENHANCING FREQUENCY REGULATION  
IN TWO-AREA MULTI-SOURCE ELECTRIC POWER SYSTEMS

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**ÖZET**

Bir elektrik güç sisteminde üretilen elektriğin frekansının değişen tüketime göre ayarlanması yük frekans regülasyonu (YFR) denilmektedir. YFR güç sistemi tasarımı ve operasyonunda oldukça önemlidir. Bu çalışmada iki bölgeli çok kaynaklı bir güç sisteminde YFR ele alınmıştır. İkincil denetleyici olarak bulanık PID denetleyici tercih edilmiş ve önerilmiştir. Denetleyicinin düzgün parametre ayarı için literatürde sıkça kullanılan simbiyotik organizmalar arama (SOA) algoritmasından faydalanılmıştır. Benzetimi gerçekleştirilen güç sistemi MATLAB/Simulink ortamında modellenmiş, SOA kodları ise MATLAB/M-file ortamında yazılmıştır. Elde edilen sonuçlar saygın dergilerde yayımlanan sonuçlarla karşılaştırılmıştır. Elde edilen verilere göre önerilen denetleyicinin frekans ve bağlantı hattı güç değişim eğrilerindeki osilasyon, oturma zamanı, maksimum pozitif aşım ve maksimum negatif aşım gibi zaman alanı performans kriterleri bakımından diğer yaklaşımlardan daha iyi performans sergilediği gözlenmiştir.

**Anahtar Kelimeler:** yük frekans regülasyonu, iki bölgeli çok kaynaklı güç sistemi, bulanık PID denetleyici, simbiyotik organizmalar arama algoritması, optimizasyon

**ABSTRACT**

In an electric power system, adjusting frequency of the electricity generated with respect to the changing consumption is named load frequency regulation (LFR). LFR is quite significant in power system design and operation. In the present research, LFR in a two-area multi-source power system is considered. As secondary controller, fuzzy PID controller is preferred and proposed. For proper parameter adjustment, widely-used symbiotic organisms search (SOS) algorithm is benefitted. The simulated power system is modelled in MATLAB/Simulink platform and the SOS codes are written in MATLAB/M-file script. The obtained results are contrasted again the results published in prestigious journals. According to the obtained findings, it is observed that the proposed controller yields better performance than other approaches from the viewpoints of time domain performance criteria such as oscillations, settling time, maximum overshoot and maximum undershoot in the frequency and tie-line power deviations.

**Keywords:** load frequency regulation, two-area multi-source power system, fuzzy PID controller, symbiotic organisms search algorithm, optimization



### GİRİŞ

Güç sistemlerini optimum çalışma durumunda tutmak için sistemlerin kontrol edilmesi gerekmektedir. Bütün elektrik enerjisi üretim merkezleri birbirine ve sisteme senkronize şekilde bağlı olduğu için her bir sistem aynı frekansa sahiptir. Bundan dolayı güç sistemlerinin verimli ve kararlı çalışabilmesi için frekans sabit kalmalıdır. Güç sistemlerinin sabit frekansta çalışabilmesi güç dengesi ile mümkündür [1]. Güç dengesinde üretilen aktif güç toplamı, sistemdeki kayıp ve iletim hatları üzerinden geçen güç toplamına eşit olmalıdır. Frekansı etkileyen en önemli parametrelerden biri aktif güçtür. Kastedilen güç dengesi, aslında aktif güç dengesini sağlayarak olacaktır. Üretilen enerji fazla ise frekans değeri artacaktır. Tüketilen enerji fazla ise bu kez frekans değeri azalacaktır. Tüketilen enerjinin karmaşık ve sürekli değiştiği günümüz dünyasında üretilen ve tüketilen güç arasındaki dengeyi sağlayabilmek için etkin ve hızlı cevap üretebilecek bir denetime ihtiyaç vardır.

İki veya daha fazla bölgenin birbirlerine bağlı/enterkonnekte güç sistemlerinde sistem frekansında meydana gelen değişimlerin kontrol edilmesi ve iletim hatlarındaki yüklenmelerin belirlenen değerler içinde kalacak şekilde generatörlerin aktif güç çıkışlarının ayarlanması yük frekans regülasyonu (YFR) olarak adlandırılır [2]. Bu manada YFR'nin görevi sistemde yük talebinin değişmesi durumunda veya meydana gelen herhangi bir bozucu etki anında veya parametre belirsizliklerinde sistem frekansını önceden belirlenmiş nominal seviyede tutmak ve farklı enerji üretim tesisleri arasındaki güç akışını kontrol etmektir [3]. Bu sayede üretilen gücün kalitesi artarak güç sisteminin güvenliği, güvenilirliği ve kararlılığı iyileştirilmiş olacaktır.

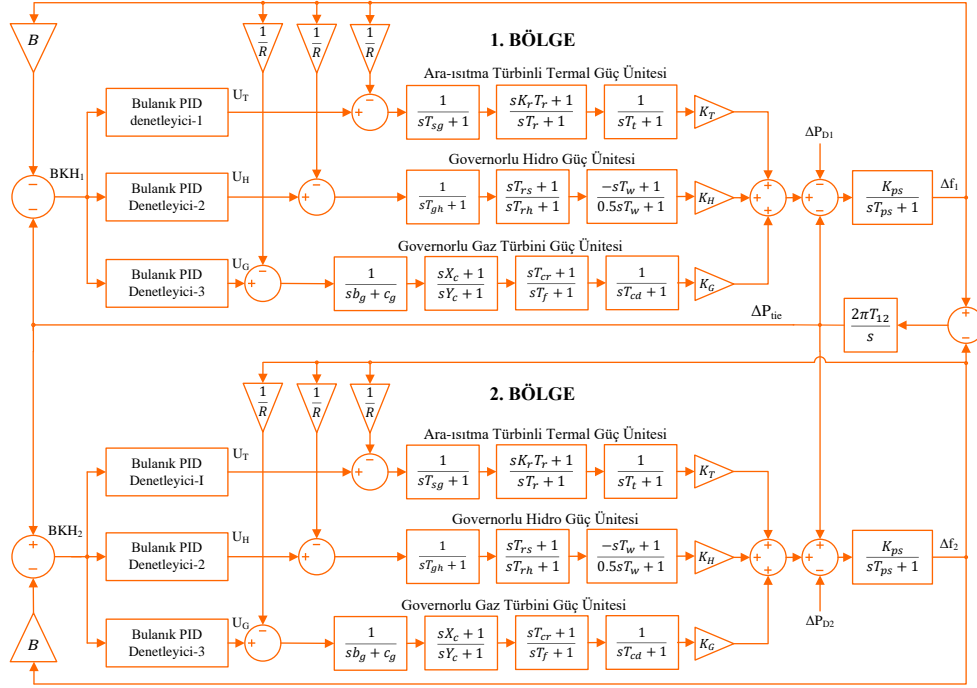
Literatürde YFR ile ilgili çok çeşitli çalışmalar bulunmaktadır. Bu çalışmalarda denetleyici parametrelerinin optimizasyonu sürecinde aday çözümlerin uygunluğunu/kalitesini değerlendirmek için genelde dört amaç fonksiyonunun kullanıldığı göze çarpmaktadır. Bunlar; zaman ağırlıklı mutlak hatanın integrali (Integral Time-Weighted Absolute Error (ITAE)), hata karelerinin integrali (Integral Squared Error (ISE)), zaman ağırlıklı hata karelerinin integrali (Integral Time-Weighted Squared Error (ITSE)) ve mutlak hatanın integrali (Integral Absolute Error (IAE)) olarak sayılabilir. Bu hedef fonksiyonları içerisinde ITAE'nin minimizasyonu sistem cevabında yerleşme zamanı ve aşım bakımından iyileşme sağlamaktadır [4].

Bazı çalışmalarda ITAE amaç fonksiyonu kullanılarak bakteriyel besin arama algoritması (BBAA) [5], hibrit bakteriyel besin arama algoritması-parçacık sürü optimizasyonu (hBBAA-PSO) [6] ve diferansiyel gelişim algoritması (DGA) [7] ile klasik PI denetleyici parametreleri elde edilmiştir. Hibrit stokastik fraktal arama algoritması-desen arama tekniği (hSFAA-DA) [8] ve DGA [9, 10] ile ITAE amaç fonksiyonu kullanılarak PID denetleyici parametreleri elde edilmiştir. Bir başka etkili çalışmada geliştirilmiş stokastik fraktal arama algoritması PID denetleyici parametrelerinin en uygun değerlerinin bulunmasında kullanılmıştır [11]. Bu çalışmada ITAE amaç fonksiyonundan farklı olarak daha makul yeni bir amaç fonksiyonu önerilmiştir. [12] ve [13] numaralı çalışmalarda öğretme-öğrenmeye dayalı optimizasyon algoritması (ÖÖOA) ile ITAE amaç fonksiyonu yardımıyla PID ve iki serbestlik dereceli PID (2SD PID) denetleyici parametreleri elde edilmiştir. [14]'de hibrit parçacık sürü optimizasyonu-desen arama (hPSO-DA) tekniği ile ITAE amaç fonksiyonu kullanılarak bulanık PI denetleyici parametreleri elde edilmiştir. Bir başka çalışmada çığırnlığa dayalı parçacık sürüsü optimizasyonu (CRAZY-PSO) ile ISE ve ITSE amaç fonksiyonları yardımıyla PI denetleyici parametreleri elde edilmiştir [15]. [16]'da ise geliştirilmiş gri kurt optimizasyon (GGKO) algoritması kullanılarak ITAE amaç fonksiyonu ile PI, PID ve eklemeli PI-PD denetleyici parametrelerinin en uygun değerleri bulunmuştur.

Bu çalışmada iki bölgeli çok kaynaklı bir güç sistemi düşünülmüş ve bu sistemin YFR performansını iyileştirmek için bulanık PID denetleyici tasarlanmış ve önerilmiştir. Denetleyici parametrelerinin optimizasyonu için güçlü yapısı ile bilinen simbiyotik organizmalar arama (SOA) algoritması tercih edilmiştir. Benzetimi gerçekleştirilen güç sistemi MATLAB/Simulink ortamında modellenmiş, algoritma ise MATLAB/M-file ortamında kodlanmıştır. Önerilen yaklaşımın performansını test etmek için elde edilen sonuçlar literatürde yayımlanan sonuçlarla karşılaştırılmıştır. Karşılaştırma sonuçlarında frekans ve bağlantı hattı güç değişim eğrilerindeki salınım, oturma zamanı, maksimum negatif aşım ve maksimum pozitif aşım gibi zaman alanı performans göstergeleri analiz edilmiştir.

İKİ BÖLGELİ ÇOK KAYNAKLI GÜÇ SİSTEMİNİN TRANSFER FONKSİYONU MODELİ

Bu bölümde iki bölgeyi çok kaynaklı güç sisteminin benzetim çalışmalarında kullanılan dinamik modeli verilmiştir. Şekil 1’te bu modelin YFR tasarımı ve analizi için yaygın olarak kullanılan transfer fonksiyonu modeli görülmektedir. Bu sistem iki ayrı çok kaynaklı bölgenin birbirlerine AA bağlantı hattı ile bağlanmasıyla oluşturulur. Her bölge termik ünite, hidro ünite ve gaz ünitesi olmak üzere üç farklı üniteye sahiptir. Sistemdeki her kontrol bölgesinin 5 girişi 2 çıkışı bulunmaktadır. Örneğin; 1. bölgenin girişleri denetleyici çıkışları  $U_T$ ,  $U_H$  ve  $U_G$ , yük değişimi  $\Delta P_{D1}$  ve iki bölge arasındaki bağlantı hattı güç değişimi  $\Delta P_{tie}$ ’dir. Çıkışlar ise frekans değişimi  $\Delta f_1$  ve bölge kontrol hatasıdır (BKH<sub>1</sub>).



Şekil 1. İki alanlı çok kaynaklı güç sistemi modeli

BKH şu şekilde hesaplanır;

$$\begin{aligned} BKH_1 &= -B\Delta f_1 - \Delta P_{tie} \\ BKH_2 &= -B\Delta f_2 + \Delta P_{tie} \end{aligned} \quad (1)$$

Her ünitenin üretilen güce katkı miktarı  $K_T$ ,  $K_H$  ve  $K_G$  sabitleriyle belirlenmektedir.  $B$  frekans yönelim faktörüdür. Termik ünite için sistem parametreleri şu şekildedir:  $R$  hız regülatör sabiti,  $K_T$  ünitenin katılım faktörü,  $T_{sg}$  hız regülatörü süresi,  $K_r$  ara-ısıtma kazancı,  $T_r$  ara-ısıtma zaman sabiti ve  $T_t$  buhar türbini zaman sabitidir. Hidro ünite için sistem parametreleri şu şekildedir:  $K_H$  ünitenin katılım faktörü,  $T_{gh}$  hidro-türbin hız regülatörünün ana servo zaman sabiti,  $T_{rs}$  hidro türbin hız regülatörünün sıfırlama süresi,  $T_{rh}$  geçici düşüş zaman sabiti ve  $T_w$  cebri borudaki suyun nominal başlangıç zamanıdır. Gaz ünitesi için sistem parametreleri şu şekildedir:  $K_G$  ünitenin katılım faktörü,  $c_g$  gaz türbini valfi konumlandırıcısı,  $b_g$  valf konumlandırıcısının gaz türbini sabiti,  $X_c$  ve  $Y_c$  sırasıyla gaz türbini hız regülatörünün sağlama ve gecikme süresi sabiti,  $T_{cr}$  gaz türbininin yanma reaksiyonu zaman gecikmesi,  $T_f$  yakıt zaman sabiti ve  $T_{cd}$  kompresör deşarj hacmi zaman sabitidir. Benzetim çalışmalarında kullanılan parametre değerleri şu şekilde ayarlanmıştır:  $f = 60$  Hz,  $B = 0.4312$  p.u MW/Hz,  $R = 2.4$  Hz/p.u,  $T_{sg} = 0.08$  s,  $K_r = 0.3$ ,  $T_r = 10$  s,  $T_t = 0.3$  s,  $T_{gh} = 0.2$  s,  $T_{rs} = 5$  s,  $T_{rh} = 28.75$  s,  $T_w = 1$  s,  $b_g = 0.05$  s,  $c_g = 1$ ,  $X_c = 0.6$  s,  $Y_c = 1$  s,  $T_{cr} = 0.01$  s,  $T_f = 0.23$  s,  $T_{cd} = 0.2$  s,  $K_T = 0.543478$  p.u,  $K_H = 0.326084$  p.u,  $K_G = 0.130438$  p.u,  $K_{ps} = 68.9566$  Hz/p.u,  $T_{ps} = 11.49$  s,  $T_{12} = 0.0433$  p.u MW/rad.

SİMBİYOTİK ORGANİZMALAR ARAMA ALGORİTHMASI

Simbiyotik organizmalar arama (SOA) algoritması Cheng ve Prayoga tarafından geliştirilen yeni, etkili ve güçlü yapıya sahip metasezgisel bir optimizasyon tekniğidir [17]. Popülasyon tabanlı, doğadan ilham

alan SOA'da çözüm kümesi ekosistem olarak adlandırılır ve ekosistemdeki her bir çözüme organizma adı verilir. Ekosistemdeki iki organizma arasındaki biyolojik etkileşim taklit edilerek yeni çözümler üretilir. Bir organizmanın ekosistemde hayatta kalabilmek için diğer organizmalarla kurduğu simbiyotik ilişkiler sırayla ortak yaşam (mutualism), fayda (commensalism) ve asalaklık (parasitism) olarak verilmektedir [17-19].

Ortak yaşam fazı; karşılıklı yarar sağlanan iki farklı organizmanın simbiyotik ilişkisini gösterir. Bu fazın çalışma mantığı Eş. 2 ve Eş. 3'de verilmiştir.  $X_i$ , ekosistemdeki organizma,  $X_j$  ise  $X_i$  ile etkileşime girecek ekosistemden rastgele seçilen bir başka organizmadır.  $BF_1$  ve  $BF_2$  fayda faktörleri,  $X_{best}$  ise ekosistemde adaptasyon derecesi en yüksek olan en iyi bireydir.

$$X_{i\text{new}} = X_i + \text{rand}(0,1) \times (X_{best} - \text{Mutual\_Vector} \cdot BF_1) \quad (2)$$

$$X_{j\text{new}} = X_j + \text{rand}(0,1) \times (X_{best} - \text{Mutual\_Vector} \cdot BF_2) \quad (3)$$

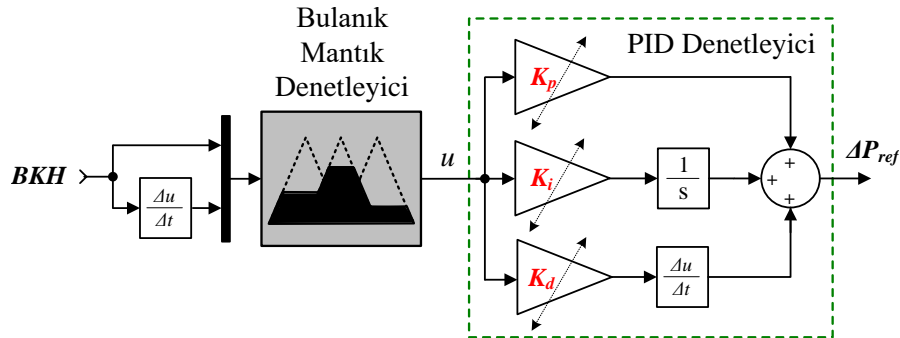
Fayda fazı; iki farklı organizmadan birinin yarar sağladığı, diğerinin ise etkilenmediği simbiyotik ilişkiyi gösterir. Bu fazın çalışması Eş. 4 ile tanımlanmıştır.

$$X_{i\text{new}} = X_i + \text{rand}(-1,1) \times (X_{best} - X_j) \quad (4)$$

Son olarak asalaklık fazı organizmalardan birinin yarar diğerinin zarar gördüğü simbiyotik ilişkidir. [17] no'lu kaynaktaki blok diyagramı kullanılarak SOA algoritması MATLAB/M-file ortamında kodlanmıştır.

### ÖNERİLEN DENETLEYİCİ YAPISI VE OPTİMİZASYONU

Önerilen denetleyici yapısı Şekil 2'de görülmektedir. Burada bulanık mantık denetleyici ile PID denetim organının art arda, eklemeli şekilde bağlandığı görülmektedir. BKH sinyali tasarlanan denetleyici ile işlendikten sonra güç sistemi için gerekli referans sinyal  $\Delta P_{ref}$  üretilmektedir. Bulanık mantık denetleyicinin girişlerinde herhangi bir kazanç kullanılmamıştır. PID denetleyicinin oransal  $K_p$ , integral  $K_i$  ve türev  $K_d$  parametreleri denetleyicinin çıkışında kazanç olarak görev yapmaktadırlar. Bulanık PID denetleyiciden maksimum performansı elde edebilmek için  $K_p$ ,  $K_i$  ve  $K_d$  parametrelerinin en iyi şekilde ayarlanması gerekir. Bu çalışmada bu parametreler deneme-yanılma yoluyla değil, SSA ile optimal şekilde ayarlanmaya çalışılmıştır.

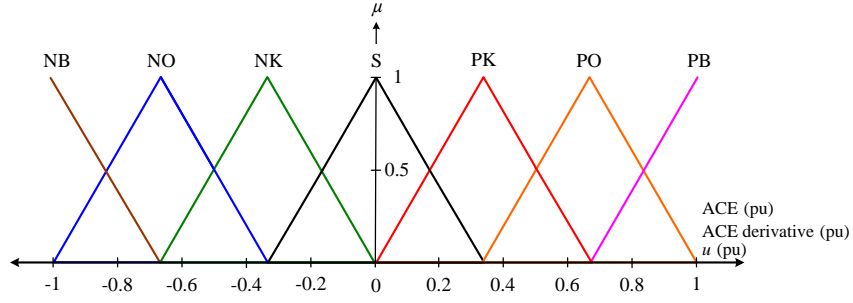


Şekil 2. Eklemeli bulanık PI denetleyicinin yapısı

Bulanık mantık denetleyicinin 2 girişi ve 1 çıkışı için 7 adet üyelik fonksiyonu tanımlanmıştır. Üyelik işlevlerinde kullanılan dilsel etiketler şu şekilde tanımlanır; NB: negatif büyük, NO: negatif orta, NK: negatif küçük, S: sıfır, PK: pozitif küçük, PO: pozitif orta and PB: pozitif büyük. Tüm üyelik fonksiyonları üçgen formundadır ve Şekil 3'te görüldüğü gibi  $[-1,1]$ 'da tanımlanmışlardır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023



Şekil 3. Tanımlanan üçgen üyelik işlevleri

Girişler için 7 üyelik fonksiyonu olduğundan tanımlanması gereken bulanık kural sayısı  $7 \times 7 = 49$ 'dur. Kurallar uzman bilgisi ve benzetim çalışmalarında elde edilen sonuçlara göre Tablo 1'deki gibi tanımlanmışlardır.

Tablo 1. Bulanık mantık denetleyicide kullanılan kural tablosu

		BKH türevi						
		N B	N O	N K	S	PK	PO	PB
B K H	N B	N B	N B	N B	N O	N O	N K	S
	N O	N B	N O	N O	N O	N K	S	PK
	N K	N B	N O	N K	N K	S	PK	PO
	S	N O	N O	N K	S	PK	PO	PO
	PK	N O	N K	S	PK	PK	PO	PB
	PO	N K	S	PK	PO	PO	PO	PB
	PB	S	PK	PO	PO	PB	PB	PB

Giriş kısmında belirtilen amaç fonksiyonlarının matematiksel ifadeleri sırasıyla Eş. 5, Eş. 6, Eş. 7 ve Eş. 8'de verilmiştir. Bu eşitliklerde;  $t$  zamanı,  $T$  benzetim süresini,  $\Delta f_1$  ve  $\Delta f_2$  bölgelerdeki frekans değişimlerini ve  $\Delta P_{tie}$  iki bölgeyi birbirine bağlayan iletim hattındaki güç değişimini göstermektedir. YFR çalışmalarında ITAE'nin diğer integral tabanlı hata kriterlerine göre daha iyi sonuçlar ürettiği görülmüştür [20, 21].

$$IAE = \int_0^T (|\Delta f_1| + |\Delta f_2| + |\Delta P_{tie}|). dt \quad (5)$$

$$ISE = \int_0^T [(\Delta f_1)^2 + (\Delta f_2)^2 + (\Delta P_{tie})^2]. dt \quad (6)$$

$$ITSE = \int_0^T [(\Delta f_1)^2 + (\Delta f_2)^2 + (\Delta P_{tie})^2]. t. dt \quad (7)$$

$$ITAE = \int_0^T (|\Delta f_1| + |\Delta f_2| + |\Delta P_{tie}|). t. dt \quad (8)$$

Yürütülen algoritmada ITAE değerinin minimizasyonu ile salınım/sapma miktarı küçük, 0 p.u referans değere en küçük oturma zamanı ile çabucak yerleşen cevap eğrilerinin elde edilmesi amaçlanmıştır. Sonuç olarak bulanık PID denetleyici tasarım problemi kısıtlı optimizasyon problemi olarak düşünülerek edilerek çözülmeye çalışılmıştır. Optimizasyon problemindeki kısıtlar denetleyici parametrelerinin alt ve üst sınırlarıdır. Optimizasyon problemi basitçe Eş. 9'daki gibi tanımlanabilir.

Aşağıdaki eşitsizlik kısıtlarını dikkate alarak ITAE değerini minimum yap

Eşitsizlik kısıtları:

$$\left. \begin{array}{l} K_p^{min} \leq K_p^* \leq K_p^{max} \\ K_i^{min} \leq K_i^* \leq K_i^{max} \\ K_d^{min} \leq K_d^* \leq K_d^{max} \end{array} \right\} \quad (9)$$

Eş. 9'da *min* ve *max* üst indisleri denetleyici parametrelerinin sırasıyla alt ve üst sınırlarını göstermektedirler. Bu çalışmada sınırlar -3 ve 3 olarak ayarlanmıştır. Optimizasyon sonrasında minimum ITAE değeri için elde edilen  $K_p^*$ ,  $K_i^*$  ve  $K_d^*$  değerleri benzetim çalışmalarında kullanılmışlardır.

### BENZETİM SONUÇLARI VE TARTIŞMA

Transfer fonksiyonu Şekil 1'de gösterilen sistemde iki bölge benzer olduğu için bu bölgelerde kullanılan denetleyiciler de benzer kabul edilmişlerdir. Bu manada toplam 6 parametrenin belli koşullar altında en iyi değerlerinin bulunması gerekir. 1. Bölgedeki basamak yük değişiminin %2 ( $\Delta P_{D1}=0.02$  puMW), diğer bölgedeki yük değişiminin sıfır olduğu ( $\Delta P_{D2}=0$  puMW) kabul edilerek SAA ile elde edilen denetleyici parametreleri Tablo 2'de verilmiştir. Bu parametreler kullanılarak elde edilen  $\Delta f_1$ ,  $\Delta f_2$  ve  $\Delta P_{tie}$  sinyallerinin oturma zamanı (ST), maksimum negatif aşım (US), maksimum pozitif aşım (OS) ve ITAE değerleri de bu tabloda gösterilmiştir. Oturma zamanı için  $\pm 0.0004$  tolerans bant kullanılmıştır. Karşılaştırmalı en iyi değerler kalın fontla vurgulanmıştır. Aynı zamanda elde edilen sonuçların literatüre katkısını göstermek için çeşitli çalışmalarla benzer şartlarla karşılaştırmalar yapılmıştır. Bu çalışmalar diferansiyel gelişim algoritması (DGA) [9]/geliştirilmiş gri kurt optimizasyonu (GGKO) algoritması [16]/hibrit stokastik fraktal arama algoritması-desen arama (hSFA-DA) tekniği [8] ile ayarlanan PID denetleyici ve yusufçuk arama algoritması (YAA) ile ayarlanan kesirli dereceli PID (KDPID) denetleyicidir [20].

Tablo 2'de verilen ITAE değerleri incelendiğinde SOA algoritması ile ayarlanan bulanık PID denetleyicinin diğer yaklaşımlara nazaran daha düşük ITAE değeri sunduğu görülür (ITAE=0.1416). Bu sonuç cevap eğrilerinin iyileştiği anlamına gelir. Nitekim önerilen yaklaşım ile elde edilen ST/US/OS gibi zaman alanı karakteristik değerlerinin literatürde bulunan diğer sonuçlardan daha iyi olduğu görülmüştür (ST:  $\Delta f_1=8.46$ ,  $\Delta f_2=5.05$ ,  $\Delta P_{tie}=4.93$ ; US:  $\Delta f_1=0.0155$ ,  $\Delta f_2=0.0081$ ,  $\Delta P_{tie}=0.0027$ ; OS:  $\Delta f_1=7.65E-04$ ,  $\Delta f_2=3.15E-04$ ). Öte yandan YAA tabanlı KDPID denetleyici,  $\Delta P_{tie}$  cevap eğrisi için daha düşük OS değeri sunmuştur. Son olarak, GGKO tabanlı PID denetleyici tepkilerinin yavaş olduğu, 0 p.u değeri aşmadan referans değere oturduğu gözlemlenmiştir. Bundan dolayı OS değerleri ölçülemediğinden Tablo 2'de n/a olarak işaretlenmiştir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

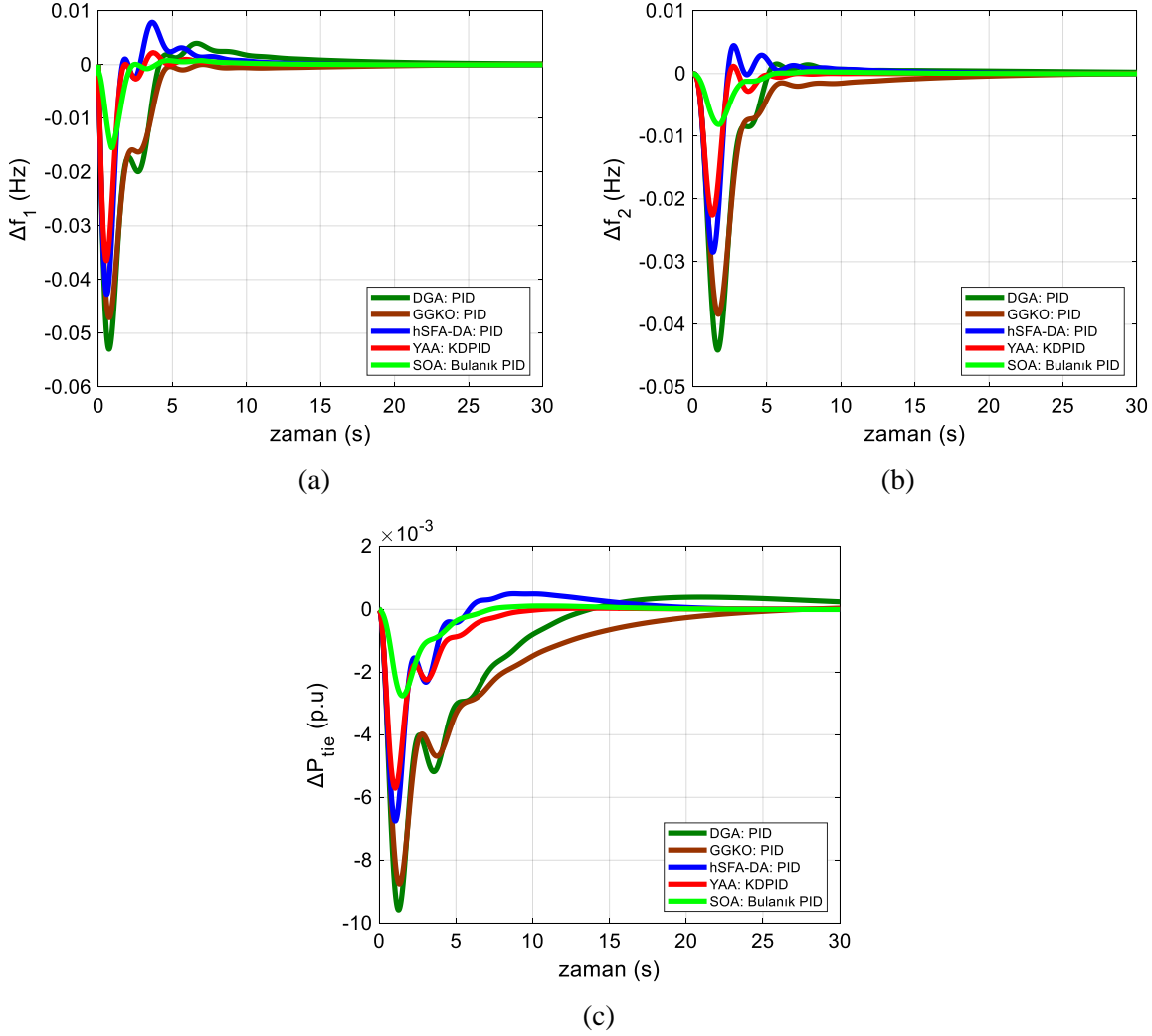
October 13-14, 2023

Tablo 2. Denetleyici parametreleri ve cevap eğrilerinin ST/US/OS/ITAE değerleri

Algoritma: Denetleyici	DGA: PID [9]	GGKO: PID [16]	hSFA-DA: PID [8]	YAA: KDPID [20]	SOA: Bulanık PID	
Denetleyici parametreleri	<b>Ünite 1: Termik</b> $K_p=0.7790$ $K_i=0.2762$ $K_d=0.6894$	<b>Ünite 1: Termik</b> $K_p=1.7502$ $K_i=-0.0087$ $K_d=0.7499$	<b>Ünite 1: Termik</b> $K_p=-1.7074$ $K_i=-1.9589$ $K_d=-1.3934$	<b>Ünite 1: Termik</b> $K_p=1.9998$ $K_i=2.0000$ $K_d=1.9999$ $\lambda=0.5021$ $\mu=0.2386$	<b>Ünite 1: Termik</b> $K_p=3.0000$ $K_i=2.9780$ $K_d=2.7692$	
	<b>Ünite 2: Hidro</b> $K_p=0.5805$ $K_i=0.2291$ $K_d=0.7079$	<b>Ünite 2: Hidro</b> $K_p=0.3110$ $K_i=0.3102$ $K_d=0.0034$	<b>Ünite 2: Hidro</b> $K_p=-0.7453$ $K_i=0.1375$ $K_d=-0.9896$	<b>Ünite 2: Hidro</b> $K_p=1.2029$ $K_i=1.1908$ $K_d=-0.4375$ $\lambda=0.5072$ $\mu=0.3748$	<b>Ünite 2: Hidro</b> $K_p=2.5741$ $K_i=-1.4130$ $K_d=0.0326$	
	<b>Ünite 3: Gaz</b> $K_p=0.5023$ $K_i=0.9529$ $K_d=0.6569$	<b>Ünite 3: Gaz</b> $K_p=0.0091$ $K_i=1.2409$ $K_d=0.6901$	<b>Ünite 3: Gaz</b> $K_p=-1.8253$ $K_i=-1.6813$ $K_d=-0.1628$	<b>Ünite 3: Gaz</b> $K_p=1.1908$ $K_d=-0.4375$ $\lambda=0.5072$ $\mu=0.3748$ <b>Ünite 3: Gaz</b> $K_p=0.9272$ $K_i=2.0000$ $K_d=1.9999$ $\lambda=1.2105$ $\mu=1.2682$	<b>Ünite 3: Gaz</b> $K_p=2.7577$ $K_i=3.0000$ $K_d=-2.6061$	
ST	$\Delta f_1$	20.91	15.69	11.47	8.31	<b>8.46</b>
	$\Delta f_2$	20.80	20.05	13.66	6.25	<b>5.05</b>
	$\Delta P_{tie}$	11.54	17.82	12.28	6.51	<b>4.93</b>
US ( $\times -1$ )	$\Delta f_1$	0.0530	0.0471	0.0427	0.0365	<b>0.0155</b>
	$\Delta f_2$	0.0441	0.0384	0.0285	0.0226	<b>0.0081</b>
	$\Delta P_{tie}$	0.0096	0.0088	0.0068	0.0057	<b>0.0027</b>
OS	$\Delta f_1$	0.0040	n/a	0.0079	0.0022	<b>7.65E-04</b>
	$\Delta f_2$	0.0016	n/a	0.0045	0.0012	<b>3.15E-04</b>
	$\Delta P_{tie}$	3.89E-04	n/a	4.99E-04	<b>3.45E-05</b>	1.07E-04
ITAE	1.0566	0.9197	0.3818	0.1557	<b>0.1416</b>	



Tablo 2’de sunulan denetleyici parametreleri kullanılarak benzetim çalışmaları gerçekleştirilmiş ve elde edilen  $\Delta f_1$ ,  $\Delta f_2$  ve  $\Delta P_{tie}$  tepkileri [0, 30]s için Şekil 4’de verilmiştir. Şekilden açıkça anlaşılacağı üzere 1. Bölge’deki 0.02 puMW’lık yük değişimiyle frekans ve bağlantı hattı güç değişim eğrileri önce düşmüş, akabinde toparlanarak referans değere oturmuşlardır. Başka bir deyişle; artan yük miktarına karşı önce frekans düşmüş, sonrasında enerji üretim tesisleri çıkışlarındaki güç miktarlarını artırarak frekans değerini nominal değere geri getirmişlerdir. Önerilen denetleyici ile elde edilen tepkiler incelendiğinde diğerlerine göre daha hızlı toparlandıkları, önemsiz bir aşım ile referans 0 p.u değere çabucak yerleştikleri görülmüştür.



Şekil 4. Birinci bölge’de 0.02 puMW’lık basamak yük değişimi sonrası elde edilen cevap eğrilerinin karşılaştırılması (a)  $\Delta f_1$  (b)  $\Delta f_2$  (c)  $\Delta P_{tie}$

## SONUÇLAR

Çalışmada YFR sistemi için ikincil denetleyici olarak bulanık PID denetleyici tasarlanmış ve denetleyici parametreleri insan yardımı olmadan SOA yöntemi ile elde edilmiştir. Ortaya konulan yöntemin performansı iki bölgeli çok kaynaklı güç sistemi üzerinde test edilmiştir. Elde edilen benzetim sonuçları literatürde bulunan sonuçlarla benzer şartlarda karşılaştırılmıştır. Karşılaştırma sonuçlarına göre önerilen yaklaşımın diğer yöntemlere kıyasla sistem tepkilerinden hesaplanan ST/US/OS/ITAE gibi zaman alanı performans göstergeleri açısından daha iyi sonuçlar sunduğu görülmüştür. Önerilen yaklaşımla elde edilen eğriler hızlı toparlanarak arzu edilen kararlı durum değerine çabucak oturmaktadırlar.

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October 13-14, 2023

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October 13-14, 2023

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ATRİAL FİBRİLASYONU OLAN KAPAK HASTALARINA UYGULANAN SERUM  
İRRİGASYONLU RADYOFREKANS ABLASYONUN BAŞARISINA MinK S38G VE ACE  
GENİN POLİMORFİZMLERİNİN ETKİSİ

EFFECT OF POLYMORPHISMS OF MINK S38G AND ACE GENE ON THE SUCCESS OF  
RADIOFREQUENCY ABLATION WITH SERUM IRRIGATION APPLIED TO VALVE  
PATIENTS WITH ATRIAL FIBRILLATION

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**ÖZET**

Bu çalışmanın amacı, MinK geni S38G ve ACE geni polimorfizmlerinin SİRFA (Serum İrrigasyonlu Radyofrekans Ablasyon) cerrahisinin başarısındaki rolü araştırmaktır. Kliniğimizde 2003 – 2008 tarihleri arasında kapak hastalığı beraberinde AF tanısı ve kapak cerrahisi beraberinde SİRFA uygulanan hastaların 64’ü kadın, 26’sı erkek olmak üzere toplam 90 hasta çalışmaya alındı. SİRFA cerrahisi sonrasında sinüs ritminde olan 30 hasta (grup I), AF devam eden 30 hasta (grup II), preoperatif kapak hastalığı olup sinüs ritminde olan 30 hasta kontrol grubu (grup III) olarak sınıflandırıldı. Genetik laboratuvarında MinK geni S38G ve ACE geni polimorfizm analizlerinin standardizasyonu yapıldı. MinK 38G allelinde yapılan çalışmalar sonucunda GG genotipine sahip hastalarda SİRFA başarısının daha düşük olduğu saptandı ( $p<0.03$ ). ACE geni ile I/D genotipine sahip hastalarda SİRFA başarısının daha az olduğu ancak istatistiksel olarak anlamlı olmadığı görüldü ( $p<0.38$ ). Sol atriyal trombusun AF grubunda daha fazla görüldüğü ve bu durumun SİRFA başarısını azalttığı saptandı ( $p<0.01$ ). AF ile ilişkisi olduğu bilinen ACE geni I/D genotipi ve MinK geni GG genotipine sahip kişilerde SİRFA başarısı azalmakla birlikte, MinK geni GG genotipine sahip kişilerde istatistiksel olarak anlamlı şekilde SİRFA başarısının azaldığını saptadık. SİRFA cerrahisi başarısını azaltan faktörler içinde genetik faktörlerin değerlendirilmesi gerektiğini düşünmekteyiz.

**Anahtar Kelimeler:** SİRFA, MinK S38G, ACE

**ABSTRACT**

In this study our aim is to research the role of MinK S38G gene and ACE gene polymorphisms in the success of Radiofrequency Ablation with Serum Irrigation (RFASI) surgery. Between 2003-2008 patients with valve disease along with AF and applied RFASI to patients who underwent to valve surgery along with AF was studied. 64 of patients were female, 26 of patients were male. Totaly 90 patients has been researched in our clinic. After RFASI surgery, 30 patients with sinus rhythm were classified as group I, 30 patients with continued AF were classified as group II and 30 patients with preoperative valve disease in sinus rhythm were classified as control group III. For the DNA analysis, MinK S38G gene and ACE gene polymorphism analysis standardization were performed at genetic laboratory. The mean age was  $48.74 \pm 10.07$  years respectively. As a result of the studies done on the MinK S38G allele, in patients with GG genotype RFASI success was lower ( $p<0.03$ ). With ACE gene, in patients with I / D genotype, RFASI success was lower but not statistically significant. ( $p<0.38$ ). Left atrial thrombuses were more in AF group and this situation is revealed on the low success of RFASI ( $p<0.01$ ). In people with the ACE gene I / D genotype and minK gene GG genotype known to be associated with AF, RFASI success is reduced, but in individuals with MinK gene GG genotype RFASI success was reduced statistically significant. We considered that the factors in reducing SİRFA surgery success, genetic factors should be evaluated.

**Keywords:** Radiofrequency Ablation with Serum Irrigation, MinK S38G, ACE

## **GİRİŞ**

Atrial fibrilasyon (AF) günümüzde en sık rastlanan uzun süreli bir aritmidir. Mortalite ve morbiditeyi önemli ölçüde artırmaktadır. AF'ye yönelik değişik enerji kaynaklar: krioablasyon, mikrodalga, elektrokoterizasyon, ultrason, lazer ve radyofrekans ablasyon gibi tedavi yöntemleri geliştirilmiştir (Ravn et al. 2008; Kazaz et al. 2006). Bu kaynaklar arasında uygulama kolaylığı ve geniş bilgi birikimi nedeniyle en sık kullanılan kaynak radyofrekans ablasyondur. SİRFA (Serum İrrigasyonlu Radyofrekans Ablasyon) cerrahisi AF bulunan hastalarda sinüs ritmini sağlamak amacıyla kullanılmaktadır. Ancak, SİRFA cerrahisi uygulanmasına rağmen bazı hastalarda sinüs ritmi görülmemektedir (Kazaz et al. 2006; Duran et al. 2003). Çalışmalarda AF ile genetik değişiklikler arasındaki ilişki ortaya konulmuştur. Bu çalışmada; SİRFA cerrahisi uygulanan AF'li hastalarda, SİRFA cerrahisinin başarısına Min K geni ve ACE geni polimorfizmlerin etkisi araştırılmıştır.

## **YÖNTEM**

Kliniğimizde 2003 – 2008 tarihleri arasında kapak hastalığı beraberinde AF tanısı ve kapak cerrahisi beraberinde SİRFA uygulanan hastaların 64'ü kadın, 26'sı erkek olmak üzere toplam 90 hasta çalışmaya alındı. Çalışmaya dahil edilen hastaların ekokardiografi ile preoperatif sol atrium çapları ve sol atriyal trombus varlığı, pulmoner arter basıncı (PAB), EKG ile hastaların preoperatif ve postoperatif ritimleri, preoperatif ve postoperatif ilaç kullanımı, pompa ve kros klemp süreleri, yapılan operasyonlar ve eşlik eden hastalıkları incelenmiştir.

Preoperatif dönemde AF ritminde olup, SİRFA cerrahisi sonrasında sinüs ritmine dönen 30 hasta grup I (sinüs grubu), AF devam eden 30 hasta grup II (AF grubu), preoperatif ve postoperatif sinüs ritminde olan 30 hasta grup II (kontrol grubu) olarak incelendi. 65 yaş üstünde olan, sol atrium çapının preoperatif ve postoperatif dönemde 6 cm'den geniş olan hastalar ve koroner arter hastalığı olan hastalar çalışma dışı bırakılmıştır.

### **Cerrahi Teknik**

Tüm hastalar median sternotomiye takiben, bikaval kanulasyon sonrası kros klemp konularak interatriyal sulkusun posteriorundan sol atriometri uygulanarak sol atrioma direkt giriş sağlandı. Mitral kapak yapısına göre replasmanlarda posterior ve/veya anterior leaflet koruma, korda transferi, kordal kısaltma gibi, mitral tamirlerde quadrangular trinagular rezeksiyon, Alfieri plasti ve ring-band anuloplasti gibi kapak kuruyucu yöntemler uygulandı. Ek cerrahi girişim olarak aort kapak replasmanı, triküspid yetmezliğinde kapak yapısına göre anuloplasti yöntemlerinden biri uygulandı. AF nedeni ile endokardiyal ablasyon uygulamak için serum irrigasyonlu Cardioblate Surgical Ablasyon Pen kullanıldı. Isı 75-80 °C olacak şekilde ortalama 10-15 saniye süreyle 25-30 Watt radyofrekans enerjisi kullanıldı. Sol atriumda trombusu bulunan vakalarda trombektomi uygulandı. İlk önce sol pulmoner venler yarım ay şeklinde yakılarak her iki uçtan sol atriometri insizyonu ile birleşecek şekilde izole edildi. Sonrasında sol pulmoner venler elips şeklinde yakılarak izole edildi. İzole edilen iki adacık düz bir hatla birleştirildi. Sol atrium apendiksine ve mitral kapak posterior anulüsüne sol pulmoner adacığından düz bir hatla yakılarak ablasyon sonlandırıldı. Sonrasında apendiksine internal ligasyon uygulandı. Ablasyondan önce kapak dikişleri termal hasar görebileceği için işlem tamamlandıktan sonra mitral kapak cerrahi prosedürüne ve ek cerrahi girişimlere geçildi. Bu çalışmada uygun DNA analiz yöntemleri ACE ve MinK gen çoğaltma analizleri yapıldı, elektroforez, agaroz jel elektroforezi, SSCP (Single strand confirmation polymorphism) yöntemleri kullanılmıştır.

### **İstatistiksel Analiz**

Verilerin istatistiksel analizinde SPSS 16.0 programı kullanıldı. Kategorik ölçümler sayı ve yüzde olarak, sürekli ölçümle ortalama ve standart sapma olarak özetlendi. Kategorik ölçümlerin gruplar arası karşılaştırılmasında Ki Kare test istatistiği kullanıldı. 2 grubun sürekli ölçümlerinin genel karşılaştırılmasında varsayımların sağlanması durumunda Student T testi, 3 grubun sürekli ölçümlerinin genel karşılaştırılmasında Tek Yönlü Varyans Analizi (One Way Anova) kullanıldı. Varyasyon homojenliği Levene testi ile ölçüldü. Tüm testlerde istatistiksel anlamlılık düzeyi 0.005 olarak alındı.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## BULGULAR

Çalışmaya 64 kadın (%71), 26 erkek (%29) olmak üzere 90 hasta alındı. Hastaların yaş ortalaması 48.74±10.07 idi. Her grup kendi içinde Yaş ortalaması, cinsiyet, ek hastalıkları demografik olarak incelenmiştir. Preoperatif antiaritmik ilaç kullanımı diğer gruplarla kıyaslandığında anlamlı olarak daha az bulundu ( $p<0.05$ ) (Tablo 1).

**Tablo 1.** Grupların demografik özelliklerinin karşılaştırılması

	Sinüs (n:30)	AF (n:30)	Kontrol (n:30)	P
Yaş	50.41±10.72	47.21±9.39	48.63±11.51	0.5
Cinsiyet				
Kadın	21 (%70.0)	19(%63.3)	24 (%80.0)	
Erkek	9 (%30.0)	11 (%36.7)	6 (%20.0)	0.35
DM	10 (%33.3)	11 (%36.7)	10 (%33.3)	0.95
HT	9 (%30.0)	10 (%33.3)	7 (%23.3)	0.68
KOAH	3 (%10.0)	3 (%10.0)	1 (%3.3)	0.53
KBY	-	1 (%3.3)	1 (%3.3)	0.99
Sigara	10 (%33.3)	9 (%30.0)	7 (%23.3)	0.68
Preoperatif Antiaritmik	18(%60.0)	24(%80.0)	9 (%30.0)	0.04

Tüm grup hastalar Trans Torasik Ekokardiografik olarak incelenmiştir. Gruplar arasında EF, sol atrium, çap ve trombüs karşılaştırılmasında EF ortalamaları ve sol atriyum çap ortalaması değerlendirildiğinde gruplar arasında istatistiksel olarak anlamlı bir farklılık belirlenmedi ( $p>0.05$ ). Sol atriyal trombüs oluşumunun AF grubunda daha fazla görülmesi istatistiksel olarak anlamlı bulundu ( $p<0.05$ ) (Tablo 2).

**Tablo 2.** Grupların preoperatif Transtorasik EKO bulgularının karşılaştırılması

	Sinüs (n:30)	AF (n:30)	Kontrol (n:30)	P
EF	50.76±4.63	49.76±5.88	49.96±4.95	0.73
LA çapı	46.40±5.18	47.80±5.71	44.00±4.97	0.06
LA trombüs	2 (%6.7)	13 (%43.3)	2 (%6.7)	*0.004
PAB	40.74±4.82	42.12±6.51	39.76±5.95	0.12

*İstatistiksel değerlendirmede, ANOVA testi (ortalama değer ± standart deviasyon) kullanıldı. \* ile işaretli olanlarda  $\chi^2$  testi kullanıldı.*

Çalışmaya katılan tüm hastalara mitral kapak replasmanı yapılmıştır. Yapılan ek cerrahi girişimler, cross-klomp süreleri ve pompa süreleri değerlendirilmiştir. Yapılan değerlendirmede, pompa süresi ortalaması en yüksek AF grubunda, en kısa kontrol grubunda belirlendi, gruplar arasındaki bu fark istatistiksel olarak anlamlı bulundu ( $p<0.05$ ). Yapılan tukey analizi AF ve sinüs grubu ile kontrol grubu arasındaki farkların anlamlı olduğu ( $p<0.05$ ), sinüs ve AF grupları arasındaki ilişkinin ise anlamlı olmadığı belirlendi ( $p>0.05$ ).

Kros klomp süresi en yüksek AF grubunda, en az kontrol grubunda olduğu istatistiksel olarak anlamlı buldu ( $p>0.05$ ). Yapılan ileri analizde AF grubu ve kontrol grubu ile sinüs grubu ve kontrol grubu arasındaki ilişki anlamlı buldu ( $p>0.05$ ).



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Gruplar arasında MinK genotipleri açısından yapılan çalışmada AF grubunda GG genotipine daha çok rastlanması istatistiksel olarak anlamlı bulundu ( $p<0.05$ ) (Tablo 4). ACE genotiplerin karşılaştırılmasında AF grubunda I/D gen polimorfizmine daha çok rastlanmasına rağmen yapılan istatistiksel çalışmada anlamlılık bulunmadı ( $p>0.05$ ) (Tablo5).

**Tablo 4.** MinK genotipleri açısından grupların karşılaştırılması

Sinüs	AF	Kontrol			P
		(n:30)	(n:30)	(n:30)	
GS		10(%33.3)	8(%26.7)	11(%36.6)	0.15
SS		11(%36.7)	4(%13.3)	7(%23.4)	0.09
GG		9 (%30.0)	18 (%60.0)	12(%40.0)	0.03

İstatistiksel değerlendirmede,  $\chi^2$  testi kullanıldı.

	Sinüs	AF	Kontrol	P
	(n:30)	(n:30)	(n:30)	
D/D	8 (%26.7)	7 (%23.3)	13 (%43.3)	0.09
I/I	6 (%20.0)	4 (%13.3)	5 (%16.7)	0.11
I/D	16 (%53.3)	19 (%63.3)	12 (%40.0)	0.38

**Tablo 5.** ACE genotipleri açısından grupların karşılaştırılması

İstatistiksel değerlendirmede,  $\chi^2$  testi kullanıldı.

Sinüs+AF grupları ile kontrol grubunun MinK genotiplerin karşılaştırılmasında Sinüs - AF grubu kontrol grubuyla karşılaştırıldığında Min K gen polimorfizmi açısından aralarındaki ilişki anlamlı bulunmadı ( $p>0.05$ ). ACE genotiplerinin karşılaştırılmasında Sinüs + AF grubu kontrol grubuyla karşılaştırıldığında; I/D genotipine sinüs+AF grubunda daha fazla rastlanması istatistiksel olarak anlamlı bulundu ( $p<0.05$ ).

Cinsiyete göre ACE genotiplerinin karşılaştırılmasında her iki cinsiyette de I/D genotipinin daha çok görüldüğü belirlendi ancak kadın ve erkekler arasında ACE genotipleri görülmesi açısından istatistiksel olarak anlamlı bir fark görülmedi ( $p>0.05$ ). MinK genotiplerinin karşılaştırılmasında her iki cinsiyet arasında Min K genotipleri görülmesi açısından istatistiksel olarak anlamlı bir fark görülmedi ( $p>0.05$ ).

## TARTIŞMA

Atriyal fibrilasyon, açık kalp cerrahisinde periopertif morbidite insidansını artıran ciddi bir risk faktörü olmaya devam etmektedir. Bu nedenle çeşitli tedavi yöntemleri denenmiştir. 1980 yılından itibaren çeşitli haritalanmalarla bu aritmiye cerrahi olarak bir tedavi seçeneği olarak bir tedavi yöntemine dönüşmüştür.

Zaman içerisinde Cox Maze ve SİRFA yöntemleri ile başarı oranları ciddi anlamda artmış, ancak bazı hastalarda AF'nin perziste etmesi engellenememiştir. Yapılan subseleler ve klinik çalışmalarda AF'nin patogenezi daha aydınlanmış, buna yönelik medikal tedaviler geliştirilmiş ve sol atrium 3 boyutlu olarak küçültme işlemleri AF tedavisinin başarısını artırmıştır.

Son zamanlarda yapılan genetik çalışmalarda ise bir takım genlerin AF'nin ortaya çıkışı, seyri ve tedaviye yanıtında etkinliği çalışılmıştır.

Ravn ve ark. (2008) tarafından yapılan çalışmada, anjiyotensinojen a-20c genotipinin tek başına veya ACE I/D genotipi ile birlikte atriyal fibrilasyon riskini artırdığı belirlenmiştir.

Ogimoto ve ark. 2002 yılında, hipertrofik kardiyomiyopatide RAS ve AF arasındaki ilişkiyi araştırmışlar; 138 hastada (26'sı AF, 112'si sinüs ritmi) ACE I/D gen polimorfizmine rastlamışlar, ACE genotipleri arasında I/D ve I/I'nın hipertrofi kardiyomiyopatili hastalarda AF gelişimi açısından risk faktörü olduğunu ve D/D genotipinin daha az önemli olduğunu belirlemişlerdir.

2004 yılında Tsai ve ark. (2004) tarafından yapılan genetik vaka-kontrol çalışmasında (250 AF, 250 kontrol), RAS genlerinin ailesel olmayan yapısal AF'de etkili oldukları belirlenmiştir. ACE gen I/D polimorfizmi, anjiyotensinojen genin T174M, M235T, G-6A, A-20C, G-152A ve G-217A polimorfizmleri ile anjiyotensin II tip I receptor geni A1166C polimorfizmi araştırılmış, haplotip analizinde anjiyotensinojen gen haplotip profili gruplar arasında önemli ölçüde farklı bulunmuş, AF grubunda M235T, G-6A ve G-217A allelleri, I/D polimorfizmi kontrol grubundan daha yüksek bulunmuş.

Bu çalışmanın kontrol grubunda D/D genotipine, sinüs+AF grubunda I/D genotipine daha çok rastlandı ve bu durum istatistiksel olarak anlamlı bulundu ( $p<0.05$ ). Yani preoperatif AF grubu ile kontrol grubu arasında ACE I/D genotipinin AF riskini artırdığını belirledik. Gruplar arası karşılaştırmada bu farklılığın SİRFA cerrahisinin azalttığı yönünde bulgular belirlendi ancak bu istatistiksel olarak anlamlı bulunmadı.

Gensini ve ark. (2003) yaptıkları çalışmada ise, 148 persistan atriyal fibrilasyonlu hasta ile 210 kişilik kontrol grubu karşılaştırılmış ve atriyal fibrilasyon riski ile ACE D/D genotipi arasında önemli bir ilişki bulunmuştur. Bu çalışmanın sonuçları bizim çalışmamızı desteklememektedir. Çalışmalar arasındaki farklılık seçilen popülasyonlar arasındaki farklılıklardan kaynaklanabileceği öne sürülmüştür.

Watanabe ve ark. (2009) yaptıkları çalışmada, lone AF grubunda kalp bloğu ve PR intervali ile ACE I/D gen polimorfizmi arasında pozitif ilişki belirlemişlerdir, D allelinin PR intervalinin uzamasıyla ilişkili olduğunu belirtmişlerdir. Tziakas ve ark. (2007) tarafından yapılan çalışmada; 158 hipertansiyon+AF'li, 174 hipertansiyon+sinüs ritimli hasta gruplarında 332 hastanın 74 (%22.3)'ünde I/I, 158 (%47.6)'inde I/D ve 100 (%30.1)'ünde D/D genotipine rastlanmıştır. Xiao ve ark. (2004) fareler üzerinde yaptığı çalışmada ise, kardiyak ACE artışının sol atriyumda büyümeyi tetikleyerek aritmiye yol açtığını belirtmişlerdir. Bizim çalışmamızda 90 hastanın 47 (%52.2)'sinde I/D, 28 (%31.1)'inde D/D ve 15 (%16.7)'inde I/I genotipine rastlandı. Literatürde I/D genotipinin fazla görülmesi bizim çalışmamızla benzerlik göstermektedir. Çalışmamızda I/D gen polimorfizminin kardiyak elektrofizyolojiyi etkileyerek AF riskini artırdığı preoperatif AF (Sinüs+ AF grubu) ve kontrol grubu karşılaştırıldığında istatistiksel olarak anlamlı ( $p<0.05$ ) bulunmasına rağmen ve SİRFA cerrahisinin başarısını istatistiksel olarak ( $p>0.05$ ) etkilemediği yönünde bulgular saptandı.

Lai ve ark. (2002) yaptıkları çalışmada, AF ve MinK geni (38G, 38S) arasındaki ilişkiyi araştırmışlardır (108 AF, 108 kontrol). Sonuçta minK 38G alleli ile AF arasında ilişki olduğu belirlenmiştir.

Prystupa ve ark. (2006) yaptığı çalışmada, MinK gen G38S polimorfizmi görülmesi açısından 69 lone AF'li hasta, 60 kişilik kontrol grubuyla karşılaştırıldı. MinK G allele AF grubunda önemli ölçüde sık rastlandı. AF grubunda hastaların, %55.07'sinde GS genotipi, %34.78'inde GG genotipi, %10.14'inde SS genotipine rastlandı. AF riskinin artması ile GG genotipi varlığı önemli ölçüde ilişkilendirilmiş, çalışma popülasyonunda S alleli varlığının AF'ye karşı koruyucu faktör olduğu saptanmıştır.

Ellinor ve ark. (2006) yaptığı çalışmada, 96 hastanın 83'ünde lone AF, 13'ünde AF ve hipertansiyon saptandı. Potasyum kanallarının KCNJ2 ve KCNE1 (minK)-5 gen mutasyonlarının AF'ye neden olabileceğini belirlediler. 331 AF'li ve 441 kontrol grubunda Fatini ve arkadaşları (2006) tarafından yapılan çalışmada minK gen 38G alleli ile atriyum fibrilasyonuna yatkınlığın artması bağlantılı bulunmuştur.

Çalışmamızın sonuçları bu araştırmalarla benzerlik göstermektedir. Preoperatif AF ile başvuran hastalar (sinüs+AF grubu) ile kontrol grubu arasında AF'li hastalarda GG genotipine daha çok rastlandı, ancak yapılan istatistiksel analizde anlamlılık saptanmadı. MinK GG genotipi olan hastalarda SİRFA cerrahisi başarısının olumsuz etkilendiği görüldü. Çalışmamızda, literatürle uyumlu olarak sol atriyal trombus riskinin, AF'li hastalarda, normal sinüs ritimli hastalara göre daha fazla olduğu belirlendi (Fustar et al.,

2006; Handa et al. 1999). Çalışmamızın sonuçlarında, preoperatif AF olan gruplarda (sinüs ve AF grubu) sol atriyal trombüsün kontrol grubuna göre daha fazla görülmesi istatistiksel olarak anlamlı bulunmuştur. Bu durumun AF'a bağlı sol atriyum dokusunun efektif kasılmamasına bağlı olduğu düşünüldü. SİRFA cerrahisi sonrası AF'u devam eden hasta grubunda (AF grubu) sol atriyal trombüsün eşlik ettiği hasta sayısının daha fazla görülmesi istatistiksel olarak anlamlı bulundu. Tüm bu bilgiler ışığında AF'un sol atriyal trombüs riskini artırdığı, sol atriyal trombüsü bulunan hastalarda da SİRFA başarısının azaldığı istatistiksel olarak belirlendi. Çalışmamızda diğer çalışmalarda olduğu gibi kadın cinsiyet hakimiyeti mevcuttu (Kazaz et al. 2006; Duran et al. 2003; Gensini et al. 2002; Prystupa et al. 2006). Yapılan istatistiksel incelemede cinsiyet ile ACE ve MinK gen değişiklikleri arasında ilişki anlamlı ilişki saptanmadı.

### SONUÇ

İleri yaş, Sol atrium çapının preop ve postop antiaritmik ilaçların kullanımının SİRFA başarısını etkilediği bir çok çalışmada bildirilmiştir. Ancak, genetik değişikliklerin aritmi cerrahisi sonuçlarına etkisi literatür tarandığında bir çok çalışma yapılmıştır. Çalışmamız sonucunda MinK geni GG genotipine sahip kişilerde SİRFA başarısının azaldığını tespit ettik. Ayrıca ACE geni I/D genotipine sahip hastalarda AF gelişme oranını istatistiksel olarak anlamlı bulmakla beraber, bu gen değişikliğinin SİRFA başarısını azaltmadığını belirledik. Çalışmamızda ayrıca sol atriyal trombüs oluşumunun literatürle uyumlu olarak AF'li hastalarda anlamlı olarak arttığını, sinüs ve AF grubu karşılaştırıldığında ise preoperatif sol atriyal trombüs varlığının SİRFA başarısını azalttığını saptadık. Sonuç olarak, AF ile ilişkisi olduğu bilinen ACE geni I/D genotipi ve MinK geni GG genotipine sahip kişilerde SİRFA başarısı azalmakla birlikte, MinK geni GG genotipine sahip kişilerde istatistiksel olarak anlamlı şekilde SİRFA başarısının azaldığını belirledik. Bu bilgiler ışığında SİRFA cerrahisi başarısını azaltan faktörler içinde genetik faktörlerinde değerlendirilmesi gerektiğini düşünmekteyiz.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## LİBERALİZM VE CUMHURİYETÇİLİK DÜŞÜNCELERİNDE KAMUSAL ALAN TASAVVURU

### CONSIDERATION OF PUBLIC SPACE IN THE THOUGHTS OF REPUBLICANISM AND LIBERALISM

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#### ÖZET

Modern ulus-devletlerin inşa edilmesinden sonra devlet ve toplum ilişkileri siyaset bilimi kapsamında önem arz eder. Modern ulus-devletlerdeki devlet-toplum ilişkisi kamusal alan biçiminde tecessüm eder. Modern toplumlarda farklı kimliklerin ve çıkarların birlikte var olabildiği bir alan olarak beliren kamusal alan, çatışma ya da uzlaşma sonucu kurulmuş bir iktidara işaret eder. Bu anlam dairesi içerisinde farklılıkları ihtiva ettiği farz edilen kamusal alan sürekli biçimde toplumsal kesimler tarafından yeniden tanımlanan ve kurgulanan bir niteliktedir. Bu izlek takip edildiğinde iki farklı siyasal ve düşünsel pozisyon olarak neşet eden liberalizm ve cumhuriyetçilik bağlamında da kamusal alanın tanımı mümkün olmaktadır. Bu çalışma kapsamında liberalizm ve cumhuriyetçilik çerçevesindeki kamusal alan tasavvurları incelenecektir. Bahse konu edilen düşünce akımlarının kamusal alana ilişkin olan tahayyüllerinin irdelenmesinden evvel kamusal alanın serencamı aktarılacaktır. Kamusal alan kapsamında ifade edilen düşüncelerin özel alana mesafe bağlamında uzlaştıkları belirtilecektir. Bununla amaçlanan şeyin kamusal alanın sınırlanması olduğu söylenecektir. Başka bir cümleyle ifade edildiğinde belli bir ahlâk üzerinden tasarlanan kamuya uygun olmayan konuların özel alana itildiği, bundan dolayı kamusal alanın sınırlandırıldığı ifade edilecektir. Kamusal alanın tanımından sonra liberalizm kapsamında tasavvur edilen kamusalın nüvesi mercek altına alınacaktır. Liberal siyaset teorisi dâhilinde toplumsal, siyasal ve ekonomik alandaki özgürlük ilkesinin önemi teslim edilmekle beraber kamusal alandaki iletişiminin kısıtlandığı beyan edilecektir. Bundan hariç olarak liberalizme dayanan kamusal alanda farklı toplumsal grupların çıkar odaklı ve pragmatik davrandıkları, ayrıca her grubun sonuca odaklandığı ve böylelikle farklılıkların ve anlaşmazlıkların üzerinin örtüldüğü ilan edilecektir. Böyle bir kamusal alanda sadece belirli konularda bir mutabakata varılabildiği söylenecektir. Bu açıdan etnik kimlik, kadın sünneti, kürtaj ve şiddet gibi mevzuların tartışılmasından ziyade özel alana itilme ihtimalinden söz edilecektir. Liberal kuram çerçevesinde ileri sürülen bireysel çıkarların aksine toplumun ortak yararını savunan cumhuriyetçiliğin kamusal alan tasarımı da incelenecektir. Cumhuriyetçi kamusal alandaki yurttaşın kamu yararına feda edilmesine erdem atfedildiği anons edilecektir. Bu açıdan yurttaşın feda olarak özneleşme imkânı verildiği belirtilecektir. Böyle bir durumda sözü edilen davranışı sergilemeyen yurttaşın kamusal alanın kapısının kapatılma ihtimalinden söz edilecektir. Nihai olarak, gerek liberalizm gerekse cumhuriyetçilik kapsamında tasavvur edilen kamusal alan modelinden kendi yaşamını kendi iradesiyle belirleyen özne tipolojisinin türemediği ileri sürülecektir.

**Anahtar Kelimeler:** Kamusal alan, liberalizm, cumhuriyetçilik.

#### ABSTRACT

After the construction of modern nation-states, state and society relations become important within the scope of political science. The state-society relationship in modern nation-states is embodied in the form of public space. The public sphere, which appears as an area where different identities and interests can co-exist in modern societies, points to a power established as a result of conflict or compromise. The public space, which is assumed to contain differences within this circle of meaning, is constantly redefined and reconstructed by social segments. When this path is followed, it is possible to define the



public sphere in the context of liberalism and republicanism, which are two different political and intellectual positions. Within the scope of this study, public space conceptions within the framework of liberalism and republicanism will be examined. Before examining the imaginations of the mentioned thought movements regarding the public space, the serendipity of the public space will be conveyed. It will be stated that the ideas expressed within the scope of public space are reconciled in the context of distance from private space. It will be said that what is intended by this is the limitation of public space. In other words, it will be expressed that issues that are not suitable for the public, designed with a certain morality, are pushed to the private sphere, and therefore the public sphere is limited. After the definition of the public sphere, the core of the public envisioned within the scope of liberalism will be examined. Although the importance of the principle of freedom in the social, political and economic fields within the liberal political theory is acknowledged, it will be declared that communication in the public sphere is restricted. Apart from this, it will be declared that in the public sphere based on liberalism, different social groups act interest-oriented and pragmatic, and that each group focuses on the result, thus covering up differences and disagreements. It will be said that in such a public sphere, agreement can only be reached on certain issues. In this respect, rather than discussing issues such as ethnic identity, female circumcision, abortion and violence, the possibility of them being pushed to the private sphere will be discussed. The public space design of republicanism, which advocates the common good of society as opposed to the individual interests put forward within the framework of liberal theory, will also be examined. It will be announced that virtue is attributed to the sacrifice of the citizen for the public good in the republican public sphere. In this respect, it will be stated that the citizen is given the opportunity to become a subject as a sacrifice. In such a case, the possibility of closing the door of the public space to the citizen who does not exhibit the mentioned behavior will be mentioned. Ultimately, it will be argued that the typology of the subject who determines his own life with his own will does not derive from the public sphere model envisioned within the scope of both liberalism and republicanism.

**Keywords:** Public sphere, liberalism, republicanism.

## GİRİŞ

17. yüzyılda modern ulus-devletlerin belirmeye başlaması ile devlet ve toplum ilişkileri gerek siyaset biliminin gerekse siyaset sosyolojisinin önemli araştırma konusu olmuştur. Devletin toplumu yönettiği bir sistemde ihtiyaç duyduğu iktidar muhakkak kendisini toplum tarafından kabul edilebilir bir nedene dayandırmak zorundadır. Devletin toplumu yönetmesi anlamına gelen iktidarın toplum tarafından kabul edilmesinin yolu ise meşru olmasından geçmektedir. Meşruiyet kavramı toplumun, devletin iktidarına rıza göstermesi ve benimsemesi anlamına gelmektedir. Bu bağlamda siyasal iktidar, meşru bir organ olarak, toplum adına karar verme yetkisini elinde bulunduran, meşru güç kullanma tekeline sahip ve bu şekilde toplumsal istikrarı sağlayan bir güç biçimidir (Çetin, 2014: 51).

Devletin toplumla ilişkisinde siyasal iktidarın muhtaç olduğu meşruiyet ilkesinin sağlanmasının bir yolu iktidarın uygulandığı toplumun değerlerine ve normlarına uygun olmasından geçmektedir. Bu anlamda iktidar, Seyla Benhabib'in tabiriyle "*meşrulaştırılması gereken bir toplumsal ilişkidir*" (Akt. Köker, 2008: 357). Bu bağlamda meşruiyet ilkesi, bir iktidar ilişkisi ağını diğer ağlara göre daha tercih edilebilir kılan haklı nedenlerin söz konusu olmasıdır. Nihai olarak toplumun rızasını içermeyen ve buna bağlı olarak meşruiyete dayanmayan bir güç ilişkisinin siyasal iktidar olması mümkün görünmemektedir (Çetin, 2014: 52).

Devlet ve toplum ilişkileri temelinde devletin elinde bulundurduğu siyasal iktidara meşruiyeti diğer bir deyişle toplumun rızasını sağlayacak olan kamusal alandır. Modern toplumlarda farklı kimliklerin ve çıkarların birlikte var olabildiği bir mekân olan kamusal alan, çatışma ya da uzlaşma sonucu kurulmuş bir iktidarın göstergesidir. Bu anlamda farklılıkları barındıran kamusal alan sürekli biçimde toplum tarafından yeniden tanımlanan ve kurgulanan bir niteliktedir. Toplumu oluşturan bireyler kamusal alanın tanımlanmasına katıldıkları oranda toplumsallığın farkına varır, içinde yaşadığı toplumsal şartları ve kendi yaşamlarını belirleyen bir özne durumuna gelirler ve bu şekilde siyasal olana yabancılaşmamış olurlar.

Bu çalışma kapsamında devlet ve toplum arasındaki ilişki üzerine geliştirilmiş refleks olarak beliren kamusal alan kavramının cumhuriyetçilik ve liberalizm düşüncelerindeki karşılığı irdelenecektir.



Metinde öncelikle kamusal alanın farklı düşünürler tarafından nasıl tanımlandığı anlatılacaktır. İkinci adımda liberalizm kapsamında tahayyül edilen kamusal alan modeli irdelenecektir. Üçüncü olarak ise cumhuriyetçi siyaset modelinde tasarlanan kamusal alan modeli merceğe alınacaktır.

### KAMUSAL ALAN NEDİR?

Kamusal alan dendiğinde akla ilk gelen çağrışımın devlet ve toplum ilişkisi olduğu giriş bölümünde belirtildi. Kamusal alan devlet ve toplumun arasında olan, ikisinin de suretini taşıyan ve ikisi arasındaki ilişkiyi tanzim eden, yansıtan bir mekândır. Devletin toplumla olan ilişkisinde toplumun üyesi olan bireyin kamusal alanda olmasından anladığımız görünür olması ve katılım yapmasıdır. Bu anlamda kamusal alanda görünür olan birey, politika yoluyla görünmeyen özel alandaki sorunlarını ve farklılıklarını da kamusal alanda dillendirme imkânı bulmaktadır.

Kamusal alanın tanımlanmasında dikkat edilmesi gereken husus bu alanın özel alan karşısında konumlanmış olmasıdır. Tabiatıyla, kamusal alan tanımlandığında özel alanla arasındaki ayrımın dikkate alınarak tanımlanması gerekir. Bu anlamda kamusal alanın kamuoyuna benzer bir şeyin oluşturulabileceği bir alana tekabül ettiği söylenebilir. Bahsi edilen alanda, özel bireylerin kamusal bir gövde oluşturarak toplandıkları her konuşma durumunda, kamusal alanın bir parçası olarak vücut buldukları ifade edilebilir (Habermas, 2010: 95).

Özel ve kamusal alan arasındaki ayrımın kökleri Antik Yunan dönemine kadar götürülebilir. Hannah Arendt kamusal alan kavramsallaştırmasında Antik Yunan polisinin agonistik kamusal alanını ideal bir kamusal alan olarak tanımlar. Agonistik terimi kamusal alanı ahlâkî ve politik büyüklüğün, kahramanlık ve seçkinliğin açığa çıktığı, sergilendiği ve başkalarıyla paylaşıldığı görünüm alanı olarak tanımlar. Arendt'e göre agonistik kamusal alan insanların tanınmak, üstün olmak ve itibar görmek için birbirleriyle rekabet ettiği ve insani olan her şeyin boşunallığını önlemek ve kalıcılığını sağlamak için güvence aradığı bir mekândır (Benhabib, 1992: 78). Kamusal alanın katılım ve görünür olma özelliğine karşın özel alan ise Arendt'in deyişiyle "*gölgede kalmış ev işlerinin alanı*" anlamındadır (Akt. Benhabib, 1992: 75). Bu bağlamda özel alan kamusala girememiş farklılıkları içinde barındıran, kamusal alanın iktidarı altında ötelenen, görülmeyen, duyulmayan ve müdahale edilmeyen bir alan olarak tanımlanabilir. Antik Yunan döneminde kamusal alan-özel alan arasındaki ilişkide özel alan agonistik kamusal alanın dışladığı kadınlar, köleler, emekçiler ve Atinalı olmayanları içermekteydi (Benhabib, 1992: 75).

Kamusal alanla özel alan arasındaki sınırların belirginleşmesinin kökeninin John Locke, Jean Jacques Rousseau ve Georg Wilhelm Friedrich Hegel'in düşüncelerinde görüldüğü belirtilebilir. Locke'un toplumsal sözleşmenin aile dışındaki toplumsal alanda yapıldığı argümanından yola çıkarak onun düşüncesinde özel alanın duygusallığın, aşkın, duygunun, merhametin ve özverinin sembolü olan kadının alanı olduğu söylenebilir (Çaha, 1998: 84). Kamusal alan ise ekonomik bağımsızlığın, rasyonel olmanın, sözleşme yapmanın ve yurttaşlığın sembolü olan erkeğe ait bir alan olarak yorumlanabilir. Bu anlamda kamusal alan tasarımında Locke'un kadını kamusal alana katmamasının sebepleri kadının ekonomik bağımlılığı, rasyonel olmaması, özel alanda hane halkına göz kulak olması ve evlilik sözleşmesi ile kamusal alandaki tüm haklarını erkeğe devretmesidir (Tannenbaum ve Schultz, 2008: 305). Böylece erkek kamusal alanda sözleşme yapan ve yurttaş olan birey olarak ailesini de temsil hakkı kazanmaktadır. Locke'un kamusal alanının siyasal boyutu mevcuttur. Kamusal alanın siyasal ayağının görevi toplumsal kamunun yaşam ve mülkiyet haklarını korumak ve güvenliğini sağlamaktır. Nihai olarak, Locke'un imgelemindeki özel alan kadının alanı iken kamusal alan sözleşmeye katılan yurttaş erkeklerin alanı ve siyasal alan ise kamusal alanın güvenliğini sağlamaktan sorumlu devletin alanıdır (Çaha, 1998: 84-85).

Locke'tan sonra kamusal alanın köklerinin bulunduğu ikinci düşünür olduğu ifade edilebilecek olan Rousseau'nun algısında kamusal alan erkeklerin yaptığı toplumsal sözleşme sonucu beliren genel iradeye tabi olma durumu yani yurttaşın diğer yurttaşlara ve devlete tabi ya da bağımlı olmasıdır. Bu anlamda kamusal alan genel irade, yeni bir toplum ve herkes için egemen bir otoritedir. Bu özelliğiyle genel irade kamusal bir şahıs, her bireyin kimliğini oluşturan bir hayat ve kendine ait iradesi olan organik bir bedendir (Tannenbaum ve Schultz, 2008: 330-335).

Kamusal alan tasarımının kökeninin görüldüğü bir diğer düşünürün Hegel olduğu belirtilebilir. Devleti "Tanrının yeryüzündeki yansıması" olarak tanımlayan Hegel, bir milletin duygu ve bilincinin ancak

devlet şuurunda birleşmesiyle anlam kazanacağına ve devlet olmadan milletin anlamsız olacağına inanmıştır (Özcan, 2008: 7). Bu anlamda Hegel'in kamusal alan modelinde devlet "*Düşüncenin en üst derecesi, aklın en mükemmel ve ahlâkîliğin en yüksek belirtisidir*" (Akt. Göze, 2005: 239). Devletin mutlak üstün olduğu kamusal alanda birey aşkın devletin taşıyıcısıdır ve devletin içinde eriyecektir. Devlet bireylere muhtaç oldukları anlamlarını verme karşılığında tüm bireylerin kamusal alanını kendi potasında eriterek kendinden menkul bir kamusal alanı doğurur. Bu anlamda gerek Rousseau gerekse Hegel'in algısındaki kamusal alan devletle bütünleşmiş bir model niteliğindedir. Rousseau ve Hegel'in imgelemindeki özel alan tasarımı ise kadınların, çocukların ve engellilerin alanıdır.

Kamusal alanın Arendt, Locke, Rousseau ve Hegel'in düşüncesinde devlet ve toplum arasında var olan bir mekân olarak tanımlandığını görmekteyiz. Her dört düşünürün algısında özel alan ailenin, kadının, ekonomik ilişkilerin, kişisel istek ve itkilerin alanı iken kamusal alan siyaseti içeren ve bu özelliğiyle katılımı mümkün kılan ve görünürlüğü bahşeden bir alan niteliğindedir. Bitirmeden önce burada dikkat çekmek istediğimiz husus kamusal alanın siyasal düşünürler ve siyaset kuramcılarının en azından bir kısmı tarafından her daim özel alanın karşısında konumlandırılarak tanımlandığıdır. Bununla amaçlanan kamusal alanın sınırlılıklar üzerinden tanımlanmasıdır. Bir diğer deyişle belli bir ahlâkîlik bağlamında tasarlanan kamuya uygun olmayan konular özel alana itilerek görünür olan kamusalın gündemine alınmamakta ve görünür olmalarına ket vurulmakta böylece kamusal alan sınırlandırılmakta ve bundan dolayı kapsayıcı olamamaktadır. Çalışmanın ilerleyen bölümlerinde cumhuriyetçi ve liberal siyaset teorilerinin kamusal alan tasarımlarında söz konusu kapsayıcılığa ne ölçüde haiz olabildikleri sorusunun cevabı aranacaktır.

### **KAMUSAL ALANDA LİBERAL MOTİFLER: İLETİŞİMSEL KISITLAMA VE YASALLIĞA DAYALI BİR KAMU ALANI TASARIMI**

Liberal ideolojinin esas alındığı yönetimlerde siyasal otoritenin varlık sebebi bireylerin hak ve özgürlüklerinin korunması ve bireylerin çıkarlarının takibinde güvenliğin sağlanmasıdır. Buna bağlı olarak liberal siyasete göre özgürlük dışsal müdahalelerden azade olma anlamındadır.<sup>1</sup> Bu anlamda liberal siyaset teorisi siyasal otoritenin müdahale edebileceği alanları olabildiğince kısıtlama ve bireylerin çıkarlarının takibini güvenli bir ortamda yapmaları için gereken ortamı sağlamayı kendisine temel görev edinmiştir. Liberal teoriye göre bireylerin kendi çıkarlarını gerçekleştirmenin sonucunda ortak çıkar da belirecektir. Bu bağlamda liberal teorinin meşruiyet ve rasyonalite anlayışının biçimsel durduğu söylenebilir (Çınar, 2005: 159). Siyasi sürecin işleminde oldukça önemli olan meşruiyetin biçimsel olması beraberinde liberal siyasi yapıda üzerinde her anlaşılmış durumun ve verilen her kararın rasyonel kabul edilmesinin ve içeriğinin incelenmemesini getirecektir.

Liberal siyaset teorisinde siyasal, toplumsal, ekonomik ve kültürel alanda çok önem verilen özgürlük ilkesinin delinmemesi adına biçimsel meşruiyetin benimsenmesi kamusal alanın iletişiminin kısıtlanması ve hukukilik üzerinden tanımlanmasına neden olmaktadır.

Bruce Ackerman, "liberal diyalog" adını verdiği modelinde farklı grupların kamusal alanda bir arada yaşama sorununu rasyonel bir şekilde nasıl çözebileceklerini sorunsallaştırdığında bunun yolunun farklılıkların dikkate alınmadığı bir tür pragmatizmden geçtiğini belirtmektedir (Ackerman, 1989: 9-10). Farklı toplumsal grupların diyalog sürecinde pragmatik davranması beraberinde her grubun sonuca odaklanmasını ve böylelikle farklılıkların ve anlaşmazlıkların üzerinin örtülmesini ve de sadece belirli konularda bir mutabakata varılmasını getirir. Ackerman, "iletişimsel kısıtlama" adını verdiği pragmatizme odaklı metodu sayesinde diyalog sürecinde bütün katılımcıların akla uygun, normatif temelde bir çıkar yolu bulacaklarına inanmaktadır (Ackerman, 1989: 16-17). Burada Ackerman'ın kamusal alan tasarımında farklı toplumsal gruplar arasında anlaşmazlık getirecek muhtemel konuların

<sup>1</sup> Isaah Berlin'in kavramsallaştırdığı bu özgürlük anlayışına göre negatif özgürlük kavramı en temel anlamda bir kişinin eylemini gerçekleştirirken müdahaleden azade olması anlamına gelir. Burada müdahaleyi yapacak olan devlet olarak kabul görmektedir. Bu bağlamda negatif özgürlük bireyin amaçlarını gerçekleştirmesinde devletin belirleyici olmasına karşı çıkar. Devletin belirleyiciliğini ortadan kaldırmanın yolu devlet ve toplum arasında bir sözleşme yapmaktan geçmektedir. Bu sözleşme ile devlet, bireyin özel alanına müdahale etmekten men edilecektir (Barry, 2003: 228-229).

ahlâkî, dini ve estetik bağlamda yer aldığını belirtmemiz gerekir. Bu anlamda toplumsal yaşamda herhangi bir bireyin özel alanına yönelik müdahale görmemesi ve özgürlüğünden olmaması için kürtaj ve şiddet gibi sözü edilen bağlama girecek mevzularla ilgili konuşmamak ve bunları özel alana hapsetmek gerekir (Benhabib, 1992: 82). Nihai olarak, Bruce Ackerman'ın kamusal alan tasarımı çalışmanın giriş bölümünde de belirttiğimiz üzere kültürel bağlamda farklı gruplardan müteşekkil modern toplumların farklılıklara rağmen ve farklılıkları içerecek biçimde kendi yaşamlarına ilişkin karara vararak özneleşmesine dayanan kamusal alan tasarımı içermektedir.

Liberal kamusal alanın hukukilik üzerinden tanımlanmasıysa siyasal ilişkilerin hukuki ilişkiler tasarımı üzerinden düşünülüp dar bir bakış açısından ele alınmasına neden olmaktadır (Benhabib, 1992: 83). Siyasal ilişkilerde hukukun üstünlüğü ilkesinin var olması devlete karşı bireyin hak ve özgürlüklerinin korunmasını garanti altına alırken, bireyin katılımcı demokrasinin gereği olan siyasi karar alma süreçlerine katılımı konusunda bir açılım sunamamaktadır. Bununla birlikte siyasal ilişkilerde hukukun üstünlüğünün olması toplumsal yaşamda tarafsızlığı getirdiğinden kültürel farklılıklar kamusal alana çıkarmakta bundan dolayı kamusal alanda çoğulculuk ve katılım yayılamamakta ve siyasi tartışma konularının kapsamı sınırlanmaktadır (Köker, 2008: 358-360).

Farklılıkların özel alanda yaşanması üzerine kamusal alan tahayyülünde bulunan devletle bu farklılıkları kamusal alanda yaşamayı savunan toplum arasındaki boşluğu liberal siyaset teorisinin dolduramadığını anlattıktan sonra, cumhuriyetçi siyaset kuramının bu boşluğu doldurup dolduramadığı incelenektir.

### **CUMHURİYETÇİ SİYASETİN AÇMAZI: KAMUSAL ALANIN AHLÂKÎLİK ÜZERİNDEN YAPILANDIRILMASI**

Kökleri Antik Yunan düşünce, pratik ve felsefesine dayanan cumhuriyetçilik, siyasi otoritenin meşruiyet kaynağının halktan kaynaklanmasını öngören, bu anlamda kendi kendini yönetebilen bağımsız bir siyasal toplumda yaşayan vatandaşların özgür olabilmeleri için “nasıl bir yönetim gereklidir?” sorusunu içeren bir düşüncedir (Keyman ve Turnaoğlu, 2008-09: 40). Cumhuriyetçi siyasete göre vatandaşların özgürce yaşaması özgür bir devleti gerektirir. Özgür bir devletin de özgürlüğünü kaybetmemesi için liberal kuramın savunduğunun aksine vatandaşların bireysel çıkarlarını bırakıp toplumun ortak yararına kendilerini adanmaları gerekir. Böylelikle kendini toplumun çıkarına adayan vatandaş birey sivil erdemi edinecektir.

Toplumun dışında herhangi bir özgürlükten bahsetmenin imkânsız olacağını düşünen cumhuriyetçi siyaset hukuk temelli bir kamusal alan tahayyülünde bulunur. Buna göre, hukuk temelli kamusal alan her bireyin kendinin evrensel bilincine vardığı, kendi özel çıkarını herkesin çıkarından ayırmamayı öğrendiği bir vatandaşlık alanıdır (Bilgin, 2008-09: 108). Toplumun refahından sorumlu olan vatandaş ortak iyinin tanımlanmasına katkı yaptığı sürece özgürdür. Tabiatıyla cumhuriyetçi kamusal alandaki vatandaş siyaset kanalıyla yaşadığı toplumun geleceğine yön veren kişidir (Çınar, 2005: 159). Cumhuriyetçi siyasete göre kamusal alan her insanın kendi özel alanında herhangi bir baskı hissetmeden kendi amaçlarının takibinin koşuludur (Bilgin, 2008: 108). Cumhuriyetçi kamusal alan özgürlüklerin bir arada var olmasını sağlayarak bireysel özgürlüğü mümkün kılar. Kamusal alanın hukuk temelinde inşa edilmesi ise hukukun üstünlüğünü getirir.

Cumhuriyetçi kamusal alanı bu özellikleriyle tasvir ettikten sonra farklılıkların kamusal alanda yaşayabilmesi sorunsalı bağlamında irdelendiğinde bunun pek mümkün olmadığı ileri sürülebilir. Cumhuriyetçi kamusal alan liberalizmin üstte tuttuğu bireyi topluma bağımlı yurttaş statüsüne sokarak ve bu yurttaşın kamu yararı adına fedakârlık yapabileceğini öngörüp ona erdem atfederek kamusal alana ahlâkî bir ton katar. Cumhuriyetçi kamusal alana yönelik ahlâkî oluş atfi özel alan-kamusal alan ayrımını yok ederek, hak ve özgürlükleri görmezden gelir. Bununla birlikte bu ahlâkî halin belirmesi cumhuriyetçi kamusal alandaki vatandaşın ortak iyinin tanımlanmasını mümkün kılan özne değil, tanımlanmasına katılan bir nesne olmasına neden olur (Çınar, 2005: 160-161).

Ahlâkîleştirilmiş bir kamusal alan düşüncesi, bu düşüncüyü benimsemeyen siyasi hareketleri ahlâk dışı ve irrasyonel olarak değerlendirir, bastırır ve böylece onlara kamusal alanda var olma şansı tanımaz. Biraz daha açarak söylemek gerekirse, kamusal alanın belli bir ahlâkî hal üzerinden tanımlanması fikri vatandaşların o kamusal alana katılımı için homojenleşmelerini şart koşar. Bu durum o ahlâkî durumu kabul etmeyen toplumsal grupların kamusal alandan dışlanmasını, yok sayılmasını beraberinde getirir (Çınar, 2005: 161-162).

## SONUÇ

Modern toplumlarda farklı kimliklerin ve çıkarların birlikte yaşayabildiği bir mekân olan kamusal alanın söz konusu bu farklı kimliklerin çatışması ya da uzlaşması sonucu kurulması gerekir. Bu meyanda farklılıkları barındıran kamusal alan sürekli biçimde toplum tarafından değişen ve gelişen siyasal ve toplumsal şartlara ve bağlamlara göre yeniden tanımlanmakta ve sürekli kurgulanmaktadır. Toplumu oluşturan bireyler kamusal alanın tanımlanmasına katıldıkları oranda toplumsallığın farkına varır, içinde yaşadığı toplumsal şartları ve kendi yaşamlarını belirleyen bir özne durumuna gelirler.

Çalışma kapsamında irdelenen liberal siyaset teorisinin kamusal alan modelinde bireysel özgürlüklere zarar verilebileceği endişesiyle farklılıkların özel alanda tutulması, kamusal alana taşınmaması gerektiği ve bu farklılıklar karşısında devletin tarafsız durması gerektiği fikri aktarıldı. Farklılıkların özel alanda tutulması ve devletin tarafsız üslubu siyaseti bireysel çıkarların kovalanması düzeyine getirmekte ve bu bağlamda siyasetin içeriğini boşaltmaktadır. Cumhuriyetçi kamusal alan tasarımı ise siyaseti ortak çıkarlar çerçevesinde algılamakta ve bu anlamda bireyi yurttaş olarak tanımlayarak özgürlüğünü toplumun özgürlüğüne feda etme riskini taşımaktadır. Kamusal alana ahlâkîlik atfeden cumhuriyetçi siyaset, kamusal alana yurttaşın girmesini belirli kıstaslara bağlamakta ve bu özelliğiyle de dışlayıcı olmaktadır.

Her iki kamusal alan modelinin farklılıkları barındırmaması durumundan hareketle mevcut kamusal alan modellerine alternatif bir kamusal alan tasarımının elzem hale geldiği ifade edilebilir.

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PAMUK (*GOSSYPİUM HİRSUTUM L.*) BİTKİSİNDE FARKLI ORANLARDA UYGULANAN  
SULAMA SUYUNUN YAĞ ORANI VE YAĞ ASİDİ KOMPOZİSYONLARI ÜZERİNE  
ETKİSİ

EFFECT OF IRRIGATION WATER APPLIED AT DIFFERENT RATES ON OIL CONTENT  
AND FATTY ACID COMPOSITIONS IN COTTON (*GOSSYPİUM HİRSUTUM L.*) PLANT

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**ÖZET**

Bu çalışma, 2022 yılı pamuk yetiştirme sezonunda Şanlıurfa-Harran koşullarında deneme desenine göre Fiona pamuk çeşidi kullanılarak ve 3 tekrarlamalı olarak deneme kurulmuştur. Sulama konuları (%50, %75 ve %100) olarak yapılmıştır. Çalışmada, yağ oranı, doymuş ve doymamış yağ asitlerinden miristik asit (c14:0), palmitik asit (c16:0), stearik asit (c18:0), oleik asit (c18:1), linoleik asit (c18:2), linolenik asit (c18:3) ve nervonik asit (C24:1) oranları (%) olarak saptanmıştır. Çalışma sonucunda sulama konularının oleik asit (c18:1) ve linolenik asit (c18:3) açısından etkisinin olduğu tespit edilmiştir. Sonuç olarak, yağlı bitkilerin yetiştirilmesinde, en önemli unsurlardan birisi olan yağ ve yağ asitleri kompozisyonunun bilinmesi için sulama konularının yanı sıra ekim zamanı, büyüme sıcaklıkları ve abiyotik streslerin de bitkisel yağın yağ içeriğini ve bileşimini değiştirebileceği yönünde dikkat edilmesi üretim açısından uygun olacaktır.

**Anahtar Kelimeler:** Pamuk, Sulama, Yağ oranı, Yağ asitleri, Biotik, Abiotik

**ABSTRACT**

This study was conducted in Şanlıurfa-Harran conditions in the 2022 cotton growing season, using the Fiona cotton variety according to the randomized blocks divided plots trial design and with 3 replications. Irrigation issues (50%, 75% and 100%) were made at the rates. In the research, fat ratio, saturated and unsaturated fatty acids; myristic acid (c14:0), palmitic acid (c16:0), stearic acid (c18:0), oleic acid (c18:1), linoleic acid (c18:2), linolenic acid (c18:3) and nervonic acid (c24:1) ratios were determined as (%). As a result of the study, it was determined that irrigation issues have an effect on oleic acid (c18:1) and linolenic acid (c18:3). As a result, it is necessary to know the composition of fat ratio and fatty acids, which is one of the most important elements in growing oily plants. Determination of these compositions, especially irrigation issues; Care must be taken in terms of production, as planting time, growing temperatures and abiotic stresses can alter the oil content and composition of the vegetable oil.

**Keywords:** Cotton, Irrigation, Fat ratio, Fatty acids, Biotic, Abiotic



## **GİRİŞ**

Pamuk (*Gossypium hirsutum* L.) kullanım alanları bakımından oldukça geniş bir kültür bitkisi olmakla birlikte, birçok farklı endüstri dalında hammadde görevi görmektedir. Üretimi yapılan kütlü pamuk, işlenmesi bakımından çırçır ve hazır giyim, çığıdı ile yağ sanayisi, liflerinden tekstil, küspesinden ise yem sanayisi alanında öne çıkan önemli bir hammadde olarak görülmektedir (TUİK, 2021). Dünyada pamuk ekiliş alanı 33.4 milyon ha, üretim miktarı ise 26.4 milyon tondur. En fazla üretimin yapıldığı ülkeler; Hindistan, Çin, ABD, Brezilya, Pakistan, Özbekistan ve Türkiye gelmektedir (ICAC, 2022).

Günümüzde tohumlarında yağ bulunan pek çok bitki bulunsa da endüstriyel alanda işlenerek yağı elde edilen başlıca bitkiler; soya, ayçiçeği, çığıt, kolza, yer fıstığı, susam, aspir, hintyağı, haşhaş, keten, kenevir, jojoba, mısır (mısır özünden), zeytin, hurma ve Hindistan cevizi öne çıkmaktadır (Arioğlu, 2014). Hayvansal kaynaklı yağların maliyet açısından yüksek olması ve yeteri kadar üretimi sağlanamadığından dolayı bitkisel yağlara daha fazla ihtiyaç duyulmaktadır (Kolsarıcı ve ark., 2015). Pamuk bitkisi her ne kadar lif bakımından öne çıksa da aynı zamanda yağlı bir tohum özelliği taşıdığı için önemli bir yağ bitkisidir. Tohumundan üretilen yağ, insan ve hayvan diyetlerinde en çok tercih edilen bitkisel yağlar arasında yer almaktadır (Yang ve ark., 2021). Pamuk tohumundan üretilen yağın içerisinde yüksek miktarda antioksidan kaynaklı maddeler bulunduğundan dolayı besin maddeleri için yüksek sıcaklık ve depolama bakımından diğer yağlara göre uzun süre bozulmadan kalabilmektedir (Sekhar ve ark., 2011).

Pamuk tohumu ortalama %20 oranlarda yağ içermekte ve bileşimleri ise doymuş ve doymamış yağ asitleri oluşturmaktadır (Özbek, 2011).

Pamuk tohumunun kalitesine etki eden unsurlardan birisi de tohumda bulunan yağ asitleri içerikleri ve miktarlarıdır. Bitkilerde özellikle sabit yağ içeriği ve bu yağlardaki yağ asitleri kompozisyonu bitki veya yağ elde edilen bitki kısımlarının gelişimine, bitkilerin yetiştirildiği dönemin biyotik ve abiyotik faktörlere göre değişebilmektedir (Aygün ve Mert, 2023).

## **MATERYAL VE METOT**

### **Deneme Yeri ve Toprak Özellikleri**

Şanlıurfa ili Harran Üniversitesi Osmanbey Kampüsü Ziraat Fakültesi Tarla Bitkileri Bölümü uygulama arazilerinde yürütülmüştür. Deneme alanı topraklarının, toprak pH'sı 7.92, organik madde içeriği ise %1.12 civarındadır (Ramazanoğlu, 2019). Deneme yerinden alınan toprak örneklerinden elde edilen analiz sonucu ve bu topraklara ait bazı fiziksel ve kimyasal özellikler Çizelge 1.'de verilmiştir.

Çizelge 1. Deneme yerine ait toprakların bazı fiziksel ve kimyasal özellikler

Derinlik (cm)	pH	Organik Madde(%)	Kireç (%)	Bitki Besin Elementleri (mg kg <sup>-1</sup> )						
				P	K	Mg	Fe	Zn	Cu	Mn
0.30	7.92	1.12	29.6	4.70	180	303	3.46	0.72	4.64	0.44

### **Metot**

#### **Deneme Deseni**

Bu çalışma, 2022 yıllı pamuk yetiştirme sezonunda Şanlıurfa-Harran koşullarında tesadüf blokları deneme desenine göre Fiona pamuk çeşidi kullanılarak ve 3 tekrarlamalı olarak deneme kurulmuştur. Sulama konuları (%50, %75 ve %100) belirlenmiş her parsel 5 sıradan oluşup, parsel uzunluğu 12 m, sıra arası 70 cm ve sıra üzeri mesafe ise 10-12 cm bırakılmıştır. Çalışmada bloklar arasında 3 m ve parseller arasında 3 m boşluk bırakılıp, toplam 36 parselden oluşmuştur.



## Sulama Uygulamaları

Araştırmada konulu 05.07.2022 tarihinde başlamış olup sulamalar damla sulama yöntemine göre yapılmıştır. Sulama suyu miktarının hesaplanmasında James ve ark. (1982) tarafından önerilen yöntem uygulanmıştır.

$$I = A * E_p * k_{cp} * P$$

Eşitlik de

I: Parsele uygulanan sulama suyu (L)

A: Parsel alanı (m<sup>2</sup>)

E<sub>p</sub>: 7 günlük birikimli class A pandaki buharlaşma miktarı (mm)

k<sub>p</sub>: Pan katsayısı

P: Örtü yüzdesi (%)

Çalışmada sulama suyu miktarı class A panda gerçekleşen 7 günlük yağışlı buharlaşma miktarı kullanılmıştır. Class A pan'da ölçülen buharlaşma miktarı çalışmadaki sulama suyu seviyeleri %50, %75 ve %100 ve bitki örtü yüzdesi (P) ile çarpıldıktan sonra konulara sulama suyu olarak uygulanmıştır.

## İstatistik analizi

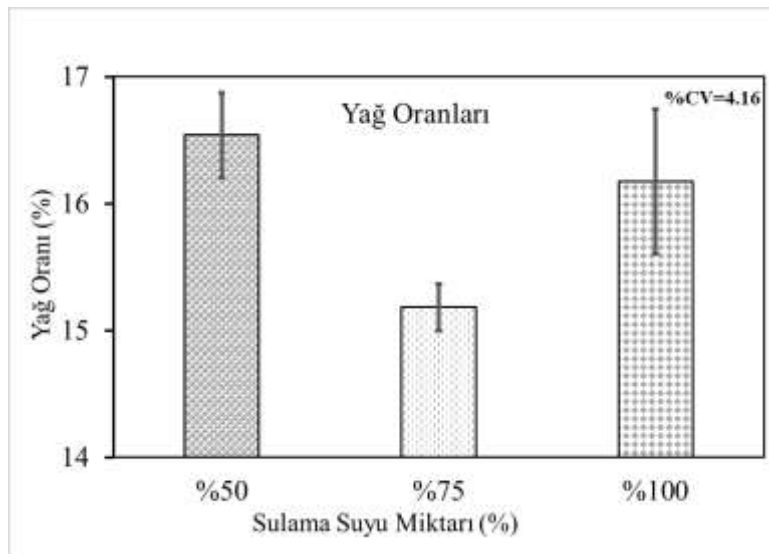
Elde edilen veriler JMP 11 (SAS Institute 2013) istatistik programında tesadüf bloklarında bölünmüş parseller deneme desenine göre analiz edilmiş, ortalamalar Tukey testine göre (0.05) gruplandırılmıştır.

## BULGULAR VE TARTIŞMA

### Yağ Oranları

Pamuk yağı sulama suyu miktarı yönünden istatistiksel olarak önemsiz bulunduğu izlenebilmektedir (Grafik 1.). Uygulamalar arasında farklılık görülmediğinden aynı grupta yer almaktadır.

Grafik 1. incelendiğinde ortalama yağ oranı %15.96 olarak belirlenirken; sulama suyu miktarı bakımından en yüksek yağ oranı %50 uygulamasında %16.54, en düşük yağ oranı ise %15.18 ile %75 sulama suyu miktarına sahip uygulamada görülmüştür. Özbek (2011), pamuk tohumunda yağ oranının %20 miktarında, O'Brien (2005), pamuk tohumu yaklaşık olarak %16 yağ içeriğine sahip olduğunu belirtmişlerdir. Grafik 1'e göre farklı sulama miktarlarının yağ oranı üzerinde önemli bir etkisinin olmadığı, elde edilen ortalama yağ oranının O'Brien (2005)'in bulgularıyla benzerlik gösterdiği, ancak Özbek (2011)'in bulgularına göre düşük olduğu tespit edilmiştir.



Grafik 1. Pamuk bitkisinde farklı sulama suyu miktarı bakımından yağ oranları (%)

### Yağ Asitleri Oranları

#### Miristik asit (c14:0) (%)

Pamuk yağı yağ asitleri kompozisyonları miristik asit yönünden istatistiksel olarak önemsiz bulunduğu izlenebilmektedir (Çizelge 3.). Uygulamalar arasında farklılık görülmediğinden aynı grupta yer almaktadır.

Çizelge 3. incelendiğinde ortalama miristik asit oranı %0.85 olduğu saptanmıştır. Karahan (2007), yağ asidi kompozisyonunda ortalama miristik yağ asit oranının % 0.5, Sekhar ve ark (2011) ortalama miristik asit oranını % 0.8, Quampah ve ark (2012) % 0,56 ile % 1,08 aralığında olduğunu, Adesina ve ark. (2013) miristik oranının %0.9 olduğunu belirtmişlerdir. Beyyavaş ve ark. (2023) miristik asit oranlarının farklı değerlere sahip olması çeşitlerin çevre interaksyonundan ve farklı genotipik yapıya sahip olmalarından da kaynaklanabileceğini belirtmişlerdir. Bizim bulduğumuz ortalama Miristik asit değeri %0.85 olup önceki çalışmalarla benzerlik gösterdiği, ancak Karahan (2007)'nin bulgularına göre yüksek olduğu tespit edilmiştir.

#### Palmitik asit (c16:0) (%)

Pamuk yağı, yağ asitleri kompozisyonları palmitik asit yönünden istatistiksel olarak önemsiz bulunduğu izlenebilmektedir (Çizelge 3.).

Pamuk tohumunda yağ asidi olarak %17-29 oranında palmitik asit bulunmaktadır (Özbek, 2011). Doymuş yağ asitleri grubundan olan palmitik yağ asidi oranının düşük olması istenmektedir (Anonim, 2022b). Çizelge 3'e göre ortalama palmitik asit oranı %22 olduğu, farklı oranlarda yapılan sulamaların palmitik asit oranını etkilemediği ve oranlar birbirine yakın olduğundan aynı grupta yer almışlardır. Uygulamalara bakıldığında sulama seviyesinin artmasıyla palmitik asit oranının azaldığını fakat istatistiksel olarak önemli düzeyde bir fark görülmemiştir. Nagaraj ve Reddy, (1997) iklim koşulları ve büyüme sezonunda sıcaklık değişimlerinin de tohumdaki yağ asitlerinin değişimine etki ettiğini; Beyyavaş (2023), sulu koşullarda yetiştirilen çeşitlerin kuru koşullara göre daha fazla palmitik asit oluşturduğu belirtmişlerdir. Ashrafi ve Razmjoo (2010), sulama seviyesinin artması ile çeşitlerin palmitik asit oranının düştüğünü belirtmesi elde edilen bulgularımızla uyumlu olduğu görülmüştür.

Çizelge 3. 2022 pamuk yetiştirme sezonunda uygulanan sulama suyu miktarının (IW) bazı yağ asitleri açısından etkisi ve %CV değerleri.

Uygulamalar	Miristik asit (c14:0) (%)	Palmitik asit (c16:0) (%)	Stearik asit (c18:0) (%)	Cis-oleik asit (C18:1) (%)
%50	0.79 a	23.25 a	2.02 a	15.45 a
%75	0.93 a	21.46 a	1.78 a	13.87 b
%100	0.84 a	21.30 a	1.87 a	13.01 b
<b>Ortalama</b>	0.85	22.00	1.89	14.11
<b>%CV</b>	11.07	3.64	4.85	2.57

#### Stearik asit (c18:0) (%)

Pamuk yağı, yağ asitleri kompozisyonları stearik asit yönünden istatistiksel olarak önemsiz bulunduğu izlenebilmektedir (Çizelge 3.).

Çizelge 3. İncelendiğinde ortalama stearik asit oranı %1.89 olduğu saptanmıştır. Doymuş ve doymamış yağ asitlerinin arasındaki oranın dengeli olması insan beslenmesi açısından büyük önem taşımaktadır. Yağların kararlı artması açısından yağ asitlerinin oranlarının yüksek olması istenilen bir durum olmasına rağmen, insanların beslenmesi için doymuş yağ asitleri oranının çok yüksek olması tavsiye edilmez (Zambiazi ve ark., 2007).

Çevresel etmenler, genotipik özellikler ve kültürel uygulamalar, tohum içerisindeki stearik asit miktarının ve buna bağlı olarak toplam doymuş yağ asidi kompozisyonunun değişim göstermesine sebep olmaktadır (Hasrianda, 2016). Çizelge 3'e göre %50 sulamanın %75 ve %100'e göre stearik asit oranının daha yüksek olduğu, Ashrafi ve Razmjoo (2010), çalışmalarında sulama seviyesinin artması ile çeşitlerin stearik asit (c18:0) oranının düştüğünü belirtmesi çalışmamızla çelişki içerisinde. Karahan (2007), yağ asidi kompozisyonunda ortalama stearik yağ asit oranının %1.9 olarak bulmaları elde edilen sonuçlarımıza benzerlik gösterdiği, Adesina ve ark. (2013), stearik asit oranını (C18) %2.1 ise elde ettiğimiz sonuçlara göre yüksek olduğu tespit edilmiştir.

### Cis-oleik asit (C18:1n9c) (%)

Pamuk yağı yağ asitleri kompozisyonları oleik asit yönünden istatistiksel olarak ( $p < 0.05$ ) önemli bulunduğu izlenebilmektedir (Çizelge 3.).

Yağlı bitkilerde doymamış yağ asitleri arasında en önemli olanlardan biri de oleik asittir. Doymamış yağ asitlerinden özellikle endüstriyel alanda çok farklı yönlü olarak yararlanılmakta ve kullanım amacına göre istenilen düzeyde yağ asit oranları birbirinden farklı olabilmektedir.

Örneğin, yemeklik açısında kalite değeri yüksek olan bir yağın oleik asit (Omega-9) miktarının fazla olması tercih edilmesinin yanı sıra sıfır ya da sıfıra yakın miktarda erusik asitin olması da arzu edilmektedir (Göre, 2021). Pamuk tohumundan elde edilen yağlar, karakteristik tadının yanında kokusu olan ve oldukça koyu bir renge sahip bir yağ olmakla birlikte %13- 44 oleik içermektedir (Anonim, 2009; Özbek, 2011). Çizelge 3. incelendiğinde ortalama oleik asit oranının %14.11 düzeylerinde olduğu, en yüksek oran %50 sulamanın yapıldığı uygulamada görülürken en düşük ise %100 sulamanın yapıldığı uygulamada tespit edilmiştir.

### Cis-linoleik asit (C18:2n6c) (%)

Pamuk yağı, yağ asitleri kompozisyonları linoleik asit yönünden istatistiksel olarak önemsiz bulunduğu izlenebilmektedir (Çizelge 4.). Uygulamalar arasında farklılık görülmediğinden aynı grupta yer almaktadır.

Pamuk yağı %46–58 linoleik asit içeren bir yağdır (Kılıkçkan, 2008). Tohum yağında doymamış yağ asitlerinin doymuş yağ asitlerine oranı 2:1'dir. Pamuk tohumlarından elde edilen önemli yağ asitleri arasından linoleik asidin öne çıktığını belirtmişlerdir (Lukonge, Labuschagne, ve Hugo, 2007). Çizelge 4 incelendiğinde; ortalama linoleik asit oranının %49.41 olduğu, en yüksek oran %50.07 ile %50 sulama uygulamasında yer alırken en düşük ise %48.40 oranında %75 sulama uygulamasında tespit edilmiştir. Karahan (2007), pamukta yağ asidi kompozisyonunda ortalama linoleik asitte %61.4, Adesina ve ark. (2013), %53,5 olarak bulunmuştur. Çalışmamızda elde edilen sonuçlar Karahan (2007)'nin sonuçlarına göre düşük, Adesina ve ark. (2013)'nin sonuçlarına ise yakın olduğu görülmektedir.

Çizelge 4. 2022 pamuk yetiştirme sezonunda uygulanan sulama suyu miktarının (IW) bazı yağ asitleri açısından etkisi ve %CV değerleri.

Uygulamalar	Cis-linoleik asit (c18:2) (%)	Linolenik asit (c18:3) (%)	Nervonik asit (c24:1) (%)
%50	50.07 a	0.128 c	3.59 a
%75	48.40 a	0.136 b	6.06 a
%100	49.78 a	0.154 a	6.38 a
<b>Ortalama</b>	49.41	0.13	5.34
<b>%CV</b>	3.42	0.71	24.42

### **Linolenik asit (C18:3n6) (%)**

Pamuk yağı yağ asitleri kompozisyonları linolenik asit yönünden istatistiksel olarak ( $p < 0.05$ ) önemli bulunduğu izlenebilmektedir (Çizelge 4.).

Pamuk yağı %0.4 oranında linolenik asit içeren bir yağdır (Kılıçkan 2008). Linolenik asit (Omega-3) oksidasyona karşı son derece hassas olması ve yağın raf ömrünü azaltması nedeniyle yemeklik yağ olarak değerlendirilen bitkilerde düşük olması arzu edilir. (Silska ve Walkowiak, 2019). Çizelge 4 incelendiğinde; ortalama linolenik asit oranı %0.13 olarak görülmüştür. Wan ve ark. (1998), pamuk tohumundaki yağ asitlerinin belirlenmesi üzerine yaptıkları çalışmada ortalamanın %3 düzeyinde olduğunu, Darla ve ark. (2007), pamukta linolenik asit miktarının % 0.1 ile % 2.1 arasında değiştiğini, Dowd ve ark. (2010), çeşitli pamuk genotiplerinde yağ asitleri ortalamasının % 0.15 ile %0.25 arasında değiştiğini, Adesina ve ark. (2013), ise linolenik yağ asidini % 0.2 olarak bulduklarını bildirmişlerdir. Bizim çalışmamızda ise linolenik asit oranının Darla ve ark. (2007) sonuçları ile benzerlik gösterdiği, Wan ve ark. (1998); Dowd ve ark. (2010); Adesina ve ark. (2013)'nın sonuçlarına göre daha düşük olduğu tespit edilmiştir.

### **Nervonik asit (C24:1) (%)**

Pamuk yağı, yağ asitleri kompozisyonları nervonik asit yönünden istatistiksel olarak önemsiz bulunduğu izlenebilmektedir (Çizelge 4). Uygulamalar arasında farklılık görülmediğinden aynı grupta yer almaktadır.

Çizelge 4'te nervonik asit miktarı ortalaması %5.34 olarak bulunduğu gösterilmiştir. Nervonik asit miktarı yönünden en yüksek değer; %100 sulamanın yapıldığı uygulamada %6.38 olarak görülürken, en düşük değer ise %50 sulamanın yapıldığı uygulamada %3.59 miktarında tespit edilmiştir. %50 sulamaya sahip uygulama, %75 ile %100 uygulamalarına kıyasla oldukça düşük olmasına rağmen istatistiksel olarak bir fark görülmemiştir. Elde edilen sonuçlarımıza bakıldığında sulama miktarı arttıkça nervonik asit miktarında da artış olduğu saptanmıştır. Yaptığımız literatür araştırmasında nervonik asite rastlanmamıştır.

### **SONUÇ**

Yağlar, enerji kaynağı olarak insan beslenmesinde ayrı bir öneme sahiptirler. Küresel iklim değişimlerinden dolayı artan sıcaklıklar ve düzensiz yağışlar tarımsal üretimi olumsuz etkilemesinin yanı sıra yağlık ürünlerde yağın bileşimi üzerine de etkisinin olduğunu göz ardı etmemek gerekir. Hayvansal kökenli yağların maliyeti pahalı ve üretimi yeterli olmadığından, insan beslenmesi için gereksinim duyulan yağların büyük bir kısmı, bitkisel kökenli yağlardan karşılanmaktadır. Yağlı bitkilerin yetiştirilmesinde, en önemli unsurlardan birisi olan yağ asitleri kompozisyonunun bilinmesi için sulama konularının iyi bilinmesinin yanı sıra ekim zamanı, büyüme sıcaklıkları ve abiyotik streslerin de bitkisel yağın yağ içeriğini ve bileşimini değiştirebileceği yönünde dikkat edilmesi üretim açısından uygun olacaktır. Çalışma sonucunda, sulama konularının oleik asit (c18:1) ve linolenik asit (c18:3) açısından önemli etkisinin olduğu; miristik asit, palmitik asit, stearik asit, linoleik asit ve nervonik asit bakımından önemli düzeyde bir etkisi olmadığı görülmüştür.

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DEFOLIANT UYGULAMASININ PAMUK (*GOSSYPIUM HIRSUTUM* L.) BİTKİSİNDE  
VERİM VE VERİM UNSURLARINA ETKİSİ

DEFOLIANT APPLICATION EFFECT ON YIELD AND YIELD COMPONENTS IN  
COTTON (*GOSSYPIUM HIRSUTUM* L.) PLANT

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**ÖZET**

Bu çalışma, 2020 yıllı yetiştirme sezonunda pamukta (*Gossypium hirsutum* L.) defoliant kullanımının verim ve lif teknolojik özelliklerine etkisini belirlemek amacıyla yapılmıştır. Çalışma, Şanlıurfa-Harran Ovası koşullarında Sultantepe köyünde tesadüf blokları deneme desenine göre 3 tekrarlamalı olacak şekilde kurulmuştur. Çalışmada ekim zamanı (5 Mayıs) olarak belirlenmiştir. Denemede bitki materyali olarak Fiona çeşidi kullanılmıştır. Defoliant uygulaması olarak Dropp Ultra (Thidiazuron+Diuron 120+60 g l<sup>-1</sup>) adlı kimyasal kozaların %60'nın açtığı dönemde uygulanmıştır. Çalışmada, uygulama öncesi ve uygulama 7, 14 ve 21 gün sonrası yaprak sayısı (adet bitki<sup>-1</sup>), uygulama öncesi toplam koza sayısı (adet bitki<sup>-1</sup>), açmış koza sayısı (adet bitki<sup>-1</sup>) ve uygulama 7, 14 ve 21 gün sonrası açan koza sayısı (adet bitki<sup>-1</sup>), koza ağırlığı (g), koza kütlü ağırlığı (g), kütlü pamuk verimi (kg da<sup>-1</sup>), çırçır randımanı (%) ve 100 tohum ağırlığı (g) incelenmiştir. Çalışmada, defoliant uygulamalarından Dropp Ultra (Thidiazuron+Diuron 120+60 g l<sup>-1</sup>) uygulamasının açan koza sayısını bakımından iyi performans gösterdiği tespit edilmiştir. Dropp Ultra (Thidiazuron+Diuron 120+60 g l<sup>-1</sup>) uygulanmasından 7. 14. ve 21. günlerden sonra açan koza sayısı kontrole göre sürekli artış gösterdiği ve kontrole kıyasla % %38'lik bir fark oluştuğu tespit edilmiştir. Defoliant uygulanan parsellerden elde edilen verim dekara 486.0 kg da<sup>-1</sup> olurken, kontrol parsellerinden alınan verim 432.67 kg da<sup>-1</sup> olmuştur.

**Anahtar Kelimeler:** Pamuk, Defoliant, Verim, Verim unsurları

**ABSTRACT**

This study was conducted to determine the effect of defoliant use on cotton (*Gossypium hirsutum* L.) yield and fiber technological properties in the 2020 growing season. The study was conducted in the Sultantepe village under the conditions of the Şanlıurfa-Harran Plain, with three replications, according to a split trial design in randomized blocks. Fiona variety was used as plant material in the experiment. As a defoliant application, a chemical called Dropp Ultra (Thidiazuron+Diuron 120+60 g l<sup>-1</sup>) was applied during normal planting, when 60% of the bolls had opened. In the study, the number of leaves before application and 7, 14 and 21 days after application (piece plant<sup>-1</sup>), total number of bolls before application (number plant<sup>-1</sup>), number of bolls bloomed application (number plant<sup>-1</sup>) and 7, 14, 21 days after application, number of bolls opening (pieces plant<sup>-1</sup>), boll weight (g), boll seed weight (g), seed cotton yield (kg da<sup>-1</sup>), ginning outturn (%) and 100 seed weight were investigated. In the study, it was determined that the Dropp Ultra (Thidiazuron+Diuron 120+60 g l<sup>-1</sup>) application, one of the defoliant applications, performed well in terms of the number of cocoons that opened. It was determined that the number of cocoons that opened after the 7th, 14th and 21st days after Dropp Ultra (Thidiazuron+Diuron 120+60 g l<sup>-1</sup>) application increased continuously compared to the control and there was a 38% difference compared to the control. While the yield obtained from the parcels where defoliant was applied was 486.0 kg da<sup>-1</sup>, the yield obtained from the control parcels was 432.67 kg da<sup>-1</sup>.

**Keywords:** Cotton, Defoliant, Yield, Yield components

### Giriş

İnsan yaşamı için öncü bir bitki olarak görülen pamuk, tekstil, beslenme, film malzemesi yapımından harp sanayisine kadar 50'den fazla sanayi alanının temel hammaddesini oluşturmaktadır. Özellikle tekstil alanında ön plana çıkan pamuk bitkisi, dünyada üretilen liflerin yaklaşık %35'ini sağlamakta ve bu anlamda tekstil endüstrisinde kullanılan en önemli bitkilerden biri olma özelliği taşımaktadır (Gündüz ve ark., 2020).

Pamuk bitkisi morfolojik yapıya sahip çok yıllık ve sınırsız bir büyüme sistemi gösterdiğinden dolayı optimum şartlar altında olduğu sürece vejetatif büyüme sürmekte olup gelişimi uzun süre devam edebilmektedir (Bondada ve Oosterhuis, 2001; Tariq, 2018). Bu sebepten dolayı kaliteli ve daha iyi verim sağlanabilmesi için pamuk bitkisinin hasadını zamanında yapılması oldukça önem taşımaktadır. Genellikle, kütlü pamuk hasadının temiz ve hasat etkinliğinin fazla olması istenmektedir (Ming-Wei ve ark. 2013). Ancak olumsuz hava şartları pamuk hasadını çoğu zaman zorlaştıran önemli bir etmendir. Özellikle hasat geciktiğinde yağmur riski artmakta ve yağmurlara maruz kalan pamuğun kalitesini olumsuz etkilemektedir (Mert, 2007).

Pamuk, elle veya makineli ekipmanlar ile hasadı yapılacaksa öncesinde pamuk bitkisinin yapraklarının dökülmesi hasat açısından olumlu etkileyecektir. Yaprakların dökülmesi ile makinenin toplama randımanı daha fazla olacağı gibi kütlü pamuğa karışan yabancı madde oranı da daha az olabilmektedir (Özbek, 2011). Ayrıca yaprak dökümü ile koza açma süresi ortalama 1-3 gün daha erken olabilmekte ve birinci el kütlü pamukta, %1-20 arasında değişen bir oranında, erkencilik göstermektedir (Ming-Wei ve ark. 2013). Daha önce yapılan çalışmalarda birçok araştırmacı hasada yardımcı olmak ve hasadı kolaylaştırmak amacıyla defoliant (yaprak dökürücü) ve koza açan kimyasallardan yararlanmışlardır (Çopur ve ark. 2010; Ming-Wei ve ark., 2013; Singh ve ark., 2015; Tashaev, 2016; Beyyavaş, 2019; Beyyavaş ve ark., 2022). Bazıları tek bir kimyasaldan yararlanırken bazı araştırmacılar da birden çok kimyasal kullanarak karışım halinde kullanmayı tercih etmişlerdir

Çalışmanın yapıldığı Harran ovası Türkiye'nin pamuk üretimi bakımından öne çıkan en önemli merkezidir. Fakat iklim koşullarında meydana gelen olumsuz durumlardan kaynaklı özellikle erken görülen sonbahar yağmurları hasadı olumsuz yönde etkilemektedir. Bu açıdan temiz ve verimli bir kütlü pamuk hasadını kolaylaştırmak için yaprakların dökülmesi ve kozaların açtırılması önem arz etmektedir.

### MATERYAL VE YÖNTEM

Denemede bitki materyali olarak bölgemiz koşullarında yaygın olarak yetiştirilen tescilli Fiona pamuk çeşidi kullanılmıştır. Deneme Şanlıurfa- Harran Ovası koşullarında Eyyübiye ilçesi Sultantepe köyünde 2020 yılı yetiştirme sezonunda yürütülmüştür. Denemede, halen piyasada çiftçilerin kullanımına sunulan Dropp Ultra ticari defoliant kullanılmıştır.

1-Dropp Ultra

2-Kontrol

#### Denemeye Ait Toprak Özelliği ve İklim Koşulları

Araştırmanın yapıldığı Sultantepe köyündeki çalışma alanından 30 cm derinliğinden alınan toprak analiz sonuçları çizelge 1'de yer almaktadır.

Çizelge 1. Şanlıurfa ili Eyyübiye ilçesi Sultantepe köyüne ait toprak özellikleri

Derinlik (cm)	Organik Madde (%)	Toplam Tuz (%)	pH	Kireç (%)	P2O5 (kg da <sup>-1</sup> )	K2O (kg da <sup>-1</sup> )
0-30 cm	0.877	0.0436	8.13	20.6117	2.061	131.0546

Kaynak: Şanlıurfa GAP Tarımsal Araştırma Enstitüsü Müdürlüğü, 2020

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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Şanlıurfa ili, Eyyübiye ilçesi karasal iklimin etkisi altındadır. Yaz mevsimi kurak ve sıcak, kış ayları ise ılık ve yağışlıdır. Çizelge 2 'den, pamuk bitkisinin gelişme dönemi boyunca yıllık (Nisan-Ekim ayları) yağış miktarı uzun yıllar ortalaması 16.80 kg m<sup>-1</sup>, sıcaklık ortalaması ise 25.4 °C ölçülmüştür.

Çizelge 2. 2020 yılı ile uzun yıllar ortalamasına ait Şanlıurfa ili iklim verileri

Aylar	2020 yılı		1929-2020 uzun yıllar ort.	
	Aylık Ort. Sıcaklık (°C)	Yağış (kg m <sup>-1</sup> )	Aylık Ort. Sıcaklık (°C)	Yağış (kg m <sup>-1</sup> )
Nisan	17.1	69.3	16.2	50
Mayıs	23.2	39.1	22.2	26.8
Haziran	28.9	0.4	28.1	4.3
Temmuz	34.2	0	32.0	2
Ağustos	30.9	0	31.5	3.4
Eylül	24.0	0	27.2	4.6
Ekim	13.5	0	20.6	26.5
Ortalama	24.5	15.49	25.4	16.80

MGM, (2020). Şanlıurfa Meteoroloji Bölge Müdürlüğü İklim Veri Değerleri, Şanlıurfa.

## Deneme Deseni ve Ekim

Deneme tesadüf blokları deneme desenine göre 3 tekrarlamalı olacak şekilde kurulmuştur. Çalışmada ekim zamanı (5 Mayıs) olarak belirlenmiştir. Defoliant uygulamaları 1-Dropp Ultra (Thidiazuron+Diuron 120+60 g l-1) 2-Kontrol ise parselleri oluşturmuştur. Uygulamalar kozaların %60'ı açtığı zaman gerçekleştirilmiştir. Kontrol parsellerine kalibrasyon yapıldıktan sonra yalnızca su püskürtülmüştür.

## Bakım, Sulama, Gübreleme ve Diğer Kültürel Uygulamalar

Deneme alanı sonbaharda önceki yıla ait bitki artıkları uzaklaştırdıktan sonra pulluk ile işlenmiş, Şubat sonu ile Mart ayının başında kültüvator ile sürülmüştür. Daha sonra tapan çekilerek tarla düzleştirilmiş ve sırt çekilerek ekime hazır hale getirilmiştir. Ekimle birlikte dekara saf 8.1 kg da<sup>-1</sup> N ve 20.7 kg da<sup>-1</sup> P (18-46 DAP) gübresi, üst gübrelemede ise 12 kg da<sup>-1</sup> saf N (% 46 üre) uygulanmıştır. Denemede bakım ve sulama işlemleri geleneksel olarak yapılmış olup toplamda 7 kez karık usulü sulanmıştır.

Fide döneminde Tütün Tripsi (*Thrips tabaci*)'i zararlısına karşılık dekara 100 ml 400 g l<sup>-1</sup> Dimethoate ile birlikte kök gelişmesine destek olmak için dekara 250 ml humik asit kullanılmıştır. Pamuk Yaprak Biti (*Aphis gossypii*) ve Pamuk Yaprak Pireleri (*Empoasca spp.*) için dekara 25 g %20 Acemiprid ile taraklanmayı teşvik etmek için yapraktan dekara 200 g fosfor takviyesi yapılmıştır. Aynı zamanda dekara 25 ml pix uygulanmıştır. Pamukta Yeşilkurt (*Helicoverpa armigera*) zararlısı için dekara 17.5 ml Coragen (200 g l<sup>-1</sup> Chlorantraniliprole) ile dekara 25 g Hekplan (%20 Acemiprid) uygulanmıştır. Ayrıca yapraktan dekara 200 g fosfor ve 200 g saf potasyum uygulaması yapılmış ve kozaların %20'si açtığı sulama sonlandırılmıştır.

## Denemede İncelenen Özellikler ve Belirleme Yöntemleri

Aşağıdaki özellikler Worley ve ark. (1976)'in belirttiği yöntemler gereğince saptanmıştır. Her parselden belirlenmiş 10 bitki üzerinden uygulamadan önce koza sayısı (adet bitki<sup>-1</sup>), uygulamadan önce açmış koza sayısı (adet bitki<sup>-1</sup>), uygulamadan sonra 7. gün açan koza sayısı (adet bitki<sup>-1</sup>), uygulamadan sonra 14. gün açan koza sayısı (adet bitki<sup>-1</sup>), uygulamadan sonra 21. gün açan koza sayısı (adet bitki<sup>-1</sup>), uygulamadan önce yaprak sayısı (adet bitki<sup>-1</sup>), uygulamadan sonra 7. gün yaprak koza sayısı (adet bitki<sup>-1</sup>), uygulamadan sonra 14. gün yaprak sayısı (adet bitki<sup>-1</sup>), uygulamadan sonra 21. gün yaprak sayısı (adet bitki<sup>-1</sup>) takip edilerek sonuçlandırılmıştır.

Her parsel yanlarındaki birer sıra ve parsel başlarından 1 m'lik kısım atılıp, ortadaki iki sırada bulunan (10mx1.4m=14m<sup>2</sup>) bitkilerden toplanmış olan kütlü pamuk verileri tartılıp ve daha sonra dekara çevrilerek verim hesaplanmıştır.

### **Verilerin Değerlendirilmesi**

Denemeden elde edilen her bir özelliğin verileri MİNİTAB (18.1) istatistik paket programı ile tesadüf bloklarında bölünmüş deneme desenine göre varyans analizleri yapıp ve Tukey testine (0.05) göre ortalamalar gruplandırılmıştır.

### **ARAŞTIRMA BULGULARI VE TARTIŞMA**

#### **Toplam Koza Sayısı**

Çizelge 3'te yapılan varyans analizi sonucuna göre; Dropp Ultra defoliant uygulamaları toplam koza sayısı (adet bitki<sup>-1</sup>) yönünden istatistiksel olarak önemsiz bulunduğu izlenebilmektedir. Uygulamalar arasında istatistiksel oranda fark görülmediğinden aynı grupta yer almışlardır.

Çizelge 3'te toplam koza sayısı (adet bitki<sup>-1</sup>) incelendiğinde; denemede kullanılan Dropp Ultra uygulamalarında toplam koza sayısı 20.76-26.40 adet bitki<sup>-1</sup> arasında olduğu saptanmıştır. Pamukta defoliant kullanma kararının verilmesinde, o anki beklenen hava koşulları, bitki olgunlaşması, bitki koşulları ve hasat programlarının tümünün düşünülmesi gerekmektedir (Edmisten 2006). Çopur ve ark. (2010), Drop ultra® (DU: Thidiazuron+Diuron) ve Roundup® uygulamalarını, çiçeklenme tarihinden 60 gün sonra yapılan Drop Ultra uygulamasında, koza sayısının azaldığını; Sokat ve Gürel 2010; Tülemen 2015; defoliant uygulamalarının koza sayısı bakımından istatistikî yönden önemli bir etkisinin olmadığını bildirmeleri çalışmamızla uyum içerisindedir. Görmüş ve ark. (2017), defoliantların koza sayısına etkisi olduğunu yönünde belirtmeleri çalışmamızla çelişir niteliktedir.

#### **Uygulama Sonrası Açan Koza Sayısı**

Çizelge 3'den, açan koza sayısına ilişkin yapılan varyans analizi sonucunda; Dropp Ultra defoliant uygulamaları açan koza sayısı bakımından önemli düzeyde (p<0.05) istatistikî farklılıkların olduğu izlenmektedir. Farklı defoliant uygulamaları açan koza sayısı bakımından farklı gruplar oluşturmasına rağmen birbirine yakın değerler oluşturmuştur.

Açan koza sayısı incelendiğinde; denemede Dropp Ultra defoliant uygulamasının açan koza sayısı bakımından 12.00-18.86 adet bitki<sup>-1</sup> arasında olduğu saptanmıştır. Özbek (2011), defoliantların kullanımının hava sirkülasyonunu ve güneşlenmesini arttırdığını, bunun da kozaların daha iyi açımına sebep olduğunu, Sokat ve Gürel (2010), defoliant uygulamalarının koza açımı, gibi özelliklerde olumlu bir etkileşim saptandığını belirtmişlerdir. Beyyavaş (2019), hasada yardımcı kimyasal uygulamaların kontrole göre daha fazla açan koza oluşturduğunu belirtmeleri; Raghavendra ve Reddy (2020), yaprak dökücü uygulamadan 7. gün sonra, Dropp ultranın açan koza oranında artış gösterdiği belirtmesi çalışmamızla uyum içerisindedir. Tülemen ve Kaynak (2016), defoliant uygulamasının açık koza sayısı üzerine önemli olmadığı yönünde belirtmeleri çalışmamızla çelişir niteliktedir. Ayrıca Haliloglu ve ark. (2020), defoliant uygulamasının gecikmesi açılan koza sayısı, etkilemediğini bildirmişlerdir.

Çizelge 3. Pamuk bitkisine defoliant uygulamasıyla elde edilen toplam koza sayısı (adet bitki<sup>-1</sup>), açan koza sayısı (adet bitki<sup>-1</sup>), uygulamadan 7. 14. 21. gün sonra açan koza sayısı (adet bitki<sup>-1</sup>) ve yüzde oranı (%) değerleri

	<b>Toplam koza sayısı</b>	<b>Açan koza sayısı</b>	<b>7.gün</b>	<b>14.gün</b>	<b>21.gün</b>	<b>Yüzde oranı</b>
Kontrol	20.76	12.00 B	13.23 B	13.67 B	14.86 B	% 33
Dropp ultra	26.40	18.86 A	21.20 A	22.33 A	24.20 A	% 71
CV %	15	6	4	4	3	

#### **Uygulamadan 7. Gün Sonra Açan Koza Sayısı**

Çizelge 3'den, uygulamadan 7. gün sonra açan koza sayısına ilişkin yapılan varyans analizi sonucunda; Dropp Ultra defoliant uygulamaları 7. gün açan koza sayısı bakımından önemli düzeyde (p<0.05) istatistikî farklılıkların olduğu izlenmektedir. Farklı defoliant uygulamaları açan koza sayısı bakımından farklı gruplar oluşturmasına rağmen birbirine yakın değerler oluşturmuştur.

Uygulamadan 7. gün sonra açan koza sayısı incelendiğinde; kontrolde 13.23 adet bitki<sup>-1</sup>, denemede kullanılan Dropp Ultra uygulamasından sonra 21.20 adet bitki<sup>-1</sup> olduğu saptanmıştır. Dropp Ultra

uygulamaları sonrası açan koza sayısı kontrole göre daha yüksek olmuştur. Ming-wei ve ark. (2013) tüm uygulamaların kontrol parsellerinden daha fazla koza açılmasına katkıda bulunduğunu; Beyyavaş (2019) hasada yardımcı kimyasal uygulamaların kontrole göre daha fazla açan koza oluşturduğu, Beyyavaş ve ark. (2022) hasada yardımcı kimyasal uygulamalarının kontrol parsellerine göre koza açtırma özellikleri yönünden iyi performans gösterdiğini belirtmeleri çalışmamızla uyumlu niteliktedir.

### Uygulamadan 14. Gün Sonra Açan Koza Sayısı

Çizelge 3'te, uygulamadan 14. gün sonra açan koza sayısına ilişkin yapılan varyans analizi sonucunda; Dropp Ultra defoliant uygulamaları 14. gün açan koza sayısı bakımından önemli düzeyde ( $p<0.05$ ) istatistiki farklılıkların olduğu izlenmektedir. Farklı defoliant uygulamaları açan koza sayısı bakımından farklı gruplar oluşturmasına rağmen birbirine yakın değerler oluşturmuştur.

Çizelge 3. incelendiğinde; kontrol 13.67 adet bitki<sup>-1</sup> olduğu saptanırken, denemede kullanılan Dropp Ultra uygulamasından 14. gün sonra açan koza sayısı 22.33 adet bitki<sup>-1</sup> olduğu saptanmıştır. Açan koza sayısına bakıldığında 14. gün açan koza sayısı, kontrole kıyasla daha yüksek ve uygulamadan 7. gün sonra açan koza sayısına göre daha yüksek olsa da, birbirine yakın olduğu tespit edilmiştir. Beyyavaş ve ark (2022), hasada yardımcı kimyasal uygulamalarının koza açtırma özellikleri yönünden iyi performans gösterdiğini belirtmeleri; Ming-wei ve ark. (2013) tüm uygulamaların kontrol parsellerinden daha fazla koza açılmasına katkıda bulunduğunu; Beyyavaş 2019 hasada yardımcı kimyasal uygulamaların kontrole göre daha fazla açan koza oluşturduğu yönünde belirtmeleri çalışmamızla uyumlu niteliktedir.

### Uygulamadan 21. gün sonra açan koza sayısı

Çizelge 3'te, uygulamadan 21. gün sonra açan koza sayısına ilişkin yapılan varyans analizi sonucunda; Dropp Ultra defoliant uygulamaları 21. gün açan koza sayısı bakımından önemli düzeyde ( $p<0.05$ ) istatistiki farklılıkların olduğu izlenmektedir. Farklı defoliant uygulamaları açan koza sayısı bakımından farklı gruplar oluşturmasına rağmen birbirine yakın değerler oluşturmuştur

Çizelge 3. incelendiğinde; kontrol 14.86 adet bitki<sup>-1</sup> olduğu saptanırken, denemede kullanılan Dropp Ultra uygulamasından 21. gün sonra açan koza sayısı 24.20 adet bitki<sup>-1</sup> olduğu saptanmıştır. Açan koza sayısına bakıldığında 21. gün açan koza sayısı, kontrol ile uygulamadan 7. ve 14. gün sonra açan koza sayısına kıyasla daha yüksek olsa da uygulamadan 14. gün sonra açan koza sayısına yakın olduğu tespit edilmiştir. Beyyavaş ve ark (2022), hasada yardımcı kimyasal uygulamalarının koza açtırma özellikleri yönünden iyi performans gösterdiğini belirtmeleri; Ming-wei ve ark. (2013) tüm uygulamaların kontrol parsellerinden daha fazla koza açılmasına katkıda bulunduğunu; Beyyavaş 2019; hasada yardımcı kimyasal uygulamaların kontrole göre daha fazla açan koza oluşturduğu yönünde belirtmeleri çalışmamızla uyumlu niteliktedir.

### Yüzde oranı %

Çizelge 3'te, açım oranları incelendiğinde; denemede en yüksek koza açım oranı %71 ile Dropp Ultra uygulamasından alınırken, kontrol %33 açım oranına sahip olduğu saptanmıştır. Dropp Ultra uygulanmasından 7. 14. ve 21. günlerden sonra açan koza sayısı kontrole göre sürekli artış gösterdiği ve kontrole kıyasla %38'lik bir fark olduğu tespit edilmiştir. Defoliant uygulamalarındaki başarı pamuğun olgunluğuna ve uygulama zamanındaki iklim koşullarına bağlı olmasına bağlamıştır (Malik ve Din, 1991; Gwathmey ve HaYes, 1997). Çalışmamızda kontrol parsellerine göre defoliant uygulaması olumlu sonuç vermiştir. Beyyavaş ve ark. (2022) çalışmalarında defoliant uygulamalarının kontrol parsellerine göre koza açma yüzdelerini bizim çalışmamızdan elde edilen bulgularla uyum içersindedir.

Çizelge 4. Pamuk bitkisine defoliant uygulamasıyla elde edilen toplam yaprak sayısı (adet bitki<sup>-1</sup>), uygulamadan 7. 14. 21. gün sonra yaprak sayısı (adet bitki<sup>-1</sup>) ve yüzde oranı (%) değerleri

	Toplam Yaprak Sayısı	7.Gün	14.Gün	21.Gün	Yüzde Oranı
Kontrol	77.03	69.83	65.30	58.97	%33
Dropp ultra	75.16	60.30	41.23	17.67	%86
CV %	7	8	17	5	



### **Uygulama Öncesi Toplam Yaprak Sayısı**

Çizelge 4’de toplam yaprak sayısına ilişkin yapılan varyans analizi sonucuna göre Dropp Ultra defoliant uygulamaları toplam yaprak sayısı yönünden istatistiksel olarak önemsiz bulunduğu Tablo 4’ten izlenebilmektedir. Uygulamalar arasında istatistiksel oranda fark görülmediğinden aynı grupta yer almışlardır.

Çizelge 4’de toplam yaprak sayısı incelendiğinde; denemede kullanılan Dropp Ultra uygulamalarında toplam yaprak sayısı 75.16 olduğu kontrol ise 77.03 olarak görülmüştür. Patterson (1996), Dropp Ultra yoğun olarak kullanıldığını, hava koşullarının yaprak döktürme başarısında ana belirleyici faktör olarak dikkate alınması gerektiğini; (Edmisten, 2013). defoliant dozlarının aşırı olması desikant etkisi yaratabileceği; sağlıklı bir yaprak dökümü için yaprağın yeterince canlı kalması gerektiği ve bu sayede absiyon tabakasına yaprak dökümü için önemli kimyasalların gönderilebileceği; Cathey (1986), döktürme etkinliğinin yapraklardaki yüksek nem düzeyinde ve sıcaklık ile nemlilik yüksek olduğunda en yüksek olduğunu; Kabak ve Kaynak (2021), yaprak sayısı yönünden farklılığın olmasına, uygulanan kültürel işlemler ile çevresel faktörler etkili olduğu belirtmişlerdir. Sokat ve Gürel (2010); Tülemen (2015), defoliant uygulamasının pamukta yaprak sayısına etkisinin önemli olduğunu yönünde belirtmeleri çalışmamızla çelişir niteliktedir.

### **Uygulamadan 7. Gün Sonra Yaprak Sayısı**

Çizelge 4’de uygulamadan 7. gün sonra yaprak sayısına ilişkin yapılan varyans analizi sonucuna göre; Dropp Ultra defoliant uygulamaları, uygulamadan 7. gün sonra yaprak sayısı yönünden istatistiksel olarak önemsiz bulunduğu izlenebilmektedir. Uygulamalar arasında istatistiksel oranda fark görülmediğinden aynı grupta yer almışlardır.

Çizelge 4’te uygulamadan 7. gün yaprak sayısı incelendiğinde; denemede kullanılan Dropp Ultra uygulamalarında kontrolde 69.83 Dropp Ultra 60.30 adet bitki<sup>-1</sup> olduğu saptanmıştır. Tülemen ve Kaynak (2016); Beyyavaş ve ark. (2022) yaprak döktürücü uygulamalarının, uygulamadan 7. gün sonra bitkide kalan yaprak sayısında önemli düzeyde farklılık olduğu yönünde belirtmeleri çalışmamızla örtüşmektedir.

### **Uygulamadan 14. Gün Sonra Yaprak Sayısı**

Çizelge 4’de uygulamadan 14. gün sonra yaprak sayısına ilişkin yapılan varyans analizi sonucuna göre; Dropp Ultra defoliant uygulamaları, uygulamadan 14. gün sonra yaprak sayısı yönünden istatistiksel olarak önemsiz bulunduğu izlenebilmektedir. Uygulamalar arasında istatistiksel oranda fark görülmediğinden aynı grupta yer almışlardır.

Çizelge 4’de 14. gün yaprak sayısı incelendiğinde; denemede kullanılan Dropp Ultra uygulamalarında 14. gün yaprak sayısı kontrolde 65.30 Dropp Ultra 41.23 adet bitki<sup>-1</sup> olduğu saptanmıştır. 14. gün sonra dökülen yaprak sayısının 7. gün sonra dökülen yaprak sayısına göre daha fazla olduğu saptanmıştır. Tülemen ve Kaynak (2016); Beyyavaş ve ark. (2022) yaprak döktürücü uygulamalarının, uygulamadan 14. gün sonra bitkide kalan yaprak sayısında önemli düzeyde farklılık olduğu yönünde belirtmeleri çalışmamızla uyumludur.

### **Uygulamadan 21. Gün Sonra Yaprak Sayısı**

Çizelge 4’de uygulamadan 21. gün sonra yaprak sayısına ilişkin yapılan varyans analizi sonucuna göre; Dropp Ultra defoliant uygulamaları, uygulamadan 21. gün sonra yaprak sayısı yönünden istatistiksel olarak önemsiz bulunduğu izlenebilmektedir. Uygulamalar arasında istatistiksel oranda fark görülmediğinden aynı grupta yer almışlardır.

Çizelge 4’te 21. gün yaprak sayısı incelendiğinde; denemede kullanılan Dropp Ultra uygulamalarında 21. gün yaprak sayısı kontrolde 58.97 Dropp Ultra 17.67 adet bitki<sup>-1</sup> olduğu saptanmıştır. Uygulamadan 21. gün sonra dökülen yaprak sayısının uygulamadan 7. ve 14. gün sonrası dökülen yaprak sayısına göre daha fazla olduğu belirlenmiştir. Tülemen ve Kaynak (2016); yaprak döktürücü uygulamalarının 21. gün yaprak sayısı bakımından önemsiz olduğu yönünde belirtmeleri çalışmamızı destekler niteliktedir. Beyyavaş ve ark. (2022) yaprak döktürücü uygulamalarının, uygulamadan 21. gün sonra bitkide kalan yaprak sayısında önemli düzeyde farklılık olduğu yönünde belirtmeleri çalışmamızla çelişir niteliktedir.



### **Yüzde Oranı**

Çizelge 4'te yaprak döküm yüzdeleri hesaplanmıştır. Çalışmada Dropp Ultra uygulamasının kontrole kıyasla daha yüksek döküm oranına sahip olduğu saptanmıştır. Çizelge 4 incelendiğinde; kontrole yaprak döküm oranı %33 olarak saptanırken, Dropp ultra uygulaması sonucu %86 olarak tespit edilmiştir. Yaprak döküm oranı kontrole göre arttığı, yaprak sayısının da kontrole göre %53 oranında azaldığı görülmektedir. Dropp Ultra uygulamasının 7. 14. ve 21. günlerden sonra kontrole göre daha fazla dökülme olduğu ve defoliant uygulamasının yaprak dökümünü büyük oranda etkilediği tespit edilmiştir.

### **Koza Ağırlığı**

Yapılan varyans analizi sonucunda; Dropp Ultra defoliant uygulamaları koza ağırlığı yönünden istatistiksel olarak önemsiz bulunduğu Tablo 5'ten izlenebilmektedir. Uygulamalar arasında istatistiksel oranda fark görülmediğinden aynı grupta yer almışlardır.

Çizelge 5'de koza ağırlığı (g) incelendiğinde; denemede kullanılan Dropp Ultra uygulamalarında koza ağırlığının (6.33 g) olduğu kontrol ise (6.10 g) olarak görülmüştür. Ayala ve Silvertooth (2001), defoliant seçilirken çevre şartlarına dikkat edilmesi gerektiği ve uygulama zamanının iyi seçilmesi gerektiğini; Beyyavaş ve ark. (2022), vejetasyon süresinin uzaması pamuk bitkisinde koza ağırlığı üzerine olumlu katkı yaptığını belirtmişlerdir. Çopur ve ark. (2010) çiçeklenmeden 60 gün sonra yapılan Drop Ultra uygulamasında, koza ağırlığının azaldığı; Snipes ve Baskin (1994), defoliant uygulamasının kontrol parseline göre koza ağırlığında düşüş olduğunu; Ayaz ve Emiroğlu (2003), defoliant uygulamasıyla kozalar açmaya zorlandığı için ufak kozalar açılmakta dolayısıyla tek koza ağırlığı da düşüş yaşandığı, en yüksek ağırlığının kontrol parselinden alınırken defoliant uygulaması yapılan parsellerin hepsinde koza ağırlığının düştüğünü yönünde belirtmeleri çalışmamızla örtüşmektedir. Awan ve ark. (2012); Görmüş ve ark. (2017) çalışmalarında defoliant uygulamasının kontrol parsellerine göre daha yüksek değerlerde bulunması çalışmamızla uyum içerisindedir.

Çizelge 5. Pamuk bitkisine defoliant uygulamasıyla elde edilen koza ağırlığı (g), koza kütlü ağırlığı (g), verim (kg da-1), çırçır randımanı (%) ve 100 tohum (g) değerleri

	<b>Koza Ağırlığı</b>	<b>Koza Kütlü Ağırlığı</b>	<b>Verim</b>	<b>Çırçır randıman</b>	<b>100 Tohum Ağırlığı</b>
Kontrol	6.10	4.35	432.67	44.47	8.86
Dropp ultra	6.33	4.80	486.0	45.62	8.43
CV %	3	3	4	1	4

### **Koza Kütlü Ağırlığı**

Yapılan varyans analizi sonucunda; Dropp Ultra defoliant uygulamalarının koza kütlü ağırlığı yönünden istatistiksel olarak önemsiz bulunduğu Tablo 5'ten izlenebilmektedir. Uygulamalar arasında istatistiksel oranda fark görülmediğinden aynı grupta yer almışlardır.

Çizelge 5'de koza kütlü ağırlığı (g) incelendiğinde; denemede kullanılan Dropp Ultra defoliant uygulamalarında koza ağırlığının (4.80 g) kontrol ise (4.35 g) olarak görülmüştür. Ayaz ve Emiroğlu (2003), farklı olgunluk dönemlerinde yapılan defoliant uygulamalarının koza kütlü ağırlığı için önemli olduğunu belirtmişlerdir. Sokat 2008; Sokat ve Gürel 2010; Tülemen 2016; defoliant uygulamalarının koza kütlü ağırlığı bakımından önemli düzeyde fark oluşturmadığını yönünde belirtmeleri çalışmamızla uyumlu niteliktedir.

### **Verim**

Yapılan varyans analizi sonucunda; Dropp Ultra defoliant uygulamalarının pamuk verimi yönünden istatistiksel olarak önemsiz bulunduğu Tablo 5'ten izlenebilmektedir. Uygulamalar arasında istatistiksel oranda fark görülmediğinden aynı grupta yer almışlardır.

Çizelge 5'de pamuk verimi incelendiğinde; denemede kullanılan Dropp Ultra defoliant uygulamalarında kontrol 432.67 Dropp ultra ise 486.0 olarak görülmüştür. Kelley ve ark. (2000); Phipps ve ark. (2002), erken yaprak döktürücü uygulamasının pamuk verimini azaltabildiğini; Çiçek ve ark. (2003), %40-50 oranında koza açılım döneminde yapılan yaprak döktürme sonucunda, kütlü pamuk veriminde düşüş

olduğunu; Çopur ve ark. (2010), çiçeklenme tarihinden 60 gün sonra yapılan Drop Ultra uygulamasında, pamuk verimi azaldığını; Denizdurduran (2008), kütlü pamuk verimi bakımından ekimden 110 ve 120 gün sonra yapılan defoliasyon işleminin en uygun zamanlar olduğunu; Beyyavaş(2019), kozaların % 60'ı açtığı dönemde en fazla kütlü pamuk veriminin, Drop Ultra uygulamalarının verdiğini; Wright ve ark. (2014) ise yaprak döktürme zamanının verimi etkilemediğini belirtmişlerdir. Elde edilen sonuçlara göre, Awan ve ark. (2012); Ming-Wei ve ark. (2013); Mrunaline ve ark. (2018); Haliloğlu ve ark. (2020) çalışmalarında defoliant uygulamasının kontrole göre daha fazla kütlü pamuk verimi verdiğini belirtmeleri çalışmamızla uyum içerisinde.

#### **Çırcır Randımanı**

Yapılan varyans analizi sonucunda; Dropp Ultra defoliant uygulamalarının çırcır randımanı yönünden istatistiksel olarak önemsiz bulunduğu Tablo 5'ten izlenebilmektedir. Uygulamalar arasında istatistiksel oranda fark görülmediğinden aynı grupta yer almışlardır.

Çizelge 5'de çırcır randımanı incelendiğinde; denemede kullanılan Dropp Ultra defoliant uygulamalarında kontrol 44.47 Dropp ultra ise 45.62 olarak görülmüştür. Larson vd. 2005; Beyyavaş (2019); Kabak ve Kaynak (2021)'in defoliant uygulamalarının çırcır randımanı üzerine etki ettiği yönünde belirtmeleri elde edilen bulgular ile zıtlık sağlamaktadır. Çiçek ve ark. (2003); Karademir ve ark. (2007); Sokat ve Gürel (2010); Tülemen (2015) ve Karaman (2019) çalışmalarında defoliant uygulamalarının çırcır randımanına etkisinin olmadığını belirtmeleri çalışmamızla uyum göstermektedir.

#### **100 Tohum Ağırlığı**

Yapılan varyans analizi sonucunda; Dropp Ultra defoliant uygulamalarının 100 tohum ağırlığı yönünden istatistiksel olarak önemsiz bulunduğu Tablo 5'ten izlenebilmektedir. Uygulamalar arasında istatistiksel oranda fark görülmediğinden aynı grupta yer almışlardır.

Çizelge 5'de 100 tohum ağırlığı incelendiğinde; denemede kullanılan Dropp Ultra defoliant uygulamalarında kontrol 8.86, Dropp ultra ise 8.43 olarak görülmüştür. Kaynak ve ark. (1999), Çiçek ve ark. (2003), Karademir ve ark. (2003), Sokat (2008), Sokat ve Gürel 2010; Haliloglu vd. (2020), defoliant uygulamasının 100 tohum ağırlığını etkilemediği yönünde belirtmeleri çalışmamızla uyum içerisinde.

#### **SONUÇ**

Pamuk bitkisinde iyi bir verim ve kalite elde edebilmek için hasadın iyi bir şekilde yapılması, yaprakların döktürülmesi ile makinenin toplama randımanı daha fazla olacağı gibi kütlü pamuğa karışan yabancı madde oranı da daha az olabilmektedir. Ayrıca yaprak dökümü ile koza açma süresi daha erken meydana geldiği ve daha önce yapılan çalışmalarda birçok araştırmacı hasada yardımcı olduğunu ve hasadı kolaylaştırmak amacıyla defoliant kullanımının olumlu etki ettiğini dile getirmişlerdir. Çalışmada, defoliant uygulamalarından Dropp Ultra (Thidiazuron+Diuron 120+60 g l<sup>-1</sup>) uygulamasının açan koza sayısını bakımından iyi performans gösterdiği ve Dropp Ultra (Thidiazuron+Diuron 120+60 g l<sup>-1</sup>) uygulanan parsellerden elde edilen verim, kontrol parsellerinden alınan verime göre daha fazla olduğu tespit edilmiştir.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DESTINATION MARKETING RESEARCH THROUGH SOCIAL MEDIA DATA: UNCOVERING THE WORLD'S MOST TAGGED COUNTRIES

## DESTİNASYON PAZARLAMASI ARAŞTIRMASI İÇİN INSTAGRAM'IN DATASINI KULLANMAK: DÜNYANIN EN ÇOK ETİKETLENEN ÜLKELERİ

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### ABSTRACT

Our purpose in this research was to use social media analytics to figure out the most instagrammed destinations in the context of countries in the world. Therefore, the research was exploratory, focusing on Instagram as a data source, and attempting to identify meaningful topics and patterns in social media communication using data collected from Instagram. In the study, the popularity of a total of one hundred and fifty-six countries on the social media platform called Instagram was investigated by a quantitative method. The research was carried out by using the data of Instagram and collecting the obtained results. oth the local language equivalents and the English equivalent of each country were obtained from the data and the results were collected.

**Keywords:** Communication Studies, Communication Research, New Media Technologies, Tourism Marketing, Social Media

### ÖZET

Günümüzde, turizm destinasyonları arasındaki rekabet gittikçe artarken bu destinasyonlara yönelik karşılaştırmalı araştırmalar da artmaktadır. Bu araştırmanın amacı sosyal medya analitiğini kullanarak ülke bazında Instagram platformunda en fazla taglenen destinasyonu bulmaktır. Araştırma, bir veri kaynağı olarak Instagram'a odaklanan ve Instagram'dan toplanan verileri kullanarak sosyal medya iletişimindeki anlamlı konuları ve kalıpları belirlemeye çalışan keşif amaçlı bir araştırmadır. Araştırmada, dünyadaki toplam yüz doksan altı ülkenin Instagram adlı sosyal medya platformundaki popüleritesi kantitatif bir yöntemle araştırılmıştır. Araştırma, tüm ülkelerin İngilizce isimlerinin Instagram datasından toplanması tekniğiyle gerçekleştirilmiştir. Araştırmanın sonucunda elde edilen veriler baz alınarak bir sıralama oluşturulmuştur. Araştırmanın sonucuna göre,

**Anahtar Kelimeler:** İletişim Araştırmaları, İletişim Çalışmaları, Yeni Medya Teknolojileri, Turizm Pazarlaması, Sosyal Medya

### INTRODUCTION

With development of information communication technologies, destinations have started using social media and the internet to promote themselves. Tourism industry is broadly identified for its contribution to economic development as one of the “world's biggest and fastest growing industries” (as cited in Çakıcı, Kuhzady, & Benli, 2017, p. 1). Consequently, competition among the number of tourism destinations worldwide is continuously growing (Drakulić Kovačević, Kovačević, Stankov, Dragičević, & Miletić, 2017). Because of the market is high competitive, destinations needs to cautiously allocate resources and give precedence to actions to maximize benefits. In this relation, destination positioning has become one of the main components of destination marketing/planning and strategies for making the tourism development sustainable and successful (Chen, Chen, & Lee, 2010).



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

The contention is that destination competitiveness has "... tremendous ramifications for the tourism industry and is therefore of considerable interest to practitioners and policy makers." (as cited in Enright and Newton, 2004, p.777). Dwyer, Forsyth, & Rao (as cited in Enright and Newton, 2004, p.777) reinforce this view, stating that it is "...useful for the industry and government to understand where a country's competitive position is weakest and strongest". (Enright and Newton, 2004, p.777). Researchers and tourism industry need a holistic review of the tourism industry and communication patterns among diverse stakeholders. In this relation, social media platforms have a considerable influence (Park, Ok, & Chae, 2015, p.885). "Social media use platforms where consumers express or share their opinions and seek travel information. Marketers have used social media as an affordable but powerful promotional tool to disseminate information about their brands, products and services" (as cited in Park, Ok, & Chae, 2015, pp.885-886). For example, microblogging tools like Instagram creates what is called "big data", which is large in size and diverse in type. Instagram alone generates about 50 million photograph daily (Aslam, n.d.). "Social media have drawn unprecedented attention from customers, businesses, and researchers in many disciplines. The hospitality and tourism industry is no exception; lately, social media have become a hot research item in the hospitality and tourism academic community." (Park, Ok, & Chae, 2015, p.885).

Lu and Stepchenkova (as cited in Park, Ok, & Chae, 2015, p.886) reported that most existing studies analyzed social media content, customer review websites, and blogs which are related to products and services in the tourism, lodging, or restaurant industries. The authors strongly suggested using social media content (e.g. user-generated data from TripAdvisor) effectively as a data source and incorporating more sophisticated methods of analyzing this type of data where most previous studies in tourism and hospitality have extensively relied on survey methods.

Destination tags are labels or identifiers used to specify and categorize specific travel destinations. They are commonly used in various contexts to provide information, categorize content, or facilitate navigation related to travel and tourism. Below are listed some ways destination tags are used:

- On travel planning websites and apps, users can search for and explore destinations using destination tags. These tags help travelers find information about specific places, including tourist attractions, hotels, restaurants, and activities.
- Social Media: Travelers often use destination tags when sharing their travel experiences on social media platforms like Instagram, Twitter, and TikTok. These tags make it easy for others to discover content related to a particular destination and gain insights into what to see and do there.
- Travel Blogs: Travel bloggers often use destination tags to categorize their articles and stories by location. This allows readers to browse content based on their interests in specific destinations.
- Geotagging Photos: When travelers take photos with their smartphones, they can geotag them with the location where the photo was taken. This creates a visual record of their travels and helps others identify the places they've visited.
- Travel Itineraries: Travel agencies and tour operators may use destination tags to organize and promote travel itineraries. This helps potential customers find trips to their preferred destinations.
- Travel Reviews: Review websites and apps like TripAdvisor use destination tags to categorize and organize user reviews of hotels, restaurants, and attractions in specific locations. This helps travelers make informed decisions based on the experiences of others.
- Navigation Apps: Navigation and mapping apps use destination tags to help users find directions and information about specific places. Users can enter a destination tag to get directions to that location.
- Event Promotion: Destination tags are used to promote events and festivals happening in specific locations. This helps event organizers reach a target audience interested in that destination.
- Tourist Information Centers: Physical tourist information centers may use destination tags on maps and brochures to highlight key points of interest in a particular area.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- Marketing and Advertising: Destination tags are used in marketing and advertising campaigns to promote tourism to specific destinations. Travel agencies, airlines, and tourism boards often incorporate destination tags into their promotional materials.

Destination tags play a crucial role in helping travelers discover, plan, and share their travel experiences. They make it easier for people to find relevant information and connect with others who have similar travel interests. Whether travelers seeking information or a travel industry professional looking to promote destinations, destination tags are a valuable tool for enhancing the travel experience. People tag countries on social media for various reasons. For example, tagging a country helps provide context and location information for a post. It lets others know where the content was created or where the person is currently located. The other reason of people tag countries is travel and tourism. Many social media users share their travel experiences, and tagging countries allows them to showcase the destinations they've visited. It's a way to document their adventures and share recommendations with others. Thirdly, cultural exploration is another reason. Tagging countries can be a way to explore and appreciate different cultures. People may share content related to cuisine, traditions, festivals, and customs specific to a country. The other reason is connecting with locals. Travelers and expatriates often use country tags to connect with locals or expat communities. It's a way to find like-minded individuals or seek recommendations from residents. Search and discovery is another reason of people tagging countries. Users interested in a specific country can search for posts tagged with that country to discover relevant content, such as travel tips, cultural insights, or news updates. In summary, tagging countries on social media serves various purposes, including sharing experiences, connecting with others, promoting businesses, raising awareness, and providing geographical context. It enhances the richness and diversity of content on social media platforms and fosters connections among users with shared interests or experiences related to a particular country.

The aim of this research is to quantify which countries are tagged how much. The reasons why people tag specific countries have been listed above. The purpose of this research is not to investigate why individuals tag specific countries. Such an investigation could be the subject of a much more detailed study. In this research, the sole objective is to determine which countries are tagged to what extent using Instagram's data. The results of this research may lead to various questions, such as why a particular country is tagged more or less, and these questions may become the subject of further research. The outcome of the research can guide sociologists, communication experts, politicians, public opinion researchers, or tourism professionals to ask different questions.

Our purpose in this research was to use social media analytics to figure out the most tagged destinations in the context of countries in the world. Therefore, the research was exploratory, focusing on Instagram as a data source, and attempting to identify meaningful topics and patterns in social media communication using data collected from Instagram. Instagram was specifically chosen because Instagram data are available to businesses and researchers. Researchers and hospitality managers and have the opportunity to use social media data and analytics. Instagram data can be used by using hashtags.

The use of hashtags on social media channels often increases the influence of content (making it public). Hashtags are those short links preceded by the pound sign (#). They are used to mark keywords or topics (e.g. #visitportugal and #heritage). A destination should create their one set of hashtags. The hashtag was created organically by Twitter users as a way to categorize messages. Now it is also linked to content on Facebook, Google+ and Tumblr and is an extremely powerful tool on Instagram and Pinterest (photo-sharing tools). Hashtags are integral to the way we communicate online, and it is important to know how to use them (as cited in Oliveira & Panyik, 2014, p. 61). Clicking on a hashtagged word in any tweet, message, photo or post shows all other tweets, messages, photos or posts marked with that keyword from all around the world. In seconds, they become a piece of knowledge on the global sphere. (Oliveira & Panyik, 2014, p. 61).

It's important to note that while hashtags are a valuable tool for social media engagement and analysis, their use in academic research often involves more rigorous methodologies, data collection, and analysis techniques. Researchers aim to gain insights into online behaviors, trends, and communication patterns, which can have broader implications for various fields of study. Hashtags serve different purposes in

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

the context of social media and academic research. In academic research, hashtags can be analyzed to understand social media trends, sentiment analysis, and the spread of information. Researchers examine how hashtags are used and the impact they have on public discourse. Some academic studies focus on the use of hashtags as a form of digital communication and language evolution. They explore how hashtags have become part of everyday online communication and how they convey meaning and context. Researchers study the role of hashtags in social movements and activism. Hashtags can help mobilize and connect individuals who share common goals and concerns, making them a subject of interest in sociology and political science research.

## METHOD

In the era of new technologies, there is a widespread opinion that hashtag is very important: “Hashtags are important. Period. There’s no argument there.” (Hart, 2018). There are many destination surveys using hashtags. For example, Jet2, a travel company, has conducted ‘the most photographed countries in the world’ survey in November 2016 (see “The Most Photographed”, n.d.). However, no more detailed and comprehensive research has been carried out since then in the context of countries. Instagram research is more related to the number of active users on geography basis (see “Leading countries”, 2018). There are also researches carried out about most instagrammed destinations but they are more based on local level not countries (see “25 Most Photographed”, 2018). For example, Sony Mobile have compiled a list of the most Instagrammed landmarks in the world (see “Top 30 most”, 2017). This research was carried out in order to eliminate the deficiency in this area. The results of the study will be able to provide useful data for researches in the various interdisciplinary fields as well as in the fields of tourism industry, sociology and communication studies. Moreover, to find out the rank of Turkey in the world is important to make a situation analysis in terms of tourism potential of Turkey. This research is important for determining Turkey's popularity on the world's trendiest social media platform as a tourism destination. Additionally, since this research is comparative in nature, it will also reveal data regarding the trendiest countries by identifying and comparing them on social media, resulting in a trend ranking.

The research methodology includes data collection and sampling, In the study, instagram hashtags of all countries in the world were collected. A list of all countries is reached from the Britannica encyclopedia (“List of”, n.d.). This list includes one hundred and ninety-five countries. This research is primarily focused on tourism marketing; therefore, the decision has been made to use English tags in the study. This choice is based on the fact that hashtags in the local language of a country may provide misleading information. The hashtags being investigated here are predominantly those used by tourists visiting a particular country. Consequently, it was decided to research the English names of countries. It is clear that hashtags related to a country's local language could be more associated with internal news networks rather than tourism. Therefore, they may provide deceptive data in the context of this research.

Because Georgia which is country one has the same name the state of Georgia in the United States, Georgia, an exception had to be made to exclude it from the list because it would provide us with misleading information. In order to ensure the reliability of the ranking, it was necessary to complete the research in a very short period of time. A long lasting search could have led to a more disadvantaged position for a country that had been searched earlier and this would undermine the credibility of the ranking. Therefore the research started on September, 30, 2023 and ended on the same date.

## RESULTS

1) Venezuela: 93.500.000, 2) Colombia: 86.800.000, 3) Canada: 84.600.000, 4) Turkey: 76.900.000, 5) Spain: 75.400.000, 6) Germany: 74.400.000, 7) Chile: 71.500.000, 8) Russia: 69.7000.000, 9) Thailand: 55.730.987, 10) Brazil: 52.500.000, 11) Malaysia: 50.400.000, 12) Greece: 48.600.000, 13) Kuwait: 45.300.000, 14) Singapore: 43.800.000, 15) Poland: 41.700.000, 16) China: 39.800.000, 17) Pakistan: 39.700.000, 18) United Kingdom (England): 36.700.000 19) Jordan: 35.800.000 20) Ecuador: 32.400.000 21) Qatar: 32.100.000 22) Peru: 31.500.000 23) Switzerland: 31.200.000 24) Sweden: 30.500.000 25) Iran: 30.400.000 26) Egypt: 29.600.000 27) Panama: 28.200.000 28) Norway: 27.400.000 29) Vietnam: 26.600.000 30) Lebanon 25.400.000 31) Ireland: 24.500.000 32) Philippines: 24.500.000 33) South Africa: 24.500.000 34) India: 24.200.000 35) Austria 24.100.000 36) Azerbaijan: 23.700.000 37) Nigeria: 20.600.000 38) Costa Rica: 18.900.000 39) Israel: 18.500.000 40) Oman:

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

17.700.000 41) Netherlands: 16.900.000 42) Japan: 16.900.900 43) Italy: 16.400.000 44) Saudi Arabia: 15.200.000 45) Iceland: 14.900.000 46) Mexico: 14.900.000 47) Cuba: 14.400.000 48) Jamaica: 14.200.000 49) Denmark: 13.600.00 50) Romania: 13.100.000 51) Indonesia: 12.700.000 52) Hungary: 12.200.000, 53) Kenya: 11.800.000, 54) Algeria 11.600.000, 55) Belarus: 11.300.000, 56) Uruguay: 11.300.000, 57) Maldives: 10.900.000, 58) Ghana: 10.800.000, 59) Slovakia: 10.400.000, 60) France: 10.400.000, 79) Czech Republic: 10.300.000, 80) Uzbekistan: 9.700.000, 81) The United States: 9.300.000, 82) Nepal: 9.200.000, 83) Korea, South: 9.100.000, 84) Bulgaria: 8.900.000, 85) Dominican Republic: 8.700.000, 86) Tanzania: 8.700.000, 87) Kazakhstan: 8.500.000, 88) Syria: 8.100.000, 89) Albania: 7.900.000, 90) Bolivia: 7.800.000, 91) Cambodia: 7.800.000, 92) Monaco: 7.800.000, 93) Serbia: 7.200.000, 94) Lithuania: 5.700.000 95) Portugal: 5.000.000, 96) Senegal: 4.200.000, 97) Bahrain: 3.000.000, 98) Australia: 7.800.000, 99) El Salvador: 7.700.000, 100) Brunei: 7.700.000, 101) Bangladesh: 7.200.000, 102) Argentina 6.700.000, 103) Paraguay: 6.400.000, 104) Montenegro: 6.200.000, 105) Barbados: 5.400.000, 106) Slovenia: 5.400.000, 107) Nicaragua: 5.300.000, 108) Afghanistan: 4.900.000, 109) Haiti: 4.600.000, 110) Mauritius: 4.600.000, 111) Latvia: 4.300.000, 112) Myanmar (Burma): 4.100.000, 113) Uganda: 3.600.000, 114) Taiwan: 3.600.000, 115) Estonia: 3.600.000, 116) Ukraine: 3.800.000, 117) Libya: 3.300.000, 118) Kyrgyzstan: 3.100.000, 119) Kosovo: 2.900.000, 120) Angola: 2.900.000, 121) Togo: 2.900.000, 122) Laos: 2.800.000, 123) Ethiopia: 2.800.000, 124) Vatican City: 2.800.000 125) Macedonia: 2.700.000, 126) United Arab Emirates: 2.700.000, 127) Fiji: 2.700.000, 128) Congo, Democratic Republic of the: 2.600.000, 129) Trinidad and Tobago: 2.600.000, 130) Morocco: 2.400.000, 131) Tajikistan: 2.400.000, 132) Namibia: 2.300.000, 133) Dominica: 2.300.000, 134) Zimbabwe: 2.200.000, 135) Benin: 2.200.000, 136) Belize: 2.100.000, 137) Zambia: 2.100.000, 138) Rwanda: 2.100.000, 139) Andorra: 2.100.000, 140) Seychelles: 1.900.000, 141) Yemen: 1.900.000, 142) Sudan: 1.800.000, 143) Turkmenistan: 1.800.000, 144) Belgium: 1.800.000, 145) Finland: 1.700.000, 146) Mali: 1.700.000, 147) Sri Lanka: 1.500.000, 148) Iraq: 1.500.000, 149) Malawi: 1.400.000, 150) Guatemala: 1.300.000, 151) Mozambique: 1.300.000, 152) Cameroon: 1.300.000, 153) Guyana: 1.300.000, 154) San Marino: 1.200.000, 155) Armenia: 1.200.000, 156) Bhutan: 1.100.000, 157) Malta: 900.000, 158) Honduras: 700.000, 159) Luxembourg: 400.000, 160) Moldova: 300.000, 161) Madagascar: 200.000, 162) Grenada: 100.000, 163) Cabo Verde: 100.000, 164) Solomon Islands: 96.400, 165) Samoa: 91.800, 166) Guinea-Bissau: 91.100, 167) Burundi: 88.600, 168) Somalia: 81.900, 169) Suriname: 80.100, 170) East Timor (Timor-Leste): 78.700, 171) Gabon: 78.100, 172) Korea, North: 70.500 173) Guinea: 68.900, 174) Equatorial Guinea: 61.700, 175) Liberia: 61.500, 176) Chad: 60.700, 177) New Zealand: 57.400, 178) Sierra Leone: 55.300, 179) Saint Vincent and the Grenadines: 52.500 180) Turkish Republic of North Cyprus: 50.600, 181) Palau: 49.000, 182) Eritrea: 47.500, 183) Papua New Guinea: 46.000, 184) Kiribati: 42.900, 185) Tonga: 42.300, 186) Vanuatu: 41.600, 187) Burkina Faso: 40.400, 188) Tuvalu: 38.700, 189) Liechtenstein: 38.400, 190) Marshall Islands: 36.800, 191) Saint Lucia: 38.100 192) Central African Republic: 35.300, 193) Antigua and Barbuda: 29.100, 194) Lesotho: 26.900, 195) Sudan, South: 24.700, The Bahamas: 26.400, 196) Swaziland: 23.100, 197) Djibouti: 23.200, 198) Mauritania: 22.900, 199) Sao Tome and Principe: 21.700, 200) Niger: 20.600, 201) Saint Kitts and Nevis: 18.700, 202) Botswana: 18.200, 203) Tunisia: 13.500, 204) Micronesia, Federated States of: 12.900, 205) The Gambia: 12.800, 206) Croatia: 10.000, 207) Bosnia and Herzegovina: 5.000, 208) South Cyprus: 5.000. 209) Nauru: 4.400, 210) Mongolia: 1.600.

## DICUSSION

According to the research results, four of the top 10 most tagged countries are from Latin America. As mentioned earlier, the findings of the research could indeed prompt sociologists, communication experts, or public opinion researchers to ask different questions. The fact that Latin American countries are tagged to such an extent has emerged as an intriguing finding based on the research results. However, why such a result has emerged, as previously mentioned, may be a subject and question for a more detailed and qualitative research in the future. Questions may arise regarding whether the reason behind Venezuela, Colombia, Chile, and Brazil being tagged so frequently is related to tourism or the usage rates of the Instagram platform in those countries. When looking at the lower end of the ranking, it can be observed that African countries or small countries from different parts of the world are concentrated in this section. This result suggests that there may be a direct correlation between internet infrastructure, population, and economic factors and the number of tags a country receives. According to the research



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

results, Turkey has become the fourth most tagged country, while Greece is the twelfth most tagged country and Spain ranks fifth in the list. When these data are read together, it is observed that both of these tourism-oriented countries receive a high number of tags. This result indicates a connection between tags and tourism, suggesting that people may be tagging these countries more frequently when sharing their travel experiences and memories on social media platforms. This finding highlights the link between tags and the tourism industry. Furthermore, the high ranking of Kuwait, despite being a small and sparsely populated country, also confirms the relationship between tourism and tags. The rise in Pakistan's ranking, on the other hand, demonstrates that a country's tagging is influenced not only by factors such as population, internet infrastructure, economic prosperity, and tourism (none of which are assumed to be present in Pakistan) but also by how much a country is discussed in the international context due to its domestic news. The likelihood of Russia ranking eighth in the list may indeed be due to similar factors. However, as previously mentioned, the findings of this research alone cannot make such claims, and this would be a subject for a different research study to explore in detail. Clearly, why Germany is tagged so frequently despite not being a tourism-oriented country could be a question for another research study. The high rankings of countries like Thailand, Malaysia, and Singapore in the list further strengthen the relationship between tags and tourism. Indeed, the fact that these countries have been actively promoting tourism in recent years is evident. This data strongly suggests that tourism marketing is being heavily carried out on social media platforms. These countries have not gained prominence for reasons similar to those of Pakistan, which further supports the idea that active tourism promotion plays a significant role in tagging and social media engagement. The fact that China ranks high in the list despite imposing restrictions on social media platforms is indeed another intriguing result of the research. The noteworthy results of the research have been briefly discussed. This research, falling into the category of primary research as it filters, categorizes, and collects data from Instagram, has the potential to prompt researchers to ask different research questions.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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**OVERİN SEX KORD STROMAL TÜMÖRÜNE BENZEYEN UTERİN TÜMÖR: OLGU  
SUNUMU**

**UTERİNE TUMOR SIMILAR TO OVARIAN SEX CORD STROMAL TUMOR: CASE  
REPORT**

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**ÖZET**

Overin seks kord tümörünü andıran uterus tümörü, patogenezi tam olarak belirlenemeyen, ancak belirgin polifenotipik immünohistokimyasal bulgulara sahip, oldukça nadir görülen bir jinekolojik tümördür. Clement ve Scully, bu tümörleri ilk olarak 1976'da literatürde yayınladılar ve bunları iki alt grup içinde sınıflandırdılar. Bu tümör uterin neoplazmalar için yayınlanmış 2021 Ulusal Kapsamlı Kanseri Ağrı Klinik Uygulama Kılavuzlarında, overin seks kord tümörünü andıran uterus tümörü bir uterus sarkomu olarak sınıflandırılır ve "geniş seks kordonu benzeri farklılaşma ve endometrial stromal bileşen içermeyen yumuşak içsi hücre proliferasyonu" olarak tanımlanır. Klinik olarak, overin seks kord tümörünü andıran uterus tümörü genellikle düşük malign potansiyelli neoplazm olarak kabul edilir. Bununla birlikte, birkaç overin seks kord tümörüne benzeyen uterin tümör (UTROSCT) vakasında postoperatif takip sırasında nüks ve metastaz bildirmiştir. Bu çalışmada klinikte postmenopozal kanama ve uterin kitle varlığı sebebiyle dış merkezde opere edilen, patolojisi "overin seks kord stromal tümörüne benzeyen uterin tümörü" olarak raporlanan olguyu sunmak amaçlanmıştır. 41 yaşında, dış merkezde total abdominal histerektomi + bilateral salpingooferektomi + pelvik paraaortik lenf nodu diseksiyonu yapılmış ve patoloji raporunda uterin kavite içinde 6x3,5x2,5 cm boyutlarında, polipoid yapıda, derece 1, malign miks müllerian tümör olarak rapor edilmesi üzerine sevk edilen olgunun histopatolojisinde solid, trabeküler ve tübül benzeri yapılar, tümör içerisinde sıkışık kalan endometrial glandlar, oval-yuvarlak nükleuslu, eozinofilik sitoplazmalı, hafif şiddette atipik nitelikte tümör hücreleri izlendi. İmmünohistokimyasal boyalardan ki-67, SF-1, Kaldesmon, Kalretinin, Vimentin, Östrojen, Progesteron, Desmin ve p16, Melan A, Pansitokeratin, EMA, CK7, SMA, İnhibin, S-100 ve CD10 çalışıldı. Çoğu benign ve malign lezyonlar ile benzer histopatolojik paternler gösterdiğinden, ameliyat öncesi veya ameliyat sırasında frozen kesitler yoluyla UTROSCT'lerin doğru teşhisini yapmak genellikle zordur. Çalışmada UTROSCT malign potansiyelli bir neoplazm olarak kabul edildi. Agresif karakterlere sahip UTROSCT alt kümesi için, tümörün nüks etmesi kötü bir prognoza yol açabilmektedir. Uterin kitlelerin klinikopatolojik ayırıcı tanısında, nadiren saptanan, overin seks kord stromal tümörüne benzeyen uterin tümörler de akla getirilmelidir.

**Anahtar Kelimeler:** Uterin tümörler, Overin seks kord tümörünü andıran uterus tümörü, Overin seks kord tümörüne benzeyen uterin tümör

## ABSTRACT

Uterine tumor similar to ovarian sex cord tumor is an extremely rare gynecological tumor whose pathogenesis is not fully determined, but has distinct polyphenotypic immunohistochemical findings. Clement and Scully first published these tumors in the literature in 1976 and classified them into two subgroups. This tumor is classified as a uterine sarcoma in the published 2021 National Comprehensive Cancer Network Clinical Practice Guidelines for uterine neoplasms, uterine tumor similar to ovarian sex cord and is described as "extensive sex cord-like differentiation and soft spindle cell proliferation without an endometrial stromal component." Clinically, uterine tumor similar to ovarian sex cord is generally considered a neoplasm of indolent or low malignant potential. However, several cases of uterine tumor resembling ovarian sex cord tumor (UTROSCT) reported recurrence and metastasis during postoperative follow-up. In this study, we aimed to present a case that was operated on at an external center due to postmenopausal bleeding and the presence of a uterine mass, and whose pathology was reported as "uterine tumor resembling ovarian sex cord stromal tumor". The case was referred to a 41-year-old patient who underwent total abdominal hysterectomy + bilateral salpingo-oophorectomy + pelvic para-aortic lymph node dissection at an external center and was reported to have a 6x3.5x2.5 cm sized, polypoid, grade 1 malignant mixed müllerian tumor in the uterine cavity in the pathology report. Histopathology revealed solid, trabecular and tubular tumors. Similar structures, endometrial glands trapped within the tumor, and mildly atypical tumor cells with oval-round nuclei and eosinophilic cytoplasm were observed. Among the immunohistochemical stains, ki-67, SF-1, Caldesmon, Calretinin, Vimentin, Estrogen, Progesterone, Desmin and p16, Melan A, Pancytokeratin, EMA, CK7, SMA, Inhibin, S-100 and CD10 were studied. It is often difficult to make an accurate diagnosis of UTROSCTs via preoperative or intraoperative frozen sections, as most show similar histopathological patterns as benign and malignant lesions. In the study, UTROSCT was considered a neoplasm with malignant potential. For the subset of UTROSCT with aggressive characters, tumor recurrence may lead to a poor prognosis. In the clinicopathological differential diagnosis of uterine masses, rarely detected uterine tumors that resemble ovarian sex cord stromal tumors should also be considered.

**Key Words:** Uterine sarcoma, Uterine tumor similar to ovarian sex cord tumor, Uterine tumor resembling ovarian sex cord tumor

## GİRİŞ

Overin seks kord tümörünü andıran uterus tümörü (OSKTAUT), patogenezi tam olarak belirlenemeyen, ancak belirgin polifenotipik immünohistokimyasal bulgulara sahip, oldukça nadir görülen bir jinekolojik tümördür. Clement ve Scully, bu tümörleri ilk olarak 1976'da literatürde yayınladılar ve bunları iki alt grup içinde sınıflandırdılar [1]. Bu tümör uterin neoplazmalar için yayınlanmış 2021 NCCN Klinik Uygulama Kılavuzlarında, (OSKTAUT) bir uterus sarkomu olarak sınıflandırılır ve "geniş seks kordonu benzeri farklılaşma ve endometrial stromal bileşen içermeyen yumuşak içsi hücre proliferasyonu" olarak tanımlanır [2]. Klinik olarak, OSKTAUT genellikle sessiz veya düşük malign potansiyelli neoplazm olarak kabul edilir [3]. Bununla birlikte, birkaç overin seks kord tümörüne benzeyen uterin tümör (UTROSCT) vakasında postoperatif takip sırasında nüks ve metastaz bildirmiştir [4-6]. Bu çalışmada klinikte postmenopozal kanama ve uterin kitle varlığı sebebiyle dış merkezde opere edilen, patolojisi "overin seks kord stromal tümörüne benzeyen uterin tümörü" olarak raporlanan olguyu sunmak amaçlanmıştır.

## OLGU

41 yaşında, dış merkezde TAH + BSO + omentektomi + PPLND yapılmış ve patoloji raporunda uterin kavite içinde 6x3,5x2,5 cm boyutlarında, polipoid yapıda, derece 1, malign miks müllerian tümör olarak rapor edilmesi üzerine sevk edilen olgunun histopatolojisinde solid, trabeküler ve tübül benzeri yapılar, tümör içerisinde sıkışık kalan endometrial glandlar, oval-yuvarlak nükleuslu, eozinoflik sitoplazmalı, hafif şiddette atipik nitelikte tümör hücreleri ve tümör hücrelerinde immünohistokimyasal bulgularda

SF-1 ile diffüz boyanma izlendi (Resim1-5). İmmunohistokimyasal bulgulara ki-67 indeksi düşük; SF-1, Kaldesmon, Kalretinin, Vimentin, Östrojen, Progesteron, Desmin ve p16 (fokal) pozitif; Melan A, Pansitokeratin, EMA, CK7, SMA, İnhibin, S-100 ve CD10 negatif olarak saptanmış olup patolojik tanısı Overin Seks Kord Tümörüne Benzeyen Uterin Tümör ile uyumlu olarak rapor edilmiştir. Hastanın kontrol ultrasonografik bulguları, operasyon loju sol komşuluğunda, intraabdominal yerleşimli, birbiri ile bağlantılı görünümde, medialde 31x38 mm boyutlarında, lateralde 36x42x104 mm boyutlarında, belirgin duvar yapısı izlenmeyen, öncelikle postoperatif hematoma lehine değerlendirilen koleksiyon şeklinde rapor edilmiştir ve bu koleksiyonun takiplerinde stabil olduğu izlenmiştir.

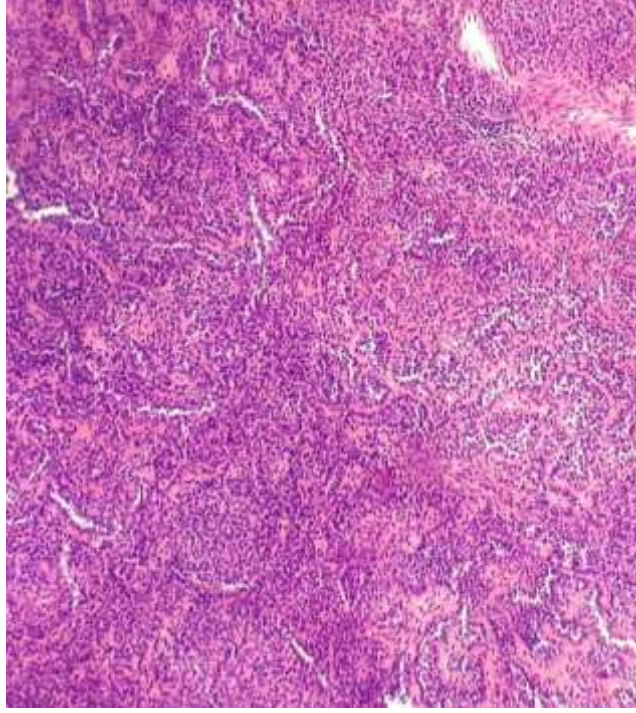
#### **TARTIŞMA VE SONUÇ**

Klinik tablo olarak çoğu zaman menopoz sonrası vajinal kanama, anormal adet görme veya pelvik ağrı [7,8] ile başvurur ve görüntüleme sonuçlarında büyümüş bir uterus veya fibrinoid lezyona benzer bir uterin kitle saptanmaktadır. Çoğu benign ve malign lezyonlar ile benzer histopatolojik paternler gösterdiğinden, ameliyat öncesi veya ameliyat sırasında frozen kesitler yoluyla UTROSCT'lerin doğru teşhisini yapmak genellikle zordur [9]. Çalışmada UTROSCT malign potansiyelli bir neoplazm olarak kabul edildi. Klinikopatolojik, immünohistokimyal bulgulara ve gözden geçirilmiş önceki literatürlere dayanarak, yüksek mitotik aktivitenin bulunması ve çapının büyük olması ( $\geq 10$  cm) tümörün agresif karakterli olduğunu düşündürdü. Agresif karakterlere sahip UTROSCT alt kümesi için, tümörün nüks etmesi kötü bir prognoza yol açabilmektedir (10).

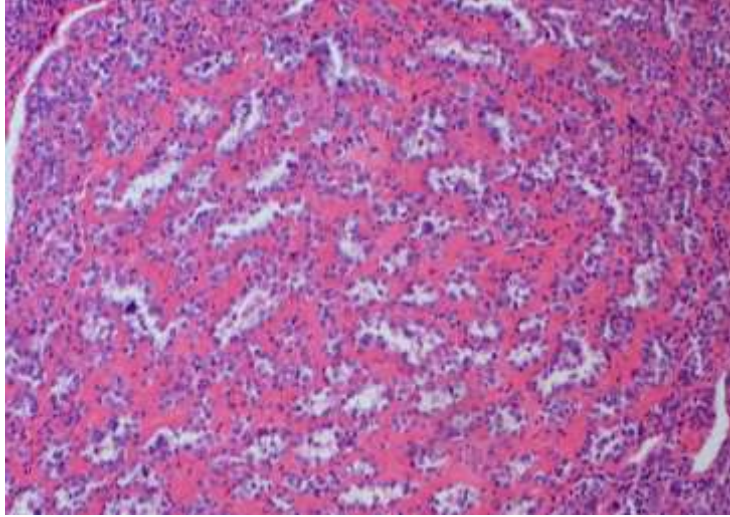
Uterin kitlelerin klinikopatolojik ayırıcı tanısında, nadiren saptanan, overin sex kord stromal tümörüne benzeyen uterin tümörler de akla getirilmelidir.

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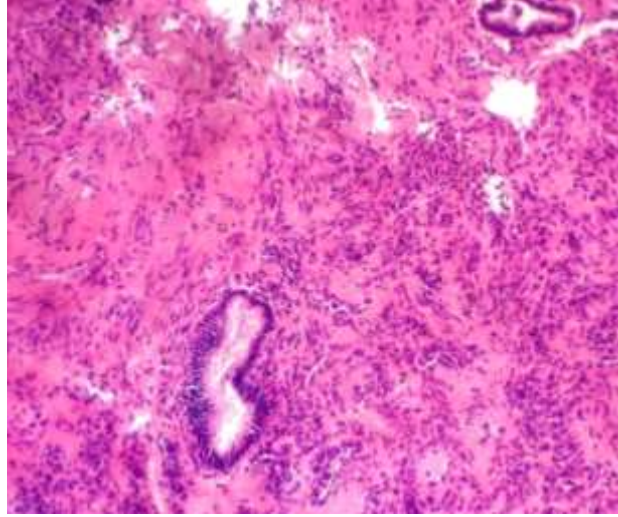


Resim 1: Solid, trabeküler ve tubul benzeri yapılardan oluşan neoplazm (H&E, 40X)

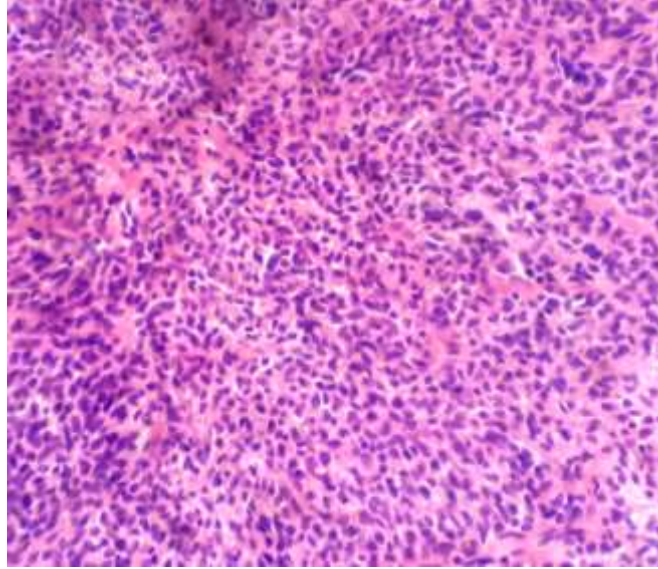


Resim 2: Tübül benzeri yapıların büyük büyütme görüntüsü (H&E, 200X)

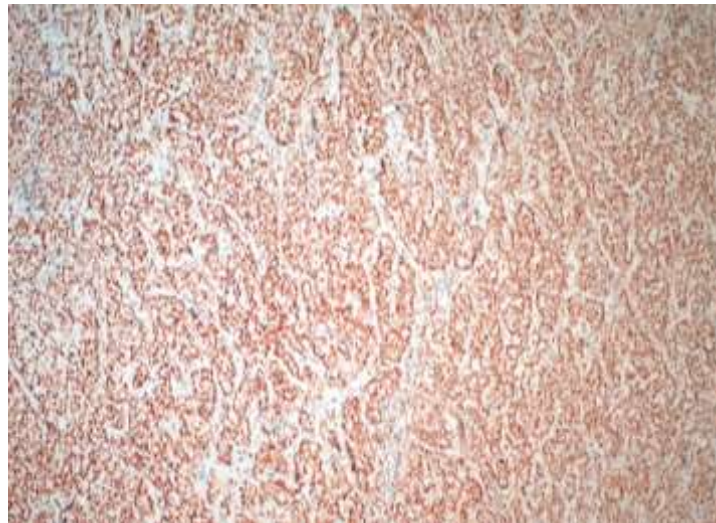




Resim 3: Tümör içerisinde sıkışıp kalan endometrial gland yapıları (H&E, 100X)



Resim 4: Oval-yuvarlak nükleuslu, eozinoflik sitoplazmalı, hafif atipik nitelikte tümör hücreleri (H&E, 400X)



Resim 5 : Tümör hücrelerinde immünohistokimyasal SF-1 ile diffüz boyanma (IHK, 100X)

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## EDEBİYAT VE KADIN<sup>1</sup> LITERATURE AND WOMEN

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### ÖZET

Kadın, edebiyata 4 şekilde dâhil olmuştur: Eseri oluşturan yazar ve/veya şair, eserde tip veya karakter olarak kahraman, eserin arz edildiği hedef kitle içerisinde okuyucu ve edebiyat bilimine katkıda bulunan bilim insanları. Eseri oluşturan kadın, modern yazılı edebiyatta eril türdeşine oranla sayısal açıdan zayıf kalmıştır. Eser içerisindeki kadın olarak da esinlendiği gerçek hayattaki kadar bulunmaktadır. Edebiyatın önemli bir kısmını oluşturan şiirlerde ve özellikle şiirin hayata en çok yansıyan şekli olan şarkı sözleri çok yüksek oranda kadına hitap veya kadından bahis üzerine kurulmuştur. İnsanlık nüfusunun yarısını oluşturan kadınlar her ne kadar eserlerde genellikle olumlu anılsalar da genellikle erkek bakış açısının ağırlığı altında kalmışlardır. Kadını, erkeğin bakış açısı üzerinden değerlendirmeye itiraz, zamanla “Feminist Bakış Açısı” ve “Feminist Eleştiri” kavramlarının doğmasına sebep olmuştur. Bu çalışmamızla “edebiyattaki kadın” olgusuna yönelik “farkındalık” oluşturmayı amaçladık.

**Anahtar Kelimeler:** Türk Edebiyatında Kadın, Edebiyat, Kadın, Feminist Bakış Açısı

### GİRİŞ

“Kadın”, türünün devamı için doğuran dişi insan için kullanılan bir tabirdir. Bu yönüyle varlık âleminde diğer dişiler gibi Tanrıdan aldığı lütufla Tanrısal bir eylem gerçekleştirir: Kendi türünden yeni bir canlı meydana getirir. Dünyaya getirdiği türdeşi olan yavrusu için doğumdan önce ve sonra birçok sıkıntılı süreç geçirdiğinden hayat içerisinde eril türdeşine göre oldukça dezavantajlı duruma düşmektedir.

Fiziksel açıdan eril türdeşine nispeten zayıflığı, yaşamsal üretim araçlarına ve üretilmiş artı değerlere ulaşmada yine dezavantajlı konuma sokmaktadır. Tanrısal lütufta, aynı zamanda dezavantaja dönüşmüştür. Eril akranları daha çok üretip daha fazla üretimden pay alırken “kadın” daha çok bedel ödediği halde daha az pay almaktadır.

Erkek, kadına nispetle insanlık tarihi boyunca hemen hemen her sahada egemen olmuş, üstünlük taslamış, kadını da herhangi bir mal varlığı gibi kendi erki altına almıştır. Hatta kadını insan olarak bile sayılmadığı coğrafyalar ve dönemler olmuştur. Günümüz dünyasında bile bu anlayışın hüküm sürdüğü yerlerin varlığı gözlemlenmektedir.

Görece bu olumsuz durumun yaşanmadığı modern toplumlarda bile erkeklerin meslekleri olarak kabul edilen işlerde bir kadın performansı ile öne geçtiğinde “kadınlar adına bir başarı” olarak lanse edilmektedir. Oysa o iş dalında bir erkek performans gösterdiğinde dikkat çekmiyor ise, o “kadın başarısı” olarak lanse edilmesinin hayret, hayranlık uyandırması, dutumun hala tam eşitlenmediğini göstermektedir. Her hayret veya takdir, süregelen, kadının “edemez, yapamaz” algısının bilinçaltında varlığını göstermektedir.

Günümüzde görece “varlık alanına” çıkmaları, yaşamın birçok alanında kadınların varlığı, üretimden kaynaklanan paylarının artışı, yüzyılları bulan ve ağır bedellerle kazanılmış haklar durumundadır.

<sup>1</sup> “Edebiyat ve Kadın” başlıklı bu çalışmamız “Türkiye Türkçesi Türk Edebiyatı”na odağına almıştır.



Hatta yalnızca kadınların dezavantajlı durumlardan kurtulmaları ve yaşam standartlarının erkekler düzeyine ulaşması için kurulmuş birçok sosyal organizasyon bulunmaktadır. Bunu yaşamsal amaç haline getiren “feminizm” diye adlandırılan felsefi/mental düşünce akımı dahi oluşmuştur.

Yaşamın birçok alanında bahsedilen durum gözleendiği gibi edebiyatta da durum aynıdır. Erkeklerle oranla popüler olmuş, kabul görmüş, tarihi dönemleri aşabilmiş kadın edebiyatçı azdır. Hem şair, yazar, araştırmacı, eleştirmen, hem de edebiyat tarihçisi, derlemecisi kadınlar erkeklerin sayısına yetişmemektedir.

Oysa edebiyat, özellikle oluşma/üretme aşamasında “duygu yoğun” bir eylemdir. Kadınlar da erkeklerle nispetle daha duygusal olduklarından daha üretken olmaları aklın gereğidir. Buna rağmen literatüre, orantısız olarak, çok az kadın girebilmiştir. Bunun sebepleri kişiden kişiye farklı yorumlanabilecek olsa da zannımızca bu alanda da erkeklerin kadınlara göre daha fazla fiziksel, finansal, sektörel üstünlüğü olmalıdır. Zira bir kadın bu alanda bile çoğu zaman bir erkeğin (kocas, babası, kardeşi) onayını almaya mecbur hissetmektedir.

Anlattığımız bu durumların tümü belki bütün dünya kadınları için geçerli ise de bizim içinde bulunduğumuz İslam kültürü içinde yaşayan kadınlar için daha fazla yaşanmış bir durumdur. Oysa İslam dini kadını erkeğin malı olmaktan çıkarıp birey yapmış ise de sonraki yüzyıllarda (aşırı korumacılığın etkisiyle) kadın daha çok hayattan kopmuş ve kendisini dille ve edebiyatla anlatsa bile modern yayıncılık kanallarıyla yayımlayamamıştır. Her ne kadar “kadın ağzı” doğaçlama yoluyla, bugün “halk edebiyatı” dediğimiz türe dâhil olmuş eserler var ise de kendi isimleriyle anılmadığından “anonim” kültür unsurlarına dönüşmüştür. Yani, başka bir deyişle “kadının adı yok” olmuştur!

Yazılı edebiyat bilgisi ve bilimine uygun olarak üretim yapıp yayınlama imkânına sahip kadınlar erkeklere göre çok az sayıda kalmıştır. Bu durum hemen hemen tüm edebiyat dönemlerimiz için böyle olmuştur: Klasik edebiyatımız, Batılılaşma dönemi edebiyatımız, Tanzimat dönemleri edebiyatımız, Servet-i Fünun-Fecr-i Ati dönemleri, Milli Edebiyat akımı ve bu sınıflandırmaların dışında faaliyet icra eden şahıslarımız için de böyledir.

Osmanlı devletinin, bir rejim ve sistem deęiştirilmesiyle yerine ikame edilen Türkiye Cumhuriyeti kadınların eğitimine önem ve öncelik vermiştir. Harf devrimi/deęişikliği ile ve okullaşma oranının artmasıyla kadınların bilgilenme, öğrenme, yazma ve yazdıklarını yayınlama imkânları artmıştır. Bu durum kadınların hayatın birçok alanında olduğu gibi edebiyat alanında da kendilerini gösterme imkânlarını artırmıştır. Kadın edebiyatçılarımız, yazar ve şairlerimiz daha fark edilir ve görünür olmuşlardır. Pek az kadın edebiyatçı edebiyat tarihimizde hak ettikleri saygınlığa ulaşmışlardır.

### **Kadın ve Edebiyat**

“Kadın”, edebiyata 4 şekilde dâhil olmuştur: Eseri oluşturan yazar ve/veya şair, eserde tip veya karakter olarak kahraman, eserin arz edildiği hedef kitle içerisinde okuyucu olarak ve Edebiyata dair araştırmalar yapan bilim insanı olarak.

#### *1. Edebi Eserde Kadın*

Söyleyen, Muhatap, Tip Veya Karakter Olarak Kadın

Edebi eserleri genel olarak üç temel sınıflandırmaya tabi tutabiliriz. Bunlar; Nazım/şiir, Kurmaca metinler ve bilgi metinleri.

Nazım/şiir kategorisinde erkek şairlerin eserleri kahir ekseriyetle kadına hitaben veya kadından bahseden eserlerdir. Metnimiz içerisinde örneklerden de anlaşılacağı üzere kadın, ulaşılması arzulanan, yokluğu acı, ıstırap veren, güzelliği yüceltilen “hedef obje”dir.

Kurmaca metinlerde ise (roman, hikâye, tiyatro) gerçek hayat esas alındığından gerçek hayattaki ağırlığı kadar metinlere dâhil olmuştur. Kadını, edebiyat türleri içine girebilen bilgi metinleri diyebileceğimiz anı, gezi, günlük, biyografi, otobiyografi, mektup gibi türlerde de yine gerçek hayattaki ağırlığına denk görebiliyoruz. Hemen hemen tüm dünya edebiyatında görünüm bu durumdadır.

Türk edebiyatında ise kadın, gerek aile konumundaki görevinden gerekse diğer konumlarıyla önemli bir yere sahiptir. Yaşamın ve zamanın uğradığı deęişiklerin beraberinde edebiyat ve edebiyatımızdaki kadın imgesi de deęişiklik göstermektedir. Örneğin İslamiyet öncesi Türk edebiyatını ele alırsak buradaki

kadın imgemiz ok atan, kılıç tutan bir yapıdayken zamanın ve hayatın değişmesiyle beraber bu özelliklerinin yerini haz, aşk vb. konular almaya başlamıştır.

Mehmet Kaplan, yaşadığımız medeniyet devrelerine göre Türk edebiyatında kadın üç şekilde değerlendirilmiştir:

1. İslamiyet'ten önce ve göçebelik devrinde o, bu devrin ideal erkek tipi olan Alp tipine yaklaşır. Erkek gibi o da ata biner, ok atar, kılıç kullanır ve icabında düşmanla kahramanca çarpışır.

2. Yerleşik medeniyete ve İslâmî kültür çevresine dâhil olduktan sonra kadın, erkek gibi ve erkekten daha fazla pasif bir karakter arz eder. Toprak ve din, insanları kendilerinden üstün tabiat veya tabiatüstü kuvvetlere bağlar. Bu devirde kadının kahramanca vasıflarını kaybederek bir haz ve aşk mevzuu olduğu görülür. Batı medeniyeti tesiri altına girdikten sonra kadının ilkin edebiyatta, sonra hayatta beşerî hakları müdafaa edilir ve tamamıyla erkekle eşit bir seviyeye getirilir.<sup>2</sup>

Kadın ve edebiyat kavramının bir arada kullanılması konusunda sürekli olarak bir tartışma durumu söz konusudur. Kadının edebiyat dünyasında yazar gerekse edebiyat ürünün malzemesi olarak kullanılması yoluyla kadının mağduriyetini geniş kesimlere duyurması açısından önemlidir.

Yazılı edebiyatın ilk ürünlerinin verilmeye başladığı dönemde Türk toplumuna ait kadınlar için erkeğin hayatı içinde erkeğin kadına verdiği değere göre tanıtılmamaktadır. *“Bir erkek her çağda bütünüyle kendi yetenek, faaliyet ve birikimlerine, başarı ve başarısızlıklarına göre değerlendirilmiş ve değerlendirilmektedir. Kadınlar ise baba, koca, oğul veya erkek kardeşinin statüsüne göre değerlendirildikten sonra kişisel nitelikleri söz konusu edilebilir. Bir kadın tek başına toplum içinde var olamaz. Bağlı olduğu erkeğin yaşama alanı içinde kendini gerçekleştirebilir ve üretken olabilir. Özellikle XX. yüzyılın ikinci yarısından sonra kadınlar kendi adlarına var olabilmeye imkân buldukça sanattan edebiyata, bilimden teknolojiye kadar dış dünya ile ilgili çalışma alanlarında başarılı ve aynı zekâ seviyesindeki erkekler kadar üretken olabileceklerini göstermişlerdir. Ancak, sorumlulukta ve imtiyazda eşitlik anlayışının bütün toplum ve kesimlerde egemen olabilmesi daha zaman alacaktır. Dünyanın pek çok yerinde olduğu gibi Türkiye’de de yer yer erkeğin üstünlüğü anlayışının hâkim olduğu kabul ve yaklaşımlar hala bazı kesimlerde oldukça etkilidir”* (Günay, 1998: 50).

Türk kahramanlık destanlarında kadın tipinin önemli bir yeri vardır. Destanlarda yer alan kadın, diğer edebiyatlarda görüldüğü gibi aşk konusu ile işlenmemekte bunun yerine kahramanlıkları ile işlenmektedir. Dede Korkut Destanı’na göre kadında aranan ikinci özellik doğurgan olmasıdır. Bunun temel sebebi Türklerde oluşan “kalabalık korku”dur ve onlar içim kısır kadın bir eğlence konusudur. Türk destanlarında işlenen kadın tipinin annelik vasfı vardır. Anne ile oğulları arasındaki sevgi ve bağlılık kadın tipinin en büyük kahramanlığıdır. Kadının kocasına sadakati göçebeler için büyük bir değer ifade etmektedir ve kadın gerektiğinde erkeğini uyarır ve tehlikelerden koruma görevi ile hükümlüdür. (Kaplan, 2004: 39-50).

Muhammethacı, efsane ve rivayetlerdeki kadın tanrı tipini yaşanan toplumun tabiatı anlayamamalarına bağlar: *“Eski insanlar toplum gelişmesinin iptidai aşamasında buldukları için üretim güçleri seviyesinin, kendilerinin bilim yeteneğinin çok geriliği sebebiyle, kendilerini çevreleyen tabiat dünyasındaki çeşitli değişimleri doğru anlama imkânına sahip değildi. Bundan dolayıdır ki, onlar hem kendi çevrelerindeki tabiat olaylarının, hem de tabiat dünyasındaki çeşitli değişmelerin, tabiatüstü gücün tesirinden olduğuna inanmışlardır. Bu yüzden eski efsane ve rivayetlerde Kadın Tanrı tipi çokça canlandırılmıştır.”* (Muhammethacı, 1997: 714 Aynı zamanda Muhammethacı, Türk edebiyatındaki kadınları üç tipe ele almaktadır. Bunlar:

<sup>2</sup> Ankara Üniversitesi. “Dede Korkut Kitabında Kadın”. Erişim: 16 Mayıs 2021.

[https://acikders.ankara.edu.tr/pluginfile.php/72210/mod\\_resource/content/1/20/dede%20korkut%20itab%C4%B1nda%20kad%C4%B1n-%20mehmet%20kaplan.pdf](https://acikders.ankara.edu.tr/pluginfile.php/72210/mod_resource/content/1/20/dede%20korkut%20itab%C4%B1nda%20kad%C4%B1n-%20mehmet%20kaplan.pdf)

1. Kadın ilâh ve tanrıça tipindeki kadınlar: Ana İlâhe Umay bu tipe örnek gösterilebilir. Umay, Türk halkları inancında koruyucu ilahe olarak görülür. Taht, talih ve devlet Tanrısı olarak da adlandırılan Umay'ın en önemli niteliği ana ve çocukları koruduğuna inanılmasıdır.
2. Kahraman kadın tipleri: Bu tipteki kadınlar becerikli kadın kahramanların tipik örneği olup kadınların o dönemdeki tabiat güçlerini ve muhtelif düşman kuvvetlerini yenme sırasında gösterdikleri kahramanca mücadele ruhunu yansıtır. Bu tip kadınlar, kadınların kahramanlığı, çevikliği ve fedakârlık ruhunun bazen erkeklerden de üstün olabileceğini gösterir. Kadınların özelliği sadece yemek yapmak, çocuğa bakmak gibi aile işleri değil, en önemlisi insanoğlunun var olma yolundaki mücadeleleridir.
3. Zeki, güzel, vefakâr kadın tipleri: Kadınların güzelliği, çevikliği, vefakârlığı halk edebiyatında övgülerin merkezi olmuştur. İnsanlar tarafında güzel olarak görülen her şey kadınların sembolü olmuştur.<sup>3</sup>

### **1.1. İslamiyet Öncesi Türk Edebiyatında Kadın**

İslamiyet önceki Türk edebiyatı olarak adlandırılmakta olan dönem Türklerin İslamiyet dinini kabul etmeden önceki dönemleridir. Bu dönem milattan önce 4000'li yıllara kadar sürdüğü bilinmektedir.

İslamiyet öncesi Türk edebiyatında kadının egemen olduğu bir durum söz konusudur. Kadın, aileyi çevirendir. İslamiyet öncesi elimize geçen veriler daha çok Çin kaynaklıdır. Bu kaynaklardan elde edilen bilgiler doğrultusunda kadının avcılık yapma becerisinin olduğu ve Türk milletinin kadına bakış açısını göstermesi konusunda önem taşımaktadır. Kaynaklardan edinilen bilgilerin neticesinde Türk edebiyatının bu döneminde kadın ve erkeğin aynı haklara, yaklaşık görevlere sahip olduğu söylenebilmektedir. Söz edildiği üzere kadının elbise dikmek, çadır kurmak, süt sağlamak vb. görevlerinin yanı sıra avcılık, çocuk büyütmek ve hatta devlet yönetiminde söz sahihi olmak gibi görevleri de bulunmaktadır. Bu durumu örneklemek adına Orhun abidelerinde peş peşe yer alan “*Devleti idare eden Han*” ve “*Devleti bile Hatun*” sözlerinden çıkartmak mümkündür.<sup>47</sup>

Eski Türk toplumlarında anne ve baba tipi eşit tutulmaktadır. Bu eşit tutulma hem haklar hem de mal varlığı konusundadır. Eski Türklerde ev, kadın ve erkeğin ortak ürünü olarak görülmektedir. Şamanizm’de eşitlik temel kurallardan birisidir ve kadın güçlü, kişilikli ve etkilidir. (Ziya Gökalp’ten akt. Abadan-Unat, 1985; 7, Doğramacı; 1989, 133)

Türk destanlarında diğer karakterler gibi kadın karakterler de tek bir açıdan ele alınmakta ve derinlemesine işlenmemektedir. Türk destanlarında kadın daha çok erkeğin destekçisidir ve bu konumdan öteye gitmemektedir.

<sup>46</sup> Gamze Polat, “*Cumhuriyet Dönemi Popüler Aşk Romanlarında Kadın Temsilleri: Muazzez Tahsin Berkand ve Kerime Nadir Romanlarının İncelenmesi*”. Yüksek Lisans Tezi, Ankara Üniversitesi Sosyal Bilimler Enstitüsü, 2009.

### **1.2. İslamiyet’in Kabulünden Sonraki Türk Edebiyatında Kadın**

İslamiyet’in etkisinde gelişen Türk edebiyatı, Türklerin İslamiyet’e geçmesiyle başlayan bir dönemdir.<sup>4</sup> Türk toplumunun İslamiyet’i benimsemesi IX. Yüzyılda başlamış ve XI. Yüzyıla kadar devam ettiği bilinmektedir.

İslamiyet öncesinden de bilindiği üzere eski Türkler kadına toplumsal olarak önem ve değer vermektedir. Ancak benimsenen İslam dininin kutsal kitabı Kuran bir bütün olarak erkeği kadından üstün kabul etmektedir. (Altındal, 2004;35) İslamiyet’in kutsal kitabı Kuran-ı Kerim’de erkeğin üstün tutulmasından ötürü destanlarda yüceltilen, değer görmekte olan kadının yerini değerini kaybetmiş bir kadın portresinin aldığı söylemek yanlış olmayacaktır. Aynı zamanda İslami kaynakların yanlış çevirilerinin sonucunda da kadının yerinin ve rolünün toplum içerisinde değiştiği görülmektedir.<sup>5</sup>

<sup>3</sup> Mehmet Emin Bars, “Türk Kahramanlık Destanlarında Kadın Tipleri”, *International Journal of Languages’ Education and Teaching* 3(2014): 128.

<sup>4</sup> Aktan, *Türk Edebiyatında Kadın*, 15.

<sup>5</sup> Aktan, *Türk Edebiyatında Kadın*, 15.

İslamiyet'in etkisinde gelişen Türk edebiyatı dönemine ait ilk eserlerden olan Kutadgu Bilig'de kadın kavramının pasif bir biçimde yer aldığı görülmektedir. Esere göre kadın; güzelliği kendini sevdirmesi, namus ve iffetine düşkün olmasıyla olumlu bir ifade ile değerlendirilirken öte yandan kadınla toplumsal hayatta fazla yeri olmayan imge olarak söz edilmektedir.<sup>6</sup>

Örnek Beyit:

“aya koldaş erdeş söz aydım kese / bu kız toğmasa yig tirig turmasa” (Albayrak & Serin, 2015, s. 28)

“Ey dost arkadaş, sana kesin bir söz söyleyeyim; bu kızlar doğmasa, doğarsa da yaşamasa daha iyi olur.”

Örnek Beyit:

“kalı toğsa yigrek anğa yir koyı / ewi bolsa koşnu ölügler toyı” (Albayrak & Serin, 2015, s. 28)

“Eğer dünyaya gelirse, onun yerinin toprağın altı veya evinin mezara komşu olması daha hayırlıdır.”

Örnek Beyit:

“kızığ tutma ewde uzun begsizin / ökünç birle ölgey özüng igsizin.” (Albayrak & Serin, 2015, s. 30)

“Kızı çabuk evlendir, uzun süre evde tutma, yoksa hastalığa gerek kalmadan bu pişmanlık seni öldürür.”

### 1.3. Halk Edebiyatında Kadın

“Halk” kelimesi sosyolojik bir terim olup bir milletin aydın kesimi, devlet yöneticileri ve ordu mensupları dışındaki büyük insan topluluğunu ifade etmektedir.<sup>7</sup> Halk edebiyatı ise bir topluluğun yaşam şartlarını, gelişmişlik düzeylerini, diğer toplumlarla olan ilişkilerini inceleyebileceğimiz destanlar, efsaneler, masallar vb. ürünlerin oluşturduğu Türk edebiyatı dönemidir.<sup>8</sup>

Ülkemizde birçok sahanın yanında halk edebiyatı araştırmalarının bilimsel anlamda başlatıcısı ve teşvik edicisi olan Fuad Köprülü ve ondan sonra gelen ilk dönem halk edebiyatçıları bu edebiyatı; ‘Anonim Halk Edebiyatı’, ‘Âşık Edebiyatı’ ve ‘Tekke Edebiyatı’ şeklinde üç ana başlık altında sınıflandırmaktadır.<sup>9</sup>

Halk edebiyatının ana başlıklarından birisi olan Anonim halk edebiyatından söz etmek gerekirse: Âşık ve tekke edebiyatlarından bağımsız, söyleyeni belli olmayan aynı zamanda da kendine özgü söyleyişi bulunan ürünlerden oluşan edebiyattır.<sup>10</sup> Aynı zamanda bu edebiyat, Türklerin en eski tarihinden beri var olan ve Müslüman oluşlarının ardından edebiyatımız içerik bakımından bir takım farklılıklarla beraber biçimini korumuş ve geleneksel oluşunun yanında dört önemli özelliği vardır: Sahibinin/söyleyenin belli olmaması, halkın hafızasında muhafaza edilmesi, kolektif hayat içinde işlevinin olması ve manzum-mensur oluşudur.<sup>11</sup> Anonim halk edebiyatı dönemin nazım şekillerinden olan ninni ile kadını ele almak yanlış olmayacaktır. Çünkü ninni, çocukların uykuya geçişinde yardımcı unsur konumundadır. Genelde “e bebeğim e ee” yahut “uyusun da büyüsün ninni tıptış tıptış yürüsün ninni” şeklindeki kelime gruplarından oluşan ve söyleyeni belli olmayan bir türdür.

Âşık edebiyatının şairleri 16. Yüzyıldan itibaren ele aldıkları şiirlerinde kadını ön planda tutmaktadır. Âşık edebiyatında kadın, Divan edebiyatına göre daha somut bir biçimde ele alınmaktadır. Şiirde yer edinen kadının kimi beyitlerde övüldüğü görülürken kimi beyitlerde ise eleştirildiği ve eksik yönlerine değinildiği görülmektedir. Bu dönemin şiiri; sade bir dil ve daha çok hece vezniyle yazılmaktadır.

<sup>6</sup> Aktan, Türk Edebiyatında Kadın, 6-17.

<sup>7</sup> Docplayer, “Türk Halk Edebiyatının Kapsamı Üzerine”, erişim: 14 Haziran 2021, <https://docplayer.biz.tr/30371524-Turk-halk-edebiyatinin-kapsami-uzerine.html>.

<sup>8</sup> İslam Ansiklopedisi, “Halk Edebiyatı”.

<sup>9</sup> İsmail Gülenç, “Anonim Halk Edebiyatının Tasnifine Dair Bir Öneri”, *Sakarya Üniversitesi Eğitim Fakültesi Dergisi*, 14(Ekim 2007): 47-48.

<sup>10</sup> Gülenç, “Anonim Halk Edebiyatının Tasnifine Dair Bir Öneri”

<sup>11</sup> Umay Günay, “Anonim Halk Edebiyatı”, *Büyük İslam Tarihi XIV*, (İstanbul: Çağrı Yayınları, 1995), 524.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Şairlerin kopuz, bağlama, cura veya tambura eşliğinde söylendikleri şiire “Türk Saz Şiiri” de denilmektedir.<sup>12</sup>

Âşık edebiyatı şairi tarafından sevgili yani kadın işlenirken tıpkı Divan edebiyatındaki gibi kullanıldığı görülmektedir. Benzetmeler daha çok badem göz, keman kaş, selvi boylu, elma yanaklı, sırma saçlı gibi vb. şeklindedir ve fiziksel özelliklerde ise sevgilinin gözü, yüzü, saçı, endamı, beni, beli, yürüyüşü vb. olarak karşımıza çıkmaktadır.<sup>13</sup>

Bayburtlu Zihni şiirinde göz:

*"Kâkülün ser bölük zülfün yüzbaşı*

*Çin mülkünün hükümrani gözlerin*

*Perçemin Hitayi halin Habeşi*

*Değer taht-ı Süleyman'ı gözlerin"* (Özdemir & Saraç, 2015, s. 115)

Dadaloğlu'nun şiirinde sevgilinin yürüyüşü:

*"Güzelin yüzü de ayın tekeri*

*Dili oğul balı nöbet şekeri*

*Omuzlar aşağı gerdan yukarı*

*Yürüyüşü kostak olur güzelin"* (Özdemir & Saraç, 2015, s. 117)

Halk edebiyatı döneminde kadınlar, sosyal hayatlarında buldukları konum itibari ile çeşitli yönlerden ele alınmış, daha çok olumsuz olmakla birlikte olumlu yönleri ile de değerlendirilmiştir. Şiirlerde olumsuz yönleri daha baskın bir şekilde ele alınmış olsa da kadının mizah çerçevesi içerisinde işlendiği de görülmektedir. Genele göre ele alınacak olursa anne, eş veya âşık olunan kadın; eleştirilere nazaran mizaha daha az konu olduğu görülmektedir. Bu eleştirme durumunu Karacaoğlan şiirlerinde görmek mümkündür. Karacaoğlan, bir şeyin tersini söyleyerek toplumun bir bireyi olan kadının eksiklerini, kusurlarını vb. yönlerini ortaya koymakta, iğneleyici ifadelerle başurmaktadır.<sup>14</sup>

Bir sevgili olarak kadın imgesi ilk olarak “Leylâ ile Mecnûn’u ele almak mümkündür. Leylâ ile Mecnûn mesnevisinde ilk kez kadın bir erkek tarafından arzu edilip ulaşılamamıştır. Mecnûn’un Leylâ’ya karşı olan düşkünlüğü erkeklik şerefini zedelediği üzerinde söylemlerin ortaya çıkmasına neden olmuştur. Çünkü bu döneme kadar hiçbir erkek bir kadına bu denli yalvarmamış, onu kovalamamıştır. Erkek emretmiş, olmuştur. Aynı zamanda Mecnûn’un yanına gelen bir Arap kadın hakkında düşüncelerini dile getiriyor: “Muhakkak ki her kadın vefasızdır. Ahde vefa keyfiyetini yazdıkları zaman kadınların ismine gelince kalem kırılmıştır. Kadın, senden başka sevecek bulamadığı müddetçe sever; ama bir başkasını bulunca seni göresi dahi gelmez! Kadın erkekte fazla sever, fakat bu sevgisinde hodgamdır. Kadın yalancı ve hilekârdır... Kadın bir hile kumkumasıdır. Evlilik hayatı zahiren sükûn ve saadet manzarası gösterir, fakat hakikatte gizli bir savaştır. Kadın, düşman olunca can için bir alettir; dost olursa canı helak eder. Yap dersin dinlemez; yapma dediğin şeye dört elle sarılır. Sen kederli isen o sevinir; sevinirsen kederinden ölür. Bu, doğru kadınların işidir, kötülere gelince onların hikâyesi çok uzundur.”<sup>15</sup> Bu söylemden yola çıkılarak dönemin kadının kötü bir eleştiriye tabii tutulduğu görülmektedir.

Leylâ ile Mecnûn mesnevisi ile tarihte kadın cinsel obje olarak nitelendirilmekten öteye gitmiş ve sevgili olmuştur. Sevgili olan kadın için; gözyaşı dökülmüş, dağ delinmiş, çöllere düşülmüş ve kendisine kavuşmak için bir erkeğin kendi canını feda ettiği ilk metin olarak karşımıza çıkmaktadır.

<sup>12</sup> Aktan, Türk Edebiyatında Kadın Divan Edebiyatında Kadının Yeri (Önemi, Nicelik ve Nitelikleri), 38.

<sup>13</sup> Aktan, Türk Edebiyatında Kadın Divan Edebiyatında Kadının Yeri (Önemi, Nicelik ve Nitelikleri), 39.

<sup>14</sup> Aktan, Türk Edebiyatında Kadın Divan Edebiyatında Kadının Yeri (Önemi, Nicelik ve Nitelikleri),

<sup>15</sup> Nizami, *Leylâ ile Mecnûn*, Ankara: Milli Eğitim Bakanlığı Yayınları, 2016, 112.



“Ferhat ile Şîrîn” mesnevisi, klasik aşk üçgeni üzerinde şekillenmekte olan bir hikâyedir. Bu mesnevîde sadece tasavvufî değerler anlatılmamakta aynı zamanda da sadece bir aşğın sevgilisine kavuşmak için çektiği acılar ele alınmamaktadır. Eserin kaleme alındığı dönemde kadının böylesine yüceltilmesinin başlangıcında bir Müslüman-Doğu hikâyesinin bulunduğu dille getirilmesi sembolik anlamı tartışılmayacak kadar önemli aynı zamanda da değerlidir.

Halk edebiyatı şairleri kadını şiirlerinde sosyal hayatlarında buldukları konum itibari ile farklı yönlerden ele alınmıştır. Şiirlerinde kadını ele alan sanatçılar onları çeşitli açıdan eleştirilene tutmuştur. Şiirlerde kadın; anne, eş veya âşık olunan kadın; eleştirilene nazaran mizaha daha az konu olduğu görülmektedir.

Halk edebiyatı sanatçılarından olan Koroğlu, ele aldığı şiirlerinde kadın-aşk-erkek üçlemesine rastlanmaktadır. Koroğlu'nun anlatmalarında birçok kadın ismine rastlanmaktadır. Bunlar: Mömîne Hanım, Telli Nigar, Dâna Hanım, Döne Sultan, Mercan Hanım, Esmer Hanım gibi adlara sahip karakterlerdir. Koroğlu'nun bu aşk ve evlilik maceralarındaki temel nokta klasik aşk ve halk hikâyelerinde farklı bir konumda olmasıdır. Bu durum klasik halk anlatılarında âşık olma durumu rüya vasıtası ile olurken Koroğlu anlatılarında bu biçimde olmamaktadır. Aynı zamanda Koroğlu'nun Anadolu anlatmalarında söz konusu edilen âşık olma genellikle Koroğlu veya keleşlerinden birinin bir kızının güzelliğinin övülmesi sonucu ona ilgi duyması veya Koroğlu veya keleşlerinden birine onların gücünü kuvvetini duyan bir kızın, onları görmeden ilgi duyması gibi durumlar ile ortaya çıkmaktadır.<sup>16</sup>

Metin Ekici, “keleş” adıyla anılan Koroğlu'nun yiğitleriyle evlenen, onlara yardımcı eden ya da onlara düşmanlık eden kadınlar bulunduğu söz etmektedir ve bu kadın tiplerini Koroğlu anlatmaları üzerinden inceleyerek üç kısma ayırmıştır:

Koroğlu veya keleşlerinin evlenmeyi düşündüğü veya kendileri Koroğlu veya kardeşleriyle evlenmeyi düşünen kadın tipler, Koroğlu veya keleşlerine yardımcı olan kadın tipler, Koroğlu veya keleşlerine kötülük eden kadın tipler.<sup>17</sup>

Özetlemek gerekirse Türk edebiyatının bu döneminde kadın, doğal güzellikleri kullanılarak yüceltildiği bilinmektedir. Aynı zamanda Türk destanlarında kadın önemlidir. Bu durumu destanda yer alan kadının evlilik yoluna çıkması için ona talip olan kişilerin belli bir mücadeleye girmesinden çıkarmak mümkündür.

#### **1.4. Klasik Türk Edebiyatında Kadın**

Türk Edebiyatında birçok adla anılan ve İslamiyet'in kabulünden sonra yazılı geleneğe dayanan edebiyattır. Bu dönem sanatçıların eserlerini, "Divan" adı verilen el yazması kitaplarda toplamasıyla dönemin isminin belirlenmesine sebep olduğu bilinmektedir.<sup>18</sup>

Türk edebiyatının bu döneminde kadın, yüceltilmekte olduğu söylenmektedir. Bunun temel sebeplerinden birisi de âşık olarak adlandırılmakta olan kişinin sevgiliye olan tapma duygusudur. Burada âşğın hissetmekte olduğu aşk tanrıya duyulmakta olan aşkın bir gölgesi, yansımadır ve kadına duyduğu aşk onu mutlak sona götürecektir.

Divan edebiyatında kadın şiirlere konu olan sevgili konumunun yanı sıra şair kadınlarımız da bu dönemde peyda olmaya başladığı görülmektedir. Ancak erkek hegemonyasının bulunduğu Divan edebiyatında kadın şairlerimizin ışığının pek parlamadığını demek yanlış olmayacaktır. Çünkü İslamiyet'in kabulü beraberinde kadına verilen değer, önem azalmaya başlamış ve bunun beraberinde kadınların imajının lekelenmesi göz ardı edilemeyecek bir unsurdur.

Bu dönemde yer alan şair ve yazarlar: Fıtnat Hanım (18.yy), Şeref Hanım (19.yy), Âdile Sultan (19.yy) gibi isimlerden oluşmaktadır.

Divan edebiyatında yer almakta olan kadın şairler, henüz kadın mektepleri olmamasına rağmen aile içerisinde tahsil görmüş olan kadınlardan oluşmaktadır.

<sup>16</sup> Metin Ekici, “Anadolu Sahası Koroğlu Anlatmalarında Kadın Tipler”, *Millî Folklor*, 11/4 (Haziran 1988): 16.

<sup>17</sup> Ekici, “Anadolu Sahası Koroğlu Anlatmalarında Kadın Tipler” 11.

<sup>18</sup> Aktan, *Türk Edebiyatında Kadın*, 24.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Divan edebiyatı döneminde kadın şair olan yazarların gerek meslektaşları olan erkek yazarlarının gerekse de eşleri tarafından kıskanıldıkları görülmektedir. Sanatsal açıdan kadın bir yazar olmanın zor olmasının yanı sıra bu kıskançlıkların ve yadırgamaların üzerinde toplumsal açıdan da kadın yazar olmanın zorlaştığı görülmektedir. Bu dönemde yazar olan kadın şairler, aşk ve tasavvufi konular üzerinde şiirler kaleme almıştır.

Hürrem Sultan, Osmanlı sarayında ilk kadın şair olarak tanınan Kanuni'nin kendisinden "*canum baharım güzeller şahı sultanım celisi halvetüm varum habibüm mahı tabanum enisi mahremüm yarüm*" hatta "*sitanbulum karamanum diyar-ı milleti rumum / bedahşanum ü kıpçağum ü bağdatum horasanum*" diye hitap ettiği eşidir.<sup>19</sup>

Leylâ Hanım, asrının bilinmekte olan ilk kadın şairlerinden birisidir. Kaleme aldığı şiirlerinde derviş ruhlu ve rind olduğunu bir müstezadında şu şekilde belirtmiştir:

*"Eyyam-ı şebeb etdi güzere bedeyi Leylâ*

*Terk etmedi belâ*

*Rindan iledir ülfetimiz rind-i cihanız*

*Biz âşık-ı canız*"<sup>20</sup>

İzzet Molla'nın kız kardeşi olarak da bilmekte olduğumuz Leylâ Hanım'ın bazı manzumelerinde abisinin izlerine de rastlanmaktadır. Aynı zamanda kendisinin ince, derviş ruhlu ve olgun bir kadın olduğu; şiiri kolay söylediği ve içinde yaşamakta olduğu durumu şiirine kolaylıkla yansıtmakta olduğu bilinmektedir.<sup>21</sup>

Babası Mehmed Nebil Bey'in izinden giderek Divan edebiyatının kadın yazarı olarak tanınan bir diğer kişi ise Şeref Hanım'dır. Şeref Hanım'ın, eserlerinde sade bir dil kullanmış, ev ve aile hayatına dair unsurlara yer vermiştir. Bazı mısralarının ahengine, ileride imalesiz bir devre girecek olan Türk arûzunun müjdecisi sayılacak bir ifade söz konusudur.<sup>22</sup>

*"Gûş etme bu âlemde şematat-ı aduyı*

*Zevkinde ol eğlen de ne delerse desünler*"<sup>23</sup>

Şeklindeki deyişi ile Şeref Hanım, kendi döneminde kadının hürriyetinin önem teşkil etmesi gerektiğine değinmiştir.

16.yüzyılın bir diğer kadın şairi Nisai, Şehzâde Mustafa'nın katledilmesi üzerine kaleme aldığı iki mersiyesi ile tanınmaktadır. Bir kadın şair olarak döneminde sözünü çekinmeden ve korkmadan dile getirmesi dönemin kadınları olmak üzere herkes için önem arz etmektedir. Mersiye'nin ilk bendine bakacak olursak:

*"Zulm idüp nev-cevâna eyledün cevr-i fezâ*

*Boynına dakdun kemendi cânına kıldun ezâ*

*Şefkat îmândur bilürken kılmanın havf-i hüdü*

<sup>19</sup> Emine Ersöz, "XV.-XVI. Osmanlı Döneminde Kadın Şairler", 3/5(Mayıs 2014): 179.

<sup>20</sup> Nihat Sami Banarlı, *Resimli Türk Edebiyatı Tarihi*, bs.3.(İstanbul: Milli Eğitim Basımevi, 1987), 1.

Cilt: 840.

<sup>21</sup> Banarlı, "*Resimli Türk Edebiyatı Tarihi*", 840.

<sup>22</sup> Banarlı, "*Resimli Türk Edebiyatı Tarihi*", 841.

<sup>23</sup> Banarlı, "*Resimli Türk Edebiyatı Tarihi*", 841.

*Merhametsüz şâh-ı âlem n'itdi Sultan Mustafâ*"<sup>24</sup> şeklindedir.

Şehzâde Mustafa'nın ölümü üzerine yazılan diğer mersiyeler ile Nisai'nin mersiyesi mukayese edildiğinde; diğer mersiye yazarlarının Nisai kadar ağır bir üslup kullanmadığı görülmektedir.

Bir diğer kadın yazarımız ise Fitnat Hanım diğer bir adlandırmasıyla Fitnat Zübeyde, Şeyhülislam Ebu İshakzâde Mehmed Efendi'nin kızı olarak bilinmektedir. Gerek dönemi gerekse diğer kadın şairlerle mukayese edildiğine adından daha çok söz ettirmeyi başarmış şairdir. Nüktedan ve hazır cevap bir hanım olduğu, aynı zamanda Arapça ve Farsçayı çok iyi bildiğinden bahsedilmekte, bu durumda yazmış olduğu divançesi bir kanıt niteliği taşıyabilmektedir.<sup>25</sup>

Divan edebiyatında yer almakta olan Fâzıl(Enderûnî), "Zenân-nâme" adını taşımakta olan eserinde; her kadın milletinin güzellerinin tasvirini yapmaktadır. Bu tasvirler içerisinde en çok İstanbul kadınları ön plandadır. Onları, bilhassa saçlarına saba rüzgârının bile değmediği ve ev kadınlarını hürmete layık bir aile mahremiyeti içinde beğenerek, saygı ile bahsetmektedir.<sup>26</sup>

### 1.5. Batı Tesirindeki Türk Edebiyatında Kadın

1789 Fransız Devrimi beraberinde yayılmaya başlayan "eşitlik ve özgürlük" kavramları, 19. Yüzyılda çöküşe başlamakta olan Osmanlı Devleti'nin umut ışığıdır ve Osmanlı Devleti'nin yaptığı bu iktisadi, toplumsal, kültürel ve siyasal değişimlerin genel adlandırılmasına "batılılaşma" adı verilmektedir.<sup>27</sup>

Türk edebiyatının bünyesine 19. Yüzyılda giren batılılaşma akımının beraberinde kadının eserlerdeki yeri değişmektedir. Bu değişim ile kadının toplumdaki yeri ve önemi tartışılmakta aynı zamanda da eserlere konu olduğu görülmektedir. Edebiyatımızın ilerleyen safhalarında kadınlık bilinci oluşmaya başlamakta ve çeşitli medya unsurları ile topluma yayılması yolunda çalışmalar yapılmıştır. Bu çalışmaların en önemlileri Osmanlı-Türk tarihinde oldukça önemli bir değişimi simgeleyen 'batılılaşma' çabalarının, birikimine ulaşarak anlamlı bir dönüşümü gerçekleştirdiği Tanzimat ve Meşrutiyet döneminde atılmıştır.<sup>28</sup> Bu adımlar atılmadan önce kadın, erkek ile aynı konumda değildir.

İnsanların temel ihtiyaçları arasında önemli bir yeri olan iki unsur; dinlemek ve anlatmaktır. Zamanın sürekli akışı, unutmayı, hafıza kayıplarını yanında getirmektedir. Bu sebepten ötürü insanoğlu yüzyıllar boyunca bazı şeyleri dinlemiş bazı şeyleri anlatmış, ortaya edebî türleri çıkartmıştır. Bu türler ise insanlık tarihi ve kültürünü taşımaktadır. Yazar ve/veya şair çevresinde bulunduğu edebiyat malzemelerini bazı işlemlerden geçirerek baştan üretir. Bu üretimin sonucunda ise ortaya bir tür çıkmaktadır. Roman da, üzerinde işçi titizliğiyle çalışılarak ortaya koyulan bu türlerden biridir. Aynı zamanda: "Roman, toplumsal hayatı ele alan ve bu hayatı enine boyuna inceleyen, bu yönüyle de verileri içinde barındıran önemli bir edebi türdür."<sup>29</sup> Bu sebeple diğer sanat dallarının aksine hayatı ve gerçekleri açık bir şekilde aktarmaktadır.

Tanzimat fermanının beraberinde Türk edebiyatında olan değişimin yanı sıra sosyal yaşantıda da değişimler görülmektedir. Bu değişimlerin en büyüğü ise kadının bu düzende kendinin farkına varması, yer aramasıdır. Orhan Oktay, "Osmanlı toplumunda kadının bir problem olarak ortaya çıkışı Tanzimat'la beraberdir."<sup>30</sup>(1191:159) şeklindeki cümlesiyle bu değişimden söz etmektedir.

<sup>24</sup> Ersöz, "XV.-XVI. Osmanlı Döneminde Kadın Şairler", 180--181.

<sup>25</sup> Aktan, Türk Edebiyatında Kadın, 30.

<sup>26</sup> Banarlı, "Resimli Türk Edebiyatı Tarihi", 784.

<sup>27</sup> Polat, "Cumhuriyet Dönemi Popüler Aşk Romanlarında Kadın Temsilleri".

<sup>28</sup> Polat, "Cumhuriyet Dönemi Popüler Aşk Romanlarında Kadın Temsilleri".

<sup>29</sup> Gıyasettin Aytaş, "Batılılaşma Maceramızda Türk Romanına Yansıyan Tipler -II- ", *G.Ü. Gazi Eğitim Fakültesi Dergisi*, 22/3 (2002)

<sup>30</sup> Mustafa Karabulut, "Tanzimat Dönemi Türk Romanında Kadın Üzerine Tematik Bir İnceleme",

*Erdem Dergisi* 64(Haziran 2013): 50.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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Türk edebiyatında kadın söyleminin ilk ismi Mithat Efendi'dir ve onun kadından söz ettiği Esaret'in ve Felsefe-i Zenan'ın 1870'de yayımlandığı bilinmektedir.<sup>31</sup> Tanzimat dönemi romanlarında işlenmekte olan Avrupalı kadın karakterler ile Türk kadınlarının Avrupalı yaşam tarzını öğrenmesi sağlanmıştır. Batılı yaşam tarzını kendine amaç edinen Türk kadının aile, ahlak vb. açıklardan ortaya çıkan değişimlerin ikileminde kaldığı da görülmektedir.

Kaleme alınan romanlar genellikle aşk teması üzerinden şekillenmektedir. Bu durumun temel sebebi Avrupalı düzene imrenen Türk edebiyatı yazarlarının aşkı da Avrupalı tarzda ele almak istemesinden kaynaklıdır. Aşkı işleyen roman türünde kadın; düşmüş yahut cariyeye olarak kullanılmaktadır. Aynı zamanda eserlerde yer alan Batılı kadın karakterlerin, Türk kadın karakterlerine göre daha serbest tavırlı takıldığı görülmektedir. Bu durum Ahmet Mithad Efendi'nin eserinde şu şekilde geçmektedir:

*“O Türk karısı ki, tavrından azametinden geçilmez. Güya nîm handesiyle, insanı ihyâ edecekmiş gibi bunu dahi ketm ü imsâk ederek çehresinden düşen bin parça olur. Nazı çekilmez. Şakası lezzetsiz. Bilirsin ya a kardeş, Bilirsin ya! Ama bir cariyeye al. Artık bizim gibi serbest, hür adamlar bir esirden ne lezzet alabilir? Kim bilir gönlü kimdedir! Esirin olduğu için sana râm olmağa mecburdur.”*(Felatun Bey ile Rakım Efendi, 74)<sup>34</sup>

Romanlarda işlenmekte olan; aşk, esaret, cariyelik, kadının düşmesi, feminizm vb. konular ile dönemin insanlarına mesajlar verilmesi amaçlanmış, kadının sosyal hayatta aktif bir konuma gelmesi ve nasıl bir yere sahip olması gerektiğini açıklamaya çalışılmıştır.

Tanzimat dönemi ile oluşmaya başlayıp Cumhuriyet devri Türk romanına kadar devam edecek olan batılı tiplerin ilk örneklerini Ahmet Mithat Efendi'nin “Felatun Bey ile Rakım Efendi” romanında görülmektedir. Söz konusu esere göre Batı ile temas kuran kadının, ideal olanı temsil etmektedir. Aynı zamanda bahsi edilmekte olan dönemin romanlarında yer almakta olan kahramanlar yoluyla da kadınların hayat tarzlarında değişimlerin oluşmaya başladığı görülmektedir. Bu durum “Zehra” romanının kahramanı Zehra'da görmek mümkün çünkü o Dünya görüşünü okumakta okuduğu romanlar çerçevesinde şekillendiren bir kadın kahramandır. Bu kadın kahramanlar, iyi bir eğitim almamalarına olarak gerçek dünya ile romanların kurmaca dünyası arasında kalır ve bu durum onların doğru kararlar almalarına engel teşkil etmekte ve Flaubert'in “Madam Bovary” adlı romanından mülhem olarak dünya edebiyatına “bovarizm” olarak giren “hayal-hakikat” tezadının Türk edebiyatındaki ilk belirgin örnekleri arasında sayılabilir.<sup>32</sup>

Namık Kemal'in “İntibah” adını taşımakta olan romanı bir aile durumunu işlemektedir. Eserin ana kahramanı olan Ali Bey'in Mâhpeyker'i tanınması üzerinde şekillenmektedir. Bu romandaki kahramanımız Mâhpeyker, meşrep bir kadın olarak karşımıza çıkmaktadır. Aynı zamanda Mehmet Rauf, “Genç Kız Kalbi” adlı romanında kadınların hayatlarının dedikodu ile geçtiğini ve yerde bağdaş kurup birbirlerini çekiştirmekten zevk aldıklarından bahsetmektedir.<sup>33</sup> Fatma Âliye Hanım'ın romanında yer almakta olan Nebahat ve Piraye karakterleri alafranga tiplerdir. Fatma Âliye'nin ideal kadın tiplerinde aradığı en önemli özellik ise “kıskanç ve histerik” genç kız profilidir.<sup>34</sup>

Mehmet Rauf, kadının erkeğe muhtaç olarak yaşamasının aşağılayıcı bir durum olmasından “Genç Kız Kalbi” romanında şu sözlerle bahsetmiştir: *“Mesela Behiç Bey, şimdi istediğini yapmakta, istediğini görmekte, istediğini sevmekte serbesttir; arzu ettiği zaman istediği yere gider, istediği adamlarla görüşür, istediği şeylerle meşgul olur. Bizim bu esir hayatımıza göre ne kadar imrenilecek bir hayat!..*

<sup>31</sup> Humed.org, “Tanzimat'tan Cumhuriyet'e Kadın Yazarlar ve Kadınla İlgili Konular”, erişim: 10 Mayıs 2021,

<sup>32</sup> Mehmet Onur Hasdedeoğlu, “Tanzimat Dönemi Yazarlarının Roman Kahramanlarında Okuma Kültürü”, *Uluslararası Dil, Edebiyat ve Halkbilim Araştırmaları Dergisi* 3/5(2015): 18.

<sup>33</sup> Pınar Bayram, “Tanzimat Döneminde Kadın”, *Uluslararası Hakemli İletişim ve Edebiyat*

*Araştırmaları Dergisi* 2/5(Güz Dönemi 2014): 354.

<sup>34</sup> Betül Coşkun, “Türk Modernleşmesini Kadın Romanları Üzerinden Okumak – Tanzimat'tan Cumhuriyet'e-“, *International Periodical For the Languages, Literature and History of Turkic* 5/4(Sonbahar 2010): 936.

*İşte, ben, ne istediğim vakit sokağa çıkabilirim... Ne de istediğim şeyi yapabilirim, ne istediğim yere gidebilirim... Çünkü kadını... Yani iradesiz, arzusuz, kudretsiz bir aciz, bir esir...”* (Mehmet Rauf, 1997:47).

Edebi eserlerde gerek kadın-erkek ilişkisinde gerekse kadınların kendi arasında çatışması görülmektedir. Bu durum; Batı edebiyatı etkisinde gelişen Türk edebiyatı döneminde aşk evliliği yapılan kadına kötü gözle bakılıp onu geleneğe karşı çıkmakla yargılayan kişiler ile açıklamak mümkündür. Şemsettin Sami'nin “Taaşuk-ı Talat ile Fitnat” adlı eserinde kadının özgürlüğüne şu ifadeler ile vurgu yapılmaktadır: “*Ah biçare biz karılar! Bizi hiç insan sırasına koymazlar! Babalarımız, istedikleri adamlara bizi hediye verircesine verirler. O adamın tabiatını bize sormazlar. Biz o adamlar ile geçinecek miyiz? Orasını hiç düşünmezler.*” (Şemsettin Sami, 2011:37).

### 1.6. Tanzimat Edebiyatında Kadın

1831 yılında ilk Türk gazetesi olarak bilinen *Takvim-i Vekayi*, gazetesinin ardından 1840 yılında William Churchil tarafından *Ceride-i Havadis* gazetesi yayımlanmaya başlamıştır. Tanzimat Edebiyatı'nın başlangıcı olarak ise 1860 yılında Şinasi ile Agâh Efendi'nin ilk özel gazete olan *Tercüman-ı Ahval*'i çıkarması kabul edilmiştir. Böylece Batı etkisindeki Türk Edebiyatı'nın ilk devresi başlamıştır.

1860'dan sonra imparatorluğun siyasi ve toplumsal durumunda önemli gelişmeler göze çarpar ve bunlar tabiatıyla edebiyatın gelişmesinde önemli katkılar sağlamış aynı zaman Mustafa Reşit Paşa'nın 1858'de ölümünden sonra 1871 tarihine kadar yönetimi elinde tutan Ali Paşa, batılılaşma hareketinin temposunu düşürdüğü bilinmektedir.<sup>35</sup>

Bu dönemde Realizm ve Natüralizm'in Avrupa'daki en büyük ismi olan Emile Zola; ünlü fizyoloji bilgini Claude Bemard'ın tıptaki Ekspresimantalizm, yani deney metodu gibi yöntemler benimsendiği ve romanlara uygulandığı görülmektedir.<sup>36</sup>

Türk edebiyatının bu devresinde modernleşmenin beraberinde kadının ön plana geldiği görülmektedir. Bu dönemle birlikte toplumu diğer yarısını oluşturan ve gerçekte toplumsal yapıyı şekillendiren kadının farkına varılarak kadının medeni seviyesinin yükseltilmesinin önemi vurgulanmaktadır.<sup>37</sup> Aynı zamanda bu dönemle birlikte Türk toplumunda en çok değişime uğrayan unsurlardan birisi de aile kurumu olduğu görülmektedir. Batı'ya yönelmekte olan Türk edebiyatıyla birlikte Türk milletinin yaşayışı ve kültürü de değişim göstermektedir. Bu durum için Cevdet Paşa, II. Mahmut devrinde adeta vükelanın iltimasıyla kendilerine şehirli kadınların yeni yeni giyindikleri feracelerden yaptırılan saray kadınları, Cuma ve bayram alaylarına hususi araçla gelmelerinden söz etmesinden anlamak mümkündür.<sup>38</sup> Aynı zamanda kadına yabancı dil, özellikle Fransızca, Batı kültürü ve piyano çalma: genelde Fransız mürebbiyenin nezaretinde öğretilir.<sup>39</sup>

Tanzimat Dönemi'nde kız çocuklarının eğitimiyle ilgili de gelişmeler yaşanmıştır. Bu dönemde ve öncesinde, tutucu görüşün 9-10 yaşına gelen kız çocuğunun artık erkeklerden saklanması düşüncesi toplumda ağır basmakta ve öğretmenlerin erkek olması, bu fikrin sürmesine, bu durum da kızların eğitimden mahrum bırakılmasına neden olmaktadır.<sup>40</sup> Aynı zamanda Tanzimat'la birlikte, eğitim olanaklarının sağlanması ve sınırlı da olsa yasal değişikliklerin yapılmasıyla başlayan toplumsal dönüşüm, basın ve edebiyat yoluyla yayılmaya çalışılmıştır.<sup>41</sup>

<sup>35</sup> Akyüz, *Modern Türk Edebiyatının Ana Çizgileri*, 12.

<sup>36</sup> Önder Göçgün, *Hüseyin Rahmi Gürpınar*, bs.3. (Ankara: Ofset Repromat Matbaası, 1990), 4.

<sup>37</sup> Tarık Özcan, *Cumhuriyet Dönemi (1923-1938) Türk Romanında Kadın İmgesi: Kafesin Ardından Kur(t)uluşa*, *Fırat Üniversitesi Sosyal Bilimler Dergisi*, 30/2(Temmuz 2020), 122.

<sup>38</sup> Ahmet Hamdi Tanpınar, *19. Asır Türk Edebiyatı Tarihi*, 7. bs.(İstanbul: Çağlayan Yayınları, 1988), 142.

<sup>39</sup> Romanımızda çocukları her sahada yetiştirmek üzere ev içinde istihdam edilen ilk kadın mürebbiye, Midhat Efendi'nin *Karnaval*'inde görülür. (İstanbul 1881).

<sup>40</sup> Polat, “*Cumhuriyet Dönemi Popüler Aşk Romanlarında Kadın Temsilleri*”, 17.

<sup>41</sup> Polat, “*Cumhuriyet Dönemi Popüler Aşk Romanlarında Kadın Temsilleri*”, 18.

Edebiyatımızda bilinen ilk roman Şemsettin Sami'nin Taaşuk'ı Tal'at ve Fitnat adlı eseridir. Bu eser ile Türk edebiyatının geleneksel olandan kopmadığını ancak Batılılaşma yolunda önemli adımlar atıldığı görülmektedir. İlk köy romanı olarak adlandırılan Nazbizâde Nazım'ın kaleminden çıkan Karabibik, ilk realist roman Araba Sevdası Recaiâde Mahmut Ekrem tarafından kaleme alınmış, ilk tarihi roman Cezmi ve ilk edebi roman olan İntibah ise Namık Kemal tarafından Tanzimat edebiyatı döneminde yazılmıştır. Bunların yanı sıra; Ahmet Mithat Efendi, Sami Paşazade Sezai, Mehmet Murat (Mizancı Murat), Fatma Aliye Hanım gibi yazarlarda roman türünde eserler verdiği bilinmektedir.

Tanzimat edebiyatı ile ilk defa Türk edebiyatı sahasında görülmeye başlayan hikâye-roman kavramları beraberinde bir karmaşaya sebebiyet verdiği görülmektedir. Bu karmaşa arasında kalan yazarlardan birisi olarak Ahmet Mithat Efendi'yi ele almak mümkündür. Ahmet Mithat'ın kaleme aldığı eserler incelemeye tabii tutulduğunda bir sayfası hikâye gibiyken bir diğer sayfası roman özelliği barındırmakta olduğu görülmektedir. Aynı zamanda Ahmet M. Efendi, romanlarında Türk okurunun geride kalmışlığına değinerek bu konudan yakındığı görülmektedir.

Tanzimat döneminin kadın yazarı olarak bilinen Fatma Âliye Hanım'ı 1891 yılında Ahmet M. Efendi ile kaleme aldığı "Hayal ve Hakikat" adlı roman ile tanımamız mümkündür. Eserde kadın karaktere ait olan kısımlar Fatma Âliye tarafından kaleme alınmışken erkek karaktere ait olan kısımlar Ahmet Mithat tarafından kaleme alınmıştır. 1892 yılında yayınlanan "Muhadarat" adını taşımakta olan roman Fatma Âliye Hanım'ın kendi ismiyle yayımlanan ilk eseridir.<sup>42</sup> Fatma Âliye, bu eseri ile ilk aşkın unutulamayacağı tezini yıkmaya çalışmıştır. Eserlerinde kullandığı kadın karakterler daha çok ideal kadın tipleridir. Bunlar; Batılı tarzda büyümüş, aristokrat aile üyesi olan aydın kadınlardır. Muhadarat adlı eserin kahramanlarından olan Fâzıla, "Fatma Âliye Hanım ve o devrin diğer kültürlü kadınlarının idealize edilmiş bir örneğidir."<sup>43</sup> Fatma Âliye Hanım'ın eserlerinde yer alan kadın karakterler bahsedilen bu özelliklerinden ötürü erkeklerden üst konumda yer almaktadır. Ancak Batılı tarzda yoğurulan bu karakterlerin bir yanı halen geleneksel kültüre bağlı olduğu da görülmektedir.

Dönemin yazarları; kadının temel sorunlarından, kadın-erkek eşitsizliğinden, görücü usulü ile yapılan evlilikten ve kadının söz sahibi olmaması gibi konularda eserleri kaleme aldığı görülmektedir. Ele alınan bu eserlerle kadını gündeme getirmek ve sosyal hayata sokmak amaç edilmediğinden söz etmek mümkündür. Ne yazık ki dönemin yazarlarının bu çabasının olumsuz sonuçlandığını Tanzimat döneminden önce oluşan pasif kadın portresini Tanzimat romanı ve diğer türlerle ele almaktan öteye gittiği söylenememektedir.

### 1.7. Servet-i Fünun Edebiyatında Kadın

Tanzimat dönemi ile başlayan edebi alandaki yenileşme çalışmaları, tam anlamı ile ilk örneklerini Servet-i Fünun döneminde vermektedir. Bu nedenle Servet-i Fünun edebiyatı, 1950'li yıllara kadar daha çok "Edebiyatı-i Cedide/Yeni Edebiyat" adıyla anıldığı bilinmektedir.<sup>44</sup> Eserlerinde ağır ve sanatlı bir dil görülen Servet-i Fünun sanatçıları belirli bir sosyal hayat tabakasına ait olan bireylerin hayatlarını kendilerine konu edindiklerini söylemek mümkündür.

Türk edebiyatının Servet-i Fünun (1896-1901/1909) devresinde kadın artık birey olarak görülmektedir.<sup>45</sup> Artık geleneksel kadın portresinin yerinde bireyselliği ön planda tutan kadın portresi bulunmaktadır.

Servet-i Fünun sanatçıları, Tanzimat dönemi ve diğer dönem sanatçılarının aksine daha profesyonel nitelikler taşıyan eserler ortaya koymuştur. Bu dönemin romancıları, Tanzimat romancılarını gibi kişisel özelliklerini eserlerine yansıtmayı değil kişiliklerini saklamayı seçmiştir. Aynı zamanda da Servet-i

<sup>42</sup> On5yirmi5.com, "Türk Kadın Romancımız Fatma Aliye Hanım", erişim: 13 Mayıs 2021, <https://on5yirmi5.com/biyografi/turk-kadin-romancimiz-fatma-aliye-hanim/>.

<sup>43</sup> Emel Aşa, *Fatma Aliye Hanım(Hayatı, Eserleri, Fikirleri)*, (Yayımlanmamış Doktora Tezi, İstanbul Üniversitesi Sosyal Bilimler Enstitüsü, 1993), 165.

<sup>44</sup> Korkmaz v.dğr. , *Yeni Türk Edebiyatı El Kitabı(1839-2000)*,131.

<sup>45</sup> Özcan, "Cumhuriyet Dönemi", 122.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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Fünun sanatçıları vermek istedikleri mesajı karakter ile yoğurmuş ve bu şekilde okuyucuya sunduğu görülmektedir.

Ahmet H. Tanpınar için Servet-i Fünun sanatçılarının Batılılaşma yolunda gösterdikleri yönelimde platonik bir hayranlığın ilerisinde bir durum olduğu düşüncesindedir. Onların, şiirde parnasizm ve sembolizm; roman ve hikâyede realizm ve natüralizm; fikir boyutunda da pozitivizm gibi akımları benimsemeleri sonucunda eskiye dair bir kapıyı kapattıklarını aynı zamanda da onların yöneldiklerini örnekler, şekilde görüş ve duyuş tarzında dilde derin ve kökten değişmeyi zorunlu hale getirdiğini söylemek mümkündür.<sup>46</sup>

Edebiyat-ı Cedideciler, Tanzimat devri romancılarından farklı bir ideolojide hareket etmiştir. Karamsar bakış açısını benimseyip aynı zamanda da siyasal ve sosyal sorunlara sırt çeviren yazarlar bu durumlar karşısında da Tanzimat dönemi yazarlarından ayrılmıştır. Buna paralel olarak da kaleme aldıkları eserlerinde yer alan karakterler de hayal kırıklığı havuzunda yüzen kişiler olmuştur.

Avrupalı tarzda ilk roman veren Halid Ziya, Tanzimat edebiyatından kendi dönemlerine gelinceye kadar Batı edebiyatı ile kurulan bağları ve kendilerinin bu konuda attıkları adımları şu sözleri ile açıklamaktadır: “Tanzimat edebiyatı, mesela Fransız edebiyatıyla münasebetinde Chateaubriand’la Volney’den, nazımda da Corneille ve Racine’leri ihmal ederek, ancak Victor Hugo’nun satanının başlangıcından Lamartine’e ve Musset’ye kadar inmişken Edebiyat-ı Cedide aradaki uzun mesafeyi ancak genç bacaklarda bulunabilecek bir kuvvet ve cesaretle, yalnız bir hamlede aşırılmış ve bütün son çağda edebiyatını kucaklayarak, kendisiyle aynı yaşta ve aynı çağda bulunan Batı edebiyatı şahsiyetleriyle birlikte yaşamaya başlamıştı.”<sup>47</sup>

Halid Ziya Uşaklıgil’in romanlarında yer alan kadın ve genç kız tiplerinin buldukları toplum içerisinde yaşamsal mücadele yürütmekte olduğu görülmektedir. Romanda yer almakta olan bu karakterler, Batılı kadınların özelliklerine sahip olma ve kimliklerini kabullendirme yolunda adımlar atmaktadır. Ancak bu adımları atmakta olan karakterler ya tamamıyla açılma ya da tamamıyla kapanma durumu göstermektedir.

Edebiyat-ı Cedide ile yeni bir Türk edebiyatı dönemine geçmekle birlikte yeni bir sevgili imgesi de oluşmaktadır. Divan edebiyatında sevgili, soyut olan iken Edebiyat-ı Cedide topluluğu yazarları tarafından somuta evirildiği görülmektedir. Bu dönemin romanlarında kadına birtakım özellikler yüklendiği ve erkekle aynı konumda olması durumu da söz konusudur. Tanzimat döneminde ele alınan eserlerde görülen kadın karakterler daha çok cariye olarak yer almakta çaresiz, zayıf ahlaklıdır. Ancak Servet-i Fünun döneminde romanlara konu olan kadın kahramanlar tahsilli, düşünerek hareket etme özgürlüğüne sahip ve kendi kişiliğinin farkında olan kadınlardır. Türk kadınının ilk dönemlerde yaşadığı baskıcı tutumu kaleme alan yabancı bir kadın yazarın “Türk Kafeslerinin Ardı”<sup>48</sup> adlı eseri ile anlamak mümkündür.<sup>49</sup>

Bu dönemin önemli roman eserlerinden olan ve hareketin temel taşı olarak sayabileceğimiz “Mai ve Siyah” adlı eserde idealist bir şairin iç dünyası ve bir Türk ailesinin yaşam tarzı, adetleri ve dönemi tasvir edilmektedir. Aynı zamanda Halid Ziya’nın kaleminden çıkma bir diğer eser olan “Aşk-ı Memnu” adlı romanda ise batılı tarza evirilmiş olan zengin Türk ailesinin hayatı işlenmektedir. Batılı tarza en yakın hatta batılı tarzda eserler olarak alabileceğimiz bu eserlerde sosyal davalar bulunmamakta ve romanlarda yer alan kahramanların iç dünyasına yönelerek sosyal hayat tasvir edilmektedir. 19. yüzyıl kadını düşünmeyen bir yapıdadır ve bu dönemin eserleri böyle bir çevreden esinlenerek kaleme alınmıştır. Buna paralel olarak devrinde sessiz olan kadınlar, eserlerde de sessiz şekilde işlenmiştir.

Dönemin yazlarından birisi olan Mehmed Rauf, edebiyat sahasında “Eylül” adlı ilk psikolojik romanı ile yer kazanmıştır. Eserde ön planda tutulan hayalleri ve duyguları ön planda tutulurken sosyal çevre

<sup>46</sup> Ahmet Hamdi Tanpınar, *Yahya Kemal*, bs.1.(İstanbul: Dergâh Yayınları, 1982), 38.

<sup>47</sup> Şükran Kurdakul, *Çağdaş Türk Edebiyatı*, bs.1. (İstanbul: Evrensel Basım Yayınları, 2000), 38-39.

<sup>48</sup> H.D. Jenkish, *Behind Turkish Lattices*, 1bs. (London, 1909).

<sup>49</sup> Cahit Kavcar, “Batı Uygurluğu Karşısında Servet-i Fünun Romancıları”, *Dergipark*(Eylül 2019), 303.



geri kalanda tutulmaktadır. Bunu Uşaklıgil'in romanlarında söz ettiğimiz duruma benzetmek mümkündür. Ancak Mehmet Rauf'un en dikkat çeken özelliği üslubundaki gevşekliği olmuştur.<sup>50</sup>

Edebiyatı-ı Cedide diğer adıyla Servet-i Fünun döneminde yer alan diğer şair/ yazarlardan söz etmek gerekirse bunlar; Mehmet Rauf, Cahit Yalçın, Saffeti Ziya, Hüseyin Rahmi Gürpınar, Ahmet Rasim, Tefrik Fikret, Cenap Şahabettin şeklindedir.

Servet-i Fünun dönemi yazarlarından olan Hüseyin Rahmi Gürpınar, Tanzimat dönemi hikâye, roman ve tiyatrolarının belli başlı konularından birini teşkil eden; ana-baba zoru ile veya eşini hiç görmeden yapılan evlilikler ve bunların sonucunda ortaya çıkan kötü durumlar, acı olaylar Gürpınar'ın romanları içinde ilk defa *Bir Muâdele-i Seudd* adlı eserinde görülmektedir.<sup>51</sup>

Bahsi edilen Servet-i Fünun dönemini özetlemek gerekirse; bu dönemde kadın eğitime tabi tutulması medeniyetin gelişmesi açısından görülmekten ziyade kadının birey olarak kendi yönelimlerini seçmesi için eğitim görmektedir. Aynı zamanda dönemin yazarları eserlerinde kadını; samimi, sanatkâr ruhlu, kültürü güzelliğini besleyen, erkek için bir teselli ve kuvvet kaynağıdır.<sup>52</sup> Servet-i Fünuncular bir kadın duyarlılığına sahiptirler ve kadın, onların duygu ve düşüncelerini anlatmada kullandıkları bir semboldür.<sup>53</sup> Bu dönem eserlerinde kadının, kadınlık yönleri ile ön plana çıktığı görülmektedir.

### 1.8. Fecr-i Ati Edebiyatında Kadın

Fecr-i Ati topluluğu ilk olarak Servet-i Fünun dergisinde yayımlanan 12 Mart 1909 tarihli bir haber ile kendilerini duyurmuştur.<sup>54</sup> Bu durunun beraberinde bir beyanname ile bağlı kalacakları prensipleri ve hedeflerini ilan edecek olan Fecr-i Ati üyeleri sanat görüşlerini şu şekilde ifade etmiştir: "*Sanat şahsi ve muhteremdir.*"<sup>55</sup>

Fecr-i Ati roman ve hikâyelerinde yazarlar daha çok aşk teması üzerinde durduğu görülmektedir. Aşk teması ile şekil bulan bu eserlerde genellikle kötü anne ve düşmüş konumda olan kadın tiplemesinin varlığı söz konusudur. Bu tiplerden birisi olan kötü anne, kızlarının kaçınılmaz sonunu hazırlama görevi ile hükümlüken, düşküm kadın tipi ise kendisini diğer kadın karakterler ile kıyaslamaktır. Düşmüş kadın olarak tanıtılmakta olan kadın karakterler, dönemin erkeklerinin kadını tanınması ve kadının nasıl bir varlık olduğunu anlaması noktasında basamak görevini üstlenmekte olduğu görülmektedir. Daha çok aşk üzerinden şekillenmekte olan eserlerde kadın- erkek ilişkisi içerisinde bulunan roller açısından âşık kadınlar, kurgu gereği mutsuzluğa mahkûm veyahut toplumsal engellere karşı karşıya gelmektedir.<sup>56</sup>

Dönemin yazarlarından olan Cemil Süleyman'ın "Dört Sene Sonra" adını taşımakta olan eserinde bir çiftin aşkı işlenmektedir. Ancak bu eserde ne kadın karakterin ne de erkeğin adına yer vermemiş, sadece karakterleri tasvir etmiştir. Eserde kadın karakterinin adlandırılmamış olması durumu ile kadın karakterinin ön plana çekilmesi adına yapılmış olan bir durumdur. Aynı zamanda anlatıcının kadına isim vermediği hikâyelerde kadın, evlilik içinde toplumsal normların dayattığı zevcelik rolünü taşıırken mücadele etme arzusundan kopar ve duyguları ifade ediş, onların iç dünyasında bir serzenişe dönüşmüş olduğu söylenmektedir.<sup>57</sup>

Fecr-i Ati romanlarında yer almakta olan kadın karakterlerinin bir kısmında aşk söz konusu olduğunda, kadın üzerinde kurulan baskıyı kendi içerisinde çatışarak yaşadığı görülmektedir. Eserlerde yer verilen

<sup>50</sup> Kenan Akyüz, *Batı Tesirinde Türk Şiiri Antolojisi*, bs.3.(Ankara: Doğu Matbaacılık ve Ticaret Limited Şirketi, 1970), 96.

<sup>51</sup> Göçgün, *Hüseyin Rahmi Gürpınar*, 47.

<sup>52</sup> Özcan, "Cumhuriyet Dönemi", 122

<sup>53</sup> Ogün Kırtıl, "Türk Romanında Kadın ve Bir Tereddüdün Romanı", *Kadın Araştırmaları Dergisi*, 5 (1995), 128.

<sup>54</sup> Korkmaz v.dğr. , *Yeni Türk Edebiyatı El Kitabı(1839-2000)*, 228.

<sup>55</sup> Korkmaz v.dğr. , *Yeni Türk Edebiyatı El Kitabı(1839-2000)*, 228.

<sup>56</sup> Ayşegül Ayık, *Fecr-i Âti Romanında ve Hikâyesinde Kadın*(Yüksek Lisans Tezi, Yıldız Teknik Üniversitesi Sosyal Bilimler Enstitüsü, 2019), 67.

<sup>57</sup> Ayık, *Fecr-i Âti Romanında ve Hikâyesinde Kadın*, 47.

dul kadın karakterler de bu çerçevededir. Dul kadın karakterlerin yaşadıkları aşk cinsellik barındırmakta ancak bu durum dönemin özelliklerini yansıtacak düzeyde değildir.

Düşmüş, düşkün kadın karakterler Fecr-i Ati dönemi eserlerinde daha çok erkeğin cinselliği tatması noktasında önemli bir yerdedir. Bu karakterlerin bazıları fuhuş yapan kadınlarken bazıları da fuhuş batağına düşmemiş ancak bulunduğu sosyal çevrede o şekilde adlandırılan kadınlardan oluşmaktadır. Yakup Kadri'nin "Yalnız Kalmak Korkusu" adını taşımakta olan eserinde böyle bir durum söz konusudur. "Elimi elektrik düğmesine götürdüm. Derhal odaya tatlı bir ziya döküldü. Kadın tâ önümde duruyor ve davetkâr, muharrik bir nazarla bana bakıyordu." ("Yalnız Kalmak Korkusu", 30)

Fecr-i Ati topluluğu, roman ve hikâyelerinde anne olarak kadın önemli bir konumdadır. Kadın olarak annenin söz konusu olduğu eserlerde anne-çocuk ilişkisi geniş çerçeveye ile okuyucuya sunulmaktadır. Kötü anne rolündeki kişiler daha çok tip olarak eserde görülmekte ve kötü kişi ön planda tutulmaktadır. Fecr-i Ati döneminde anne olarak kadın karakterler verilerek anneliğin önemi vurgulanmıştır.

Sözü edilmekte olan Fecr-i Ati topluluğuna kadın: evli, bekâr, yabancı, dul, düşmüş, cariyeye, anne, âşık, erkeğin aşkından karşılık bulamamış, terk edilmiş, aldatılmış, hasta, kıskanç gibi şekillerde eserlere konu olmuştur.

### 1.9. Milli Edebiyat Döneminde Kadın

Milli edebiyat dönemi, II. Meşrutiyet dönemi sonrasında ortaya çıkan birtakım görüşlere göre İstiklal Savaşı'nı da içine alan ve Cumhuriyetin ilanına kadar devam eden edebiyat faaliyetlerine verilen adlandırmadır.<sup>58</sup>

Milli edebiyat hareketinin ilk filizi olan *Genç Kalemler*'in ilk şekli, Haziran 1909'da Manastır'da *Hüsn ve Şiir* adıyla on beş günde bir yayımlanan edebî dergidir. Dördüncü sayıdan sonra Selânik'e taşınan dergi, 23 Temmuz 1909'dan itibaren burada Selânik Hukuk Mektebi talebeleri H. Hüsnü ile İsmâil Subhi tarafından çıkarılmıştır.<sup>59</sup> Genç Kalemler dergisi etrafında şekillenmekte olan Milli edebiyat döneminde 1911 yılında dergide yayımlanan Turan manzumesiyle Bütün Türkçülük fikrini benimsediğini göstermiş olan Ziya Gökalp (1876-1924), bilhassa I. Dünya Savaşı boyunca, bu hareketin lideri durumundadır.<sup>60</sup>

Bu dönemin yazarları milli kaynakları kullanmayı kendilerine amaç edinerek özde milliliğe dönmeyi istemektedir. Türk edebiyatının başka edebiyatlardan beslenmesi görüşüne karşı bir tutum sergilemekte olan Milli edebiyatçılar dilde sadeleşmeyi ve yabancı sözcüklerin Türkçeden çıkartılması gerektiği görüşüne eserlerinde yer verdiği görülmektedir.

Yakup Kadri Karaosmanoğlu, Refik Halit Karay, Reşat Nuri Güntekin, Ebubekir Nazım Tepeyran, Halide Nusret Zorlutuna, Ömer Seyfettin, Ziya Gökalp, Mehmet Emin Yurdakul gibi yazarlar Milli edebiyat döneminde eser veren yazarlardır. Bahsi edilmekte olan yazarlar, Türk hikâyeye ve romanında bu dönemle birlikte yavaş yavaş bireysel temaların dışına çıkarak sosyal konulara eğilmeye başlamıştır.<sup>61</sup> Bunun beraberinde halk ile aydın çatışması ortaya çıkmıştır.

Milli edebiyat devresinde kadın, tıpkı erkekler gibi savaş mücadelesi içinde yer aldığını görmek mümkündür. Dönemin siyasal eğilimleri ile şekillenen Milli edebiyat döneminde, kadın olgusunu romanlarının odağına yerleştirmeyi başaran ve Milli edebiyat döneminin en önemli romancılarından birisi olarak Halide Edip Adivar'dan da söz etmek mümkündür.<sup>62</sup>

Fatma Âliye ile aynı zamanlarda roman yayınlayan Halide Edip'in eserlerinde meşrutiyetin izlerine rastlanmaktadır. Aynı zamanda Halide Edip'in romanlarında geleneksel kadın tipleri, ideal kadın

<sup>58</sup> Korkmaz v.dğr, *Yeni Türk Edebiyatı El Kitabı(1839-2000)*, 184.

<sup>59</sup> İslam Ansiklopedisi, "Genç Kalemler".

<sup>60</sup> Akyüz, *Modern Edebiyatın Ana Çizgileri*, 157.

<sup>61</sup> Sevgül Türkmenoğlu, "Milli Edebiyat Dönemi Roman ve Hikâyeciliğine Genel Bir Bakış", *Sosyal Bilimler Enstitüsü Dergisi* 45(Sonbahar 2019): 37.

<sup>62</sup> Şengül "Kadın Edebiyatı", 46.

kahramanı farklı bir bakış açısı ile yansıtma açısından önemli bir işlev görmektedir.<sup>63</sup> Halide Edip Adıvar'ın "Ateşten Gömlek"<sup>64</sup> adlı eserinde yer alan kadın karakteri vermek mümkündür. Eserde yer almakta olan kadın karakterimiz cinsel kimliği ile ön plana çıkmaktan ziyade toplumsal birlik ve mutluluk duygusu ile ön plandadır. Bu yönüyle bakacak olursak Milli edebiyat devrinde kaleme alınan kadın karakterler; milli bilince ulaşmayı başarmış, millet uğruna gözünü bile kırpmadan canını verecek olan kişilerdir.

Adıvar, eserlerinde sade bir dil kullanmakta aynı zamanda Adıvar'ın romanlarında tamamen terk ettiği realist bir yaklaşımla eserlerini kaleme alması da dikkat çekmektedir.<sup>65</sup>

Milli edebiyat dönemi yazarları artık bir gözlemci olarak Anadolu'yu anlatmak yerine bizzat yaşayıp, görerek eserlerini kaleme almıştır. Bu durum ile de okuyucu "taşra" gerçeklerini, insanların yaşadığı cehaleti, yoksulluğu görmüştür. Aynı zamanda Milli edebiyat döneminde ele alınan eserlerde genel konunun "Milli Mücadele" olduğundan söz etmek mümkündür. Türk edebiyatının bu devresi ile eserlerin: dili, işleniş biçimi ve teması değişmiş ve bunun beraberinde de Türk edebiyatında yeni bir serüven başlamıştır.

### 1.10. Cumhuriyet Dönemi Edebiyatında Kadın

Türkiye Cumhuriyeti Devleti'nin kurulmasından 1939'a kadar uzanan dönemi işleyen ve içine alan Türk Edebiyatı'nın en son evresi aynı zamanda da takip edilebilen evresi Cumhuriyet Devri Türk Edebiyatı (Atatürk Devri Edebiyatı) olarak adlandırılmaktadır.<sup>66</sup>

Bu dönemde eser vermekte olan yazarlar ve şairler Cumhuriyet dönemi öncesinde de bu sahada olan yazarları da bünyesinde barındırmaktadır. Cumhuriyet'in ilk yılları olarak adlandırılan bu devrede: Halide Edip Adıvar, Kerime Nadir Azrak, Osman Cemal Kaygılı gibi isimler yer almaktadır.

2. Meşrutiyet Dönemi, kadının sosyal hayattaki konumunun artmasına imkân sağlamıştır. 1917'de çıkarılan "Aile Hukuku Kararnamesi"nde kadınlara yönelik hükümler yer almıştır. Bu hükümler doğrultusunda kadınlar ilk defa derneklerde çalışma olanağını bu dönemde kazanmıştır.<sup>67</sup>

Cumhuriyet'in ilk dönemlerinde yazılmaya başlanan eserlerde "Kurtuluş Savaşı"nın destekler niteliktedir. Aynı zamanda bu dönemde yazarların kaleme aldığı eserlerle inkılaplara destekçi olarak sürecin hızlanmasını sağladığı görülmektedir. İnkılapların ivme kazanması yolunda yazılan romanlarda inkılapların halka aktarılması söz konusudur. Ancak kaleme alınan bazı eserlerde bu inkılapların eksik yanları da çıkmıştır.

Edebiyatın bu devresinde çeşitli Türk edebiyatı şair ve yazarları kadının İslamiyet öncesinde olduğu gibi değer kazanması gerektiği düşüncesini benimsemektedir. Bu düşünce temelinde hareket eden sanatçılardan olan ve Batı'ya yönelen Salahaddin Asım: "Kadının "iyi bir eş ve anne" olması gerektiğini belirten İslamcılara karşı çıkarak bu anlayışın kadını erkek için bir "şehvet kölesi", çocuk için ise fedakâr bir bakıcı konumuna indireceğini belirtir. Asım kadına toplumsal yaşam içerisinde hak ettiği yerin verilmesi ve onun eğitilmesiyle sağlıklı bir toplum kurulabileceğini vurgular (Asım: 1989, 22). Aynı zamanda Türk edebiyatının bu döneminde kadının özgürlük kazandığı görülmektedir. Bu özgürlükler doğrultusunda kadın, kendi ihtiyaçları için yaşamaktan vazgeçmiştir.

Cumhuriyet dönemi ile hayatımızda var olmaya başlayan, Kemalizm beraberinde ev ve iş hayatında başarılı olan kadınları meydana getirmiştir.

Kadınlar, "İslâmî kadın", "Kemalist kadın", "Sosyalist kadın" olmuşlar ancak hiçbir zaman "sadece kadın" olamamış ve 1970-1990 yıllarındaki süreçte kadın yazarlar sadece Kemalizm'in bu ikiliğini ve

<sup>63</sup> Coşkun, "Türk Modernleşmesini Kadın Romanları Üzerinden Okumak-Tanzimat'tan Cumhuriyet'e-", 933.

<sup>64</sup> Halide Edip Adıvar, *Ateşten Gömlek*, 1.bs. İstanbul: Özgür Yayınları, 1922.

<sup>65</sup> Türkmenoğlu, "Milli Edebiyat Dönemi Roman ve Hikâyeciliğine Genel Bir Bakış", 39-40.

<sup>66</sup> Ayfer Yılmaz, "Geçmişten Günümüze Kadın Şairlerin Konumuna Genel Bir Bakış", *Dergipark* 1/2(Yaz 2012)

<sup>67</sup> Ayfer Yılmaz, "Geçmişten Günümüze Kadın Şairlerin Konumuna Genel Bir Bakış", *Dergipark* 1/2(Yaz 2012)

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Sosyalizmin başarısızlığını tatmakla kalmamışlar, kendilerine sorulmaksızın ya da kendi seçimleri olmaksızın kendilerine yüklenen farklı tipteki rol modelleri de tatmışlardır.” (Gülendam: 2001, s. 105)

Batılılaşmanın ilk tohumlarının atılmaya başladığı dönem olarak bilinen Tanzimat edebiyatında görülmeye başlanan kadının erkekleştirilme durumu Cumhuriyet dönemi Türk edebiyatında da görülmektedir.<sup>68</sup> Bu durum ile edebi eserlere konu olan kadın, tıpkı bir erkek gibi hürdür. Cumhuriyet’in ilk yıllarında, dönemin birçok kadın yazarı gibi Halide Edib de siyasi mücadelenin içinde yer almaktadır ancak diğerleri gibi “*hayallerini gerçekleştirecek görevler beklerken Halide de manevi anlamda linç edilmiş, işlevsiz kılınarak “öldürülmüştü”. Vurun Kahpeye adı, başına gelenlerin bir özeti idi.*” (Çalışlar: 2010, s. 303). Halide Edip, eserlerinde kadın karakterlerinin evliliği konusunda bazen muhafazakâr olmuş bazen ise serbest tutum sergilemiştir. Adıvar’ın değerler karşısında az çok muhafazakâr olan tutumu “Raik’in Annesi ve Handan” adlı eserinde ortaya çıkmaktadır.<sup>69</sup>

Halide Edib Adıvar (1882 veya 1884- 9 Ocak 1964), gerek muharebe döneminde gösterdiği başarıları neticesinde gerekse Milli edebiyat dönemini yansıtan eserleri ile akıllarda yer edinmiştir.

Tomris Uyar (15 Mart 1941- 4 Temmuz 2003), dönemin önemli dergilerinde yayınladığı çeşitli türlerdeki eserleri ile kendinden söz ettirmiştir.

Edebiyatımızın “*çoksatar*” kavramı ile eşleştirilen ve okumayı elit kavram olmaktan çıkaran kadın yazar ise Kerime Nadir (5 Şubat 1917-20 Mart 1984) olmuştur.<sup>70</sup>

Adalet Ağaoğlu(23 Ekim 1929- 14 Temmuz 2020), ele aldığı eserlerinde farklı dönemleri ve bu dönemlerde yaşayan insanların hayatlarını konu edinmesi yönüyle 20. Yüzyılda kendinden en çok söz ettiren kadın yazar olmuştur.

Üç kadın yazarımızdan olan Şükûfe Nihal, ele aldığı eserlerinde askerlik meselelerine değinmiş ve yaptığı göndermelerle Türk edebiyatında önem kazanmıştır. Bir romanında askerlik meselesinden şu sözlerle bahsetmektedir: “*Ben, kadını siyasi hakka malik etmek için uğraşan kadın cemiyetlerine hayret ediyorum. Bu cemiyetler, evvela, bütün kadınları bir iş sahibi etmeye alıştırmak için çalışmalı. Çünkü içtimai mevkii olmayan hiçbir fert siyasi hakka malik olamaz*” (Şükûfe Nihal, 2008a: 162, 163).

Cumhuriyet döneminde ile kadın yazarların ele aldığı eserler, erkek yazarların eserlerini yayınladığı dergilerde yayımlanmamakta, kadınların çıkarttığı “kadınlara mahsus” dergilerde yayınlanmaktadır. Bu dönemin kadın şairleri: Adile Ayda, Canan Apak, Mefkûre Dünder, İnci Asena, Aysel Özakin, Feriha Altıok, Neclâ Aysan, Nurten Çelebioğlu, Türkan İldeniz, Halide Nusret Zorlutuna, Sevim Dil, Emine Erbaş, Meliha Avni, Birhan Keskin, Meral Üner gibi isimlerden oluşmaktadır.

Dönemin şairlerinden olan Türkan İldeniz, bir kadın olarak kadına kadını anlatma sorumluluğu ile şiirlerini kaleme almıştır.<sup>71</sup> “Yarış” adını taşımakta olan şiirinde kız ve erkek çocuklarına toplumun bakışını tema edinmiştir. Henüz hiçbir suçu yokken kız bebeğin daha dünyaya gelirken toplum tarafından istenmediğine vurgu yaparak bu istenmeme yüzünden erkekle hep bir mücadele halinde olacağından bahsetmiştir:<sup>72</sup>

*Hazırım ben hadi artık başlasın yarış*

*Çalsın davullar zurnalar*

*Dinsin yağmur göreyim bir ebem kuşağını*

<sup>68</sup> Tuba Yılmaz, “1923-1940 Arası Cumhuriyet Dönemi Kadın Romanlarında İdeal Kadın Tipi Olarak Erkekleşen Kadın”, *Rumeli’de Dil ve Edebiyat Araştırmaları Dergisi* 7(Ekim 2016): 38.

<sup>69</sup> Coşkun, “Türk Modernleşmesini Kadın Romanları Üzerinden Okumak – Tanzimat’tan Cumhuriyet’e-“:948

<sup>70</sup> EQ Dergisi, “Türk Edebiyatının Can Suyu Kadın Yazarları”, erişim: 10 Mayıs 2021, <https://eqdergi.com/eq87/turk-edebiyatinin-can-suyu-kadin-yazarlari/>.

<sup>71</sup> Neslihan Bodur, “Cumhuriyet Dönemi Türk Şiirinde Kadının Sesi: Türkan İldeniz”, *Uluslararası Hakemli Kültür-Sanat-Mimarlık Dergisi* 1/1(Haziran 2018): 32-33.

<sup>72</sup> N. Bodur, “Cumhuriyet Dönemi Türk Şiirinde Kadının Sesi: Türkan İldeniz”, 33.

*Geçemezsem eğer, mezardan kaldırmak anamı*

*-Erkek evlat doğurmamış-*

*Hay benim de saçım kısa olmalıydı.*

*Demek ben doğunca ağladı evin saçakları*

*Ezik ninnilerde sorumsuz boşadı babam anamı ha*

*Tahtı mı vardı acep kendinden sonra kalacak*

*Ya da şehzadeler bekleyen tacı*

[...] *Bu bir üvey yaşantıydı baştan beri Biliyordum  
bağdaşamazdım*

[...] *Uzun saçıma demir atmışken bakışları*

*Doruklar bulutun türküsünü söyler mi yine*

*İşte rezilce yağmalanmış dünya pazarı*

*Aslan payını kapmışlar işte*

*Bu hile oyunda bana düşen pay*

*Boğulmaktı kadınlığının denizinde (İldeniz 1967: 27 - 28).*

Kadın, şiirlerde arzulanan, sahip olunmak istenen “ideal” objedir. Kadına şiirler yazılmış, yokluğu ile kahrolmuştur.

Nazım Hikmet’in “Kadınlarımız Yüzü” adlı şiiri ile kadınların çehrelerinden yola çıkılarak bir milletin yaşamış olduğu acıyı, eziyeti, sevinci vb. durumları görebileceğimizden söz etmektedir.

*Kadınlarımızın yüzü acılarımızın kitabıdır*

*acılarımız, ayıplarımız ve döktüğümüz kan*

*karasabanlar gibi çizer kadınların yüzünü.*

*Ve sevinçlerimiz vurur gözlerine kadınların*

*göllerde ışıyan seher vakıtları gibi.*

*Hayallerimiz yüzlerindedir sevdiğimiz kadınların, görelim görmeyelim  
karşımızda dururlar gerçeğimize en yakın ve en uzak.*

Kadınlarımızın Yüzleri, Nazım Hikmet

Cahit Sıtkı Tarancı “Başımı Koruyan Melek” adlı şiiri ile kadını bir melek gibi görmüş ve yüceltmıştır. Onun bu şiirinde kadın; yolunu aydınlatan bir fener, hayat kaynağı olmuştur.

*Aşk ile yaptım bu işi*

*Elimle seçtiğim dilber*

*Yarin olmuşu ermiş*

*Şefkatte anneye değer*

*Her sabah sağlığım neşem*

*Her akşam huzurum odur*

*Değme güzele değişmem*

*Böyle hanım az bulunur*

*Karımdır o benim gerçek*

*Merdivende ışık tutan*



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

*Başımı koruyan melek*

*Cümle kazadan beladan*

Başımı Koruyan Melek, Cahit Sıtkı Tarancı

Paul Walery'in "Green" adlı şiiri ile şairin kalbinin sadece kadın için çarptığı dile getirilmiştir. Aynı zamanda şiir ile birlikte şairin zihnine mih gibi işlenmiş bir kadın imgesi olduğu görülmektedir.

*İşte yemişler, çiçekler, yapraklar ve dallar!*

*İşte kalbim, çarpıntısı yalnız senin için!*

*O bembeyaz ellerin kalbimi kırmazlar!*

*Bu küçük armağanı dilerim hoş göresin.*

*Ben geldim işte, çiğlerle bezenmiş olarak;*

*Alnımda seher yelinin dondurduğu çiğler,*

*Yorgunluğumu alsam ayakucunda bırak!*

*Hayal etsem o tatlı demleri birer birer.*

*Bırak unutayım başımı taze göğsünde!*

*Hâlâ aklımda lezzeti son öpüşlerinin.*

*Hayırlı fırtınadan sonra sakin, asude*

Green, Paul Verlaine

"Eylül" şiiri ile Haydar Ergüven kadını eylül ayına benzetmektedir. Çünkü kadının gittiğinde yaşanan o dağınıklık tıpkı yaz mevsimin bitmesinde ağaçların yapraklarını dökmesi gibidir.

*Yazın bittiği her yerde söylenirse*

*kadının gittiği de her yerde söylenir*

*kadın gittiği her yerde şiir diye söylenir:*

*Kadının gittiği yazın bittiğidir, her yerde*

*yaz biter kadın giderse, bunun sonu şiirdir,*

*yazın sonu şiirdir, şiirdir aşkın sonu...*

*Şehir her semtiyle yazın peşine düşse*

*yaz uzar bundan ve aşklar da nasiplenir,*

*yazın peşinde şehir, kadının peşinde şiir*

*eylülün semtine kadar böyle gidilir*

*bir gecede gittimdi hazirandan eylüle*

*eylül yazdan terkedilmişti, şiirse haziranda*

*kadın tarafından terkedildi o söylenece:*

*Bütün oğullar anneyi bir şiire terkeder!*

*O kadın beni terkederse şair olurum*

*oğul olduğum kadın sakın beni terketme,*

*şiirdir söylenir, yazdır biter, kadındır gider*

*Bütün kadınlar şiiri bir kadına terkeder!*



Eylül, Haydar Ergüven

Melih Cevdet Anday'ın "Seni Düşünüyorum" adını taşımakta olan şiirinde kadın çocukluğudur, onu çocukluğuna götürür. Kadın, temiz ve saf olandır. Aynı zamanda şiirde geçmekte olan "gözümün nuru, başımın tacı" gibi ifadelerle de kadının el üstünde tuttuğu görülmektedir.

## 2. Eserin Arz Edildiği Hedef Kitle İçerisinde Okuyucu Olarak Kadın

Kadın okuyucuların edebiyatla ilişkisi, yüzyıllar boyunca büyük bir değişim ve evrim geçirdi. Bu ilişki, kadınların toplumsal rolleri ve statülerinin görünümü ile yakından ilişkilidir.

Kadın okuyucular, edebiyat hayatının önemli bir parçasını oluşturur. Hem yazar hem de okuyucu olarak, kadınların edebiyata katkısının bulunmaması ve yaşadıkları yerlerde görülenlerdir. Kadın yazarların eserleri, kadın okuyucular tarafından sıklıkla özdeşleştirilmiş karakterler ve deneyimler sunarak özel bir bağ kurmalarına yardımcı olur.

Kadın okuyucuların romantik rolü, 19. yüzyılda büyük bir değişim yaşadı. Özellikle 19. yüzyılın sonlarından itibaren, kadınların kitap okuma ve yazma işlemleri gerçekleştirilmektedir. Bu dönemde kadınlar, edebiyatın toplumsal değişimlerinin bir aracı olarak kullanarak, toplumsal cinsiyet normlarını ve rollerini sorgulamaya başladı.

Feminist edebiyatın artması, kadın okuyucuların daha fazla şikâyeti var. Feminist yazarlar, kadınların deneyimlerini ve toplumsal sorunları edebiyata taşıdılar ve bu eserleri, kadın okuyucuların yaşadıkları daha fazla temsil edildiklerini hissetmelerine yardımcı oldu. Feminist edebiyat, cinsiyet eşitliği ve toplumsal adalet göstergeleri önemli bir rol oynadı.

Kadın okuyucular, edebiyatı eleştiren ve araştıran önemli bir topluluk oluşturmuşlardır. Edebi eleştiriler ve incelemeler, kadınların edebiyatla ilgili analizleri ve ifade etmelerine olanak tanır. Cinsiyet, kimlik ve toplumsal sorunlar, kadın okuyucuların literatürünün dağılımını analiz etmelerine ve tartışmalarını zenginleştirmelerine yardımcı olur.

Klasik edebiyat eserleri, kadın okuyucular için özel bir bilgiye sahiptir. Bu eserlerdeki kadın karakterler ve yaşadıkları deneyimler, kadınların geleneksel ve kültürel açıdan nasıl evrimleştiğini anlamalarına yardımcı olur. Kadın okuyucular, klasik eserlerle duygudaşlık yaparak, geçmişteki kadınların yaşamlarını ve mücadelelerini daha iyi anlarlar.

Kitap kulüpleri ve toplulukları, kadın okuyucular için önemli bir sosyal platform sağlar. Bu gruplar, kitap okuma ve tartışma fırsatları sunuyor. Kadınlar, bu topluluklarda edebiyatlarını paylaşabilir, yeni yazarlar keşfedebilir ve daha fazlasını anlama yeteneğine sahip olurlar. Kitap kulüpleri, kadınların edebiyata olan bağlılığını güçlendirir.

Kadın okuyucuların edebiyatının daha da çeşitlendirilmesi önemlidir. Farklı kültürlerden gelen yazarlar ve çeşitli kimliklere sahip karakterler, kadın okuyucuların dünya görüntüleri genişletiliyor. Çeşitlilik ve temsil, edebiyatın zenginliğini artırır ve daha fazla okuyucunun yaşadığı edebiyatta görmesini sağlar.

Kadın okuyucular, genç nesilleri de içeriyor. Genç kızlar, edebiyatı keşfederken kadın yazarların eserlerini okuyarak kendi kimliklerini oluşturma yolculuğuna başlarlar. Kadın yazarlar, genç nesil okuyucular üzerinde önemli bir yapıya sahiptir ve sürekli olarak okuyucunun kuşaklarını şekillendirebilirler.

Kadın okuyucuların kitap tercihleri, edebiyat dünyasının çeşitlenmesine katkıda bulunur. Kadınlar, farklı türlerdeki kitapları tercih ederler ve farklı temalara ilgi gösterirler. Bu tercihler, edebiyatın çeşitli sanatçıları ve deneyimlerini yansıtır. Kitap seçimleri, bireysel ve toplumsal düzeydeki farklılıklar kutlar.

Kadın okuyucuların edebiyatla ilişkisi, tarihi ve kültürel olarak önemli bir evrim geçirdi. Bu ilişki, kadınların toplumsal değişimindeki rollerini ve yaşadıklarını ifade etme yolculuklarını yansıtır. Kadın okuyucular, sadece edebiyat okuma pratiği olarak değil, aynı zamanda toplumsal değişim aracı olarak da kullanmışlardır. Bu yolculuklarda kadınların edebiyatının zenginliğinin ifade edilmesi ve kendi deneyimlerinin artırılması sağlanır. Kadın okuyucuların edebiyatla ilişkisi, edebiyatın şekillendirmeye devam edecek, çünkü onun okuma deneyimi yeni bir anlam ve süre sunuyor.

### 3. Edebiyat Eserini Oluşturan İcracı Olarak Kadın

Edebiyat malzemesi insan temelinde kurulan ve insana hitap etmekte olan sanattır.<sup>73</sup> Sanatçı, yaşadığı çevreyi gözlemleyen ve bunu tecrübeleri ile harmanlayıp edebiyat eserini ortaya kayandır. 19. Yüzyıla kadar edebiyat eserini ortaya koyan sanatçı eril kimlikte olmuş ancak 19. Yüzyılın getirdiği yeniliklerle edebiyat eserini ortaya koyan dişil kimlik söz konusunu olmaktadır.

*Kadın edebiyatı* ifadesinin ilk kez “19. Yüzyılda erkekler tarafından ortaya atıldığını”<sup>74</sup> Ulla Hahn bir yazısında belirtmektedir. Ancak herhangi bir cinsiyetin egemenliğinin doğru olmamasından ötürü *kadın edebiyatı* adlandırması pek doğru bulunmamaktadır.<sup>75</sup> Sözü edilen edebiyat adlandırmasını doğru bulmakta olan yazarlar dönemin zihniyetinden şikâyetçi olan ve kadın anlayışının baskın olmasını istemekte olan yazarlardır.

Genellikle toplumun sosyal genlerini bir sonraki nesillere kadınlar taşımaktadır. Bunu da daha çok edebiyatın alanına giren konuşma eylemiyle gerçekleştirirler. Bugün “Halk Edebiyatı” olarak sınıflandırılmış eserlerin büyük çoğunluğu kadınlar tarafından icra edilmiştir. Bu durum hemen hemen tüm dünyada bu görünümde. Erkeklerin icra ettikleri eserler ise nispeten daha çok eserin icra usulleriyle ilgili bir önceki neslin ustalarından alınan eğitimler ile icra edildiğinden kayıt altına alınması daha olanaklı hale gelmiştir. Kadın icracıların eserleri zamanla yok olurken erkek icracıların eserleri yazılı olarak bir sonraki nesle aktarılabilmektedir. Bu durum “kadın” icracıların görece erkek icracılara oranla daha az eser verdiği algısı oluşturmuştur.

Bu durum, edebiyatın modernleşmeye başlayıp baskı teknolojilerinin ve yayıncılık imkânlarının gelişmeye başladığı dönemlerden itibaren de kadınların aleyhine gelişmiştir. Edebi eser basımının bir maliyet gerektirmesi, yayıncılığın ise bir sosyal ilişkiler ağı gerektirdiği düşünüldüğünde kadınların eril türdeşlerine göre gene dezavantajlı durumda oldukları gözlemlenmiştir.

#### 3.2. Türk Edebiyatında İcracı Olarak Kadın

Yukarıda adları anılan kadın yazarlar dışında birçok isim daha edebiyat evrenine dahil olmuşlardır. Bu kişileri eserleriyle, etkileriyle zikretmek bu metnimizin hacmini oldukça artıracaktır. Buna dair müstakil bir çalışma yapılması gereğine inanıyoruz. Böyle olmakla birlikte, eksik olsa da en azından isimlerin bazılarını yazmayı uygun gördük:

Adalet Cimcöz (1910-1970), Adile Ayda, (1913-1992), Afet İnan (1908-1985), Afet Ilgaz (Muhteremoğlu) (1937-2015), Ayla Oral (1938), Azra Erhat (1915-1982), Azra Kohen (1979), Birhan Keskin (1963), Buket Uzuner (1955), Didem Madak (1970), Elif Şafak (1971) Emine Işın (1938-2021), Ferzan Gürel (1919-2009), Füzûzan (1935), Gülten Akın (1933-2015), Gülten Dayıoğlu (1935), Güner Ener (1935), Güzide Sabri (1883-1946), Halide Nusret Zorlutuna (1901-1984), İffet Halim Oruz (1904-1993), İhsan Raif Hanım (1877-1926), İnci Aral (1944), Kerime Nadir Azrak (1917-1984), Lale Müldür (1956), Latife Tekin (1957), Leyla Erbil (1931-2013), Leyla Hanım (1850-1936), Melahat Özgü (1907), Melek Sabah Şardağ (1946), Meral Çelen (1934), Mihri Hatun (1460?-1506), Mîna Urgan (1915-2000), Muazzez Menemencioglu (1929-2011), Muazzez Tahsin Berkand (1900-1984), Mübeccel İzmirli (1934-1982), Müşerref Yılmaz (1944), Nilgün Marmara (1958-1987), Nermin Menemencioglu (1910-1994), Nevin İşlek (1936), Nezihe Meriç (1924-2009), Nezihe Araz (1920-2009), Nigar Hanım (1856-1918), Nihal Yalaza Taluy (1900-1968), Nursen Karas (1938), Nurten Çelebioğlu (1930), Pınar Kür (1943), Sabahat Emir (1943), Samiha Ayverdi (1905-1993), Sennur Sezer (1943-2015), Sevgi Sosyal (1936-1976), Tezer Özlü (1943-1986), Türkan İldeniz (1938), Ülker Köksal (1935), Yıldız İncesu (1939), Züleyha Münif (1932-2021).

#### I.IV. Edebiyata Dair Araştırmalar Yapan Kadın

Türkiye Cumhuriyetinde yıllar süren üniversiteleşme süreci ile kadınların akademik eğitim alma imkanlarının artması ve üniversitelerin ihtiyaç duyduğu akademik personel kadrolarına atanmaları

<sup>73</sup> Mehmet Bakır Şengül, “Kadın Edebiyatı: Bir Varoluş Mücadelesi”, *JASSS*, 44 (Mart 2016): 203-211.

<sup>74</sup> Gülperi Sert, “Kadın Edebiyatı ‘Kavramı Üzerine”, *Gündoğan Edebiyat*, S.7, Yaz 1993, 119.

<sup>75</sup> Şengül “Kadın Edebiyatı: Bir Varoluş Mücadelesi”, 203-211.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

neticesi oldukça çok sayıda kadın edebiyata dair araştırma, inceleme ve kritik edebilmişlerdir. Üniversitelerin Dil, Edebiyat, Dil ve Edebiyat, Dil ve Edebiyat Eğitimi, dil ile ilgili diğer bölümlerde öğrencilerin çoğunun kadın öğrenciler olduğu gözlemlenmekte, yine kadın akademisyenlerin sayısı artmaktadır. Bu alanda da eril türdeşlerine oranla sayısal açıdan azınlıkta kaldığı görülmektedir. Bilime, edebiyat ve dil bilimine oldukça değerli katkılar sunmuşlardır.

Kadın akademisyenlerin bilme katkıları ve arz ettikleri eserleri metnimizin hacmini oldukça artıracağından müstakil çalışmaya havale etmekle yetineceğiz.

## SONUÇ

Kadın, edebiyatın hem oluşturucusu, hem konusu, hem muhatabı hem de araştırmacısı olmuştur. Ancak fiziki zayıflığı, anne olarak ödediği ağır biyolojik bedeli dolayısıyla erkekler kadar edebiyat alanında da varlık gösterememişlerdir. Bu olumsuz durum, toplumların gelişmesiyle, teknolojinin ve yayıncılığın imkânlarıyla daha çok görünür olmuşlardır. Bu durum yalnızca Türk Edebiyatı için değil, tüm dünyada hemen hemen böyledir.

Türk Edebiyatında da çok güçlü kadın şair, yazar ve araştırmacı kendilerinden bahsettirir olmuşlar ve tarih süzgecinden geçerek bir sonraki kuşaklarca da benimsenip aktarılmıştır.

Biz, bu çalışmamızla Türk edebiyatı odaklı “Edebiyat” ve “Kadın” konusunu çalışırken “Kadın Edebiyatı” literatürüne katkı yapmayı amaçladık. Umarız ki bir nebze de olsa farkındalık oluşturabildik.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**YAŞAR KEMAL'İN İNCE MEMED ROMANINDA HALK KÜLTÜRÜ  
CULTURE IN YAŞAR KEMAL'S İNCE MEMED NOVELS**

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**ÖZET**

Toplumcu-gerçekçi bir yazar olan Yaşar Kemal, eserini duru bir halk Türkçesiyle kaleme almış, halkın yaşamına dair gözlemlerini olduğu gibi romanında yansıtmıştır. İnce Memed romanları, Çukurova köylüsünün feodal/ağalık düzeni karşısındaki mücadelesini, haksızlık ve adaletsizliğin karşısındaki emekçinin dönüşümünü, isyanını ve inançla sürdürdüğü yaşam yolculuğunu anlatırken yoğun bir kültürel malzemeyi de okuyucuya arz eder. Bu yönüyle Türk ve Dünya kültür bilimine önemli bir veri sağlamıştır. Çalışmamızın odağı olan, “İnce Memed romanlarını kültür izleri” bağlamında eseri incelenmiş; yoğun bir kültürel malzemeyle karşılaşılmıştır. Kültür izleri olarak, halk deyişleri (atasözü, deyim, kargış, mani, tekerleme, ağıt, türkü), gelenek ve görenekler, örf, adet ve töreler, giyim-kuşam, yeme-içme kültürü, oynan oyunlar, halk hekimliği, özellikle “at” unsuru ve halk inanışları (batıl inanışlar, dini inanışlar ve efsane ve efsaneleştirmeler) görülmüştür. Eserdeki sembolik yapılar ve üstlendikleri anlamlara değinilmiştir. Dikkat çeken bir diğer unsur da “kitle psikolojisi”dir. Bu tespitemizi gösterebilmek için romanların olay örgüsü aktarılmıştır. Olay ve durumlar karşısında kitlelerin edindiği tavırların psikolojik bir devinim olduğunu göstermektedir. Eseri incelediğimizde çatışan iki kitlenin varlığını tespit edilmiş, bu iki kitlenin hareket ve tavırları, içinde buldukları kültürel ortamın psikolojik yansıması olarak değerlendirilmiştir.

**Anahtar Kelimeler:** Yaşar Kemal, İnce Memed, Kültür, Halk Kültürü

**GİRİŞ**

Yaşar Kemal, toplumun dezavantajlı kesimlerinin yaşantılarındaki zorluklara tanıklık etmiş, acılarını, yaşadıklarını eserlerine yansıtmış bir yazardır. Halk edebiyatına da ilgi duyan Kemal'in şiirleri 1940'lı yıllarda "Çığ", "Ülke", "Millet", "Kovan" ve "Beşpınar" dergilerinde okuyucusuyla buluşur. İstanbul'a 1951'de taşınan Kemal, kısa bir süre işsizlikten sonra "Yaşar Kemal" imzasıyla, 1963'e kadar Cumhuriyet gazetesinde, fıkra ve röportajlar yazdı. Yazılarında Anadolu insanının sorunlarını anlatmaya çalıştı. Yaşar Kemal'in bu dönemde yaptığı "Dünyanın En Büyük Çiftliğinde Yedi Gün" başlıklı röportajı, Gazeteciler Cemiyetince verilen "Özel Başarı Armağanı"na değer görüldü.

Eserlerinde sade ve akıcı bir üslup kullanan Yaşar Kemal, roman ve öykülerinde çoğunlukla Çukurova'da yaşanan insan dramlarını işlemiştir. "İnce Memed" in de içinde bulunduğu birçok eseri sinema filmi ve tiyatroya uyarlanmıştır. Eserlerinde Anadolu'nun efsane ve masallarından da yararlanan Kemal, 1970'ten sonra yazdığı romanlarında ise şehir insanının hayatını ele almaya başlamıştır. Nobel'e aday gösterilmiştir.

Denebilir ki, Yaşar Kemal'in eserleri birer kültür taşıyıcısıdır. Eserlerinde birçok değeri kaydetmiş bir kalem ve kültür emekçisidir. Duyarlı bir halk gözlemcisi olan Yaşar Kemal kültür değerlerini tespit etmeyi başarmıştır. Eserlerinde Anadolu halkının yaşam tarzlarını, örf ve adetlerini, giyim-kuşamlarını, gelenek ve göreneklerini, yaşadıkları çevreyi, düşünce biçimlerini ve inanışları gibi birçok kültürel unsura yer vermiştir. Hem maddi/somut hem de manevi/soyut kültür varlıklarımızın önemine hemen hemen tüm eserlerinde vurgu yapmıştır. Yaşar Kemal köy köy dolaşıp sözlü folklor ürünlerini derlemeye de çalışmıştır. Eserlerinde özellikle Çukurova'yı, Çukurova halkını konu edinen Yaşar Kemal, halkın tüm kültür değerlerini, sade bir halk dili ve romancı üslubuyla okuyucularına sunmuştur. Sadece içinde bulunduğu toplumun kültürünü değil diğer kültürlerle de yakınlık gösterip yansıtan bir yazar olmuştur. Kültürel zenginliklere sahip çıkılması gerektiğine dair mesajlar vermiştir.



### 1. Kültür Kavram

Kültür sözcüğü, Latince kökenli olup Fransızcadan Türkçeye geçmiştir. Latince “cultura”, toprağa bir şeyler ekip ürün almak, üretmek anlamlarında kullanılmıştır. Voltaire, Fransız Devrimi öncesinde bu sözcüğü, insan zekasının oluşumunu ve gelişimini belirleyen bir terim olarak kullanınca sözcük değişik bir anlam kazanmıştır. Fransızca’dan Almanca’ya önceleri “cultur” daha sonra kültür biçiminde geçen sözcük zamanla Avrupa dillerine yayılmış ve 1871’de İngiliz antropoloğu Taylor kelimeye bilimsel bir içerik kazandırınca kavramın önemi oldukça artmıştır. Almanlar “culture” sözcüğünü uygarlık ve kültürel evrim karşılığında kullanmışlardır. 19. Yüzyılın ikinci yarısı ile 20. Yüzyılın ilk çeyreğinde Fransızlar ve İngilizler uygarlık sözcüğünü kültür ifadesine tercih etmişlerdir.<sup>1</sup>

E. Sapir kültürün üç anlamda yahut üç anlam grubunda kullanıldığını dikkat çekmektedir. (i) ilk gruba göre kültür ‘insanın hayatında içtimai yoldan tevarüs ettiği maddi ve manevi her unsuru ihtiva eder. Bu manada kullanılan kültür, insan mefhumuyla hemen hemen aynı şeyi ifade etmektedir.’ (ii) Kavramın ikinci kullanılışı ‘kişisel incelik ve ideal’i içermektedir. Böylesi kültür bilgi, görgü, tecrübe, gelenek, tavır, eda, tutum, yaşam tarzı anlamına gelmektedir. ‘Kültürlü insan’ şeklinde muayyen bir tipolojiye işaret etmektedir. (iii) Kavramın bir diğer kullanımı ise daha çok insan yaşantısının ‘manevi’ boyutlarına hasredilmesi, yani, din, sanat ve ilim alanında kullanılmasıdır.

Raymond Williams’a göre İngiliz dilinin en karmaşık birkaç sözcüğünden biri olan kültür, bir dizi anlamı içeren colereden türemiştir. İkamet etmek, yetiştirmek, korumak anlamlarına gelen kavram, zamanla bir sürecin adı olmuş ve insan gelişimi sürecini içine alacak şekilde genişletilmiştir.

Her tanımlamada kültürün bir milletin var olmasındaki önemine değinilir. Örneğin Türkçe Sözlükte ‘kültür’;

1. Tarihi, toplumsal gelişme süreci içinde yaratılan bütün maddi ve manevi değerler ile bunları yaratmada, sonraki nesillere iletmede kullanılan, insanın doğal ve toplumsal çevresine egemenliğinin ölçüsünü gösteren araçların bütünü, hars, ekin.
2. Bir topluma veya halk topluluğuna özgü düşünce ve sanat eserlerinin bütünü
3. Muhakeme, zevk ve eleştirme yeteneklerinin öğrenim ve yaşantılar yoluyla geliştirilmiş olan biçimi.
4. Bireyin kazandığı bilgi olarak tanımlanmıştır.

Kültür, genel tanımıyla bir milletin maddi ve manevi unsurlarının tümüne denir. Milletlerin, yaşam şekilleri, örf ve adetleri, gelenek ve görenekleri, törenleri, inançları, eğlence biçimleri, dansları, bayramları, oyunları, mutfakları, giyim-kuşamları gibi birçok unsur ‘kültür’ denen olguyu meydana getirir.

Görüldüğü üzere “kültür” kavramının tek tanımı yoktur. Bütün tanımlamalarda kültürün bir ulus için önemi vurgulanmıştır. Hayatımızda var olan ve yaşadığımız her şey bir kültür meydana getirir. Ve oluşan bu kültür olgusu, bize uluslararası sahada, bir var olma kimliği kazandırır.

Dil, toplumsal kültürü oluşturan unsurların başında gelir. Çünkü diğer unsurlarının meydana gelmesinde yine dile başvurulur. İnsan zihnindeki düşünce ve fikirleri dil ile ifade eder ve ifade ettikleri diğer kültür unsurlarını da meydana getirir. Sözlü folklor, inanç, sanat, gelenekler, töreler, normlar gibi tüm kültür unsurları dil ile ifade edilir. Her ulusun dili farklı bir kültür havzası oluşturur. Gelenek ve görenekler bir toplumun yazılı olmayan kural ve kanunlarıdır. Toplumda kuşaktan kuşağa geçen kültür mirasları, alışkanlıklar, beceriler, davranışlar gelenekleri oluşturmuştur. Bir şeyi eskiden olduğu gibi yapmaya ise “görenek” denmektedir. Gelenek ve göreneklerin etki gücü birbirine farklılık gösterse de gelenek ve görenekler önemli birer kültürel unsurlardır. Her toplumun, yaşadığı yer, zaman, iklim, coğrafi koşullar gibi etkenler yaşam biçimlerinde farklılıklar oluşturur. Tüm bu farklılıklar, toplumların kendilerine özgü kültürler oluşmasını sağlar. Bu etkenler toplumdaki bireylerin, giyim-kuşamlarını, yeme-içme şekillerini, sanatları gibi unsurların şekillenmesinde etkili olur. Kültür bir yaşam tarzı/biçimi olarak da ifade edilebilir.

<sup>1</sup> Erman Artun, *Türk Halkbilimi* (Adana: Karahan Kitabevi, 2018)



## 1. Romanların Olay Örgüsü

Roman türü, her ne kadar kurmaca da olsa anlatmaya dayalı edebi türler içerisinde gerçeğe/hayatin olağan akışına en uygun tür olması, yazarın kalemiyle hayata projeksiyon tutması sayesinde “kültür, halk kültürü, kültürel nesnelere, kültürel etkileşimler, kültürel ilişkiler” açısından son derece görünür bir kaynaktır. Kişiler arası ilişki, kişilerin sosyal statüleri, kişilerin mekânla uyumu, mekânın ve kişilerin olay zamanı içerisindeki uyumları roman dünyasındaki “halk kültürünü” özel bir boyutta okuyuculara aktarmaktadır.

Yazarın kurguladığı roman dünyası okuyucular tarafından yadırganmayıp “gerçeğe uygunluğu” açısından itiraz edilmemişse araştırmacılar açısından birer uygun veri olarak kabul edilebilir.

Bu sebepten kültürel izler temalı bu metnimizde romanın olay örgüsü ve romanın kurmaca evrenini olay örgüsünde işlenmiştir. Romanların olay örgüsü toplum yaşayışıyla ilgili kültürel veriler açısından oldukça önemli bir kaynaktır. Metnimizin bu kısmında özellikle verilmesi gerektiğini düşünmekteyiz.

### 1.1. İnce Memed-1

İnce Memed, doğup büyüdüğü Abdi Ağanın köyünden kaçır, Kesme köyünden Süleyman'ın evine sığınır. Süleyman'a Abdi Ağanın yaptığı eziyetleri anlatır. Süleyman İnce Memed'i bir süre evinde saklar, Memed de onun hayvanlarına bakmasında yardımcı olur. Bir süre sonra İnce Memed annesini düşünüp, dertlenmeye başlar. Bir gün hayvanlara bakarken tesadüfen kendi köylüsü Pancar Hösük'le karşılaşır. İnce Memed köyden kaçtıktan sonra annesi dâhil herkes onun öldüğüne dair düşüncelere kapılmıştır. Pancar Hösük durumu köylülerine ve İnce Memed'in annesi Döne'ye iletir. Memed'in ölmediğini öğrenen Abdi Ağa, onun kaçır başka bir köyden birine çalışmasını hazmedemez, çok öfkelenir. Gidip Kesme köyünden Memed'i alır ve geri getirir. Ona türlü türlü işkenceler yapar. Zaten köylüye ziyadesiyle zulmü yapan Abdi Ağa Memed ve annesi Döne üzerindeki baskıyı daha da artırır. O yılın hasadının dörtte üçünü ellerinden alır. İlk kış, İnce Memed'in evinde yiyecek kalmaz, Bu durum sadece Memed'de değil, diğer köylülerde de aynıdır. Köylü Abdi Ağa'dan borç yiyecek ister. Abdi Ağa herkese yiyecek verir ancak İnce Memed'in annesi Döne'yi geri çevirir. Abdi Ağa kimsenin Döne'ye yiyecek vermesine de müsaade etmez. Durmuş Ali isminde bir köylü gizlice biraz yiyecek yardımı yapar. Bu zor şartlar üzerine Memed ve annesi tek varlıkları olan ineklerini Abdi Ağaya satmak zorunda kalır.

Bir gün Memed ve arkadaşı Mustafa kasabaya gitmek için köyden çıkar. Yolda eski bir eşkiya olan Koca Ahmet ile tanışır. Koca Ahmet, Memed ve arkadaşına kendi yaşadıklarını anlatır. Memed ve arkadaşı Koca Ahmet'e hayran kalırlar. Kasabaya vardıklarında yepyeni bir dünya ile tanışmanın ilk adımını atarlar. Kasabada Hasan Onbaşı ile tanışırlar. Hasan Onbaşı Memed'e yeni ufuklar açar. Dünyaya düşünerek bakmayı öğretir. Memed Köye döndüğünde Abdi Ağanın zulmünden kaçma düşüncelerine girer ve bunu âşık olduğu kız Hatçe ile paylaşır. Hatçe bu fikri onaylar. Abdi Ağanın yeğeni olan Veli ile zorla nişanlandırılan Hatçe sevdiği kişi olan Memed'le kaçır.

Hatçe ile Memed'in kaçtığını duyan Abdi Ağa deliye döner. Onların peşine izci olan Topal Ali ve adamlarını takar. Topal Ali'nin becerisiyle Memed ve Hatçe bulunur. Memed bulunduğu Abdi Ağa onu öldürecekken silahı alır Abdi Ağa ve yeğeni Veli'yi vurur. Veli oracıkta can verirken Abdi Ağa yaralanır. Memed dağa çıktığından beri annesi ve Hatçe'den haber alamaz. Sürekli annesi ve sevdiğini düşünür. Zulmün bitmesi için Abdi Ağayı vurmak gerektiğini kanaatine varır. Bunun üzerine Memed ve çetesi Abdi Ağayı vurmak için köye inerler. Durmuş Ali, Memed'in annesi ve Hatçe'nin başına gelenleri Memet'e anlatır. İnce Memed'in onu öldüreceği haberini önceden duyan Abdi Ağa köyden kaçmıştır. Abdi Ağayı bulmak için onun evine baskın yapar. Onun bütün ailesini öldürmeye karar veren Memed, Abdi Ağanın tüm zulümlerine karşılık yine de onun eş ve çocuklarına merhamet edip serbest bırakmıştır. Hatçe'yi hiç aklından çıkarmayan Memed onu görmeyi aklına koyar ve hapishanede onu bir şekilde ziyarete gider. Hatçe, Memed'i karşısında görünce sevinçten bir şey diyemez. Memed de Hatçe'yle aynı durumda kalır. Hatçe, Memed'in ölmediği haberini büyük bir sevinçle İraz'a anlatır. İraz da Hatçe'nin sevincini paylaşır. Bir süre sonra Memed, Hatçe ve İraz'ın Kozan'da bir hapishaneye gidecekleri haberini alır. Bunun üzerine Hatçe'yi kurtarma planları yapar. Cabbar bu fikrin bir çeşit delilik olduğunu düşünse de Memed vazgeçmez. Hatçe ve İraz'ı jandarmaların ellerinden alır. İnce Memed'den korkan Abdi Ağa kasabada bir evde saklanır. İnce Memed, Topal Ali'ni yardımıyla Abdi Ağayı bulur ve öldürür. Sonra da kayıplara karışır.

### **İnce Memed-2**

Ali Safa Bey'in baskılarına dayanamayan köylüler, bu baskının nedeni olarak Yobazoğlu'nu görüp ona lanet ederler. Koca Osman ve Ferhat Hoca, Yobazoğlu'nun böyle kaçıp gitmesini doğru bulmaz ve Yobazoğlu'nun tekrar köye dönmesi için ikna etmeye çalışır. Ancak Yobazoğlu tekrar dönmeye ikna olmaz. İnce Memed'i tekrar bulan Koca Osman, onu güçsüz düşüğünü görünce onu bir süre evinde saklar ve ona iyi bakar. İnce Memed'in varlığı ona bir umut sağlar. Günlerce Memedi saklayıp kimseye yerini söylemez, köyün içinde neşe ile dolaşması köylülerin dikkatini çeker. İnce Memed, Vayvay köyüne geri döner. Koca Osman ve Kamber anaya uzun bir süre konuk olur. Ali Safa köylüler ve Koca Osman'dan iyice şüpheye düşer. Tekrar köyü kurşunlatmaya başlar. Koca Osman, kurşunlayanlara karşılık verir ve birini vurur. Ferhat Hoca, Seyfali ile birlikte durumu şikâyet için karakola gidince vurulmanın Remzi Çavuş olduğunu anlar. İnce Memed, tekrar Vayvay köyüne geri döner. Koca Osman ve Kamber anaya uzun bir süre konuk olur. Ali Safa köylüler ve Koca Osman'dan iyice şüpheye düşer. Tekrar köyü kurşunlatmaya başlar. Koca Osman, kurşunlayanlara karşılık verir ve birini vurur. Ferhat Hoca, Seyfali ile birlikte durumu şikâyet için karakola gidince vurulmanın Remzi Çavuş olduğunu anlar.

İnce Memed Sarı Ümmet diye birinin evine gider. Sarı Ümmet, evde jandarma ve Kara İbrahim çetesinin olduğu haberini verir. Daha sonra kendi köylüsü olan Hürü Ananın evine gider. Hürü Ana, köye gelen Abdî Ağanın kardeşi olan Kel Hamza'nın yaptığı eziyetleri anlatır. Durmuş Ali'yi de vurduğunu söyler. Topal Ali kılavuzluğunda İnce Memed'in yerini bulan Yüzbaşı Faruk, Memed'e pusu kurar. Hürü Ana çatışma sırasında korkusuzca Memed'in yanına gidip ona yardım eder. İnce Memed'in cephanesinin azaldığını fark eden Asım Çavuş, Memed'i teslim almak için silahsız ona gider. Memed vurabilecekken bile Asım Çavuşa ateş etmez. Çatışma sürerken Topal Ali, İnce Memed'le yer değiştirir ve onun yerine bir süre ateş eder. Memed'te o esnada oradan kaçır. İnce Memed, Koca Süleyman'ın evine sığınır. Onu arayan Yüzbaşı Faruk, izci Yel Musa'yı da yanlarına alır. Topal Ali, Yel Musa'nın İnce Memed'in yerini bulmasından korkmaya başlar, onu sürekli yanlış taraflara yönlendirme çabalarına gider. Yel Mustafa, Topal Ali'nin yapmaya çalıştığını anlar. Yel Mustafa, İnce Memed'in Koca Süleyman'ın evinde olduğunu bilmesine rağmen jandarmalara söylemez. Topal Ali ilk fırsatta Yüzbaşının köyü aratacağı haberini Memed'e ulaştırır. Memed oradan hemen kaçır. Kulaksız İsmail diye bir köylünün değirmenine sığınır. Kulaksız İsmail kendisi ve köylünün yaşadığı sıkıntıların sebebinin Memed'in Eşkîya olmasına bağlar ve onu hırpalamaya çalışır. Vayvay köyüne gelen Memed'in yerini Ali Safa'ya söylemek için yola çıkan Zeynel, haberi vermeden geri döner. Yolda köylüleri Deli Muslu, Sarı Süleyman, Ahmet tarafından öldürülür. İnce Memed'in varlığından güç alan bu köylüler, Ali Safa'nın tarlalarını ateşe verir, her gece evini kurşunlamaya başlarlar. Ali Safa, köylülerin bu korkusuz durumlarından şüphelenir ve bu sebebi öğrenmek için köye Murtaza Ağayı gönderir. Durumu bir türlü anlayamayan Ali Safa, Çıkçık köylülerinden yardım ister evini korumaya aldırır ve köye baskılarını artırmaya başlar.

Çatışmada yaralanan İnce Memed'i, Koca Osman ve köylü sır gibi saklar. Ona Köse Halil, Seyran ve Kamer Ana bakar. Seyran bu sırada İnce Memed'e gönlünü kaptırır. Seyran'ın âşık oluşu onu yıllarca küs olduğu ailesiyle barışmasına sebep olur. Duygularını ilk Kamer Anaya açan Seyran bir süre İnce Memed tarafından fark edilmediğini hissettikçe kahrolur. Memed'i sık sık görmek için fırsatlar yaratan Seyran'a kısa bir süre sonra Memed de âşık olur ve birlikte olur. Birlikte oldukları bir sırada "yağız at" ile karşılaşır, Seyran atı bir kuzu gibi yakalar. Ali Safa köylüyü bezdirmek için yeni bir yol izler. Köyün suyunu kesmesi için Pişmanoğlu Mustafa ile anlaşır. Mustafa köyün suyunu keser. Köyde susuzluktan çocuklar ölmeye başlar. Sonra da Ali Safa köylüleri tutuklaması için savcı ve yargıca rüşvet verir. Köylü jandarma tarafından tutuklanır, kasabaya götürülür, günlerce aç susuz bekletilir. En son Seyfali, bırakılmaları karşılığında köyü terk edeceklerini söyler. Olanları duyan İnce Memed, Koca Osman ve Halil'den helallik ister ve Ali Safa'yı öldürmeye gider. Ali Safa'nın evine Topal Ali'nin de yardımıyla girer ve üç kurşunla Ali Safa'yı öldürür. Sonrada kendi köyü olan Değirmenoluk Köyüne de gidip orada Kel Hamza'yı da öldürür. Kel Hamza'yı da vuran Memed, Alidağı'na doğru yol alır ve bir süre imi timi belirsiz olur. Hamza'nın ölümü üzerine köyde eğlenceler düzenlenir.

### **1.2. İnce Memed-3**

Ali Safa Bey'i ve Kel Hamza'yı öldüren İnce Memed, Ali Dağı'na doğru kaçır. Jandarma arkada İnce Memed önde yine bir kovalamacadır başlar. Ali Safa Bey ve Kel Hamza öldükten sonra halk yine

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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ağalara beylere yaranmak için İnce Memede sövmeye başlamıştır. Ne hırsızlığını ne kadın kaçırmasını, ne tecavüzünü bırakırlar. Varsa yoksa tek konuştukları İnce Memed ve onun zalimliğidir. En çok da Karadağlıoğlu Murtaza Ağa korkar İnce Memed'den. Her gittiği yerde ondan bir haber var mı diye korkuyla etrafı dinler. Arif Saim Bey ve diğer beylerin olduğu bir akşam buluşmasında Arif Saim Bey, öz evladı, kardeşi gibi sevdiği Zülfü Bey ile konuşur. Zülfü Bey bir harp kahramanı ve savaş sonrasında da kendini tarla işlerine vermiş ve tapu müdürlüğü görevini yapmak istemiş biridir. Toplantıdan sonra Murtaza Ağa ile Topal Ali konuşarak yürürler. Murtaza Ağa, Topal Ali'den korkar ancak sonunda onun da İnce Memed'in düşmanı olduğuna inanır ve kendisine ondan bir zarar gelmeyeceğini düşünür. Murtaza Ağa kasabada her kimi gördüyse Ankara'ya İnce Memed için telgraf çektirir. Eğer erkenden önlem alınmazsa bu İnce Memed Ankara'da sizi de öldürecek dedirtir. Ancak daha sonra bunu duyan ağalar beyler ya bu telgraflar Arif Saim Bey'in kulağına giderde hükümet Adana'yı başıboş bıraktık sanıp Arif Saim Bey'i zora sokar ve bundan dolayı da kendi başları yanar korkusuyla Murtaza Ağaya kızarlar.

Faruk Yüzbaşı, Asım Çavuş ve Kertiş Ali onbaşı Bakır gediğine giderken yağız atı görürler. Yüzbaşı iki kez dener ama atı vuramaz. Sonra Kara İbrahim gelir. Dokuz kişi gördüm der. Ama İnce Memedi hiç önceden görmediği için çıkaramaz. Hepsini akşama doğru kaldıkları mağaraya doğru gitmiş ve çatışma başlamıştır. Sabaha kadar süren çatışmada dokuz eşkiyayı öldürmüştür Faruk Yüzbaşı ve birliği. En merak ettiği içlerinde İnce Memed'in olup olmadığıdır. Oraya gelen civar köylülerden biriyi çağırır yanına. İnce Memed var mı diye sorar bunların içinde. Köylü bakar bakar eşkiyalara. Bu der İnce Memed. Faruk Yüzbaşı kasabaya gidecek en hızlı adamı sorar. Tazı Tahsin derler. Yazar pusulayı gönderir. Üç günlük yolu bir gün bir gecede gider Tazı Tahsin. Kaymakamlığa gidip haberi verir. Sonra bütün kasaba bu haberle çalkalanır. Bütün ağalar beyler kaymakamlıkta toplanır. En çok da Murtaza Ağa sevinmiştir habere. Topal Ali'ye artık düşman gibi soğuk bakar olmuştur. Muştuluk olarak 300 lira verir Tazı 'ya. Diğer beyler de onar yirmişer lira muştuluk vermiştir. Tazı sevincinden yerlere göklere sığamaz.

İnce Memed'in öldüğünü duyduktan sonra Murtaza Ağa artık Topal Ali'yi yanında istemez. Hatta daha birkaç gün önce ona kardeşim diyen o değilmiş gibi şimdi ona nefretle bakıyordu. Eve geldiklerinde Topal Ali'ye hakaretler yağdırır. Sonunda da bütün aldığı kıyafetleri üstünden çıkarttırır, don gömlek bırakır Ali'yi ve evden kovar. İnce Memed'in köyünde bir ölüm sessizliği vardır. Kimse Koca Osman'la Seyran'a İnce Memed'in öldüğünü söyleyemez. Koca Osman bugüne kadar İnce Memedi onlarca kez öldürdüler, inanmayın siz bu söylenenlere, gidip de gören oldu mu der. Herkesi bir heyecan alır. Seyran hemen yola çıkar. Öldürülen eşkiyaların olduğu yere geldiğinde nefes nefese bir korku içindedir. Tüm eşkiyaların yüzüne gözyaşı içinde tek tek bakar ancak İnce Memedi göremez. Yüzünde bir gülümseme ile köye geri dönmek için yola koyulur. Yüzbaşı, Murtaza Ağanın avukata yazdırıp gönderttiği telgrafları öğrenir. Her telgrafta civar köylerin muhtarlarının imzaları vardır. Kertiş Ali onbaşıya muhtar Kenan'ı getirmesini söyler. Muhtar Kenan bakar kâğıda ama ne o dilekçeyi yazmıştır ne de altına imza atmıştır. Kertiş döve döve kan revan içinde bırakır muhtarı, itiraf et der ama Kenan bir şey yapmamıştır ki. Onbaşı alır muhtarı dereye götürür. Döve döve nihayet öldürür Kenan'ı. Yüzbaşıya döner, Kenan'ın ölmeden önce ağzından Murtaza Ağayla Zülfü'yü duydum der. Yüzbaşı diğer dilekçelere imza atan tüm muhtarları alın der onbaşıya. Kendisi de akşam Murtaza Ağa ve Zülfüyle konuşmak için yanına çağırır. Gelirler, konuşurlar ama Yüzbaşı onları suçlamaz. Bu dilekçeleri kimin yazdığını bilir misiniz der. Onlar da bilmediklerini ama bulmak için ona yardım edeceklerini söyler. Çıkışta Zülfü, bizi buraya dilekçeleri yazanın biz olduğunu bildiği için çağırdığımı ve bunu bildiğini anlayalım diye çağırdığımı söyler.

İnce Memed, Kasım, Temir ve Ferhat Hoca'ya çoban Müslüm haber getirir. Çamlıköy Köyündeki Hasanın babası Hıdır Ağa Kuzgun Velinin İnce Memedi öldürmek için köye geleceğini söylemesini istemiştir Müslüm'den. Dağları tepeleri ok gibi aşarak Kuzgun Veliden önce köye gitmek isterler. Köye vardıklarında herkes köyün ortasında onları karşılar. Yağmurdan sırlıklam olmuş üstlerini değiştirsinler diye yeni kıyafetler verirler. Sonra da bir güzel karınlarını doyururlar. Hıdır Ağa odaya elleri bağlı Kuzgun Veliyi ve adamlarını sokar. İnce Memede gönül borçlarını ödemek için önce onlar yakalamıştır adamları. Kuzgun Veliyi ne yapacaklarını tartışır, eli kolu bağlı eşkiyayı öldürmek kitapta yazmaz diye serbest bırakırlar. Evden çıktıktan sonra bahçede koltuğunun altından ateş eder Kuzgun Veli. Kurşun İnce Memedin abasını delip çıkmıştır. Bir yaylım ateşi başlarken arkadan Ferhat Hoca Kuzgun Veliye yaklaşarak alınının ortasından vurup öldürür. Kuzgun Velinin adamları da İnce

Memede katılmayı kabul eder. Derken jandarmalar tüm köyü kuşatmış, ateş altında kalmışlardır. İnce Memed, Şahan ve Müslüm duvar gibi yamaçtan aşağı inerek jandarmaların arkasına düşer. Çapraz ateşte kalan jandarmalar geri çekilir. Mahmut Ağa da İnce Memedi öldürüp namına nam katmak için jandarmayla taraf tutmuştur. İnce Memed ve ekibi ikiye bölünerek iki farklı köye dağılırlar. Çiçeklidesi köyüne giden İnce Memed ve beraberindekiler Sefil Ali'nin dayısı Sarı Çavuş'un evine giderler. Sarı Çavuş onları evde bir güzel saklar. İhtiyaç gidermek için dışarı çıktıkları bir sefer Tazı Tahsin onları görür. Muhtara gider, muhtar da bu haberi Mahmut Ağa'ya vermesi için Tahsin'i kendisine gönderir. İnce Memed doğru Çiçeklidesi köyüne gider. Emiş Hatun'a bu köyden kıyamete kadar çıkmayacaksınız der ve arkasına bile bakmadan hızla gözlerden kaybolur. Sarı Çavuş, bir İnce Memed uğurlama adeti olarak köylülere keven dikenlerinden bir yığın yaptırıp yaktırır. O günden sonra bir daha İnce Memedi gören olmaz. Çiçeklidesi köyü her yıl İnce Memed'in gittiği günde keven dikenlerinden bir yığın yapıp ateşe verirler. Dağların doruğu üç gece ağarır, ortalık apaydınlık, gündüz gibi olur.

### 1.3. İnce Memed-4

İnce Memed Müslüm ile jandarmadan kaçarken bir köye sığınır. Bir köylüye konuk olurlar. Murtaza Ağa, İnce Memed dışında bir de Topal Ali korkusu sarmıştır. Topal Ali'nin gönlünü çelip onu yanına çekmeye çalışır. Topal Ali'den İnce Memed'in köylünün gözünde efsane olmuş, kurşun değmeyen atını öldürmesini ister. Köylü, Memed'in canının bu atta olduğuna inanır. At için büyük para ödülü konulur. Paraya talip köylüler yılıya bırakılmış ne kadar at varsa kasabaya getirirler. Jandarma komutanı atları ve köylüleri sıraya dizer. At daha fazla efsaneleşir. Memed ve Müslüm, başka bir köye giderler. Memed, portakal bahçesi ve ev alarak eşkıyalığı bırakmak ister. Müslüm'ü, Seyran ve Hürü Ana'yı getirmesi için kendi köyüne gönderir. İhtiyaçlarını Zeynullah'ın aynı zamanda kasabada ve civarında yaşanan tüm olayların, dedikoduların yayıldığı bir mekân olan dükkânından alır. Memed sık sık bu dükkâna gider. Çetesinin yaptıklarını yine buradan öğrenir.

Kadınlar Memed'in atı hakkında kasabada konuşmak yasaklanmış ise de at hakkında türlü efsaneler söyler söylenir olmuştur. Toros köylerindeki bütün çocuklara "Memed" adı verilir olmuştur. Eşraf ve ağalar tedirgindir. Topal Ali, İnce Memed'in eşkıyalığı bıraktığını Hüsne Hatun ile Murtaza'ya söyler. Memed kimseyle konuşmaz olmuştur. İrgatlar paralarını alamayınca ayaklanmışlardır. Memed bu duruma sevinir, beyaz bir Arap atı alır, tekrar silahlarını kuşanır. Sevdikleriyle vedalaşarak Zeynullah'ın dükkânına gelir. Şakir Ağa'yı öldürür. Atını Hemit'e sürer. Diğer yandan Zülfü, Taşkın Bey, Muallim Rüstem, Molla Duran, Murtaza Ağa gizlice toplanmışlardır. Plan yaparlar: Uzun Cabbar'ın yanına adam veriler, Arif Saim Bey'i soydururlar. Soygunu da İnce Memed'in üzerine yıkarlar. Fakat gerçeği bilen Arif Saim vardır. Eski eşkıya Bayramoğlu'nu ikna ederek İnce Memed'in peşine gönderir. Ama çıkan çatışmada öldürülür. Çatışmada Memed, Arif Saim'i; Topal Ali de Murtaza'yı öldürür. Köylü Dikenlidüzü'nü akın eder. Çakırdikenleri, karaçalılar, devedikenleri toplanır, ateş yakılır, davullar çalınır.

Olay Örgülerinin anlatıldığı bu kısımda, müstakil bir çalışmayı gerektiğini düşündüğümüz kişi isimleri, unvanlar, lakaplar, hitaplar başlı başına incelenmesi gereken çok yoğun kültürel izler taşımaktadır.

## 2. Kültürel Unsurlar

### 2.1. Sözlü Kültüre Ait unsurlar

#### 2.1.1. Eserdeki Halk Deyişleri

Deyiş; (1) Deme, söyleme işi, (2) Deme (söyleme, anlatma) biçimi, dili kullananın düşüncesini anlatabilmek ve söylemine özellik katabilmek için dilsel gereçleri kendine özgü ölçütlerle seçip kullanması, biçim, üslup. (3) Bir kimsenin bir konuyla ilgili anlattıkları, ifade(4) Halk şiiri, halk türküsü. (5) Semahla birlikte yalnızca bağlama eşliğinde ağır tempoda söylenen bir beste türü, (6) Halk ozanlarının şiirlerine ya da yaratıcısı belli olmayan halk türkülerine verilen ad, (7) Söylenen (söz).<sup>2</sup> Anlamlarına gelmektedir. Halk Deyişleri, kültürü oluşturan en önemli unsurlardan biri olmanın yanısıra diğer kültür değerlerimizi de gelecek kuşaklara aktarılmasında önemli rol oynar.

<sup>2</sup><https://www.lafsozluk.com/2012/08/deyis-nedir-ne-demektir.html>



### 2.1.2. Deyim

Kültürel unsurları ve değerleri aktarmada önemli bir görev üstelenen dil, estetik bir şekil alarak deyim ve atasözlerini meydana getirir. Anlatımı kuvvetlendirmek, az söz ile çok şey anlatmak için deyim ve atasözlerine başvururuz. Weisgerber'e göre dil, yaşamın bütün alanlarında, günlük yaşamın en yalın olaylarında, bilimin ana formlarında, göreneklerde ve törelerde, inançlarda ortaya çıkar, dil her türlü maddesel yaşamın, tekniğin, ekonominin de koşuludur; dinde, hukukta, felsefe ve sanatta yeri vardır. Dilin etkide bulunan gücü, dilde izini bırakan dünya tablosu ile yaşamın bütün alanlarına yayılır. Buna karşılık dilde her bir alanın özel gereksinimleri ve koşulları ile kendi çevresini ve yönünü belirler.<sup>3</sup>

Eserde geçen bazı deyim örnekleri şunlardır; “Çocuğun elbiseleri sana iyi gelir. Daha yepyeni. Nasıl da bağıryordu it oğlu it! Canı şekerden tatlı...” “O siyasetçi ne bilir telgraf yazmayı, telgraf yazıp da Ankara'yı tavlamaı. Benim telgrafımı Ankara'da okuyan her **kişi iki gözü iki çeşme ağlamazsa...**”

### 2.1.3. Atasözleri

Atasözleri bir toplumun duygu, düşünce inanç ve kültür yapısını yansıtır. Atasözlerinin kim tarafından ne zaman söylendiği bilinmez. Yani atasözleri anonimdir. Bu sözler topluma mal olmuş, toplum tarafından benimsenmiş ve yüzyılların düşünce ve mantık isteminden geçerek günümüze ulaşmış kısa ve özlü sözlerdir. Atasözleri, bir düşünce açıklanırken ya da savunulurken tanık olarak da gösterilirler.<sup>4</sup>

“Ağalar Memed'imi böylece görseler belki de daha çok korkarlar. **Ummadık taş baş yarar demezler.**”, “Sersem sepet Koca Osman! **Kurt kocayınca köpeklerin maskarası olmuyor, kurt kocayınca köpekleşiyor.**”

### 2.1.3. Beddua/ Kargış

Beddua veya eski Türkçe'deki söyleyişle “kargış”, çaresiz olan, acı çeken ve bir kötülüğü maruz kalan bir insanın bunları yapanın cezalandırılmasını istemek ve bu yolla intikamını almak ve adaleti sağlamak amacıyla söylediği, kötü dilek ve düşünceleri ihtiva eden kalıplaşmış sözlerdir. Bedduanın birebir sözlük karşılığı “kötü-dua”dır. Türkiye Türkçesinin ağızlarında “beddua” karşılığı olarak “ilenç, inkisar, kargış ve lanet” gibi sözcükler de kullanılır. Beddualar ve duaların kökeninde belirli durumlara has olarak söylenen kalıplaşmış sözün sihirli bir gücü olduğu ve bu sözlerini söylenilip tekrarlanmasının kutsal güç veya güçleri harekete geçireceği inancı yatar.<sup>5</sup>

(...) “Çocuklar, gene koşuştular. Kadınlarsa önlerine çıkan bu çakırdikenine beddua ettiler: “kökü geçesice.”” (...)

### 2.1.5. Küfür

Küfürler, çoğunlukla yoğun bir öfke anında ağızdan dökülen sözlerdir. Onları dilin diğer sözlerinden ayıran en temel özellik, sosyolojik açıdan “ayıp” ve dinî açıdan da “günah” kabul edilmeleridir. Toplum huzuruna ve insan onuruna yönelik sözlü bir saldırı şeklinde görülmesinin doğal bir sonucu olarak küfür, hukuki açıdan da suç teşkil eder. Bütün bunların yanında, küfür dile ait bir unsurdur.<sup>6</sup>

“Köylüler ile Ali Safa Bey arasında yıllarca süren bir savaştır başlar. Ali Safa Beyin it oğlu it zekâsı kendisini bu savaşta gösterir.”

### 2.1.6. Tekerleme

Genel olarak tekerlemelerin birçok tarifi yapılmıştır: Ali Duymaz; tekerlemelerin şekil, konu, muhteva ve işlevleri bakımından sınırları tam ve kesin olarak belirlenmemiş halk edebiyatı ürünleri olduğu;

<sup>3</sup>Seçkin Aydın, “Kültürel Bir Miras Olarak Atasözlerinin Kullanımı Üzerine Türkçe Öğretmenlerinin Görüşleri, *Folklor/ Edebiyat*, 2013, cilt:19, sayı:75

<sup>4</sup>[https://bilgiyelpazesi.com/egitim\\_ogretim/konu\\_anlatimli\\_dersler/turkce\\_dersi\\_ile\\_ilgili\\_konu\\_anlatimlar/atasoz\\_zu\\_atasozleri\\_atasozlerinin\\_ozellikleri\\_1.asp](https://bilgiyelpazesi.com/egitim_ogretim/konu_anlatimli_dersler/turkce_dersi_ile_ilgili_konu_anlatimlar/atasoz_zu_atasozleri_atasozlerinin_ozellikleri_1.asp)

<sup>5</sup> Özkul Çobanoğlu, Sacide Çobanoğlu, “Türk Halk Kültüründe Konuşmalık Türler Bağlamında Sözel Nasihatler, Dua ve Beddualar”, *Avrasya Uluslararası Araştırmalar Dergisi*, cilt:4, sayı:7, 2005

<sup>6</sup> İbrahim Yılmaz, “39 ve 41 Numaralı Şer'iyecilerinde Küfür Sözleri”, *Akademik Dil ve Edebiyat Dergisi*, cilt:3, sayı:3, Aralık 2019.

belirsizliğin sebebi olarak da tekerlemelerin daha çok bilmece, âşıkşiri, masal, ninni, oyun, halk hikâyesi, halk tiyatrosu gibi pek çok halk edebiyatı ve folklor türünü içinde barındırmasının olduğunu ifade etmektedir.<sup>7</sup>

“Derin düşüncelere daldı. Uğurböcekleri geldi gözlerinin önüne, eline konan Uğur böceklerini, ‘uç uç, tellice böcek, sana papuç alacağım, şalvar fistan alacağım. Uç uç, tellice böcek sana dünyayı vereceğim, sana nar çiçeği, boynu bükük mor menekşe takacağım. Uç uç, tellice böcek...”

### 2.1.7. Ağıt

Türkçede de ölen bir kimsenin ardı sıra söylenen ezgili manzum lirik eserlere ağıt denilmektedir. Mevcut kaynaklara göre Türk tarihinde ölenin ardı sıra ağlayarak söylenen şiire melodi koşmak suretiyle saç yolup yüz yırtarak icra edilen bu tür eserlere, eskiden “sagu” denildiği bilinmektedir. Sözlük anlamı olarak “sagu” ölenin iyiliklerini, yiğitliğini, güzelliğini vs. anlatan ağıttır. Eserin dördüncü cildinde çatışmada ölen Mestan için köylü kadınlar ağıtlar yakarlar.

### 2.1.8. Türkü

Türkçe söylenmiş şiir anlamına gelen “Türkü”nün “Türki” sözüden geldiği görüşü ittifakla kabul edilmiş bir görüştür. Yani, Türk kelimesine Arapça “i” ilgi ekinin getirilmesiyle vücut bulmuştur. “Türk’e has” anlamına gelen bu söz, halk ağzında “Türkü” şekline dönüşmüştür. İnce Memed, Abdi Ağanın zulmünden dolayı köyden kaçınca bütün köylü onu aramaya koyulur. Onu arayanlardan Ali, Dursun ve Osman yorulunca bir yerde dinlenirler, o sırada Ali tarafından dertli bir türkü söylenir;

## 2.2. Eserde Yaşayış Biçimi ile İlgili Kültürel İzler

### 2.2.1. Yeme-İçme Kültürü

“Memed gitti pınarın başına, uzun, mor çiçekli yarpuzların üstüne çöktü. Sarı Ümmetin verip de beline bağladığı çıkını açtı. Azıkta üç baş soğan, altı yumurta, bol çökelek, bir parça Türkmen peyniri, bol bol kömbe ekmeği vardı. Birkaç da bazlama.”

### 2.2.2. Giyim- Kuşam Kültürü

Her toplumun kendi örf ve adetlerine, yaşadıkları coğrafyanın iklim koşulları ve diğer beşeri ve doğal faktörlerden kaynaklı giyim-kuşamlarında farklılık görülür. Giyim- kuşamda görülen bu farklılıklar toplumları birbirinden ayırır ve toplumlara yeni bir toplum olma kimliği kazandırır. Bugün yeryüzünde yaşayan birçok topluma baktığımızda birbirinden farklı giyim kültürlerinin olduğunu görürüz. Eserde köylülerin “aba” giyindiğine değinilir.

### 2.2.3. Gelenek ve Görenekler

Çalışmamızın konusu olan eserde de kültürü oluşturan öğeler arasında olan gelenek ve göreneklere dair bulgulara rastlıyoruz. Örneğin, çırık; çeşitli bitki ve hayvan liflerini daha sonra bir dokuma tezgahında kumaşa dokunan iplik veya ipliğe dönüştürmek için kullanılan eski bir buluştur. Çırık eğirme, Anadolu’nun her bölgesinde rastlanan bir gelenektir. Eserde de evlerinin gündün yanına oturan kadınların çırık eğirdiğine değinilir.

### 2.2.4. Örf- Âdet ve Töreler

İncelediğimiz eserde köylülerin yaşam tarzlarına baktığımızda onların örf, adet ve törelerine dair bulgular elde ediyoruz. Örneğin eserde, Abdi Ağanın Hatçe ve yeğeni Veli’nin nişanında, gelinine beşi bir yerde taktığı görülür, düğünlerde gelin ve damada takı takılması kültürümüzde yer alan adetlerdendir. Eserin bir bölümünde, Hatçenin, Memede kaçmasından sonra annesinin verdiği tepkinin, Toros köylerinde töre olduğu söylenir.

### 2.2.3. Oyunlar

Eserde çocukların “köküç” oyununu oynadıkları söylenir.

<sup>7</sup> Dolunay Akgül Barış, Ahmet Serkan Ece, “Kültürel Değerlerin Aktarılmasında Çocuk Tekerlemeleri ‘Tekerlemelerimizi Biliyor muyuz?’”, *Değerler Eğitimi Dergisi*, cilt:13, No:29, Haziran 2015, 343-368



## 2.2. At Kültürü

Çalışmamızın konusu olan “İnce Memed” eserinde de romanın başkahramanı İnce Memed’in “Yağız atından” roman boyunca bahsedildiğinden Türk kültüründe “at”tan özellikle bahsetmek gerekir:

Türk ulusu tarihte var olduğundan beri kendine özgü köklü bir medeniyete/kültüre sahip olmuştur. Buldukları coğrafyalar, etkileşime girdiği diğer topluluklar, kendi kültürlerinin oluşup şekillenmesine etki etmiştir. Türklerin sahip olduğu birçok özellik kendine özgü olduğundan milli bir kültür oluşturmayı başarmış bir millettir. Kültürü oluşturan tüm unsurları, Türk toplumunda kendilerine has bir şekilde görmekteyiz. Gelenek-göreneklere, örf ve adetleri, yaşam tarzları, dil ve edebiyatları, mit ve inanışları gibi birçok kültür unsuru diğer toplumlardaki kültür unsurlarından farklı, kendilerine mahsus milli bir kültür oluşturmuştur. Türkler gelenek ve göreneklere, örf ve adetlerine sıkı sıkıya bağlı bir topluluktur. Hayatın birçok evresinde gelenek-göreneklere, örf ve adetlerine, töre ve normlarına bağlı kalırlar. Göçebe hayata bağlı olarak at, Türk kültürü için önemli bir yerdedir. At, bir binek hayvanı olmasının yanı sıra atın etinden ve sütünden beslenen Türk toplumları vardır. Atın bu kültürde bu kadar yer kaplaması at üzerinde oynanan oyunları da beraberinde getirmiştir. Türk toplumlarını anlatan tüm yazılı, sözlü eserlerde de at yer verilir. At, birçok eserde kahramanın yardımcısı görevindedir. Yine Kırgız Türklerinden olan Cengiz Aytmatov’da eserlerinde ata genişçe yer vermiştir.<sup>8</sup>

Türk Toplumunu zengin bir halk kültürüne sahiptir. Geçmişten bugüne birçok kültür faaliyetlerini bırakmayıp, halen devam ettirmektedirler. Hayatın her sahasında bu kültür unsurlarını Türk toplumlarında görmek mümkündür. Bahsettiğimiz sadece Türk kültüründen birkaç örnektir, bahsetmediğimiz sayısız Türk kültürünün var olduğunu da belirtmekte fayda vardır.

At, geçmişten bugüne bütün Türk toplumlarında önemli bir yere sahiptir. Türkler, atı binek aracı olma dışında hem etinden hem de sütünden de yararlanmışlardır. Eserde de “at” ve at ticaretinin sürekli söz konusu olması “atın” kültürümüzdeki yerinin önemini bir göstergesidir. Örneğin, Arif Saim ve Yağmur ağa arasında geçen bir konuşmadan, “ata” verilen önem görülür.

## 3. Kültürleşme

Kültürleşme, iki ya da daha çok kültürün karşılıklı etkileşme sonucu benzeşme yönünde değişmeye uğramaları olarak tanımlanır. Bir başka ifadeyle; bireyler, gruplar, alt kültürler arasında, yaratı, yenilik en önemlisi de göç sonucu oluşan etkileşme şeklindeki kültürel iç devinimdir. Kürt asıllı Türk yazarı olan Yaşar Kemal hem Kürt hem de Türk Kültürüne hâkim, iki kültürü de özümsemiş bir yazardır. Çalışmamızın konusu olan “İnce Memed” eserinde de bu iki kültürün harmanlandığı gözlenmektedir. Esere dair verdiğimiz bütün kültürel tespitler, iki kültürün iç içe geçmişliğidir aslında. Eserde yer yer rastlanan Kürtçe kelime ve Kürtçe diyaloglar da kültürel etkileşimin bir sembolü gibidir.

## 4. Kitle Psikolojisi

Eserde ezen kitle (ağalar, yöneticiler) için İnce Memed, korku yaratan bir görünüş niteliğindedir. İnce Memed’in Abdi Ağayı öldürmesi, diğer ağaların içine salınan ilk korkudur. Sonrasında Ali Safa Bey, Kel Hamza gibi zalim ağaları öldürmesi başta Murtaza Ağa olmak üzere diğer ağaların içindeki korkunun artmasına sebep olur. Bu korkular ezen kitlenin psikolojinde, İnce Memed’den kurtuluş yolu aramaya iter. İnce Memed’de birey yoktur çatışan iki kitle vardır ve her bir kitlenin ayrı düşünce ve anlayışı vardır. Eserde görülen bu kitlesel hareketler, psikolojik bir devinimin sonucudur denebilir.

## SONUÇ

Çalışmamızda kültürün ne olduğu ve kültürü oluşturan unsurlar (gelenek, görenek, örf, adet, dil, din, mit, inanış vb.) açıklandı. Romanlarda anlatılan olaylar toplumsal yaşayışı, kültürel ortamı en iyi gösterdiğinden eserin olay örgüsü aktarıldı. Yaşanılan olaylar karşısında halkın takındığı durum ve tavırlar bir kültür refleksi olarak yorumlandı. Hem kültürü oluşturmada hem de kültürü taşımada en önemli araç dildir. Halk, dille farklı kullanımlar, farklı yapılar (deyim, atasözü, kargış, küfür vb.) meydana getirir ve bu yeni oluşan şekiller kültürün birer tamamlayıcısıdır. Bu romanlarda da bolca kullanıldığı görülmüştür. Yaşam tarzı, kültürün bir yansıması olarak bu eserlere de çokça yansımıştır. Eserlerde tespit ettiğimiz, gelenek ve görenekler, örf ve adetler, oynan oyunlar, giyim-kuşam, yeme-

<sup>8</sup> Cengiz Aytmatov, *Elveda Gülsarı* (çev: Refik Özdek), Ötüken Yayınları, 2010.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

İçme usulleri kültürü meydana getiren unsurların arasında değinildi. Kültürü oluşturan bir diğer unsur olan inanışlara da eserde sıkça rastlanmıştır. Eserde halkın bir takım kurallara göre yaşaması, onların dini inançlarını, bazı olay ve durumları inanç üzerinden yorumlanmıştır. Batıl inançlar ve bir inanış biçimi olan efsaneler ve eserdeki kahramanlara olağanüstü özellikler yükleyerek efsaneleştirilmeleri halkın inanç biçimlerinin bir göstergesidir. Çalışmamızda, eserde geçen Kürtçe kelimeler tespit edilmiş ve “kültürleşme” olayı ile yorumlandı. Romanda, ezen (ağalar, yöneticiler) ve ezilen (köylü, halk) kitlenin içinde buldukları durumdan dolayı verdiği tepkilerin, bireysel çıkıp kitlesel bir tepkiye dönüşmesi kitle psikolojisi ile yorumlandı.

Bu çalışma, kültür başlığı altında yalnızca İnce Memed romanlarının değil, tüm Yaşar Kemal romanları için çok daha derinlikli ve hacimli çalışılmayı hak etmekte olduğunu hatırlatmakta ve bir ufuk çizgisine işaret etmektedir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## TÜKETİCİ DAVRANIŞLARINI ANLAMANNIN BİR YOLU OLARAK ELEKTROENSEFALOGRAFİ (EEG) KULLANIMI USING ELECTROENCEPHALOGRAPHY (EEG) AS A WAY TO UNDERSTAND CONSUMER BEHAVIOR

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### ÖZET

Tüketici davranışlarını araştırmak üzere kullanılan geleneksel pazarlama yöntemi, bilinçli bilişsel kontrolden etkilenmekte ve tüketicinin gerçek tercihlerini yansıtmakta yetersiz kalmaktadır. Pazarlama araştırmalarına nörobilimin de dahil edilmesi bu açığı kapatarak geleneksel pazarlama ile elde edilemeyecek veriler sağlamaktadır. Nöropazarlama, alışverişçi beynin kara kutusunun kodlarını çözümleyerek satın alma davranışındaki temel beyin süreçlerinin daha iyi anlaşılmasını vaat etmektedir. Son 20 yılda pazarlama araştırmalarına göz izleme, yüz ifadesi, fonksiyonel manyetik rezonans görüntüleme (fMRI), galvanik deri iletkenliği ve elektroensefalografi (EEG) gibi biyometrik yanıtlar dahil edilerek nöropazarlama ile müşteri içgörülerine ulaşılmaktadır. Sensörler aracılığı ile beyin dalgalarının aktivitesi sonucu üretilen elektrik sinyallerini yakalayabilen ve çok düşük frekanslı sinyalleri kaydetme özelliğine sahip olan EEG, yüksek zamansal çözünürlüğü ve nispeten düşük maliyeti nedeniyle son zamanlarda nöropazarlama araştırmalarının ilgi odağı haline gelmiştir.

Bu çalışma, EEG aracılığı ile tüketici davranışlarını anlamaya yönelik yapılan nöropazarlama araştırmalarına odaklanmaktadır. Yapılan literatür araştırması neticesinde ilgili araştırmalara ait yöntemler ve elde edilen bulguların derleme halinde sunulması hedeflenmektedir.

Tüketicinin uyarılara (logo, reklam vb.) verdiği tepki, uyarandan hoşlanıp hoşlanmadığı gibi konuları araştırmak üzere EEG'den faydalanan birçok çalışma mevcuttur. Nöropazarlama alanında kullanılmak üzere yeni veri analizi tekniklerinin geliştirilmesi ile EEG sinyal verilerine çeşitli filtreleme yöntemleri uygulanarak en çok tercih edilen ürünlerin veya bir ürünü beğenip beğenmeme durumlarının tahmini mümkün hale gelmiştir. Özellikle gelişen teknoloji ile artırılmış gerçeklik (AR) ve sanal gerçekliğin (VR) pazarlama alanına dahil olması, bu alanlarda EEG ile yapılan nöropazarlama çalışmalarını da beraberinde getirmiştir.

Yapılan araştırma doğrultusunda tüketici davranışlarının araştırılması amacıyla EEG kullanımının değerli bilgiler sağladığı ve pazarlama stratejilerinin tüketici üzerindeki fizyolojik etkilerini anlamak için etkili bir araç olduğu görülmüştür. Bu çalışma, gelecekte yapılacak olan nöropazarlama araştırmaları için pratik çıktılar sağlamaktadır.

**Anahtar Kelimeler:** Elektroensefalografi, nörobilim, tüketici davranışı, nöropazarlama.

### ABSTRACT

The traditional marketing method used to study consumer behavior is influenced by conscious cognitive control and is insufficient in reflecting the consumer's true preferences. The inclusion of neuroscience in marketing research fills this gap and provides data that cannot be obtained through traditional marketing. Neuromarketing promises to better understand the fundamental brain processes underlying

purchasing behavior by decoding the black box of the shopper's brain. In the last 20 years, neuromarketing has been used to gain customer insights by incorporating biometric responses such as eye tracking, facial expressions, functional magnetic resonance imaging (fMRI), galvanic skin conductivity, and electroencephalography (EEG). EEG, which can capture electrical signals generated by brain wave activity through sensors and has the ability to record very low-frequency signals, has become the focus of neuromarketing research in recent years due to its high temporal resolution and relatively low cost.

This study focuses on neuromarketing research conducted to understand consumer behavior through EEG. The aim is to compile the methods and findings of relevant research through a literature review. Many studies have used EEG to investigate topics such as the consumer's response to stimuli (logo, advertisement, etc.) and whether they like the stimulus. With the development of new data analysis techniques for use in neuromarketing, it has become possible to predict the most preferred products or whether a consumer likes a product by applying various filtering methods to EEG signal data. The inclusion of augmented reality (AR) and virtual reality (VR) in the marketing field, especially with advancing technology, has also brought neuromarketing studies using EEG in these areas.

The research conducted shows that the use of EEG provides valuable information for studying consumer behavior and is an effective tool for understanding the physiological effects of marketing strategies on consumers. This study provides practical outputs for future neuromarketing research.

**Keywords:** Electroencephalography, neuroscience, consumer behavior, neuromarketing.

### GİRİŞ

Bireylerin arzu ve ihtiyaçlarını karşılamak amacıyla ürün ve hizmetleri satın alma ve kullanma süreçleri olarak tanımlanan tüketici davranışını (Solomon,1995; akt. Durmaz, Bahar ve Kurtlar, 2011) etkileyen faktörler ve tüketici karar verme süreçleri pazarlama sektörünün ilgisini çekmektedir (Albayrak ve Aksoy, 2008). Yeni tekniklerin, stratejilerin ve tasarımların geliştirilmesi için satın alma sürecindeki davranışsal, bilişsel ve nörofizyolojik değişkenlerin belirlenmesi önem arz etmektedir (Muñoz, López-Gallego, Arias-Salazar, ve Serna-Rodríguez, 2019). Tüketici davranışlarını araştırmak üzere kullanılan geleneksel pazarlama yöntemi, tüketici duygu ve tercihini birebir görüşme, anket ve odak grup çalışmaları ile ölçmekte (Bastiaansen vd., 2018; akt. Mashrur vd., 2022) ancak bu yöntem bilinçli bilişsel kontrolden etkilenmekte ve tüketicinin gerçek tercihlerini yansıtmakta yetersiz kalmaktadır. Pazarlama araştırmalarına nörobilimin de dahil edilmesi bu açığı kapatarak geleneksel pazarlama ile elde edilemeyecek veriler sağlamaktadır (Xu vd., 2023).

### Nöropazarlama ve Elektroensefalografi (EEG)

Yapılan araştırmalar, tüketici satın alma kararlarının büyük bir çoğunluğunun bilinçaltında verildiği sonucuna varmaktadır (Alsharif vd., 2021, Alsharif vd., 2021; Bočková vd., 2021; akt. Bhardwaj, Rana, Behl ve Caceres, 2023). Son 20 yılda pazarlama araştırmalarına göz izleme, yüz ifadesi, fonksiyonel manyetik rezonans görüntüleme (fMRI), galvanik deri iletkenliği ve elektroensefalografi (EEG) gibi biyometrik yanıtların dahil edilmesi ile (Mashrur vd., 2022) alışverişçi beynin kara kutusunun kodlarını çözümlyerek satın alma davranışındaki temel beyin süreçlerinin daha iyi anlaşılmasını vaat eden nöropazarlama (Meyerding ve Mehlhose, 2020) ile müşteri içgörülerine ulaşılmaktadır (Mashrur vd., 2022). Araştırmalar, pazarlama stratejilerine daha fazla katkı sağlaması ve beyin görüntüleme ile daha iyi sonuçlara ulaşılabilmesi düşünceleri ile pazarlama sektörünün nöropazarlamayla ilgilendiğini ortaya koymaktadır (Bhardwaj vd., 2023).

Sensörler aracılığı ile beyin dalgalarının aktivitesi sonucu üretilen elektrik sinyallerini yakalayabilen ve çok düşük frekanslı sinyalleri kaydetme özelliğine sahip olan EEG (Sebastian, 2014), yüksek zamansal çözünürlüğü ve nispeten düşük maliyeti nedeniyle son zamanlarda nöropazarlama araştırmalarının ilgi odağı haline gelmiştir (Golnar-Nik, Farashi ve Safari, 2019; Alsharif vd., 2022). Sinyal davranışının zaman alanı, frekans alanı veya zaman-frekans alanı cinsinden değişiminden tespit edilen EEG sinyalleri (Saidatul, Paulraj ve Yaacob, 2012; akt. Oon, Saidatul ve Ibrahim, 2018), genellikle salınım frekans aralığına göre delta dalgaları(0.2–3.99 Hz), teta dalgaları (4–7,99 Hz), alfa dalgaları (8–12,99 Hz), beta dalgaları (3–29,99 Hz) ve gama dalgaları (30–50 Hz) olarak bölünmekte, tüm beyin dalga frekansları

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

ölçülebilir olsa da yapılacak araştırmaya göre daha önemli olanlar ayrıştırılarak analiz edilmektedir (Kweon vd., 2018).

Nöropazarlama araştırmalarında EEG kayıtları genellikle; sinyalin frekans özelliğinin incelendiği spektral analizi, beynin iki yarım küresindeki aktivitelerin karşılaştırıldığı hemisferik asimetri ve uyaranlar nedeniyle ortaya çıkan beyin tepkilerinin araştırıldığı olayla ilgili potansiyel analizi olarak analiz edilmektedir (Kalaganis vd., 2021). Ürünlere yönelik tercihlerin gözlemlenmesi sürecinde tüketicinin beynindeki bilgilere ulaşma yeteneğine sahip olan EEG, pazarlama stratejilerinde yol gösterici niteliktedir (Yadava, Kumar, Saini, Roy ve Prosad Dogra, 2017).

Bu çalışma, EEG aracılığı ile tüketici davranışlarını anlamaya yönelik yapılan nöropazarlama araştırmalarına odaklanmaktadır. Yapılan literatür araştırması neticesinde ilgili araştırmalara ait yöntemler ve elde edilen bulguların derleme halinde sunulması hedeflenmektedir.

## BULGULAR

Araştırma dahilinde yapılan literatür incelemesi, ilgili anahtar kelimeleri eşleştirmek amacıyla literatür araştırması, sistematik literatür araştırması, uygunluk kontrolü ve bulguların raporlanması aşamalarından oluşmaktadır. Scopus, Web Of Science, Google Scholar veritabanları üzerinde “neuromarketing”, “elektroensefalografi veya EEG”, “consumer behavior” anahtar kelimeleri kullanılarak yapılan literatür araştırmasında ulaşılan çalışmaların özet ve bulgu bölümleri incelenmiş, uygunluk durumları neticesinde çalışmaya Tablo 1’de bulunan 14 araştırma dahil edilmiştir. Yapılan literatür araştırması, dergi, konferans ve kitap bölümlerindeki hakemli makaleler ile sınırlıdır.

**Tablo 1.** Araştırmaya dahil edilen çalışmalara genel bakış

Yazar ve Yıl	Veri Toplam Araçları	Araştırma Tasarımı	Önemli Bulgular
Horská ve Berčík, 2014	EEG	Katılımcılardan farklı aydınlatma ortamlarında alışveriş yapmaları istenmiştir.	Farklı yoğunluk ve renk sıcaklığının tüketici üzerinde etkili olduğu, bazı ışık türlerinin olumlu duygusal tepkiler sağladığı bulgulanmıştır.
Murugappan vd., 2014	EEG	12 katılımcıya reklam videosu izletilmiştir.	Çeşitli filtreleme yöntemleri kullanılarak tüketicinin en çok tercih ettiği marka bulgulanmıştır.
Li vd., 2016	EEG	Artırılmış gerçeklik içeren android uygulaması ile entegre beyin makine arayüzü geliştirilmiştir.	Geliştirilen sistem ile tüketici tercihlerinin otomatik analizi alınmaktadır.
Pileliene ve Grigaliunaite, 2017	EEG, Göz İzleme, Anket	30 katılımcıya ünlü ve ünsüz kadın sözcüsü olan maden suyu reklamları izletilmiştir.	Ünkü kadın sözcü reklam üzerinde önemli bir etkiye sahiptir. Ünlü kadın sözcü ünlü olmayana göre daha yüksek bir duygusal değere sahiptir.
Oon vd., 2018	EEG	10 katılımcıya reklam videosu izletilmiştir.	Çeşitli filtreleme yöntemleri kullanılarak tüketicinin en çok tercih ettiği marka bulgulanmıştır.
Rosenlacher vd., 2018	EEG, Yarı Yapılandırılmış Görüşme ve Anket	20 katılımcı iki gruba ayrılarak (kontrol-deney) sanal gerçeklik ve cep telefonu üzerinden reklam izletilmiştir.	Sanal gerçeklik kullanan katılımcıların dikkat ve duygu durumunda kontrol grubuna göre artış gözlemlenmiştir.
Golnar-Nik vd. 2019	EEG	Katılımcılara farklı marka cep telefonlarına ait videolar izletilmiştir.	Beğenme durumunun sol frontalde teta sinyal gücünü artırdığı, beğenme durumunun ise sağ frontalde sinyal gücünü artırdığı bulgulanmıştır.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Hsu ve Chen, 2020	EEG	8 deney videosu (emoji içeren), 8 kontrol videosu (emoji içermeyen) olmak üzere 16 adet otel tanıtım videosu, 16 katılımcıya izletilmiştir.	Katılımcılar uyarıcı içeren videolarını izledikleri sırada teta dalgaları önemli ölçüde artarken beta dalgaları önemli ölçüde azalmıştır. Bulgular, olumlu emojiğin tüketici davranışı üzerinde olumlu bir etki yaratabileceğini göstermiştir.
Zhi-Wei vd., 2021	EEG	21 katılımcının çevrimiçi alışveriş üzerinden satın alma kararı incelenmiştir.	Ürünün görüntülenme sırasındaki prefrontal asimetrisi ile gerçek satın alma davranışının ilişkili olduğu bulgulanmıştır.
Biercewicz vd., 2022	EEG	34 katılımcıya sanal gerçeklik market mağazasında alışveriş yapmaları istenmiştir.	Katılımcıların sürdürülebilir tüketim davranışı açısından duyguları üzerinden memnuniyet durumları incelendiğinde en fazla memnuniyet somon ürününe olduğu gözlemlenmiştir.
Córdova vd., 2022	EEG	6 katılımcıya çevrimiçi cep telefonu alışverişini yaptırılmıştır.	Kadınlar erkeklere göre daha hızlı satın alma kararı vermiştir. Nihai cihazla alternatifinin karşılaştırılması sırasında sağ prefrontal lobda aktifleşme olduğu, erkeklerde en çok beyin aktivitesinin frontal lobda olduğu, karar vermeye karşılık gelen alanla birlikte görsel hafızanın da tüm aşamalarda mevcut olduğu bulgulanmıştır.
Hassani vd., 2022	EEG	20 katılımcıya 16 çift ayakkabı görseli gösterilmiştir.	Alışveriş sırasında kadın tüketicilerde erkeklere oranla daha fazla bölgenin aktifleştiği bulgulanmıştır. Beğenme beğenmeme durumlarında kısmen beyin farklı bölgelerinde aktifleşme olduğu görülmüştür.
Mashrur vd., 2022	EEG	15 katılımcıya ürün görsel ve tanıtımı gösterilmiştir.	Çeşitli filtreleme yöntemleri kullanılarak tüketicinin ürüne karşı tutumu bulgulanmıştır.
Wang vd., 2022	EEG ve Anket	66 katılımcıya kulaklık görselleri ve bilgileri gösterilerek ürünü almak isteyip istemedikleri ve ödeme yöntemi (nakit/mobil) sorulmuştur.	Elde edilen bulgular doğrultusunda katılımcıların mobil ödeme tercihi sırasında ERP'lerine bakıldığında ödeme zevklerinin arttığı, ödeme acılarının azaldığı tespit edilmiştir.

Tablo 1'de görüldüğü üzere araştırmaya dahil edilen 14 çalışmadan 9'u görsel uyarıcı ve tüketici satın alma davranışını, 5'i ise yeni EEG analiz yöntemlerini konu olarak ele almaktadır. Aşağıda, EEG aracılığı ile tüketici davranışını inceleyen 14 çalışmaya ait yöntem ve bulgular sunulmaktadır.

## Görsel Uyarıcılar ve Satın Alma Davranışı Üzerine Yapılan EEG Çalışmaları

Tüketicinin satın alma davranışına yönlendirecek dikkat çekici reklamların hazırlanmasının pazarlama sektöründe büyük bir öneme sahip olması reklamın tüketici üzerindeki etkilerinin bilinmesini de gerekli kılmaktadır (Kalaganis vd., 2021). Tüketicinin uyarıcılara verdiği tepki, uyarıcıdan hoşlanıp hoşlanmama durumu gibi konuları araştırmak için EEG'den faydalanan birçok çalışma mevcuttur (Vecchiato vd., 2011). Hsu ve Chen (2020) tarafından 16 katılımcı ile gerçekleştirilen bir çalışmada bilinç altı uyarıcı içeren (gülen emoji) otel videolarının tüketici tercihlerini nasıl etkilediği araştırılmıştır. Veri toplama aracı olarak EEG kullanılan çalışmada bilinç altı uyarıcı olarak kullanılan gülen yüz emojiğinin teta dalgalarının artması ile katılımcıların hafızası üzerine olumlu etki yarattığı, beta dalgalarını azalması ile de kaygı düzeyini azalttığı, sonuç olarak bilinçaltı uyarıcıların tüketici tercihlerini etkilediği çıkarımına varılmıştır.

Ürün reklamlarında ünlü kadın sözcünün tüketici üzerine etkilerinin araştırıldığı bir çalışmada, 30 katılımcıya ünlü olan ve olmayan kadın sözcülerin olduğu maden suyu reklamları izletilmiş, veriler anket, EEG ve göz izleme yöntemleri ile toplanmıştır. Elde edilen EEG verileri doğrultusunda olayla ilgili potansiyeller (ERP) analiz edildiğinde sol yarım kürede bulunan P3 kanalında ünlü olan sözcünün ünlü olmayana göre daha fazla P300 genliği ortaya çıkardığı bulguların ünlü sözcülerin tüketiciler açısından daha fazla duygusal değere sahip olduğu çıkarımına varılmıştır. Çalışmada elde edilen göz izleme verilerinde, katılımcıların ünlü olan sözcüyü izleme sürelerinin ünlü olmayana göre anlamlı düzeyde yüksek olduğu bulgulanmış olup elde edilen bulgular EEG bulgularını destekler niteliktedir (Pileliene ve Grigaliunaite, 2017).

Pazarlamacılar için bir diğer araştırma konusu ürün ve marka algısıdır. Bir ürünün veya hizmetin ambalajı, kullanılabilirliği ve marka algısı o ürünün piyasa değerini etkileyen önemli faktörlerdir (Kalaganis vd., 2021). Córdova vd. (2022) tarafından çevrimiçi cep telefonu alışverişinde tüketici karar verme aşamalarının EEG aracılığı ile 6 katılımcı üzerinden incelendiği bir çalışmada kadınların erkeklere göre daha hızlı satın alma kararı verdikleri, nihai cihaz ile alternatifleri arasında yapılan karşılaştırma sırasında sağ prefrontal lobda aktifleşme meydana geldiği, erkeklerde en çok beyin aktivitesinin frontal lobda gerçekleştiği ve tüm aşamalarda karar verme alanları ile birlikte görsel hafızanın mevcut olduğu bulgulanmıştır.

Zhi-Wei ve ark. (2021) tarafından yapılan başka bir çalışmada 21 katılımcıdan çevrimiçi alışveriş yapmaları istenerek prefrontal asimetrinin tüketici satın alma kararıyla ilişkisi incelenmiş, elde edilen bulgular doğrultusunda ürünün görüntülenme anındaki prefrontal asimetri ile gerçek satın alma davranışı arasındaki prefrontal asimetri arasında ilişki olduğu sonucuna ulaşılmıştır. Çalışmada gama frekans asimetrisinin tüketici satın alma davranışını tahmin edebildiği çıkarımına ulaşılmıştır. Sanal gerçeklik aracılığı ile sürdürülebilir tüketim davranışının araştırıldığı başka bir çalışmada, katılımcıların duygu durumları üzerinden en fazla memnuniyet duyulan ürünün tespiti EEG aracılığı ile yapılmıştır (Biercewicz, Chraçhol-Barczyk, Duda ve Wiścicka-Fernando, 2022).

Sunum yapılan ortama karşı tüketici tutumunun araştırıldığı çalışmalar bulunmaktadır. Farklı aydınlatma ortamlarının tüketici davranışı üzerine etkilerinin araştırıldığı bir çalışmada katılımcıların farklı aydınlatma koşullarına sahip simüle edilmiş gıda mağazalarında alışveriş yapmaları istenmiş, görev sırasında verileri EEG aracılığı ile toplanmıştır. Yapılan EEG analizleri sonucunda bazı aydınlatma çeşitlerinin beyin aktivitesinde değişikliklere yol açtığı ışığın yoğunluk ve renk sıcaklığının bilinçli ve bilinçaltı tepkileri etkilediği ve pozitif yönde duygusal tepkileri sağladığı ancak ışık türünün demografik özelliklere göre farklılık gösterdiği sonucuna ulaşılmıştır (Horská ve Berčik, 2014).

Gelişen teknoloji ile artırılmış gerçeklik (AR) ve sanal gerçekliğin (VR) (Russo, Bilucaglia ve Zito; 2022) pazarlama alanına dahil olması (Adeola vd., 2022), bu alanlarda EEG ile yapılan nöropazarlama çalışmalarını da beraberinde getirmiştir. Rosenlacher ve ark. (2018) sanal gerçekliğin tüketici üzerine etkilerini incelemek amacıyla 20 katılımcıdan oluşan bir grupla yaptıkları deney sonucunda EEG verilerinden elde edilen bulgular doğrultusunda sanal gerçeklikte izlenen reklamların dikkat ve duygu durumunda artış sağladığı sonucuna ulaşmışlardır. Bu alandaki araştırmaların genişletilmesi amacıyla yeni sistemler de geliştirilmektedir. Li ve ark. (2016) tarafından geliştirilen bir sistemle ürünlerin artırılmış gerçeklik görsellerini içeren bir Android uygulaması ile beyin makine arayüzünün (BMI) entegrasyonu sağlanarak EEG aracılığı ile alınan sinyaller doğrultusunda tüketici tercihlerinin otomatik analizi sağlanmaktadır.

Yukarıda belirtilen uygulama alanları dışında farklı alanlar üzerine yapılan sınırlı sayıda araştırma bulunmaktadır. Tüketici ödeme yöntemi tercihinin araştırıldığı bir çalışmada 66 katılımcıya kulaklık görselleri gösterilmesinin ardından fiyatı ve alıp almama durumları ile tercih ettikleri ödeme yöntemi sorulmuştur. Çalışma sonunda yapılan olaya ilişkin potansiyel (ERP) analizi ile mobil ödemenin ödeme zevkini artırdığı ödeme acısını ise azalttığı sonucuna varılmıştır (Wang vd., 2022).

Nöropazarlama alanında kullanılmak üzere yeni veri analizi tekniklerinin geliştirilmesi ile EEG sinyal verilerine çeşitli filtreleme yöntemleri uygulanarak en çok tercih edilen ürünlerin (Murugappan vd., 2014; Oon vd., 2018), tüketicinin olumlu/olumsuz tutumunun (Mashrur vd., 2022) veya bir ürünü beğenip beğenmeme durumlarının tahmini mümkün hale gelmiştir (Yavada vd., 2017; Ouzir, Lamrani, Bradley ve El Mouddeh, 2024). Golnar-Nik ve ark. (2019), EEG'nin tüketici tercihlerini tahmin etme

potansiyelini arařtırmıř, katılımcıların farklı marka cep telefonu videolarını izledikleri süre zarfında alınan EEG verilerinden elde edilen bulgular dođrultusunda beęenme durumunda sol frontal lobda teta dalgası sinyallerinde, beęenmeme durumunda ise sađ frontal lobda teta dalgası sinyallerinde artış olduđu gözlemlenerek satın alma konusunda karar verme sıklığı ile beęenme/beęenmeme durumlarının tahmini için en ayırt edici bölgenin frontal ve centro-parietal bölgeler olduđu çıkarımına ulařılmıştır.

EEG verileri üzerine çeřitli filtreleme yöntemlerinin uygulandıđı bir alıřmada, 12 katılımcıya reklam videoları izletilmiş elde edilen bulgular dođrultusunda yapılan yöntem ile tüketicinin en çok tercih ettiđi markanın tahmin edilebildiđi ortaya ıkarmıştır (Murugappan vd., 2014). Oon ve ark. (2018) tarafından tüketici tercihinin tahmin edilebilirliğinin arařtırıldıđı bir alıřmada, reklam videosu izletilen 10 katılımcının EEG verileri çeřitli filtreleme yöntemlerinin uygulanması ile analiz edilmiş, elde edilen bulgular dođrultusunda tüketici tercihinin tahmin edilebilirliği dođrulanmıştır. Bir ürüne karşı tüketici tutumunun bulgulanabilirliğinin arařtırıldıđı bir alıřmada 15 katılımcıya önce ürün ardından da ürünlerin tanıtımları gösterilmiş, elde edilen EEG verileri üzerinde uygulanan filtreleme yöntemleri ile ürünlere karşı tüketici tutumunun tespit edilebildiđi sonucuna varılmıştır (Mashrur vd., 2022).

Alıřveriř sırasında tüketicinin ürünü beęenip beęenmeme durumunun cinsiyete göre farklılıđının arařtırıldıđı bir alıřmada 20 katılımcıya 16 çift ayakkabı görseli gösterilmiş, beęenip beęenmeme durumlarını tanımlanan tuřlara basarak ifade etmeleri istenmiştir. Beęenip beęenmeme durumlarının tahmin edilebilirliği üzerine uygulanan analiz tekniđi ile EEG verileri incelendiđinde beęenip beęenmeme durumlarında beynin farklı bölgelerinde kısmen de olsa aktifleřme görüldüđu ve kadınlarda erkeklere oranla daha fazla beyin bölgesinde aktifleřme olduđu bulgulanmıştır (Hassani, Hekmatmanesh ve Nasrabadi, 2022).

Özetle, yapılan alıřmalar göstermektedir ki tüketici davranıřlarını anlamının bir yolu olarak EEG'nin kullanılması, geleneksel arařtırma yöntemleri ile elde edilemeyecek veriler sunarak bilinaltı arklarının iřleyiřinin özömlenmesinde büyük bir öneme sahiptir. Tüketicinin uyarılara verdiđi gerek tepkileri gün yüzüne ıkararak satın alma davranıřını etkileyen unsurların belirlenmesinde ve pazarlama sektöründe uygulanacak yeni stratejilerin geliřtirilmesinde yol gösterici nitelikte olduđu anlařılmaktadır.

### SONU

Tüketici satın alma davranıřına rasyonel unsurlar kadar duygusal unsurlar da dahil olmaktadır (Yücel ve Cořkun, 2018). İnsan beyninde aktifleřen bölgeler üzerinden gerekleřen deđiřimleri inceleyen nöropazarlama, pazarlama sektöründe yeni stratejiler geliřtirmesine olanak sađlamaktadır (Merdin, 2022). Nörogörüntüleme teknikleri arasında diđerlerine oranda daha az uzamsal özünörlük hassasiyeti bulunsa da EEG, neredeyse biliř hızında yakalayabildiđi beyin aktivitelerinin kaydedilmesi için uygun bir aday olarak görölmektedir (Kalaganis vd., 2021). Bireyin katılım, dikkat ve duygusal düzeylerinin ölçömlenmesine büyük fayda sađlamaktadır (Romero, 2017; akt. Royo-Vela ve Varga, 2022). Tařınabilir olması tüketicinin gerek dünyadaki tepkilerinin gerek zamanlı ve hareketini kısıtlamadan ölçömlenmesine olanak tanır (Royo-Vela ve Varga, 2022).

Fonksiyonel manyetik rezonans (fMRI), göz izleme, yüz ifadesi, galvanik deri iletkenliđi, kalp ritmi vb. ölçömlerin yapıldıđı cihazlarla uyumludur ve çođu arařtırmada bu cihazlarla birlikte kullanılmaktadır. Yüksek zamansal özünörlük, kolay tařınabilirlik, göz izleme cihazı ve giyilebilir diđer cihazlar ile kullanılabilir olması, düşük maliyetli olması vb. avantajları (Bazzani vd., 2020) bulunsa da hafıza merkezi gibi beynin derinliklerinde yer alan bölgelerdeki aktivitelerin ölçölmesinin mümkün olmaması dezavantaj olarak görölmektedir (Alarcao ve Fonseca, 2017; akt. Kalaganis vd., 2021).

Tüketici arařtırmalarında kullanılan diđer nörogörüntüleme yöntemleri olan fMRI, manyetoensefalografi (MEG) ve fonksiyonel yakın kızılötesi ışın spektroskopisi (fNIRS) ile karşılařtırıldıđında EEG'nin avantaj ve dezavantajları bulunmaktadır. Beynin kan akıřındaki deđiřikliđi ölçömlenmek amacıyla kullanılan fMRI (Morin, 2011), beynin uzaysal özünörlüđünde iyi bir sonuç verirken EEG zamansal özünörlük avantajına sahiptir (Rossiter ve diđerleri, 2001; Reimann ve diđerleri, 2011; akt. Lin, Cross, Jones ve Childers; 2018). fMRI'ın EEG'nin aksine yüksek maliyetli olması ve tařınabilir olmaması daha az tercih edilme nedeni olabilmektedir (Byrne, Bonfiglio, Rigby ve Edelstyn, 2022). EEG'ye benzeyen, beyindeki aktivitelerin manyetik alanlarını ölçen MEG (Cenizo, 2022), EEG'den daha iyi uzaysal özünörlüđe sahip olsa da EEG gibi beyin yüzeyinde olan aktiviteyi

ölçümlemekle sınırlıdır (Morin, 2011). Her ne kadar EEG'ye benzese ve avantajları olsa da MEG yüksek maliyeti nedeniyle sık tercih edilmemektedir (Cenizo, 2022). Oksijenli ve oksijensiz hemoglobini ölçümlemek amacıyla kullanılan fNIRS (Alsharif, Salleh, Abdullah, Khraiwish ve Ashaari, 2023), EEG'ye oranla daha düşük zamansal çözünürlüğe sahip olsa da zamansal ve uzaysal çözünürlükler arasındaki dengeyi sağlamakla birlikte göz kırpması vb. birçok artefaktan arındırılmıştır (Garczarek-Bak, 2019). Ancak son teknoloji EEG'lerin fNIRS'a göre daha küçük ebatla olması avantaj olarak görülmektedir (Quaresima ve Ferrari, 2019). Yapılan araştırma ile her ne kadar dezavantajları bulunsa da küçük ebatlarda, taşınabilir ve mükemmel zamansal çözünürlüğe sahip olması nedeniyle en sık kullanılan veri toplama araçlarından biri olduğu görülmüştür.

EEG kullanımının tüketici davranışlarının araştırılmasında değerli bilgiler sağladığı ve pazarlama alanındaki stratejilerin tüketici üzerindeki fizyolojik etkilerini anlamak için etkili bir araç olduğu gözlemlenmektedir. Bu çalışma, gelecekte yapılacak olan nöropazarlama araştırmaları için pratik çıktılar sağlamaktadır.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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ENDÜSTRİYEL BİR DA MOTORUN HIZ DENETİMİNİN DURUM GERİ BESLEME  
YÖNTEMİ İLE GERÇEKLEŞTİRİLMESİ  
SPEED CONTROL OF AN INDUSTRIAL DC MOTOR USING FULL STATE FEEDBACK  
METHOD

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## ÖZET

Doğru akım (DA) makineleri lineer davranışları, görece düşük maliyetleri, hız ve pozisyon denetimlerinin kolay yapılabilmesi ve iyi bir moment-hız karakteristiği göstermelerinden dolayı endüstriyel uygulamalarda oldukça yaygın bir şekilde kullanılırlar. Bu makineleri kontrol sistemlerinde etkin şekilde ele alabilmek için güçlü ve güvenilir bir denetleyici tasarımına ihtiyaç vardır. Bu çalışmada hız denetimi için endüstriyel bir DA motorun elektriksel ve mekanik parametreleri laboratuvar testleriyle tayin edilerek motorun durum uzay modeli çıkartılmıştır. Daha sonra durum dinamiklerinin geri besleme katsayıları, doğrusal karesel düzenleyici yöntemi (LQR) ile MATLAB© programı ile sayısal olarak hesaplanmıştır. Denetleyici performansını belirleyen geri besleme katsayıları yeni, güçlü ve popülasyon tabanlı bir meta-sezgisel yöntem olan stokastik fraktal arama (SFA) algoritması ile elde edilmiştir. Referans takibinin doğru yapılabilmesi için her iki denetleyicinin giriş ölçekleme katsayıları hesaplanmıştır. Benzetim sonuçlarına göre SFA yöntemiyle tasarlanan denetleyicinin daha az aşım yaptığı, tepe zamanı ve yükselme zamanının görece daha az olduğu belirlenmiştir.

**Anahtar Kelimeler:** DA Motor, LQR, Stokastik arama algoritması, optimizasyon

## ABSTRACT

Direct current (DC) machines play an important role in industrial applications because of their low cost, linear behavior, easy controllability, and great moment-speed characteristics. In order to effectively use these machines in control systems, a powerful and efficient controller design is needed. In the present study, a state space model of a DC motor is obtained based on its real physical parameters in order to achieve speed control. Then, the feedback coefficients of the state dynamics were calculated numerically with the MATLAB© program using the linear quadratic regulator method (LQR). The feedback coefficients that determine the controller performance were also obtained with the stochastic fractal search (SFS) algorithm, which is a new, powerful and population-based meta-heuristic method. In order to ensure accurate reference tracking, the input scaling coefficients of both controllers were calculated. Simulation results indicate that controllers designed with the SFS method overshoot less, and their peak time and rise time are relatively shorter.

**Keywords:** DC motor, LQR, stochastic search algorithm, optimization

## 1. GİRİŞ

DA motorlar, üretim maliyetlerinin nispeten düşük olması, iyi bir hız-moment karakteristiği göstermeleri, doğrusal davranış sergilemelerinden ötürü ve kolay denetlenebilir olmaları gibi avantajlara sahip oldukları için robotik uygulamalardan endüstriyel alanlara kadar birçok yerde yüzyılı aşkın bir süredir kullanılmaktadırlar [1], [2]. Sabit mıknatıslı DA motorlar fırça ve komütatör bulundurmadıkları için DA motorlarla benzer performans göstermek suretiyle popüler olmuşlardır. Fakat DA motorların yerini tamamen alamamışlardır [3], [4]. Bu durumun önemli nedenleri arasında fırçasız servo motorların üretim ve işletme maliyetlerinin daha fazla olması yer almaktadır. Armatür sargılarına göre demir çekirdekli kalıcı mıknatıslı DA motorları, yüzey sargılı DA motorları, hareketli sargılı DA motorlar,

fırçasız DA motorlar olarak sınıflandırılabilirler [5]. Bu çalışmada Şekil 1.' de gösterilen deneysel amaçlı olarak kullanılan Femsan© firmasına ait endüstriyel bir DA motor kullanılmıştır. Motor istenilen güç seviyelerine çıkabilmesi için yabancı uyarımlı olarak enerjilendirilmiş olup ters elektromanyetik kuvvet katsayısı sabit olarak elde edilmiştir. Bu haliyle modelleme sabit mıknatıslı DA motor modellemesine benzer bir nitelik taşımaktadır.



Şekil 1. Femsan Marka Endüstriyel DA makine

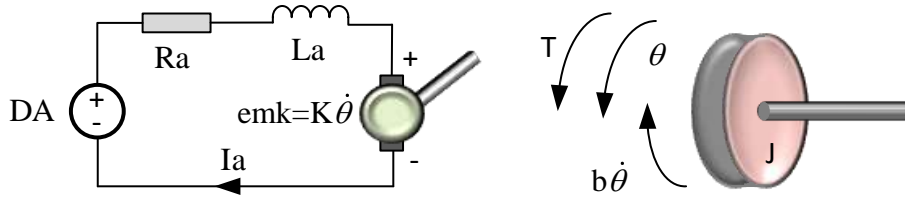
DA motor hız ve pozisyon denetimi için literatürde pek çok çalışmaya yer verilmiştir. Benzetim tabanlı yapılan bir çalışmada genetik algoritmalar kullanılarak PID parametreleri bulunmuş olup bir DA şönt motorunun hız denetimi yapılmıştır [6]. Fakat DA motorun yük altındaki tepkisine yer verilmemiştir. Bir diğer çalışmada ise yapay sinir ağları kullanılarak oran ve integral katsayıları bulunmuş ve adaptif bir şekilde değiştirilebilir özelliği de elde edilmiştir [7]. Fakat çalışma işlem yükü ve karmaşık yapıda bir denetim mekanizması içerdiğinden tercih edilebilir görülmemektedir. Başka bir çalışmada geleneksel PID kontrole ek olarak bir robotik uygulama için düşük hızlarda deadbeat servo kontrol yapılarak sistem salınımı nispeten azaltılmıştır[8]. Modern kontrol sistemlerinde kararsız bir sisteme transfer fonksiyonu şeklinde bir kompensatör eklendiğinde sistem ancak başlangıç koşulları sıfır olmak şartıyla kararlı hale getirilebilir. Başlangıç koşulları ve sisteme ait tüm fiziksel ve elektriksel durum değişkenlerini analiz edebilme olanağı tanıdığı için tasarım durum-uzay formatı şeklinde yapılmaktadır. Sistem dinamikleri birinci derece türevsel eşitlikler ve bu eşitlikler arasında doğrusal bağımlılık ilişkisi göz önünde bulundurularak durum uzay matrisleri elde edilir. Her bir durum değişkeninden sistemin referans girişine bir katsayıyla çarpılarak negatif geri besleme yapılır ise sistem hem kararlı hale getirilebilir hem de istenen kök değerlerine taşınabilir. Bu katsayıların hesabı için Bass-Gura ve Ackerman yöntemleri literatürde yaygın olarak bilinmektedir. Ancak ulaşılmak istenen kök değerleri bilinmez ise detayı sonraki bölümlerde verilecek olan doğrusal karesel düzenleyici (LQR) yöntemiyle optimal olarak hesaplanabilir [9]. Fakat hata değerinin minimizasyonu denetleyici çıkışı düşünüldüğünde diğer performans koşullarını olumsuz yönde etkileyebilmektedir [10]. Denetleyicinin kararlı bir şekilde çalışması ve sistem dinamiklerinin istenen değerlere başarılı bir şekilde ulaşmasını sağlamak amacıyla optimal geri besleme kazanç katsayılarının bulunması amacıyla (SFA) algoritması kullanılmıştır. Metasezgisel algoritmaların çoğu sürü hayvanı hareketi gibi doğal davranışları taklit ederken bu algoritma içinde fraktal adı verilen bir matematik kavramını bireylerin doğal büyüme olgusundan ilham alınarak ortaya konmuştur [11]. Düzenli olarak görülen difüzyon özelliğinin kullanılması ile bu algoritmadaki rastgele fraktallar arama uzayının daha verimli bir şekilde keşfedilmesini sağlamaktadır [12].

Bu çalışmada ise endüstriyel bir DA motora ait parametreler laboratuvar koşullarında yapılan testler neticesinde elde edilmiş, hız kontrolü için durum uzay formatında modelleme yapılmıştır. Öneme değinilen geri besleme katsayılarının hesabı, sistemin oturma zamanı, yükselme zamanı, tepe zamanı ve bozucu etkiyi elimine etme kabiliyeti gibi performans kriterleri göz önüne alınarak yeni, güçlü ve algoritmik parametrelere ihtiyaç duymayan bir meta-sezgisel yöntem olan (SFA) tekniğiyle bulunmuştur. Elde edilen sonuçlar benzetim çalışması yapılarak performans açısından LQR tekniğiyle kıyaslanarak bulunan sonuçlar yorumlanmıştır.

## 2. MATERYAL VE METOD

### 2.1 DA Motor ve Modeli

DA motorlar, uygulanan gerilim sonucu uyarım kutupları ve kolektör dilimleri vasıtasıyla sabit bir elektromanyetik alan oluşturarak doğrusal hareket imkânı sağlayan motorlardır. DA motora ait elektriksel eşdeğer devre ve serbest cisim diyagramı Şekil 2’ de verilmiştir.



**Şekil 2.** DA motorun elektriksel eşdeğer devresi ve serbest cisim şeması

$T$  ile ifaden edilen motor momenti endüvi akımı  $I_a$  ile tork sabiti  $K_t$  ‘nin çarpımına eşittir. Endüklenen gerilim zıt elektromanyetik kuvvet (emk), dönme hızıyla zıt emk sabiti  $K_e (=K_t)$  sabitiyle orantılı olup Denklem 1. ve Denklem 2.’ De gösterilmiştir.

$$T = K_t I_a \quad (1)$$

$$emk = K \dot{\theta} \quad (2)$$

Bu çalışmada kullanılan DA motora ait elektriksel ve mekanik parametreler motor üzerinde yapılan testler sonucunda elde edilmiş olup Tablo 1. de değerler verilmiştir.

**Tablo 1.** DA Motora Ait Parametreler

Atalet momenti $J=0,025 \text{ Kg.m}^2/\text{sn}^2$
Viskoz sürtünme katsayısı $b=0,0045 \text{ Nms/rad}$
Moment sabiti $K=1.1908\text{V/rad/sn}$
Zıt emk sabiti $K_t= \text{N.m/Amp}$
Armatür direnci $R=3,3698\Omega$
Armatür endüktansı $162,5\text{mH}$

Daha sonra Kirchoff akımlar kanununa göre Denklem 3. ve Newton eylemsizlik kanununa göre Denklem 4. elde edilir.

$$L \frac{di}{dt} + RI_a = V - K \dot{\theta} \quad (3)$$

$$J \ddot{\theta} + b \dot{\theta} = K_t I_a \quad (4)$$

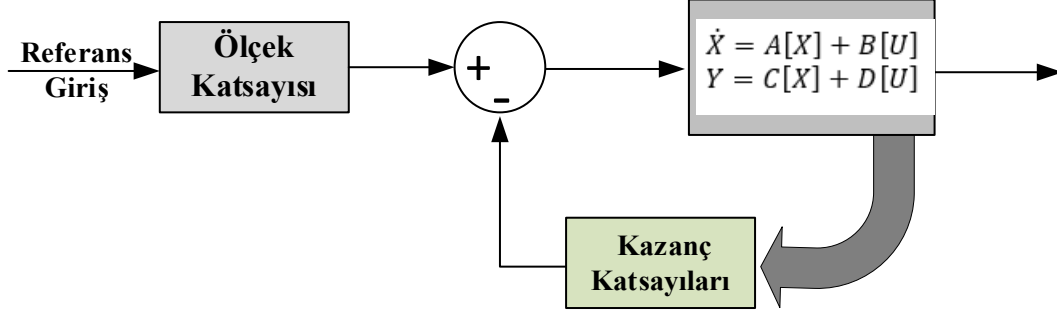
DA motor modeline ait dinamik durum değişkenleri Denklem 3. ve Denklem 4 göz önünde bulundurularak durum uzay matrisleri aşağıdaki gibi elde edilir.

$$A = \begin{bmatrix} -\frac{b}{J} & \frac{K}{J} \\ -\frac{K}{L} & -\frac{R}{L} \end{bmatrix}, \quad B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, \quad C = [1 \quad 0], \quad D = [0], \quad (5)$$

### 2.2 Tam Durum Geri Besleme ve LQR ile Optimal Kontrol

Sisteme ait tüm durum değişkenlerinin ölçülebildiğini kabul ederek Denklem 5 ‘te verilen matrisler yardımıyla sistemin durum denklemleri belirlenmektedir. Burada durum geçiş matrisi olan A matrisi ve giriş matrisi olan B matrisi kullanılarak sistemin durum denetlenebilir olup olmadığının testi

yapılmalıdır. Literatürdeki genel şeması Şekil 3’ de verilen denetleyicide her bir durum bir kazanç katsayısıyla çarpılarak negatif geri besleme yapıp girişe uygulanmaktadır. Böylece sistemin dinamik davranışı değiştirilebildiği gibi öz değerleri sağ yarı S düzleminde olan kararsız sistemler de kararlı hale getirilebilir [13]. Kontrol sistemlerindeki son değer teoremi düşünüldüğünde denetleyicinin referans giriş işaretini tam olarak takip edebilmesi her zaman mümkün olmayabilir. Bu nedenle girişe bir ölçeklendirme katsayısı hesaplanarak eklenmelidir.



Şekil 3. Tam durum geri besleme denetleyicinin genel şeması

Kazanç katsayılarının bulunmasında kök yer eğrisi üzerinde eğer elde edilmek istenilen kökler belirlenmiş ise Bass-Gura ve Ackerman metotları kullanılabilir. Ancak sonuç aşım, yükselme zamanı ve salınım yapma gibi performans ölçütlerine bağlı olarak her zaman başarılı olmayabilir. Bu yüzden sistem giriş ve çıkışına bağlı  $J$  performans ölçütünü minimize edecek şekilde  $Q$  ve  $R$  matrisleri belirlenir. Bilinen karesel performans fonksiyonunun biçimi aşağıdaki gibidir.

$$J(u) = \frac{1}{2} \int_0^T [x^T(t).Q.x(t) + u^T(t).R.u(t)]dt \quad (6)$$

Denklem 6’ da performans indeksini minimize edecek yöntem literatürde değinilen Hamilton optimizasyon yöntemidir. Bu çalışmada MATLAB® fonksiyon kütüphanesinde mevcut olan doğrusal karesel düzenleyici ile analitik olarak optimizasyon yapılarak geri besleme kazanç katsayıları hesaplanmıştır.

### 2.3 SFS Algoritması ve Uygulaması

Durum geri besleme katsayılarının SFS algoritması ile otomatik belirlenmesi için öncelikle sistemin modeline ihtiyaç duyulmaktadır. Bunun için MATLAB/Simulink ortamında tasarlanan ve Şekil 2’de verilen model ele alınmıştır. SFS optimizasyon algoritması ise MATLAB/m-file ortamında yazılarak geri besleme parametreleri optimizasyon probleminin çözümü için MATLAB/Simulink modeline iletilmiştir. Optimizasyon algoritmasındaki fraktal yahut aday denetleyicilerin uygunluk testi için Denklem 7’de verilen amaç fonksiyonu kullanılmıştır.

$$J = \alpha_1 \int_0^{t_{sim}} |e|.t.dt + \alpha_2 |M_p| \quad (7)$$

Denklem 7’de  $J$  amaç fonksiyonunu,  $e$  hata değeri ve  $M_p$  ise cevabın tepe değerini temsil etmektedir.  $t_{sim}$  ise simülasyon süresi,  $\alpha_1$ ,  $\alpha_2$ , ağırlık katsayılarıdır. Bu katsayılar çalışmada sırasıyla 0,999 ve 0,001 olarak ayarlanmıştır. SFA algoritmasının başlangıcında, geri besleme katsayılarından oluşan bir dizi fraktal 0 ile 10 arasında rastgele üretilmiştir. Her bir birey ya da denetleyici Şekil 2’de görünen geri besleme ile denetim sistemine uygulandıktan sonra sistemin bu parametrelerle belli bir süre benzetimi gerçekleştirilmiş ve farklı cevaplara ulaşılmıştır. Organizmanın performansı Denklem 7 kullanılarak hesaplandıktan sonra SFA difüzyon ve güncelleme fazları ile yenilenmek üzere optimizasyon modülüne geri döndürülürler. Bu süreç maksimum iterasyon sayısına kadar tekrar etmektedir. Optimizasyon sonunda elde edilen son katsayılar önerilen denetleyici parametreleri olacak şekilde dikkate alınmış ve Bölüm 2.4’de kullanılmışlardır. Deneme yanılma metodu ile SFA algoritmasının parametrelerinin en iyi değerleri *organizma sayısı* = 20 ve *iterasyon sayısı* =50 olacak şekilde ayarlanmıştır.

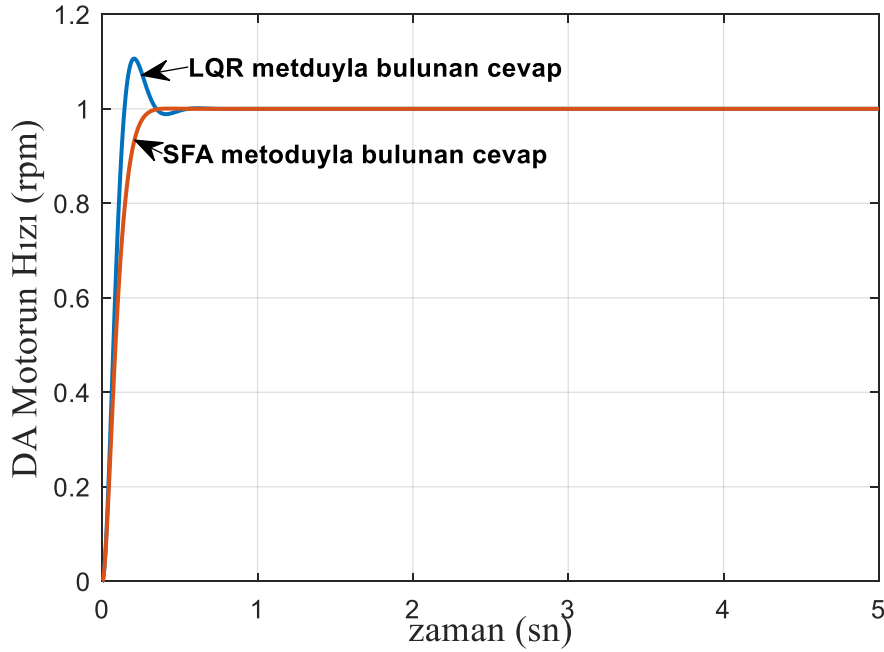
### 2.4 Benzetim Çalışması ve Bulgular

DA motora ait parametreler yardımıyla Denklem 5 kullanılarak MATLAB/Simulink platformunda modelleme yapılmış ve geri besleme katsayıları LQR metoduyla hesaplanarak benzetim çalışmasına

yerleştirilmiştir. Denklem 5. modelde kullanıldığı için birinci durum hız bilgisini, ikinci durum ise DA motorun çektiği akım miktarını temsil eder. Bu çalışmada hız kontrolü amaçlandığı için performans kıyaslamasında birinci durum bilgisi çıkış olarak alınmıştır. LQR tekniği için seçilen  $Q$  ve  $R$  ağırlık katsayı matrisleri aşağıdaki gibi olup ölçek katsayısı ise 1,2077 olarak hesaplanmıştır. Birinci durum ve ikinci durum geri besleme katsayıları ise sırasıyla 0,0036 ve 0,1531 olarak MATLAB© fonksiyonlar kütüphanesi kullanılarak hesaplanmıştır.

$$Q = \begin{bmatrix} 50 & 0 \\ 0 & 1 \end{bmatrix} \text{ ve } R = [0 \quad 1], \quad (8)$$

Daha sonra SFA algoritmasıyla belirlenen geri besleme katsayıları buluna geri besleme katsayıları MATLAB/Simulink ortamında kullanılarak benzetim yapılmıştır. Bu katsayılar birinci ve ikinci durum olmak üzere sırasıyla 0,00110889 ve 2,25069 olarak bulunmuştur. Ölçek katsayısı ise 1,2131 olup sisteme birim basamak girişi verilerek her iki denetleyicinin çıkış grafiği Şekil 4’de gösterilmiştir.



Şekil 4. Denetleyicilere ait birim basamak cevapları

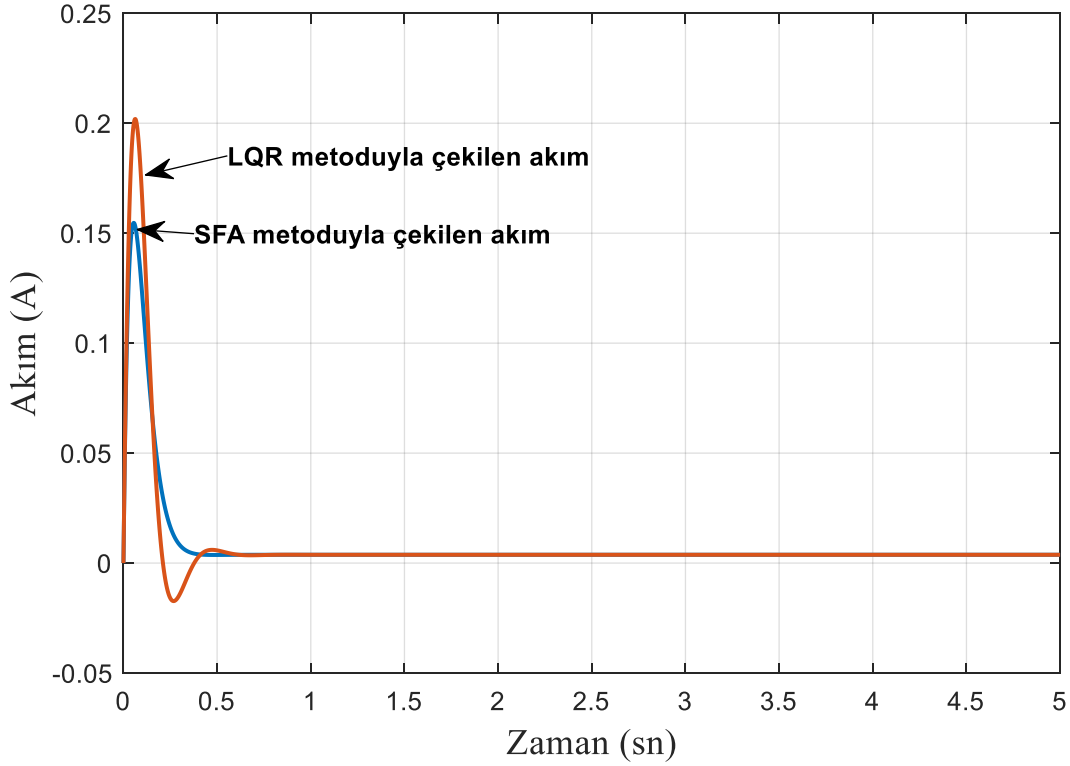
Tablo 2. de ise her iki denetleyici tasarımına ait performans bilgileri verilmektedir. Tepe zamanından ( $t_p$ ) ve yükselme zamanından ( $t_r$ ) ödün vermeksizin oturma zamanı ( $t_s$ ), maksimum aşım ( $M_p$ ) miktarı değerlerinin oldukça iyileştirildiği görülmektedir.

Tablo 2. Denetleyicilere ait geçici durum performans değerleri

	Yükselme zamanı	Tepe zamanı	Oturma zamanı	Maksimum aşım %
LQR ile bulunan değerler	19 ms	22 ms	17 ms	% 12
SFA algoritması ile bulunan değerler	20,5 ms	23 ms	11 ms	%0,6

DA motora ait en önemli büyüklüklerden birisi de motorun çektiği akımdır. Denetleyici ile benzetim yapılırken çekilen akım miktarı ikinci durum değişkeni Şekil 5’te verilmiştir. SFA ile tasarlanan

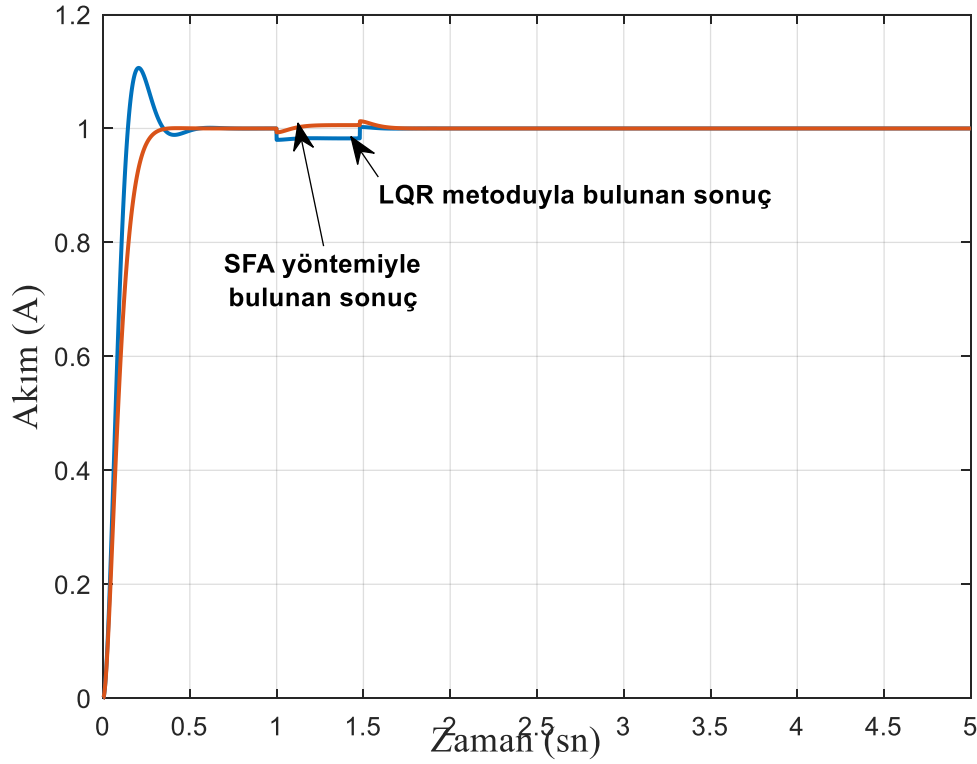
denetleyici ile çekilen akım eğrisinin dinamik performansının daha iyi olduğu ve maksimum akım değerinin daha düşük olduğu görülmektedir.



Şekil 5. DA motorun çektiği akım miktarı

Denetleyicinin bozucu etkilere karşı koyma performansını kıyaslayabilmek için  $t = 1$  s'de DA motor miline yük bindirilmiş ve bu yük  $t = 2$  s'de kaldırılmıştır. Elde edilen sonuçlar Şekil 6'te gösterilmektedir. SFA algoritmasıyla yapılan denetleyicinin bozucu girişi daha iyi ve kısa sürede elimine ettiği görülmektedir.





Şekil 6. Denetleyicilerin bozucu etkiye karşı koyma performansları

### 3. SONUÇ

DA makineler düşük üretim maliyetleri, pratik bir şekilde denetlenebilir olmaları, doğrusal davranış sergilemeleri ve başarılı bir moment hız dinamiği gösterdikleri için endüstride önemli bir yer tutarlar. Fakat iyi bir denetleyici olmadan doğru bir hız ve pozisyon kontrolü yapılamaz. Bu çalışmada endüstriyel ve parametreleri laboratuvar çalışmalarıyla elde edilmiş bir DA motora ait büyüklükler kullanılarak durum uzayı formatında modelleme yapılmış ve tam durum geri beslemeli denetleyici tasarlanmıştır. Bu geri besleme katsayılarının bulunması için MATLAB© fonksiyonlar kütüphanesinde LQR metodu kullanılarak yeni ve güçlü bir metasezgisel yöntem olan SFA algoritmasıyla bu katsayılar optimize edilmiş ve denetleyici performansları kıyaslanmıştır. SFA ile tasarlanan denetleyici yükselme zamanı ve tepe zamanı kriterlerinden ödün vermeksizin maksimum aşım miktarı ve oturma zamanı gibi büyüklüklerde başarı göstermiştir. Ayrıca bozucu etkinin çok daha iyi bir şekilde elimine edildiği görülmüştür.

### 4. TARTIŞMA

Bu çalışma ile DA makineler ait doğrusal denetleyici tasarımları için metasezgisel bir yöntem önerilmiş ve doğrudan sistem dinamikleri iyileştirilmiştir. Böylece denetim sistemi tasarımı için popülasyon tabanlı yaklaşımların ilerletilebilmesi açısından öncülük edilmiştir. Gerçek zamanlı uygulamalar için iyi bir adım atılmıştır.

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BİR MANYETİK ASKILAMA SİSTEMİNE AİT PID DENETLEYİCİ  
PARAMETRELERİNİN STOKASTİK FRAKTAL ARAMA ALGORİTMASI İLE  
BELİRLENMESİ

DETERMINATION OF PID CONTROLLER PARAMETERS OF A MAGNETIC  
LEVITATION SYSTEM USING STOCHASTIC FRACTAL SEARCH ALGORITHM

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## ÖZET

Bu çalışmada birçok endüstriyel ve ticari alanda kullanılan, açık çevrim, kararsız, hızlı dinamikleri ve doğrusal olmayan durum değişkenlerine sahip olan manyetik askılama sistemi ele alınmıştır. Sistemin modeli gerçek fiziksel parametreler ile oluşturulmuş ve Tylor serisine açılım yöntemiyle uygun denge noktalarında doğrusallaştırılmıştır. Bu sistemin denetimi için kontrol sistemlerinde ve literatürde pratik yapısından dolayı yaygın bir şekilde kullanılan PID denetleyicisi tasarlanmıştır. Bu denetleyicinin performansını belirleyen parametrelerin elde edilmesi için basit, güçlü, yeni bir meta-sezgisel yöntem olan stokastik fraktal arama (SFA) algoritması kullanılmıştır. Bulunan parametrelerin performansının testi amacıyla bu parametreler kök yerleştirme metodunun kullanıldığı benzer bir çalışmadaki parametrelerle kıyaslanmıştır. Farklı referans girişler kullanılarak elde edilen benzetim sonuçlarından önerilen yaklaşımın sistemin oturma zamanından fazla ödün vermeden yükselme ve tepe zamanı ile maksimum aşım miktarını önemli ölçüde azalttığı görülmüştür. Ayrıca sisteme bozucu girişler uygulanmış ve SFA tabanlı PID denetleyici bu girişlere karşı gürbüz bir performans sergilemiştir.

**Anahtar Kelimeler:** Manyetik askılama, kök yerleştirme, PID, stokastik fraktal arama algoritması, optimizasyon

## ABSTRACT

In this study, the magnetic levitation system, which is open loop, unstable and has fast dynamics along with nonlinear state variables and is used in many industrial, commercial areas, is discussed. The system is modelled with real physical variables and linearized at the appropriate equilibrium points using the Tylor series expansion method. Because of its practical structure, a PID controller is widely employed in literature for controlling the concerned system. In order to determine the parameters of this controller that has a significant impact on control performance, a simple, powerful, and metaheuristic search technique known as the stochastic fractal search (SFS) algorithm is adopted. To analyze the performance of SFS tuned controller parameters, they are compared to that published in a reported similar study where the controller parameters are determined using root location method. From the simulation results obtained using different reference inputs, it has been seen that the proposed approach significantly reduces the rise/peak time and maximum overshoot without compromising the settling time much. Moreover, disturbance inputs are applied to the system and SFS based PID controller shows a robust performance against these inputs.

**Keywords:** Magnetic levitation, root location, PID, stochastic fractal search, optimization

## 1.GİRİŞ

Manyetik askılama sistemleri, içeriğinde ferromanyetik malzeme bulunan herhangi bir cisimi, mekanik bir destek ve temas bulunmaksızın belirli bir pozisyonda asılı kalacak şekilde tasarlanan sistemlerdir. 1842’ de Samuel Earnshaw’ ın ortaya koyduğu bir teoremle doğal manyetik alanlar ile kararlı bir askılamanın sağlanamayacağını ispat edilmiştir. Bu nedenle 1930’ lu yıllardan beri elektrik akımı

yardımla yapay olarak elde edilen manyetik alanlarla birçok askılama sistemi tasarlanmıştır [1]. Bu sistemlere temasın olmadığı, sürtünme, titreşim ve ısınmanın istenmediği, gürültüye karşı hassasiyet gerektiren mühendislik uygulamalarında yer verilmektedir. Örnek olarak, yüksek hızlı Maglev tren, biyomekanik implant yerleşimi, uzay aracı simülatörleri, hassas yarıiletken levha taşımacılığı belirtilebilir [2]-[3]. Fakat bu sistemler aşırı derecede lineer olmayan durum değişkenleri içerdikleri ve kararsız bir dinamik yapıda oldukları için hassas uygulamalarda gürbüz, pratik ve güçlü denetleyicilere ihtiyaç duymaktadırlar. Bu amaçla literatürde birçok denetleyici kullanılmıştır. Örneğin Wei ve arkadaşları manyetik askılama sistemi üzerinde dahili ve harici gürültüyü tahmin etmek ve sönmölemek amaçlı bir denetleyici tasarlamışlardır. Bu çalışmada sistemde oturma zamanı performansı çok iyi olmamakla birlikte istenmeyen salınımlar gözlenmiştir [4]. Bir diğer çalışma bulanık sinirsel ağ tabanlı denetleyicinin başlangıç koşulları geliştirilerek parçacık sürü optimizasyonu kullanılarak sistem çevrim dışı olacak şekilde bulunmuş ve manyetik askılama sistemine uygulanmıştır [5]. Manyetik askılama sisteminde evrimsel programlama tabanlı bulanık kayan kipli denetleyici tasarımı yapılarak diğer kayan kipli denetim yöntemleriyle kıyaslanmıştır [6]. Başka bir çalışmada ise bu sistem için dahili model denetleyici tabanlı PID denetleyici tasarımı yapılarak parametre belirleme işlemi için hem doğrusal hem de doğrusal olmayan modeller kullanılmıştır [7].

PID (Proportional+Integral+Derivative) denetleyici pratik uygulanabilirliği, kolay anlaşılabilir algoritmasından dolayı proses kontrol organlarında 1940' lı yıllardan beri yaygın bir şekilde kullanılmaktadır [8]. Diğer çeşitleri olan P, PI ve PD denetleyicilerin yetersiz kaldığı sistemlerde PID tercih edilmelidir. Bu manada oransal denetimde oluşan kararlı durum hatası PI denetim ile giderilebilir. Fakat, meydana gelen aşımalar, bu denetime türevsel etkinin de eklenmesiyle en aza indirilir yahut tamamen kaldırılır [9]. Literatürdeki bir diğer çalışmada endüstriyel uygulamalardaki denetim organlarının çoğunun PI/PID çeşidinde olduğu belirtilmiştir [10]. Bu denetleyicinin performansı oransal kazanç, integral kazancı ve türevsel kazanç olmak üzere yalnızca üç parametreye bağlıdır. Sistemin verimli şekilde denetlenebilirliği bu üç parametrenin düzgün ayarlanmasıyla yakından ilgilidir. Buradan esinlenilerek sistemin performansını optimal noktaya taşıyacak bir denetleyici parametrelerinin ayarı için stokastik fraktal arama (SFS) algoritmasından faydalanılmıştır. Basit ama güçlü arama kabiliyeti ile göze çarpan SFS algoritması 2015 yılında ortaya konmuştur [11]. Metasezgisel algoritmaların çoğu sürü hayvanı hareketi gibi doğal olan davranışlarını taklit ederken bu algoritma içinde fraktal adı verilen bir matematik kavramını bireylerin doğal büyüme olgusundan ilham alınarak ortaya koymaktadır. Düzenli olarak görülmekte olan difüzyon özelliğinin kullanılması ile bu algoritmadaki rastgele fraktallar arama uzayının daha verimli bir şekilde keşfedilmesini sağlamaktadır. Bir diğer aşama ise bazı istatistiksel kurallara göre her bireyin yeniden pozisyon olduğu güncellenme aşamasıdır [12].

Bu çalışmada ise yukarıdaki bazı pratik özelliklerine değinilen PID denetleyici tasarımı ve analizi incelenmiştir. Sistemin yükselme zamanı, tepe zamanı, maksimum aşım miktarı gibi performans kriterlerini etkileyen PID denetleyici katsayılarının belirlenmesi için pratik, güçlü ve yeni bir meta-sezgisel metot olan (SFS) algoritması kullanılmış olup sistem gerçek fiziksel değerleri baz alınarak modelleme yapıldığında ikinci dereceden ve kararsız bir yapıda olduğu görülmektedir. Bu tarz sistemler için PID katsayılarının belirlenmesinde sönmü oranı, doğal frekans ve oturma zamanı gibi büyüklüklerin kolayca formüle edildiği kök yerleştirme tekniği de kullanılmaktadır. Literatürde bu tekniğin kullanıldığı bir çalışmadan elde edilen katsayılar ile SFS algoritması kullanılarak elde edilen katsayıların yer aldığı PID denetleyiciler nitelikli bir benzetim çalışması yapılarak performans açısından kıyaslanmıştır.

## 2. MATERYAL VE METOD

### 2.1. Manyetik Askılama Sistemi

Manyetik askılama sisteminin esas amacı Şekil 1' de görülen m kütesine sahip demir bir bilyenin elektromanyetik sargının merkezinde yer alan ferromanyetik nüve ile arasındaki x pozisyonunun istenilen seviyede tutulmasıdır. Bilyeye uygulanan kuvvet, bilye ile nüve arasındaki uzaklığın karesiyle ters orantılıdır. Topun pozisyonunun algılanması için Şekil 1' de görüleceği gibi bilyeye bir kızıl ötesi ışık kaynağından ışın gönderilmektedir. Bilyeden yansımayan ışınlar hemen karşısındaki fotodedektör tarafından algılanmak suretiyle konum bilgisi elde edilir. İstenen pozisyona göre elektromanyetik sargının akımı artırılıp azaltılarak denetim sağlanmaktadır. Bu çalışmada Feedback Instruments Limited

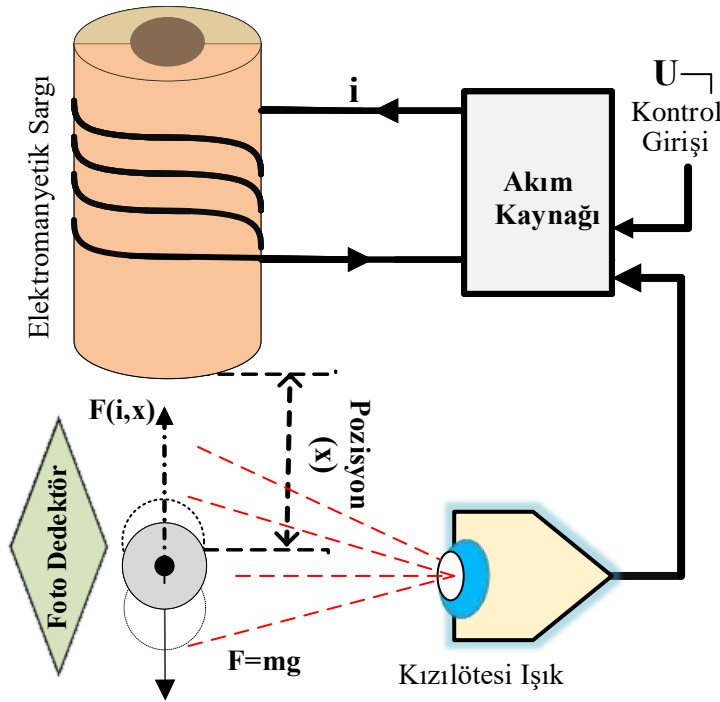
şirketinin ürettiği ticari manyetik askılama sistemi temel alınarak modelleme yapılmıştır. Sistemin fiziksel parametreleri Tablo 1’ de verilmektedir [13].

**Tablo 1.** Manyetik askılama sisteminin gerçekleştirilebilir parametreleri

Parametreler	Değerleri
m- Topun Kütle	20 gr
g- Yerçekimi İvmesi	9,81 m/s <sup>2</sup>
i <sub>0</sub> - Sargı Akımının Çalışma Noktası Değeri	0,8 A
x <sub>0</sub> - Top Pozisyonunun Denge Noktası	9 mm
k <sub>1</sub> - Sargı Akımının Kontrol Kazanç Katsayısı	1.05 A/V
k <sub>2</sub> - Sensör Akım Kazanç Katsayısı	143,48 V/m

Elektromanyetik sargının içinde dolaşan akım  $i$ , ve topun pozisyonu  $x$  arasındaki lineer olmayan ilişkiyi veren eşitlik aşağıdaki gibidir. Bu denklemde  $g$  yerçekimi ivmesi,  $k$  sargı parametrelerine kazanç katsayısını temsil eder.

$$m\ddot{x} = mg - k \frac{i^2}{x^2} \quad (1)$$



**Şekil 1.** Manyetik askılama sistemi şeması

Denklem 1’ den de görüleceği üzere sistemin yapısının non-linear olmasından ötürü sistem uygun bir bir çalışma noktası etrafında lineerleştirilmelidir. Çalışma noktası olarak  $x_0$  ve  $i_0$  ile temsil ettiğimiz noktaları ele alarak transfer fonksiyonu elde edilmek istenirse  $\ddot{x}$  eşitliği denklem 1’ den aşağıdaki gibi elde edilir.

$$\ddot{x} = g - f(x,i), f(x,i) = k \frac{i^2}{mx^2} \quad (2)$$

Daha sonra  $\ddot{x} = 0$  eşitliği de kullanılarak

$$g = f(x, i) \rightarrow i_0, x_0 \quad (3)$$

Denklem 3' den  $i_0, x_0$  değerleri elde edilebilir.

$$k = \frac{mgx_0^2}{i_0^2} \quad (4)$$

Taylor Serisine açılım yöntemini kullanılıp doğrusallaştırma yapılmak istendiğinde serinin  $x_0$  ve  $i_0$  çalışma noktası civarındaki türevsel eşitliği aşağıdaki gibi elde edilebilir. Doğrusallaştırma amaçlandığında demir bilyenin pozisyonu için  $x = x_0 + \Delta x$  ifadesi yazılabilir.  $\Delta x$  Çalışma noktası civarındaki çok küçük bir değişimdir. Sargı içinde dolaşan sargı akımı için ise  $i = i_0 + \Delta i$  eşitliğiyle verilebilir. Burada da  $\Delta i$  çalışma noktası civarında çok küçük bir değişimi ifade eder. Bu kabullerle topun pozisyonu  $x$  ve sargı akımı  $i$  yi ifade eden denklemin son hali aşağıdaki gibi elde edilir.

$$\ddot{x} = -\left(\frac{\partial f(i, x)}{\partial i}\right)_{i_0, x_0} \Delta i + \left(\frac{\partial f(i, x)}{\partial x}\right)_{i_0, x_0} \Delta x \quad (5)$$

Denklemin her iki tarafının laplace dönüşümü elde edilirse,

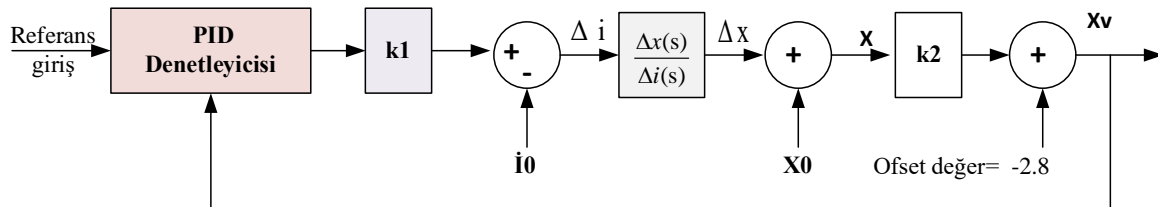
$$s^2 \Delta x = -(K_i \Delta i + K_x \Delta x), \quad (7)$$

$$s^2 \Delta x + K_x \Delta x = -K_i \Delta i, \quad (8)$$

$$\Delta x(s^2 + K_x) = -K_i \Delta i, \quad (9)$$

$$\frac{\Delta x}{\Delta i} = \frac{-K_i}{s^2 + K_x} \quad (10)$$

Bu eşitlikte  $K_i = 2mg / i_0$ ,  $K_x = 2mg / x_0$  ile ifade edilmektedir.



Şekil 2. Manyetik askılama sisteminin sayısal modeli ve PID denetleyici.

## 2.2. SFA Algoritması ve Uygulaması

Denetleyici parametrelerinin SFA algoritması ile otomatik belirlenmesi için öncelikle sistemin modellenmesi gerekmektedir. Bunun için Matlab/Simulink ortamında düzenlenen ve Şekil 2'de verilen model kullanılmıştır. SFA optimizasyon algoritması ise Matlab/m-file ortamında kodlanmış ve PID denetleyici parametreleri optimizasyon probleminin çözümü için Matlab/Simulink modeline iletilmiştir. Optimizasyon algoritmasındaki bireylerin ya da muhtemel denetleyicilerin uygunluğunun test edilmesi için Eş 11'de verilen amaç fonksiyonu kullanılmıştır.

$$J = \alpha_1 \int_0^{t_{sim}} |e| \cdot t \cdot dt + \alpha_2 \frac{d}{dt} x_m + \alpha_3 M_p \quad (11)$$

Eş. 11'de  $J$  amaç fonksiyonunu,  $e$  hata değeri,  $x_m$  sistemin cevabı ve  $M_p$  ise cevabın tepe değerini ifade etmektedir.  $t_{sim}$  Simülasyon süresi ve  $\alpha_1, \alpha_2, \alpha_3$  ağırlık katsayılarıdır. Bu katsayılar çalışmada sırasıyla 0,6, 0,15 ve 0,25 olarak belirlenmiştir. SFA algoritmasının başlangıcında, PID parametrelerinden oluşan bir dizi birey  $-10 \leq K_p, K_i, K_d \leq 0$  olacak şekilde rastgele türetilmiştir. Her bir birey ya da denetleyici



Şekil 2’de görünen kapalı çevrim kontrol sistemine uygulandıktan sonra sistemin bu parametreler vasıtasıyla belli bir süre benzetimi gerçekleştirilmiş ve farklı sonuçlara ulaşılmıştır. Her bir birey performansı Eş. 11 kullanılarak hesaplandıktan sonra SFA fazları ile güncellenmek üzere optimizasyonun gerçekleştiği aşamaya geri gönderilirler. Organizmaların bu şekilde sırayla kapalı çevrim kontrol sistemine uygulanması ve ardından optimizasyon modülüne geri gönderilmeleri aşamaları maksimum iterasyon sayısına kadar tekrarlanmaktadır. Optimizasyon sonunda elde edilen nihai parametreler önerilen denetleyici parametreleri olarak tanımlanmış ve Bölüm 2.3’de kullanılmışlardır. Deneme yanılma yoluyla SFA algoritmasının parametrelerinin en iyi değerleri birey sayısı = 10 ve iterasyon sayısı = 50 olacak şekilde ayarlanmıştır.

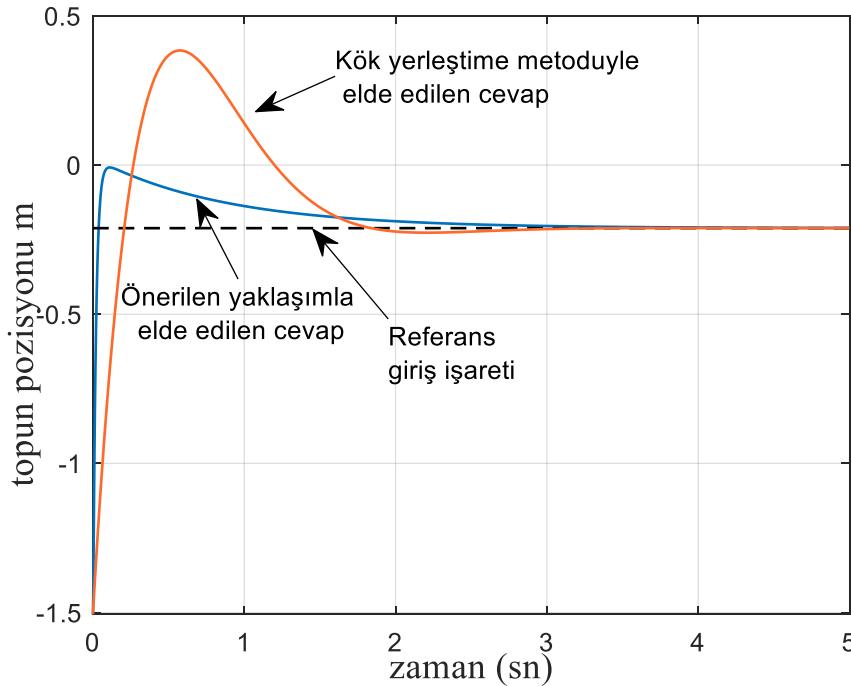
### 2.3. Benzetim Çalışması ve Bulgular

Manyetik askılama sistemi, modellendiğinde ve doğrusallaştırıldığında elde edilen denklem 10’ dan da görüleceği gibi sistem ikinci dereceden kararsız bir yapıya sahiptir. Bu çeşit sistemler için geleneksel kök yerleştirme metodu, kök yer eğrisi analizi ve performans kriterlerine bağlı olarak formüllerin kullanılmasıyla birlikte PID kontrol parametrelerinin bulunması oldukça yaygındır [3]. Ancak bu çalışmada hassas bir denetleyicinin tasarlanması için optimum parametrelere ihtiyaç duyulduğundan SFA algoritması ile parametreler hesaplanarak [3] çalışmasındaki sonuçlarla performans açısından kıyaslanmıştır. Öncelikle sisteme giriş olarak birim basamak fonksiyonu şeklinde bir giriş işareti verilmiş böylece referans takip cevabı gözlenmiştir. Elde edilen parametreler ise Tablo 2’ de verilmiştir.

**Tablo 2.** Benzetim çalışmasında kullanılan PID parametreleri

Metot	$K_p$	$K_i$	$K_d$
Geleneksel kök yerleştirme metodu	$K_p=-2,8674$	$K_i=-4,4354$	$K_d=-0,5065$
SFA algoritması ile bulunan parametreler	$K_p=-9,99478$	$K_i=-9,99202$	$K_d=-0,116655$

Şekil 3’de görüleceği üzere sistemin girişine birim basamak işareti uygulandığı zaman önerilen metot kullanılan denetleyicinin çıkış cevabı yükselme zamanı, tepe zamanı, oturma zamanı maksimum aşım miktarı gibi performans kriterlerine göre ele alınmış ve bulgular Tablo 3’ te verilmiştir.



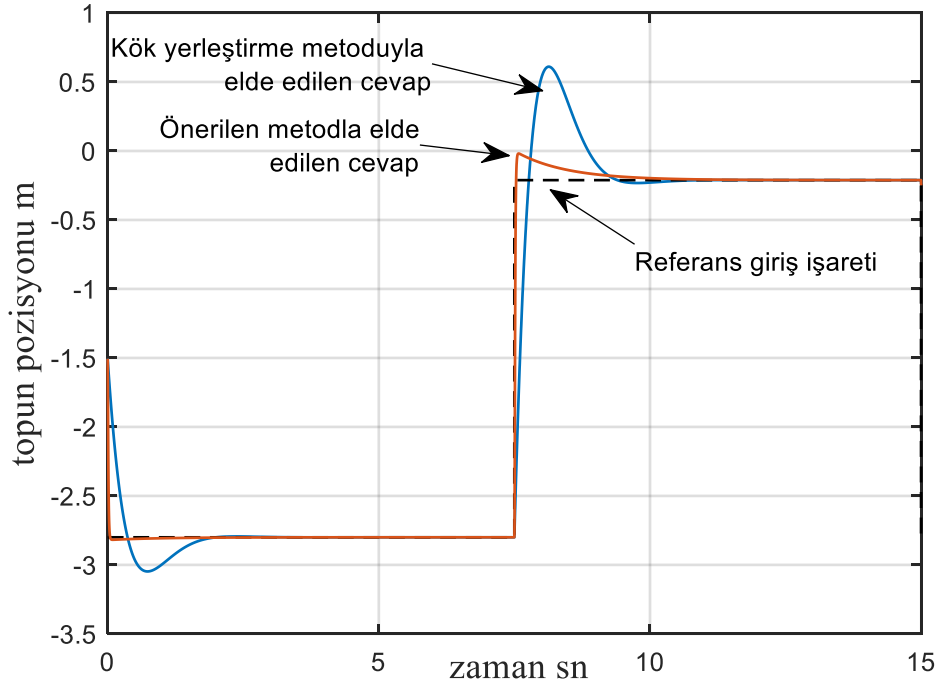
**Şekil 3.** Denetlenen sistemin birim basamak cevabı

Tablo 3'ten görüleceği gibi oturma zamanından ( $t_s$ ) fazla ödün vermeksizin yükselme zamanı ( $t_r$ ), tepe zamanı ( $t_p$ ) ve maksimum aşım miktarı ( $M_p$ ) kayda değer ölçüde iyileştirilmiştir.

**Tablo 3.** Benzetim çalışmasında kullanılan PID parametrelerinin performansları

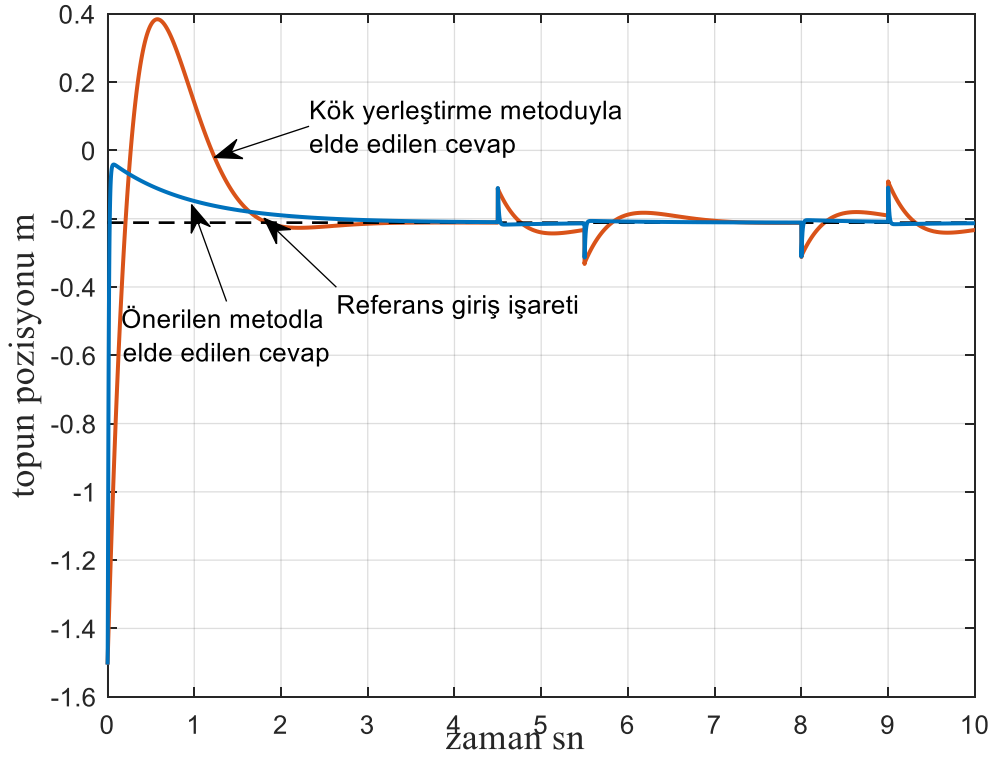
	Yükselme zamanı	Tepe zamanı	Oturma zamanı	Maksimum aşım %
Geleneksel kök yerleştirme metodu	0,41sn	0,61sn	2,33sn	%37,6
SOA algoritması ile bulunan parametreler	0,05sn	0,1sn	2,33sn	%16,5

Sistemin referans takip performansını incelemek ve (Maden,2018) çalışmasındaki verilerle kıyaslamasını gerçekleştirmek için bu çalışmadaki referans kare dalga işareti aynı şekilde uygulanmış ve Şekil 4' te görüleceği üzere daha iyi bir çıkış performansının sergilendiği görülmüştür.



**Şekil 4.** Sistemin kare dalgalı referans giriş işareti cevabı

Sistemin bozucu etkiye dayanım performansının test edilebilmesi için manyetik askılama sisteminin çıkışındaki topun pozisyonuna 5. ve 7. saniyeler arasında bozucu etki uygulanmış ve 10 sn boyunca sistem modeli çalıştırılmış; önerilen metotla tasarlanan denetleyicinin daha iyi ve kısa sürede bozucu etkiyi elimine ettiği Şekil 5' te gözlemlenmiştir.



Şekil 5. Sistemin bozucu etkiyi elimine etme cevabı

### 3. SONUÇ

Bu çalışmada sürtünmesiz ortam sağlayabilme, gürültüsüz ve istenmeyen titreşimleri önleme gibi avantajlarından dolayı birçok mühendislik alanında yer bulan manyetik askılama sistemi ele alınmıştır. Sistem gerçek fiziksel parametreler kullanılarak modellenmiş aşırı derecede doğrusal olmayan ve kararsız yapıdaki bu sistem önce doğrusallaştırılmış olup ardından denetleyici olarak literatürde yaygın olarak yer alan PID denetleyici düşünülmüştür. Oturma zamanı, yükselme zamanı, maksimum aşım miktarı gibi performans kriterlerini etkileyen PID katsayılarının bulunması için literatürde oldukça yeni ve güçlü bir metasezgisel yöntem olan SFA algoritması kullanılmıştır. Sonuçların geleneksel kök yerleştirme metoduyla bulunan katsayıların performansıyla kıyaslandığında oturma zamanından fazla ödün vermeden yükselme zamanı, tepe zamanı ve maksimum aşım miktarı açısından daha iyi bir sergilediği görülmüştür. Ayrıca bozucu etkiye dayanım konusunda da daha başarılı bir performansın sergilendiği görülmüştür.

### 4. TARTIŞMA

Bu çalışma, hassas uygulamalar için denetleyici tasarımında metasezgisel yöntemlerin kullanılması için önemli bir sonuç teşkil etmektedir. Ayrıca gerçek zamanlı uygulamalar için yol göstermekte ve denetleyici performansının önemi ortaya konmaktadır. Denetleyici tasarımının uygulanabilirliği hususunda da gerekli parametre ayarlarının yapılması ön plana çıkarmaktadır.

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BAKTERİ KAYNAKLI YEŞİL SENTEZ İLE ELDE EDİLEN GÜMÜŞ  
NANOPARTİKÜLLERİN METİLEN MAVİSİ BOYASININ GİDERİMİNE ETKİSİ  
WEAVINGS EFFECT OF SILVER NANOPARTICLES OBTAINED BY BACTERIAL  
GREEN SYNTHESIS ON THE REMOVAL OF METHYLENE BLUE DYE

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**ÖZET**

Metilen mavisi, özellikle tekstil olmak üzere kağıt, kimya, tıp gibi pek çok endüstride kullanılmaktadır. Prosesler sonrasında meydana gelen boya içeren atık sular karışıkları toprak ve su kaynaklarını kirleterek ekolojik düzene zarar verdiği bilinmektedir. Sentetik boyalar aynı zamanda insanlar üzerinde mutajenik, toksik, alerjik ve kanserojenik reaksiyonlara sebep olabilmektedir. Bu boyaların giderilmesi için uzun yıllardır çözüm aranmakla birlikte hem etkili hem de güvenilir ve temiz yöntem arayışı bilim insanlarını son yıllarda biyolojik nanopartiküllere yönlendirmiştir. Metal nanopartiküllerin sahip oldukları yüksek yüzey/hacim oranlarından dolayı ağır metal, boya, pestisit vb kirleticilerin uzaklaştırılmasında yüksek etkinlik gösterdiği pek çok çalışmada belirtilmiştir. Nanopartiküller kimyasal, fiziksel yöntemlerle elde edilebilmekle birlikte son yıllarda toksik olmayan, yüksek biyoyoumlu alternatif yöntemler dikkat çekmektedir. Yeşil sentez olarak adlandırılan mikroorganizma veya bitki aracılığı ile nanopartikül sentezi çevre dostu ve güvenilir olduğu için yeni araştırmaların ilgi odağı olmuştur. Metal nanopartiküller içerisinde gümüş nanopartiküllerin (AgNp) tıbbi teşhis ve tedavide, kontrollü ilaç salınımında, kanser tedavilerinde, koruyucu olarak gıda ambalajı ve kozmetiklerde, ağır metal ve boya gideriminde çok geniş bir kullanımı vardır. *Actinobacter* sp., *Bacillus* sp, *Staphylococcus aureus*, *Thiobacillus thioparus*, *Pseudomonas aureus*, *Streptomyces* sp. gibi farklı mikroorganizmaların gümüş nanopartikülünü sentezleyebildiği yapılan çalışmalar ile gösterilmiştir Bu çalışma kapsamında mikroorganizma kaynaklı yeşil sentez ile elde edilecek gümüş nanopartiküllerin metilen mavisi giderimi etkinliğinin araştırılması amaçlanmıştır. Yerli kaynaklardan izole edilip tanımlanmış, antimikrobiyal ve sitotoksik etkinliğe sahip *Paenibacillus* sp. (YSM) bakterisi kullanılarak gümüş nanopartikül sentezlenmiştir. *Paenibacillus* sp. kültürü ve bakteri içermeyen süpernatant 1 mM AgNO<sub>3</sub> çözeltisi içerisinde 37°C sıcaklıkta (150 rpm) çalkalanarak 24 saat inkübe edilmiştir. İnkübasyon sonunda hem pellet hem de süpernatantta gümüş nanopartikülüne özgü kahverengimsi renk oluşumu gözlenmiştir. Nanopartikül içeren çözeltilerin UV-spektrofotometrede 325-800 nm dalga aralığında absorpsiyon taraması yapılmıştır. 420-450 nm

dalga boyunda elde edilen pikler gümüş nanopartikül sentezini doğrulanmıştır. Elde edilen AgNp ler metilen mavisi (50ml, 20 mg) çözeltisine eklenerek 37°C sıcaklıkta (150 rpm) 72 saat inkübasyona bırakılmıştır. Çalışma sonucunda pelletten elde edilen nanopartiküllerin %8, süpernatant ile elde edilen gümüş nanopartiküllerin ise %26 metilen mavisi giderme yeteneğinde olduğu gözlenmiştir.

**Anahtar kelimeler:** Gümüş nanopartikül, metilen mavisi, *Paenibacillus* sp., yeşil sentez.

## ABSTRACT

Methylene blue is used in many industries such as textile, paper, chemistry and medicine. It is known that the dye-containing wastewater pollutes the soil and water resources which it mixes and harms to ecology Synthetic dyes can also cause mutagenic, toxic, allergic and carcinogenic reactions in humans. Although solutions have been sought for the removal of these dyes for many years, the search for an effective, reliable and clean method has led scientists to biological nanoparticles in recent years. It has been stated in many studies that metal nanoparticles show high effectiveness in removing pollutants such as heavy metals, dyes, pesticides, etc. due to their high surface/volume ratios. Nanoparticles can be obtained by chemical and physical methods. However, in recent years, non-toxic, highly biocompatible alternative methods have attracted attention. Nanoparticle synthesis through microorganisms or plants, called green synthesis, has become the focus of new research because it is environmentally friendly and reliable. Among metal nanoparticles, silver nanoparticles (AgNp) have a wide range of uses in medical diagnosis and treatment, controlled drug release, cancer treatments, preservatives in food packaging and cosmetics, and heavy metal and dye removal. Studies have shown that different microorganisms such as *Actinobacter* sp., *Bacillus* sp, *Staphylococcus aureus*, *Thiobacillus thioparus*, *Pseudomonas aureus*, *Streptomyces* sp. can synthesize silver nanoparticles. In this study, it was aimed to investigate the methylene blue removal efficiency of silver nanoparticles obtained by microorganism-derived green synthesis. Silver nanoparticles were synthesized using *Paenibacillus* sp. (YSM) bacteria has antimicrobial and cytotoxic activity. *Paenibacillus* sp. bacteria and the bacteria-free supernatant were incubated in 1 mM AgNO<sub>3</sub> solution for 24 hours with shaking (150 rpm) at 37°C. At the end of the incubation, a brownish color formation specific to silver nanoparticles was observed in both the pellet and the supernatant. Absorbance scanning of nanoparticle-containing solutions was performed in the UV-spectrophotometer in the 325-800 nm wave range. The peaks obtained at 420-450 nm wavelength confirmed silver nanoparticle synthesis. The obtained AgNps were added to methylene blue (50 ml, 20 mg) solution and incubated for 72 hours at 37°C (150 rpm). As a result of the study, it was observed that the nanoparticles obtained from the pellet had the ability to remove 8% methylene blue, and the silver nanoparticles obtained from the supernatant had the ability to remove 26%.

**Keywords:** Silver Nanoparticle, Methylene Blue, *Paenibacillus* sp., Green Synthesis

## GİRİŞ

Günümüz gelişen teknolojileri ile üretilen pek çok sentetik boya özellikle tekstil olmak üzere kozmetik, gıda gibi pek çok fabrikada kullanılmaktadır. Yapılan kimyasal işlemler sonrasında çok yüksek miktarda boyar madde içeren atık su meydana gelmektedir. Çoğunlukla sentetik olan bu boyaların kanserojenik, toksik ve alerjik olduğu bilinmektedir. Boyalar ile kirlenmiş bu sular, karışıkları toprak ve su kaynaklarını kirletmekte aynı zamanda karışıkları sularda bulanıklığa sebep olup güneş ışınlarını engelledikleri için suda yaşayan canlıları olumsuz yönde etkilemekte ve ekolojik düzene zarar vermektedir (Ertuğrul ve Dönmez, 2009, Zayak vd. 2017).



Bu zararın önüne geçmek için atık suların temizlenmesi çalışmaları yıllardır bilim insanlarının araştırma konusu olmuş ve pek çok farklı yöntemler geliştirilmiştir. Buna rağmen atık sulardaki boyaların temizlenmesi konusu hala çözülme bekleyen büyük bir problem olarak karşımızda durmaktadır (Samuel vd. 2020). Metilen mavisi (MB), pamuk, yün ve ipeğin boyanmasında yaygın olarak kullanılan mavi katyonik bir tiyazin boyasıdır. Pozitif yükün amin nitrojen atomunda ya da kükürt atomunda yer aldığı üç mezomerik konfigürasyona sahiptir (Somasundaram vd. 2021). Atık sularla birlikte doğaya karışmasıyla ekosistemi kirlettiği ayrıca ve toksisitesi nedeniyle maruz kalan insanlarda mide ağrısı, kusma ve dizanteri gibi ciddi bir tehlikeler oluşturabildiği bildirilmiştir (Kadam vd. 2020, Somasundaram vd. 2021).

Nanopartiküller (Np), 0,1- 1000 nm boyutunda, yüksek yüzey enerjisi, büyük yüzey fraksiyonuna sahip malzemelerdir (Mechouche vd. 2022). Sahip oldukları yüksek yüzey/hacim oranlarından dolayı nanomalzemeler, kimya, malzeme bilimi, mühendislik, fizik, biyoloji vb bilim dallarının bir arada çözümler ürettiği etkili ve güvenilir kaynaklar olarak uzun zamandır tercih edilmektedirler (Ali vd. 2017, Kumari ve Tripathi 2020). Nanopartiküller genel olarak karbon bazlı, inorganik nanopartiküller ve metalik, iletken nanopartiküller olarak iki grupta incelenmektedir. Metalik Np'ler içerisinde gümüş nanopartiküller (AgNp), tıbbi teşhis ve tedavide, kontrollü ilaç salınımında, kanser tedavilerinde, koruyucu olarak gıda ambalajı ve kozmetiklerde kullanılmaktadır (Yu vd. 2013, Mechouche vd. 2022). Bunun yanı sıra ağır metal, boya, pestisit vb kirleticilerin uzaklaştırılması gibi ekotoksikoloji çalışmalarında son yıllarda büyük bir ivme ile yerini almıştır (Kadam vd. 2020).

Gümüş nanopartiküllerin sentezinde fiziksel, kimyasal yöntemler kullanılabilirlikle birlikte, daha hızlı, ekonomik ve çevreci olması sebebiyle son yıllarda "yeşil sentez" olarak adlandırılan canlıların kullanıldığı yöntem öne çıkmıştır (Singh ve Dhaliwal, 2018). Yeşil sentezde bitkiler, bitki ekstraktları gibi materyallerin yanı sıra maya, küf, bakteri gibi mikroorganizmalar da kullanılabilir (Reddy vd. 2010). *Actinobacter* sp., *Bacillus* sp., *Staphylococcus aureus*, *Thiobacillus thioparus*, *Pseudomonas aureus*, *Streptomyces tuius* gibi farklı mikroorganizmaların gümüş nanopartikülünü sentezleyebildiği yapılan çalışmalar ile gösterilmiştir (Reddy vd. 2010, San vd. 2015, Kumari ve Tripathi 2020). *Paenibacillus* gram pozitif, çubuk formda, aerobik, endospor oluşturan bir bakteri cinsidir (Ekim vd. 2020, Huq 2020). Antimikrobiyal, antioksidan özelliklerinden dolayı probiyotik olarak kabul edilmektedir (Çalık vd. 2017, Ekim vd. 2017, Ekim vd. 2020, Sreenivasa vd. 2021). *Paenibacillus* cinsleri ile yapılmış kısıtlı çalışma bulunmakla birlikte güncel araştırmalarda gümüş nanopartikül sentezlediğini gösteren çalışmalar mevcuttur (Sreenivasa vd. 2021, El Shanshoury vd. 2022, Tregubova vd. 2023). Yapmış olduğumuz çalışmada sığırlardan izole edilip tanımlanmış *Paenibacillus* sp. bakterisinin ekstraselüler ve intraselüler yollarla gümüş nanopartikül sentezlemesi, sentezlenen bu AgNp'lerin metilen mavisi giderim yetenekleri araştırılmıştır. Çalışmamız bu konuda yapılmış ilk araştırma niteliğindedir.

## YÖNTEM

### Bakterilerin Geliştirilmesi

*Paenibacillus* sp. bakterisi Luria-Bertani (LB) broth besiyerinde 37°C sıcaklıkta 18 saat inkübe edilerek geliştirilmiştir (Şekil 1). 2. aktif sonrası gelişen bakteriler 6000 rpm hızda 15 dakika santrifüj edilerek fosfat tamponu (PBS) ile 2 kez yıkanmıştır. Mcfarland 0,5 bulanıklığına ayarlanan *Paenibacillus* sp. kültürü, besiyerine %2'lik inokule edilerek 24 saat inkübasyona bırakılmıştır (Reedy vd. 2010).



Şekil 1. Bakterinin geliştirilmesi a) Besiyerlerinin hazırlanması b) Bakterilerin aktifleştirilmesi

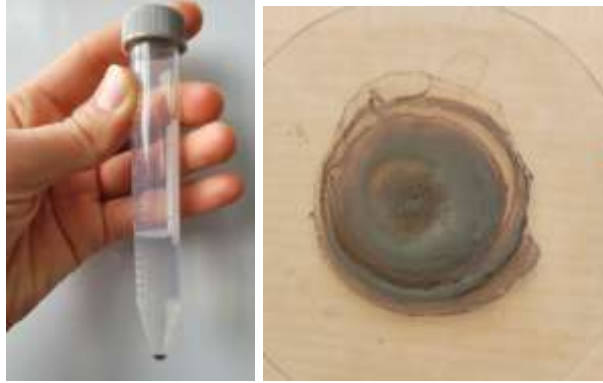
### Gümüş Nanopartikül Sentezi

Mcfarland 0,5 bulanıklığına ayarlanarak 24 saat inkübe edilen kültür, pellet ve süpernatantın (intraselüler ve ekstraselüler sentez) ayrılması için santrifüje alınmıştır. Santrifüj sonrası 0,22 µm filtreden geçirilen süpernatant (10 ml), 100 ml erlene alınarak 90 ml 1mM AgNO<sub>3</sub> ile tamamlanmıştır. Pellet için, PBS ile yıkanan pellet üzerine 100 ml 1mM AgNO<sub>3</sub> eklenmiştir. Örnekler 37 °C sıcaklıkta 100 rpm hızla çalkalanarak 24 saat inkübe edilmiştir (Şekil 2). Çözeltilerdeki kırmızı kahverengi renk oluşumu nanopartikül oluştuğunun göstergesi olarak kabul edilmiştir. Gümüş nanopartikül sentezi UV- spektrofotometrede 325-800 nm absorbansta okunmuş, 400-450 nm aralığında görülen pikler ile sentez doğrulanmıştır (San vd. 2015).



Şekil 2. Yeşil sentez ile gümüş nanopartikül sentezi

İnkübasyon sonunda gümüş nanopartikül içeren çözeltiler 6000 rpm'de 30 dk santrifüj edilerek distile su ile yıkanarak saat camında kurutulmuştur (Şekil 3).



Şekil 3. Sentezlenen gümüş nanopartiküller a)Yıkama sonrası nanopartiküller b) Kurumaya bırakılan nanopartiküller

### Gümüş Nanopartiküllerin Metilen Mavisini Giderimi

Sentezlenen gümüş nanopartiküllerden 20 mg tartılıp 50 ml boya solüsyonuna (20 mg metil mavisini) eklenmiş, 37 °C sıcaklıkta çalkalanarak inkübe edilmiştir (Şekil 4). 72 saat sonunda nanopartikül içeren boya çözeltilerinin renginde nanopartikül içermeyen kontrol grubuna göre açılma olduğu belirlenmiştir. Çözeltilerden alınan örnekler UV-Spektrofotometresinde (600nm) ölçüm yapılarak yüzde giderim etkinliği aşağıdaki formüle göre hesaplanmıştır (San vd. 2014);

$$\% \text{ Giderim} = \frac{(\text{Kontrol}-\text{Örnek})}{\text{Kontrol}} \times 100$$



Şekil 4. Gümüş nanopartikül içeren ve içermeyen metilen mavisini çözeltilerindeki boya gideriminin araştırılması

## BULGULAR

### Gümüş Nanopartikül Sentezi

AgNP sentezinin birincil tespiti, çözelti renginin açık sarıdan koyu kahverengiye değişimi ile ortaya konulmuştur. Yukarıda belirtilen koşullarda yapılan sentez sonrasında pellet ve süpernatantta renk değişimi (Şekil 5) makalelerde belirtildiği gibi gözlenmiştir (Huq 2020, El Shanshoury vd. 2022). Renkte meydana gelen bu değişimin, bakterilerdeki protein, sekonder metabolit gibi bileşenlerin ortamdaki gümüş nitratin katalitik süreçte azaltması ile meydana geldiği öne sürülmektedir (Ali vd. 2017, Alfryyan vd. 2022).



Şekil 5. Sentezlenen gümüş nanopartiküller (a:  $AgNO_3$  b: pellet tarafından sentezlenen nanopartikül c: süpernatant tarafından sentezlenen nanopartikül d: süpernatant kontrolü:  $AgNO_3+LB$ )

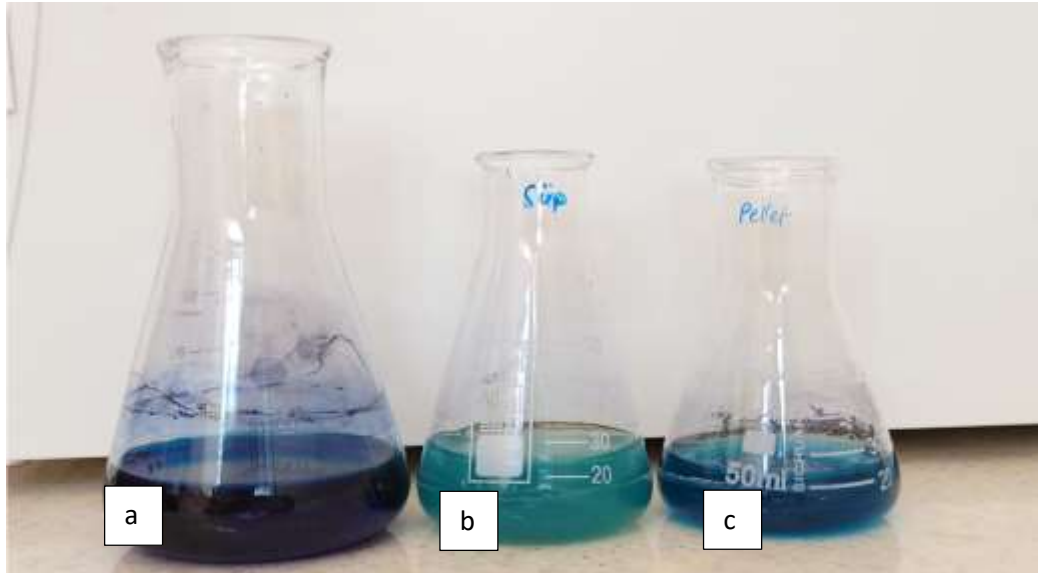
Yeşil sentez sonuçları UV-Spektrofotometrede istenilen aralıkta (yaklaşık 420-440 nm) pik vererek (Şekil 6) gümüş nanopartikül sentezinin gerçekleştiğini doğrulamıştır (Ali vd. 2017, Singh ve Dhaliwal, 2018, Alfryyan vd. 2022).



Şekil 6. Bakteri pellet ve süpernatantının sentezlediği gümüş nanopartiküllerin 325-800 nm dalga boyundaki pikleri

### Metilen Mavisi Giderimi

Elde edilen AgNp ler metilen mavisi (50ml, 20 mg) çözeltisine eklenerek 37°C sıcaklıkta (150 rpm) 72 saat inkübasyona bırakılmıştır. Çalışma sonucunda pelletten elde edilen nanopartiküllerin %8, süpernatant ile elde edilen gümüş nanopartiküllerin ise %26 metilen mavisi giderme yeteneğinde olduğu gözlenmiştir (Şekil 7).



Şekil 7. Gümüş nanopartiküllerin metilen mavisi giderimi a)Kontrol b)Süpernatant ile elde edilen AgNp c)Pellet ile elde edilen AgNp

### TARTIŞMA VE SONUÇ

Dünya çapında her yıl 280.000 ton tekstil boyasının ekosisteme karıştığı bilinmektedir. Bu boyalar çevre kirliliğine, ekolojik zararlara ve kanser gibi ciddi etkilere neden olabilmektedir



(Samuel vd. 2020). Fiziksel, kimyasal, biyolojik birçok yöntem ile boyaların zararlı etkilerinin engellenmesi çalışmaları hali hazırda devam etmektedir. Bununla birlikte son yıllarda nanopartiküller ile yapılan çalışmalar hız kazanmış, pek çok güncel araştırmalar nanopartiküllerin yüksek etkinliğe sahip olduğunu kanıtlamıştır (Alfryyan vd. 2022). Nanopartiküller içerisinde gümüş Npler yüksek aktiviteye sahip olması aynı zamanda toksik olmaması gibi sebeplerle tıbbi çalışmalarda, ilaç denemelerinde, biyolojik etkinlik araştırmalarında tercih edilir olmuştur (Roshmi vd. 2017). Nplerin sentezlenmesinde hızlı gelişmeleri, ekonomik olması, tekrarlanabilirliğinin kolay olması, çevre dostu ve biyouyumlu olması sebebiyle mikroorganizma aracılı yeşil sentez araştırmacıların ilgi odağı olmuştur (Somasundaram vd. 2021, Sreenivasa vd. 2021, Mechouche vd. 2022).

Metilen mavisi boyasının gideriminde çok farklı yöntemler kullanılmaktadır. Bu çalışmada yerli kaynaklardan izole edilerek tanımlanan probiyotik özellikteki *Paenibacillus* sp. kullanılarak ekstraselüler ve intraselüler yollarla AgNp sentezlenmiş, sentezlenen bu AgNplerin metilen mavisi giderimi araştırılmıştır. Yaptığımız çalışmada hem bakterilerin hem de süpernatantın gümüş nanopartikül sentezleyebildiği görülmüştür. UV-spektrofotometre sonuçları AgNp sentezinde süpernatantın, bakteri hücrelerine göre daha verimli olduğunu ortaya koymuştur. Potansiyel bir yeni probiyotik olan *Paenibacillus* sp. nin sentezlediği bu AgNplerin antimikrobiyal, antioksidan, antikanserojenik, yara iyileştirme gibi çalışmalarda kullanılabileceği düşünülmektedir. *Paenibacillus* türlerinin AgNp sentezleyebildiğini gösteren çalışmalar bulunmakla birlikte (Sreenivasa vd. 2021, El Shanshoury vd. 2022, Tregubova vd. 2023) bu nanopartiküllerin metilen mavisi giderimine dair bir çalışmaya rastlanılmamıştır. *Paenibacillus* cinsine yakın *Bacillus* türleri ile yapılan araştırmalarda *Bacillus* sp. ile sentezlenen AgNplerin metilen mavisi gideriminde yüksek etkinlik gösterdiği ortaya konulmuştur. Bu bağlamda Alfryyan ve ark. (2022), *B. cereus* ile sentezledikleri ekstraselüler AgNplerin %100, intraselüler AgNplerin ise %24,1-50,6 oranında giderim yapabildiğini belirtmişlerdir. İntraselüler sentezde bakteri içerisinde gelişen sentezin zor etkinlik gösterdiği, etkinliğin artırılması için sonikasyon gibi parçalayıcı işlemlerin faydalı olabileceği belirtilmiştir. Vadivel ve ark. (2021), *B. kochii* kültürünün hücre içermeyen süpernatantı (ekstraselüler sentez) ile sentezledikleri AgNplerin metilen mavisini yaklaşık %73 temizleyebildiğini ifade etmişlerdir. Roshmi ve ark. (2017), *B. subtilis* SJ 15 suşunun ışık altında fotokatalitik degradasyon ile %76,5 metilen mavisi giderim yeteneğinde olduğunu göstermişlerdir. Bunlar dışında bitki ekstraktı ile yapılan araştırmada Singh ve Dhaliwal (2018), *Nepeta leucophylla* ekstraktı ile elde ettikleri AgNplerin metilen mavisini ışık altında %82,8 ışık yokluğunda % 61,25 oranında degrade edebildiğini göstermişlerdir. Yapmış olduğumuz araştırmada pelletten elde edilen nanopartiküllerin %8, süpernatant ile elde edilen gümüş nanopartiküllerin ise %26 metilen mavisi giderim yeteneğinde olduğu gözlenmiştir. Alfryyan ve ark. (2022) çalışmalarında da olduğu gibi bizim çalışmamızda da intraselüler AgNplerin etkinliğinin ekstraselüler senteze göre daha düşük olduğu gözlenmiştir. %26lık giderim umut verici olmakla birlikte çalışma sonuçlarımızı diğer araştırmalar ile kıyasladığımızda *Paenibacillus* sp. kaynaklı AgNplerin *Bacillus* türlerine göre daha düşük aktiviteye sahip olduğu fark edilmektedir. AgNplerin sentezinde kullanılan konsantrasyon ve sürelerin değiştirilerek yapılacak yeni çalışmalarda bu giderimin daha da artırılabilirliği düşünülmektedir.

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### **TEŞEKKÜR**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## SOSYAL İÇERİK PLATFORMLARININ WEB SİTE ARAYÜZ TASARIMLARININ KULLANICILAR AÇISINDAN KULLANIM KOLAYLIĞI SAĞLAMASI YÖNÜNDEN İNCELENMESİ: ONEDİO VE BUZZFEED WEB SİTELERİNİN KULLANIM ANALİZİ<sup>1</sup>

### EXAMINATION OF WEBSITE INTERFACE DESIGNS OF SOCIAL CONTENT PLATFORMS FOR EASE OF USE FOR USERS: USAGE ANALYSIS OF ONEDIO AND BUZZFEED SITES

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#### ÖZET

Bu çalışmada sosyal içerik platformları olan Onedio ve BuzzFeed web sitelerinin kullanılabilirliği incelenmiş; kullanıcılar ile web site arayüzleri arasındaki ilişki ortaya konulmuştur. Çalışmanın verileri, 2023 yılında Karabük ilinde yaşayan Onedio ve BuzzFeed web sitelerini daha önce kullanmış ve 18-45 yaş aralığındaki 30 kişi ile yarı yapılandırılmış görüşme yöntemi uygulanarak elde edilmiştir. Çalışma, Nielsen (2020) tarafından geliştirilen 10 kullanılabilirlik buluşsal yöntemine dayandırılarak, özellikle popüler sosyal içerik platformlarından biri olan Onedio ve BuzzFeed'in web site arayüz tasarımlarının kullanıcılar açısından kullanım kolaylığını incelemeyi amaçlamaktadır. Çalışma, 5'li likert ölçeği kullanılarak katılımcılara anket yolu ile görevler verilerek oluşturulmuştur. Katılımcılar, her iki web sitesine girmesi yolu ile verilen görevleri gerçekleştirmektedir. Bu geri bildirimler, kullanıcıların platformlarda gezinme deneyimleri, içeriklere erişimleri ve genel memnuniyetleri hakkında önemli bilgiler sunmaktadır. Araştırmanın beklentileri şunlardır: (1) Web arayüz tasarımcıları, kullanıcıların web sitelerinde vakit geçirmesiyle aynı orantıdadır. (2) Sosyal içerik platformlarının arayüz tasarımları kullanıcıların aradıklarını bulmakta kolaylık sağlamaktadır. (3) Kullanıcılar ve arayüz tasarımı arasındaki ilişki pozitif yöndedir. (4) Arayüz tasarımları, kolay kullanım sunduğu takdirde kullanıcıların sosyal içerik platformlarını daha sık ziyaret etmesi arasında bir ilişki vardır. (5) Sosyal içerik platformlarının arayüzü, kullanıcılar açısından olumlu yöndedir. Bulgular, web arayüz tasarımının, kullanıcı davranışı ve deneyimini etkilediğini göstermektedir. Sosyal içerik platformlarını ziyaret etmelerine katkı sağladığını ve arayüz tasarımlarını kullanım kolaylığı açısından optimize ettikleri görülmüştür. Genel olarak, sosyal içerik platformlarının web arayüzünde yer alan reklamların kullanıcıların gözlerini yorduğu ve içerikleri okunmakta zorlanmasına yol açması arayüz tasarımının kullanılabilirliği açısından olumsuz bir durum yarattığı belirlenmiştir. Ayrıca çalışmada, iletişim sayfalarının "geri bildirim sağlama" açısından daha iyi hale getirilmesi önerilmiştir. Kullanıcılar, arayüz üzerinde yer alan içeriklerin okunabilirliği, font kullanımı, menü yerleşimi ve kullanımı kullanıcı deneyimi açısından olumlu görüş belirttiklerini ifade etmişlerdir. Bu sonuçlara göre platformların web arayüz tasarımı genel hali ile kullanışlı olduğu saptanmıştır.

<sup>1</sup> Bu çalışma, Mustafa Üsame Akgün'ün, Karabük Üniversitesi Lisansüstü Eğitim Enstitüsü Disiplinlerarası İletişim ABD YL Programı, "Sosyal İçerik Platformlarının Web Site Arayüz Tasarımlarının Kullanıcılar Açısından Kullanım Kolaylığı Sağlaması Yönünden İncelenmesi: Onedio Ve Buzzfeed Web Sitelerinin Kullanım Analizi" başlıklı tezinden türetilmiştir.

**Anahtar kelimeler:** Web Arayüz Tasarımı, Web, İnternet, Kullanılabilirlik.

### ABSTRACT

In this study, the usability of social content platforms Onedio and BuzzFeed websites was examined; the relationship between users and website interfaces was revealed. The data of the study was obtained by applying a semi-structured interview method with 30 people between the ages of 18-45 who lived in Karabük province in 2023 and had previously used the Onedio and BuzzFeed websites. The study aims to examine the ease of use of the website interface designs of Onedio and BuzzFeed, one of the popular social content platforms, for users, based on the 10 usability heuristics developed by Nielsen (2020). The study was created by giving tasks to the participants via a survey using a 5-point Likert scale. Participants perform the tasks given by entering both websites. These feedbacks provide important information about users' browsing experience on the platforms, their access to content, and their overall satisfaction. The expectations of the research are as follows: (1) Web interface designers are in the same proportion as users spend time on websites. (2) The interface designs of social content platforms make it easy for users to find what they are looking for. (3) The relationship between users and interface design is positive. (4) There is a relationship between users visiting social content platforms more frequently if interface designs offer easy use. (5) The interface of social content platforms is positive for users. Findings show that web interface design affects user behavior and experience. It has been observed that they contribute to visits to social content platforms and optimize interface designs for ease of use. In general, it has been determined that advertisements on the web interface of social content platforms tire users' eyes and cause difficulty in reading the content, which creates a negative situation in terms of the usability of the interface design. Additionally, the study suggested that contact pages should be improved in terms of "providing feedback". Users stated that they expressed positive opinions in terms of the readability of the content on the interface, font use, menu layout, and user experience. According to these results, it has been determined that the web interface design of the platforms is generally useful.

**Keywords:** Web Interface Design, Web, Internet, Usability.

### GİRİŞ

Teknolojinin hızlı evrimi, internetin yükselmesine yol açmış ve bu durum iletişim ile bilgi paylaşımı alanında büyük bir devrime neden olmuştur. Bu dönüşüm, dünya çapında bilgiye erişimi temelden değiştirmiş ve iletişim şekillerini tamamen dönüştürmüştür. İnternetin bu dönemi, bilgi çağının başlangıcını işaret ederken, web sitelerinin yükselmesi de bu dönüşümde kritik bir rol oynamıştır. Akıllı cihazların yaygınlaşması, insanlara bilgiye her yerden ve her zaman erişme özgürlüğü vermiştir. Bu, web sitelerini günlük yaşamın ayrılmaz bir parçası haline getirmiş ve dijital dönüşümün anahtarı olmuştur. Web siteleri, bireylerin iletişim ve etkileşimini artıran bir unsur olarak öne çıkmaktadır. Web sitelerinin zaman içerisindeki dönüşümü ile birlikte bireylerin web siteleri ile olan bağlarını destekleyen bir yapıyı ortaya koyan web arayüzleri ortaya çıkmıştır. Web arayüz tasarımları, web sitelerinin karmaşık yapılarını bireylerin daha kolay bir şekilde anlamlandırmasını sağlayan bir yapıyı temsil etmektedir. Bu yapı temelinde kullanıcının ihtiyaçlarını karşılama ve kullanıcı memnuniyeti amaçlamaktadır.

Arayüz tasarımları, kullanıcı ve kullanıcı deneyimi arasında belli bir ilişkiyi barındırmaktadır. Bu ilişki kullanıcının, web sitesine ilk temas kurması ile başladığı söylenebilir. Kullanıcı, web sitesinin hedef ve amaç doğrultusunda ihtiyaçlarını gidermesini beklemektedir (Derel, 2016, s.12). Bu doğrultuda kullanıcının ihtiyaçlarını gidermeyen ve kullanıcı deneyimi kötü olan bir web sitesi, kullanıcıların gezinmesini zorlaştıracak ve web site kullanıcı sayılarının düşmesine yol açacaktır (Oğuz, 2019, s. 40-41). Web arayüz tasarımları oluşturulurken, tasarımcılara rehberlik eden tasarım kılavuzları, kullanıcıların sisteme entegrasyonunu kolaylaştırarak web sitelerinin kullanılabilirliğini artırmayı hedeflemektedir. Günümüzde sıkça tercih edilen ve popüler olan tasarım kılavuzlarından biri olan Nielsen'in 10 kullanılabilirlik buluşsal yöntemi (Nielsen J. , 2020) tasarımcıların işini kolaylaştıran etkili yöntemler arasındadır. Bu metodu açıklamak gerekirse;

- Basit kullanım sunması

- Kullanıcıya hitap etmesi
- Bellek yükünü hafifletmek
- Süreklilik ve uygunluk
- Geribildirim sağlaması
- Giriş ve çıkışların rahat yapılabilmesi
- Kısayollar oluşturularak bireylerin yönlendirilmesi
- Hata mesajlarının alınması
- Web sitelerinde oluşabilecek hataların giderilmesi
- Kullanıcının web sitelerini kullanımı konusunda kılavuz belgelerin hazırlanması (Acartürk & Çağıltay, 2006, s. 337).

Nielsen'in bu kılavuz yöntemi, kullanıcıların web sitesi ile etkili bir etkileşim kurabilmelerini ve sitedeki içeriği anlama ve yorumlama yeteneklerini geliştirmelerine imkan tanımaktadır. Bu yöntem, kullanıcıya kullanım kolaylığı sağlayarak kullanıcı memnuniyetini arttırmaktadır.

Kullanıcı memnuniyetini ölçmek için kullanılabilirlik, arayüz tasarımlarının kullanılabilirliğinin sağlayıp sağlamadığını gösteren kalite göstergesi olarak tanımlanmaktadır (Nielsen, Usability 101: Introduction to Usability, 2012). Chisnell ve Rubin (2008) kullanılabilirlik kavramını "Handbook of Usability Testing" adlı kitabında şu şekilde tanımlamıştır.

"Üretilen ürünün beklenen amacı karşılıyorsa o ürün görevini yerine getirmiş sayılmaktadır" (Rubin & Chisnell, 2008).

Kullanılabilirlik, bazı kriterleri barındırmaktadır. Bu kriterler okunabilirlik, tıklanabilirlik, gezinme menüsü, erişilebilirlik olarak öne çıkmaktadır. Doğru yapılandırılmış bir web sitesi, kullanıcının içeriğe ulaşmasını yardımcı olmalı, görev ve amaçlarını gerçekleştirmesi noktasında yönlendirmeli ve içeriğin okunmasını kolaylaştırmalıdır. Kullanıcının web sitesinde elde ettiği deneyimler sonucunda tasarımcılar web sitelerini şekillendirmektedirler. Bu nedenle kullanıcı dostu arayüz tasarımları önem taşımaktadır. Kullanıcı dostu arayüz tasarımı, web sitelerinin etkili bir şekilde kullanılmasını sağlamaktadır. Kullanıcı dostu arayüz tasarımının temel unsurları arasında boşluk/doluluk oranları, font kullanımı, renk seçimi, ikon yerleşimi ve cihaz duyarlılığı gibi faktörler yer almaktadır. Bu unsurlar, kullanıcı deneyimini etkileyerek web sitelerinin kullanılabilirliğini artırmaktadır. Tasarımcılar, bu unsurlara odaklanarak web arayüz tasarımlarını inşa etmeleri gerekmektedir.

İnternetin evrimi, web sitelerinin ortaya çıkışı ve arayüz tasarımının gelişimi, teknolojinin bireylerin dijital deneyimlerindeki rolünü yansıtmaktadır. Kullanıcılar, hızlı, kullanıcı dostu ve etkileşim odaklı deneyimler talep etmektedir. Web site tasarımcıları, bu taleplere uygun, işlevsel ve estetik açıdan tatmin edici arayüzler oluşturmak için kullanıcı ihtiyaçlarına odaklanmalıdır. Bu unsurların dikkate alındığı web siteleri, kullanıcıların çevrimiçi dünyada daha verimli ve keyifli vakit geçirmelerini sağlayabileceği söylenebilir.

Bu çalışmanın amacı sosyal içerik platformlarındaki web arayüz tasarımlarının kullanım kolaylığı ve kullanıcı, arayüz tasarımı arasındaki ilişki üzerine odaklanmaktadır. Bu amaçlardan yola çıkarak araştırmanın beklentileri şunlardır;

- (1) Web arayüz tasarımları, kullanıcıların web sitelerinde vakit geçirmesiyle aynı orantıdadır.
- (2) Sosyal içerik platformlarının arayüz tasarımları kullanıcıların aradıklarını bulmakta kolaylık sağlamaktadır.
- (3) Kullanıcılar ve arayüz tasarımı arasındaki ilişki pozitif yöndedir.
- (4) Arayüz tasarımları, kolay kullanım sunduğu takdirde kullanıcıların sosyal içerik platformlarını daha sık ziyaret etmesi arasında bir ilişki vardır.
- (5) Sosyal içerik platformlarının arayüzü, kullanıcılar açısından olumlu yöndedir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## YÖNTEM

### Evren ve Örneklem

Araştırmanın evreni olarak 2023 yılında Karabük ilinde yaşayan Onedio ve BuzzFeed sosyal içerik platformlarını daha önce kullanmış ve internete erişimi olan kullanıcılar seçilmiştir. Araştırma, 18-45 yaş aralığındaki 30 kişiye yarı yapılandırılmış görüşme yöntemi ile uygulanmıştır. Söz konusu çalışma sosyal içerik platformlarından Onedio ve BuzzFeed web siteleri ile sınırlandırılmıştır.

Araştırmada toplam 30 katılımcı bulunmaktadır, bunların 17'si erkek ve 13'ü kadındır. Ankete katılan katılımcıların %56,7'sini erkekler, %43,3'ünü ise kadınlar oluşturmaktadır (Tablo 1).

**Tablo 1.** Cinsiyet Dağılımları

	Frekans	Yüzde	Kümülatif Yüzde
Erkek	17	56,7	56,7
Kadın	13	43,3	100,0
Toplam	30	100,0	

Araştırmaya katılan katılımcıların yaş dağılımı incelendiğinde, 18-25 yaş aralığındaki katılımcıların oranı %60,0 (18 kişi), 26-45 yaş aralığındakilerin oranı ise %40,0 (12 kişi) olarak belirlenmiştir. Bu sonuçlardan, ankete katılan genç kesimin, orta yaş kesimine kıyasla daha fazla ilgi gösterdiği görülmektedir (Tablo 2).

**Tablo 2.** Yaş Dağılımları

	Frekans	Yüzde	Kümülatif Yüzde
18-25 Yaş Arası	18	60,0	60,0
26-45 Yaş Arası	12	40,0	100,0
Toplam	30	100,0	

Araştırma katılımcılarının eğitim düzeylerine dair inceleme sonuçlarına göre, katılımcıların %20'sinin (6 kişi) ortaöğretim seviyesinde eğitim aldığı, %56,7'sinin (17 kişi) lisans düzeyinde eğitim gördüğü ve %23,3'ünün (7 kişi) lisansüstü eğitimlerini tamamlamış veya devam ettirmekte olduğu görülmektedir. Önemli bir husus olarak, hiçbir katılımcının ilköğretim seviyesinde eğitim almadığını vurgulamak gerekir. Bu veriler, çoğunluğun, %56,7 oranında lisans düzeyinde eğitim almış olduğunu işaret etmektedir (Tablo 3).

**Tablo 3.** Eğitim Dağılımları

	Frekans	Yüzde	Kümülatif Yüzde
Ortaöğretim	6	20,0	20,0
Lisans	17	56,7	76,7
Lisansüstü	7	23,3	100,0
Toplam	30	100,0	



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Ankete katılan katılımcıların meslek gruplarına yönelik gerçekleştirilen inceleme sonuçlarına göre, katılımcıların %13,3'ü (4 kişi) kamu sektöründe istihdam edilen bireylerden oluşmaktadır. %36,7'si (11 kişi) özel sektörde çalışmaktadır. Ayrıca, %43,3'lük bir oranı temsil eden 13 kişi öğrencidir. %6,7'lik bir dilimi ise 2 kişi oluşturmaktadır ve bunlar herhangi bir işte çalışmamaktadır. Bu sonuçlara dayalı olarak, ankete katılanların büyük çoğunluğunu öğrenciler ve özel sektör çalışanları oluşturmaktadır (Tablo 4).

**Tablo 4.** Meslek Dağılımları

	Frekans	Yüzde	Kümülatif Yüzde
Kamu	4	13,3	13,3
Özel Sektör	11	36,7	50,0
Öğrenci	13	43,3	93,3
Çalışmıyor	2	6,7	100,0
Toplam	30	100,0	

Ankete katılan katılımcıların internete erişirken kullandıkları cihaz tercihlerine dair yapılan incelemede, katılımcıların %26,7'sinin (8 kişi) bilgisayarları tercih ettiği, %3,3'ünün (1 kişi) tablet kullanmayı seçtiği ve %70,0'ünün (21 kişi) ise cep telefonlarını kullandığı gözlemlenmektedir (Tablo 5).

**Tablo 5.** İnternet Erişimindeki Cihaz Dağılımları

	Frekans	Yüzde	Kümülatif Yüzde
Bilgisayar	8	26,7	26,7
Tablet	1	3,3	30,0
Cep Telefonu	21	70,0	100,0
Toplam	30	100,0	

Araştırmaya katılan katılımcılara, çoklu soru yöntemi kullanılarak hangi sosyal içerik platformlarını kullandıkları sorulmuştur. Katılımcıların %10'u (5 kişi) tarafından tercih edilen platform, BuzzFeed'dir. %48'i (24 kişi), Onedio'yu tercih ettiği sonucuna ulaşmıştır. Reddit ise %28'lik (14 kişi) bir oranla üçüncü sırada yer almıştır. Ankete katılan katılımcıların %14'ü (7 kişi), tercih ettikleri platform olarak 9Gag'i belirtmiştir. Bu veriler, katılımcıların en yaygın olarak tercih ettiği platformun Onedio olduğunu göstermektedir (Tablo 6).

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**Tablo 6.** Hangi Sosyal İçerik Platformlarını Kullandıklarına Dair Dağılımlar

	N	Yüzde
BuzzFeed	5	10,0
Onedio	24	48,0
Reddit	14	28,0
9Gag	7	14,0
Hiç Girmedim	0	0
Toplam	50	100,0

### Veri Toplama Araçları

Bu çalışma, anket yöntemi kullanılarak gerçekleştirilmiş ve iki bölümden oluşmaktadır. İlk bölümde katılımcıların demografik bilgileri toplanmıştır. İkinci bölümde ise katılımcılara sosyal içerik platformlarında çeşitli görevler verilmiştir. Bu görevler, Onedio ve BuzzFeed web sitelerini kullanarak gerçekleştirilmiş ve elde edilen veriler bilgisayar ortamında işlenmiştir.

Çalışmanın temel amacı, sosyal içerik platformlarının kullanılabilirliğini katılımcıların gözünden değerlendirmektir. Katılımcılar rastgele örneklem yöntemiyle seçilmiş ve toplamda 30 kişiden oluşmaktadır. Bu katılımcılara sosyal içerik platformlarıyla ilgili çeşitli görevler verilmiş ve bu görevlerin sonucunda katılımcıların deneyimleri 5'li Likert ölçeği kullanılarak değerlendirilmiştir.

Rensis Likert tarafından geliştirilen 5'li Likert ölçeği, bu araştırmanın ana veri toplama aracıdır. Katılımcılara önceden belirlenmiş ifadeleri değerlendirmeleri için bu ölçeği kullanmaları istenmiştir.

### Çalışmada Kullanılan Ölçekler

Ölçek 10 ifadeden oluşmaktadır. Ölçeklerde 5'li likert kodlamasıyla;

1. Katılmıyorum 2. Kesinlikle Katılmıyorum 3. Kararsızım 4. Katılıyorum 5. Kesinlikle Katılıyorum seçenekleri kullanılmıştır.

Çalışma sonuçları, sosyal içerik platformlarının kullanılabilirliğini katılımcıların deneyimlerine dayanarak analiz etmek için Nielsen'in (2020) "10 Usability Heuristics for User Interface Design" makalesindeki kullanılabilirlik kurallarına göre analiz edilmiştir. Katılımcılar her iki sitede çeşitli görevler gerçekleştirmiş ve deneyimlerini paylaşarak bu platformların kullanılabilirliğini değerlendirmiştir.

Çalışma, Onedio ve BuzzFeed sosyal içerik platformlarının kullanılabilirliğini analiz etmek için katılımcılara 10 aşamalı görev verilerek gerçekleştirilmiştir. Katılımcıların kullanılabilirlik deneyimlerini analiz etmeyi amaçlayan profil ekleme ve üye olma görevleri bir başlık altında değerlendirilmiştir.

Verilen görevler aşağıdaki gibidir;

Görev 1: Sosyal içerik platformlarındaki test sayfalarının kullanılabilirlik açısından değerlendirilmesi amacıyla, katılımcılardan herhangi bir testi çözmeleri istenmiştir.

Görev 2: Ana sayfa erişilebilirliği ve web sitelerinin hızını değerlendirmek amacıyla, katılımcılardan testi tamamladıktan sonra ana sayfaya dönmeleri istenmiştir.

Görev 3: Sosyal içerik platformlarının içerik bulunabilirliği hızı ve site içi arama motorunun kullanılabilirliğini inceleyebilmek için, katılımcılardan site içinde arama yapmaları istenmiştir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Görev 4: Katılımcılardan, sosyal içerik platformu sitelerinin iletişim kanallarını analiz etmek ve geri bildirim güvenilirliğini test etmek amacıyla Onedio ve Buzzfeed web sitelerinde bulunan iletişim sayfalarına ulaşmaları istenmiştir.

Görev 5: Sosyal içerik platformu web sitelerinde yer alan reklamların kullanıcı deneyimini (hız, odaklanma, dikkat dağıtma vb.) nasıl etkilediğini analiz edebilmek için, katılımcılardan bu reklamları kapatması istenmiştir.

Görev 6: Onedio ve Buzzfeed web siteleri, içeriklere yorum yapma ve etkileşimde bulunma yeteneği sağlamak amacıyla kullanıcılardan üyelik oluşturmalarını talep etmektedir. Katılımcılardan, oluşturdukları profiller aracılığıyla siteye bağlılık seviyelerini ve profillerin kullanılabilirliğini değerlendirmişlerdir.

Görev 7: Sosyal medya platformlarında kullanıcıların sitede daha fazla zaman geçirebilmesi için etkileşimin büyük bir önemi vardır. Bu nedenle katılımcılardan, site içindeki herhangi bir içeriğe yorum yapma ve içeriğe tepki verme (beğenme, paylaşma, emoji kullanma) görevi verilmiştir. Söz konusu web sitelerinin yorum yapma ve tepki butonlarının kullanılabilirliği, verilen görevler doğrultusunda katılımcılar tarafından test edilmiştir.

Görev 8: Onedio ve Buzzfeed web sitelerinin menü düzenlemesini kullanılabilirlik açısından incelemek ve istenilen video içeriklerine erişim konusunu test etmek amacıyla, katılımcılardan video sayfasına yönlendirilmeleri ve herhangi bir içeriği izlemeleri talep edilmiştir. Katılımcılar, videolara erişilebilirlik ve web sitelerindeki menüleri kullanıcı deneyimi açısından değerlendirmişlerdir.

Görev 9: Sosyal içerik platformlarında bulunan içeriklerin yükleme hızını test etmek ve kullanıcıların web sitesindeki sayfaları sorunsuz bir şekilde kullanabilme yeteneklerini değerlendirmek amacıyla, katılımcılardan en son içeriğe ulaşma görevi verilmiştir, ardından bu içerikten başlangıç içeriğine geri dönmeleri istenmiştir.

## BULGULAR

Çalışma, katılımcıların Onedio ve BuzzFeed sosyal içerik platformlarının gezinme kolaylığını değerlendirmeleri istenmiştir. Katılımcılardan bu platformlarda gezinmenin kolaylığını değerlendirmeleri için 1 ila 5 arasında bir ölçekte puan vermeleri istenmiştir. Sonuçlara göre, katılımcılar platformların gezinme kolaylığına olumlu bir bakış açısı sergilemişlerdir, ortalama puan ( $\bar{x}$ = 3,63) olarak bulunmuştur (Bkz.: Tablo 7).

Katılımcılardan 6 kişi platformların gezinme açısından zor olduğunu ifade etmiş, 20 kişi ise bunun kolay olduğunu belirtmiştir. 4 katılımcı ise kararsızdır. Katılımcılar, platformlarda gezinirken herhangi bir sorun yaşamadıklarını vurgulamıştır, bu da platformların kullanıcı dostu olduğunu işaret etmektedir.

Sonuçlar, Onedio ve BuzzFeed sosyal içerik platformlarının kullanıcı deneyimi konusunda titiz çalıştığını ve kullanıcıların beklentilerini karşılamak için gerekli önlemleri aldığını göstermektedir. Araştırma, bu platformların kullanıcı deneyimi tasarımlarının Nielsen'in (2020) "10 Usability Heuristics for User Interface Design" prensipleri ile uyumlu olduğunu göstermektedir (Acartürk & Çağıltay, 2006).

**Tablo 7.** Katılımcıların Sosyal İçerik Platformlarındaki Kullanılabilirlik Açısından Gezinme Deneyimleri

	N	Minimum	Maksimum	Ortalama	Std. Sapma
Her iki sitenin sayfalarında gezmek kolaydır	30	1	5	3,63	1,426

Katılımcılara, Onedio ve BuzzFeed web sitelerindeki içeriklere erişilebilirliğini ve odaklanma problemi üzerine deneyimlerini ölçmek için "Anasayfaya tekrar dönün ve anasayfada yer alan herhangi bir içeriğe girin ve o sayfada yer alan diğer bir içeriğe geçmeyi deneyin" sorusu yöneltilmiştir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Elde edilen verilere göre, katılımcılar Onedio ve BuzzFeed platformlarında sunulan içeriklerin erişilebilir ve okunabilir olduğunu yüksek bir oranda ifade etmişlerdir, ortalama puan ( $\bar{x}$ = 3,67) olarak bulunmuştur (Bkz.: Tablo 8).

Katılımcılardan 6 kişi platformlardaki içeriklere erişimin ve okumanın zor olduğunu ifade etmiş, 20 kişi ise bu konuda kolaylık yaşadığını belirtmiştir. 4 katılımcının ise kararsız kaldığı görülmüştür.

Araştırma sonuçları, Onedio ve BuzzFeed'in içerik sunumunda kullanıcı deneyiminin ön planda olduğunu göstermektedir. Katılımcıların içeriklere hızlı ve sorunsuz erişebilme deneyimleri, platformların kullanıcıların ihtiyaçlarını anladığını ve içerikleri etkili bir şekilde sunmak için gereken önlemleri aldığını yansıtmaktadır (Novoseltseva, 2017). Araştırma sonuçları, Onedio ve BuzzFeed'in kullanıcı deneyimini önemseydiğini ve içerikleri kullanıcı dostu bir şekilde sunmaya çalıştığını göstermektedir. Bu olumlu görüşler, platformların kullanıcı dostu arayüzleri ve düzenli içerik düzenlemeleri ile ilişkilendirilebilir. Bu veriler, bu platformların içerik sunumu, gezinme düzeni ve arayüz tasarımının başarılı olduğunu göstermektedir. Bu veriler aynı zamanda, Onedio ve BuzzFeed gibi platformların Nielsen'in (2020) "10 Usability Heuristics for User Interface Design" prensiplerinden "süreklilik ve uygunluk" ile uyumlu olduğunu göstermektedir (Acartürk & Çağıltay, 2006).

**Tablo 8.** Katılımcıların Sosyal İçerik Platformlarındaki İçerik Okunabilirliği ve Erişilebilirlik Deneyimleri

	N	Minimum	Maksimum	Ortalama	Std. Sapma
Bir içeriğe ulaşmak ve onu okumak kolaydır	30	1	5	3,67	1,295

Çalışma, katılımcıların Onedio ve BuzzFeed web sitelerinin sayfa yüklenme hızlarına yönelik kullanıcı deneyimlerini ölçmek amacıyla "Anasayfaya tekrar dönün ve anasayfada yer alan herhangi bir içeriğe girin ve o sayfada yer alan diğer bir içeriğe geçmeyi deneyin" sorusu yöneltilmiştir. Tablo 8'de yer alan görev ile birlikte değerlendirilmiştir. Katılımcılara bu konuyla ilgili görüşlerini belirtmeleri için bir anket uygulanmıştır. Sonuçlara göre, katılımcılar Onedio ve BuzzFeed'in sayfa yüklenme hızlarını oldukça olumlu bir şekilde değerlendirmişlerdir, ortalama puan ( $\bar{x}$ = 3,57) olarak bulunmuştur (Bkz.: Tablo 9).

Katılımcılardan 8 kişi platformların sayfa yüklenme hızını yavaş bulurken, 19 kişi ise bu hızı yeterince hızlı olarak görmüşlerdir. 3 katılımcı kararsız olduğunu belirtmiştir. Verilerin analizi sonucunda, katılımcıların genellikle bu platformların sayfa yüklenme hızlarını olumlu bir şekilde değerlendirdikleri gözlemlenmiştir. Araştırmaya katılanlar arasında, sayfa yüklenme hızlarını yavaş bulanlar ve hızlı bulanlar arasında görüş farkı olsa da, çoğunluk hızlı yüklenmeyi olumlu bir şekilde değerlendirmiştir. Bu sonuçlar, bu platformların kullanıcıların içeriklere hızlı bir şekilde erişim sağladığını ve beklemek zorunda kalmadıklarını göstermektedir. Günümüz internet kullanıcıları hızlı ve kesintisiz bir deneyim aramaktadır (Lowdermilk, 2013) ve bu araştırma, Onedio ve BuzzFeed'in bu gereksinimi karşıladığını göstermektedir.

Bu bulgular aynı zamanda, Nielsen'in (2020) kullanılabilirlik heuristiklerinden "bellek yükünü hafifletmek" maddesi ile uyumlu olduğu görülmektedir (Acartürk & Çağıltay, 2006) ve kullanıcıların web sitelerini daha uzun süre kullanmalarına ve içerikleri daha fazla tüketmelerine olanak tanmaktadır (Nielsen, Response Times: The 3 Important Limits, 1993).

Araştırma verileri, Onedio ve BuzzFeed gibi platformların sayfa yüklenme hızlarının kullanıcılar için önemli bir faktör olduğunu ve bu alanda başarılı olduklarını vurgulamaktadır. Kullanıcıların hızlı ve kesintisiz deneyim arayışlarına cevap veren bu platformlar, kullanıcı bağlılığını artırılması konusunda başarılı olduğu söylenebilmektedir.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**Tablo 9.** Katılımcıların Sosyal İçerik Platformlarındaki Web Sayfalarının Yüklenme Hızı Deneyimleri

	N	Minimum	Maksimum	Ortalama	Std. Sapma
Her iki sitenin de sayfa yüklenme hızı oldukça hızlıdır	30	1	5	3,57	1,501

Katılımcılara, Onedio ve BuzzFeed sosyal içerik platformlarındaki menü yerleşimi ve kullanımının kullanıcı deneyimine etkisine ölçmek amacıyla “Her iki sitede menüde yer alan ‘Test (Quizzes)’ bölümüne girin ve ilk içeriğe tıklayın ve testi çözün” sorusu yöneltilmiştir. Katılımcılar, Onedio ve BuzzFeed’in web menülerini kullanma ve menülerin yerleşimi konusunda olumlu bir deneyim yaşadıklarını ifade etmişlerdir, ortalama puan ( $\bar{x}$ = 3,33) olarak bulunmuştur (Bkz.: Tablo 10).

Katılımcılardan 7 kişi platformlardaki menülerin yerleşimini ve kullanımını yetersiz bulurken, 10 kişi kararsız kaldığı görülmüştür. Diğer 13 kişi ise menülerin yerleşimi ve kullanımının yeterli olduğunu belirtmiştir.

Bu sonuçlar, Onedio ve BuzzFeed’in kullanıcı deneyimi tasarımında menü düzenlemesine özen gösterdiklerini ve kullanıcıların ihtiyaçlarına odaklandığını göstermektedir. Menülerin kullanımının kolay olması, kullanıcıların içeriklere hızlı erişim sağlamalarını ve istedikleri bölümlere anında yönlendirilmelerini sağlamaktadır (Rieger, 2009). Bu da platformların kullanıcı dostu arayüzüne odaklandıklarını ve içeriklere hızlı erişimlerini sağlama amacını yansıtmaktadır.

Kullanıcılar için menülerin kullanımının kolay olması, içeriklere hızlı erişim sağlama ve istenilen bölümlere anında yönlendirme açısından kritik bir rol oynamaktadır. Katılımcıların menülerin kullanımını olumlu şekilde değerlendirmesi, platformların bu konuda başarılı olduklarını göstermektedir.

Ayrıca, veriler Onedio ve BuzzFeed gibi platformların Nielsen’in (2020) "10 Usability Heuristics for User Interface Design" adlı makalesindeki “kısayollar oluşturularak bireylerin yönlendirilmesi” maddesi ile uyumlu olduğunu göstermektedir (Acartürk & Çağiltay, 2006). Bu veriler, platformların kullanıcı deneyimi tasarımında kullanıcı ihtiyaçlarına odaklandığını ve menülerin kullanımının basit ve sezgisel olduğunu belirtmektedir (McCollin, 2012).

**Tablo 10.** Katılımcıların Sosyal İçerik Platformlarındaki Menü Yerleşim ve Kullanım Deneyimleri

	N	Minimum	Maksimum	Ortalama	Std. Sapma
Sosyal içerik platformlarındaki menü yerleşimi ve kullanımı iyi düzeydedir	30	1	5	3,33	1,269

Katılımcılara, Onedio ve BuzzFeed sosyal içerik platformlarının iletişim sayfalarının erişilebilirliği hakkında deneyimlerini ölçmek için “Her iki sitede “İletişim” sayfalarını bulun ve sayfaya girin” sorulan bu veriler sonucunda, her iki web sitesinin iletişim sayfalarının genel olarak erişilebilirlik durumu geliştirilmesi yönünde olduğu sonucuna varılmıştır ( $\bar{x}$ = 3,00) (Bkz.: Tablo 11).

Katılımcılardan 14’ü iletişim sayfalarına erişemediklerini ifade etmiş, 14 kişi ise bu sayfalara ulaşabildiklerini belirtmiştir. Geriye kalan 2 kişi ise bu konuda kararsız kalmıştır.

Bu sonuçlar, Onedio ve BuzzFeed’in iletişim sayfalarının erişilebilirliği konusunda geliştirilmesi yönünde olduğunu göstermektedir. Katılımcılar, iletişim sayfalarının erişilebilirlik deneyimlerindeki olumlu ve olumsuz şekilde değerlendirmesi, platformların “geri bildirim sağlama” açısından önem vermesi gerektiğini belirtmektedirler. İletişim sayfalarının erişilebilir olması, kullanıcıların platformlarla iletişim kurmalarını ve olası sorunları çözmelerini kolaylaştırmaktadır (Hersey, 2015).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Bu sonuçlara dayanarak, Onedio ve BuzzFeed sosyal içerik platformlarının Nielsen'in (2020) "10 Usability Heuristics for User Interface Design" adlı makalesindeki "geri bildirim sağlaması" açısından geliştirilmesi gerektiği sonucuna varılmıştır (Acartürk & Çağıltay, 2006).

Ayrıca bu veriler, Onedio ve BuzzFeed gibi platformların kullanıcılarının geri bildirimlerini hızlı ve etkili bir şekilde ele almaları gerektiğini vurgulamaktadır. İletişim sayfalarının kullanıcı dostu olması, kullanıcıların platformlarla ilgili düşüncelerini paylaşmalarını ve sorunlarını iletmelerine yardımcı olmaktadır (Sezer & Kahraman, 2022).

**Tablo 11.** Katılımcıların Sosyal İçerik Platformlarındaki İletişim Sayfalarının Bulunabilirlik Deneyimleri

	N	Minimum	Maksimum	Ortalama	Std. Sapma
Sitelerin iletişim sayfaları kolayca bulunabilir	30	1	5	3,00	1,414

Katılımcılara, sosyal içerik platformlarında bulunan reklamların içeriklerin okunmasına ve odaklanmaya etkisini ölçmek amacıyla "İki sitede 'anasayfa'da yer alan reklamları kapatmayı deneyin" sorusu yöneltilmiştir. Veri analizi sonuçlarına göre, katılımcıların sosyal içerik platformlarında bulunan reklamların içerikleri okuma ve odaklanma sorunları yarattığına dair yüksek oranda ( $\bar{x}=2.33$ ) olumsuz görüş belirttikleri gözlenmiştir (Bkz.: Tablo 12).

Katılımcılardan 17 kişi sosyal içerik platformlarındaki reklamların göz yorduğunu ve içeriğin okunmasına engel olduğunu ifade etmiştir, 8 kişi ise reklamların bu tür sorunlar yaratmadığını belirtmiştir. 5 katılımcının kararsız kaldığı gözlenmiştir. Bu veriler, reklamların içerik tüketimi ve kullanıcı deneyimi üzerinde potansiyel etkileri olduğunu vurgulamaktadır.

Katılımcıların yüksek oranda olumsuz görüşleri, reklamların içerikleri okumayı ve odaklanmayı engelleyebileceğini ve bu nedenle kullanıcıların içeriği eksik tüketebileceğini yansıtmaktadır. Reklam yerleştirmesi konusunda dikkatli bir denge kurmanın ne kadar önemli olduğunu vurgulamaktadır.

Elde edilen verilere göre, katılımcılar sosyal içerik platformları reklamlarının içeriklerin okunmasına ve odaklanma sorunu yaratacağını belirtmişlerdir. Snell (2008), reklam yerleştirmesinde dikkatli bir denge oluşturmanın ne kadar kritik olduğunu vurgulamaktadır.

Araştırma sonuçlarına göre, Onedio ve BuzzFeed sosyal içerik platformlarının Nielsen'in (2020) "10 Usability Heuristics for User Interface Design" adlı makalesindeki "kullanıcıya hitap etme" maddesi ile uyumsuz olduğu gözlemlenmiştir (Acartürk & Çağıltay, 2006). Tasarımcıların, içeriğe sorunsuz bir erişim sağlamak ve kullanıcıların içeriğe konsantre olmalarını sürdürebilmelerini sağlamak amacıyla reklamları kullanıcı deneyimini olumsuz etkilemeden etkili bir şekilde entegre etmeleri gerekmektedir (Dikener, 2011) (Tablo 12).

**Tablo 12.** Katılımcıların Sosyal İçerik Platformlarındaki Reklamların İçeriğin Okunabilirliğine ve Odaklanabilirliğine Dair Deneyimleri

	N	Minimum	Maksimum	Ortalama	Std. Sapma
Reklamlar göz yormamaktadır ve içeriğin okunabilirliğini engellememektedir	30	1	5	2,33	1,322

Ankete katılan katılımcıların sosyal içerik platformlarına üyelik oluşturma süreci ve profil fotoğrafı ekleme deneyimlerinin ölçmek amacıyla "Profil menüsünden profil ayarlarına giderek profil fotoğrafını ekle" sorusu yöneltilmiştir. Elde edilen verilere göre, her iki platformda da üyelik oluşturma ve profil



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

fotoğrafi ekleme deneyimleri yüksek bir seviyede olumlu olarak değerlendirilmiştir, ortalama puan ( $\bar{x}$ = 3.90) olarak bulunmuştur (Bkz.: Tablo 13).

Katılımcılardan 1 kişi üyelik oluşturma ve profil fotoğrafı eklemekte zorluk yaşadığını ifade etmiştir, 20 kişi ise bu süreçlerde zorluk yaşamadıklarını belirtmiştir. 9 katılımcı kararsız kaldığı gözlemlenmiştir. Bu veriler, sosyal içerik platformlarının kullanıcıların üyelik oluşturma ve profil düzenleme süreçlerini kolaylaştırarak kullanıcı memnuniyetine verdiği değeri göstermektedir. Katılımcıların olumlu deneyimleri, platformların hesap oluşturma ve kişisel bilgilerini girilmesini kolaylaştırdıklarını göstermektedir (Heather & Kogan, 2020). Ayrıca bu veriler, kullanıcılar sosyal içerik platformlarında profil düzenlemelerini rahatlıkla yaptıklarını ortaya koymaktadır (Yaşar, 2014). Bu veriler sonucunda, Onedio ve BuzzFeed sosyal içerik platformlarının Nielsen'in (2020) "10 Usability Heuristics for User Interface Design" prensiplerinden "kullanıcının web sitelerini kullanımı konusunda kılavuz belgelerin hazırlanması" ile uyumlu olduğunu göstermektedir (Acartürk & Çağıltay, 2006).

Bu sonuçlar, sosyal içerik platformlarının kullanıcıların üyelik oluşturma süreci ve profil düzenlemelerini basit, sorunsuz hale getirme amacını yansıtmaktadır.

**Tablo 13.** Katılımcıların Sosyal İçerik Platformlarına Üye Olma ve Profil Fotoğrafi Ekleme Deneyimleri

	N	Minimum	Maksimum	Ortalama	Std. Sapma
Sitelere kolayca üye olunabilmekte ve profil fotoğrafı eklenebilmektedir	30	1	5	3,90	,845

Çalışma kapsamında, katılımcılara, Onedio ve BuzzFeed web sitelerinde içeriklere yorum ve emoji bırakma deneyimleri hakkında "Her iki sitede yer alan bir içeriğe girerek yorum yapmayı ve emoji bırakmayı deneyin" sorusu yöneltilmiştir. Elde edilen veriler, katılımcıların bu iki platformda içeriklere yorum ve emoji bırakma deneyimlerini oldukça olumlu bir şekilde değerlendirdiklerini göstermektedir, ortalama puan ( $\bar{x}$ = 4.27) olarak bulunmuştur (Bkz.: Tablo 14).

Katılımcılardan 1 kişi sosyal içerik platformlarında yorum ve emoji bırakmanın zor olduğunu ifade etmiştir, 23 kişi ise bu işlemin kolay olduğunu belirtmiştir. 6 katılımcı kararsız kaldığını ifade etmiştir.

Elde edilen verilere dayanarak, Onedio ve BuzzFeed sosyal içerik platformlarının kullanıcıların içeriklere etkileşimde bulunma sürecini kolaylaştırmaya odaklandığı görülmektedir. Katılımcıların yüksek orandaki olumlu deneyimi, platformların yorum ve emoji bırakma işlemlerini kullanıcı dostu ve sezgisel bir şekilde tasarladığını göstermektedir.

Ayrıca, bu sonuçlar kullanıcıların içeriklere yorum ve emoji bırakma konusunda herhangi bir zorluk yaşamadığını belirtmeleriyle de desteklenmektedir. Bu durum, platformların kullanıcıların geri bildirimlerini ve tepkilerini paylaşma sürecini basit ve erişilebilir hale getirme amacını yansıtmaktadır.

Araştırma sonuçlarına dayanarak, Onedio ve BuzzFeed sosyal içerik platformlarının, kullanıcıların içeriklere yorum ve emoji bırakma deneyimini Nielsen'in (2020) "10 Usability Heuristics for User Interface Design" adlı makalesindeki "süreklilik ve uygunluk" prensibi ile uyumlu bir şekilde optimize ettiği gözlemlenmiştir (Acartürk & Çağıltay, 2006).

**Tablo 14.** Katılımcıların Sosyal İçerik Platformlarında Yorum ve Emoji Bırakma Deneyimleri

	N	Minimum	Maksimum	Ortalama	Std. Sapma
Sitelere yer alan içeriklere yorum ve emoji bırakmak oldukça kolaydır	30	1	5	4,27	1,015

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Ankete katılan katılımcılara, Onedio ve BuzzFeed web sitelerindeki video içeriklere erişim deneyimlerini incelemek amacıyla katılımcılara “Menü’yü kullanarak “Video” kategorisine girin ve ‘video’yu bulun, izleyin” sorusu yöneltilmiştir. Yapılan veri analizi sonucunda, her iki platformda videoların kolayca erişilebilir olduğu sonucuna ulaşılmıştır ve katılımcıların bu konudaki deneyimleri oldukça yüksek olduğu ( $\bar{x}= 4.00$ ) belirlenmiştir (Bkz.: Tablo 15).

Katılımcıların sadece 3’ü, sosyal içerik platformlarında bulunan videolara erişim konusunda zorluk yaşadıklarını belirtirken, 21 kişi bu süreçte herhangi bir sorun yaşamadığını ifade etmiştir. Ayrıca, 6 katılımcı ise bu konuda kararsız kalmıştır.

Bu sonuçlara göre, katılımcılar bu iki platformda videolara kolaylıkla erişebildiklerini ve istedikleri videoları bulmada herhangi bir zorluk yaşamadıklarını ifade etmektedirler.

Bu verilere dayanarak, Onedio ve BuzzFeed web sitelerinin Nielsen’in (2020) "10 Usability Heuristics for User Interface Design" adlı makalesinde yer alan "kısayollar oluşturularak bireylerin yönlendirilmesi" (Acartürk & Çağiltay, 2006) maddesinin dikkate alındığını ve bu kısayolların başarılı bir şekilde oluşturulduğu görülmektedir.

**Tablo 15.** Katılımcıların Sosyal İçerik Platformlarındaki Video Bulunabilirlik Deneyimleri

	N	Minimum	Maksimum	Ortalama	Std. Sapma
Sitelerde yer alan videoların bulunabilirliği konusunda sorun yaşanmamaktadır	30	1	5	4,00	1,114

Katılımcılara, Onedio ve BuzzFeed web sitelerindeki video içeriklere erişim deneyimlerini incelemek amacıyla katılımcılara “Her iki sitede menüde yer alan ‘Test (Quizzes)’ bölümüne girin ve ilk içeriğe tıklayın ve testi çözün” sorusu yöneltilmiştir. Katılımcılara yöneltilen sorular sonucunda, Onedio ve BuzzFeed web sitelerinde yer alan testleri bulma ve kullanma deneyimleri oldukça olumlu olarak değerlendirilmiştir, ortalama puan ( $\bar{x}= 4.00$ ) olarak bulunmuştur (Bkz.: Tablo 16).

Katılımcıların sadece 4’ü, sosyal içerik platformlarında mevcut olan testlere erişim ve çözümlemede güçlük yaşadıklarını belirtirken, 23 kişi bu sürecin herhangi bir sıkıntı olmadığını ifade etmiştir. 3 katılımcı ise bu konuda kararsız kaldığı görülmüştür.

Sosyal içerik platformlarının kullanıcı arayüzü tasarımının, kullanıcıların aradıkları içeriğe kolayca erişimini sağlama açısından kritik bir rol oynadığı açıkça görülmektedir. Bu sonuçlar, platformların kullanıcılarını etkili bir şekilde yönlendirme becerilerini ve içerikleri nasıl düzenleyebildiklerini yansıtmaktadır. Kullanıcıların testlere kolayca erişebilmesi, bu platformların içerikleri nasıl etiketlediklerini, kategorilere ayırdıklarını ve arama işlevlerini nasıl kullandıklarını göstermektedir (Aydın, 2019, s. 30-34).

Elde edilen verilere göre, Onedio ve BuzzFeed sosyal içerik platformlarının Nielsen’in (2020) "10 Usability Heuristics for User Interface Design" başlıklı makalesinde yer alan kullanılabilirlik ilkesi olan "kısayollar oluşturularak kullanıcıları yönlendirme" ilkesi ile uyumlu olduğu görülmüştür (Acartürk & Çağiltay, 2006).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 16.** Katılımcıların Sosyal İçerik Platformlarındaki Test Bulunabilirlik ve Kullanım Deneyimleri

	N	Minimum	Maksimum	Ortalama	Std. Sapma
Sitelerde yer alan testlerin bulunabilirliği ve çözümü kullanım sorunu yaratmamaktadır	30	1	5	4,03	1,129

Araştırmaya katılan katılımcılara, Onedio ve BuzzFeed sitelerinin genel kullanılabilirliği hakkında soru yöneltilmiştir. Elde edilen veriler, katılımcıların genel olarak bu sosyal içerik platformlarını kullanımı konusunda olumlu ( $\bar{x}=3,90$ ) bir deneyim yaşadığını göstermektedir (Bkz.: Tablo 17).

Ankete katılan katılımcılardan 3'ü, bu platformların kullanımı hakkında olumsuz deneyimler yaşadığını ifade etmiştir. Diğer 20 kişi ise bu platformların kullanımının sorunsuz olduğunu belirtmiştir. 7 katılımcı ise kararsız kalmıştır. Bu veriler, genel olarak katılımcıların bu sosyal içerik platformlarının kullanımı konusunda sorun yaşamadığını ve olumlu bir şekilde değerlendirdiğini göstermektedir.

Katılımcıların bu platformları olumlu bir şekilde değerlendirmesi, platformların kullanıcı deneyimini ne kadar başarılı bir şekilde optimize ettiğini yansıtmaktadır. Kullanıcıların platformları sorunsuz bir şekilde kullanabildiğini belirtmeleri, platformların kullanıcı dostu arayüz tasarımı, içerik erişim süreçleri ve genel kullanılabilirlik konularındaki başarısını göstermektedir. Elde edilen veriler sonucunda, kullanıcıların sosyal içerik platformlarında genel olarak olumlu deneyimlere sahip oldukları ve platformların kullanıcı memnuniyetine odaklandığı, kullanıcı dostu bir tasarım anlayışını benimsediği görülmektedir.

Elde edilen verilere göre, Onedio ve BuzzFeed sosyal içerik platformlarının Nielsen'in (2020) "10 Usability Heuristics for User Interface Design" başlıklı makalesindeki "basit kullanım sunması" ilkesi ile uyumlu olduğu görülmüştür (Acartürk & Çağiltay, 2006).

**Tablo 17.** Katılımcıların Sosyal İçerik Platformlarındaki Genel Deneyimleri

	N	Minimum	Maksimum	Ortalama	Std. Sapma
Sosyal içerik platformlarının kullanımı genel olarak oldukça kolaydır	30	1	5	3,90	1,185

## TARTIŞMA VE SONUÇ

İnternetin doğuşu, dünya çapında kayda değer bir paradigma değişikliğine yol açmıştır; bilgiye erişimi devrimleştirerek iletişimi daha etkili hale getirmiştir. Önceden ulaşmanın zor olduğu bilgilere artık geniş kitleler kolayca erişebilmektedir. Teknolojideki gelişmeler, insan yaşam biçimlerini kökten dönüştürmüş ve özellikle akıllı cihazların yaygınlaşması, internete her an ve her yerden erişimi mümkün kılarak web sitelerinin önemini artırmıştır. Bu, bilgi çağının başlangıcına önemli bir katkıda bulunmuştur.

Web arayüz tasarımı, internet kullanıcılarının bilgilere ulaşma ve bu bilgilerle etkileşim kurma süreçlerini kolaylaştırmak açısından kritik bir rol oynamaktadır. Arayüz tasarımları, kullanıcıların web sitelerini etkili bir şekilde gezinmelerine ve istedikleri içeriğe hızla erişmelerine olanak tanır. Bu tasarımın temel unsurları arasında boşluk/doluluk oranları, font seçimi, renk paleti, ikon yerleşimi ve cihaz uyumluluğu bulunmaktadır. Bu faktörler, kullanıcı deneyimini büyük ölçüde etkilemektedir.

Kullanıcı memnuniyeti ve kullanıcı dostu tasarım, web sitelerinin kullanılabilirliğini artırmaktadır. Bu nedenle web siteleri tasarlanırken, basit, anlaşılır ve anlamlı tasarım ilkelerine titizlikle uyulmalıdır. Kullanılabilir web site tasarımı, kolay okuma, tıklama işlemlerini basitleştirme, gezinme menülerini

optimize etme ve erişilebilirlik gibi kriterleri içermelidir. Tasarımcılar, bu unsurlara dikkat ederek kullanıcıların web sitelerini sorunsuz bir şekilde kullanmalarına yardımcı olmalıdır. Ayrıca, kullanıcıların kullanımı kolay olan web sitelerine daha fazla ilgi gösterdiği gözlemlenmektedir.

Tüm bu değişimler ve öncelikler göz önüne alındığında, web tasarımının, bilgi çağında internet kullanıcıları için ne kadar önemli olduğu daha belirgin hale gelmektedir. Kullanıcı odaklı tasarım ilkelerine bağlı kalındığında, web siteleri daha etkili ve kullanıcı dostu hale getirilebilir. Bu, bilgiye hızlı ve kolay erişimi destekler, kullanıcı deneyimini iyileştirir ve sonuç olarak internetin sunduğu avantajları daha iyi değerlendirmemize yardımcı olabilmektedir.

Bu çalışma, Onedio ve BuzzFeed sosyal içerik platformlarının kullanılabilirlik ve kullanıcı deneyimi konularını merkezine alarak, katılımcıların tercihlerini, gezinme deneyimlerini, içeriklere erişim kolaylığını, sayfa yüklenme hızını, menü kullanımını, iletişim erişilebilirliğini, reklamların etkisini, üyelik süreçlerini, yorum bırakma ve video erişim deneyimlerini incelemiştir. Bu hedeflere ulaşmak amacıyla bir anket kullanılmıştır. Ayrıca, katılımcıların kişisel özellikleri ve daha önce kullandıkları diğer sosyal içerik platformları gibi değişkenler de dikkate alınmıştır.

Bu çalışma, kullanılabilirlik açısından tasarım süreçlerine rehberlik sağlamak amacı gütmüş ve bu amaçla Nielsen'in (2020) "10 Usability Heuristics for User Interface Design" başlıklı makalesinde belirtilen 10 kullanılabilirlik heuristiğini temel almıştır. Bu sonuçlar, sosyal içerik platformlarının kullanıcı deneyimini geliştirmek ve kullanıcı dostu arayüzler sunmak için Nielsen'in rehberlerini benimsemenin önemini vurgulamaktadır. Aynı zamanda, bu çalışma, gelecekteki araştırmalar için bir temel oluşturacak şekilde Nielsen'in heuristiklerini uygulamanın tasarım açısından ne kadar kritik olduğunu ortaya koymaktadır.

Çalışmadan elde edilen bu sonuçlar, Onedio ve BuzzFeed gibi platformların kullanıcı deneyimini iyileştirme çabalarının, kullanıcı memnuniyetini artırmada ve uzun vadeli kullanıcı bağlılığını oluşturmada ne kadar etkili olduğu açıkça görülmektedir. Bu analiz, bu platformların içerik sunumu, teknik altyapı ve kullanıcı dostu arayüz tasarımı gibi faktörlerde ne kadar etkili olduklarını belirgin bir şekilde göstermektedir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## BOX-BEHNKEN YANIT YÜZEY METODOLOJİSİ İLE OPTİMİZE EDİLMİŞ KARBOKSİMETİL SELÜLOZ- ALJİNAT-*A.sativa* BAZLI HİDROJELLERİN SENTEZİ VE ŞİŞME ÇALIŞMALARI

## SYNTHESIS AND SWELLING STUDIES OF CARBOXYMETHYL CELLULOSE- SODIUM ALGINATE-*A.sativa* BASED HYDROGELS OPTIMIZED BY BOX-BEHNKEN RESPONSE SURFACE METHODOLOGY

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### ÖZET

Hidrojeller, su arıtma, gıda teknolojisi ve biyomedikal alanlar gibi çeşitli sektörlerde yaygın olarak uygulanan üç boyutlu fiziksel ya da çapraz bağlı ağ yapıdaki polimerlerdir. Çok sayıda hidrofilik fonksiyonel grubu yapısında bulunduran homopolimer veya kopolimerlerden oluşan bu yapılar büyük miktarda su emme ve tutma yeteneğine sahiptir. Doğal polimerler, toksik olmayan, suda kolay çözünme, ucuz, kolayca elde edilebilme ve biyolojik olarak parçalanabilmelerinden dolayı sentetik polimerlere göre hidrojel uygulamaları için oldukça uygundur. Karboksimetil selüloz (CMC), özellikle biyomedikal alanda sıklıkla kullanılan yüksek moleküler ağırlığa sahip, suda çözünen, biyolojik olarak parçalanabilen ve biyoyumlu bir polimerdir. CMC kolay çapraz bağlanmasından dolayı, yüksek su alımına sahip hidrojeller oluşturabilmektedir. Fakat CMC hidrojelleri genellikle zayıf mekanik dayanım göstermektedir, bu da şişmiş hallerde kullanımlarını sınırlamaktadır. Bu nedenle CMC polimerinin yapısal stabilizasyonu sağlamak üzere aljinat gibi diğer polimerle birlikte kullanılmaktadır. Sodyum Aljinat (SA), çeşitli miktarlarda  $\beta$ -(1 $\rightarrow$ 4)-bağlı D-mannuronik asit (M) ve  $\alpha$ -(1 $\rightarrow$ 4)-bağlı L-guluronik asit kalıntılarında oluşan doğrusal blok kopolimerdir. SA esas olarak kahverengi alglerden ve bakterilerden elde edilir ve anyonik yapıda suda kolay çözünebilen bir polisakarittir. Ayrıca düşük toksisitesi, çeşitli olumlu fiziksel özellikleri ve hidrojelere kazandırdığı mekanik davranışların çeşitliliği sebebiyle biyomedikal ve doku mühendisliği uygulamalarında aljinatı en yaygın araştırılan polisakarit haline getirmektedir. *Avena sativa L.* (Poaceae), gıda ürünü olarak kullanılan Gramineae familyasına ait bir tahıldır. *A. sativa*'nın kolloidal dispersiyonu, egzamaya bağlı kaşıntı ve diğer tahriş durumlarının tedavisinde topikal bir ajan olarak FDA tarafından onaylanmıştır. Biyopolimer yapıdaki hidrojeller dış çevre koşullarındaki değişikliklere göre büzülme veya genişlemeye yönelik kontrol edilebilir tepkilerle tasarlanabilir. Bu çalışmada iyonik çapraz bağlayıcı CaCl<sub>2</sub> ile CMC/SA/*A.sativa*



hidrojelleri Box-Behnken Tasarım (BBD) Analizi kullanılarak optimize edilmiştir. Box-Behnken Tasarımı'nda SA oranı (A) (%1-%3), CMC oranı (B) (%1-%3) ve *A. sativa* oranı (C) (% 0,1-%0,5) değiştirilerek hidrojel şişmesi üzerindeki istatistiksel etkisi araştırılmıştır. Hidrojellerin şişme oranları ve kinetik sabitleri hesaplandı. BBD ile optimize edilen hidrojellerin farmasötik ve biyomedikal alanlarda kullanıma uygun, ucuz, kolay hazırlanabilen ve toksik etki göstermeyen bir biyomateryal olarak literatüre fayda sağlayacağı kanaatindeyiz.

**Anahtar Kelimeler:** Hidrojel, Karboksimetilselüloz, Sodyum Aljinat, *A.sativa*

### ABSTRACT

Hydrogels are polymeric gels with a three-dimensional physical or cross-linked network structure, which are widely applied in various sectors such as water purification, food technology and biomedical fields. These structures, which consist of homopolymers and copolymers containing many hydrophilic functional groups in their structure, have the ability to absorb and retain large amounts of water. Natural polymers are more suitable for hydrogel applications than synthetic polymers because they are non-toxic, easily soluble in water, cheap, easily obtained and biodegradable. Carboxymethyl cellulose (CMC) is a high molecular weight, water-soluble, biodegradable and biocompatible polymer that is frequently used especially in the biomedical field. CMC can form hydrogels with high water uptake due to its easy cross-linking. However, CMC hydrogels generally exhibit poor mechanical strength, limiting their use in the swollen state. For this reason, it is used together with other polymers such as alginate to provide structural stabilization of the CMC polymer. Sodium Alginate (SA) is a linear block copolymer composed of residues of various amounts  $\beta$ -(1 $\rightarrow$ 4)-linked D-mannuronic acid (M) and  $\alpha$ -(1 $\rightarrow$ 4)-linked L-guluronic acid. SA is mainly obtained from brown algae and bacteria and is an anionic polysaccharide that is easily soluble in water. In addition, its low toxicity, various favorable physical properties and the diversity of mechanical behaviors it imparts to hydrogels make alginate the most widely researched polysaccharide in biomedical and tissue engineering applications. *Avena sativa L.* (Poaceae), used as a food product, is a grain belonging to the Gramineae family. A colloidal dispersion of *A. sativa* is approved by the FDA as a topical agent for the treatment of eczema-related itching and other irritation conditions. Biopolymer structured hydrogels can be designed with controllable responses to shrink or expand according to changes in external environmental conditions. In this study, CMC/SA/*A.sativa* hydrogels with ionic crosslinker  $CaCl_2$  were optimized using Box-Behnken Design (BBD) Analysis. Hydrogel was created by changing the SA rate (A) (1%-3%), CMC rate (B) (1%-3%) and *A. sativa* rate (C) (0.1%-0.5%) in the Box-Behnken Design. Its statistical effect on swelling was investigated. The Swelling ratio and kinetic constants of the hydrogels were calculated. We believe that BBD-optimized hydrogels will benefit the literature as a biomaterial that is inexpensive, easy to prepare, non-toxic, and suitable for use in pharmaceutical and biomedical fields.

**Keywords:** Hydrogel, Carboxymethylcellulose, Sodium Alginate, *A.sativa*

### GİRİŞ

Hidrojeller, hidrofilik grupların varlığı nedeniyle suyu emme kapasitesi daha yüksek olan ancak suda çözünmeyen üç boyutlu polimerik ağ yapılarıdır (Kumar vd., 2020). Hidrojeller son yıllarda, atık su arıtımı, tarım, doku mühendisliği, ilaç salımı ve elektroaktif uygulamalar gibi çeşitli araştırma alanlarındaki uygulamaları nedeniyle araştırmacıların büyük ilgisini çekmektedir (Kumar&Negi, 2019; Jayaramudu vd., 2017; RahmanRaheem, 2023; Lu vd., 2023). Hidrojeller doğal veya sentetik polimerlerden malzemelerden yapılabilir ve değişen derecelerde sertlik ve elastikliğe sahip olabilir (Jiang vd., 2023). Bir sistemdeki su miktarını düzenlemeye yardımcı olabildiklerinden nem kontrolünün önemli olduğu ürünlerde sıklıkla kullanılırlar (Suneetha vd., 2023; Phonrachom vd., 2023). Polisakkarit olarak sodyum karboksimetil selüloz (CMC), çok sayıda hidroksil (-OH) ve karboksilat (-COO-) grubu içeren yüksek molekül ağırlıklı anyonik polimerik bir malzemedir (Liu vd., 2013). Biyobozunabilirliği, biyouyumluluğu, toksik olmaması, immünojenitesi ve akıllı yanıt verme yeteneği nedeniyle doku mühendisliği, ilaç dağıtımı, tekstil endüstrisi, kağıt, dağıtıcı ve su arıtma uygulamalarında yaygın olarak kullanılmaktadır (Ninan vd., 2014; Tiwari vd., 2017; Liu vd., 2016). Sodyum aljinat (SA), esas olarak

deniz yosunundan ve aynı zamanda bakteri kaynaklarından izole edilen, doğal, polianyonik, toksik olmayan, biyoyumlu, immünojenik olmayan ve biyolojik olarak parçalanabilen, doğrusal, karbonhidrat biyopolimerleri olan aljinik asidin sodyum tuzudur (Jiang vd., 2018; Kıvılcımdan vd., 2016). SA iki monomerik birimden oluşur;  $\beta$ -d-mannuronik asit (M-blok) ve  $\alpha$ -l-guluronik-asit (G-blok). SA, biyoyumluluğu, biyolojik olarak parçalanabilirliği, iyi jel oluşturma özellikleri ve düşük maliyeti nedeniyle biyomedikal jellerde yaygın olarak kullanılmaktadır (Huang vd., 2015; Park vd., 2017; Sood vd., 2023). Yulaf, *Avena sativa L.* (Poaceae), gıda ürünü olarak kullanılan Gramineae familyasına ait bir tahıldır. Yulaf'ın koloidal dispersiyonu, egzamaya bağlı kaşıntı ve diğer tahriş durumlarının tedavisinde topikal bir ajan olarak FDA tarafından onaylanmıştır (Veerasubramanian vd., 2018). Aynı zamanda birçok kozmetik formülasyonun ana bileşeni olup dermo-koruyucu, antiinflamatuvar ve antioksidan moleküller içerir (Kurtz vd., 2007).

İstatistiğe dayalı analitik bir teknik olan Yanıt Yüzeyi Metodolojisi, geleneksel yöntemlere göre daha hızlı, malzeme tasarrufu ve ekonomik olması nedeniyle farklı süreçlerin optimize edilmesinde başarıyla uygulanmaktadır (Hashemikia vd., 2015; Zhao vd., 2016). Box-Behnken Deney Tasarımı Yöntemi, 3-7 faktörlü ve yüksek, orta ve düşük olmak üzere üç düzeyde deneysel koşul sağlayabilen bir tür yanıt yüzeyi yöntemidir. Bu yöntemin kullanımı kolay ve tahmin edilen sonuçlar ve gerçek deneysel sonuçlara yakın olduğundan deneysel çalışmalarda yaygın olarak kullanılmaktadır (Dizaj vd., 2015; Zhao vd., 2016).

Bu çalışmada, kalsiyum klorür ( $\text{CaCl}_2$ ) ile iyonik çapraz bağlanmış Karboksimetil selüloz- Aljinat-*A. sativa* hidrojel jeller Box-Behnken deneysel tasarım yöntemi kullanılarak optimize edildi. Hidrojellerin %Şişme değerleri, Smak ve şişme kinetik sabitleri hesaplandı. Malzeme tüketimini indirgeyerek ve zamandan tasarruf sağlayarak optimum koşullara sahip medikal, farmasötik ve gıda uygulamalarında kullanılabilir alternatif bir biyokompozit malzemenin hazırlanması amaçlanmıştır.

## YÖNTEM

### Materyal

Aljinik asit ve Kalsiyum klorür Merck Firmasından (Almanya); Karboksimetil selüloz Aklar Kimyadan (Türkiye) ve *A. sativa* koloidal yulaf unu yerel bir marketten (Ankara, Türkiye) satın alınmıştır. Deney, Design-Expert Version 13 yazılımı (Stat-Ease, MN, ABD) kullanılarak tasarlandı.

### Hidrojellerin Hazırlanması

Çalışmada deney dizaynında belirtilen miktarlardaki CMC, SA ve *A. sativa* tartılıp ısıtıcılı manyetik karıştırıcıda  $40^\circ\text{C}$ 'da blend karışımları hazırlandı. %5lik  $\text{CaCl}_2$  çözelti ile iyonik çapraz bağlama yöntemiyle petri kaplarında ( $\text{cm}=9,5$ ) hidrojel oluşumu gerçekleştirildi. Elde edilen hidrojel belli çaplarda kesilerek sabit tartıma ( $\text{etüv}=40^\circ\text{C}$ ) alındı. Kurutmadan önceki hidrojel jeller Şekil 1'de sunulmuştur.



Şekil 1. Hidrojeller

### Box-Behnken tasarım modeli (BBD) Analizi

Box-Behnken tasarım modeli (BBD), yanıt olarak elde edilen hidrojellerin su şişme kapasitesi ile hazırlama parametrelerini optimize etmek ve çeşitli hazırlama parametreleri arasındaki etkileşimleri görselleştirmek için kullanıldı. Distile su içerisindeki hidrojellerin şişme oranını araştırmak için A: SA miktarı, B: CMC miktarı ve C: *A.sativa* içeriği (C) gibi üç bağımsız işlem değişkeni seçildi. Regresyon denkleminde kodlanan değerler ile gerçek değerler arasındaki ilişki aşağıdaki Eş.1’de verilmiştir.

$$X_i = (x_i - x_i^*) / \Delta x_i \quad \text{Eş. 1}$$

burada  $X_i$  bağımsız değişkenin kodlanmış değeridir,  $x_i$  bağımsız değişkenin kodlanmamış değeridir,  $x_i^*$  bağımsız değişkenin merkez noktasındaki kodlanmamış değeridir ve  $\Delta x$  adım değişim değeridir. Bu modelde, merkez noktaların (0 kodlu) üst üste birleştirildiği üç seviyeli bir faktöriyel (-1, 0 ve 1) vardır. Tasarım faktörünün aralığı SA miktarı, CMC miktarı ve *A.sativa* içeriği aralığına göre bağımsız süreç değişkenleri ve üç merkez noktalı 15 deneme Tablo 1’de sunulmuştur. Veriler denkleme göre ikinci dereceden bir polinom modeline yerleştirildi (Eş.2).

$$Y = \alpha_0 + \sum_{i=1}^3 \alpha_i X_i + \sum_{i=1}^3 \alpha_{ii} X_i^2 + \sum_{i=0}^2 \sum_{j=i+1}^3 \alpha_{ij} X_i X_j \quad \text{Eş. 2}$$

burada Y tahmin edilen cevap,  $X_i$  ve  $X_j$  kodlanmış değerlerdeki bağımsız değişkenlerdir,  $\alpha$  sabit katsayıdır.  $\alpha_0, \alpha_i, \alpha_{ii}$  ve  $\alpha_{ij}$  ise sırasıyla modelin sabit etki, doğrusal etki, kare etkisi (ikinci dereceden) ve etkileşim katsayılarıdır (Fan vd., 2020).

Tablo 1. BBD Analizi ile SA/CMC/*A.sativa* hidrojellerin hazırlanması ve optimizasyon değişkenleri

Std	Run	Factor 1 A:Alg g	Factor 2 B:CMC g	Factor 3 C:A.sativa g	Response 1 Swelling %
12	1	2	3	0,5	280,8
6	2	3	2	0,1	235,7
8	3	3	2	0,5	245,8
9	4	2	1	0,1	150,7
2	5	3	1	0,3	62,9
15	6	2	2	0,3	194,1
4	7	3	3	0,3	190,9
13	8	2	2	0,3	196,2
3	9	1	3	0,3	149,3
7	10	1	2	0,5	185,8
5	11	1	2	0,1	177,4
14	12	2	2	0,3	191,1
11	13	2	1	0,5	152,6
1	14	1	1	0,3	137,3
10	15	2	3	0,1	282,8

Modellemede parametre olarak; Alg SA oranını (A) (%1-%3), CMC oranı (B) (%1-%3) ve *A. sativa* yüzdesi (C) (% 0,1-%0,5) kullanılmıştır. Modelde  $R^2$  değerleri ve anlamlı terimler, her bir yanıt için varyans analizi ANOVA ile test edildi.

### Hidrojellerin Şişme Derecelerinin ve Şişme Kinetik Parametrelerinin Belirlenmesi

Hidrojellerin şişme dereceleri gravimetrik ölçümlere göre belirlendi. Şişme yeteneklerini belirlemek için sabit tartıma gelen hidrojeller ( $M_0$ ) distile su içerisinde oda koşullarında 24 saat sürede bekletildi. Bu sürenin sonunda hidrojellerden yüzey suyu blotlama işlemiyle uzaklaştırıldı ve ardından tekrar tartıldı. Hidrojellerin denge su içerikleri aşağıdaki Eş.3 kullanılarak hesaplandı.

$$\%Şişme = \frac{t \text{ anındaki şişmiş hidro jelin kütlesi (g)} - \text{başlangıçtaki kuru hidro jelin kütlesi (g)}}{\text{başlangıçtaki kuru hidro jelin kütlesi (g)}} \times 100$$

## BULGULAR

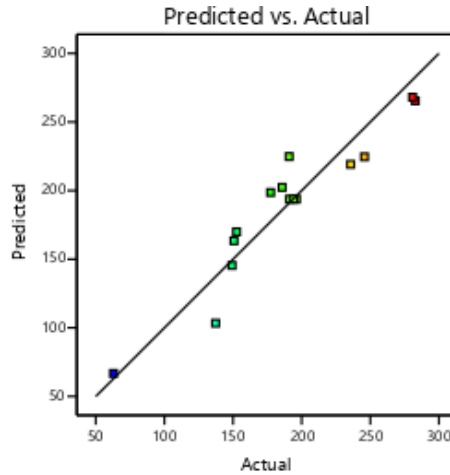
### Şişme modelinin BBD Analizi ile optimizasyonu

Tabloda verilerinin ANOVA analizi ile deneysel süreçlerin uyumluluğu p değerinin 0.05'ten küçük ( $p < 0.05$ ) olması ile açıklanmaya çalışılmış ve modelin istatistiksel olarak anlamlı olduğu görülmüştür (Tablo 2). Bu durumda hidrojenlerin hazırlanması için A, B, AB, AC, BC, A<sup>2</sup>, B<sup>2</sup>, C<sup>2</sup> model terimleri olarak bulunmuştur. 0.05'ten büyük p değerleri, deneysel ve tahmin edilen değerlerin deneysel hata ile açıklanabileceğini göstermektedir. 4,84'lük Model F değeri, modelin anlamlı olduğunu göstermektedir. Ayrıca p değerinin 0,0500'ün altında olması model terimlerinin anlamlı olduğunu gösterir. 238,77'lik Uyum Eksikliği F-değeri, Uyum Eksikliğinin anlamlı olduğunu ima etmektedir. Bu kadar büyük bir Uyum Eksikliği F değerinin gürültüden kaynaklan uyum eksikliğinin saf hataya göre önemli olmadığı anlamına gelir ve ihtimal %0,42'dir. R<sup>2</sup>'nin 0,8970, düzeltilmiş R<sup>2</sup>'nin 0,7115 ve Varyasyon katsayısı değeri %16,26 olarak bulunmuştur. Daha küçük VK değerleri, daha yüksek VK değerlerine sahip deneylerden daha iyi tekrarlanabilirlik gösterir.

İkinci dereceden Şişme Derecesi (%) modeli için regresyon denklemi aşağıdaki gibi bulundu:

$$\text{Şişme Derecesi (\%)} = 193,8 + 10,69A + 50,03B + 2,3C + 29AB + 0,425AC - 0,975BC - 32,125A^2 - 26,75 B^2 + 49,5C^2.$$

Şekil 2'de görüldüğü gibi, % Şişme'nin tahmin edilen değerleri ile deneysel değerlerinin hafif sapmalarla birbirine yakınlığı, tasarlanan deneysel modelin kabul edilebilir doğrulukta ve değişkenlerin anlamlı olduğunu bize göstermektedir.

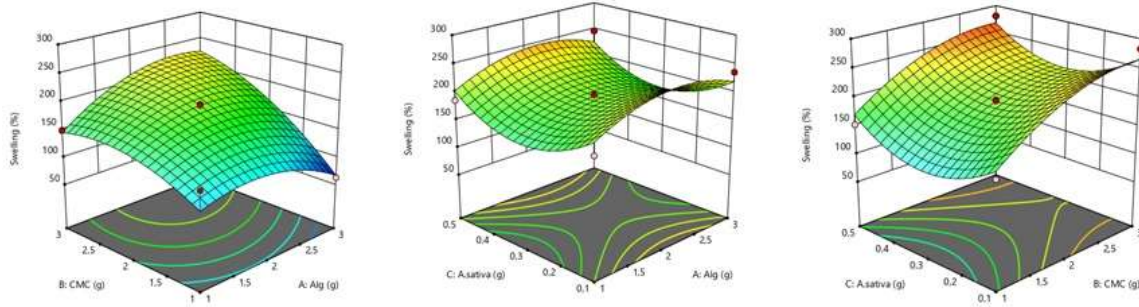


Şekil 2. % Şişme'nin tahmin edilen değerleri ile deneysel değerleri.

Tablo 2. Anova Analizi

	Sun of Squares	df	Mean Square	F-value	p-value	
<b>Model</b>	41086,05	9	4565,12	4,84	0,0487	<b>significant</b>
A-Alg	913,78	1	913,78	0,9681	0,3703	
B-CMC	20030,01	1	20030,01	21,22	0,0058	
C-A.sativa	42,32	1	42,32	0,0448	0,8407	
AB	3364,00	1	3364,00	3,56	0,1177	
AC	0,7225	1	0,7225	0,0008	0,9790	
BC	3,80	1	3,80	0,0040	0,9519	
A <sup>2</sup>	3810,52	1	3810,52	4,04	0,1007	
B <sup>2</sup>	2607,62	1	2607,62	2,76	0,1574	
C <sup>2</sup>	9047,08	1	9047,08	9,59	0,0270	
<b>Residual</b>	4719,30	5	943,86			
Lack of Fit	4706,16	3	1568,72	238,77	0,0042	<b>significant</b>
Pure Error	13,14	2	6,57			
<b>Cor Total</b>	45805,35	14				
<b>Std. Dev.</b>	30,72					
<b>Mean</b>	188,89					
<b>C.V. %</b>	16,26					
<b>R<sup>2</sup></b>	0,8970					
<b>Adjusted R<sup>2</sup></b>	0,7115					

Değişkenlerin ikili etkileşimleri ANOVA analizinden sonra, değerlendirilmiş aşağıdaki Şekil 3’de yüzey tepki grafikleri olarak sunulmuştur.



Şekil3. % SD 3-boyutlu yüzey grafikleri.

SA ve CMC miktarındaki artış şişme derecesini arttırdığı, ayrıca artan CMC miktarı şişme derecesini önemli ölçüde arttırdığı bulunmuştur.

### Hidrojellerin Şişme Derecelerinin ve Şişme Kinetik Parametre Sonuçları

Hidrojellerin şişme kinetiği parametrelerinin hesaplanması

$$t/S=A+Bt$$

eşitliğine göre oluşturulan  $t/S-t$  grafiklerinin eğim ve kesim noktalarından hesaplanan sırasıyla maksimum şişme derecesi (Smak) ve şişme hız sabiti (kş) ile tablo 3’de sunulmuştur..



Tablo 3. Hazırlanan hidrojelilerin Smak ve şişme kinetik parametreleri.

Hydrogel Run number	smak	k şişme
1	1,17	2,21E-02
2	1,6	1,18E-02
3	2,8	3,72E-03
4	0,5	1,53E-02
5	0,9	7,01E-03
6	1,3	3,20E-02
7	1,4	1,59E-02
8	2,3	6,64E-03
9	1,7	8,13E-03
10	1,9	1,70E-02
11	2,1	2,62E-03
12	2,2	7,02E-03
13	2,3	1,86E-03
14	1,1	2,60E-03
15	3,4	3,19E-03

### TARTIŞMA VE SONUÇ

Bu çalışmada  $\text{CaCl}_2$  kullanılarak çapraz bağlanmış SA-CMC-*A.sativa* hidrojellerin hazırlanması için Box-Behnken tasarımı (BBD) kullanılmıştır. Üç faktörlü (CMC oranı, SAoranı ve *A.sativa* miktarı) olacak şekilde deney tasarımı yapılmış ve model 15 deney önermiştir. Model de cevap olarak hazırlanan hidrojellerin % şişme değerleri kaydedilmiştir. ANOVA analizi sonucu, modelin istatistiksel olarak anlamlı olduğu görülmüştür. Ayrıca istatistiksel olarak F değeri 4,84'lük Model F değeri modelin anlamlı olduğunu göstermiştir. BBD tarafından oluşturulan optimum koşullar sırasıyla CMC= 2, SA= 3, *A.sativa*=0,1 olarak seçilmiştir. Deneysel çalışmanın ortalama şişme derecesi değerleri % 282,8 olarak belirlendi. En hızlı şişen hidrojel ise 2:2 CMC/SA oranında 0,3 g *A.sativa* ile hazırlanan hidrojellerin olduğu belirlendi. Sonuç olarak BBD ile zamandan tasarruf edilerek minimum sarf malzeme ile çeşitli uygulama alanlarında kullanılacak bir materyal literatüre kazandırılmıştır. Hidrojeller projenin ilerleyen çalışmalarında değişen uygulama alanlarındaki performanslarına göre değerlendirilecektir.

### TEŞEKKÜR

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TELE-RADYOLOJİ METİN VERİLERİNİ OTOMATİK TAMAMLAMA  
AUTO-COMPLETING TELE-RADIOLOGY TEXT DATA

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**ÖZET**

Teleradyoloji, sağlık sektöründe dijital görüntüleme teknolojisinin hızla gelişmesiyle birlikte önemli bir alan haline gelmiştir. Ancak, teleradyoloji uygulamalarında, radyologlar ve tıbbi uzmanlar tarafından yazılan rapor metinlerinde veya hastaların sağlık geçmişi (anamnez) belgelerinde eksiklikler ve hatalar sıkça karşılaşılan sorunlardır. Bu eksiklikler ve hatalar, raporların ve anamnezlerin kalitesini düşürebilir ve hasta güvenliğini riske atabilir. Ayrıntılı radyoloji raporları ve anamnez verilerinin yazılması hekim için zaman alan rutin bir işidir. Hekimin tıbbi metin yazarken yazım hatası yapmasını engelleyecek araçların geliştirilmesi doğal dil işlemenin uygulama alanlarından biridir. Kelime tamamlama sistemleri öncelikle kullanıcının yazması gereken tuş vuruşu sayısını azaltmayı, böylece kullanıcıların zamandan ve emekten tasarruf etmesini amaçlamaktadır. Otomatik tamamlama modelleri, radyologların veya tıbbi uzmanların yazdığı metinleri analiz ederek eksik veya hatalı bölümleri tanımlayabilir ve bu eksiklikleri otomatik olarak tamamlayabilirler. Bu, raporların ve anamnezlerin daha tutarlı ve bilgi dolu olmasını sağlar.

Bu çalışmada, Türk radyoloji raporları ve anamnez verilerinin otomatik tamamlaması için hibrit bir model öneriyoruz. Önerilen model, karakter tabanlı Uzun kısa süreli hafıza (LSTM) ile kelime tabanlı LSTM'yi birleştirmektedir. Bu sayede, metni otomatik olarak tamamlarken yazım hatalarına karşı dayanıklıdır.

Deneylerde, beyin ve ekstremiteler MR ve BT görüntülerine ilişkin radyoloji raporları ve anamnez verilerine odaklandık. Önerilen modeli, BERT ve GPT-2 ile karşılaştırdık. Önerilen modelin, tuş vuruşu tasarrufu, BLEU puanı, eğitim süresi, tahmin süresi ve bellek tüketimi açısından en gelişmiş modellerden daha iyi performans gösterdiğini gösterdik.

Önerilen modelin, teleradyoloji uygulamalarında raporların ve anamnezlerin kalitesini iyileştirmeye yardımcı olabileceği düşünülmektedir.

**Anahtar kelimeler:** Teleradyoloji, Otomatik tamamlama, doğal dil işleme.

**ABSTRACT**

Teleradiology has become an important field in the healthcare industry with the rapid development of digital imaging technology. However, in teleradiology applications, omissions and errors in the report texts written by radiologists and medical specialists or in the health history (anamnesis) documents of the patients are frequently encountered problems. These omissions and errors can reduce the quality of reports and anamneses and compromise patient safety. Writing detailed radiology reports and anamnesis data is a time-consuming routine task for the physician. Developing tools that will prevent physicians from making spelling mistakes while writing medical texts is one of the application areas of natural language processing. Word completion systems primarily aim to reduce the number of keystrokes the user must type, thus saving users time and effort. Auto-completion models can analyze texts written by radiologists or medical specialists, identify missing or incorrect sections, and automatically complete these deficiencies. This ensures that reports and anamneses are more consistent and informative.

In this study, we propose a hybrid model for automatic completion of Turkish radiology reports and anamnesis data. The proposed model combines character-based Long short-term memory (LSTM) and word-based LSTM. In this way, it is resistant to typos while automatically completing the text.

In the experiments, we focused on radiology reports and anamnesis data on brain and extremity MRI and CT images. We compared the proposed model with BERT and GPT-2. We show that the proposed model outperforms state-of-the-art models in terms of keystroke savings, BLEU score, training time, prediction time, and memory consumption.

It is thought that the proposed model can help improve the quality of reports and anamneses in teleradiology applications.

**Keywords:** Teleradiology, Autocomplete, natural language processing.

## GİRİŞ

Ayrıntılı radyoloji raporları ve anamnez verilerinin yazılması hekim için zaman alan rutin bir işidir. Bu tıbbi metinler birçok karakter ve kelime grubuna sahip uzun Latince kelimeler içerir. Hekimin bu metinleri yazarken yazım hatası yapmasını engelleyecek araçların geliştirilmesi doğal dil işlemenin uygulama alanlarından biridir. Kelime tamamlama sistemleri öncelikle kullanıcının yazmak için ihtiyaç duyduğu tuş vuruşu sayısını azaltmayı, böylece kullanıcıların zamandan ve emekten tasarruf etmesini amaçlamaktadır. Ayrıca tuş vuruşlarının sayısını azaltmakla kalmaz, aynı zamanda metindeki yazım hatalarını da azaltarak metnin belirli bir biçimde yazılmasına olanak tanır. Deneylerimizde beyin ve ekstremiteler MR ve BT görüntülerine ilişkin radyoloji raporları ve anamnez bilgilerinden yararlandık.

**Anamnez:** Bir hastanın tıbbi geçmişi veya anamnezi, bir hastanın tıbbi tanısı için hekim tarafından elde edilen bilgilerdir. Teleradyoloji iş akışında bu veri, hasta radyoloji görüntülerinin değerlendirilmesinde ikinci bilgidir. Bu bilgiler hasta demografik bilgilerini, sorunlarını, semptomlarını, teşhislerini, ilerleme notlarını, tedavilerini, ilaçlarını, yaşamsal belirtilerini, geçmiş tıbbi geçmişi, laboratuvar verilerini, önceki radyoloji raporlarını ve daha fazlasını içerir. Çoğunlukla anamnez bilgileri, tüm bu bilgileri tek bir metin alanında içeren serbest metin verileridir.

Radyoloji raporları klinik görüntüleme bilgilerinin önemli bir kaynağıdır. Vücudun birçok kısmı hakkında kritik bilgiler içerir. Bu bilgi, belirsizlik fiilleri, anatomi, gözlemler ve aidiyet değiştiriciler gibi belirli anlamsal unsurlardan oluşan genel bir modeli takip eder. Hem radyoloji raporlarının hem de anamnez cümlelerinin otomatik olarak tamamlanmasının çeşitli zorlukları vardır çünkü her ikisini de yazmanın bir standardı yoktur.

Bu yazımızda, daha önce yazılan harf ve kelimeleri kullanarak kullanıcıya öneriler sunan bir sistem önerdik. Sistem, radyoloji raporlarındaki metinleri ve beyin ve ekstremiteler MR ve CT görüntüleri ile ilgili anamnez metnini otomatik olarak tamamlayan bir derin öğrenme modeli kullanıyor. Önerilen model, karakter tabanlı otomatik tamamlama modeli ile kelime tabanlı otomatik tamamlama modelini birleştiren hibrit bir modeldir. Model, her iki modelin avantajlarını birleştiriyor. Son teknoloji modeller ile önerilen hibrit modelin tuş vuruşu tasarruf oranı, BLEU puanı, tahmin süresi, bellek tüketimi ve eğitim süresi açısından ayrıntılı bir karşılaştırmasını sunduk. Gerçek hayattaki uygulamaları tasarlarken tuş vuruşu kaydetme ve BLEU puanı önemli değerlendirme yöntemleri olsa da eğitim süresi, tahmin süresi ve bellek tüketimi de dikkate alınmalıdır. Sonuçlarımızı diğer son teknoloji derin öğrenme modelleriyle de karşılaştırdık. Klinik raporları otomatik olarak tamamlamak için klinik görüntüleri kullanmak makalenin kapsamı dışındadır.

Otomatik metin tamamlama literatüründeki çalışmaların çoğu, arama motorlarındaki sorgu metinleri ve tıbbi metinlere odaklanmaktadır (Cai ve De Rijke, 2016). Bu bölümde bu iki grup araştırma alanıyla ilgili çalışmaları özetleyeceğiz. Gupta, önerileri sıralamak ve en iyi önerileri sunmak için bağlamı anlamak için n-gram koşullu olasılık sözlüklerini kullanan, bağlama duyarlı, gerçek zamanlı bir yazım denetleyici önerdi (Gupta, 2020). Yulianto ve ark. bir kütüphanede anahtar kelime araması için otomatik tamamlama ve yazım denetimi için Levenshtein mesafesini kullandı (Yulianto, Arifudin ve Alamsyah, 2019). Singh ve Singh, morfoloji, konuşma bölümü, parçalama, kökten ayırma, hash tablosu gibi diğer alanlardaki tekniklerin nasıl kullanılabileceğini analiz etti. Yazım denetleyicileri için kullanılır (Singh

ve Singh, 2020). Chen ve diğerleri. AOL sorgu günlüğü veri kümesinden kullanıcı tercihlerini otomatik olarak yakalamak için hem kullanıcı düzeyinde RNN'yi hem de oturum düzeyinde RNN'yi kullanan, dikkat temelli hiyerarşik bir sinirsel sorgu öneri modeli önerdi (Chen, Cai, Chen ve De Rijke, 2020). Jaech ve Ostendorf, arama motorları için bir otomatik tamamlama modeli önerdiler (Jeach ve Ostendorf, 2018). Park ve Chiba, sorgunun otomatik tamamlanması için karakter düzeyinde tekrarlayan sinir ağı (RNN) kullanan bir model önerdiler (Park ve Chiba, 2017). Bölümün bu kısmında klinik verilerle ilgili çalışmaları özetleyeceğiz. Zhang ve diğerleri. nöral diziden diziye öğrenmeyle radyoloji raporu oluşturmayı otomatikleştirmek için bir model önerdi (Zhang vd, 2018). Han ve ark. Radyologla ilgili klinik karar almayı desteklemek için otomatik olarak lomber omurga MRI'lerinin birleşik raporlarını oluşturur (Han vd, 2018). Biswal, elektroensefalogram (EEG) Kayıtlarından tıbbi raporlar yazmak için yığılmış bir evrişim sinir ağı (CNN) ve bir RNN kullanarak kaymayla değişmeyen ve zamansal kalıpları çıkaran bir model önerdi (Biswal, Xiao, Westover ve Sun, 2019). Biswal ve ark. X-ışınları ve EEG için raporlar üreten etkileşimli bir yöntem önerdi (Biswal vd, 2020). CNN modeli görüntüleri girdi olarak kullanır ve LSTM'yi kullanarak cümleler oluşturur. Van ve Kauchak, metin basitleştirme için BERT, RoBERTa, XLNet ve GPT-2'yi birleştiren bir topluluk modeli sunuyor (Van, Kauchak ve Leroy, 2020). Gopinath ve ark. klinik metinler için makine öğrenimine dayalı bir sistem geliştirdi (Gopinath vd, 2020).

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### ARAŞTIRMA VE BULGULAR

Önerilen hibrit model, karakter tabanlı otomatik tamamlama modeli ve kelime tabanlı otomatik tamamlama modeli olmak üzere iki alt model içermektedir. İlk olarak veriden bilgi verecek olup, sonrasında hibrit modeli oluşturan karakter bazlı ve kelime bazlı alt modellerin nasıl tasarlandığı hakkında bilgi verilecektir. Sonrasında ise eğitim parametrelerinden bahsedilip, eğitim ve test sonuçları açıklanacaktır.

### Veri Analizi

Kullanılan verilerde MR Beyin ve BT Beyin çekimlerine ait rapor ve anamnez metinleridir. Veri hiçbir ön adımdan geçmediği için verinin içeriği aynı zamanda yanlış yazılmış rapor ve anamnezlerden de oluşmaktadır. İlk öncelikle veri frekansa göre analiz edildiğinde kelime bazlı frekans analizi Tablo 1'de, karakter bazlı kelime sayısı ise Tablo 2'de gösterilmiştir.

Frekans (Sıklık)	Kelime Sayısı
>10000	7
>5000	14
>1000	110
>250	354
>100	620
>50	914
>20	1493

Tablo 1. Radyoloji raporlarında değişen frekans aralıkları için kelime sayıları

Karakter Uzunluğu	Kelime Sayısı
15	210
14	270
13	412
12	567
11	699
10	887
9	928
8	997
7	949
6	742
5	592
4	319
3	173

Tablo 2. Radyoloji raporlarında kelimelerin karakter uzunluğuna göre kelime sayısı

Rapor ve anamnez cümlelerin içerisinde, 7761 adet benzersiz kelime bulunurken, bir cümledeki en yüksek kelime sayısı 24 olarak saptanmıştır. 11585 adet benzersiz rapor cümlesi bulunurken, 6412 adet anamnez bulunmaktadır. Rapor cümlelerdeki sayıların hepsini tek bir işaret olarak algıladığımızda ise benzersiz cümle sayısı 9814'e düşmektedir.

#### **Karakter Tabanlı Otomatik Tamamlama Modeli**

Karakter tabanlı otomatik tamamlama modelinin temel amacı sözcükleri otomatik tamamlamaktır. Kullanıcı charInput olarak en az 1 veya daha fazla harf girdiğinde, model 10 kelimelik tahminleri listeler. Otomatik tamamlama modeli, bir kodlayıcı, bir kod çözücü ve bir dikkat mekanizmasından oluşan, bilinen bir diziden diziye mimarisidir (Yang, Wang ve Chu, 2020). Modelin girişi charInput harf dizisidir. Her harf, tek geçişli karakter kodlamasıyla kodlanır. Model, kaynak dizisini girdi olarak alır ve çıktı olarak metni üretir. Kodlayıcıda 2 katmanlı çift yönlü LSTM kullanılmıştır. Kodlayıcı, kaynak dizinin tüm bilgisini (bağlam vektörü) kodlar ve bilgiyi, hedef diziye tahmin eden 1 katmanlı kod çözücü LSTM'ye aktarır. Çıktıdaki her harf, gizli duruma, bağlam vektörüne ve < end > dizi belirteciye ulaşılan kadar önceden tahmin edilen harfe göre tahmin edilir. Giriş belirteçlerinin doğrudan kendilerine bağlanmasını sağlayan Keras öz-dikkatini kullandık (Hu, 2020). Işın boyutunun  $k = 10$  olduğu ışın arama kod çözümünü kullanarak  $k$  kelimenin en yüksek puana sahip olduğunu hesaplıyoruz

#### **Kelime Tabanlı Otomatik Tamamlama Modeli**

Kelime tabanlı otomatik tamamlama modeli, kullanıcı tarafından yazılan önceki kelimeleri prevWordInput alır ve önceki tam kelimelere göre cümleleri otomatik tamamlar. Kullanıcı tarafından yazılan kelimenin eksik olması durumunda model, eksik kelimeye ilişkin herhangi bir bilgiyi kullanmaz. Model, karakter tabanlı otomatik tamamlama modelinde bahsedilen modele benzer şekilde bir kodlayıcı, bir kod çözücü ve bir öz-dikkat mekanizması içeren bir diziden diziye model olarak tasarlanmıştır. Modelin girişi bir kelime dizisidir. Her sözcük için, kodlayıcıya giriş olarak Hızlı Metin gömme kullanılır. Önceden eğitilmiş Türkçe Fasttext modeline radyoloji raporlarıyla ince ayar yaptık.

Kodlayıcıda dikkat mekanizmalı 2 adet çift yönlü LSTM gizli katmanı bulunmaktadır. Kod çözücüde tek katmanlı tipik bir LSTM kullanılır. Karakter modeline benzer şekilde model, ışın arama kod çözme (ışın boyutu  $k = 10$ ) kullanılarak en yüksek puana sahip  $k$  kelime dizileri üretir. Model,  $k$  kelime tahminlerinin her biri için en üstteki  $t$  sonraki kelimeyi bulur. Işın araması cümlelerin sonuna kadar devam eder. Daha sonra model, tam kelime dizisi tahminini elde etmek için geri adım atar ve en yüksek puana sahip 10 kelime dizisi tahminini seçer.

#### **Hibrit Otomatik Tamamlama Modeli**

Karakter bazlı otomatik tamamlama Modeli ile Kelime bazlı otomatik tamamlama modelinin birlikte kullanılmasıyla oluşturulan hibrit model, yazılacak raporun veya anamnezin ilk kelimesinden sonra her harfin sonucunda bir sonuç dönmektedir.



Karakter bazlı otomatik tamamlama modeli ilk kelime ve ondan sonraki kelimeler yazılırken, yazılan kelimenin çıktı listesi olarak  $wordList_c^1 = \{word_c^1, word_c^2, \dots, word_c^{10}\}$  bir sonuç dönerken, kelime bazlı otomatik tamamlama modeli ilk kelimedenden sonraki kelimeler yazılırken, yazılması beklenen kelimenin çıktı listesi olarak  $wordList_w^1 = \{word_w^1, word_w^2, \dots, word_w^{10}\}$  sonuç dönmektedir.

İki modele ait çıktı listelerin içerisinde, o kelimenin tahminine dayalı aynı id'nin olasılık değerleri çarpılarak en yüksek ihtimalli 10 yeni kelime listesi elde edilmektedir.

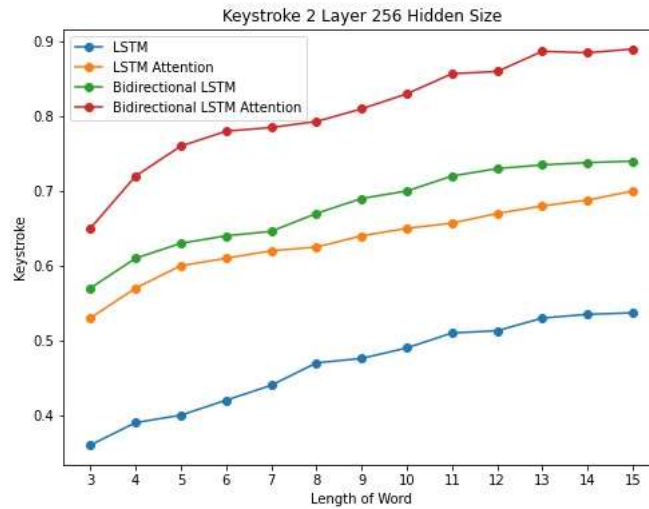
### Eğitim

Karakter bazlı otomatik tamamlama model eğitiminde benzersiz olan 7761 adet kelimenin içerisinde 3 karakter ve daha uzun kelimelerde eksiltme ve bozma yapılarak kelimeler karakter uzunluğu – 1 x 2 sayısı kadar çoğaltılmıştır. Örnek olarak 3 karakterli bir kelime modelin girişine eksik karakter ve bozuk kelime olarak verilmek için 4 kez çoğaltılmıştır. Veri sayısı 120180'e arttırılmıştır. Bu sayısının %80'i eğitim, %10'u doğrulama ve %10'u da test için kullanılmıştır. Öğrenme oranı 0.01 ile 0.005 arasında 20 epok olarak eksponansiyel olarak azaltılıp arttırılacak olarak ayarlanmıştır. Aktivasyon fonksiyonu olarak softmax, kayıp fonksiyonu olarak da categorial crossentropy belirlenmiştir. 500 epok süren eğitimde en düşük vdoğrulama kaybı veren epok değeri kaydedilmiş ve test seti bu epokta kaydedilen modelde denenmiştir. Kaydedilen epokta test verisetinin sonucu %87 doğruluk olarak hesaplanmıştır.

Kelime bazlı otomatik tamamlama modelinde ise 16226 adet benzersiz rapor ve anamnez cümleleri, cümle sonlarından birer birer eksiltilecek ve ortalarından da eksiltmeler yapılarak bu sayı 224514 olarak arttırılmıştır. Eğitim, doğrulama, test veri sayısı ve diğer hiperparametreler karakter bazlı model ile aynı şekilde ayarlanmıştır. Kelime bazlı modelin test verisindeki doğruluk oranı ise %91.2 olarak hesaplanmıştır.

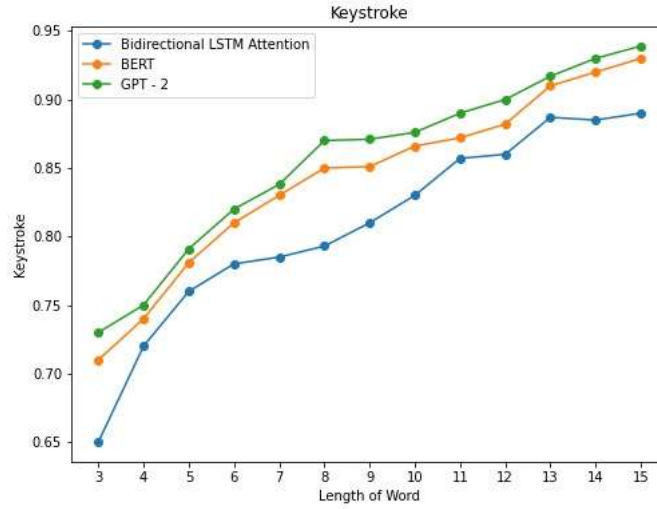
### Deneyel Sonuçlar

Karakter bazlı otomatik tamamlama modelinin testi için kullanılan metrik keystroke'tur. Keystroke, yazılan bir kelimedede en az karakterle yazılıp sonuç listesi içerisinde olduğu dilimdeki karakter tasarrufu oranıdır.



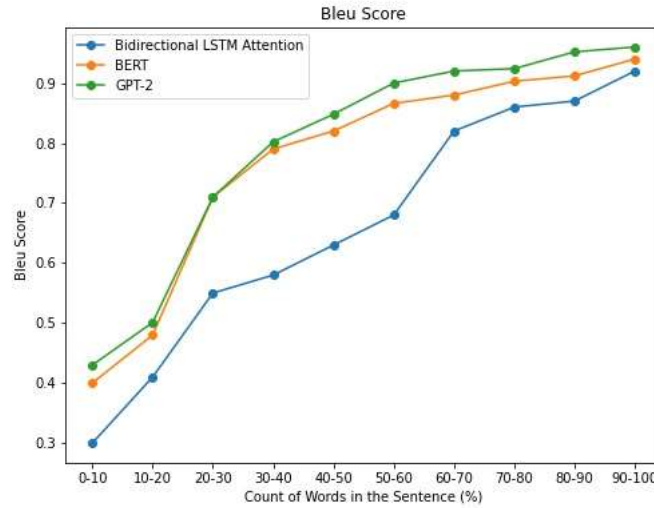
Şekil 1. Karakter bazlı LSTM modellerinin keystroke sonuçları

Aynı hiperparametrelerle eğitilen 4 farklı LSTM bazlı modelğin eğitimi sonucu, modellerin test veri setindeki keystroke analizi şekil 1'de gösterilmiştir. Bidirectional LSTM + Attention modeli tüm karakter uzunluğundaki kelimelerde keystroke oranı en fazla skor veren model olmuştur.



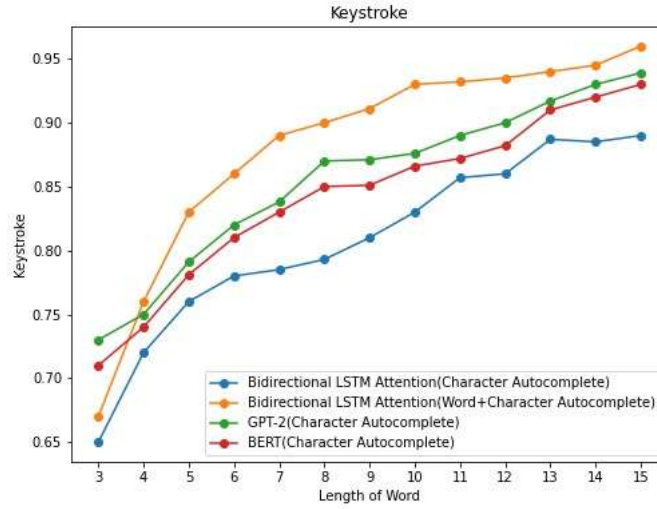
Şekil 2. Karakter bazlı otomatik tamamlama modeli ile Bert ve GPT-2 sonuçları

Kelime tamamlama modelinin test verileri sonucunda BLEU skor metriği sonuçları Şekil 3'te gösterilmektedir.



Şekil 3. Kelime bazlı model ile Bert ve GPT-2 'nin BLEU skor sonuçları

Hibrit model sonucunda ise, karakter bazlı modelin keystroke metriğindeki gelişimini ve BERT ile GPT-2'nin sonuçları ile karşılaştırıldığı grafik Şekil 4'te verilmiştir.



Şekil 4. Hibrit Modelin Keystroke sonucu

## TARTIŞMA VE SONUÇ

Bu yazıda, hastaların anamnez bilgilerinin ve klinik görüntülerin radyoloji raporlarının otomatik olarak tamamlanmasına yönelik, kullanıcının yazmak zorunda olduğu tuş vuruşu sayısını azaltmak için hibrit bir model önerdik. Önerilen model, metni otomatik tamamlarken yazım hatalarına karşı dayanıklı olacak şekilde eğitilmiştir. Önerilen model, giriş bölümünde bahsedilen zorlukların üstesinden gelmek için hem karakter düzeyinde hem de sözcük düzeyinde LSTM modellerini kullanır. Tablo 3'te gösterilen sonuçlara göre önerilen model, tuş vuruşu tasarrufu (keystroke), bellek tüketimi, eğitim süresi ve tahmin süresi açısından son teknoloji ürünlerinden BERT ve GPT-2 modellerinden daha iyi performans göstermektedir.

Model	Tahmin Süresi (s)	Hafıza (MB)	Eğitim Süresi(s)
LSTM	0.068	5	7210
LSTM, Attention	0.113	60.8	7407
Bi-LSTM	0.102	10.4	12811
Bi-LSTM, Attention	0.117	122.1	13976
GPT-2	0.154	384	19819
BERT	0.147	298	16192

Tablo 3. Modellerin tahmin süresi, hafıza ve eğitim sürelerini karşılaştırma

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AYRIK HARTLEY DÖNÜŞÜMÜ KULLANILARAK FDAM'IN UZAY  
HARMONİKLERİNİN ANALİZİ

ANALYSIS OF SPACE HARMONICS OF BLDC MOTOR USING DISCRETE HARTLEY  
TRANSFORM

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**ÖZET**

Klasik DA motorlarının moment-hız karakteristikleri doğrusaldır. Ancak bu motorlarda komütasyon işlemi mekanik olarak fırça ve kollektör ile gerçekleştirilmektedir. Fırçasız DA motorlarında (FDAM) ise doğrusal olan moment-hız karakteristiği korunarak komütasyon işlemi elektronik olarak gerçekleştirilmektedir. FDAM'ların düşük atalet momenti, mıknatis kullanımına bağlı olarak yüksek güç yoğunluğu ve verim, sessiz çalışma ve az bakıma ihtiyaç gibi birçok üstünlüğü bulunmaktadır. Bu motorlarda kullanılan mıknatisin malzemesi ve yapısı makine performansı ile doğrudan ilişkilidir. Uzay harmonikleri makinenin geometrisi ile ilişkilidir. Bu harmonikler makinenin gürültülü çalışmasına neden olup nüvesinde ısınma ile sonuçlanır. Hava aralığı dalga şeklinin değişimi uzay harmoniklerinin genliğini etkilemektedir. Bu çalışmada FDAM'ın farklı offset değerinde hava aralığı dalga şekilleri çıkarılmıştır. Elde edilen dalga şekline Ayrik Hartley Dönüşümü (AHD) uygulanarak baskın harmonikler ve diğer harmonik bileşenleri incelenmiştir. Böylelikle FDAM'larda offset değerinin makinenin verim, hava aralığı dalga şekli, uzay harmonikleri gibi performans değerleri elde edilmiştir.

**Anahtar Kelimeler:** Uzay harmoniği, Ayrik Hartley Dönüşümü, Fırçasız DA motoru.

**ABSTRACT**

The torque-speed characteristics of classical DC motors are linear. However, in these motors, commutation is performed mechanically with brushes and a commutator. In brushless DC motors (BLDC), on the other hand, the linear torque-speed characteristic is maintained, and commutation is performed electronically. BLDC motors have many advantages, such as low moment of inertia, high power density, efficiency due to the use of magnets, silent operation, and minimal maintenance. The material and structure of the magnets used in these motors are directly related to machine performance. Space harmonics are related to the geometry of the machine. These harmonics can cause noisy operation of the machine and result in heating in the core. Changes in the air gap waveform affect the magnitude of space harmonics. In this study, air gap waveforms at different offset values for BLDC motors have been extracted. By applying Discrete Hartley Transform (DHT) to the obtained waveform, dominant harmonics and other harmonic components have been analyzed. Thus, performance parameters such as efficiency, air gap waveform, and space harmonics have been obtained for BLDC motors with different offset values.

**Keywords:** Space harmonics, Discrete Hartley Transform, Brushless DC motor

### GİRİŞ

Klasik DA makinaları doğrusal moment-hız karakteristiğine sahiptirler. Bu makinalara uyarım mekaniksel olarak fırça kollektör düzeneği kullanılarak sağlanır. Ancak bu düzeneğin kullanımı motorun sık sık bakıma ihtiyaç duymasına neden olur. Bu noktada Fırçasız Doğru Akım Motorları (FDAM) klasik motorun doğrusal moment-hız karakteristiğine sahip olup komütasyonun elektronik olarak gerçekleştirildiği ve bu olumsuzluğun ortadan kaldırıldığı makinalardır [1]. FDAM'lar yüksek güç yoğunluğu, yüksek verim, düşük atalet momenti az bakım gereksinimi özelliklerine sahiptirler. Tüm bu özelliklerin avantajı ile sağlık sektöründe, havacılık sektöründe, elektrikli araç sanayinde ve yüksek hız gerektiren birçok endüstriyel uygulamalarda tercih edilmektedir [2-5].

FDAM'ların rotor kısmında sabit mıknatıslar bulunmaktadır. Rotorda sargı bulunmaması rotor bakır kaybını önlemekte ve bu makinalarda yüksek verime olanak sağlamaktadır. Özellikle son yıllarda yüksek enerji yoğunluğuna sahip mıknatısların üretimi ile sabit mıknatısların elektrik makinalarında kullanımı artmıştır. Bu mıknatısların kullanımı ile amaca yönelik olarak özel tasarımlar yapılabilmektedir. Sabit mıknatıslı makinalarda, ferritler, Alüminyum-Nikel-Kobalt alaşımları, Neodimyum-Demir-Bor içerikli mıknatıslar kullanılmaktadır [6].

Literatürde FDAM'lar ile ilgili birçok farklı çalışma mevcuttur. Bu çalışmalarda genellikle mıknatıslar ve motorun kontrolü üzerine yoğunlaşmıştır [7, 8]. Yaz ve Çetin yaptıkları çalışmada elektrikli bisikletler için fırçasız doğru akım motorunun tasarımı, analizi ve uygulamasını gerçekleştirmişlerdir. Motor başlangıç açısını 3 farklı konumda incelenmiş ve en iyi başlangıç açısının 90° olduğu belirlenmiştir [9]. Kullanılan mıknatıs malzemesi ve geometrisi makinanın performansını etkilemektedir. FDAM'ın mıknatıs malzemesi ve kalınlığının tasarıma olan etkisinin incelendiği çalışmada verim, güç gibi performans parametreleri incelenmiştir. Yapılan incelemeler sonucunda, N45-M mıknatısının performans açısından en uygun olduğu tespit edilmiştir [10]. Benzer bir çalışmada, elektrikli bisiklet için FDAM tasarımı ve analizi gerçekleştirilmiştir. Çalışmada tasarıma ait tüm geometrik parametreler verilerek tasarım detaylandırılmıştır [11]. Kullanıcı odaklı tasarımların dışında elektrik makinalarının tasarımında metaheuristik optimizasyon algoritmaları da kullanılmaktadır. Yapılan çalışmada fırçasız bir DC motorun tasarım optimizasyonu farklı algoritmalar kullanılarak optimize edilmiştir. Çalışmada motorun verimliliğini maksimum düzeye çıkartmak ve toplam kütlesini en aza indirmek amaçlanmıştır [12]. Genetik algoritma kullanılarak yapılan bir diğer çalışmada yüzey yerleştirmeli FDAM'ın optimal tasarımı çalışılmıştır. Elektriksel ve mekanik gereksinimler ve diğer sınırlamalar optimizasyon problemi olarak belirlenmiştir [13]. Geliştirilmiş arı algoritması kullanılarak yapılan tasarım çalışmasında fırçasız DA motorunun optimum tasarımı gerçekleştirilmiştir. Optimizasyonda güç kayıpları, hacim ve maliyet amaç fonksiyonu olarak belirlenmiştir. Simülasyon sonuçları önerilen yöntemin çok yüksek performans sergilediğini göstermiştir [14].

Bu çalışmada FDAM'ın farklı offset değerinde performansı incelenmiştir. Bu amaçla, hava aralığına çizilen kontor yardımıyla hava aralığı akı dalga formları elde edilmiştir. Elde edilen dalga formuna Ayrik Hartley Dönüşümü (AHD) uygulanarak harmonik bileşenleri çıkarılmıştır.

### TASARLANAN FIRÇASIZ DA MOTORU

Fırçasız DA makinalarında fırça kollektör düzeneğinin olumsuz etkisinin yok edilmesi amacıyla komütasyon işlemi elektronik olarak gerçekleştirilmektedir. Özellikle sürücü teknolojisi ve malzeme alanındaki gelişmelerle yüksek güç yoğunluklu FDAM'ların kullanımı yaygınlaşmıştır. FDAM'ların yapısı incelendiğinde rotoru sabit mıknatıslardan, statoru alan sargılarından ve rotor pozisyonunun tespit edilmesi için de sensörler bulunmaktadır. FDAM'lar dış rotorlu, iç rotorlu ve disk tipi olmak üzere üç grupta sınıflandırılabilir [15, 16]. İç rotorlu yapıda mıknatıslar rotora farklı şekilde yerleştirilebilir. Mıknatısın yapısı, malzemesi ve yerleştirilme şekli makinanın performansı üzerinde etkilidir.

DA makinasının tasarımına Denklem 1'de verilen çıkış eşitliği ile başlanır [15].

$$C_o = \pi^2 B_{ort} ac \times 10^{-3} \quad (1)$$

Denklemden  $ac$  spesifik elektriksel yükleme olarak bilinir ve Denklem 2 ile ifade edilir.

$$ac = \frac{I_z Z}{\pi D} \quad (2)$$



Denklem 1’de  $B_{ort}$  spesifik manyetik yüklemidir ve Denklem 3 ile elde edilir.

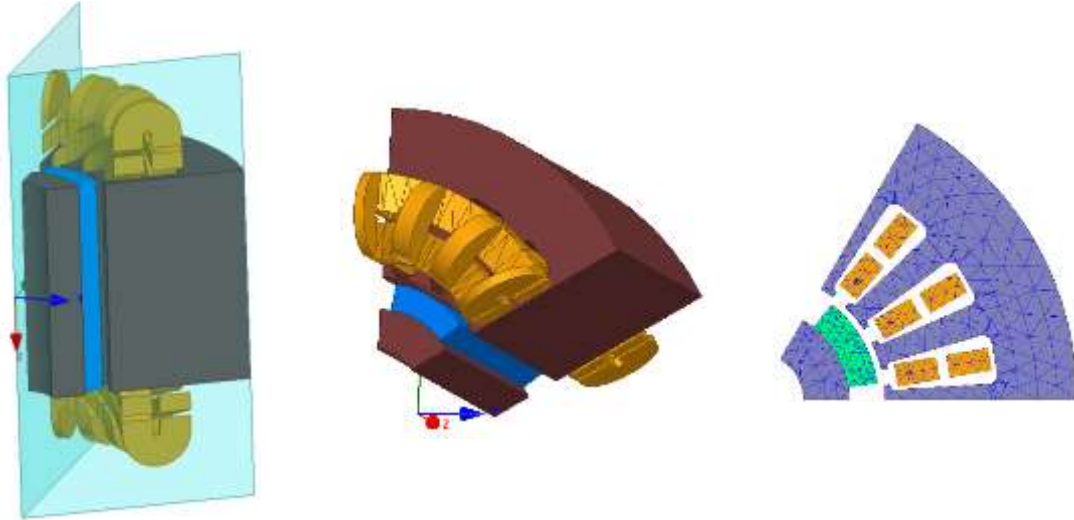
$$B_{ort} = \frac{p\phi}{\pi DL} \quad (3)$$

Denklemden  $D$  stator armatür çapı ve  $L$  stator aksel uzunluğudur. Tasarlanacak motorun kutup sayısı ve diğer kriterleri dikkate alınarak stator çapı ve aksel uzunluğu,  $D^2L$  ayrışımı yapılarak tasarım detaylandırılabilir. Çalışmada tasarlanan yüzey yerleştirmeli iç rotorlu FDAM’ın ilk tasarım parametreleri Tablo 1’de verilmiştir.

**Tablo 1.** Tasarım parametreleri

Parametre	Değer	Parametre	Değer
Anma gücü (W)	30	Stator dış çapı (mm)	48
Kutup sayısı	6	Rotor dış çapı (mm)	18,2
Rotor tipi	İç	Stator oluk sayısı	18
Eksenel uzunluk (mm)	22	Stator/rotor malzemesi	M19
Offset (mm)	0	Kutup adımı/kutup yay oranı	0,734

Tasarlanan motorun sınır koşulları atanarak oluşturulan 1/6 modeli ve mesh ağı yapısı Şekil 1’de verilmiştir.



Şekil 1. Motor parça kesiti

İlk tasarlanan motorun performans değerleri Tablo 2’de verilmiştir.

**Tablo 2.** İlk tasarım performans değerleri

Parametre	Değer
Çıkış gücü (W)	30
Verim (%)	86,024
Spesifik elektriksel yüklenme (A/m)	15853
Toplam güç kaybı (W)	4,87
Stator dış akı yoğunluğu (T)	1,56
Vuruntu torku (mNm)	38,80

## UZAY HARMONİĞİ, ETKİSİ VE ANALİZİ

Harmonikler, elektrik sistemlerinde temel frekansın katlarında olup gerilimde ve yük akımında bozulmalara neden olurlar. Harmonikler enerji iletimi ve dağıtımında kayıpların oluşmasına, üretim kısmında generatörün sinüzoidal dalga şeklinin bozulmasına ve motor kullanımında ise ısı şeklinde kayıplara neden olabilmektedir. Elektrik makinalarında zaman harmoniği ve uzay harmoniği olmak üzere iki tür harmonik kavramı mevcuttur [15]. Zaman harmoniği kaynağın sinüs biçiminden farklı olmasından kaynaklanır. Zaman harmoniği, nonlinear yüklerin ve yarı iletken elemanların kullanımının artması ile sistemde artmaktadır. Zaman harmoniğinin artması makinada titreşim ve gürültüye neden olup verimini etkilemektedir [17]. Diğer harmonik kavramı olan uzay harmonikleri ise elektrik sistemlerinden bağımsız olarak tamamen elektrik makinasının yapısı ile bağlantılıdır. Bu harmonikler makina tasarımları tarafından irdelenmektedir. Uzay harmonikleri, makinada gürültü ve titreşime neden olmakla birlikte nüvede de doyuma, torkun azalmasına neden olabilirler [18]. Uzay harmoniğinin etkisi motorda yapılacak yapısal değişiklikler ile azaltılabilir. Dolayısıyla, tasarlanan motorun uzay harmoniklerinin tasarım aşamasında tespit edilmesi ve gerekli tasarım değişikliklerinin yapılması performans açısından önemlidir.

Analizlerde elde edilen dalga formları sinüzoidal olmayan dalga formundadırlar. Bu dalga formları Fourier serisine açıldığında uzay harmonikleri elde edilir. Çıkarılan dalga formları farklı frekanstaki sinüs bileşenlerini içermektedir ve bu bileşenlerin her biri Fourier bileşeni olarak adlandırılır. Fourier bileşenleri grafiksel yöntem, analitik yöntem ve doğrudan ölçme yöntemi olarak üç farklı yöntemle belirlenebilir. Elektrik sistemlerinde harmoniklerin analizlerinde Ayrık Hartley Dönüşümü kullanılabilir [19-21]. AHD mühendislik uygulamalarında, sinyal işleme, görüntü işleme ve harmonik analizlerinde tercih edilmektedir. AHD'de Fourier dönüşümünün aksine sanal bileşen kullanımına ihtiyaç bulunmamaktadır. AHD'de  $N$  uzunluğa sahip bir dizi için Denklem 4 ile ifade edilir.

$$B = \sum_{n=0}^{N-1} X_n \left( \cos \left( \frac{2\pi nk}{N} \right) + \sin \left( \frac{2\pi nk}{N} \right) \right) = \sum_{n=0}^{N-1} X_n(n) \cdot \text{cas} \left( \frac{2\pi nk}{N} \right) \quad (4)$$

Denklemden  $X_n$  ifadesi gerçek zamanlı işareti,  $n$  incelenen işaretten alınan örnek,  $k$  harmonik sırası ve  $N$  toplam örnek sayısını göstermektedir [19, 22].

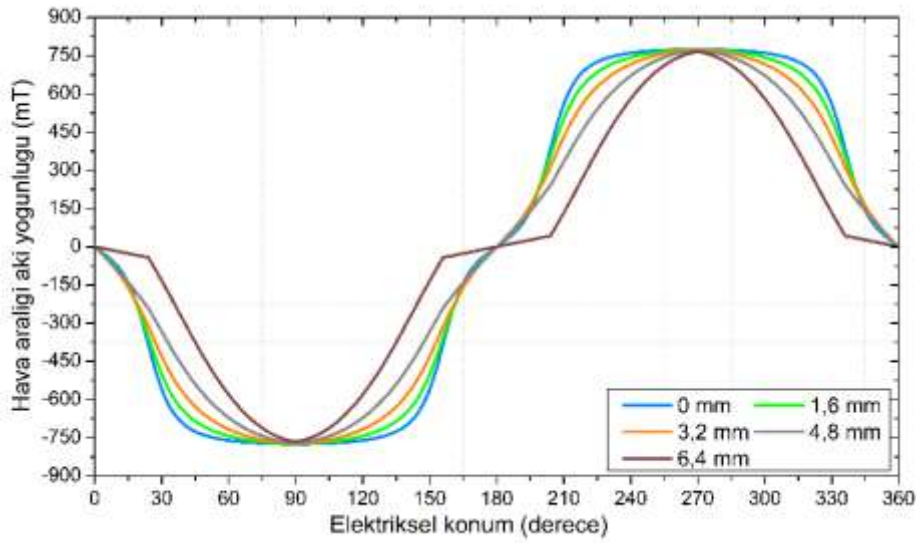
## SONLU ELEMANLAR VE AHD ANALİZLERİ

Çalışmada offset değeri ilk tasarımda 0 mm olarak seçilmiştir. Fiziksel yapının izin verdiği maksimum offset değeri 6.4 mm ve çözüm aralığı olarak 1,6 mm olarak belirlenmiştir. Dolayısıyla offset değerleri 0, 1,6 mm, 3,2 mm, 4,8 mm ve 6,4 mm olan 5 farklı motor yapısının performansı sonlu elemanlar analizi ile yüksüz ve anma yükünde belirlenmiştir. Tablo 3'de motorların farklı offset değerindeki performansları verilmiştir.

Tablo 3. Motor performans deęerleri

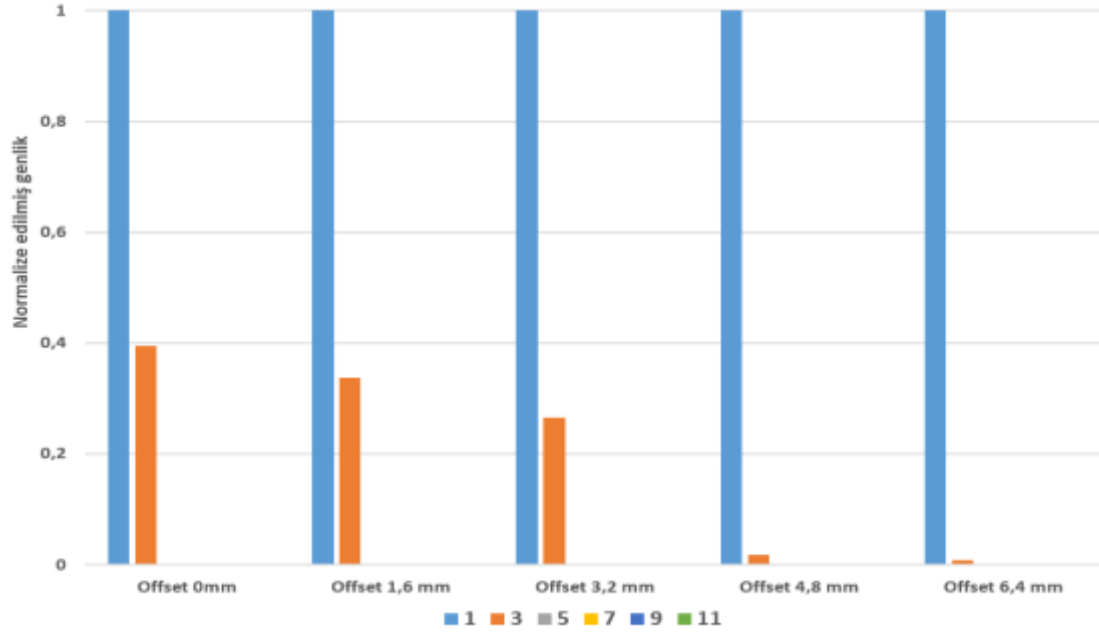
Parametre/Offset (mm)	0	1,6	3,2	4,8	6,4
Verim (%)	86,024	85,952	85,841	85,657	85,195
Vuruntu torku (mNm)	38,805	25,667	14,332	10,961	17,918
Mıknatis aęırlığı (g)	13,215	12,892	12,404	11,555	9,465

Motorların performansları incelendięin offset deęeri arttıęında verimin azaldığı grlmektedir. Ancak verimdeki azalma kısıtlı kalmıřtır. Offset deęerinin artması mıknatısların křelerindeki basıklığın artması olduęundan kullanılan mıknatis miktarı offsetin artması ile azalmıřtır. Mıknatısın formunun deęiřimi hem vuruntu torkunu deęiřirmiřtir hem de hava aralıęı dalga formunu deęiřirmiřtir. Őekil 2’de motorların hava aralıęı dalga Őekilleri verilmiřtir.



Őekil 2. Hava aralıęı dalga formları

Elde edilen hava aralıęı aki daęılımlarına AHD uygulanarak elde edilen harmonik spektrumları Őekil 3’de verilmiřtir.



Şekil 3. Harmonik spektrumu

Yapılan analizlerde her offset değerinde 3. harmonik baskın harmonik olarak elde edilmiştir. Şekil 3’de harmonik genlikleri normalize edilmiş genlik olarak verilmiştir. 1. harmonik temel bileşeni vermektedir. 5., 7., 9. ve 11. harmonik bileşenleri genlikleri ihmal edilebilecek kadar düşük çıkmıştır. Analizlerde offset değeri arttığında baskın harmonik olan 3. harmoniğin etkisi azalmıştır. Ancak verim ile birlikte değerlendirildiğinde bir seçim yapmak gerekebilir.

## SONUÇLAR

FDAM’ların yüksek yoğunluğuna sahip olması, komütasyon işleminin elektronik olarak gerçekleşmesi bu motorların kullanımını arttırmaktadır. Tasarlanan FDAM’ın mıknatıs offseti değiştirilerek oluşturulan motorların hem anma yükünde hem de yüksüz durumda performansları incelenmiştir. Yapılan analizlerde offset değeri arttığında beklendiği üzere kullanılan mıknatıs değeri azalmıştır. Offset değerinin artması verimin az da olsa azalması ile sonuçlanmıştır. Uzun harmoniklerinin belirlenmesi için hava aralığı dalga formları her bir motor için çıkarılmış ve AHD analizleri gerçekleştirilmiştir. Buna göre offset değeri arttığında özellikle 3. harmoniğin etkisi azalmıştır. Ancak harmoniğin etkisi azalırken makinanın verimi de azalmaktadır. Tasarımcıların bu nokta da tercih yapması gerekebilir.

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ÇİFT KAFESLİ ASENKRON MOTORUN OLUK SAYISININ MOTOR BAŞLANGIÇ  
TORKUNA ETKİSİ

EFFECT OF THE NUMBER OF SLOTS OF A DOUBLE CAGE INDUCTION MOTOR ON  
THE MOTOR STARTING TORQUE

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**ÖZET**

Günümüzün en önemli sorunlarından biri olan enerji hem üretim hem de tüketim aşamasında verimli bir şekilde kullanılmalıdır. Fosil kaynaklı enerji üretiminin doğa verdiği zararlar nedeniyle yenilenebilir enerji kaynaklarından üretime dönüşüm hızlı bir şekilde devam etmektedir. Benzer şekilde ulaştırma sektöründe içten yanmalı motorların hem doğaya verdiği zararlar hem de fosil yakıtların bilinen rezervlerinin azalması bu sektörde de bir dönüşüme neden olmaktadır. Elektrikli araçlar kullanım esnasında klasik tip araçlara göre çevreci bir sürüş sağlamaktadır. Elektrikli araçlarda gücü sağlayan motorun performansı aracın performansını belirlemektedir. Bu araçlarda farklı tipte tahrik motorları kullanılmaktadır. Çalışmada, elektrikli araçlar için 10 kW, 4 kutuplu çift kafesli asenkron motor tasarımı gerçekleştirilmiştir. Elektrik makinalarında, makinanın performansı fiziksel değişkenler ve kullanılan malzemeler ile geliştirilebilir. Bu amaçla, çalışmada stator oluk sayısı sabit olarak alınmış ve rotor oluk sayısı farklı kombinasyonlarda (36/30, 36/34 vb.) analizler gerçekleştirilmiştir. Manyetik akı yoğunluğu, kalkınma torku, verim gibi performans parametreleri sonlu elemanlar analizleri (SEA) ile elde edilmiştir. Oluşturulan modeller arasında özellikle şehir içi kullanım için önemli bir parametre olan başlangıç torkunun maksimum olması sağlanırken verim değerini ise istenilen aralıkta elde edilmesi sağlanmıştır.

**Anahtar Kelimeler:** Elektrikli araç, başlangıç torku, çift kafes, sonlu elemanlar analizi.

**ABSTRACT**

One of the most important problems of today, which is energy, should be efficiently utilized both in production and consumption stages. Due to the environmental damage caused by fossil fuel-based energy production, the transition to renewable energy sources is rapidly continuing. Similarly, in the transportation sector, both the environmental damage caused by internal combustion engines and the depletion of known reserves of fossil fuels are causing a transformation in this sector as well. Electric vehicles provide an environmentally friendly driving experience compared to conventional vehicles. The performance of the motor that provides power in electric vehicles determines the vehicle's performance. Different types of drive motors are used in these vehicles. In the study, a 10 kW, 4-pole double-cage induction motor design has been implemented for electric vehicles. In electric machines, the performance of the machine can be improved with physical variables and materials used. For this purpose, in the study, the stator slot number was kept constant, and different combinations of rotor slot numbers (36/30, 36/34, etc.) have been analyzed. Performance parameters such as magnetic flux density, starting torque, and efficiency were obtained through finite element analyses (FEA). Among the created models, particular attention was given to maximizing the starting torque, an important parameter for urban use vehicle, while achieving the desired efficiency within a specified range.

**Keywords:** Electric vehicle, starting torque, double cage, finite element analysis.



## **GİRİŞ**

Dünya nüfusunun hızla artması ve teknolojinin gelişmesi ile birlikte enerjiye olan ihtiyaç her geçen gün artmaktadır. Bu enerji ihtiyacının fosil kaynaklar ile karşılanması ise çevresel zararlara neden olabilmektedir. Özellikle elektrik enerji talebinin karşılanmasında yenilenebilir enerji kaynaklarının kullanımı ile bu kaygılar azaltılmaktadır. Benzer şekilde ulaştırma sektöründe de bu gelişim ve artışlara paralel olarak artan araç sayısı söz konusudur. Bilindiği üzere araçlar enerji tüketimi açısından büyük bir paya sahiptir. İçten yanmalı motor kullanan araçlarda benzer şekilde doğaya zarar verebilmektedir. Buna alternatif olarak ise elektrikli motor kullanımı söz konusudur [1].

Otomobilin icat olmasından itibaren elektrik motorunun kullanımı söz konusudur. Ancak batarya kapasitesi ve yarı iletken teknolojisinin yeteri düzeyde olmaması ve içten yanmalı motorlu araçların seri üretimi ile elektrikli motor kullanımı ikinci plana düşmüştür. Yıllar içerisinde içten yanmalı motorların doğaya verdiği zararların anlaşılması ve verimlerinin düşük olması klasik araçların alternatifinin aranmasına neden olmuştur. Batarya ve sürücü teknolojisinin gelişmesi ile araç tahrik sisteminde elektrik motorların kullanımı artmıştır. Elektrik motorlarının yüksek tork yoğunluğu ve yüksek verimli olması ile doğaya daha az zarar vermesi bu motorların araçlarda kullanımını yaygınlaştırmıştır [2].

Elektrikli araçların tahrik teknolojisi üç ana grupta incelenebilir. İlki birden çok enerji kaynağının olduğu hibrit sistemlerdir. Bu sistemlerde bir kaynak içten yanmalı motor iken diğeri ise elektrikli motordur. İçten yanmalı motor hem aracı hareket ettirmekte hem de bataryanın şarj olmasını sağlayabilmektedir. Bu araçlarda aynı zamanda şarj edilebileni de mevcuttur. Hibrit sistemlerde düşük yakıt maliyeti, faydalı frenleme ve az yakıt kullanımından dolayı düşük egzoz emisyonu avantajları mevcuttur. Ancak bu teknolojiye birden çok tahrik teknolojisinin kullanımı güç aktarımında karmaşıklığa neden olabilmektedir. İkinci teknoloji ise tamamı elektrikli araçlardır. Araçta güç sadece elektrik motorundan sağlanmaktadır. Bu teknolojiye sessiz çalışma, sıfır egzoz emisyonu, faydalı frenleme, avantajları mevcuttur. Ancak tamamı elektrikli araçlarda kısıtlı menzil ve batarya teknolojisinin istenilen seviyede olmaması dezavantajdır. Son olarak yakıt hücreli elektrikli araç teknolojisi mevcuttur. Bu teknoloji de faydalı frenleme, sürüş sırasında sıfır emisyon gibi avantajlar mevcuttur. Ancak özellikle hidrojenin üretimi ve depolanma işlemindeki zorluklar ön plana çıkmaktadır [3-7].

Bu çalışmada, elektrikli araçlar için 10 kW gücünde, 4 kutuplu çift kafesli asenkron motor tasarımı ve performans analizi gerçekleştirilmiştir. Bu amaçla ilk aşamada motorun analitik tasarımı gerçekleştirilmiş, ikinci aşamada SEA gerçekleştirilmiştir. Daha sonra oluşturulan modelde stator oluk sayısı sabit alınarak rotor oluk sayısı değiştirilmiş ve kalkınma torkuna etkisi belirlenmiştir.

## **ELEKTRİKLİ ARAÇLAR VE TASARLANAN MOTOR**

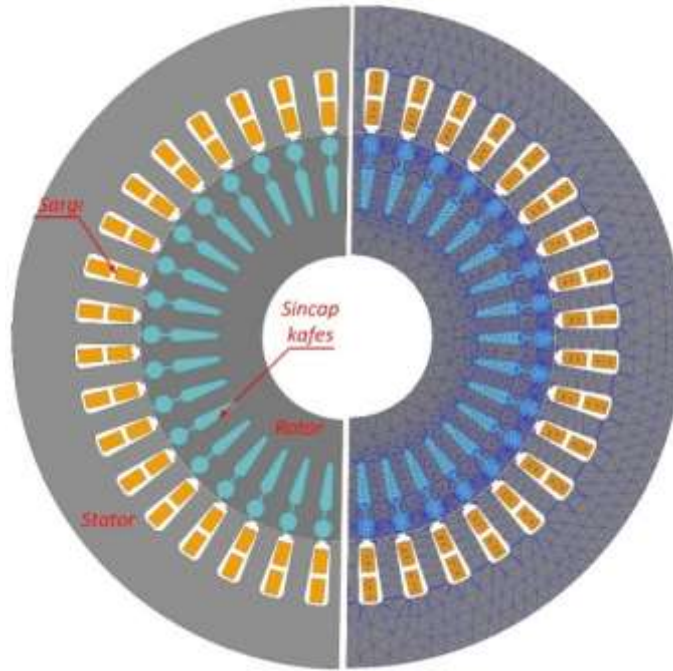
Klasik tip araçlarda tekerleklere aktarılan güç içten yanmalı motordan aktarılmaktadır. Bu tip sistemlerde faydalı frenleme yoktur. Özellikle batarya teknolojisi ve güç elektroniği alanında yaşanan gelişmeler ile sürücü teknolojisi gelişmiş ve kolay kontrol edilebilen elektrik makinalarının üretimi mümkün olmuştur. Bu durum ise elektrikli araçların kullanımını hızlandırmıştır [8,9]. Elektrikli araçlarda doğru akım motorları, relüktans motorlar, senkron ve asenkron motorlar kullanılmaktadır [10-12]. Klasik doğru akım motorlarının kontrolü kolay ancak fırça kollektör düzeneğinden dolayı bakıma ihtiyaç duymaktadırlar. Relüktans makinalar yüksek tork dalgalanmasına sahiptirler. Mıknatıslı senkron makinalar malzeme teknolojisindeki gelişmelere paralel olarak yüksek güç yoğunluğu ve verim avantajı sunmaktadırlar. Ancak özellikle nadir toprak malzemelerin tedarik sorunu kısıtlı kullanıma neden olabilmektedir. Asenkron motorlarda ise sabit mıknatıslı makinalara oranla düşük güç yoğunluğu sunmasına rağmen sağlam yapı ve amacına yönelik tasarlanan bir motor ile yüksek bir verim elde edilebilir [13-15].

Çalışma kapsamında tasarımı gerçekleştirilen asenkron motor 10 kW gücünde, 4 kutuplu sincap kafesli yapıdadır. İlk tasarlanan motorun tasarım parametreleri Tablo 1’de verilmiştir [16].

**Tablo 1.** Tasarım parametreleri

Parametre	Değer	Parametre	Değer
Anma gücü (kW)	10	Stator dış çapı (mm)	202
Kutup sayısı	4	Rotor dış çapı (mm)	124,25
Stator / rotor malzemesi	M43	Eksenel uzunluk (mm)	190
Sincap kafes malzemesi	Alüminyum	Stator oluk sayısı	36

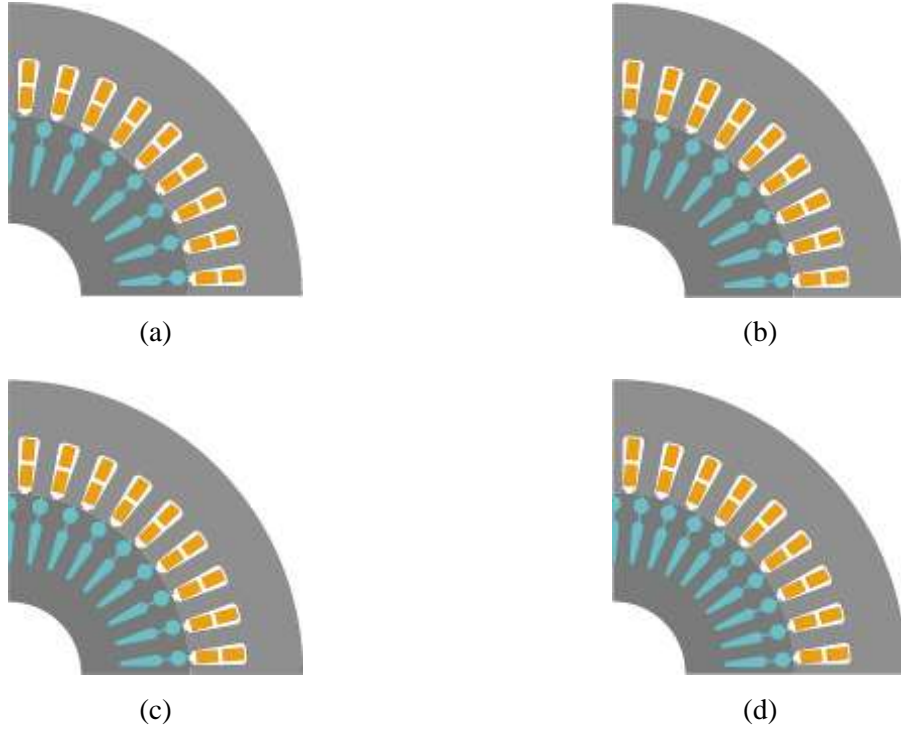
Tasarımı gerçekleştirilen motorun 3 boyutlu parça kesitli modeli ve mesh yapısı Şekil 1’de verilmiştir.



**Şekil 1.** Motor parça kesiti ve mesh yapısı.

### **MOTORUN KARŞILATIRMALI PERFORMANS ANALİZİ**

Elektrik makinalarının performansını etkileyen birçok parametre mevcuttur. Malzeme ve fiziksel yapı performansın geliştirilmesinde dikkate alınabilir. Stator veya rotor oluk sayısı ve yapısı manyetik devrede değişime neden olacağından elektriksel parametrelerde de değişim görülecektir [17,18]. Çalışmada stator oluk sayısı sabit olmak üzere rotor oluk sayısı 30, 32, 34 (ilk tasarım) ve 38 olarak değiştirilmiş ve modellerin başlangıç torkları SEA ile elde edilmiştir. Sonlu elemanlar metodu, belirli bölgede kısmi diferansiyel denklemlerle ifade edilebilen büyüklüklerin analizinde kullanılmaktadır. Bu metodun kullanımı ile elektrik makinalarında makinanın gerilim, verim, güç kayıpları, akı dağılımları gibi elektriksel ve manyetik büyüklüklerinin elde edilmesinde kullanılır. Oluşturulan ilk model ve yeni motor yapıları Şekil 2’de verilmiştir.



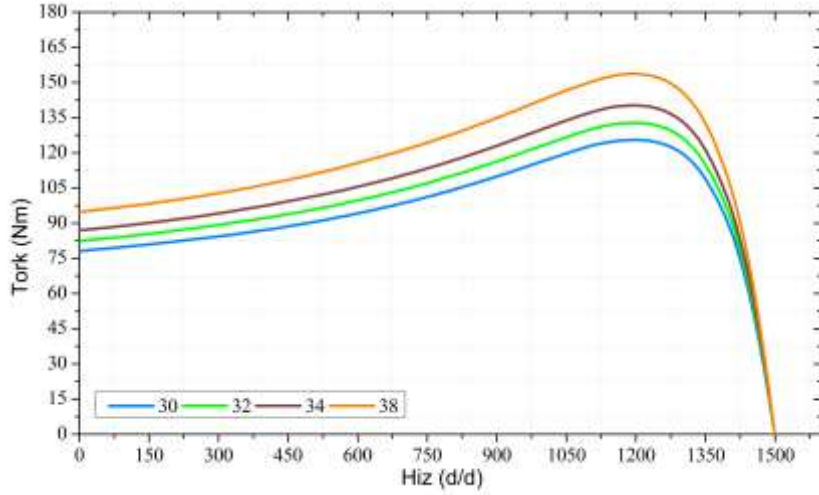
Şekil 2. Oluşturulan motor yapıları, a) 36/30, b) 36/32, c) 36/34, d) 36/38.

Şekil 2’de oluşturulan modeller anma yükünde ve yüksüz durumda analize tabi tutulmuştur. Motorların performans değerleri Tablo 2’de verilmiştir.

Tablo 2. Motor performansları

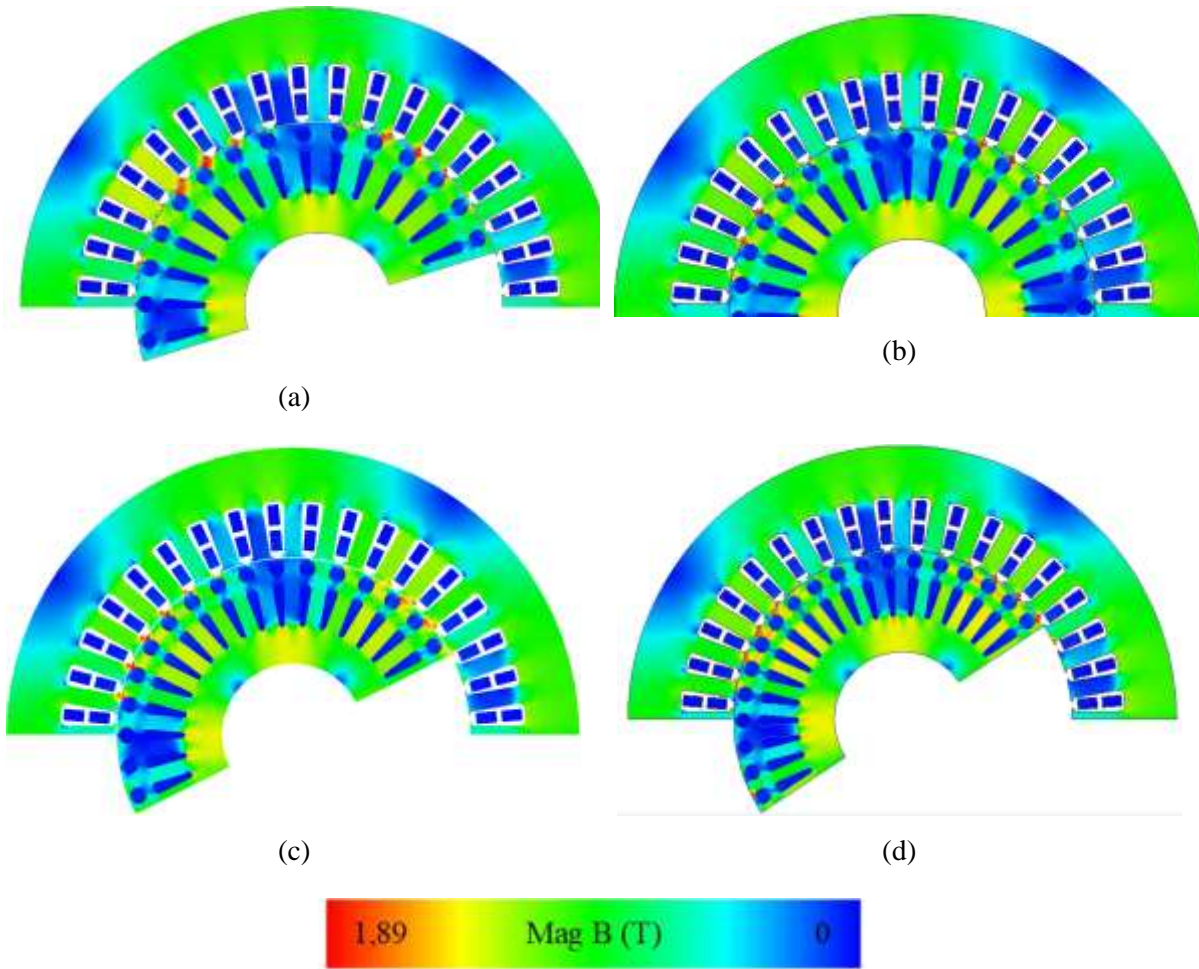
Parametre \ Model	36 / 30	36 / 32	36 / 34	36 / 38
Verim (%)	85,145	85,522	85,792	86,096
Başlangıç Torku (Nm)	78,165	82,457	86,963	94,824
Toplam Ağırlık (kg)	41,976	42,021	42,066	42,156
Anma Torku (Nm)	66,496	66,278	66,111	65,843

Özellikle şehir içi kullanımda dur-kalk şeklinde çalışma görevi olan elektrikli araçlar dikkate alındığında başlangıç torkunun yüksek olması performans açısından önemlidir. Tablo 2 değerlendirildiğinde rotor oluk sayısının artması motorun başlangıç torkunu arttırmaktadır. Diğer parametreler sabit olarak alındığından motor toplam ağırlığı yaklaşık olarak aynı kalmıştır. Benzer durum anma torkunda da geçerlidir. Şekil 3’de motorun tork-hız eğrisi verilmiştir.



Şekil 3. Motor tork-hız eğrileri.

Rotor oluk sayısının artması başlangıç torkunun artmasını sağlamasına rağmen motor çapı sabit alındığından nüvede ki doyuma dikkat edilmelidir. Bu amaçla yapılan zamana bağlı analizlerde sınır şartları sağlanarak oluşturulan parça kesit modeller incelenmiştir. Şekil 4’de nüve üzerindeki manyetik akı yoğunluğu dağılımı verilmiştir.



Şekil 4. Manyetik akı yoğunluğu dağılımı, a) 36/30, b) 36/32, c) 36/34, d) 36/38.



Şekil 4'te özellikle rotor oluk kısmının akı dağılımı dikkate alınmalıdır. Oluk sayısının artması geometri sabit kaldığında nüvede doyuma neden olabilir. 36/38 yapısında beklendiği üzere akı yoğunluğu diğerlerine göre nispeten yüksektir. Kullanılan M43 malzemesi ve akı dağılımları birlikte dikkate alındığında tüm oluşturulan modeller için akı dağılımları uygundur.

### SONUÇ

Elektrik araçlar, petrol fiyatlarındaki istikrarsızlık ve çevresel kaygının artması ile birlikte alternatif çözüm olarak gündeme gelmiştir. Batarya teknolojisinin gelişimi ve hızlı şarj olanaklarının artması ile de hızlı bir şekilde yaygınlaşmaktadır. Bu araçlarda tekerleklere aktarılan güç elektrik motorundan sağlanmaktadır. Dolayısıyla motorun performansı doğrudan aracın performansını belirlemektedir. Özellikle şehir içi dur-kalkın yoğun olduğu durumlarda aracın kalkınma torkunun yüksek olması arzu edilir. Bu amaçla çift kafesli asenkron motorun rotor oluk sayısı piyasada kullanılan motor verileri de dikkate alınarak 30, 32, 34 ve 38 olarak tasarlanmış ve başlangıç torku değerleri elde edilmiştir. İlk tasarımda başlangıç torku 78,165 Nm iken 38 oluğa sahip rotora sahip motorda 44,824 Nm elde edilmiştir. Ayrıca motor veriminde yaklaşık %1'lik iyileşme sağlanmıştır. Oluk sayısının artması başlangıç torkunu arttırmaktadır. Ancak sınırlayıcı kriter olarak nüve akı dağılımlarına dikkat edilmelidir.

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October 13-14, 2023

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## BAĞLAMA AKUSTİĞİNDE TASARIMIN SESE ETKİSİNİ ARAŞTIRAN ÇALIŞMALARA YÖNELİK BİR DEĞERLENDİRME

### AN EVALUATION OF STUDIES INVESTIGATING THE EFFECT OF DESIGN ON SOUND IN BAGLAMA ACOUSTICS

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#### ÖZET

Bir müzik aleti olan bağlama, aynı zamanda karmaşık mekanik titreşimlerin meydana geldiği fiziksel bir sistemdir. Bu fiziksel sistemde, tellerde meydana gelen titreşimler, köprü aracılığıyla bağlamanın ses tahtasına iletilir. Ses tahtası aracılığıyla tekneye ve tekne içindeki havaya aktarılan titreşimler ise genellikle tekne üzerinde yer alan ses deliğinden dış ortama yayılır. Çalgıların akustiği üzerine yoğunlaşan müzikal akustik, ülkemizdeki araştırmacılar tarafından yeni yeni tercih edilmeye başlayan bir bilim dalı olarak karşımıza çıkmaktadır. Oysa uluslararası alanda, özellikle keman üzerine yoğunlaşan benzer çalışmaların başlangıcının 18.yy'a dayandığı bilinmektedir. Kemanın ses tahtası üzerinde yapılan deneysel modal analiz çalışmaları sayesinde mod şekilleri ve bu modlara karşılık gelen mod frekansları yıllar öncesinde tespit edilmiştir. Elde edilen bu gibi veriler, kemanın akustik özelliklerinin daha iyi bir seviyeye gelmesi yolunda bir basamak olarak kullanılmıştır. Bu çalışmada, bir Türk halk müziği çalgısı olan bağlamanın akustiği üzerine yoğunlaşmıştır. Araştırmanın amacı, bağlama yapımında ortaya konan yeni tasarımların sese olan etkilerini araştıran bilimsel çalışmaları tespit etmek ve bu çalışmalardan elde edilen verileri akustik bilimi açısından tek tek değerlendirmektir. Bu kapsamda tespit edilen çalışmalar incelendiğinde, hepsinin yüksek lisans tezi olduğu ve her birinde farklı farklı tasarımların yapıldığı görülmüştür. Tezlerde belirlenen bağımsız değişkenler; teknenin büyüklüğü, sapın formu, ses tahtasının yapısı ve formu, ses deliğinin büyüklüğü ve konumu, köprünün konumu ve formu olarak sıralanabilir. Bu çalışmaların çoğunda, bağlama üzerinde meydana getirilen yapısal yeniliklerin ses şiddetine ve sönüm sürelerine olan etkileri ölçülürken sadece birinde mod frekanslarının tespit edildiği görülmüştür. Çalışmalarda yapılan tüm yapısal yeniliklerin, ses şiddetini artırıcı etkide bulunduğu tespit edilmiştir. Ülkemizde çalgı akustiği alanında yapılan bilimsel çalışmaların sayısı göz önünde bulundurulduğunda, bu alanda çalışan araştırmacıları teşvik etmek adına, sınırlı sayıdaki akustik laboratuvarların daha da yaygınlaştırılması önerilmektedir. Bu düşünceye paralel olarak, çalgılarla ilgili çok daha farklı akustik parametrelerin ölçülebildiği deney düzeneklerinin ve ölçüm ekipmanlarının araştırmacıların kullanımına verilmesiyle yayın potansiyeli yüksek olan bir alanın gelişiminin destekleneceği düşünülmektedir.

**Anahtar Kelimeler:** bağlama akustiği, çalgı akustiği, müzik fiziği, müzikal akustik

#### ABSTRACT

The baglama, a musical instrument, is also a physical system where complex mechanical vibrations occur. In this physical system, the vibrations that occur in the strings are transmitted to the soundboard of the baglama through the bridge. The vibrations transmitted to the soundboard are then dispersed to the resonator and the air inside it, and they generally radiate to the external environment through the sound hole located on the resonator. Musical acoustics, which focuses on the acoustics of musical instruments, emerges as a field of study that is gradually gaining popularity among researchers in our country. However, internationally, it is known that similar studies, particularly those focusing on the violin, have their origins dating back to the 18th century. Thanks to experimental modal analysis studies conducted on the soundboard of the violin, mode shapes and the corresponding mode frequencies were determined years ago. Data obtained like this has been used as a step towards improving the acoustic

properties of the violin. In this research, the focus has been on the acoustics of a Turkish folk music instrument called the baglama. The aim of the research is to identify scientific studies that investigate the effects of new designs in baglama construction on sound, and to individually evaluate the data obtained from these studies from the perspective of acoustic science. When examining the identified studies within this scope, it was observed that each of them was a master's thesis, and each one involved different designs. The independent variables determined in the theses can be listed as follows: the size of the resonator, the form of the neck, the structure and form of the soundboard, the size and position of the sound hole, the position and form of the bridge. In most of these studies, it was observed that the effects of structural innovations made on the baglama on sound intensity and damping times were measured, with only one of them focusing on the determination of mode frequencies. It was found that all structural innovations in the studies had an enhancing effect on sound intensity. When considering the number of scientific studies conducted in the field of musical instrument acoustics in our country, it is recommended to further expand the limited number of acoustic laboratories in order to encourage researchers working in this field. In line with this idea, it is believed that by providing researchers with experimental setups and measurement equipment capable of measuring a much wider range of acoustic parameters related to musical instruments, the development of a field with high publishing potential will be supported.

**Keywords:** baglama acoustics, musical instrument acoustics, music physics, musical acoustics

## GİRİŞ

Bir Türk halk müziği çalgısı olan bağlama, temel olarak üç ana bölümden oluşmaktadır: tekne (rezonatör), ses tahtası ve sap. Bunların dışında ana gövde üzerinde burgular, alt eşik (köprü), üst eşik, ses deliği ve tel takacağı gibi daha küçük kısımlar da yer almaktadır. Bağlama ya da diğer bir deyişle saz, günümüzde belli bir çalgı ailesine verilen genel bir isimdir. Standart bir yapısı olmamakla beraber farklı tekne büyüklüklerinde imal edilmekte ve ona göre de adlandırılmaktadır. Örneğin cura, tambura, abdal ve divan gibi türleri vardır.

Gitar, piyano ve özellikle de kemanla ilgili bilimsel araştırmaların yaklaşık olarak 18.yy'dan itibaren yapılmaya başlandığı bilinmektedir. Bu tür çalgıların yapısal ve akustik açıdan detaylı olarak incelenmesi sonucu belli standartlar elde edilmiş ve önemli markalar ortaya çıkmıştır. Ancak bağlamada ve benzer olarak diğer Türk müziği çalgılarında maalesef böyle bir durum hala söz konusu değildir. Bağlama üzerine yapılan bilimsel araştırmaların, son 20 yıldır yapıldığı bilinmektedir. Dolayısıyla batı müziği çalgılarındaki gibi bir standart yapının oluşması için epey zamana ihtiyaç duyulduğu ortadadır. Tarihsel süreç içerisinde bağlamanın yapısal ve akustik gelişimi, bağlama yapımcılarının bireysel çabaları sayesinde olmuştur. Bu türden çabalarla, zaman içerisinde değişip dönüşmüş ve günümüzdeki halini almıştır.

## MÜZİK FİZİĞİ

Müzik fiziği ya da diğer bir deyişle müzikal akustik, adından da anlaşılacağı gibi fizik ve müzik disiplinlerinin ortak konusudur. Harmonikler, rezonans, girişim, yansıma, doğal frekans, mod şekli, vuru vb. konular hem fiziğin hem de müziğin ilgi alanına giren başlıca konulardır. Müzikal akustikte çalgılar, ses üreten karmaşık bir sistem olarak ele alınır ve akustik olarak çözümlenir.

Çalgılar ses üretim süreçleri göz önünde bulundurulduğunda en genel anlamda telli, nefesli ve vurmali olarak gruplandırılmaktadır. Telli çalgılar da kendi içinde, telin uyarılma biçimine göre; mızraplanan (*plucked strings*), yaylanan (*bowed strings*) ve vurulan (*struck strings*) olmak üzere üç gruba ayrılırlar. Örneğin mandolin, gitar ve bağlamanın telleri mızraplanarak; keman, çello ve viyolanın telleri yaylanarak; piyanonun telleri ise vurularak uyarılmaktadır (Raichel, 2006:522; Rossing, 2010:173).

Bağlamadan elde edilen seste en büyük pay kuşkusuz tekne ve ses tahtasına düşmektedir. Mızrapla (bazen de elle) uyarılarak titreşime zorlanan tellerde oluşan akustik enerji, alt eşik aracılığıyla ses tahtasına iletilir. Titreşen ses tahtası hem tekneyi hem de tekne içindeki hava moleküllerini titreşime zorlar. Tellerde belli frekanslarda başlatılan titreşim hareketi bu yolla tüm gövdeye iletilir ve gövdenin de aynı frekans değerlerinde titreşmesi sağlanır. Bir çalgıda, kendi ses aralığındaki tüm frekansları eşit oranda yükseltmesi (eşit ses şiddetine sahip olması) istenen bir durumdur. Ancak bu, pratikte pek

mümkün olmamaktadır. Ek olarak; çalgıdan elde edilen toplam sesteki tiz ve pes sesler arasında bir dengenin olması, seslerin sönüm sürelerinin nispeten uzun olması, harmonik yapının belli bir düzen içinde olması gibi faktörler de çalgıların seslerinin “iyi” olarak sınıflandırılmalarında etkili olmaktadır.

Günümüzdeki bazı bağlama yapımcıları ve araştırmacıları, diğer telli çalgılardan da esinlenerek bağlama üzerinde bazı yapısal farklılıklar ve tasarımlar yapmışlardır. Buradaki ortak amaç, bağlamanın ses kalitesini daha iyi bir seviyeye taşımaktır. Son yıllarda yapılan bu tür çalışmalarda, hem tasarlanan bağlamaların hem de geleneksel yolla yapılan bağlamaların sesleri kayıt altına alınmış ve sonuçlar birbiriyle kıyaslanmıştır.

### BAĞLAMA YAPIMINDA YENİ TASARIMLAR

İncelenen bu ilk çalışmada, tekne yani rezonatör boyları farklı olan iki bağlamanın ses karakterleri kıyaslanmıştır (Alp, 2018). Tekne boyunun büyük ya da küçük olması her ne kadar bir yenilik olmasa da, yapısal açıdan bir farklılık oluşturduğu ve sesi doğrudan etkilediği için ele alınmıştır.

İlk olarak, tekne boyları 43cm ve 38cm olan iki bağlama imal edilmiştir. Her iki bağlamanın teknelerinin üzerine ikişer tane ses deliği açılmıştır. Bağlamaların teknelerinde maun, ses tahtalarında ladin ve sap kısımlarında ise akgürgen ağaçları tercih edilmiştir. İmal edilen bu iki bağlamanın görüntülerine Şekil 1’de yer verilmiştir.



Şekil 1. Tekne büyüklüğü 43cm ve 38cm olan bağlamalar (Alp, 2018)

Bu iki bağlamadan alınan ses kayıtları incelendiğinde; teknesi küçük olan bağlamadan elde edilen seste tiz seslerin daha belirgin olduğu ve daha yüksek işitildiği belirlenmiştir. Teknenin büyümesiyle birlikte bas karakterli seslerin ortaya çıktığı görülmüştür. Ayrıca büyük bağlamada kalın tellerin, küçük bağlamada ise ince tellerin ürettiği sesin sönümlenme süresinin daha uzun olduğu tespit edilmiştir.

Bağlamanın teknesinde olduğu gibi içi boş, kapalı ve bir ses deliği ile dışarı açılan sistemlerde meydana gelen titreşimlerin doğal frekansı ( $f$ ) şu eşitlik yardımıyla hesaplanmaktadır:

$$f = \frac{c}{2\pi} \sqrt{\frac{S}{VL}}$$

Bu eşitlik, bize Helmholtz rezonatörünün doğal frekansını vermektedir. Bağlamanın teknesi bir Helmholtz rezonatörü olarak kabul edildiğinde  $S$ , ses deliğinin yüzey alanını ( $m^2$ );  $L$ , ses deliğinin et kalınlığını ( $m$ ) ve  $V$  ise tekne içinde kalan havanın hacmini ( $m^3$ ) vermektedir. Eşitlikte yer alan  $c$  ise sesin havadaki hızıdır (Fletcher & Rossing 1991:13). Buna göre  $V$ 'nin yani tekne içindeki havanın hacminin artmasının, doğal frekansı düşüreceği ve bunun sonucunda sesin pes bir karakter kazanacağı söylenebilmektedir. Bunun yanı sıra bu durumu destekleyen bir diğer bilimsel gerçeklik de, çalgı büyüdükçe tüm modların frekanslarının daha düşük olacağıdır (Rossing, 2010:63). Bu bilgi sayesinde, çalgının titreşim esnasında daha düşük frekanstaki seslerle rezonansa girme eğilimi göstereceği ve böylelikle pes karakterin daha fazla ön plana çıkacağı şeklinde bir yorum yapılabilir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Bir diğ er ç alıřmada, bađlam anın sadece sap kısmına yenilik getirilmiřtir (Öztorun, 2022). Bunun için ilk olarak geleneksel yapıda bir bađlama imal edilmiřtir. İmalat esnasında, teknenin sap ile birleřeceđ i bölgeye Őekil 2’de görüldüđ ü gibi “U” řeklinde bir metal bađlantı aparatı monte edilmiřtir. Böylelikle arařtırmada kullanılacak tüm sapların kolay sökü lüp takılmasına imkân sađlanmıřtır.



**Őekil 2.** Teknenin sap tarafına yerleřtirilen “U” řeklindeki metal aparat (Öztorun, 2022)

Arařtırma kapsamında toplamda altı tane bađlama sapı imal edilmiřtir. Bunlardan bir tanesi standart forma sahip diğ er beř tanesi ise birbirinden farklı tasarımlara sahiptir. Bu sapların hepsi aynı ađađ kütüđ ünden aynı biçimde kesilmiř ve hepsinin en, boy, yükseklik ölçüleri eřit alınmıřtır. Tasarlanan deneysel saplarda (DS) ortak olarak hepsinin içleri oyulmuř ve üst eřiđ in hemen altına birer tane ses kafesi açılmıřtır. Sapların içindeki hava boşluđ u ile teknenin içindeki hava boşluđ u temas halindedir yani arada bir engel yoktur. Sapların birbirinden farklı olmaları ise řu řekilde sađlanmıřtır. Birinci deneysel sapa (DS-1) hiç delik açılmamıřtır. DS-2’ye 18, DS-3’e 36, DS-4’e 55 ve DS-5’e 74 delik açılmıřtır. Açılan deliklerin çapları DS-5 dıřındakilerde 6mm olarak ayarlanmıřtır. DS-5’te ise 4mm’ye düřürülmüřtür. Tasarlanan bađlama sapları Őekil 3’te yer almaktadır.



**Őekil 3.** Tasarlanmıř bađlama sapları (Öztorun, 2022)

Standart sap ve tasarlanan beř adet sap, metal bađlantı aparatı yardımıyla sırayla tekneye takılarak bađlam anın ses yayılımları ölçülmüřtür. Deneysel sapların takılı olduđu durumlarda 60cm ve üzeri mesafelerde ölçülen ses řiddetlerinin, standart saplı olandan daha yüksek olduđu tespit edilmiřtir. Ayrıca tüm deneysel saplar için yakın ve uzak mesafelerde ayrı ayrı kaydedilen řiddet deđerlerinin her birinin, birbirinden farklı deđerler aldıđı görülmüřtür.

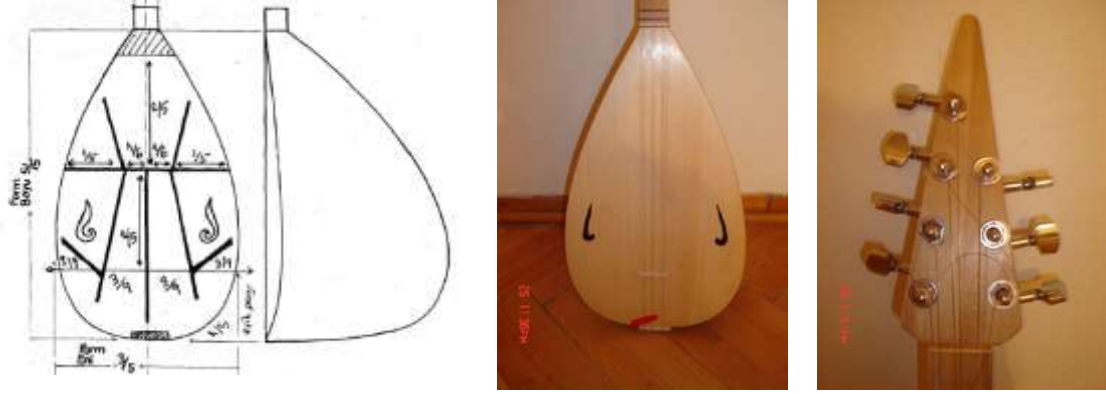
Çalıřmada, deneysel sapların hepsinin içlerinin oyulmasıyla rezonatörün toplam hacminin artması sađlanmıřtır. Saptaki hava boşluklarının hacmi DS-1’den DS-5’e dođ ru sırayla artış göstermektedir. Çalgıların tekneleri (rezonatörleri) birer Helmholtz rezonatörü olarak düřünüldüđ ünde, teknenin hacmi büyüdükçe gövde içindeki havanın daha pes seslerle rezonansa gireceđ i ve çalgıdan çıkan sesin daha pes olacađı söylenebilmektedir. Dolayısıyla en tiz karakterli bađlam anın sap kısmında boşluk olmayan geleneksel saplı bađlam anın ve en pes karakterli bađlam anın ise DS-5 olması beklenmektedir.

Arařtırmada her bir bađlam anın sesiyle ilgili dinleyicilerden görüř alınmıř ve en çok beđ enilen bađlamaların DS-2 ve DS-3 olduđu görülmüřtür. Neden bu iki bađlam anın sesinin tercih edildiđ i



konusunda fikir sahibi olmak adına, çalışma kapsamında tüm bağlamalardan örnek ses kayıtları alıp harmonik yapıları ve zarf detayları çözümlenerek birbirleriyle bir kıyaslama yapılabilir.

Bir başka çalışmada, bağlama üzerinde birden fazla tasarım yapılmıştır (Erdiş, 2006). İlk olarak ses tahtası üzerine kemandaki f-deliklerine benzer ses delikleri açılmıştır. Ses tahtasına balkon çıtalar eklenmiştir. Ahşap malzemeden yapılan burgular yerine metalik burgular takılmıştır. Sayılan bu yeni yaklaşımlar, bir tanbura ve bir cura üzerinde denenmiştir. Tasarlanan tanburanın görüntüsü Şekil 4'te yer almaktadır.



Şekil 4. Tasarıma ait çizim örneği ve imal edilen tanbura (Erdiş, 2006)

Tasarlanmış tanbura ve curanın ses kayıtları alınmış ve geleneksel yapıda olan benzerleriyle kıyaslanmıştır. Tasarlanmış tanburadan kaydedilen ses örnekleri incelendiğinde, ses şiddetinde bir artış olduğu gözlenmiştir. Sönüm sürelerinde ise bir farklılık görülmemiştir. Tasarlanmış curadan kaydedilen seslere bakıldığında hem ses şiddetinin arttığı hem de sönüm sürelerinin uzadığı görülmüştür.

Literatürde, bağlamanın ses tahtasına balkon sistemi eklenmesinin sese olan etkisini araştıran iki adet çalışma bulunmaktadır. Bu ilk çalışmada, ses tahtasındaki ses deliğinin ve balkon sisteminin ses şiddetine ve sönüm sürelerine olan ortak etkileri incelenmiştir. Yani elde edilen sonuçlar üzerinde hem ses deliğinin hem de balkon sisteminin etkileri bulunmaktadır. İmal edilen her iki deneysel bağlamada da ses şiddetinin arttığı bildirilmiştir. Çalgıların rezonatörlerine açılan ses delikleri, içeriye hapsolan sesin dışarıya çıkması için bir fırsat verdiğinden dolayı işitilen sesin şiddetinin artması beklenir.

Balkon çıtaların denendiği bir diğer çalışmada ise, bağlamanın sadece ses tahtası kısmında farklı tasarımlar yapılarak sese olan etkileri araştırılmıştır (Güdek, 2019). Geleneksel yapıdaki ses tahtasına sahip bir bağlamanın ses kayıtları alındıktan sonra ilk aşamada ses tahtasının altına balkon sistemi eklenmiş ve ikinci aşamada da balkon sistemine sahip ses tahtasının sapa yakın tarafına bir ses deliği açılmıştır. İmal edilen kısa saplı bağlamanın tekne ve sap kısmında maun, ses tahtasında ise ladin ağacı kullanılmıştır. Tasarlanan ses tahtasının alttan görünümü Şekil 5'te yer almaktadır.



Şekil 5. Ses tahtasına eklenen balkon sistemi ve ses deliğinin konumu (Güdek, 2019)

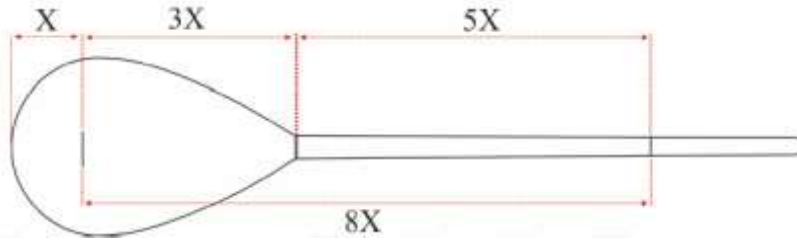
Geleneksel, balkonlu ve balkon + ses delikli ses tahtalarının takılı olduğu üç farklı bağlamanın stüdyo ortamında ses kayıtları alınmıştır. Geleneksel yapıdaki ses tahtasına sahip bağlamadan alınan kayıtlarda, ses aralığının dar olduğu ve tiz seslerin daha önde olduğu görülmüştür. Balkonlu ses tahtasına sahip bağlamadan alınan kayıtlarda, ses aralığının genişlediği ve baslarda artış olduğu belirlenmiştir. Balkon + ses deliği olan bağlama ile yapılan ölçümlerde ise basların daha da öne çıktığı saptanmıştır.

Bağlamada ses tahtasına balkon sistemi eklenmesinin sese olan etkisini araştıran bu ikinci çalışmada, yine ilk çalışmada olduğu gibi frekans ile ses şiddeti arasındaki ilişki incelenmiştir. Yine ses tahtasına balkon çıtalar ve ses deliği eklenmiştir ancak ilk çalışmadan farklı olarak bu iki tasarımın etkileri sırayla ölçülmüştür. Dolayısıyla balkonlu ses tahtasının ve ses deliğinin etkisini tek başına inceleme şansı doğmuştur.

Ses tahtasına balkon çıta ekleyerek yapılan çalgılardan en bilineni, kemandır. Kemanda hem f-delikleri hem de bas balkon eklenmenin kemanın akustik karakterini nasıl etkilediği, keman akustiği alanında yapılan çalışmalarla tespit edilmiştir. Kemanın kapağına f-deliklerinin eklenmesinin mod frekanslarını azaltıcı yönde; bas balkonun eklenmesinin ise artırıcı yönde etki yaptığı bilinmektedir (Jansson, 2002b:22).

Bu çalışmada bağlamanın ses tahtasına hem balkon çıtalar hem de ses deliği eklenmenin, ses şiddetinin artmasında ve tiz-bas dengesinin değişmesinde ayrı ayrı etkilerinin olduğu bildirilmiştir. Bu doğrultuda keman üzerine yapılan açıklamalar da göz önünde bulundurulduğunda, ses tahtasına ses deliği ve balkon sistemi eklenmenin bağlamanın mod frekanslarının üzerinde etkili olduğu şeklinde yorum yapılabilir.

Günümüze kadar geleneksel ölçümler üzerinden imal edilen bağlamalara alternatif olarak bir başka çalışmada, altın orana göre taslak çizim ve eğrileri oluşturulan yeni bir bağlama tasarlanmıştır (Çiçekçiöğlü, 2017). Tekne boyu 40cm olarak ölçülen bağlamadaki altın oranlar, Şekil 6'da verilmiştir.



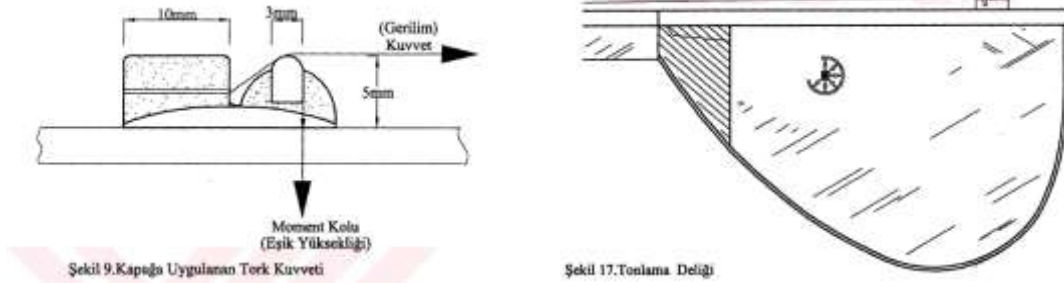
Şekil 6. Tasarlanan bağlamadaki altın oranlar (Çiçekçiöğlü, 2017)

Bu şablona göre iki eşik arası sekiz birim (8X) alındığında, alt eşik ile tel takacağı arası bir birime (X) denk gelmektedir. Bu durum; altın orana göre yapılan bağlamadaki alt eşiğin, geleneksel yapıdaki bir bağlamanın alt eşiğine göre ses tahtasının merkezine daha yakın konumlandığı anlamına gelmektedir. Yani altın orandaki alt eşik, merkeze daha yakındır. Tasarlanan bağlamadan alınan ses kayıtları ile geleneksel yöntemle imal edilen bağlamanın ses kayıtları kıyaslanmıştır. Eşiğin hem konumunun hem de boyunun değişmesi sonucu, ses tahtasına yapılan basıncın azaldığı ve böylelikle doğuşkanların (harmoniklerin) daha belirgin tınladığı, sönüm süresinin uzadığı ve ses yüksekliğinin arttığı ifade edilmiştir.

İki sabit nokta arasına gerilen teller ile bağlamanın gövdesi arasındaki bağlantı, alt eşik aracılığıyla sağlanır. Alt eşik hem telleri taşıyan hem de tellerde meydana gelen titreşimleri gövdeye ileten bir parçadır. Alt eşiğin şekli, yüksekliği, konumu ve yapımında kullanılan malzemenin cinsi değiştirilerek bağlamadan elde edilen sesin tınısına müdahale edilebilir. Bu çalışmada ele alınan alt eşiğin ses tahtasının merkezine daha yakın konumlanması, tel boyunun kısalmasına neden olacaktır. Tel boyu ile frekans ters orantılı olduğu için tel boyu kısalınca frekans değeri artacak yani ses tizleşecektir. Dolayısıyla bağlamadan elde edilen sesin tınısı da doğrudan değişecektir. Tel boyunun değişmesinin yanı sıra, telin hangi noktadan nasıl uyarıldığı, sesin harmonik yapısını ve dolayısıyla tınısını etkileyen diğer önemli faktörler arasında yer almaktadır (Jansson, 2002a:15; Serway & Beichner, 2015:555; Zeren, 2018:169).



Bağlama akustiği konusunda tespit edilen bir diğer çalışmada, bağlamanın eşik sistemine bir yenilik getirilmiştir (Demir, 2002). Geleneksel yapıdaki bir bağlamada, sap üzerinden gelen teller alt eşik üzerinden geçip tekne bitimindeki tel takacağına bağlanır. Bu çalışmada ise sap üzerinden gelen teller, gitar ve udda olduğu gibi alt eşığe bağlanmıştır. Ayrıca bir de teknenin üst tarafına ikinci bir ses deliği açılmıştır. Yeni eşik formunun detaylı çizimi ve bağlamanın yandan görünümü Şekil 7’de yer almaktadır.



Şekil 7. Eşik ve ses deliği tasarımı (Demir, 2002)

Yapılan ölçümlerde, tellerin titreşim sürelerinin geleneksel yapıdaki bir bağlamaya kıyasla iki kat arttığı, tel harmoniklerinin daha belirgin hale geldiği ve daha bas karakterli bir tını elde edildiği bildirilmiştir.

Telin tel takacağına değil de alt eşığe bağlanması, ses tahtasına etki eden kuvvetleri değiştirecektir. Bu durum ise bağlamanın titreşim özelliklerinin ve mod frekanslarının değişmesine neden olacaktır. Dolayısıyla elde edilen sesin tınısı değişecektir.

Yapılan literatür taraması sonucunda, bağlamanın ses tahtasında farklı malzeme kullanımının sese olan etkisinin araştırıldığı bir çalışmaya rastlanmıştır (Çıkrıkçıoğlu, 2021). Başlangıç olarak, iki adet geleneksel yapıda bağlama ve iki adet de yeni ses tahtası tasarımına sahip bağlama yapılmıştır. Tasarlanan iki adet bağlamanın ses tahtasının yapımında, kompozit nomex honey comb yapı malzemesi kullanılmıştır. Dört bağlamanın hepsinde ses deliğinin açılıp kapanabilen bir yapıda olması sağlanmıştır. Yapılan ölçümlerde bu parametrenin etkisi de incelenmiştir. Kompozit malzemeyle kaplanan ses tahtasının görüntüsü Şekil 8’de yer almaktadır.



Şekil 8. Kompozit malzemeyle kaplanan ses tahtası (Çıkrıkçıoğlu, 2021)

Geleneksel ve kompozit yapıdaki ses tahtalarına sahip bir numaralı bağlamaların mod frekansları incelendiğinde, 1. mod hariç diğer modların frekans değerlerinin düştüğü görülmüştür. Geleneksel ve kompozit yapıdaki ikinci bağlamalarda 1., 3. ve 5. modların frekansları düşerken 2. ve 6. modların frekanslarının arttığı görülmüştür. Buradan, kullanılan yapı malzemesinin bağlamanın doğal frekansları üzerinde etkili olduğu söylenebilmektedir.

Doğal frekansları şimdye kadar en çok araştırılan çalgı, kemandır. Kemanın mod şekilleri ve bu modlara karşılık gelen doğal frekanslar üzerine yapılmış çok sayıda bilimsel çalışma bulunmaktadır (Hutchins,

1962; Hutchins, 1983; Marshall, 1985; Woodhouse, 2014; Gough, 2016; Jansson, 2002b). Bir çalgının ses tahtasının bazı özel modlarının frekansı, olması gereken değerden düşükse yükseltilmeye, yüksekse düşürülmeye çalışılır. Buna, *serbest plaka akordu (free plate tuning)* adı verilir ve özellikle keman yapımında oldukça yaygındır (Hutchins, 1987). Bu yöntemle elde edilen veriler, yapım aşamasının sonunda çalgının akustik karakterinin nasıl olacağı konusunda çalgı yapımcısına yapım daha bitmeden bir fikir verir. Böylelikle yapımcı, çalgının tınısına önceden müdahale etme şansını yakalar. Keman için özel olan modlar ve frekanslar, bilimsel çalışmalarla çok önceden tespit edilmiştir. Ancak bağlamada böyle bir durum henüz söz konusu değildir. Genel anlamda bağlama çalgısının mod şekilleri ve mod frekansları hakkında referans değerler henüz tam olarak ortaya konmadığı için söz konusu çalışmadaki bağlamaların mod frekanslarının aldığı değerler, yeteri kadar yorumlanamamaktadır.

### SONUÇ, TARTIŞMA

Bu araştırmanın amacı, bağlama yapımında yeni bir tasarımın sese olan etkisini araştıran çalışmaların akustik açıdan bir değerlendirmesini sunmaktır. Yapılan literatür incelemeleri sonucunda, bu alanda yedi tane bilimsel çalışmanın yapıldığı ve bu alanda yapılan çalışmaların da son 20 yılda hız kazandığı tespit edilmiştir. Yapılan çalışmaların tamamının yüksek lisans tezi olduğu ve bu çalışmaların her birinde bağlamanın farklı bölgeleri üzerinde meydana getirilen yapısal farklılıkların sese olan etkilerinin araştırıldığı görülmüştür. Tezlerde incelenen parametreler şu şekilde sıralanabilir: teknenin büyüklüğü, sapın formu, ses tahtasının yapısı ve formu, ses deliğinin büyüklüğü ve konumu, alt eşiğin konumu ve formu. Çalışmaların çoğu, bağlamadan elde edilen seslerin şiddetleri ve sönüm süreleri üzerine odaklanmıştır. Yalnızca bir çalışmada mod frekanslarının tespit edildiği görülmüştür.

Yapılan değerlendirme sonucunda bağlamanın farklı kısımlarının yeniden tasarlanmasına yönelik yapılan çalışmaların, özellikle keman gibi batı müziği çalgılarıyla yapılan çalışmalara göre daha yolun çok başında olduğu ortaya çıkmıştır. Literatürde, batı müziği çalgılarının mod şekillerini ve frekanslarını tespit eden, köprü mobilitesini, ses yayılımını, ses yönelimini ölçen sayısal modelleme ve simülasyonların yapıldığı çokça çalışma olduğu bilinmektedir.

Ülkemizde çalgı akustiği üzerine yapılan çalışmalar incelendiğinde, müzikal akustiğin yeni yeni gelişmeye başlamış bir alan olduğu söylenebilmektedir. Bu alana özgü laboratuvar ve test ortamlarının sınırlı sayıda olması da gelişimin önündeki bir engel olarak karşımıza çıkmaktadır. Özellikle çalgıların rezonatörlerini konu alan ve sonlu eleman metodunun (*finite element method*) kullanıldığı sayısal çalışmaların hem maliyetlerinin yüksek olması hem de çok fazla zaman alması, bu alandaki çalışmaların nispeten sınırlı sayıda olmasının sebepleri arasında yer almaktadır. Alanın gelişimine katkı sağlamak adına, başta bağlama olmak üzere diğer Türk müziği çalgılarını da konu alan ve güncel yöntemlerin kullanıldığı daha detaylı bilimsel çalışmaların yapılması temel hedeftir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## ANKEBÛT SURESİ BAĞLAMINDA ÖRÜMCEK METAFORU SPIDER METAPHOR IN THE CONTEXT OF SÛRAT AL-‘ANKABÛT

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### ÖZET

Yüce Allah'ın insanlığa son hitabı olan Kur'an, ilk muhataplarının Araplar olmasından dolayı Arapça olarak indirilmiş, bu husus çeşitli ayetlerde dikkate sunulmuştur. Nitekim "Apaçık Kitab'a andolsun ki, iyice anlayasınız diye biz, onu Arapça bir Kur'an yaptık." ayeti bu anlama delalet etmekte; bundan amacın ise verilen mesajın daha iyi anlaşılmasını sağlamak olduğunu bildirmektedir. Bu açıdan bakıldığında mesajın muhataplara doğru ve etkili bir biçimde ulaşması adına Kur'an'ın Arapçanın bütün imkânlarını kullandığı görülmektedir. Meramın açık ve net bir şekilde muhataba aktarılması için kullanılan yöntemlerden bir tanesi de şüphesiz ki mecazi yani metaforik anlatımlardır. "Tat (azabı) bakalım! Hani sen güçlüydün, şerefliydin!?", "Biz onlara, 'Aşağılık maymunlar olun' demiştik.", "Size olan kin ve öfkelerinden dolayı parmaklarını ısırırlar." ve "Fecrin beyaz ipliği siyah ipliğinden sizce ayırt edilinceye kadar yiyin ve için; ama sonra da geceye kadar orucu tutun." gibi ayetler Kur'an'da metaforik yöntemin baskın bir şekilde kullanıldığına delalet etmektedir. Bu çalışmada Ankebût suresi 41. ayette yer alan metaforik anlatım üzerinde durulacak, müfessirlerin bu metafora yaklaşım tarzları irdelenecektir. Bu ayet Allah'tan başka veya Allah ile beraber başka varlıkları dost edinmenin yani şirkin açmazlarını, dayanaktan yoksunluğunu, zayıf olup yıkılmaya mahkum olduğunu ve bu inancın üzerine hiçbir şeyin temellendirilemeyeceği gerçeğini çarpıcı bir metaforla dikkate sunmaktadır. Bu anlamda Allah'tan başka varlıklara tapanların yaptıkları bütün eylem ve söylemleri, bir üflemeyle harabeye dönebilecek derecede kırılğan olan örümceğin evine benzetilmiş, yaşamlarının manasız, gayesiz ve boş olduğu belirtilmiştir. Netice itibariye Kur'an, tevhid, nübüvvet, adalet, ibadet ve ahiret gibi konularda bilginin daha iyi öğrenilmesi ve akılda kalmasını sağladığı, anlatımı güçlendirdiği, derin düşünmeye sevk ettiği, soyut kavramların daha iyi anlaşılmasına yardımcı olduğu, tek seferde birden fazla şey anlatmayı sağladığı, hayal gücünü canlı tuttuğu, belirli bir konuya vurgu yaparak konuyu daha çarpıcı hale getirdiği için metaforik anlatımı tercih etmiştir.

**Anahtar Kelimeler:** Kur'an, Tefsir, Ankebût, Metafor

### ABSTRACT

The Quran, which is the last address of Almighty Allah to humanity, was sent down in Arabic because its first addressees were the Arabs, and this issue is brought to attention in various verses. As a matter of fact, "By the Obvious Book, we have made it an Arabic Quran so that you may understand it thoroughly." The verse indicates this meaning; He states that the purpose of this is to ensure a better understanding of the message given. From this perspective, the Quran uses all the possibilities of Arabic to reach the addressees correctly and effectively. One of the methods used to convey the meaning clearly and clearly to the addressee is metaphorical expressions. "Taste (the torment)! "When you were strong and honorable!?", "We said to them, 'Be despicable monkeys'.", "They bite their fingers because of their hatred and anger towards you." and "Eat and drink until the white thread of dawn can be distinguished from the black thread; but then fast until the night." Verses such as these indicate that the metaphorical method is used dominantly in the Quran. In this study, we will focus on the metaphorical expression in the 41st verse of Sûrat al-‘Ankabût, and the commentators' approach to this metaphor will be examined. This verse presents, with a striking metaphor, the impasse of taking other beings other than Allah or along with Allah as friends, that is, polytheism, its lack of support, its weakness and doomed to collapse, and the fact that nothing can be based on this belief. In this sense, all the actions and discourses of those who worship beings other than Allah are likened to a spider's house, which is

so fragile that it can be destroyed with a blow, and it is stated that their lives are meaningless, purposeless and empty. As a result, it enables better learning and retention of information on subjects such as the Quran, monotheism, prophethood, justice, pray and afterlife strengthens expression, encourages deep thinking, helps to understand abstract concepts better, and enables to explain more than one thing at a time. He preferred metaphorical expression because it kept his imagination alive and made the subject more striking by emphasizing a certain subject.

**Keywords:** Quran, Tafsir, 'Ankabüt, Metaphor

## GİRİŞ

Kur'an'ın amacı tevhid, nübüvvet, adalet, ibadet ve ahiret gibi temel konularda bilgi vermek ve insanın karşılaşılabileceği muhtemel sorunlara çözüm üretmektir. Zira insan akleden, düşünen, anlamaya çalışan, kuşku duyan ve sorgulayan bir varlıktır. Bundan dolayı da Kur'an, hedef kitlenin verilen mesajları daha iyi anlaması, kavraması, üzerinde düşünmesi ve doğru mantık yürüterek sağlıklı bir sonuca varması için dildeki bütün anlatım biçimlerini kullanmaya gayret etmiştir. Kur'an'ın yararlandığı anlatım biçimlerinden bir tanesi de mecaz yani metaforlardır. Farklı görüşler bir yana bırakılacak olursa İslam alimlerinin genel kanaatine göre Kur'an'ı oluşturan içeriklerin bir kısmında açık anlatım, bir kısmın da ise dolaylı anlatım yani mecazi/metaforik anlatım biçimi tercih edilmiştir. Yüce Allah'ın, vahyin inzalinde insanla doğrudan değil de dolaylı olarak konuşmayı seçmesi bu açıdan önemlidir. Zira insan ancak bu yolla yaratıcısıyla daha kolay iletişime geçmiş, ondan vahiy almış ve anlaşılması zor olan gaybi bilgileri ancak bu metaforik anlatım biçimiyle zihnine yakınlaştırmıştır.

Literatürde metaforlar konusu hakikat-mecaz bağlamında ele alınmaktadır. Kur'an'daki metaforik anlatımlar konusunu işleyen "mecâzü'l-kur'ân" terkinin bir Kur'an ilmi olarak ilk defa kimin tarafından kullanıldığı kesin olarak bilinmemekle beraber Kur'an'daki mecazlar üzerine yapılan çalışmalar veya Kur'an'daki mecazlara dikkat çeken eserler çok eskilere gitmektedir. Bu konuda Halil b. Ahmed, Sibeveyhi, Ebû Zeyd el-Kureşî, Yahyâ b. Ziyâd el-Ferrâ, Ma'mer b. Müsennâ gibi dilcilerle Mu'tezile âlimleri ve özellikle Câhiz önde gelmektedir (Birişik, 2023).

## ARAŞTIRMA VE BULGULAR

### Metafor ve Mecaz Kelimelerinin Anlamları

Türk Dil Kurumu güncel sözlüğüne bakıldığında metafor kelimesinin karşılığının "mecaz" kelimesi olduğu görülmektedir (TDK, 2023). Bundan dolayı konunun daha iyi anlaşılması için bu iki kelimenin anlamlarını vermek uygun olacaktır. Eski Yunancadaki *méta* (üzerine) ve *phrein* (bir şeyi taşımak, aktarmak, nakletmek) kelimelerinin bir araya gelmesinden oluşan *metafor*; bir "şey" in birtakım yönlerinin başka bir "şey" e aktarıldığı zihinsel ve dilbilimsel süreçleri ifade etmektedir (Lakoff & Johnson, 2010, s. 11; Cebeci, 2013, s. 9,10; Dur, 2016, s. 122-128). Mecaz kelimesi ise mef'al kalıbında bir kelime olup "cvz" fiil kökünden türemiştir. Bu kelime sözlükte yola girmek, bir yolda yürümek, yolu ortalamak gibi manalara ek olarak ismi mekan formunda konum, geçilen yer anlamında kullanılmıştır. (Ferâhidî, 1998, s. 6/165; İbn Manzûr, 1993, s. 5/326). Terim olarak da "hakikat manası ile nakledilecek mana arasında bulunması gereken bir alâka ve hakikat anlamının kastedilmesine engel olan bir karinenin bulunması halinde ortak bir iletişim dilinde konulduğu anlamının dışında kullanılan lafız" şeklinde tanımlanmıştır (Durmuş, 2023).

### Anlatım Biçimi Olarak Metaforun Seçilme Nedenleri

Din dili sadece somut ve görülebilir olgularla ilgili olmayıp duyuların idrakini aşan gaybi olgularla da ilgili olduğu için Kur'an'da ve hadislerde mecazın kullanıldığı görülmektedir (Sami, 2018, s. 15). Metaforik üslup, anlatımı güçlendirmesi, bilginin daha iyi öğrenilmesi, bilginin akılda kalmasını kolaylaştırması, soyut kavramların daha iyi anlaşılmasına katkıda bulunması, kişiyi derin düşünmeye teşvik etmesi ve tek seferde birden fazla duyguya hitap etmesi açısından çokça tercih edilen bir anlatım biçimidir. Metaforik anlatım, dilin zenginliğinin kullanılmasına katkı sunmakta, hayal gücünün canlı tutulmasına da yardımcı olmaktadır. Yine metafor, doğrudan anlatılamayan şeylerin ifade edilmesini sağlamakta, anlatımda yaratıcılığın ortaya çıkmasına imkan vermektedir. Ayrıca metafor, belirli bir konuya vurgu yapmak veya konuyu daha çarpıcı hale getirmek için de kullanılmaktadır. Bundan dolayı



metaforlar, alışılmış günlük dildeki kelime ve mana birliklerine, özgün çağrışımlar yüklenmesi sonucu dilin imkânlarını da sınırsız hâle getirmektedirler (Mâturîdî, 2005, s. 8/230; Karataş, 2018, s. 278, 279; Kılıç, 2010, s. 11-40).

### Kısaca Ankebût Suresi

Nüzul yeri hususunda tartışma bulunan Ankebût suresi, tercih edilen görüşe göre Mekke’de nazil olmuş olup 69 ayettir (İbn Atiyye, 2001, s. 4/305; Râzî, 1999, s. 25/23; Şevkânî, 1993, s. 4/221). Mushaf’ta 29. sırada yer alan sure, nüzul sırasına göre ise 85. sure olup Rûm suresinden sonra Mutaffifin suresinden önce inmiştir. Sure, adını 41. ayette geçen ve örümcek anlamına gelen ankebût kelimesinden almaktadır. Surenin ana konusu doğru inanca sahip olmak ve bu inancın gereklerini yerine getirerek yaşamaktır. Sure insanın bir gaye doğrultusunda yaratıldığını, mutlaka imtihan edileceğini iyi ve kötü insanların bu sınamalarla birbirinden ayrılacağını ifade etmektedir. Daha sonra da geçmiş milletlerden örnekler vermek suretiyle konu pekiştirilmekte, müşriklerin Hz. Peygamber ve Kur’an’la ilgili bazı sorularına cevaplar verilmekte ve şüpheleri izale edilmektedir (Karaman vd., 2020, s. 4/250, 251). Nüzul zamanına bakıldığında Ankebût suresinin Müslümanların Mekke’de en şiddetli işkenceye maruz kaldıkları dönemde indiği görülmektedir. Çünkü müşrikler, bu dönemde İslâm’a tamamen karşı çıkıyor ve yeni dine girenleri en şiddetli şekilde cezalandırıyorlardı. Yüce Allah bu sureyle Müslümanları cesaretlendirip güçlendirmek ve iman zayıflığı gösterenleri teşvik etmek gibi bir gaye gütmüştür (Mevdûdî, 1995, s. 4/222).

### Ankebût Suresi 41. Ayetin Bağlamı

Ayetlerin doğru anlaşılmasında siyak sibak yani ayetin bağlamı çok önemlidir. Bu açıdan ayetler içinde bulunduğu sure ve genel Kur’an bağlamında değerlendirilmelidir. Ankebût suresi insanın dünya hayatında mutlaka deneneceği gerçeğini dile getirerek başlamakta, daha önce yaşamış olan milletlerin de imtihana tabi tutulduklarını hatırlatmaktadır. Bu yöntemin sünnetullah olduğu vurgulanmakta; doğrularla yalancılara ancak bu şekilde tefrik edildikleri hususu dikkate sunulmaktadır. Ayrıca iyi insanların ödüllendirileceği, kötülerin cezalandırılacakları ve hiç kimsenin başkasının günahını yüklenmeyeceği gibi temel ilkeler de belirtilmektedir (Altuntaş & Şahin, 2011, s. Ankebût 29/2-13). Herkes tarafından kolayca anlaşılabilir ve uygulanabilir bu apaçık temel ilkelere rağmen geçmiş kavimlerin içine düştüğü şirk girdabı örneklerle açıklanmaktadır. Hz. Nûh’un bütün çağrılarına rağmen, halkın tevhit inancını terk edip putlara taptıkları (Altuntaş & Şahin, 2011, s. Nûh 71/23), Hz. İbrahim’in kavminin tevhit inancından uzaklaşarak, düzmece putları ilah olarak tanıdıkları (Altuntaş & Şahin, 2011, s. Enbiyâ 21/52,53), Hz. Lût’un kavminin tevhit inancını bırakarak sapkın bir yol tercih ettikleri üzerinde durulmaktadır (Altuntaş & Şahin, 2011, s. A'râf 7/80-84). Medyen, Âd, Semûd kavimleri ile Firavun, Kârun ve Hâmân gibi şahısların da tevhit akidesine karşı çıkarak sahte ilahlar edindikleri de bildirilmektedir. Yüce Allah bu kavimleri günahlarından dolayı çeşitli şekillerde cezalandırdığını, onlara asla haksızlık yapmadığını, lakin onların kendilerine zulmettiğini, onların içine düştüğü girdabı betimleyecek bir metaforla dikkate sunmaktadır. Bu metafor Ankebût suresinin 41. ayetinde şöyle geçmektedir: *“Allah’tan başkalarını dost edinenlerin durumu, kendine bir ev edinen örümceğin durumu gibidir. Evlerin en dayanaksızı ise şüphesiz örümceğin evidir. Keşke bilselerdi!”* Bu ayetle yüce Allah yukarıda ifade edilen kavimlerin helak edilme sebeplerini açıklamaktadır. Zira bu toplumlar Allah’a inanmayı, ona kulluk etmeyi, onun emirlerini bireysel ve sosyal hayatta uygulamayı reddetmiş, Allah yerine sahte ve düzmece ilahlar uydurarak, çıkarları gereği onlara kulluk edip zulme sapmışlardır. İşte burada Yüce Allah onların inanç, ibadet ve düşünce dünyalarını Allah’a kapattıklarını, kendi oluşturdukları inanç dünyalarının ise örümceğin evi gibi dayanaksız, zayıf ve cılız olduğunu, bu düzmece tanrıların onları cezalandırılıp yok olmaktan kurtaramadıklarına vurgu yapmaktadır. Bu ayetin siyakında *“Allah, onların kendisini bırakıp da hangi şeye yalvardıklarını şüphesiz bilir. O, mutlak güç ve hikmet sahibidir.”* (Altuntaş & Şahin, 2011, s. Ankebût 29/42) buyrulmak suretiyle o kavimlerin düzmece tanrılarının, sahte ilahlarının güç ve hikmetten yoksun olduklarını ve o ilahların, yardıma en muhtaç oldukları anda onları yüzüstü bıraktıklarını bildirmektedir. Zira o sahte tanrılarda hakiki anlamda bir güç ve hikmet bulunmamaktadır. Bundan dolayı yüce Allah, üstün ve dilediğini yapabilen biricik egemen gücün sadece kendisi olduğunu bildirmekte, bu varlık alemi en ince noktasına kadar planlayıp yönlendiren ve yaptığı her işinde hikmet bulunanın sadece kendisi olduğunu vurgulamaktadır. Bir sonraki ayette ise *“İşte biz, insanlara bu misalleri anlatıyoruz ama bunların hikmetini, gerçek bilgi sahibi olanlardan başkası kavrayamamaktadır.”* (Karaman vd. H. , 2020, s.



Ankebût 29/43) buyurmak suretiyle bunun bir temsil olduğu, bunun üzerinde düşünülmesi ve bu temsilin gayesinin iyi anlaşılması gerektiği vurgulanmaktadır. Zira temsil ve teşbihler, aklını kullanın bilgi sahibi olanları birtakım gizli ve gizemli manalara ulaştıran yollardır. Nitekim bu metafor da müşrikle muvahhit arasındaki farkı ortaya koymakta ve birtakım kapalı manaları ortaya çıkarmak suretiyle o manaları zihne tasvir etmektedir.

Genel Kur'an bağlamında bakıldığında da yüce Allah'ın hakikati ifade etme adına bu tür temsiller getirdiği ve metaforik anlatımlara yer verdiği görülmektedir. *"Şimdi (düşünün, önünü görmeden), yüzüstü sürünen mi hedefe erişir, yoksa doğru yolda düzgün yürüyen mi?"* (Karaman vd. H. , 2020, s. Müлк 67/22) ve *"Allah, birbiriyle çekişen ortak sahipleri bulunan bir (köle) adam ile yalnızca bir kişiye ait olan bir (köle) adamı örnek verdi. Bu iki adamın durumu hiç, bir olur mu?Hamd Allah'a mahsustur. Hayır, onların çoğu bilmiyorlar."* (Altuntaş & Şahin, 2011, s. Zümer 39/29) ayetleri Kur'an'ın anlatım üslubunda temsil ve mecaza yer verildiğine delalet etmektedir.

### **Ayetteki Örümcek Ağı Metaforu Üzerindeki Düşünceler ve Değerlendirme**

Kur'an, üzerinde durduğu hususların iyice anlaşılması, akılda kalması, düşünceye sevk etmesi açısından metaforlar kullanmıştır. Ankebût suresi 41. ayette de müşriklerin içinde buldukları çıkmazlar, örümcek ağı metaforu ile ifade edilmiştir. Kur'an'ın, buradaki hedefine ulaşmak için en uygun metaforu seçtiği görülmektedir. Zira uygun biçimde kullanılan her metafor, bilineni bilinmeyenle bağdaştırarak anlatıma "cazibe", "açıklık" ve "seçilirlik" kazandırır. Bu açıdan metaforlar amaç ve konu ile ilgili "yerine uygun" nitelikte olmalıdır (Cebeci, 2013, s. 19). Seyyid Kutub (1906-1966) bu metaforun, varlık alemindeki güçlerin gerçek mahiyetini gözler önüne seren son derece gerçekçi ve bir o kadar ilginç bir tasvir olduğunu düşünmektedir (Seyyid Kutub, 1992, s. 5/2736, 2737).

Söz konusu ayette örümcek ağı metaforunun tercih edilmesinde, birçok hususun dikkate alındığı müşahade edilmektedir. Metaforda dikkat çekilen husus, örümceğin evi mahiyetindeki yuvasıdır. Bu açıdan örümceğin bizzat kendisi veya örmesi/dokuması metaforun dışında bırakılmıştır. "Örümceğin evi/yuvası" metaforuyla anlatılmak istenenlerin daha iyi anlaşılması için "ev" mefhumuna bakılması gerekmektedir. Ev duvarları, tavanı, penceresi ve kilitlenen bir kapısı olan yapıdır. Evin yapılış amacı kişinin her açıdan kendisini güvende hissedebileceği bir ortam oluşturmaktır. Bu amaçla ev, kişiyi soğuk ve sıcaktan korur. Aynı şekilde ev kişiyi yabancı hayvan saldırıları, afet vb. belalardan korur. Bu açıdan ev kişiye bazı faydalar sağlar, kişiyi bazı zararlardan da korur. Eğer bir ev, yukarıda ifade edilen ihtiyaçları karşılamazsa o yapı ev olmaktan çıkar. İşte örümceğin evi de aynen böyledir. Onun evi, onu hiçbir şeyden koruyamaz, zira onun ağı, saldırılara karşı ne bir şeyi örtebilir ne de kapatabilir. Evin birçok özelliğinin bulunması gerektiği gibi ibadet edilecek varlığın da yaratıcı, rızık verici, fayda verici ve zararı defedici olması gibi özellikleri olması gerekmektedir. Şayet bu vasıfların hepsi o varlıkta bulunmasa bile en azından o varlığın kendisine kulluk edenlere faydası olması veya onlardan zararı defetmesi gerekmektedir. Zira bu vasıflara sahip olmayan birinin varlığı ile yokluğu eşittir. O halde, örümceğin nice zahmetlere girerek, ihtiyaç anında kendisini koruyamayan o evi yapmasının bir anlamı olmadığı gibi müşriklerin de ihtiyaç anında kendilerine fayda veremeyecek olan düzmece tanrıları dost edinmesinin bir anlamı bulunmamaktadır (Râzî, 1999, s. 25/57).

Bu metaforun seçilmesinde diğer bir neden ise bu örneğin herkes tarafından bilinmesidir. Müfessir Zemahşerî'ye (ö. 538/1144) göre bu temsilden maksat, inkârcıların dinlerinde sığınmak ve dayanak edinip Allah'tan başka veli tuttıkları nesnelere kırılganlık ve zayıflıkta insanlar nezdinde darb-ı mesel olan bir şeye benzetmektir ki o da örümcek ağıdır (Zemahşerî, 1986, s. 3/454). Bu açıdan burada, verilen mesaja hizmet etsin diye bağlamı kolayca anlaşılabilir bir metafor tercih edilmiştir. Bu da evler içinde en zayıf, en cılız ve dayanaksız evin, örümceğin yuvasının olmasıdır ki bütün insanlar bunu bilirler. Ufak bir esintide veya küçücük bir dokunmayla örümceğin yuvası toz zerrecikleri gibi darmadağın olur, etrafa saçılır ve kaybolur gider. Burada yüce Allah, müşriklerin sahte tanrıları için yaptıkları bütün amellerin de örümceğin yuvası gibi zayıf ve dayanaksız olduğunu vurgulamıştır. Nitekim başka surelerde Yüce Allah inkarcıların amellerini rüzgarın savurduğu küle (Karaman vd. H. , 2020, s. İbrâhîm 14/18) ve geniş düzlüklerde görülen seraba (Karaman vd. H. , 2020, s. Nûr 24/39) benzetmiştir (Mâturîdî, 2005, s. 8/229).

Genel olarak müfessirler, Yüce Allah'ın bu metaforu müşriklerin içinde buldukları durumu anlaşılır kılmak için verdiği görüşünü öncelemişlerdir. Zira müşrik, kendisini yoktan var eden, her türlü ihtiyacını

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

karşılıyan asıl mabudunu bırakmış, varlık alemine gelmesi ve ihtiyaçlarının karşılanması hususunda hiçbir katkısı olmayan düzmece dostlar ve tanrılar edinmiştir. Müfessirlere göre örümceğin yuvası örümceği zarar görmekten koruyamadığı gibi müşriklerin sahte ilahları da müşrikleri Allah'ın azabından koruyamamıştır (Taberî, 2000, s. 20/38; İbn Ebî Hâtim, 1997, s. 9/3063; İbn Atiyye, 2001, s. 4/318; Şevkânî, 1993, s. 4/235). Örümceğin yuvasının en korunaksız yapı olduğu bilindiği halde söz konusu ayetin "Keşke bilselerdi" şeklinde son bulması bir farkındalık oluşturmak içindir. Buna göre bu ifadeyle "Keşke durumlarının bu olduğunu ve dinlerinin bu kadar kırılğan, zayıf, tutarsız ve yetersiz olduğunu bilselerdi!" anlamı kastedilmiştir (Zemahşerî, 1986, s. 3/455). Yine bu ifade "Keşke evlerin en zayıf ve gevşek olanının örümcek ağı olduğunu bildikleri gibi dinlerin en zayıf ve temelsiz olanının da ilim ve kudretten yoksun cansız varlıklar olan putlara tapmak olduklarını bilselerdi" anlamında olduğu da ifade edilmiştir (Beydâvî, 1997, s. 4/195; Derveze, 1963, s. 5/481).

Bazı müfessirler ayette ifade edilen "veliler" kelimesinden kastın putlar veya tapınılan başka sahte ilahlar olmadığını aksine bunların toplumu yanlış yönlendiren insanlar olduğu görüşünü dile getirmişlerdir. Nitekim İmam Mâturîdî (ö. 333/944) söz konusu ayette ifade edilen sahte ilahlardan kastın toplumu yanlış yönlendiren liderler ve onların inşa ettiği sistemleri takip eden halk olduğunu ifade etmekte ve "Ayette bildirilen veliler/dostlar sözünün zahiri manası bu manaya delalet etmektedir" demektedir (Mâturîdî, 2005, s. 8/229).

Seyyid Kutub, insanların bazen bütün güç ve yetkinin Allah'a ait olduğunu unuttuklarını, bundan dolayı da bütün değerlerinin altüst olduğunu, hangi taraf gideceklerini şaşırıldıklarını belirtmekte; bu tür durumlarda insanların, iktidar sahiplerinin caydırıcı gücüne aldandıklarını, bu otoriteyi yeryüzünde dilediğini yapabilen tek egemen güç sandıklarını, bu yüzden korku ve ümitle bu güce yöneldiklerini, ondan korktuklarını dikkate sunmaktadır. Kutub, sahte ilahlar hükmündeki iktidar sahiplerinin vereceği zarardan korunmak ya da onun kanatları altına girmeyi garantilemek için insanların onu hoşnut etmeye çalıştıklarını da sözlerine eklemektedir. Kutub gerek birey ve toplumların gerekse devletlerin ellerindeki bitmez tükenmez denilen güçlere sığınmanın tıpkı örümceğin ağdan örülü yuvasına sığınması gibi olduğunu belirtmektedir. Kutub "Tek güç, Allah'ın gücüdür. Biricik dostluk, Allah'ın dostluğudur. O'nun dışındakiler istediği kadar büyüklük taslasın, azgınlaşıp zorbalaşsın, istediği kadar zulüm, baskı ve işkence araçlarına sahip olsun kesinlikle zayıftırlar, güçsüzdürler, önemsizdirler" (Seyyid Kutub, 1992, s. 5/2736, 2737) demek suretiyle söz konusu ayetin günümüz dünyasındaki yansımalarına dikkat çekmektedir.

Mevdûdî'ye (1903-1979) göre ayette kullanılan "veli" kavramı, sözde tanrıları, çeşitli şekil ve cisimlerle tezahür eden ilahları, azizleri ve kurtarıcı ruhları sembolize etmektedir. Bunlardan hiçbiri Yüce Allah'ın bireysel veya toplumsal cezalandırmasına engel olamamıştır. Zira Ankebût suresi 14-40. ayetlerde Allah'tan başka dost edinenlerin helak edildikleri haber verilmiş, sözde dostlarının onlara fayda getiremediği vurgulanmıştır. Böylece onların bu inanç ve düşüncelerinin tamamen asılsız olduğu ortaya çıkmıştır (Mevdûdî, 1995, s. 4/253).

Celal Yıldırım (1932-2019) örümceğin ağını kendisini korumaktan ziyade, avını yakalamak için ördüğünü ifade ederek asıl amacının kendinden zayıfları ağıyla tuzağa çekmek ve öldürmek olduğunu belirtmektedir. Yine ona göre günümüzde de zayıf iradeli, menfaatçi, kendi çıkarından başka kaygısı olmayan kişiler, ülkeyi sömüren dinsizlerin, materyalist ve sapkınların ağına yakalanırlar ve son nefeslerini o ağda verme felâketine uğrarlar. Celal Yıldırım, peygamber ve kitap tanımayan materyalist inkarcıların, sapkın düşünceleri doğrultusunda birtakım dernekler vücuda getirdiklerini, çok cazip fikirlerle ortaya çıktıklarını, örümcek ağı misali tüzüklerinin çekici ve aldatıcı olduğunu, ağlarına düşürdükleri insanları önce kendi idealleriyle zehirleyip felçli hale getirdiklerini sonra da ondan yararlanmaya başladıklarını ifade etmek suretiyle konuya farklı bir bakış açısı getirmektedir (Yıldırım, 1991, s. 9/4643, 4644). Bu bakış açısına göre toplumun ekonomik ve sosyal açıdan önde gelen güçlü insanları, yöneticiler veya iş adamları, dünyevi bazı faydaları elde etmek için toplumu çıkarları doğrultusunda idare etmektedirler. Bunun için gerekirse anayasalar ve yasalar meydana getirmekte, bunlarla toplumu hem maddi hem de manevi olarak sömürmektedirler. Böylece insanlar da Yüce Allah'ın herkes için adaleti sağlayan yasalarını terk eder, kendi küçük menfaatleri için onlara ses çıkarmaz ve onları takip ederler. "Onlar Allah'ı bırakıp hahamlarını, papazlarını ve Meryem oğlu Mesih'i rableri olarak kabul ettiler. Oysa tek Tanrı'dan başkasına kulluk etmemekle emrolunmuşlardı. Ondandır başka tanrı yoktur. Allah, koştukları eşlerden münezzehtir." (Altuntaş & Şahin, 2011, s. Tevbe

9/31) ayeti de bu manayı desteklemektedir. Bu ayet indiğinde “Ya Resulallah, onlara ibadet etmezlerdi.” diye itiraz eden bir sahabiye Hz. Peygamber “Allah’ın helal kıldığına haram derler, siz de haram tanımaz mıydınız? Allah’ın haram kıldığına helâl derler, sizde helâl saymaz mıydınız?” sorusuna “Evet” denilince Hz. Peygamber’in “İşte bu onlara ibadettir.” (Elmalılı, 2007, s. 4/308) şeklinde cevap vermesi de bu anlamı pekiştirmektedir. “İbrâhim onlara şöyle demişti: “Sizler, sırf dünya hayatında aranızdaki sevgi (ve çıkar) ilişkisini sürdürmek için Allah’ı bırakıp kendinize birtakım putlar edindiniz. Sonra kıyamet gününde birbirinizi reddedecek, birbirinize lânetler yağdıracaksınız. Varacağınız yer cehennemdir; hiçbir yardımcınız da olmayacaktır.” (Karaman vd. H. , 2020, s. Ankebût 29/25). ayeti de bugün çeşitli çıkarları için zulmü destekleyen ve zülme sessiz kalanların kıyamet günü birbirlerini suçlayacaklarını fakat bu tavrın onları cehennem azabından kurtaramayacağını ifade etmektedir.

Söz konusu ayetin tefsirinde müfessirin yaşadığı dönem ve bulunduğu ortamın etkili olduğu görülmektedir. Bu açıdan ilk dönem müfessirlerin çoğunluğu ayetteki “evliya” kelimesini putlar gibi sahte ilahlarla açıklama yoluna gitmişlerdir. Erken dönem yazılan bazı tefsirlerde ve geç dönemde yazılan tefsirlerin büyük bir kısmında ise bu kelime daha çok toplumu yöneten ve yönlendiren yöneticiler, liderler ve büyük sermaye sahipleri olarak tefsir edilmiştir. Yapılan ikinci tefsirin, ayetin daha iyi anlaşılmasına katkı sağladığı ve günümüz insanında daha çok karşılık bulduğu ifade edilebilir. Zira Allah’ın emir ve yasakları doğrultusunda hazırlanmayan hiçbir yasa insanın dünya ve ahiret saadetini temin edemez ve insanlığın kaşınacağı sorunları çözemez. Tarih bunun örnekleriyle doludur. Nitekim bu surede de Allah’ın koyduğu yasaların terk edilmesinin acı sonuçları, geçmiş halklardan örnekler verilmek suretiyle açıklanmıştır.

### SONUÇ

Kur’an, muhataplarından mü’minleri desteklemek, müşrikleri de ilzam etmek için Arap dilinin bütün anlatım biçimlerinden yararlanmıştır. Bu anlamda mecaz olarak tanımlanan metaforik anlatımı da tercih etmiştir. Kur’an’da metaforik yapılara bakıldığında, hemen her surede bir şekilde metaforik yapılara rastlamanın mümkün olduğu görülmektedir.

Ankebût suresinde kullanılan örümcek ağı metaforu, Allah inancını bireysel ve sosyal hayatlarından çıkarmış kişi ve toplumları betimlemektedir. Bu insanlar, kendilerini güvene alma adına düzmece dostlar edinmişlerdir. Fakat binbir umutla tutundukları bu dostlar onlar için sahte ve hayali bir dünyadan öte değildir. Zira onların inşa ettiği dünya zayıflık ve kırılabilirlik açısından örümceğin ağı gibidir. Örümceğin ağı, sağlam ve dayanıklı bir temel üzerine bina edilmediği için, korunmaya en muhtaç olduğu zamanda, sahibini yüzüstü bırakmaktadır. Ufacık bir rüzgarda örümceğin yuvası toz duman olmakta, yıkılıp gitmektedir. Kendi düzenini kurma hususunda örümceğin çalışması, beyhude bir çabaya dönüşmüştür. Aynen bunun gibi bazı insanlar ve toplumlar da Allah mefhumunu hayatlarından çıkarmış, hayatın gerçeklerinden kopuk, sahte bir dünya kurgulamışlardır. Fakat bu kurgunun, çıkar ve güç faktörünü önceleyen, insani bütün değerleri yok sayan, gerçekçi bir kurgu olmadığı görülmektedir. Zira kendilerinde ilim, hikmet ve güç olduğu var sayılarak dayanak edinilen bu sahte dostlar bir hayat sahnesinden çekilmekte böylece kendilerine bel bağlamış olan insanları ve toplumları yok olmayla karşı karşıya bırakmaktadır. Bu açıdan bakıldığında ilk insandan itibaren sosyal, siyasal, bilimsel ve ekonomik anlamda güç ve serveti ellerinde bulduranlar kendi sapkın fikirleri doğrultusunda örümcek ağı misali bir dünya düzeni kurmuşlardır. Örümcek ağı zihniyetiyle kurulan bu dünyada zayıflar ve güçsüzler daima ezilmiş, maddi ve manevi anlamda köleleştirilmişlerdir. Söz konusu ayette ifade edildiği gibi Yüce Allah’ın azabı gelince de bu düzmece dünyaları onlara bir yarar sağlamamıştır.

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October 13-14, 2023

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DÜŞÜK SERA GAZ SALINIMLI ELEKTRİKLİ TERMOSİFONUN EKSERJİ ANALİZİ VE  
ENERJİ PRODÜKTİVİTESİ

EXERGY ANALYSIS AND ENERGY PRODUCTIVITY OF LOW GREENHOUSE GAS  
EMISSIONS THERMOSIPHON

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**ÖZET**

Son zamanlarda tüketimin de artmasıyla birlikte sera gazlarının emisyonları özelde karbon salınımı artış göstermiştir. Bu noktada salınımın azaltılması ve enerji verimliliği noktasında yapılan çalışmaların sayısı da artmıştır. Dolayısıyla, evsel bazda enerji verimliliğinde etkili olan elemanlardan termosifonlar elektriği fazlaca miktarda kullanmasından ötürü enerji verimliliği sağlanması gereken en önemli evsel sistemlerden biri olarak ortaya çıkmaktadır.

Bu çalışmada, düşük sera gaz salınımlı elektrikli bir termosifon modeli geliştirilmiş ve 50 L ve 100 L'lik çeşitli gövde ölçülerinde ve 3,5 kW ve 5,5 kW'lık güç değerlerinde analize tabii tutulmuştur. Analiz neticelerinde ölü durum sıcaklıklarındaki ekserji produktivitesi her iki durum için de karşılaştırıldı. 3,5 kW ve 5,5 kW'lık güç değerlerindeki iki termosifonun ekserji verimleri grafiklerle irdelenmiştir. Ayrıca fonksiyonel verim ve evrensel verimlerin neticeleri de çalışmaya aktarılmıştır. Bu durumdaki ekserji verimlerinin değişkenlik gösterdiği saptanmıştır. Düşük sera gaz salınımlı elektrikli bir termosifonun ekserji yıkım değerleri hesaplanmıştır. Ekserji yıkım değerlerinin farklılaşması iki düşük sera gaz salınımlı elektrikli termosifonların farklı güç değerlerindeki akışkan davranışıyla açıklanabilmektedir. En yüksek ekserjetik akım değerleri de grafik sonuçlarıyla irdelenmiştir.

**Anahtar Kelimeler:** Sera gazı, Elektrikli Termosifon Verimi, Ekserji, Produktivite

**ABSTRACT**

Recently, with the increase in consumption, emissions of greenhouse gases, especially carbon emissions, have increased. At this point, the number of studies on reducing emissions and energy efficiency has also increased. Therefore, thermosiphons, which are among the elements that are effective in energy efficiency on a domestic basis, emerge as one of the most important domestic systems that need to be energy efficient because they use large amounts of electricity.

In this study, a thermosiphon model with low greenhouse gas emissions was developed and analyzed at various body sizes of 50 L and 100 L and power values of 3.5 kW and 5.5 kW. As a result of the analysis, exergy productivity at dead state temperatures was compared for both cases. The exergy efficiencies of two thermosiphons with power values of 3.5 kW and 5.5 kW were examined graphically. In addition, the results of functional efficiency and universal efficiency were also transferred to the study. It has been determined that exergy efficiencies in this situation vary. Exergy destruction values of an thermosiphon with low greenhouse gas emissions were calculated. The difference in exergy destruction values can be explained by the fluid behavior of two low greenhouse gas emission electric water heaters at different power values. The highest exergetic flow values were also examined with graphical results.

**Keywords:** Greenhouse gas, Thermosiphon Efficiency, Exergy, Productivity

## GİRİŞ

Tüm dünyada aşırı ve yanlış enerji kullanımı nedeniyle enerji talebi artmış ve araştırmacılar enerji kayıplarını azaltmaya çalışmışlardır. Bunu başarmak için araştırmacılar, buharlaşma ve yoğunlaşma işlemlerinin sürekli devam ettiği termosifonu etkili bir ısı değiştirici olarak kullanmışlardır [1-3]. Termosifonda gizli buharlaşma ısı ve kaldırma kuvveti, termal enerjinin buharlaştırıcıdan yoğunlaştırıcıya aktarılmasına yardımcı olur.

Çalışma akışkanı yoğunlaştırıcıda termal enerjisini kaybederek güneş enerjili su ısıtıcı, yenilenebilir enerji, klimalar denilen farklı uygulamalardaki kaynağa dönecek ve bu döngü devam edecektir [4-8]. Bu cihazlar elektronik cihazlardan ısının uzaklaştırılması ve ısı geri kazanımı gibi farklı uygulamalarda yaygın olarak kullanılmaktadır [9-12]. Termosifonlar yüksek verimlilikleri, güvenilirlikleri ve maliyet etkinlikleri nedeniyle permafrostun korunması, yolların buzunun çözülmesi, türbin kanadının soğutulması, ısı eşanjörleri, elektronik bileşenler vb. gibi birçok farklı uygulamada kullanılmakta ve verimlilik çalışmaları yapılmaktadır [13-17].

## MATERYAL VE METOD

Termosifonun ekserji balansı aşağıdaki şekilde yazılabilir:

$$(\dot{E}x_{h,in} + \dot{E}x_{c,in}) - (\dot{E}x_{h,out} + \dot{E}x_{c,out}) = \dot{E}x_{dest} \quad (1)$$

Burada “ $\dot{E}x_{h,in}$ ” ve “ $\dot{E}x_{h,out}$ ” sıcak akışkanın ekserji girişi akımı ve ekserji çıkışı akımı olmakla birlikte “ $\dot{E}x_{c,in}$ ” ve “ $\dot{E}x_{c,out}$ ” soğuk akışkana ait ekserji giriş-çıkış akımıdır. Son olarak “ $\dot{E}x_{dest}$ ” ekserji yıkımı akımıdır.

Akışkanın ekserji akımını ( $\dot{E}x_f$ ) aşağıdaki gibi hesaplanır:

$$\dot{E}x_f = \dot{m}_f [(h_f - h_0) - T_0(s_f - s_0)] = \dot{m}_f c_{p,f} [(T_f - T_0) - T_0 \ln(T_f/T_0)] \quad (2)$$

Böylece;

$$\dot{E}x_{h,in} = \dot{m}_{h,in} c_{p,h} [(T_{h,in} - T_0) - T_0 \ln(T_{h,in}/T_0)] \quad (3)$$

$$\dot{E}x_{h,out} = \dot{m}_{h,out} c_{p,h} [(T_{h,out} - T_0) - T_0 \ln(T_{h,out}/T_0)] \quad (4)$$

$$\dot{E}x_{c,in} = \dot{m}_{c,in} c_{p,c} [(T_{c,in} - T_0) - T_0 \ln(T_{c,in}/T_0)] \quad (5)$$

$$\dot{E}x_{c,out} = \dot{m}_{c,out} c_{p,c} [(T_{c,out} - T_0) - T_0 \ln(T_{c,out}/T_0)] \quad (6)$$

Burada “ $\dot{m}$ ” kütleli debi, “ $c_p$ ” özgül ısı kapasite ve “ $T$ ” sıcaklıktır. Ayrıca, alt indisler “in”, “out”, “c”, ve “h” sırasıyla giriş, çıkış, soğuk ve sıcak anlamındadır.

Termosifonun ekserji yıkım akımı ( $\dot{E}x_{dest}$ ) aşağıdaki gibi bulunabilir:

$$\dot{E}x_{dest} = \dot{S}_{gen} T_0 \quad (7)$$

Burada “ $\dot{S}_{gen}$ ” entropi üretim akımını göstermektedir. Literatürde, düşük sera gaz salınımlı elektrikli bir termosifon modeli için ekserji veriminin hesaplanması için değişik yollar vardır. Aşağıda, en yaygın kullanılan ikisi verilmektedir. Termosifonun evrensel ekserji verimi ( $\omega_{univ}$ ) aşağıdaki gibi hesaplanır:

$$\omega_{univ} = [(\dot{E}x_{h,out} + \dot{E}x_{c,out}) / (\dot{E}x_{h,in} + \dot{E}x_{c,in})] 100 \quad (8)$$

Termosifonun fonksiyonel ekserji verimi ( $\omega_{func}$ ) aşağıdaki şekilde bulunabilir:

$$\omega_{func} = [(\dot{E}x_{c,out} - \dot{E}x_{c,in}) / (\dot{E}x_{h,in} - \dot{E}x_{h,out})] 100 \quad (9)$$

## BULGULAR

Bu çalışmada, iki değişik termosifon modelleri ekserjetik analize tabii tutulmuştur. Referans durum sıcaklığı yani ölü durum sıcaklıkları; 0.06°C, 7°C, 13°C, 19°C ve 23°C olarak kabul edilmiştir ve analiz bulguları çalışmaya aktarılmıştır. Mekanizmalara entry yapan suların sıcaklıkları önemli olmaktadır.

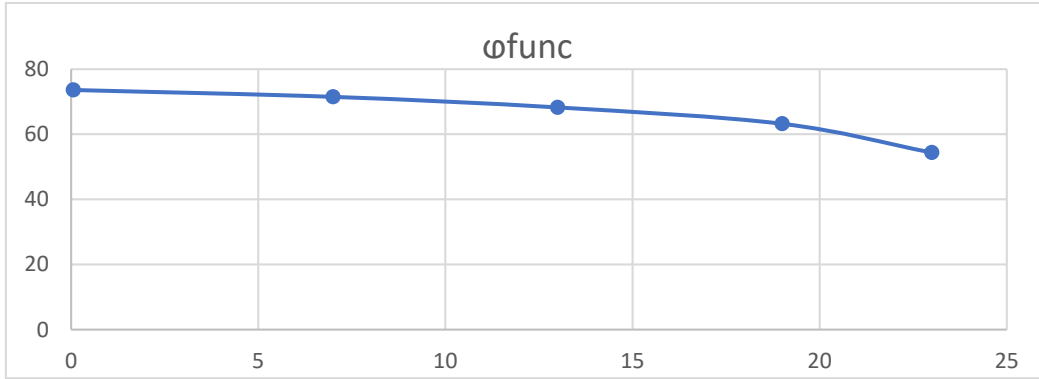


# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

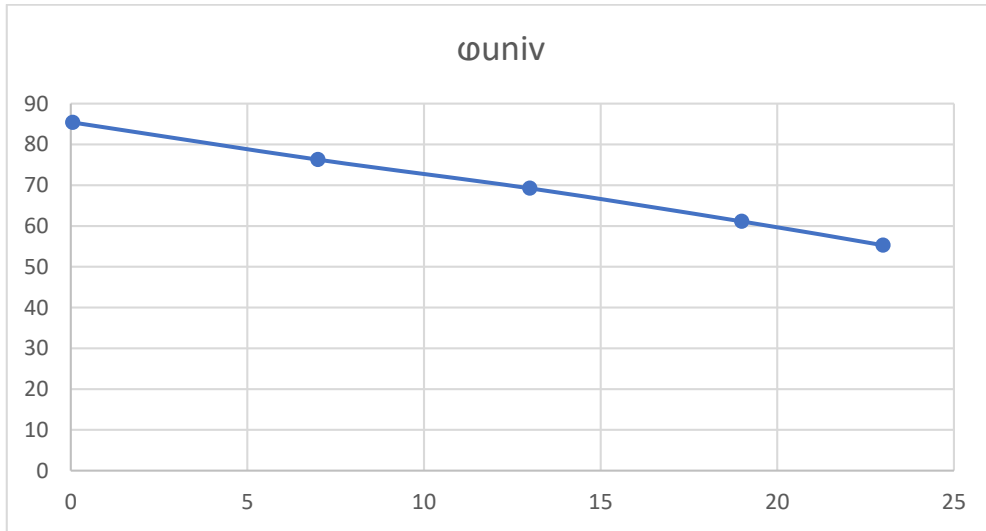
October 13-14, 2023

Mekanizmalardan biri sıcak suyun 74°C'den 36,5 °C'ye soğutulduğu sırada, soğuk suyun 32 °C'de girdiği ve 63,9 °C'de çıktığı ve debisinin  $\dot{m}=2.5$  kg/h olduğu düşük karbonlu 3,5 kW 'lık modeldir. Bu düşük karbonlu elektrikli termosifonun fonksiyonel verim sonuçları Şekil 7'de gösterilirken, universal verim sonuçları Şekil 8'de gösterilmiştir.

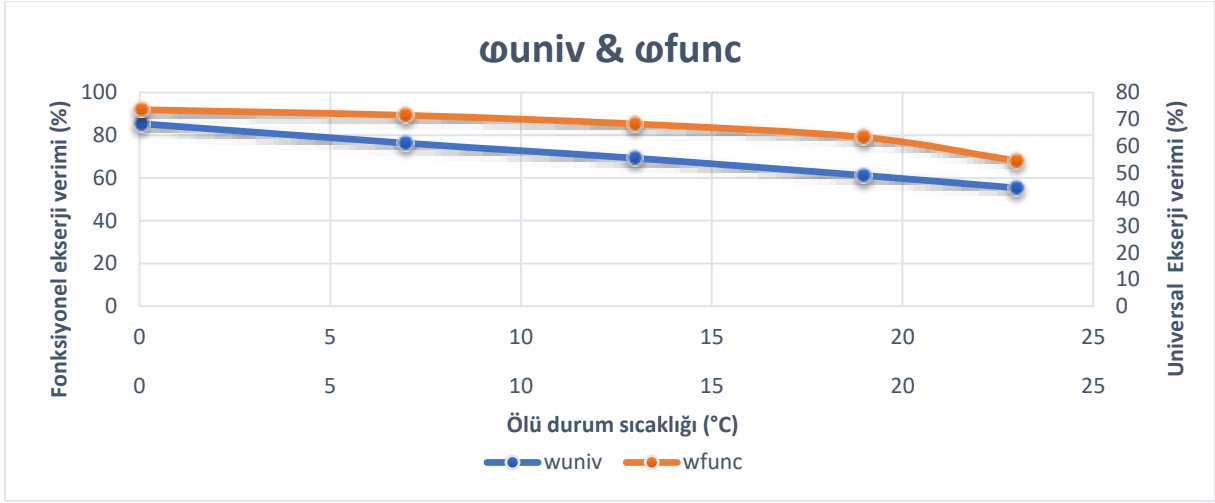
Diğer bir taraftan ikinci mekanizmanın entryleri ise farklılık göstermektedir. İkinci ortamda sıcak suyun 74°C giriş yaptığı ve 51,94 °C' ye kadar soğuyarak çıkış yaptığı anda, soğuk suyun da girişi 29°C'den yapılarak 48,9 °C'ye kadar ısındığı ve kütleli akış debisinin  $\dot{m}=2.5$  kg/h olduğu düşük karbonlu 5.5 kW'lık model olarak dizayn edilmiştir. Bu düşük karbonlu elektrikli termosifon modellerinin fonksiyonel ve universal verimlerinin karşılaştırılması Şekil 9'da gösterilmiştir.



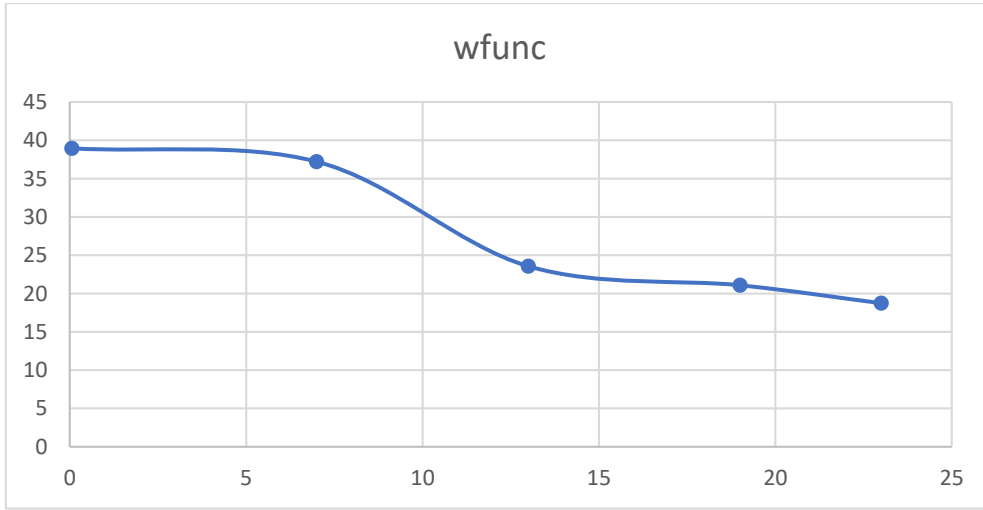
Şekil 7. Fonksiyonel Verim - 3.5 kW To=0,06  $\dot{m}=2,5$  kg/s



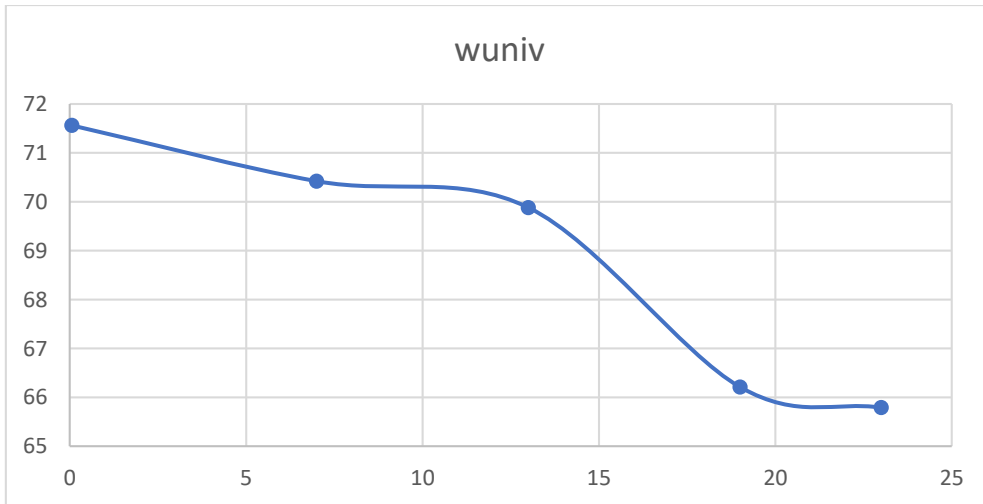
Şekil 8. Universal Verim - 3.5 kW To=0,06  $\dot{m}=2,5$  kg/s



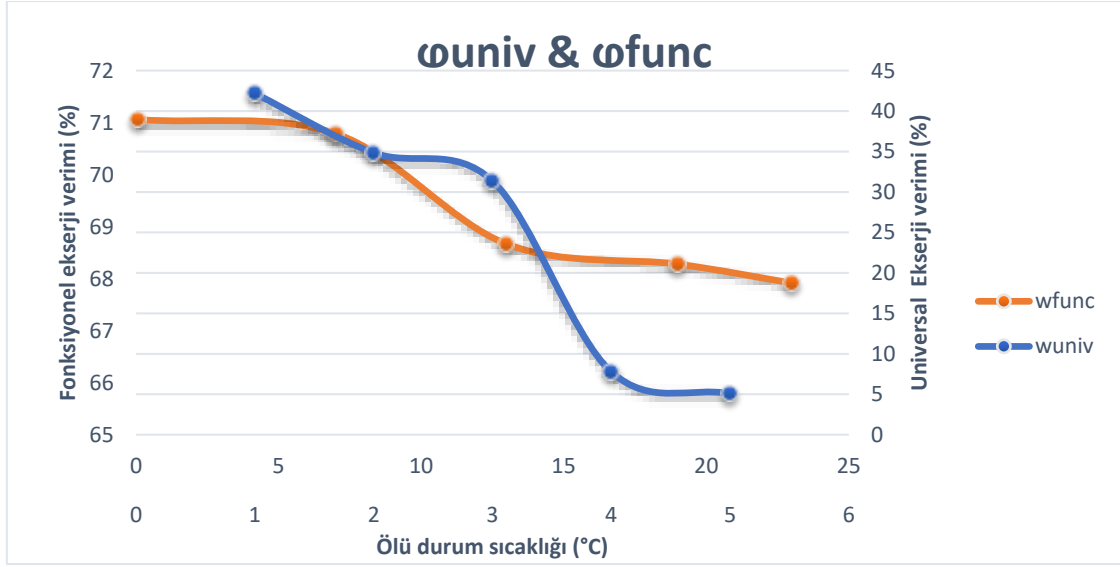
Şekil 9. Fonksiyonel ve Universal Verimin Karşılaştırılması, Termosifon 3,5 kW



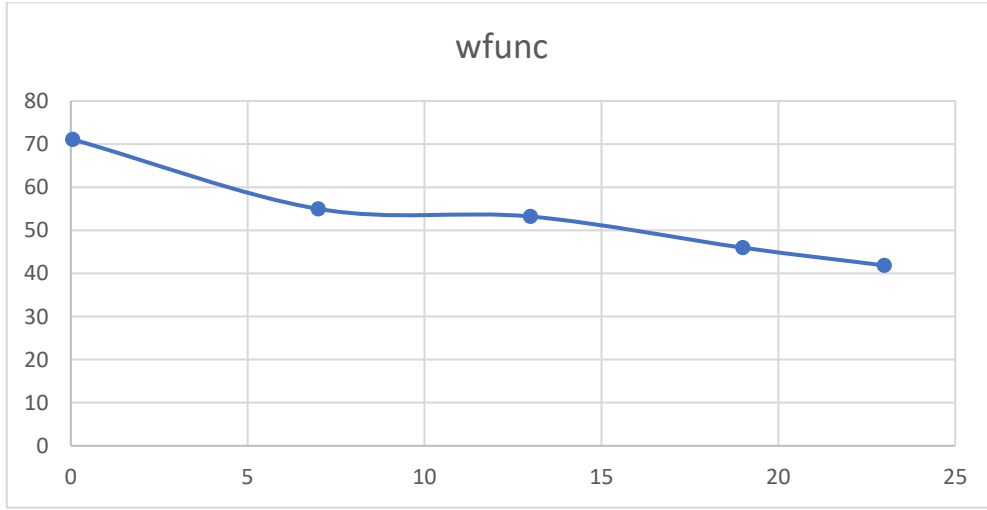
Şekil 10. Fonksiyonel Verim – 5,5 kW  $T_o=0,06$   $\dot{m}=2,5$  kg/s



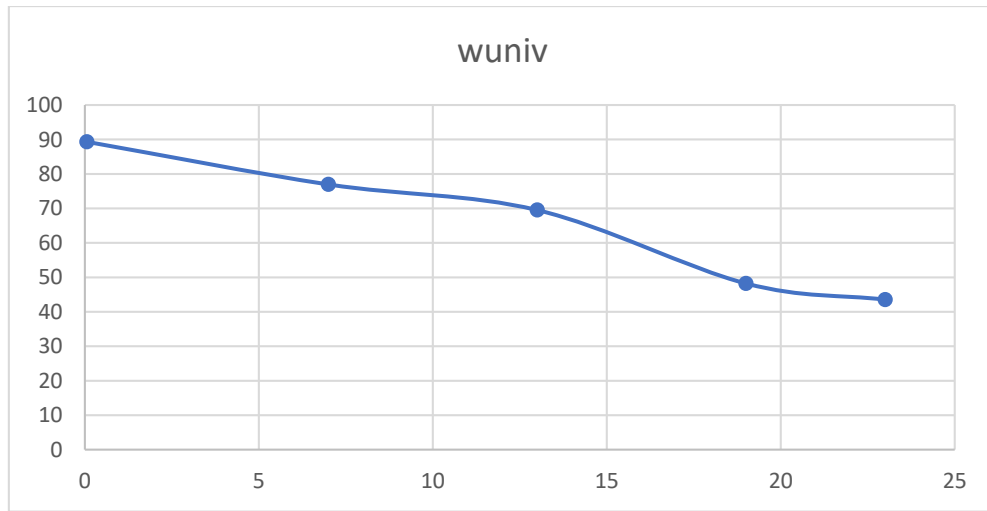
Şekil 11. Universal Verim - 5,5 kW  $T_o=0,06$   $\dot{m}=2,5$  kg/s



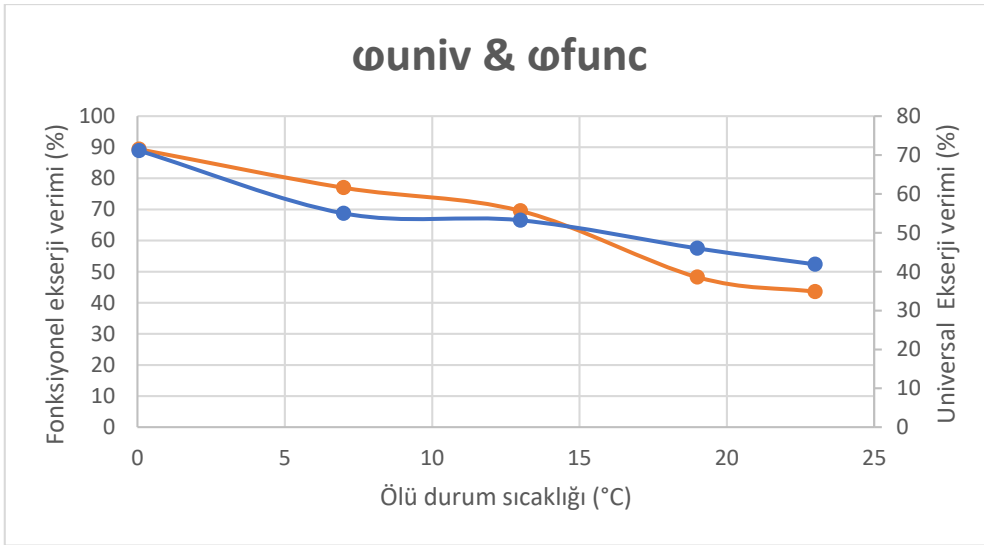
Şekil 12. Fonksiyonel ve Universal Verimin Karşılaştırılması, Termosifon 5,5 kW



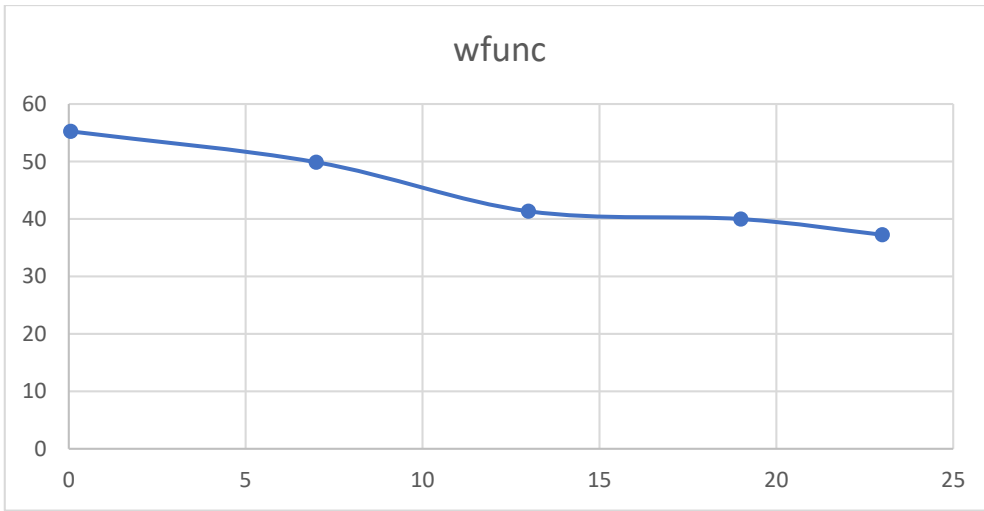
Şekil 13. Fonksiyonel Verim - 3,5 kW To=0,06 m=2,7 kg/s



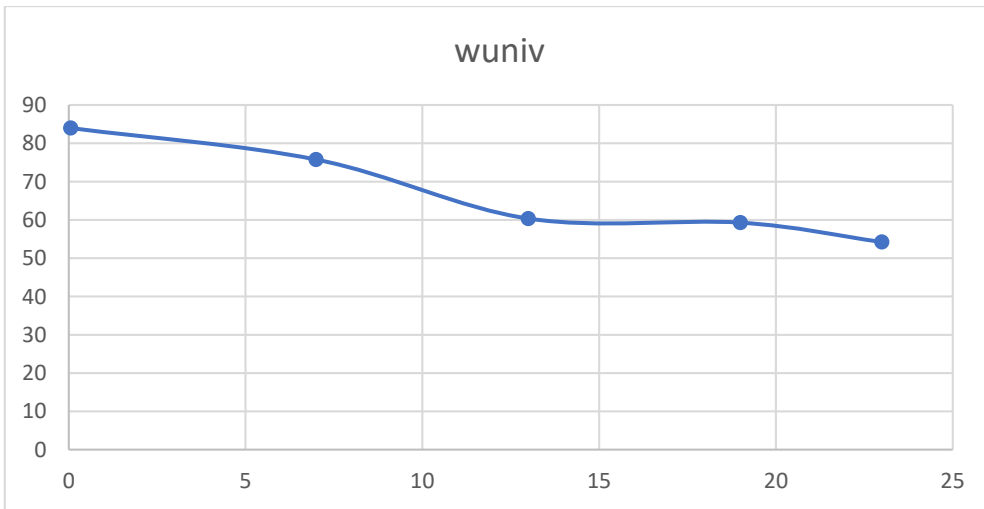
Şekil 14. Universal Verim - 3,5 kW To=0,06 m=2,7 kg/s



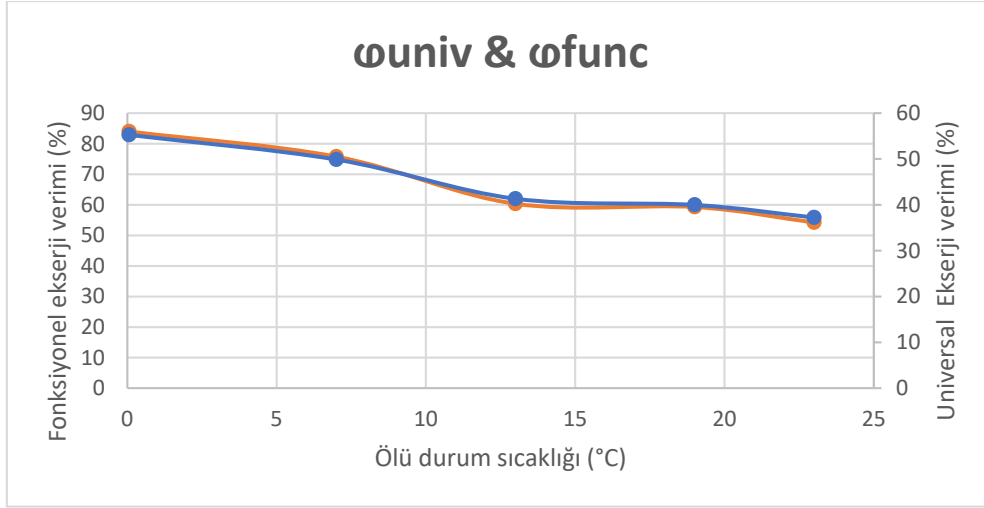
Şekil 15.  $\omega_{univ}$  &  $\omega_{func}$ - Termosifon 3,5 kW  $T_o=0,06$   $\dot{m}=2,7$  kg/s



Şekil 16. Fonksiyonel Verim - 5,5 kW  $T_o=0,06$   $\dot{m}=2,7$  kg/s



Şekil 17. Universal Verim - 5,5 kW  $T_o=0,06$   $\dot{m}=2,7$  kg/s



Şekil 18.  $\phi_{univ}$  &  $\phi_{func}$ - Termosifon 5,5 kW  $T_o=0,06$   $\dot{m}=2,7$  kg/s

Bu çalışmada birbirinden farklı tarzda dizayn edilmiş 3.5 kW'lık düşük sera gaz salımlı termosifon ile yine düşük sera gaz salımlı 5.5 kW'lık termosifon dizayn edilmiş ve ölü durum sıcaklıkları 0.06°C, 7°C, 13°C, 19°C ve 23°C olması halinde bu beş durum için 2.5 kg/s ve 2.7 kg/s debi değerlerindeki ekserji analizleri yapılarak grafikler halinde sonuçlar yorumlanmıştır.

Düşük sera gaz salımlı termosifonun EME giriş akımı 0.06°C ÖS'de bulunmuştur. MEKY düşük sera gaz salımlı termosifonun 5.5 kW'lık mekanizmaya kıyasla düşük sera gaz salımlı termosifonun 3.5 kW'lık mekanizmasında 81.12 kW olarak ÖS 0.06°C için bulunmuştur.

Düşük karbonlu 3.5 kW'lık termosifonun en düşük UFEV sırasıyla % 55.29 ve % 54.37 olarak 23°C ÖS'de hesaplanmışken, EME verim değerleri % 80.29 ve % 55.32 olarak 0.06°C ÖS'de bulunmuştur. Diğer yandan, 5.5 kW'lık düşük sera gaz salımlı termosifonun en düşük UFEV sırasıyla % 65.79 ve % 18.74 olarak 23°C ÖS'de hesaplanmışken, EME verim değerleri % 82.18 ve % 33.14 olarak 0.06 °C ÖS'de bulunmuştur.

Düşük sera gaz salımlı termosifonun 3.5 kW'lık mekanizmasında kütleli debinin 2.7 kg/s olması durumunda, en düşük UFEV sırasıyla % 43.55 ve % 41.87 olarak 23°C ÖS'de hesaplanmışken, EME verim değerleri % 81.97 ve % 75.02 olarak 0.06 °C ÖS'de bulunmuştur. Diğer bir durum olan, düşük sera gaz salımlı termosifonun 5.5 kW'lık mekanizmasında kütleli debinin 2.7 kg/s olması durumunda, en düşük UFEV sırasıyla % 54.22 ve % 37.24 olarak 23°C ÖS'de hesaplanmışken, EME verim değerleri % 81.68 ve % 76.48 olarak 0.06 °C ÖS'de bulunmuştur.

## SONUÇLAR

3.5 kW'lık düşük sera gaz salımlı termosifon ile 5.5 kW'lık modeli, ekserji analizine tabii tutulmuştur. 0.06 °C ve 23 °C aralığında farklılaşan beş değişik ölü durum sıcaklığının ekserjetik neticeleri üzerine etkisi gözlenmiştir. Dolayısıyla yapılan çalışmadan aşağıdaki çıkarımlar izlenebilmektedir;

- Ekserji verimi düşük sera gaz salımlı termosifon modelinde ÖS'yle ters orantılı bir şekilde değişim göstermektedir. Diğer bir taraftan, ekserji verimleri düşük ölü durum sıcaklıklarında daha yüksek seviyelerde seyretmektedir. ÖS'nin artması durumunda şartların değişimi gözlenmekte ve ekserji veriminin azalarak düşüşe geçtiği tespit edilmektedir. Her iki mekanizma durumları düşünüldüğünde EME veriminin en düşük ÖS sıcaklığı olan 0.06 °C'deyken gerçekleştiği simule edilmiştir

- Fonksiyonel ekserji ile diğer verim çeşidi olan evrensel ekserji veriminin karşılaştırılması sonucunda fonksiyonel verime bağlı değerlerin daha düşük seviyelerde kaldığı görülmektedir. Çünkü fonksiyonel ekserji verimi ayrı ayrı sıcak ve soğuk akışkanların ekserji farkını temel bazda değerlendirmektedir. Lakin buna karşılık evrensel ekserji veriminde böyle bir tanımlama geçerli değildir.

- Ekserji yıkımları ÖS'yle doğru orantılı olarak düşük sera gaz salımlı termosifon mekanizmasında değişmektedir. Sistemdeki tersinmezliklerden bunun kaynaklı olduğu ve verim etkili sonuçlar doğurabileceğini söylemek yerinde olacaktır. Ek olarak en düşük ekserji yıkımı akımları en düşük ÖS

0.06°C’de her iki mekanizma için gözlenmiştir. Burada, ekserjetik neticelerin etkilenmesi ölü durum sıcaklığının değişmesiyle gerçekleştiği söylenebilmektedir. Dolayısıyla, en iyi tasarım, verim ve performans değerleri eldesi için en uygun referans koşullarının seçilmesi gereklidir.

### NOMENCLATURE

ÖS: Ölü durum sıcaklığı

MEKY: Maksimum ekserji yıkımı akımı

UFEV: Evrensel ve fonksiyonel ekserji verimleri

EME: En yüksek ekserji

$\dot{m}_f$ : Akışkanın kütleli debisi

Tf: Akışkan sıcaklığı

$c_{p,f}$ : Akışkanın özgül ısı kapasitesi

$h_f$ : Akışkan sıcaklığındaki akışkanın entalpisi

$s_f$ : Akışkan sıcaklığındaki akışkanın entropisi

T<sub>o</sub>: Referans sıcaklığı

$h_f$ : ÖS’deki akışkanın entalpisi

$s_o$ : ÖS’deki akışkanın entropisidir.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## 2010-2021 YILLARI ARASINDA DÜNYA GENELİNDE MEYDANA GELEN BULAŞICI HASTALIK SALGINLARINDAN ÖLÜMLERLE İNSANİ GELİŞİMİŞLİK İNDEKSİ ARASINDAKİ İLİŞKİNİN BELİRLENMESİ

### DETERMINATION OF THE RELATIONSHIP BETWEEN DEATHS FROM COMMUNICABLE DISEASE OUTBREAKS AROUND THE WORLD BETWEEN 2010 AND 2021 AND THE HUMAN DEVELOPMENT INDEX

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#### ÖZET

Tarih boyunca dünya üzerindeki pek çok coğrafya salgınlardan etkilenmiştir. Veba, lepra, kolera, sifiliz, grip, HIV/AIDS, Ebola ve son olarak Covid-19 bu salgınlardan önemli etkenleridir. Bu çalışmada 2010 yılı başından 2021 yılı sonuna kadar olan on iki yıllık süre içinde meydana gelen bulaşıcı hastalık salgınlardan değerlendirilmesi ve salgın ölümleriyle İnsani Gelişmişlik İndeksi (İGİ) arasındaki ilişkinin araştırılması amaçlanmıştır. Araştırma ekolojik türdedir. Salgın verileri EM-DAT public'ten elde edilmiş ve en az bir kişinin öldüğü 223 salgın araştırma kapsamına alınmıştır. Salgının başlangıç yılı, gerçekleştiği ülke ve kıta, etiyojisi, ölüm sayısı ve ülkeye ait İGİ bilgileri bir forma kaydedilmiştir. Sayısal verilerin özetlenmesine ortalama±standart sapma ve ortanca (min-max) değerleri, kategorik verilerin özetlenmesinde frekans ve yüzde dağılımları kullanılmıştır. Bağımlı ve bağımsız değişkenler arasındaki ilişkiler Spearman korelasyon katsayısı ile değerlendirilmiştir.  $p < 0,05$  olan değerler istatistiksel açıdan anlamlı kabul edilmiştir. Salgınlardan en sık görüldüğü yıllar 2010 ( $n=37$ ), 2019 ( $n=29$ ) ve 2012 ( $n=24$ ) idi. Salgınlardan %44,8'i bakteri, %54,3'ü virus ve %0,9'u parazit kaynaklıydı. En sık görülen bakteriyel hastalık %40,8 sıklıkla kolera ve en sık görülen viral hastalık %19,3 sıklıkla Dang humması idi. Bu dönemde tek görülen parazitik hastalık Leishmaniazis'di. Salgınlardan en fazla ortaya çıktığı ülkeler Demokratik Kongo Cumhuriyeti, Nijerya ve Nijer'di. İncelenen 223 salgının %69,1'i Afrika kıtasında meydana gelmişti. Araştırma kapsamında değerlendirilen 221 salgın olayının %66,4'ü düşük İGİ'ye sahip bir ülkede gerçekleşmişti. Ölüm sayısı ortalaması  $245,79 \pm 781,53$  ve ortancası 35 (1-6908) idi. Salgınlardan ölümlerin yıllara göre İGİ ile olan korelasyonu değerlendirildiğinde anlamlı bir sonuç bulunmadı ( $p > 0,05$ ). Salgın ölümleri hastalık orijini ve kıtaya göre gruplandırıldığında ölüm sayısı-İGİ arasında anlamlı korelasyon belirlenmedi ( $p > 0,05$ ). Dünya genelinde on iki yıllık süreçte salgın sayılarında düzenli bir seyir izlemeyen artma ve azalmalar dikkati çekmektedir. Bakteriyel ve viral kaynaklı salgınlardan sayıları nispeten birbirine yakındır. Salgınlar en fazla oranda Afrika kıtasında ve en yüksek sıklıkta düşük insani gelişmişlik düzeylerinde izlenmiştir. Salgınlardan ölüm sayısı ile İGİ arasında anlamlı ilişki belirlenmemiştir. Bulaşıcı hastalıklar ve salgınlardan dünya çapında önemli bir halk sağlığı sorunu olmayı sürdürmektedir.

**Anahtar Kelimeler:** bulaşıcı hastalık, salgın, mortalite, insani gelişmişlik.

#### ABSTRACT

Historically, many areas of the world have been affected by outbreaks. Plague, leprosy, cholera, syphilis, influenza, HIV/AIDS, Ebola and finally Covid-19 are important agents of these outbreaks. This study aims to evaluate the infectious disease outbreaks that occurred in the twelve years from the beginning of 2010 until the end of 2021 and to determine the relationship between epidemic deaths and the Human

Development Index (HDI). The study is ecological type. Outbreak data were obtained from EM-DAT public and 223 outbreaks with at least one death were included. The year of outbreak onset, country and continent, etiology, number of deaths and the HDI of the country were recorded on a form. Mean±standard deviation and median (min-max) values were used to summarize numerical data, and frequency and percentage were used to summarize categorical data. Relationships between dependent and independent variables were assessed using Spearman's correlation coefficient.  $p < 0.05$  was considered statistically significant. The most common years for outbreaks were 2010 (n=37), 2019 (n=29), and 2012 (n=24). Of the outbreaks, 44.8% were caused by bacteria, 54.3% by viruses, and 0.9% by parasites. The most common bacterial disease was cholera with a frequency of 40.8% and the most common viral disease was Dengue fever with a frequency of 19.3%. Leishmaniasis was the only parasitic pathogen observed during this period. The countries with the highest number of outbreaks were Democratic Republic of Congo, Nigeria and Niger. Of the 223 outbreaks analyzed, 69.1% occurred in Africa. Of the 221 outbreaks evaluated in the study, 66.4% occurred in a country with a low HDI. The mean number of deaths was  $245,79 \pm 781,53$  and the median was 35 (1-6908). When the correlation between outbreak deaths and HDI was evaluated, no significant relationship was found ( $p > 0.05$ ). When outbreak deaths were grouped by disease origin and continent, no significant correlation was found between the number of deaths and HDI ( $p > 0.05$ ). Over the twelve years, the number of outbreaks worldwide has increased and decreased in an irregular pattern. The numbers of bacterial and viral outbreaks are relatively close. Outbreaks were most frequent in Africa and most frequent at low levels of human development. There was no significant relationship between outbreak deaths and HDI. Communicable diseases and outbreaks remain a major public health problem globally.

**Keywords:** communicable disease, outbreak, mortality, human development.

## GİRİŞ

Belirli bir toplumda, bölgede veya mevsimde bir bulaşıcı hastalığın beklenen sıklığından daha fazla gözlenmesi salgın olarak adlandırılmaktadır (Hacımustafaoğlu ve Önürmen, 2018). Tarih boyunca dünya üzerindeki pek çok coğrafya salgınlardan etkilenmiştir. Veba, lepra, kolera, sifiliz, grip, HIV/AIDS, Ebola ve son olarak Covid-19 bu salgınlardan önemli etkenleridir (Ahmadı ve ark., 2020). Bulaşıcı bir hastalığın kontrol altına alınamaması ve bir salgın durumunun ortaya çıkması; toplumsal huzursuzluk, sağlık sektörünün kapasitesinin aşılması neticesinde sağlık hizmet sunumunun bozulması, ölümlerin ve sakatlıkların görülmesi, özellikle hizmet ve üretim alanlarında işgücü kayıpları ve hastalık nedeniyle harcamalardan kaynaklı ekonomik sıkıntılar ve bazı hastalıkların dünya çapında yayılabilmesi gibi ciddi sonuçlara yol açabilmektedir (Akın, 1997; Aytaç, 2017).

Bu çalışmada 2010 yılı başından 2021 yılı sonuna kadar olan on iki yıllık süre içinde meydana gelen bulaşıcı hastalık salgınlarının değerlendirilmesi ve en az bir kişinin ölümüyle sonuçlanmış salgınlarda bu ölümlerle İnsani Gelişmişlik İndeksi (İGİ) arasındaki ilişkinin belirlenmesi amaçlanmıştır.

## YÖNTEM

Araştırma ekolojik türde olup 15.03.2023-15.09.2023 tarihleri arasında yürütülmüştür.

Araştırmada kullanılan salgın verileri EM-DAT public'ten elde edilmiş ve en az bir kişinin öldüğü 223 salgın araştırma kapsamında değerlendirilmiştir (EM-DAT public, 2023). EM-DAT veri tabanına ölüm sayısı 10'dan fazla olan, yaralanan/etkilenen kişi sayısı 100'den fazla olan, yerelde olağanüstü hâl ilan edilen ve/veya uluslararası yardım çağrısında bulunulan afetler kaydedilmektedir (EM-DAT, 2023). Bu çalışma için salgının başlangıç yılı, gerçekleştiği ülke ve kıta, etiyojoloji, ölüm sayısı ve ülkeye ait İGİ bilgileri bir forma kaydedilmiştir.

En az bir kişinin ölümüyle sonuçlanmış 223 salgından İGİ verisi bulunmayan Somali'ye ait iki salgın olayı dışlandıktan sonra toplam 221 salgının neden olduğu ölümlerle İGİ arasındaki ilişki araştırılmıştır. İnsani gelişmenin temel boyutlarını ölçmekte olan İGİ; kişi başına düşen gayrisafi milli hâsıla, beklenen öğrenim süresi, ortalama öğrenim süresi ve doğumda beklenen yaşam süresi değerleri ile hesaplanmaktadır. İGİ, 0 ile 1 arasında değer alan bir indeks olup, değerler 1'e yaklaştıkça insani

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

gelişmişlik artmaktadır (UNDPa, 2023). İGİ, 0,550'nin altı düşük, 0,550-0,699 orta, 0,700-0,799 yüksek ve 0,800 ve üzeri çok yüksek olacak şekilde sınıflandırılmaktadır (UNDPb, 2023). Çalışmada örneğin 2011 yılında Hindistan'da gerçekleşen bir salgın için o ülkeye ve o yıla ait, 2014 yılında Yemen'de gerçekleşen bir salgın için o ülkeye ve o yıla ait İGİ kullanılmıştır.

Araştırmada kullanılan verilerin tamamı kamunun erişimine açık olduğundan ve çalışmada insanla doğrudan temas bulunmadığından etik veya resmi herhangi bir izne gerek duyulmamıştır. Araştırma için finansal destek alınmamıştır. Yazarlar arasında çıkar çatışması bulunmamaktadır.

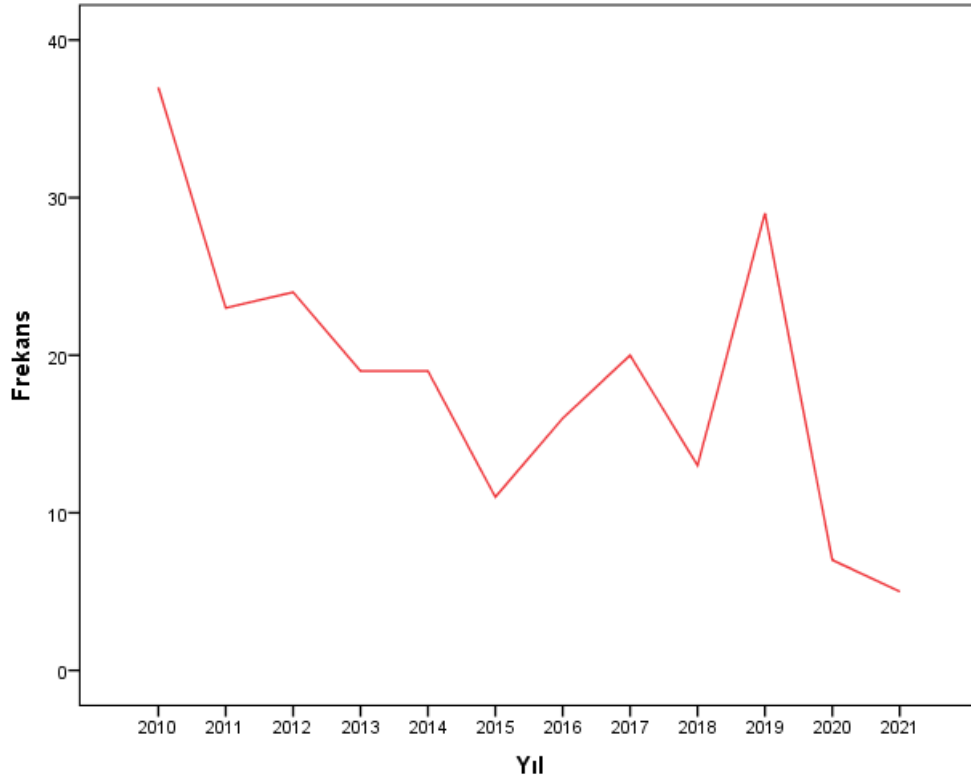
Veri analizi ve rapor yazım işlemleri bilgisayar ortamında gerçekleştirilmiştir. Sayısal verilerin özetlenmesine ortalama±standart sapma ve ortanca (min-max) değerleri, kategorik verilerin özetlenmesinde frekans ve yüzde dağılımları kullanılmıştır. Bağımlı ve bağımsız değişkenler arasındaki ilişkiler Spearman korelasyon katsayısı ile değerlendirilmiştir. Elde edilen korelasyon katsayılarının yorumlanmasında 0,00-0,19 arası önemsiz düzeyde ilişki, 0,20-0,39 arası zayıf ilişki, 0,40-0,69 arası orta düzeyde ilişki, 0,70-0,89 arası kuvvetli ilişki ve 0,90-1,00 arası çok kuvvetli ilişki olarak kabul edilmiştir. Pozitif işaretli korelasyon katsayıları değişkenlerin birlikte artıp azaldığına, negatif işaretli korelasyon katsayıları ise değişkenlerden biri artarken diğerinin azaldığına veya tam tersine işaret etmektedir (Alpar, 2014). Tanımlayıcı bulgular 223 salgın üzerinden, ölüm sayısı-İGİ ilişkisi 221 salgın üzerinden değerlendirilmiştir.  $p < 0,05$  olan değerler istatistiksel açıdan anlamlı kabul edilmiştir.

## BULGULAR

Araştırma kapsamında değerlendirilen 223 salgının %16,6'sı (n=37) 2010 yılında, %10,3'ü (n=23) 2011'de, %10,8'i (n=24) 2012'de, %8,5'i (n=19) 2013'te ve 2014'te, %4,9'u (n=11) 2015'te, %7,2'si (n=16) 2016'da, %9'u (n=20) 2017'de, %5,8'si (n=13) 2018'de, %13,7'si (n=29) 2019'da, %3,1'i (n=7) 2020'de ve %2,2'si (n=5) 2021'de meydana gelmiştir. Salgınların en sık görüldüğü yıllar 2010, 2019 ve 2012 idi. Yıllara göre en az bir ölümlü sonuçlanan salgın sayıları Tablo 1'de ve salgın sayılarının yıllar içerisinde izlediği trend Şekil 1'de gösterilmiştir.

**Tablo 1.** Dünya genelinde 2010-2021 yılları arasında meydana gelen ve en az bir ölümlü sonuçlanan salgın sayıları

Yıllar	n	%
2010	37	16,6
2011	23	10,3
2012	24	10,8
2013	19	8,5
2014	19	8,5
2015	11	4,9
2016	16	7,2
2017	20	9,0
2018	13	5,8
2019	29	13,0
2020	7	3,1
2021	5	2,2



**Şekil 1.** Dünya genelinde 2010-2021 yılları arasında meydana gelen ve en az bir ölümlle sonuçlanan salgın sayılarının yıllar içindeki trendi

On iki yıllık süreçte değerlendirilen salgınlarnın %44,8'i bakteriyel, %54,3'ü viral ve %0,9'u parazit kaynaklıydı. Bütün etkenler içerisinde en sık görülen bakteriyel hastalık %40,8 sıklıkla kolera ve en sık görülen viral hastalık %19,3 sıklıkla Dang humması idi. Salgına sebep olan bakteriyel etkenli hastalıklar kolera, diyare, difteri ve leptospiroz; viral etkenli hastalıklar Dang humması, kızamık, menenjit, Ebola, sarı humma, Lassa ateşi, Hepatit E, Polio, veba, tifo, MERS-CoV, ensefalit, Marburg, İnfluenza ve Rift vadisi ateşi idi. Bu dönemde tek görülen parazitik hastalık türü Leishmaniazis'ti. Hastalık türlerinin dağılımını Tablo 2'de yer almaktadır.

**Tablo 2.** Dünya genelinde 2010-2021 yılları arasında meydana gelen ve en az bir ölümlle sonuçlanan salgınlarnın hastalık türlerine göre dağılımı

Hastalık orijini	Hastalık türü	n	%
Bakteriyel hastalıklar	Kolera	91	91,0
	Diğer	9	9,0
Toplam		100	100,0
Viral hastalıklar	Dang humması	43	35,5
	Ebola	12	9,9
	Kızamık	17	14,0
	Menenjit	18	14,9
	Sarı humma	10	8,3
	Diğer	21	17,4
Toplam		121	100,0
Parazitik hastalıklar	Leishmaniazis	2	100,0
	Diğer	0	0,00
Toplam		2	100,0

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Salgınların en fazla ortaya çıktığı ülkeler Demokratik Kongo Cumhuriyeti (n=17), Nijerya (n=17) ve Nijer (n=13) idi. İncelenen 223 salgının %69,1'i Afrika, %15,7'si Amerika, %14,3'ü Asya ve %0,9'u Okyanusya kıtalarında meydana gelmişti (Şekil 2).



**Şekil 2.** Dünya genelinde 2010-2021 yılları arasında meydana gelen ve en az bir ölümlle sonuçlanan salgınların kıtalara göre dağılımı

Araştırma kapsamında değerlendirilen 221 salgın olayının %66,4'ü düşük, %20,6'sı orta, %11,2'si yüksek ve %0,9'u çok yüksek İGİ'ye sahip bir ülkede gerçekleşmişti. İGİ ortalaması  $0,514 \pm 0,130$  ve ortancası  $0,508$  ( $0,295-0,901$ ) idi. Ölüm sayısı ortalaması  $245,790 \pm 781,531$  ve ortancası  $35$  ( $1-6908$ ) idi. En fazla ölüme yol açan salgınlar 2010-Haiti (n=6908) kolera salgını, 2014-Liberya (n=4810) Ebola salgını ve 2014-Sierra Leone (n=3956) Ebola salgınıydı.

Salgınlardan ölümlerin yıllara göre İGİ ile olan korelasyonu değerlendirildiğinde anlamlı bir ilişki belirlenmedi ( $\rho = -0,064$   $p > 0,05$ ). Salgın ölümleri hastalık orijini ve kıtaya göre gruplandığında da ölüm sayısı-İGİ arasında anlamlı korelasyon bulunmadı ( $p > 0,05$ ).

## TARTIŞMA

Araştırma kapsamında değerlendirilen salgınların yaklaşık olarak yarısı viral ve diğer yarısı bakteriyeldir. Bakteriyel hastalıklar içerisinde kolera salgınları ve viral hastalıklar içerisinde Dang humması ön plandadır. Kolera, geçmiş dönemlerde önemli bir salgın etkeni olmuş ve çok sayıda insanın yaşamını kaybetmesine yol açmıştır (Ahmadı ve ark., 2020). Fekal-oral yolla ve su ilişkili olarak bulaşan bir hastalık olan kolera, 1822 yılından başlayarak Anadolu'da da çeşitli salgınlara neden olmuştur (Yılmaz, 2017; Kumaş, 2011; Menekşe, 2020). Günümüzde de kolera salgınları görülmeye devam etmektedir (Uyar ve ark., 2021). 2022 ve 2023 yılları içerisinde Benin, Malavi, Kamerun, Pakistan, Somali, Mozambik, Kongo ve Demokratik Kongo Cumhuriyeti'nde kolera salgınları izlenmiştir (WHO, 2023). Sivrisinek aracılı bir hastalık olan Dang hummasının görülme sıklığı 2000'li yılların başından beri artış göstermektedir (Mungan, 2007). 2022 ve 2023 yılları itibariyle Dang humması salgınları



görülmeye devam etmektedir (WHO, 2023). Hem kolera hem de Dang humması salgınlarında iklim değişikliği ve küreselleşme arttırıcı ve hastalıkların yayılmasını kolaylaştırıcı rol oynuyor olabilir. Ayrıca her iki hastalığa karşı da koruyuculuğu yüksek, etkili ve yaygın kullanılan birer aşı mevcut değildir. Kişilerin hasta olmamak için hijyen kurallarına dikkat etmeleri ve sivrisineklerden korunmak için bireysel önlem almaları gerekmektedir. Bu durumlar bu hastalıklardan korunmayı güçleştirmektedir.

Araştırmada incelenen salgınların büyük çoğunluğu Afrika kıtasında ortaya çıkmıştır. DSÖ Erken Uyarı Cevap Sistemi verileri üzerinden yapılmış bir araştırmada kolera salgınları incelenmiş ve salgınların çoğunluğunun Güney Afrika'yı etkilediği belirlenmiştir (Uyar ve ark., 2021). Tarihte özellikle kolera salgınları Hindistan'dan ve Asya kıtasından kaynak almıştır (Yılmaz, 2017). Günümüzdeki bu değişikliğin nedeni açıklıkla ve yoksullukla özdeşleştirilen Afrika kıtasında görülen derin eşitsizlikler olabilir. Afrika'nın dünyanın en sıcak kıtası olması ve yağış alması bulaşıcı hastalık salgınlarıyla ilişkilendirilebilecek bir diğer neden olabilir.

Araştırma kapsamında değerlendirilen salgınların çoğu düşük İGİ'ye sahip ülkelerde meydana gelmiştir. İGİ'nin bileşenleri incelendiğinde (kişi başına düşen gayrisafı milli hâsıla, beklenen öğrenim süresi, ortalama öğrenim süresi ve doğumda beklenen yaşam süresi) her bir bileşenin, özellikle gelir ve eğitimle ilişkili olanların yüksekliğinin bulaşıcı hastalıkları azaltması beklenmektedir. Araştırmada salgın ölümleri ile İGİ arasında anlamlı bir korelasyon belirlenmemiştir. Bulaşıcı olmayan hastalık mortalitesiyle İGİ ilişkisini araştıran bir çalışmada ise anlamlı ilişki belirlenmiştir (Yıldırım Öztürk ve Uyar, 2020). İGİ azaldıkça, gelirin, eğitimin ve beklenen yaşam süresinin azalmasına paralel olarak, salgından ölümlerin artacağı düşünülmüştür. Özellikle bulaşıcı hastalıklar gibi tek bir etkenle ilişkilendirilen sağlık sorunlarının İGİ ile yakın ilişkili olacağı araştırmacılar tarafından öngörülmüştür ancak salgın ölümlerinin artışı İGİ gibi tek bir parametrenin değil, çok daha kompleks değişkenlerin etkisi altında olabilir.

### **Araştırmanın Üstün Yönleri ve Kısıtlılıkları**

Araştırmada dünya genelinde 2010-2021 yılları arasında gerçekleşmiş ve kayda alınmış en az bir ölüm olgusunun görüldüğü salgınların tamamı değerlendirilmiştir. Salgın ölümleriyle İGİ arasındaki ilişki araştırılmıştır. Bunlar araştırmanın üstün yönleridir.

Yararlanılan veri tabanında yer almayan salgınlar değerlendirilememiştir. En az bir ölümün olduğu salgınlardan ikisi (Somali'de gerçekleşenler) ilgili ülkeye ait İGİ bulunmadığından bazı analizlerde dışarıda bırakılmıştır. 2022 ve 2023 yılında meydana gelen salgınlar, bu yıllara ait İGİ'ler araştırmanın yapıldığı sırada yayımlanmadığından değerlendirmeye alınmamıştır. Araştırma ekolojik türde olduğundan, belirlenen ilişkilerin nedensellik açısından değerlendirilmesi aşamasında dikkatli olunması gerekmektedir. Belirlenen ilişkiler, araştırmanın türünden ötürü, ekolojik yanılığa açıktır. Bu durumlar araştırmanın kısıtlılıklarıdır.

### **SONUÇ**

Araştırmada dünya genelinde on iki yıllık süreç içinde en az bir kişinin öldüğü 223 salgın değerlendirilmiş olup, yıllar içerisinde salgın sayılarında düzenli bir seyir izlemeyen artma ve azalmalar dikkati çekmektedir. Bakteriyel ve viral kaynaklı salgınların sayıları nispeten birbirine yakındır. En sık izlenen iki salgın kolera ve Dang humması salgınlarıdır. Salgınlar en fazla oranda Afrika kıtasında ve en yüksek sıklıkta düşük insani gelişmişlik düzeylerinde izlenmiştir. Salgınlardan ölümler ile İGİ arasında anlamlı bir ilişki belirlenmemiştir. Bulaşıcı hastalıklar ve salgınlar dünya çapında önemli bir halk sağlığı sorunu olmayı sürdürmektedir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## KÜLTÜR SANAT GAZETECİLİĞİ: GAZETE HABERLERİ ÜZERİNDEN BİR DEĞERLENDİRME

### CULTURE AND ARTS JOURNALISM: AN EVALUATION ON NEWSPAPER NEWS

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#### ÖZET

Türkiye’de tek bir alana yönelik habercilik yapmayan basın kuruluşları sayfalarında ekonomi, siyaset, eğitim, spor, bilim, teknoloji gibi farklı konulardaki gelişmelere yer vermektedir. Kültür sanat da bu türler arasında yer almaktadır. Kültür ve sanat haberleri sinema, tiyatro, müzik, fotoğraf ve edebiyat gibi dalları içerisinde barındırmaktadır. Dolayısıyla alt dalları bu denli geniş olan habercilik pratiğinin uygulanması toplumsal açıdan önem kazanmaktadır. Bu nedenle çalışmada kültür sanat haberciliğinin güncel görünümünün ortaya koyulması ve değerlendirilmesi amacıyla konuyla ilgili basında yer alan haberler incelenmiştir. Araştırmada içerik analizi yöntemi kullanılmıştır. Tiraj bakımından ilk on sırada yer alan Sabah, Hürriyet, Sözcü, Milliyet, Posta, Yeni Şafak, Akşam, Takvim, Yeni Akit ve Korkusuz Gazetesi örneklem grubu olarak belirlenmiştir. Gazetelerin kültür sanat haberlerinin farklı alt dallarına yönelik gelişmeleri haberleştirdikleri görülmüştür.

**Anahtar Kelimeler:** Kültür, Sanat, Kültür Sanat Haberciliği, Gazetecilik, Haber

#### ABSTRACT

Press organizations in Turkey cover developments in various fields such as economy, politics, education, sports, science and technology. Culture and arts are also among these types. Culture and arts news has sub-branches such as cinema, theater, music, photography and letters. Therefore, the practice of journalism, which has such a wide sub-branches, gains social importance. For this reason, in this study, the news in the press on the subject were analyzed in order to reveal and evaluate the current situation of culture and arts journalism. Content analysis method was used in the research. Sabah, Hürriyet, Sözcü, Milliyet, Posta, Yeni Şafak, Akşam, Takvim, Yeni Akit and Korkusuz, which are among the top ten newspapers in terms of circulation, were selected as the sample group. It was observed that newspapers covered developments in different sub-branches of culture and arts news.

**Keywords:** Culture, Art, Culture and Art Journalism, Journalism, News

#### GİRİŞ

İnsanlar tarih boyunca merak duygularını gidermek için bilgilenme ihtiyacı hissetmiştir. Bu ihtiyaca yönelik içinde bulunulan zamanın koşullarına göre farklı araçları kullanmışlardır. Gazeteler de merak duygusunu gidermek ve doğru bilgiye erişmek adına başvurulan kurumlar arasında yer almaktadır. Basın da insanların isteklerine hizmet etmek adına siyaset, eğitim, spor, teknoloji, ekonomi, sağlık gibi farklı alanlara yönelik gelişmeleri topluma aktarmaktadır. Kültür ve sanat da bu alanlardan biridir. Kültür sanat haberlerinin sinema, müzik, kitap, kültürel miras, resim, plastik sanatlar gibi farklı alt dalları bulunmaktadır. Birçok alt dalı olan bu alana yönelik gelişmelerin haberleştirilmesi ise önemlidir. Çünkü birden çok alanı kapsayan kültür sanat haberleri toplumun çoğunluğuna hitap edebilecek durumdadır. Ayrıca kültür sanat etkinlikleri insanların rahatlatma ve boş zamanın değerlendirilmesi konusunda da ön plana çıkmaktadır. Böyle bir durumda da konuyla ilgili haberlerin ne ölçüde ve nasıl aktarıldığı üzerinde durulması gereken konudur. Bu nedenle çalışmada, kültür sanat haberlerine ne sıklıkla yer verildiği ve güncel görünümün değerlendirmesi amacıyla yazılı basında yer alan kültür sanat haberleri ele alınmıştır.

Çalışmada kavramsal çerçeve başlığı altında kültür kavramı, sanat kavramı ele alındıktan sonra kültür sanat gazeteciliği açıklanmaya çalışılmıştır. Bu bölümde kültür sanat haberciliği ifadesi, kültür sanat gazeteciliğini niteleme adına kullanılmış, her ikisi de eşanlamli olarak ele alınmıştır. Araştırma bölümünde ise tiraj bakımından ilk on sırada yer alan gazetelerin bir hafta içerisinde yaptığı kültür sanat haberleri incelenmiştir.

### **KAVRAMSAL ÇERÇEVE: KÜLTÜR, SANAT VE KÜLTÜR SANAT GAZETECİLİĞİ**

Kültür ve sanat kavramlarının açıklanması kültür sanat gazeteciliğinin anlaşılmasında önemlidir. Kültür, uzun yıllardır tartışılan ve özellikle tanımlanmasında uzlaşımın bulunmadığı bir kavramdır. Kültür, insanların hayatı boyunca edindiği alışkanlıklar (Öztoğat, 2017: 207), oluşturduğu her türlü oluşum ve yaşam biçimi (Erdoğan, 2007: 160) ile insana ait olanın ifadesi (Erdoğan, 2011: 465) olarak tanımlanabilmektedir. Sanat kavramı da yine kültür gibi farklı açılardan ele alınarak ifade edilmeye çalışılmaktadır. Sanat birçok akımı ve uygulayıcısı bulunan sosyal bir kurumdur. İçinde bulunulan zamana ve topluma göre sanatın ne olduğuna yönelik fikirler değişebilmektedir. Sanat'ın İngilizce'deki karşılığı "art"tır. Art terimi kökeni Latinceye dayanan ve anlamı "düzenleme" olan "ars" kelimesinden gelmektedir (Keser, 2005: 291). Dolayısıyla sanatı kısaca düzene koyma olarak tanımlamak mümkündür. Ayrıca sanat, insan ve doğada yer alan nesnel gerçekler arasındaki estetik ilişkidir. (Ersoy, 2002: 6).

Basında çeşitli konuların işlenmesi farklı konularda uzmanlaşma ihtiyacının önünü açmıştır. Kültür sanat da bu alanlardan biri olmuştur. Nitekim kültür sanat gazeteciliği sinema, müzik, heykel, tiyatro ve edebiyat gibi birçok sanat dalına yönelik yapılan haberleri kapsamaktadır. Sanat dallarıyla ilgili gelişmeleri nitelikli bir biçimde aktarmak ise kültür sanat muhabirinin alanında uzmanlığına ve yetkinliğine bağlıdır (Acar Odyakmaz, 2013: 206). Dolayısıyla kültür sanat haberleri konusunda uzmanlaşma gazeteler için oldukça önemlidir. Çünkü haberi oluşturma aşamasında muhabirin soru sorabilmesi gerekmektedir. Bu da kültür sanat habercilerinin sanatın temel alanları ile ilgili bilgi sahibi olması zorunluluğunu ortaya çıkarmaktadır (Büyükbaykal ve Büyükbaykal, 2019: 95-96). Gezmen ve Büyükaslan (2019: 83) da gazetecilerle yaptığı görüşmelerden elde ettiği bilgiler neticesinde kültür sanat alanında uzmanlaşmanın önemine vurgu yapmış, alanla ilgili çalışan muhabirlerin temel bilgilere sahip olması gerektiğini ön plana çıkarmıştır. Ancak ekonomi ve ilgi gibi nedenlerden ötürü basında kültür sanat alanına yönelik uzmanlaşma sınırlı kalmakta, kültür sanat haberleri alanda uzman olmayan muhabirler tarafından takip edilebilmektedir (Erdoğan, 2007: 172-173). Bu noktada, kültür sanat haberlerinde yalnızca uzmanlaşmadan kaynaklanmasa da sanat ve sanatçı kavramının içinin boşaltılabildiği, kültür ve sanatla ilgili gelişmelerin magazinsel boyutta işlenebildiği için kültür sanat haberciliğine yönelik eğitimin geliştirilmesi de önem arz etmektedir (Büyükbaykal ve Büyükbaykal, 2019: 97).

### **ARAŞTIRMA METODOLOJİSİ**

Çalışmada içerik analizi yöntemi kullanılmıştır. İçerik analizi yöntemi yazılı, görsel ve işitsel olmak üzere kaydı bulunan her türlü medya çıktılarının incelenmesi için kullanılmaktadır (Gökçe, 2019: 21). İçerik analizi konuyla ilgili çeşitli kategoriler belirlenerek medya metinlerinin detaylı bir şekilde incelenmesine olanak sağlamaktadır. Bu nedenle çalışmada içerik analizine başvurulmuştur. Araştırmada 1 Ekim- 8 Ekim 2023 tarihleri arasında basında yer alan kültür sanat haberleri incelenmiştir. Tiraj anlamında ilk on sırada bulunan Hürriyet, Sabah, Sözcü, Posta, Milliyet, Yeni Şafak, Yeni Akit, Korkusuz, Takvim ve Akşam Gazetesi örneklem grubu olarak seçilmiştir. Yöntemin uygulanması noktasında kategoriler; Sinema, Müzik, Kitap, Sergi, Heykel, Kültürel Miras, Müze ve Şiir olarak belirlenmiştir. Gazetelerde kategorilere yönelik magazinsel boyutta ele alınan haberler analize dahil edilmemiştir.

### **BULGULAR**

Gazetelerin incelenen tarih aralığında kültür sanat haberciliğinin farklı alt dallarına yönelik gelişmeleri sayfalarına taşıdığı görülmüştür. Ayrıca ele alınan gazetelerde günlük olarak sadece kültür sanat haberlerine ayrılan bir bölüm bulunmamaktadır. Bu noktada Yeni Şafak ve Yeni Akit'in sürekli olması da zaman zaman kültür sanat bölümü oluşturduğu da görülmüştür.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Tablo 1: Gazetelere Göre Haber Sayıları

Gazete	2 Ekim 2023	3 Ekim 2023	4 Ekim 2023	5 Ekim 2023	6 Ekim 2023	7 Ekim 2023	8 Ekim 2023	Toplam
Hürriyet	1	3	4	1	-	2	-	11
Milliyet	4	3	1	4	4	1	1	18
Posta	1	-	-	1	2	-	-	4
Sözcü	5	3	3	-	1	-	1	13
Sabah	-	3	-	1	2	3	-	9
Yeni Şafak	4	5	5	4	4	5	1	28
Yeni Akit	1	1	-	2	2	1	-	7
Korkusuz	2	3	-	-	2	-	-	7
Takvim	-	-	-	-	1	-	-	1
Akşam	2	1	-	3	1	-	1	8
<b>Toplam</b>	<b>20</b>	<b>22</b>	<b>13</b>	<b>16</b>	<b>19</b>	<b>12</b>	<b>4</b>	<b>106</b>

Gazetelerde bir haftalık süre içerisinde toplam 106 kültür sanat haberi yapılmıştır. Bu haberlerin tarihlere göre dağılımı ise 3 Ekim’de 22, 2 Ekim’de 20, 6 Ekim’de 19, 5 Ekim’de 16, 4 Ekim’de 13, 7 Ekim’de 12 ve 8 Ekim’de 4 haber şeklinde olmuştur. Kültür sanat haberlerine en çok yer veren gazete 28 haber ile Yeni Şafak’tır. Yeni Şafak’ı sırasıyla Milliyet (18), Sözcü (13), Hürriyet (11), Sabah (9), Akşam (8), Yeni Akit (7), Korkusuz (7) ve Takvim (1) Gazetesi takip etmiştir. Takvim Gazetesi’nin bir haftalık süre içerisinde yalnızca bir kültür sanat haberi yapması dikkat çekmiştir. Takvim Gazetesi’nde aslında özellikle sinema ve müzik gibi alanlarla ilgili yoğun olarak haber paylaşılmıştır. Ancak bunlar magazinsel boyutta aktarılmıştır.

Tablo 2: Haberlerin Kategorilere Göre Dağılımı

Gazete	Sinema	Müzik	Kitap	Sergi	Heykel	Kültürel Miras	Müze	Şiir
Hürriyet	7	1	1	-	-	2	-	-
Milliyet	4	8	1	2	1	2	-	-
Posta	1	-	1	-	-	2	-	-
Sözcü	2	4	-	3	1	2	-	1
Sabah	-	2	3	1	-	2	1	-
Yeni Şafak	7	3	7	5	-	4	2	-
Yeni Akit	-	-	3	-	-	3	1	-
Korkusuz	1	3	-	3	-	-	-	-
Takvim	-	-	1	-	-	-	-	-
Akşam	5	1	1	1	-	-	-	-
<b>Toplam</b>	<b>27</b>	<b>22</b>	<b>18</b>	<b>15</b>	<b>2</b>	<b>17</b>	<b>4</b>	<b>1</b>
<b>Genel Toplam</b>	<b>106</b>							

Gazetelerde sinema (27), müzik (22) ve kitap (18) kategorilerine yönelik kültür sanat gelişmeleri diğer dallara göre daha çok işlenmiştir. Bunları sırasıyla kültürel miras (17), sergi (15), müze (4), heykel (2) ve şiir (1) izlemiştir. Basında sinema kategorisi altında genellikle film festivalleri işlenmiştir. Müzik alanıyla ilgili olarak ise festivaller ve konserlere yönelik metinler okura aktarılmıştır. Gazetelerde en çok yer verilenlerden biri olan kitap kategorisi altında ise özellikle kitap fuarlarına dönük bilgilendirici içeriklerin sunulduğu görülmüştür. Kültürel miras alanında da yoğun olarak arkeolojik çalışmalarda ortaya çıkan, kültürel anlamda değeri olan buluntulara/kalıntılara yönelik haberler yapılmıştır. Sergi konusunda ise resim ve fotoğrafı kapsayan faaliyetler sıklıkla özetlenmiştir.

## SONUÇ

Tarihsel süreç içerisinde kültür sanat haberleri basında çeşitli biçimlerde yer almıştır. Çalışma da gazetelerde kültür sanat haberlerinin ne sıklıkla yer aldığı tespit edilmesi ve değerlendirilmesinin yapılması amacıyla oluşturulmuş, kültür ve sanata yönelik gelişmelerin basında ilgi görmediği tespit edilmiştir. Nitekim incelenen tarih aralığında on gazetede konuyla ilgili toplam 106 habere yer verilmiştir. Yapılan haberlerin büyük kısmı ise film festivalleri, konserler ve sergilerle ilgili kısa metinlerdir. Kültür sanat etkinliklerine dönük derinlemesine bir bilgi ve insanların ele alınan konuyla ilgili yorum gücü artırabilecek aktarımlar yapılmamıştır. Ayrıca basında sanat ve sanatçıyla ilgili haberlerin magazinsel boyutta ele alındığı da görülmüştür. Gazetelerde özellikle müzik ve sinema kategorisine yönelik gelişmeler magazin haberi olarak sunulmuştur. Araştırmada bu şekilde sunulan haberler analize edilmemiştir. Ancak bu tür habercilik anlayışının Büyükbaykal ve Büyükbaykal'ın (2019: 97) da üzerinde durduğu gibi sanat kavramının içinin boşaltılmasına neden olduğunu söylemek gerekmektedir. Netice itibarıyla basında kültür, sanat ve sanatçıya yönelik çok sayıda haber bulunsa da mesele özünden uzaklaştırılmış bir biçimde topluma ulaştırılmaktadır. Basının insanların rahatlatma ve boş zamanlarını değerlendirmesinde etkili olabilecek olan kültür sanat haberlerini daha yoğun ve derinlemesine ele alması önemli bir ihtiyaçtır.

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KİRÂAT-İ SEB'Â BAĞLAMINDA MÜZZEMMİL SÛRESİ  
SURAH MUZAMMİL İN THE CONTEXT OF QIRAAT-I SEB'A

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**ÖZET**

İslam dininin temel kaynağı mesabesinde bulunan Kur'an-ı Kerim'in herkes tarafından rahatça okunabilmesi ve mesajının doğru anlaşılabilmesi için Hz. Peygamber döneminde kıraat farklılıklarına ruhsat verilmiştir. Daha sonra bu ruhsatı kullanan kurrâ imamlar, kıraatlerin yaygınlaşması ve öğretilmesi hususunda ciddi gayretler ortaya koymuşlardır. Bu gayretlerin bir neticesi olarak sahih kabul edilen kırâat-i seb'a sistemli bir şekilde okutularak günümüze kadar ulaşması sağlanmıştır. Kıraat ilmi birtakım fonetik seslendirmelerle sınırlı kalmayıp birçok sûrede kapalı görülen kelimelerin anlaşılması için de başvurulmuş temel kaynaklar arasında yer edinmiştir. Bu çalışmanın konusu "Kur'an'ın tane tane, yavaş yavaş" okunması ve Hz. Peygamber'in elçilik vazifesine hazırlanması ile ilgili bazı önemli durumların hatırlatıldığı Müzzemmil sûresinin kırâat-i seb'a bağlamında tetkik edilerek kurrâ imamların ihtilaf ettikleri usûl ve ferşi farklılıkları ortaya koymaktır. Yine sûrede varit olan kıraatlerden bilhassa ferşi farklılıkların manaya etkilerinin tespit ve tayini yapılacaktır. Çalışmada öncelikle Müzzemmil sûresinde kırâat-i seb'a imamları arasında ihtilafın hâsıl olduğu usûl konularından medlerin uzatılma miktarı, idğam çeşitleri, sila, nakil, imale/beyne-beyne, sekte, terkik ve tağlîz'in okunuşu ayrı başlıklar halinde verilerek incelenecektir. Akabinde benzer bir yöntemle ferşi farklılıklar da örneklerle birlikte ele alınacaktır. Netice itibarıyla Müzzemmil sûresinde verilen örnekler ve bilgi-bulgular çerçevesinde kurrâ imamların usûl konularında olduğu gibi ferşi farklılıklarda da ihtilaf ettikleri, bunların da az bir kısmında manaya çeşitlilik ve yorum zenginliği katması bakımından etki ettiği tespit edilmiştir.

**Anahtar Kelimeler:** Kur'an, Müzzemmil, Kıraat, Kırâat-i Seb'a, Mana

**ABSTRACT**

In order for everyone to read the Holy Quran, which is the basic source of the Islamic religion, and to understand its message correctly, Hz. Differences in qiraat were permitted during the time of the Prophet. Later, quran imams who used this license made serious efforts to spread and teach qiraats. As a result of these efforts, the qiraat-ı seb'a, which is considered authentic, has been recited systematically and has survived to the present day. The science of recitation is not limited to some phonetic vocalizations, but has also become one of the main sources used to understand the words that are hidden in many surahs. The subject of this study is "reading the Qur'an one by one, slowly" and reading the Prophet Muhammad. The aim of this study is to examine the Surah Muzammil, in which some important situations related to the preparation of the Prophet for his ambassadorship duty are reminded, in the context of qiraat, and to reveal the differences in method and principle that the Quran imams disagreed on. Again, the effects of the differences in the meaning of the qiraats in the sura, especially the substantive ones, will be determined and determined. In the study, first of all, the procedural issues in which there is disagreement among the imams of the qiraat-ı seb'a in the Surah Muzammil are the amount of prolongation of the meds, types of idğam, sila, transfer, imale/beyne-beyne, sekte, tarakik and tağlîz. The reading of the mimes will be examined under separate headings. Subsequently, substantive differences will be discussed with examples using a similar method. As a result, within the framework of the examples and information-findings given in the Surah Muzammil, it has been determined that the qurra imams disagreed on procedural differences as well as on procedural issues, and in a small part of them, they had an impact in terms of adding diversity to the meaning and richness of interpretation.

**Keywords:** Quran, Muzzammil, Qiraat, Qiraat-ı Seb'a, Meaning

## **GİRİŞ**

Kur'an-ı Kerim nazil olduğu andan günümüze dek inananların temel kaynağı, hayat veren düsturlarıyla ve ruhu teskin eden kendine has üslûbıyla gönüllere şifa olmuştur. Bu ilahi ve son kitabın rahatça okunabilmesi ve ihtiva ettiği hakikatlerin doğru anlaşılabilmesi için ilk muhatabı olan Hz. Peygamber tarafından farklı kıraatlerle okunmasına ruhsat verilmiştir (Dâni E. , 1987; İbnü'l-Cezerî, ts.; Dinçer, 2022). Kur'an'ı bizzat Hz. Peygamber'den öğrenen sahabe, söz konusu ruhsatı kullanarak kıraatlerin herkese ulaşması ve talim ettirilmesi için ciddi gayretler sarf etmişlerdir. Bu samimi çabanın bir ürünü olarak mütevatir olarak adledilen kırâat-i seb'a eğitimi sistemli bir şekilde okutularak çağlar boyu devam etmiş ve bizlere kadar ulaşması sağlanmıştır (İbnü'l-Cezerî, ts.). Kırâat-i seb'a imamlarının okuyuşları göz önünde bulundurularak birçok sûrenin tefsiri yapılmış ve mananın tam anlaşılabilmesi için de kıraat ilmi başvurulmuş temel kaynaklar arasında yerini almıştır.

Bu araştırmada Müzzemmil sûresi, kırâat-i seb'a bağlamında ele alınmıştır. Yapmış olduğumuz araştırmalar neticesinde Müzzemmil sûresinin daha önce tefsir, hadis, Arap dili grameri, din eğitimi ve benzer diğer bazı İslami ilimler çerçevesinde değerlendirildiği fakat kırâat-i seb'a bakımından müstakil bir çalışmaya konu edinmediği tespit edilmiştir. Bu araştırmada mevzu bahis eksikliğin giderilmesi adına Müzzemmil sûresi hakkında umumi bilgiler aktarıldıktan sonra, konu ekseninde sûrede kıraatlerin varit olduğu âyetler, kırâat-i seb'a bağlamında örnekleme üzerinden endüksiyon (tümevarım) yöntemi ile farklı başlıklar altında verilerek tahlili yapılmıştır. Yapılan bu çalışma ile Müzzemmil sûresinde varit olan yedili kıraat sistemindeki imamlara ait okuyuşların, usûl farklılıkları ve ferşi ihtilaflar çerçevesinde değerlendirilip mana çeşitliliği ve yorum zenginliği oluşturması hususuna az da olsa bir katkı sunması gaye edinmiştir.

## **MÜZZEMMİL SÛRESİ HAKKINDA GENEL BİLGİLER**

Nüzûl sırasına göre dördüncü sırada bulunup Mekke'de nazil olan Müzzemmil sûresi, yirmi âyetten oluşmaktadır. Elbiseye bürünen, örtünen (Ragıb el-İsfahânî, ts.) manasında olan Müzzemmil, sûre olarak genel itibarıyla tevhid, nübüvvet ve âhiret hususlarını ihtiva etmektedir. Aynı şekilde gece namazı, Kur'an'ın tane tane, yavaş yavaş okunması, Hz. Peygamber'in elçilik vazifesine hazırlanması ve benzeri bazı durumlar hakkında tavsiye ve uyarı niteliğinde birtakım hususları kapsamaktadır. Sûre hakkında genel bilgiler verdikten sonra şimdi de sûrede geçen kıraat ihtilaflarını yedili sistemde yer alan imamların okuyuşlarına göre usûl ve ferşi bağlamında ayrı başlıklar altında inceleyelim.

## **MÜZZEMMİL SÛRESİNDE GEÇEN USÛL FARKLILIKLARI**

Bu kısımda sûrede bulunan bütün usûl konuları yerine yalnızca kırâat-i seb'a imamlarının iftilaf ettiği konular ele alınacaktır. Sûrede bulunan söz konusu usûl farklılıkları ve ihtilafın hâsıl olduğu durumlar sırasıyla şu şekilde olmuştur:

### **Medlerin Uzatılması Miktarı**

Usûl konularından en çok tekrarlanan husus, medlerin uzatılması miktarıdır (İbn Galbun, 1991). Mertebeyn (tûl ve tevassut) usulüyle okunan sûrelerden biri olan Müzzemmil sûresinde geçen medlere bakıldığında kırâat-i seb'a imamlarının ihtilaf ettikleri med ölçüleri hakkında şu uygulamalar tespit edilmiştir:

#### **a. Meddi Muttasıl**

Bu sistemde yer alan kıraat imamlarından meddi muttasılı bir, iki ve dört elif miktarı uzatan kimse bulunmamaktadır. Ancak üç elif kadar uzatanlar: Ebû Amr, İbn Âmir, İbn Kesîr, Âsım, Kisaî ve Kâlûn; beş elif uzatma miktarıyla okuyanlar ise Hamza ve Verş olmuştur.

#### **b. Meddi Munfasıl**

Meddi munfasılı üç elif olarak uzatanlar, İbn Âmir, Âsım, Kisaî, Kâlûn ve Dûrî; Hamza ve Verş ise beş elif kadar uzatmışlardır. Ayrıca meddi munfasılları Ebû Amr ve İbn Kesîr bir elif şeklinde de uzatarak bunları hulûfle okuyabilmişlerdir. Bunlara ilaveten imam Verş, sûrede geçen "فَأَقْرُوا" , "أَخْرُونَ" ve "أَتُوا"



## Tağlîz

“Bir şeyi olduğundan daha kaba ve büyük göstermek” ya da “kalınlaştırmak (Ragıb el-İsfahânî, ts.)” anlamında gelen tağlîz; harfe kalınlık sıfatı vererek okumaktır. Bu bakımdan tağlîz, “tı/ط”, “zı/ظ” ve “sad/ص” harflerinden sonra “lam/ل”ın varit olmasıyla kalın okunur (İbnü’l-Cezerî, ts.). Müzzemmil sûresinde “الصَّلَاةُ” kelimesinde meydana gelen tağlîz sıfatını kıraat imamlarından sadece Verş uygulamaktadır (Dimyâtî, 1987).

Buraya kadar tetkiki yapılan meseleler dışında da usûl farklılıkları ile ilgili konular bulunmaktadır. Fakat başta da belirtildiği gibi bu çalışmada sadece Müzzemmil sûresinde kırâat-i seb’a imamlarının ihtilaf halinde oldukları hususlar incelenmiştir. Ayrıca ele alınan usûl çeşitlerinden anlam üzerinde bir etkinin söz konusu olmaması sebebiyle sadece okuyuş farklılıkları ve kıraat imamlarının tercihlerine yer verilmiştir. Usûl farklılıklarını verdikten sonra şimdi de ferşi ihtilaflar hakkında sûrede geçen vecihler örneklerle birlikte tahlil edilecektir.

## FERŞİ İHTİLAFLAR

“Bir şeyi sermek, dizmek ve yaymak (İbn Manzûr, 1707)” manalarına gelen ferş; “belli bir kurala bağlı kalmaksızın, rivayet esasına dayalı olarak, birtakım kelimelerin harf, hareke, irab ve fiillerde meydana gelen yapısal farklılıkların tetkik edilmesi (Feyizli, 2016)” demektir. Ferşi ihtilaflar, usûl farklılıklarına göre bazen anlam üzerinde etkili olup (Keleş, 2023; Çetin, 2001), Kur’an’ın mesajında tezat oluşturmadan manaya uygun olarak yorum zenginliği ve görüş çeşitliliği meydana getirmektedir. Kur’an’da sûrelerin tamamına yakınında ferşi ihtilaflar bulunurken, bazı sûrelerde ise cumhur ittifak halinde olduğundan söz konusu ihtilaflar hâsıl olmamaktadır. Ferşi ihtilafın meydana geldiği sûrelerden biri de Müzzemmil sûresidir. Şimdi bu sûrede bulunan ihtilaflar ve manaya etkileri incelenecektir.

### Müzzemmil Sûresinde Bulunan Ferşi İhtilaflar ve Manaya Etkisi

Sûrede kırâat-i seb’a imamlarına ait ferşi ihtilaflar ve manaya etkileri yalnızca üç âyette gerçekleşmiştir. Bunlar da sırasıyla şu şekildedir:

- “*Gecenin yarısında kalk yahut yarısından biraz eksilt.*” (إِنْفُصٌ أَوْ نِصْفَةٌ مِنْهُ قَلِيلًا) âyetinde geçen “أَوْ” kelimesini Nâfi, İbn Kesîr, Ebû Amr, İbn Âmir ve Kisaî “vav/و” harfini damme ile “أَوْ” diye okurlar. Bu okumada uygulanan hareke değişikliğinin manaya herhangi bir etkisinin bulunmadığı görülmektedir.

- “*Şüphesiz gece kalkışı, (kalp ve uzuvlar arasında) tam bir uyuma ve sağlam bir kıraata daha elverişlidir.*” (إِنَّ نَاشِئَةَ اللَّيْلِ هِيَ أَشَدُّ وَطْأً وَأَقْوَمُ قِيلاً) âyetinde varit olan “وَطْأً” ifadesini Ebû Amr ve İbn Âmir “وَطْأً” şeklinde okurlar. Her iki kullanım kalıbı da mastar olup benzer anlamları ifade etmektedirler. Ancak aralarında şu şekilde bir anlam inceliğinin bulunduğu ifade edilmiştir: “وَطْأً” kıraati kişinin Kur’an okurken kendi başına aldığı haz ve benzer şekilde kalbinin huzurlu olmasıyla hoşnut olması iken; “وَطْأً” kullanımdaki kıraat ise karşılıklı bir memnuniyet anlamında olup; hem Kur’an okuyan hem de onu dinleyen Rabbinin kendisinden razı olması anlamındadır (Taberî, 2000; Kurtubî, 1964).

- “*(Ey Muhammed!) Şüphesiz Rabbin, senin, gecenin üçte ikisine yakın kısmını, yarısını ve üçte birini ibadetle geçirdiğini biliyor...*” (إِنَّ رَبَّكَ يَعْلَمُ أَنَّكَ تَقُومُ أَدْنَىٰ مِنْ ثُلُثِي اللَّيْلِ وَنِصْفَهُ وَثُلُثَهُ) âyetinde geçen “وَنِصْفَهُ” kısmını Nâfi, Ebû Amr ve İbn Âmir “وَنِصْفِهِ وَثُلُثِهِ” diye okurlar. Bu okuyuş vechine ilaveten İbn Âmir’in birinci ravisi Hişam “ثُلُثِي” kelimesini de “ثُلُثِي” şeklinde “lam/ل” harfinin sükûnu ile manaya etki etmeden okumaktadır. “وَنِصْفَهُ وَثُلُثَهُ” kısmının cer ile okunması durumunda da mana: “Sen gecenin üçte ikisinden, yarısından veya üçte birinden daha az kıyamda durursun (Râzî, 1999)” şeklinde olur. Görüldüğü üzere burada kıraatlerin de yardımıyla irab bakımından ufak farklılıklar olmakla birlikte manada tezat oluşturma yerine, yorum zenginliği ve anlam çeşitliliği oluşmaktadır.

## SONUÇ

Müzzemmil sûresi, ilk nazil olan sûreler arasında olması sebebiyle elçilik vazifesi gibi ağır bir sorumluluk olan Peygamberlik makamına Hz. Muhammed’in hazırlanması ve birtakım ulvi hatırlatmaların konu edinmesi açısından üzerinde en çok araştırmaların yapıldığı sûrelerden biri olmuştur. Sûrenin kıraatler bağlamında daha evvel tahlil edilmemiş olması, bu araştırmayı yapmamıza vesile olmuş ve şu sonuçlara ulaşmamızı sağlamıştır:

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Kırâat-i seb'a açısından kayda değer ihtilafların bulunduğu sûrede hem usûl farklılıkları hem de ferşi ihtilaflar açısından kıraat imamlarına ait birçok vecihler varit olmuştur. Özellikle usûl farklılıkları sûrenin hemen her âyetinde cereyan ettiği, ferşi ihtilafların ise üç âyette ortaya çıktığı tespit edilmiştir. Usûl konularının bir kısmında ittifak söz konusuyken; medlerin uzatılma miktarı, idğamı meal günne, sıla, nakil, imale/beyne-beyne, sekte, terkik ve tağlîz'in okunuşunda ihtilaf olduğu saptanmıştır.

Sûrede ferşi ihtilafların meydana geldiği "أَوْ انْقُصْنَا"، "وَوَطَّأْنَا"، "وَوَطَّأْنَا" ve "وَوَصَّفْنَا وَتَلَّأْنَا" kısımlarında lafız-anlam ilişkisi bakımından önemli farklılıklara yol açmasa da ifade çeşitliliği ve yorum zenginliği yönünden katkı sağladığı sonucuna varılmıştır.

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# 6. ULUSLARARASI ANKARA MULTİDİSİPLİNER BİLİMSEL ÇALIŞMALAR KONGRESİ 13-14 Ekim, 2023

## KUYU İÇİ SİSMİK – KARŞILIKLI KUYULAR ARASI TOMOGRAFİ YÖNTEMİ DOWNHOLE SEISMIC – CROSSHOLE TOMOGRAPHY METHOD

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### ÖZET

Bu çalışmada, son yıllarda jeofizikte oldukça yaygın olarak kullanılan Kuyu İçi Sismik tomografi yöntemi anlatılmıştır. Petrol - gaz aramalarında ve madencilik endüstrisinde Kuyu İçi Sismik tomografi yöntemi değerli kaynakların belirlenebilmesi için yaygın olarak kullanılmaktadır. Jeoteknik araştırmalarda, Kuyu İçi Sismik tomografi yöntemi; standart penetrasyon testi, karot alma ve numune alma gibi yöntemleri tamamlamak için kullanılmakta olup, alan karakterizasyonunun etkinliğini artırmaktadır. Bu yöntemin kullanım alanları arasında kayalardaki çatlakların tespiti, rezervuarların değişen koşullarının izlenmesi, mineralizasyonun tanımlanması, sınırlandırılmamış akiferlerin karakterizasyonunu ve doğal boşlukların tespiti yer alır. Karşılıklı Kuyular Arası sismik ölçümlerin kullanılması sondaj kuyuları arasındaki zemin kütlesi ile ilgili bilgi elde edilmesinde ekonomik fayda sağlamaktadır. Çalışma Şaftı lokasyonlarında açılan kuyu çiftleri arasında hem P dalgası hem de S dalgası için Karşılıklı Kuyular Arası Sismik tomografi yöntemi yapılmıştır. Her Çalışan kuyu konumunda, tam bir 3D kapsama elde etmek için, sondaj delikleri A ve B, A ve C, A ve D, D ve B, C ve B, C ve D olan altı adet karşılıklı kuyular arası tomografi incelemesi yapılmıştır. Karşılıklı Kuyular Arası (Cross-Hole) sismik yöntem ile ölçülen dalga hızları kullanılarak zemin kesitinde yer alan tabakaların özellikleri bulunmaya çalışılmıştır. Çalışma Şaftı için konum haritaları ve 3D blok modelleri sunulmuştur. 3 boyutlu modelden elde edilen kot haritaları ve düşey kesitler de sunulmuştur. Oluşturulan yeraltı modellerine göre dört kuyu arasındaki ortamın hız dağılımı elde edilmiştir. Bu tezde amaç, dört kuyu arasındaki bölgenin 3 boyutlu olarak daha ayrıntılı bir şekilde incelenmiş olması ve incelenmiş alanda zemin parametrelerine uygun bir yapı tasarlanmasıdır.

**Anahtar Kelimeler:** Jeofizik, Karşılıklı Kuyular Arası Tomografi, P Dalgası, S Dalgası, Sismik Tomografi.

### ABSTRACT

In this study, in-hole seismic tomography method, which is widely used in geophysics in recent years, is explained. In oil - gas exploration and mining industry Downhole Seismic tomography method is widely used to identify valuable resources. In geotechnical surveys, Downhole Seismic tomography method; It is used to complement methods such as standard penetration testing, coring and sampling, increasing the effectiveness of field characterization. The uses of this method include the detection of cracks in rocks, monitoring of changing conditions of reservoirs, identification of mineralization, characterization of unconfined aquifers, and detection of natural voids. The use of reciprocal Cross-Hole seismic measurements provides economic benefits in obtaining information about the soil mass between boreholes. Cross-Hole Seismic tomography method was performed for both P wave and S wave between wells drilled at Working Shaft locations. At each Working well location, six opposing Cross-Hole tomography studies were performed, with boreholes A and B, A and C, A and D, D and B, C and B, C and D, to obtain complete 3D coverage. By using the wave velocities measured by the Cross-Hole seismic method, the properties of the layers in the soil section were tried to be found.



# 6. ULUSLARARASI ANKARA MULTİDİSİPLİNER BİLİMSEL ÇALIŞMALAR KONGRESİ 13-14 Ekim, 2023

Location maps and 3D block models are provided for the Working Shaft. Elevation maps and vertical sections obtained from the 3D model are also presented. According to the underground models created, the velocity distribution of the medium between the four wells was obtained. The aim of this thesis is to examine the area between the four wells in 3D in more detail and to design a structure suitable for the soil parameters in the studied area.

**Keywords:** Geophysics, Cross-Hole Tomography, P Wave, S Wave, Seismic Tomography.

## GİRİŞ

Bu çalışmada, son yıllarda jeofizikte oldukça yaygın olarak kullanılan Kuyu İçi Sismik tomografi yöntemi anlatılmıştır. Petrol - gaz aramalarında ve madencilik endüstrisinde Kuyu İçi Sismik tomografi yöntemi değerli kaynakların belirlenebilmesi için yaygın olarak kullanılmaktadır. Jeoteknik araştırmalarda, Kuyu İçi Sismik tomografi yöntemi; standart penetrasyon testi, karot alma ve numune alma gibi yöntemleri tamamlamak için kullanılmakta olup alan karakterizasyonunun etkinliğini artırmaktadır. Bu yöntemin kullanım alanları arasında kayalardaki çatlakların tespiti, rezervuarların değişen koşullarının izlenmesi, mineralizasyonun tanımlanması, sınırlandırılmamış akiferlerin karakterizasyonunu ve doğal boşlukların tespiti yer alır. Karşılıklı Kuyular Arası sismik ölçümlerin kullanılması sondaj kuyuları arasındaki zemin kütlesi ile ilgili bilgi elde edilmesinde ekonomik fayda sağlamaktadır.

Karşılıklı Kuyu yönteminde zemin içinde bir kaynaktan üretilen sismik dalganın aynı derinlikte alıcılara yatay olarak ulaşması için geçen süre ölçülmekte ve yatay uzaklıklar tespit edildikten sonra dalga hızları bulunmaktadır. Kuyu İçi yönteminde ise zemin yüzeyinde üretilen dalganın kuyu içinde bilinen derinlikteki alıcıya dikey olarak gelmesi için gerekli zaman ölçülmekte, direkt zaman-derinlik grafiğinden hızlar tespit edilmektedir.

Sismik tomografi yöntemi, sayısal bir grid alanındaki geniş doğrusal denklemlerin çözülmesini sağlamaktadır. Tomografi yöntemi, görüntüleme işleminden oluşmaktadır. Yaygın olarak tıp bilimlerinde, özellikle beyin tomografisinin çekilmesi ve görüntülenmesinde yararlanılmıştır. Yapının ya da cismin belirlenmesinden dolayı sorun daha kolay çözümlenmiştir. Problem olarak ise görüntünün ayrımlılığının artırılması durumu açığa çıkmıştır. Jeofizikteki uygulamalarda da bu tür problemler vardır. Tomografik hesaplamalarda son zamanlarda birçok araştırmacı tarafından uygulanmış, uygulanmakta olan ve tavsiye edilen çözüm yöntemleri vardır. Bu yöntemler ışın tomografisi (ray tomography) ve saçılma tomografisi (diffraction tomography) olmak üzere iki başlık altında toplanmaktadır. Işın tomografisi yöntemi, kendi içinde yine üç algoritmik çözüme ayrılmaktadır.

Cismin hacmi ya da büyüklüğü, tanımlanan dalgaların dalga boyları ile karşılaştırılıyor ise kırınma (diffraction) ve saçılma (scattering) olayları baskın bir şekil alır. Bu durumda sistem ışın denklemi yerine dalga denklemi ile belirtilir. Enerji ile cisim arasındaki ilişkinin ışın denklemi ile başarılı bir şekilde ifade edilmesi durumunda ışın tomografi tekniği kullanılmaktadır.

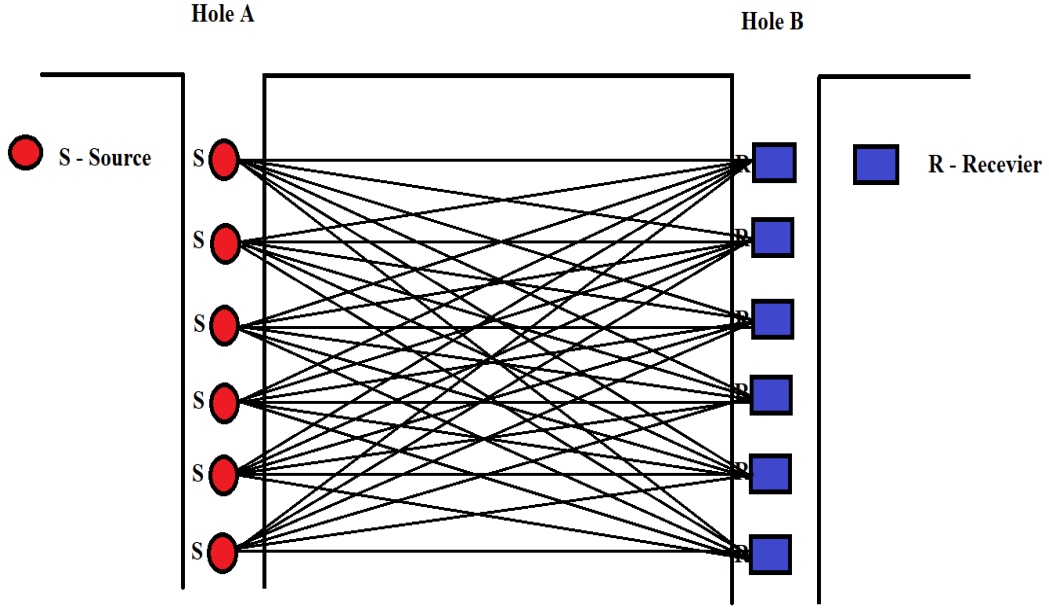
Bu çalışmada, son yıllarda jeofizikte oldukça yaygın olarak kullanılan Kuyu içi sismik tomografi yöntemlerinden olan Karşılıklı Kuyular Arası (Cross-Hole) tomografi yöntemi ele alınmıştır. Yöntemde, açılan dört kuyu arasındaki bölgenin hız değişimleri incelenerek farklı yapıda olan bölgeler modellenmiştir. Bu tezin amacı, dört kuyu arasındaki bölgenin 3 boyutlu olarak daha ayrıntılı bir şekilde incelenmiş olmasıdır.

## ARAŞTIRMA VE BULGULAR

Yüzeyde uygulanan sismik yöntemler ile elde edilemeyen düşük hız zonlarının belirlenebilmesi için uygulanmaktadır. Karşılıklı kuyular arası tomografi yöntemiyle zeminde meydana gelen kırıklı, çatlaklı zonlar ve boşluklar tespit edilmektedir. P ve S dalgası hızları zeminin dinamik parametrelerinin saptanmasına yönelik bir çalışma olup yöntem sondaj kuyusu içerisinde gerçekleştirilmektedir. Karşılıklı kuyu yöntemi, bir veya daha fazla birbirine yakın kuyular içinde belirli derinliklerde kaydedilen boyuna (P) ve enine (S) ortalama dalga hızlarını içermektedir. P ve S dalga hızları kuyu içinde bilinen bir seviyede bu dalgaların seyahat zamanları ölçülerek

## 6. ULUSLARARASI ANKARA MULTİDİSİPLİNER BİLİMSEL ÇALIŞMALAR KONGRESİ 13-14 Ekim, 2023

hesaplanmaktadır. Her nokta farklı bir sondaj kuyusu içinde aynı derinlikte yer alır. Karşılıklı kuyular arası sismik tomografi yönteminde dalga yayılımı Şekil 1.'de gösterilmiştir.



Şekil 1. Karşılıklı Kuyular Arası (Cross-Hole) Sismik Tomografi Yönteminde Dalga Yayılımı

Karşılıklı Kuyular Arası (Cross-Hole) sismik tomografi yöntemi avantaj olarak sismik dalgaların sağlıklı ve kesin ölçümler yapılmasına olanak sağlamasıdır. Karşılıklı kuyular arası sismik tomografi yöntemi yüzeyde yapılan kırılma çalışmalarında açığa çıkmayan düşük hız tabakalarını net bir şekilde görebilme ve tanımlayabilmemizi olanaklı hale getirmektedir

Karşılıklı kuyular arası sismik tomografi yöntemi, sismik kaynak dört kuyudan birine, jeofon dizisi ise başka bir kuyuya indirilerek yapılır. Kullanılan sismik kaynak hem P dalgalarını hem de yatay polarize S dalgalarını üretmektedir.

Testler sırasında, kaynak sondası her bir test kuyusuna 2 m derinlik aralığında indirilmiş ve sondaj deliği duvarına sıkıca kenetlenerek şekilde paketleyiciyi şişirerek yerine kilitlenmiştir.

Bu çalışmada, Sondaj A ile Sondaj D arasında (12.23 m sondaj aralığı) ve Sondaj C ile Sondaj D arasında (10 m sondaj aralığı) hem P dalgası hem de S dalgası Karşılıklı kuyular arası sismik tomografi yöntemi yapılmıştır. Çalışmalar sırasında kaynak kuyusuna her 2 metrede bir atış yapılmış, alıcılar ise alıcı kuyusuna 1 m aralıkla yerleştirilmiştir.

Sörveyler sırasında 10 adet alıcı, alıcı kuyusunda sabit bekletilirken, atış için kullanılan kuyuya 2 m aralıklarla atış yapılmıştır. Sondaj mesafesinin 12.23 m olduğu A ve D sondaj çiftinde, alıcı noktalarını mevcut kaynak derinliğinin yaklaşık 12 m yukarısına ve mevcut kaynak derinliğinin 12 m altına kadar seçmek yeterli olmuştur. Buna karşılık, sondaj mesafesinin 10 m olduğu C ve D sondaj çiftinde, mevcut kaynak derinliğinin yaklaşık 10 m yukarısına ve mevcut kaynak derinliğinin 10 m altına kadar alıcı noktalarını seçmek yeterli olmuştur.

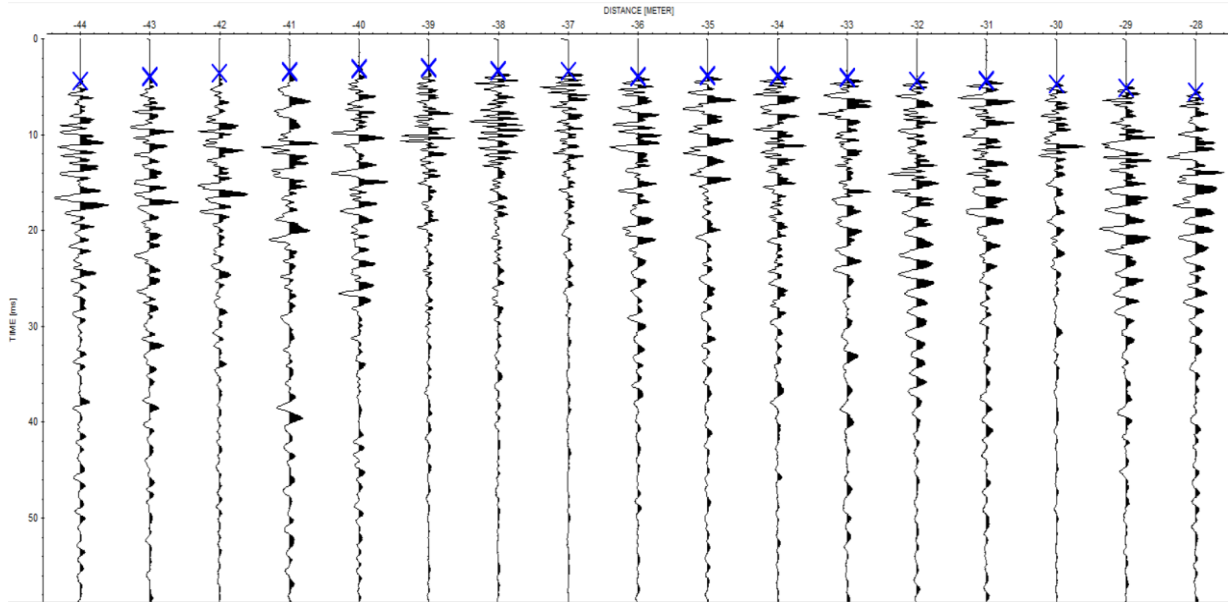
Toplam 6 adet kuyuda karşılıklı kuyular arası tomografi yöntemi uygulanmıştır. Her kuyuda 44 tane Normalite ve Polarite datası olmak üzere toplamda 264 data alınmıştır.

Karşılıklı kuyular arası (Cross-Hole) tomografi yöntemi 10-14 m BH aralığı ile açılan, derinliği 45 m olan sondaj kuyuları ile yukarıdan aşağıya doğru gerçekleştirilmiştir. Her Çalışan kuyu konumunda, tam bir 3D kapsama elde etmek için, sondaj delikleri A ve B, A ve D, B ve C, B ve D, C ve A, C ve D olan 6 adet Karşılıklı kuyular arası tomografi yöntemi yapılmıştır.

## 6. ULUSLARARASI ANKARA MULTİDİSİPLİNER BİLİMSEL ÇALIŞMALAR KONGRESİ 13-14 Ekim, 2023

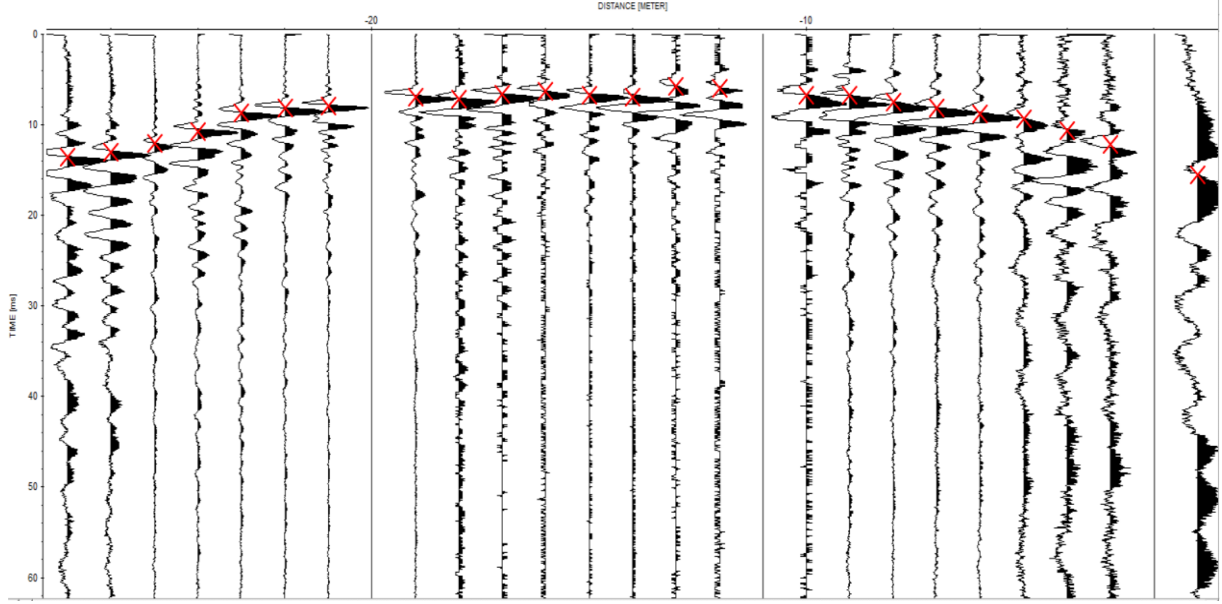
Karşılıklı kuyular arası tomografi yöntemi, sondaj delikleri arasındaki çok sayıda ışın yolu boyunca elde edilecek birincil ve ikincil dalgaların, P ve S hızlarının elde edilmesini sağlamak için sondaj çiftleri halinde gerçekleştirilmiştir. Kaynak kuyusunda her 2 m derinlik aralığında atışlar yapılmış ve ikinci kuyuda 1 m aralıklarla farklı derinliklerde birden fazla alıcı ile sinyalin yayılma hızı ölçülmüştür. Çalışma, kaynak sondaj kuyusunda 2 m derinlikte iken başlamış ve alıcılar 1 m aralıklarla 2 ile 11 m arasına yerleştirilmiştir. En az 3 kere ölçüm alındıktan sonra alıcı sondaj kuyusunda jeofonlar sabit iken kaynak sondaj kuyusunda 180 derece döndürülerek ters atışlar yapılmış ve ters atışlar kaydedilmiştir. Kaynak 2 m'de sabit tutulmuş ve alıcılar bir sonraki adım için 1 m aralıklarla 12 ile 21 m'ye taşınmıştır. Kaynak kuyusunda kaynak döndürülerek yine normal atışlar ve ters atışlar kaydedilmiştir. Ardından, alıcılar 12 ile 21 m arasındayken kaynak 4 m'ye taşınmıştır. Normal ve ters atışlar kaydedildikten sonra alıcılar 2 ile 11 m'ye alınmış ve aynı işlemler tekrarlanmıştır. Farklı derinlik kombinasyonları için sondaj kuyularının taranmasına benzer şekilde devam edilmiştir.

Alınan sinyallerin örnekleri Şekil 2. ve Şekil 3.'de gösterilmektedir. Bu kayıtlar tüm sondaj yerleri arasındaki test sırasında toplanmıştır ve alıcılar 1 ile 45 m arasına yerleştirilmiştir. Örnek kayıtlarda, P dalgası için ilk gelenler mavi çarpılarla, S dalgası için ilk gelenler kırmızı çarpılarla gösterilmiştir.



Şekil 2. Jeofon Dizisinin Dikey Bileşenine Ait Alınan Sinyalin Örnek Kaydı A-B Kuyuları İçin (Mavi çarpılar P dalgası varış zamanını gösterir)

# 6. ULUSLARARASI ANKARA MULTİDİSİPLİNER BİLİMSEL ÇALIŞMALAR KONGRESİ 13-14 Ekim, 2023



Şekil 3. Jeofon Dizisinin Yatay Bileşenine Ait Alınan Sinyalin Örnek Kaydı A-B Kuyuları İçin (Kırmızı çarpılar S dalgası varış zamanını gösterir)

Artan atış aralığının hız modelleri üzerindeki etkisini anlamak için, 2 m atış aralığı ile toplanan verilerin ters çözüm sonuçları, 4 m atış aralığını temsil edecek şekilde indirgenmiş verilerin ters çözüm sonuçlarıyla karşılaştırılmıştır. Aynı verilerden farklı atış aralıklarına sahip iki veri seti hazırlanmıştır. 2 m atış aralığına sahip orijinal veriler ters çevrilmiş ve ışın yoğunluğu çizimleri ve hız modelleri hazırlanmıştır. Aynı veriler, bazı kayıtlar silinerek 4 m atış aralığına sahip bir veri seti haline getirilerek küçültülmüştür. Daha sonra yine 4 m atış aralıklı bu veri seti ters çevrilmiş ve ışın yoğunluk çizimleri ve hız modelleri hazırlanmıştır. Daha sonra hem Işın yoğunluğu çizimleri hem de hız modelleri karşılaştırılmıştır. Daha geniş bir boşluk kullanıldığında bazı küçük detayların gözden kaçtığı ancak genel olarak genel görüntünün aynı kaldığı görülmektedir.

## TARTIŞMA VE SONUÇ

Bu çalışmada, Kuyu A ile Kuyu D arasında (12.23 m sondaj aralığı) ve Kuyu C ile Kuyu D arasında (10 m kuyu aralığı) hem P dalgası hem de S dalgası Karşılıklı kuyular arası (Cross-Hole) sismik tomografi yapılmıştır. Kaynak-kuyuda her 2 metrede bir atış yapılırken, alıcı-kuyuda 1 m aralıkla alıcılar yerleştirilmiştir.

Sismik sinyalleri yorumlamak için ilk varış seyahat-zaman tomografisi kullanılmıştır. P dalgası ve S dalgası için ilk varış zamanları, manuel olarak seçilmiş ve ters çözüm analizi için derlenmiştir. Ters çevirmeleri gerçekleştirmek için eşzamanlı yinelemeli yeniden yapılandırma tekniğini (SIRT) kullanır. Çalışma alanının, ışın bükülmesine neden olabilecek yüksek hızlı kontrastlar içermesi beklendiğinden, model için bir ışın bükme yaklaşımı benimsenmiştir. Her karşılıklı kuyular arası tomografi taramasında verilerin iyi veya orta düzeyde sinyal kalitesine sahip olduğu görülmektedir.

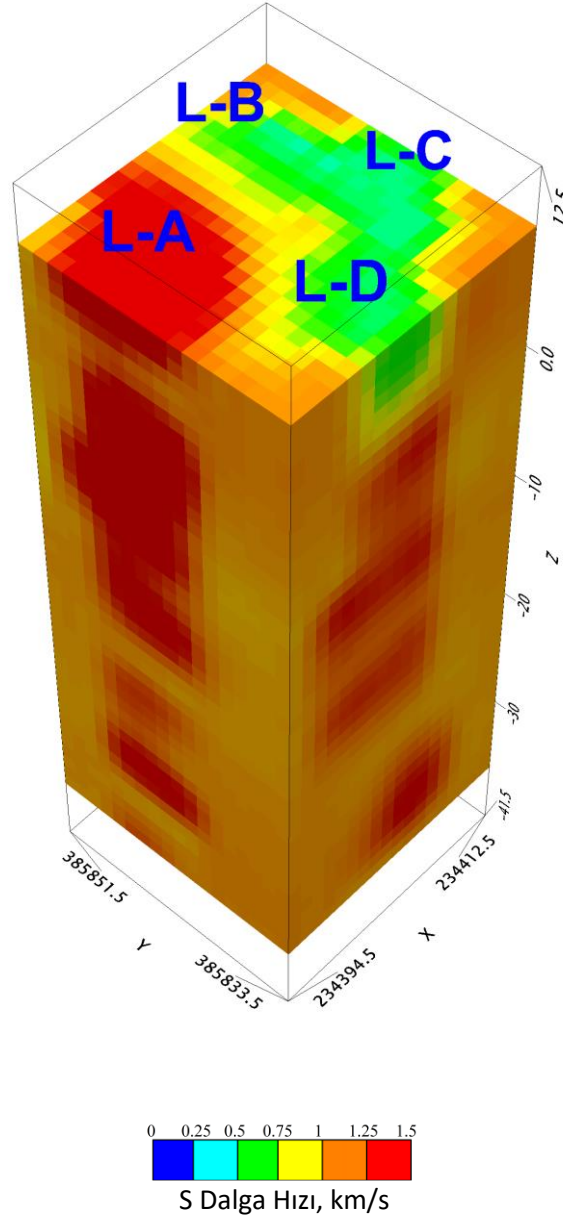
İlk varış zamanlarından önce, sismik kayıtlar her atış derinliği için birleştirilmiş ve daha sonra birleştirilmiş kayıtlar yatay (X ve Y) ve Dikey (Z) Bileşenlere bölünmüştür. Toplama sırasında, sinyal kalitelerinin daha iyi olması nedeniyle hem yatay hem dikey bileşenler kullanılmıştır.

Sismik verilerin çözümü için anlayabilmek için, Cross-Hole loglamalarının 3B ters çözümleri için Işın yoğunluğu grafikleri hazırlanmıştır. Sondaj çiftlerinde gerçekleştirilen tüm Cross-Hole loglamalarında hedef alanın büyük bir kısmında nokta başına 50 ışından daha fazla ışın yoğunluğu elde edilmiştir.

Seyahat süresi verilerinin ters çözümünden sonra 3 boyutlu modeller hazırlanmıştır. Daha sonra seviye haritaları ve düşey kesitler üretilmiştir. Çalışma Şaftı için konum haritaları ve 3B blok modelleri sunulmuştur. 3 boyutlu modelden elde edilen kot haritaları ve düşey kesitler de sunulmuştur.

## 6. ULUSLARARASI ANKARA MULTİDİSİPLİNER BİLİMSEL ÇALIŞMALAR KONGRESİ 13-14 Ekim, 2023

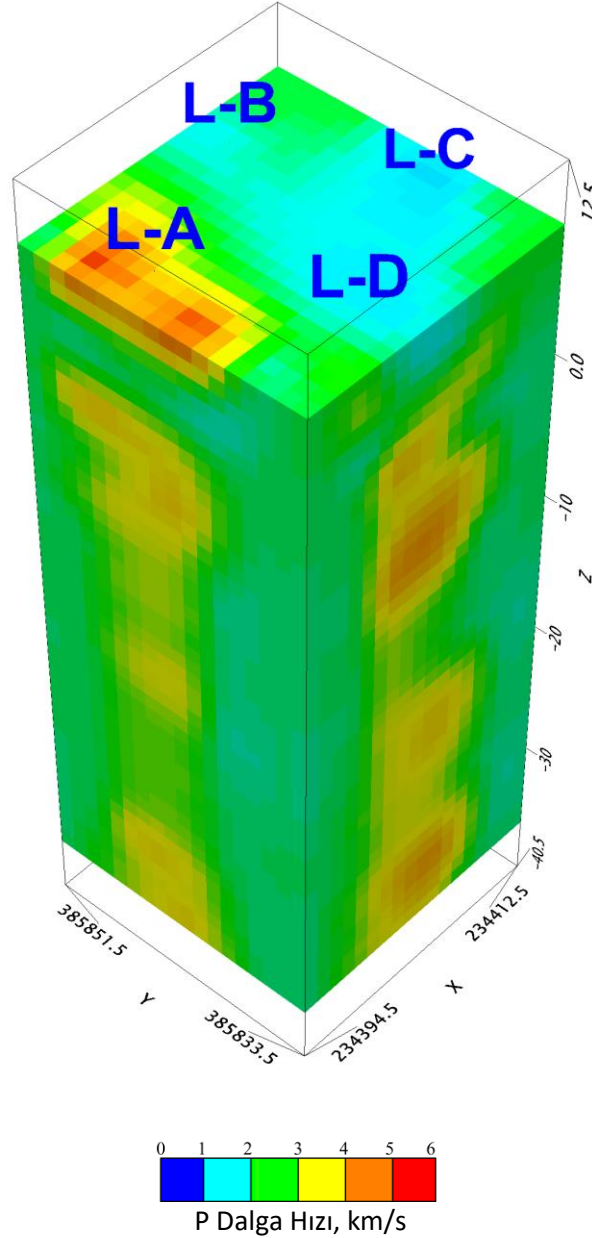
Sismik verilerin çözümlene gücünü anlayabilmek için, nihai seyahat süresi tersine çevirme çözümüne olan güveni değerlendirmek için ortak bir kriter olan ışın yoğunluğu grafikleri hazırlanmıştır. 2 m'lik atış aralığıyla, hedef alanın çoğu üzerinde nokta başına 50 ışımdan daha fazla olan iyi bir Işın yoğunluğu elde etmenin mümkün olduğu gözlemlenmiştir. 4 m'lik atışların azaltılmış verileriyle bile, hedef alanın çoğu üzerinde nokta başına 40 ışımdan daha fazla olan bir ışın yoğunluğuna sahip olmak mümkündür. 2 m kaynak aralığı ile veri toplamanın yüksek derecede güvenilirlik ve çözünürlük ile hız modelleri verdiği sonucuna varılabilir. Bazı küçük detayların kaybıyla bile modeller üretecek olan 4 m kaynak aralıklı veriler bile toplanabilir, ancak genel resim aynı kalacaktır. Hem 10 m hem de 12.23 m'de datanın orta düzeyde sinyal kalitesine sahip olduğu gözlemlenmiştir.



Şekil 4. S Dalgı Hızına Ait 3B Ters Çözüm Modeli Blok Şeması



6. ULUSLARARASI ANKARA MULTİDİSİPLİNER  
BİLİMSEL ÇALIŞMALAR KONGRESİ  
13-14 Ekim, 2023



Şekil 5. P Dalga Hızına Ait 3B Ters Çözüm Modeli Blok Şeması

Çalışma Şaftları sondaj kuyularında Karşılıklı kuyular arası tomografi araştırmalarının sonuçları hakkında aşağıdaki genel kanıya varılabilir:

- Sondaj kuyularında gerçekleştirilen Cross-Hole loglamalarında hedef alanın büyük bir kısmında nokta başına 50 ışıktan daha fazla ışın yoğunluğu elde edilmiştir. Işın yoğunluğu grafiği, sismik verilerin çözümü için bir göstergesidir ve kişinin nihai seyahat süresi tersine çevirme çözümüne olan güvenini değerlendirmek için yaygın bir kriterdir.
- Hedef alanın üniform olmayan ışın kapsamına rağmen, sahanın üniform olmayan jeolojisi nedeniyle ters çözüm analizinin yine de makul sonuçlar vereceği varsayılmaktadır.
- Cross-Hole tomogramlarında düşük P ve S dalgası hız anomalileri görülmez.

Yinelemeyi başlatmak için ilk hız modeli, sırasıyla P dalgası ve S dalgası seyahat süresi tersine çevirmesiyle birlikte ilk hızın seçimi kritik değildir ve varsayılan olarak veri



## 6. ULUSLARARASI ANKARA MULTİDİSİPLİNER BİLİMSEL ÇALIŞMALAR KONGRESİ 13-14 Ekim, 2023

kümesindeki en düşük ve ortalama düz çizgi hızı arasında olacak şekilde seçilir. Ölçülen seyahat süresi ile hesaplanan seyahat süresi arasındaki fark olan kök ortalama kare (RMS) kalıntısı, her yinelemeden sonra hesaplanır. Bu değerin 7. yinelemeden sonra sabitlendiği gözlenmiş ve ardından hız modellerinde çok az gelişme sağlanmıştır. Sonuç olarak, yinelemeli süreç durdurulmuştur.

Kuyu içi sismik tomografi yöntemlerinde Karşılıklı Kuyular Arası (Cross-Hole) tomografi yöntemi dinamik zemin özelliklerinin belirlenmesinde kuyular arasındaki bölgenin hız değişimlerini ayrıntılı olarak inceleyerek bölgenin 3 boyutlu görüntüsünü vermektedir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## KATILIM BANKALARINDA KARLILIĞI ETKİLEYEN MAKROEKONOMİK FAKTÖRLERİN TESPİTİ

### DETERMINATION OF MACROECONOMIC FACTORS AFFECTING PROFITABILITY IN PARTICIPATION BANKS

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#### ÖZET

Bankacılık sektörü, ticaretten endüstriye, hizmetlerden tarıma neredeyse tüm sektörlerle bağlantılıdır. Bankalar hane halkları, tasarruf sahipleri, yatırımcılar, girişimciler, üreticiler, özel ya da kamudaki pek çok aktörün bir paydaşı pozisyonundadır. Katılım bankaları da mevduat bankaları kadar bu sayılan fonksiyonları yerine getirmektedir. Bankaların ve özelde katılım bankalarının görevlerini yerine getirebilmesi için kendi karlılıklarının devamlılığını sağlaması gerekmektedir. Bu sebeple katılım bankalarının karlılığını nelerin belirlediği, üzerinde durulması gereken bir konudur. Çalışmada 14 ülkeye ait 2014-2020 verileri ile katılım bankalarındaki karlılığa etki eden dış faktörler incelenmiştir. Karlılık göstergesi olarak öz kaynak karlılığındaki büyüme oranı kullanılmıştır. Bağımsız değişkenler ise kişi başına düşen gelirdeki yıllık büyüme oranı, nüfustaki yıllık büyüme oranı, sabit sermaye birikimindeki yıllık büyüme oranı, hükümet harcamalarındaki yıllık büyüme oranı ve dışa açıklık oranıdır. Yapılan panel kantil regresyon sonuçları yalnızca sermaye birikimi ve dışa açıklık göstergelerinin karlılığın bir belirleyicisi olduğunu göstermektedir. Bulgular makroekonomik parametrelerin katılım bankalarının karlılığına etkisinin zayıf olduğunu ortaya koymuştur.

**Anahtar kelimeler:** İslami Finans, Karlılık, Katılım Bankacılığı.

#### ABSTRACT

The banking sector is linked to almost all sectors, from commerce to industry, from services to agriculture. Banks are in the position of a stakeholder of many actors in households, savers, investors, entrepreneurs, producers, private or public. Participation banks fulfill these functions as well as deposit banks. In order for banks and especially participation banks to fulfill their duties, they need to ensure the continuity of their own profitability. For this reason, what determines the profitability of participation banks is an issue that needs to be emphasized. In the study, the 2014-2020 data of 14 countries and the external factors affecting the profitability of participation banks were examined. The growth rate in return on equity was used as a profitability indicator. The independent variables are the annual growth rate in per capita income, the annual growth rate in population, the annual growth rate in fixed capital accumulation, the annual growth rate in government expenditures and the openness rate. The panel quantile regression results show that only capital accumulation and openness indicators are determinants of profitability. The findings revealed that the effect of macroeconomic parameters on the profitability of participation banks is weak.

**Keywords:** Islamic Finance, Profitability, Participation Banking.

## **GİRİŞ**

Bankaların toplumdaki hayati rolü nedeniyle bankacılığın olmadığı bir yaşam düşünmek neredeyse imkânsızdır. Yani bankalar için ekonominin oksijeni tabirini kullanmak mümkündür. Herhangi bir ülkede hükümet, ekonomiyi bankacılık sistemi aracılığıyla yani parasal araçlar vasıtasıyla güçlendirmektedir. Sadece hükümetler değil tüm mali bireysel ve ticari işlemler bankalar kanalıyla yürütülmektedir. Fakat geleneksel bankacılığın avantajlarının yanında dezavantajları da mevcuttur. Yirmi birinci yüzyıldaki ekonomik ve finansal kriz geleneksel bankacılık sisteminden kaynaklanmıştır. Faize izin veren sistem bu tür finansal krizlerin sık yaşanmasına sebep olmaktadır. Herhangi bir nedenle borcun ödenmemesi durumu tüm ekonomik sistemi etkilemektedir. İslami bankacılık faiz ve faiz yükünün sonuçlarından kurtulmaya yardımcı olacak model olarak bilinmektedir. İslami bankalarda tüm araçlar faizsiz İslami finansmana uygundur. İslami finansın en önemli temsilcileri olan katılım bankaları kendilerine özgü bir felsefe ile çalışmaktadırlar. İslami kurallara uygun olarak riski ve karı müşterilerle paylaşarak İslami anlayışın verdiği meşruiyetle müşteri ihtiyaçlarını karşılama esasına göre hareket etmektedirler (Asadullah, 2017; Ougoujil ve Rigar, 2018).

İslami kurallara uygun olarak belirtilen faaliyetlerin finansmanı için katılım bankaları ve diğer taraflar arasında mudarebe (emek-sermaye ortaklığı), müşareke (ortaklık türü), murabaha (sözleşme), icare (kira anlaşması) ve iktina (kiralanan malın mülkiyetinin kiralayana devredilmesi) başlıkları altında faaliyetler yürütülmektedir. Ticari bankaların finansman portföyü, toplam aktiflerin genellikle %50 ile %60'ı civarında en büyük payı oluşturmaktadır. Finansmanın getirisi banka için en yüksek gelirdir. İslami bankalar için gelir kaynağı ise mudarebe sözleşmesi ve müşareke sözleşmesindeki kâr paylaşımından, alış-satış sözleşmelerindeki avantajlardan, icare ve iktina sözleşmelerindeki kiralardan ve diğer sözleşmelere ilişkin ücretlerden elde edilmektedir. (Kusumastuti ve Alam, 2019).

Katılım bankacılığı küresel finans sektörünün en hızlı büyüyen alanlarından biridir. İslami finans ürünlerine yönelik güçlü talep, yasal yönlerdeki ilerleme ve mali düzenlemeler İslami bankacılık ve finansın büyümesine katkıda bulunmaktadır. Özellikle Müslüman ülkelerde çok sayıda katılım bankası ortaya çıkmıştır. Bu bankaların hepsi temelde aynı İslami esaslara göre yönetilmelerine rağmen, çeşitli piyasa yapılarında faaliyet göstermektedirler. Tüm finansal sistemlerini İslamlaştıran İran, Pakistan ve Sudan dışındaki diğer Müslüman ülkeler faize dayalı sistemler kullanılıyor olmakla beraber Bangladeş, Brunei, Endonezya, Ürdün, Kuveyt, Malezya ve Birleşik Arap Emirlikleri gibi ülkelerde İslami bankalara tekel statüsü verilmiştir. Bahreyn, Mısır ve Türkiye'de ise çok sayıda katılım bankası bulunmaktadır (Haron, 1996).

Katılım bankalarının gözlenebilir düzeyde performansının bir göstergesi karlılıktır ve karlılık düzeyi ne kadar yüksekse bankacılığın performansı da o kadar yüksektir. Karlılık hem yatırımcılar hem de yöneticiler için önemli bir bilgi olup, istikrarı ve banka performansını açıklamaktadır. Banka karlılığı yönetimin de başarısını gösterir ve yatırımcılar için en önemli göstergelerden biridir. Karlılıktaki değişiklikler ekonomik büyümeye katkıda bulunmaktadır. Çünkü karlardaki artış şirketlerin nakit akışı pozisyonunu iyileştirerek daha fazla esneklik sunmaktadır (Supiyadi vd., 2019) Performans ölçümü yani karlılık için kullanılan göstergeler öz sermaye karlılığı (ROE) ve aktif karlılık oranı (ROA)'dır. Her ikisi de bankacılık sektörünün finansal performansını ölçmek için kullanılabilir. ROE yalnızca şirket sahibinin yatırımından elde ettiği getiriyi ölçerken, ROA şirketin toplam varlıklarını kullanmak için kâr elde etmedeki etkinliği ölçmek için kullanılmaktadır (Kusumastuti ve Alam, 2019).

Literatürdeki teorik ve ampirik kanıtlar İslami veya konvansiyonel bankaların karlılığının, bankaların iç yönetimine ve bu kurumların faaliyet gösterdiği çevresel faktörlere ilişkin kriterlerle değerlendirildiğini göstermektedir. Katılım bankaların karlılığını etkileyebilecek çeşitli iç ve dış faktörlerin bulunduğu bilinmektedir. Bankaya özgü faktörleri kapsayan içsel faktörleri bankanın büyüklüğü, sermaye, kredi, pazar payı, gider vb. finansal oranlar oluşturmaktadır. Bankaların kontrol alanı dışındaki makroekonomik göstergeleri içeren dışsal faktörler ise enflasyon, kur, büyüme, gelir, işsizlik, para arzı, hükümet harcamaları vb. parametrelerdir (Bakkeri ve Ali, 2020; Minny ve Görmüş, 2017). Bu çalışmada 14 ülkedeki katılım bankalarının 2014-2020 dönemindeki karlılığının makroekonomik belirleyicilerle ilişkisi araştırılmıştır. Önceki araştırmalardan farklı olarak bu çalışma hem çok ülkeli hem de daha önce kullanılmamış bir yöntem olan panel kantil regresyon bulguları sunmaktadır.

Çalışma dört başlıktan oluşturulmuştur. Birinci başlıkta konu ile ilgili temel bilgilere yer verilmiştir. İkinci başlıkta literatür özeti sunulmuştur. Üçüncü başlıkta veri seti ve model tanıtılmış, dördüncü başlıkta tahmin edilen bulgulara ait sonuçlar raporlanmıştır. Sonuç başlığı ile çalışma tamamlanmıştır.

## **YÖNTEM**

Literatürdeki çalışmalar özetlenirken özel olarak İslami esaslara göre çalışan bankaları incelemiş araştırmalara yer verilmiştir. Yazın taramasında yalnızca mevduat bankalarının karlılığını ya da mevduat bankaları ile katılım bankalarının karlılığını ele alan çalışmalar olduğu bilinmektedir. Spesifik olarak katılım bankalarının karlılığını inceleyen araştırmalar görece olarak daha azdır. Katılım bankalarının karlılığını etkileyen faktörleri kapsayan çalışmalar dönem, yöntem ve ülke olarak farklılık göstermektedir. Bazı çalışmalar iç faktörlere, bazıları ise dış faktörlere odaklanırken bir kısım çalışmada ise hem iç dış faktörlerin tespit edildiği görülmüştür. Genel olarak makroekonomik düzeyde karlılık belirleyicilerini ele alan araştırma sayısı daha azdır. Ayrıca çalışmalarda tek ülkeye ait birçok bankanın verileriyle çalışıldığı görülmektedir. Çok ülkeye dayalı analiz yapan çalışma sayısı oldukça azdır. Birden fazla yatay kesit birime ait analiz yapan araştırmalarda ise daha çok bilinen panel regresyon yöntemlerine ağırlık verildiği görülmektedir. Bu çerçevede literatürden örnekler şu şekilde sıralanabilir.

Haron (1996), çeşitli İslam ülkelerindeki İslami bankaların karlılığını farklı dönemler için rekabetçi bankalar ve monopolistik bankalar ayırımına dayalı olarak En Küçük Kareler (EKK) metodu ile incelemiştir. İki farklı piyasayı temsil eden kukla değişken, pazar payı, faiz, para arzındaki büyüme, enflasyon ve toplam varlıklar bağımsız değişken olarak kullanılmıştır. Bulgular faiz oranının önemli derecede karlılık üzerinde olumlu, pazar payı ve para arzının ise olumsuz etkili olduğunu göstermiştir.

Asma'Rashidah Idris vd. (2011), Malezya'da dokuz İslami bankanın 2007-2009 dönemi için üç aylık verilerini kullanarak Genelleştirilmiş En Küçük Kareler (GLS) yöntemi ile ROA üzerinde banka büyüklüğünün anlamlı ve pozitif etkisi olduğunu belirlemişlerdir.

Ali vd. (2012), Pakistan'da 2003-2009 döneminde altı İslami bankada reel büyüme oranı, sanayi üretim oranı, faiz, enflasyon ve işsizlik değişkenlerinin karlılık üzerine etkisini incelemişlerdir. ROE üzerinde dış ekonomik faktörler anlamlı etkili değilken, ROA üzerinde yalnızca faiz etkilidir.

Macit (2012) tarafından Türkiye'de 2005-2010 dönemi üç aylık verileriyle dört katılım bankası için ROA ve ROE değişkenleri kullanılarak EKK ile karlılık belirleyicileri tespit edilmiştir. Öz kaynakların toplam aktiflere oranı her iki gösterge için önemli olup, döviz kuru ve reel faiz oranı anlamlı ve katılım bankalarının karlılığını olumlu yönde etkilemektedir.

Kusumastuti ve Alam (2013), Endonezya'da 2015-2017 yıllarında EKK metodu ile maliyet getiri oranının ROA üzerinde anlamlı etkili, sermaye yeterlilik oranı ve takipteki kredilerin anlamlı etkiye sahip olmadığını belirlemişlerdir.

Muda vd. (2013), Malezya'daki on yedi yerli ve yabancı İslami bankanın karlılık belirleyicilerini 2007-2010 arasındaki döneme ait üç aylık veriler kullanılarak GLS metodu ile belirlemişlerdir. Sonuçlar yerli İslami bankaların yabancı İslami bankalara göre daha karlı olduğunu ortaya koymuştur. Yerli bankaların karlılık belirleyicileri genel giderler, krediler, verimlilik, gayri safi yurt içi hasıla, büyüme oranı ve banka büyüklüğüdür. Buna karşılık, kişi başına düşen gayri safi yurtiçi hasıla (GSYİH), yalnızca yabancı bankaların banka karlılığını belirlemede önemli bir etkiye sahiptir. Ayrıca çalışmada, mevduat, sermaye, rezervler, enflasyon ve banka yaşının hem yerli hem de yabancı bankaların karlılığını belirlemede önemli bir etkiye sahip olduğu tespit edilmiştir.

Obeidat vd. (2013) tarafından Ürdün'de 1997-2006 döneminde İslami bankaların karlılığına etki eden iç ve dış değişkenler regresyon tahmini ile tespit edilmiştir. Sonuçlar, karlılığın en önemli içsel belirleyicilerinin toplam mevduat, mevduat maliyeti, toplam harcamalar, mudaraba kredileri ve sınırlı yatırım mevduatları olduğunu göstermiştir. Öte yandan temel dış belirleyiciler para arzı ve pazar payı olarak tespit edilmiştir.

Ali (2015), Pakistan'daki İslami bankaların karlılığının makroekonomik belirleyicilerini, 2006-2012 arasında üç aylık zaman serisi verileri ile Johansen- Juselius Eşbütünleşme, EKK ve Granger nedensellik testi ile incelemiştir. Bulgular, faiz ve enflasyonun karı pozitif etkilediğini göstermiştir. Diğer taraftan Granger nedensellik testi enflasyondan karlılığa doğru tek yönlü nedensellik olduğunu göstermiştir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Görüş ve Özgür (2016), Türkiye’de 2006-2016 dönemi aylık verileriyle bankaya özgü faktörlerin beş İslami bankanın karlılığı üzerindeki etkilerini EKK metodu ile ele almışlardır. ROA bağımlı değişken olmak üzere öz sermayenin toplam varlıklara oranı, kredi kalitesi, kredilerin toplam varlıklara oranı, net faiz marjı, faaliyet giderlerinin toplam varlıklara oranı, pazar payı ve dışı faiz gelirlerinin toplam varlıklara oranı bağımsız değişken olarak seçilmiştir. Ampirik sonuçlar öz sermayenin toplam varlıklara oranı, net faiz marjı ve pazar payının banka karlılığının pozitif belirleyicisi olduğunu ortaya koymuştur.

Karakuş ve Yılmaz Küçük (2016), Türkiye’deki dört katılım bankasının 2010-2014 dönemi çeyreklik verileriyle sabit ekiler modeline dayalı olarak tahminler yapmışlardır. Döviz kuru, enflasyon, GSYİH ve duran varlıkların aktif toplama oranı ROA ve ROE’yi negatif, çalışan sayısı ise pozitif etkilemektedir. Bankacılık sektörü kredi hacmi, sanayi üretim endeksi, işsizlik oranı kredilere uygulanan ortalama faiz oranı ve toplanan fonların aktif karlılık üzerinde anlamlı ve pozitif etkisi vardır. İşsizlik oranı, alınan kredilerin aktif toplama oranının ve reel kesim güven endeksinin öz kaynak karlılığına negatif etki yaptığı, saatlik kazanç endeksi, bilanço dışı yükümlülüklerin aktif toplama oranı, diğer faaliyet giderlerinin aktif toplama oranı ve alınan kısa vadeli kredilerin alınan toplam kredilere oranının öz kaynak karlılığını pozitif etkilediği sonucuna ulaşılmıştır.

Asadullah (2017), Pakistan 2006-2015 yıllarında beş İslami bankanın karlılık belirleyicilerini bağımlı değişken ROA olmak üzere sabit etkiler modeli ile belirlemiştir. Karlılıkta banka büyüklüğü ve likidite önemli değişkenlerdir. Likiditenin bankaların karlılığı üzerinde olumlu, büyüklüğünün ise olumsuz etkisi vardır. GSYİH ve enflasyonun etkisi önemsizdir.

Minny ve Görmüş (2017), Türkiye’de üç katılım bankası için 2008-2016 yılları arasında çeyrek dönem için faiz oranı değişimlerinin katılım bankalarının karlılığı üzerindeki etkisini tespit etmişlerdir. Kao Eşbütünleşme ve regresyon tahminleri faiz oranlarındaki değişimlerin katılım bankalarının karlılığı ile anlamlı ve pozitif bir ilişkiye sahip olduğunu göstermiştir.

Akdağ ve Ekinci (2018), çeşitli ülkelerde faaliyeti olan on katılım bankasının karlılığının determinantlarını 2013-2017 periyodunda öz kaynak karlılığı bağımlı değişken olmak üzere GMM (Genelleştirilmiş Momentler Metodu) modeli ile araştırmışlardır. Önceki dönem öz karlılık oranı, sermaye yeterlilik oranı ve krediler/aktif toplam oranı öz kaynak karlılığını pozitif ve anlamlı, öz kaynak/aktif toplam oranının ise öz kaynak karlılığını negatif ve anlamlı şekilde etkilemektedir.

Dodi vd. (2018), Endonezya’da İslami bankaların 2008-2017 dönemi karlılığını GMM yöntemi ile incelemişlerdir. Sonuçlar banka büyüklüğünün hem ROA hem de ROE’yi olumlu; sermaye, kredi riski ve likiditenin ise olumsuz etkilediği ortaya koymuştur. Ayrıca enflasyonun pozitif, GSYİH’nın etkisinin önemsiz olduğu görülmüştür.

Aka (2019), Türkiye’de üç katılım bankasının 2010-2018 dönemi çeyreklik verileriyle banka karlılığını etkileyen faktörleri sabit etkiler modeliyle tespit etmiştir. ROA ve ROE göstergeleri bağımlı değişken olarak seçilmiştir. Sonuçlar kaldıraç oranı, aktif büyüklük, takipteki kredilerin oranı, operasyonel etkinlik, kredi mevduat oranı ve banka piyasa yoğunluğunun karlılık ile istatistiki bakımdan anlamlı ilişki içinde olduğunu göstermiştir.

Supiyadi vd. (2019), Endonezya’da 2010-2017 yıllarında İslami banka karlılığının iç ve dış etkenlerini sabit etkiler modeli ile incelemişlerdir. ROA üzerinde sermaye yeterliliği, kredi riski ve aktif büyüklüğü anlamlı ve olumsuz etkiye sahipken, likidite banka karlılığı üzerinde olumlu ve anlamlı etkiye sahiptir. Dış faktör olarak yalnızca enflasyon anlamlı ve pozitif etkili iken, GSYİH negatif ve anlamlı etkilidir.

Bakkeri ve Ali (2020), Orta Doğu ve Kuzey Afrika’daki 30 İslami bankanın karlılıkları üzerinde etkisi olan iç ve dış faktörleri, 2005-2018 yılları için panel EKK metoduyla tahmin etmişlerdir. Sonuçlar, yönetim kalitesinin, kapitalizasyonun, likiditenin, hizmetlerin kalitesinin, personelin yetkinliğinin ve kadınların varlığının karlılığın önemli belirleyicileri olduğunu göstermiştir. Büyüklük, çeşitlendirme ve enflasyon gibi diğer belirleyicilerin İslami bankaların karlılığı üzerinde önemli bir etkisi olmadığı tespit edilmiştir.

Parlakkaya vd. (2020), Türkiye’deki üç katılım bankasının 2006-2019 dönemi verileriyle panel EKK dayalı olarak karlılık belirleyicilerini tespit etmişlerdir. Kredi riski, banka büyüklüğü, faaliyet etkinliği ve enflasyon ROA üzerinde etkilidir. Operasyonel risk, faaliyet etkinliği, kredi riski ve enflasyon ise



ROE değişkenini etkilemektedir. Ayrıca katılım bankalarının karlılığı üzerinde bankaların kendilerine özgü değişkenlerinin, makroekonomik göstergelere göre daha etkili olduğu ifade edilmiştir.

Yılmaz ve Özgür (2021), Türkiye’de 2015-2019 yılları arasında statik panel veri analizleriyle net dönem kârı-zararı/toplam aktiflerin bağımlı değişken olduğu durumda karlılığa etki eden içsel ve dışsal faktörleri incelemiştir. Aktif karlılık ile anlamlı ilişkisi bulunan sermaye yeterlilik oranı ve kullanılan fonların negatif etkili olduğu görülmüştür.

Şeker ve Çemberlitaş (2022), Türkiye’de 2016-2021 dönemi için çeyreklik verilerle katılım bankalarının karlılığı üzerine etki eden içsel ve dışsal faktörleri sabit etkiler modeli ile belirlemiştir. Modelde hem aktif karlılık hem de öz sermaye karlılığı iki ayrı modelde bağımsız değişken olarak kullanılmıştır. Bulgular aktif karlılığının bağımsız değişken olduğu durumda yalnızca takipteki alacakların pozitif ve anlamlı etkisi olduğunu göstermiştir. Bağımsız değişken öz sermaye karlılığı olduğunda ise toplanan fonlar, takipteki alacaklar ve toplam aktifler pozitif ve anlamlı sonuç vermiştir. Anlamlı ve negatif tek makro gösterge ise külçe altın satış fiyatıdır.

### YÖNTEM

Araştırmanın evreni finansal performansın ölçüsü olarak bilinen karlılık tüm bankalarda olduğu gibi katılım bankalarında da en önemli amaçtır. Bu çalışmada katılım bankalarında karlılığa etki eden makroekonomik faktörler araştırılmıştır. Bahreyn, Bangladeş, Malezya, Suudi Arabistan, Türkiye, Birleşik Arap Emirlikleri, Brunei, Mısır, Endonezya, Ürdün, Nijerya, Umman, Pakistan ve Sudan’ın oluşturduğu 14 ülkeli panel için 2014-2020 yılları veri mevcudiyetine göre analize dahil edilmiştir. Karlılık göstergesi ROA bağımsız değişken olarak kullanılmıştır. Bağımlı değişkenler ise GRW, POP, CAP, GEXP, OPN göstergelerinden oluşmaktadır. ROA; öz sermaye karlılığındaki büyüme oranını, PGRW; kişi başına düşen gelirdeki yıllık büyüme oranını, POP; nüfustaki yıllık büyüme oranını, CAP; sabit sermaye birikimindeki yıllık büyüme oranını, GEXP; hükümet harcamalarındaki yıllık büyüme oranını, OPN; dışa açıklık oranını göstermektedir. Veriler Dünya Bankası ve İslami Finansal Hizmetler Kurulu (IFSB) veri tabanlarından elde edilmiştir. Bağımsız değişken ve bağımlı değişkenlere bağlı olarak tahmin edilen panel kantil regresyon eşitliği (1) aşağıdaki gibidir:

$$ROA_{it} = \beta_{it} + \beta_1 PGRW_{it} + \beta_2 POP_{it} + \beta_3 CAP_{it} + \beta_4 GEXP_{it} + \beta_5 OPN_{it} + \varepsilon_{it} \quad (1)$$

Panel kantil regresyonunda serilerin normal dağılım gösterip göstermediği değişkenlerin için basıklık (Kurtosis) ve çarpıklık (Skewness) incelemesi ile elde edilmektedir. Çarpıklık değerleri 0 iken normal dağılım, 0’dan küçük iken sola çarpıklık, 0’dan büyük iken sağa çarpıklık bulunduğu ifade edilmektedir. Verilerde dağılım genişliğini ölçen değerlerin 0’dan farklı olması normal dağılım olmadığını göstermektedir. Normal dağılımın kontrolünde Shapiro-Wilk ve Shapiro-Francia testleri kullanılmaktadır. Bu testler için olasılık değerinin 0,05’ten küçük olması normal dağılımın yokluğunu göstermektedir. Normal dağılım ile ilgili işlemlerden sonra doğrusal ya da doğrusal olmayan farklı modellerin analizlerinde kullanılan Koenker ve Basset Jr (1978)’in önerdiği panel kantil regresyon tahmin edilmiştir. Denklem 2’de görüldüğü gibi değişken için kantil değeri  $Quant_{i\theta}(y_i/x_i)$  ile hesaplanmaktadır (Xu ve Lin, 2018: 449-453; Salari vd. 2021: 49632-49634).

$$y_i = x_i b_{\theta i} + \mu_{\theta i}, \quad 0 < \theta < 1 \quad Quant_{i\theta}(y_i/x_i) = x_i \beta_{\theta} \quad (2)$$

Yukarıdaki tahminle, EKK yönteminin etkin sonuçlar vermediği durum için daha güçlü sonuçlar elde etme fırsatı doğmaktadır.

### BULGULAR

Değişkenlere ait normal dağılım bilgileri normal dağılım sergilemediğini göstermiştir. Serilerin normal dağılmaması standart EKK tahmincisi yerine panel kantil regresyon yönteminin kullanılmasının daha uygun olacağını göstermektedir. Tablo 1 yardımıyla panel kantil regresyon sonuçları izlenebilir.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 1.** Panel Kantil Regresyon Sonuçları

Değişkenler	KANTİLLER					EKK
	10	25	50	75	90	
<b>C</b>	0.360 <sup>a</sup> (0.000)	0.492 <sup>a</sup> (0.000)	0.696 <sup>a</sup> (0.000)	0.825 <sup>a</sup> (0.000)	1.768 <sup>a</sup> (0.000)	0.722 <sup>a</sup> (0.000)
<b>PGRW</b>	0.025 <sup>c</sup> (0.082)	0.005 (0.640)	-0.001 (0.410)	0.750 (0.222)	0.900 (0.482)	0.005 (0.777)
<b>POP</b>	0.028 <sup>c</sup> (0.063)	0.032 <sup>b</sup> (0.043)	0.015 (0.376)	-0.002 (0.874)	-0.037 (0.126)	0.022 (0.547)
<b>CAP</b>	0.002 <sup>c</sup> (0.090)	0.002 <sup>c</sup> (0.080)	0.005 <sup>b</sup> (0.031)	0.007 <sup>b</sup> (0.024)	0.012 <sup>c</sup> (0.050)	0.002 (0.657)
<b>GEXP</b>	0.001 (0.590)	0.005 (0.848)	-0.002 (0.940)	-0.001 (0.584)	-0.007 (0.137)	-0.003 (0.632)
<b>OPN</b>	0.002 <sup>a</sup> (0.009)	0.002 <sup>b</sup> (0.010)	0.003 <sup>b</sup> (0.016)	0.009 <sup>b</sup> (0.039)	0.006 <sup>a</sup> (0.001)	0.001 (0.298)

Not: Olasılık değerleri parantez içinde verilmiş olup a, b ve c sırasıyla %1, %5 ve %10 anlamlılığı göstermektedir.

Tablo 1'e göre kantiller arasında katılım bankalarının karlılığını belirleyen faktörlerin etkisi değişmektedir. Kişi başına düşen gelirdeki büyüme için yalnızca 10. kantilde anlamlı pozitif ilişki elde edilmiştir. Nüfus artış hızı ise 10. ve 25. kantillerde anlamlı ve pozitif etkilidir. Sermaye birikimi tüm kantiller için anlamlı sonuç verirken etkinin oldukça küçük olduğu görülmüştür. Hükümet harcamalarındaki artış ise hiçbir kantil için karlılık üzerinde etki oluşturmamaktadır. Hükümet harcamalarındaki yıllık büyüme oranı için de anlamlı etki elde edilememiştir. Yine ticari dışa açıklık değişkeni de tüm kantiller için küçük olmakla birlikte pozitif ve anlamlı bulgu sunmaktadır. Son olarak Tablo 1'de standart EKK sonuçları görülmektedir. Bulgular kantil regresyon sonuçlarının EKK sonuçlarına göre daha anlamlı olduğunu göstermektedir. Kantil regresyon ile bağımlı değişkene ait farklı değerlerin bağımsız değişkenlere etkisinin daha ayrıntılı bilgiler sunduğu ifade edilebilir. Bulgular detaylı incelendiğinde paneli oluşturan ülkelerde katılım bankalarının karlılığını etkileyen makroekonomik faktörlerin karlılık üzerinde etkisinin sınırlı olduğu görülmektedir. Fakat dışa açıklık değişkeni için özel vurgu yapmak faydalı olacaktır. Dışa açıklık tüm ülkeler için piyasaların uluslararasılaşması açısından önemlidir. Dışa açık ekonomiler bankacılık sektörü ve özelde katılım bankaları için yeni müşteri potansiyeli anlamına gelmektedir. Böylece karlılığı sağlamada etkili bir yol olarak kabul edilebilir.

## TARTIŞMA VE SONUÇ

Bu çalışmada katılım bankalarının karlılığının dış faktörlerden etkilenip etkilenmediğini incelenmiştir. Ampirik bulgular Ali vd. (2012), Dodi vd. (2018), Parlakkaya vd. (2020), Şeker ve Çemberlitaş (2022) gibi çalışmalarla benzer sonuç ortaya koymuştur. Makroekonomik göstergelerin banka karlılığı üzerinde etkisinin yüksek düzeyde olmadığı bulgusuna ulaşılmıştır. En önemli etkiye sahip değişkenler sermaye birikimi ve dışa açıklıktır. Bazı hükümetlerin benimsediği korumacı politikaların katılım bankalarının karlılığını olumsuz etkileyerek bankacılığın gelecekteki gelişimini bozabileceği tespit edilmiştir. Karlılığı artıran dışa açıklık politikalarının oluşturulması önemlidir. Katılım bankalarının karlılıklarını

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

artırabilmek için benimsedikleri yönetim stratejilerinin daha önemli olduğu ortaya çıkmaktadır. Finansal performansa dayalı değişkenlerle tahminler yapılması daha etkin sonuçlar elde edilmesini sağlayacaktır.

Para piyasalarının en temel organı bankalardır. Çünkü bankalar hem tasarrufların ekonomiye girmesi hem de finansmana olan ihtiyacın karşılanmasında önemli bir görev üstlenmektedir. Katılım bankalarının da içinde bulunduğu bankacılık sektöründe karlılığın düşmesi, finans sektöründeki itici gücün zayıflaması anlamına gelmektedir. Son dönemde ortaya çıkan krizler ve bankacılık sektöründeki ilişki karlılığının makroekonomik değişkenlerle ilişkisinin kopamayacağını göstermektedir.

Son olarak bu çalışmanın en önemli kısıtının veri elde etme süreci olduğunu belirtmekte fayda vardır. Hem ülke hem dönem olarak daha genişletilmiş panellerle çalışılması bulguların güvenilirliğini artıracaktır. Ayrıca daha fazla değişken ilave edilerek banka karlılığı için etkili faktörler tespit edilebilir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SOSYAL İLİŞKİLERİN SANAL DÜNYASI; METAVERSE VE REKREATİF ETKİNLİKLER ÜZERİNE BİR İNCELEME

### THE VIRTUAL WORLD OF SOCIAL RELATIONS; AN INVESTIGATION OF METAVERSE AND RECREATIONAL ACTIVITIES

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#### ÖZET

Metaverse ve rekreasyon, dijital dünyada insan etkileşimlerini ve eğlence deneyimlerini dönüştüren iki önemli kavramdır. Metaverse, sanal dünyaların, sosyal medyanın ve artırılmış gerçekliğin birleştiği, çok boyutlu bir dijital evreni ifade eder. Rekreasyon ise kişisel zevk ve eğlence amaçları için yapılan aktiviteleri içerir. Bu iki kavram arasındaki ilişki, dijital çağın eğlence ve etkileşim paradigmasını tamamen değiştirmektedir.

Metaverse, insanların sanal dünyalarda buluşabileceği ve etkileşimde bulunabileceği bir platform sunar. Burada, rekreasyon fikri kendiliğinden ortaya çıkar. Kullanıcılar, avatarlarını kişiselleştirerek, sanal konserlere katılarak, sanal spor etkinliklerine katılarak veya sanal dünyaları keşfederek eğlenebilirler. Metaverse, fiziksel sınırlamaların olmadığı bir ortam sunar, bu da rekreasyonun daha erişilebilir ve çeşitli hale gelmesine olanak tanır. Bu çalışmada nitel araştırma yöntemlerinden 'doküman analizi' yöntemi kullanılacaktır.

Rekreasyon, metaverse içinde çeşitli biçimlerde gerçekleşebilir. Örneğin, bir kullanıcı tatilini gerçek dünyada yaşamadan önce, tatil destinasyonunu metaverse içinde sanal olarak ziyaret edebilir. Sanal gerçeklik (VR) teknolojisi, bu deneyimleri daha da özgün hale getirirken, artırılmış gerçeklik (AR) kullanıcıların fiziksel dünya ile etkileşimde bulunmalarına olanak tanır. Metaverse aynı zamanda spor ve oyun dünyasına da büyük bir etki yapmıştır. Sanal sporlar ve e-sporlar, metaverse içinde popüler hale gelmiştir. Bu, rekabetçi oyunları sevenlerin sanal dünyada rekabet etme ve izleme şansına sahip olduğu bir rekreasyon biçimidir.

Sonuç olarak, metaverse ve rekreasyon, dijital çağın insanlar arası etkileşim ve eğlence anlayışını kökten değiştiren iki önemli kavramdır. Metaverse, rekreasyon deneyimlerini daha da özgün ve erişilebilir hale getirirken, kullanıcılara sanal dünyada farklı ve etkileyici deneyimler sunar. Bu iki kavramın birleşimi, gelecekteki dijital eğlence ve etkileşim dünyasının temelini oluşturur. Bu bağlamda metaverse evreni içerisinde yer alan rekreatif etkinlik ve uygulamaların geliştirilmesi, denetlenmesi ve incelenmesi gerekmektedir. Bireylerin dijital dünyaya daha da adapte olması neticesinde bu uygulamaların değer kazanacağı düşünülmektedir.

**Anahtar kelimeler:** Dijitalleşme, Metaverse, Rekreasyon.

#### ABSTRACT

The relationship between the Metaverse and recreation is a pivotal aspect of transforming digital interactions and entertainment experiences. The Metaverse refers to a multidimensional digital universe where virtual worlds, social media, and augmented reality converge. Recreation encompasses activities undertaken for personal enjoyment and entertainment purposes. The interplay between these two concepts is reshaping the paradigms of entertainment and interaction in the digital age.

The Metaverse provides a platform where individuals can gather and interact in virtual realms, naturally giving rise to the concept of recreation. Users can personalize their avatars, participate in virtual concerts, engage in virtual sports events, or explore virtual worlds. The Metaverse offers an environment

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

without physical constraints, making recreation more accessible and diverse. In this study, the 'document analysis' method, one of the qualitative research methods, has been used.

Recreation can take various forms within the Metaverse. For instance, users can virtually visit holiday destinations before experiencing them in the physical world. Virtual Reality (VR) technology enhances these experiences, while Augmented Reality (AR) enables users to interact with the physical world simultaneously. The Metaverse has also significantly impacted the world of sports and gaming. Virtual sports and eSports have gained popularity within the Metaverse. This form of recreation allows enthusiasts of competitive gaming to compete and spectate within the virtual world.

In conclusion, the Metaverse and recreation are two pivotal concepts that are fundamentally reshaping interpersonal interactions and entertainment in the digital age. The Metaverse enhances recreation experiences, offering users distinct and immersive experiences in the virtual realm. The fusion of these two concepts have been laid the foundation for the future of digital entertainment and interaction. In this context, recreational activities and applications within the metaverse universe need to be developed, supervised and examined. It is thought that these applications will gain value as individuals adapt more to the digital world.

**Keywords:** Digitalization, Metaverse, Recreation.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DEPREMİN SOSYO-MEKANSAL ETKİLERİ: İSTANBUL'DA BİR ORTA SINIF MAHALLESİ'NİN DEĞİŞİMİ

### SOCIO-SPATIAL EFFECTS OF THE EARTHQUAKE: THE TRANSFORMATION OF A MIDDLE-CLASS NEIGHBOURHOOD IN ISTANBUL

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#### ÖZET

1999 Gölcük depreminin İstanbul ilinde en çok etkilediği ilçe Avcılar'dır. Depremden bugüne Avcılar Türkiye'nin toplumsal hafızasında deprem ile anılan bir yerdir. Bu durum depremin yarattığı fiziksel hasarlar ve can kayıplarının ötesinde sosyal ve ekonomik etkilerden kaynaklanmaktadır. İlçe, 1980'lerin ortalarından itibaren kentleşme eğilimleri ve politikaları paralelinde inşaat faaliyetlerinin yoğunlaştığı bir bölgedir. Avcılar'ın kentsel olarak taşıdığı bazı nitelikler ve yeni konut sunum biçimleri bilhassa güney kısmına ve merkez hattına İstanbul'daki orta ve üst orta sınıfları bu dönemde ilçeye çekmiştir. 1999 depremi, Avcılar'ın gerek mekânsal gelişimi gerekse toplumsal yapısında büyük bir kırılma yaratmıştır. Deprem öncesinde ilçenin güney kısmına, E-5'in (D-100 karayolu) altında kalan sahil bandındaki bölüme ve merkez hattına, yerleşen orta sınıfların çeşitli katmanları depremin ardından ilçeyi terk etmiştir. Avcılar'ın sınıfsal coğrafyası depremle birlikte değişmiştir. Mahallerde depremin tezahürlerine göre gayrimenkul fiyatlarının yeniden değerlendirildiği spekülasyon bir ortam oluşmuştur. Bu durum Denizköşkler Mahallesi'nde kristalize olurken, depremin sonuçları tüm ilçenin gelecek 20 yılını etkilemiştir. Denizköşkler'in orta sınıf sakinleri evlerini çok ucuz fiyatlarla satmış, Beylikdüzü ve Bahçeşehir gibi en yakındaki yeni orta sınıf meskenlere taşınmıştır. Mahalledeki konut satış ve kira fiyatları ucuzlayınca bu kez İstanbul'dan ve ilçeden dar gelirli ve yoksul bir kitle Denizköşkler'e yerleşmiştir. Ayrıca mahalle, kent merkezinde marjinalize edilen ve kentin içinde görünmez olmaya, anonimleşmeye çalışan gruplar (göçmenler, madde kullananlar, evsizler) için sığınacak bir yere dönüşmüştür. Deprem sonrasında ise kentin büyümesi ve gelişmesi kuzey aksında gerçekleşmiştir. TEM Otoyolu'nun kuzeyinde yer alan İspartakule yeni orta sınıf yerleşimleri olan toplu konut projelerinin yer aldığı bir bölge ile bu süreçte kurulacaktır. Bu çalışma bir mahalleyi baz alarak bir doğal afet olarak tanımlanan depremin kentsel coğrafyada yarattığı sınıfsal, mekânsal ve sosyal değişimin izlerini sürerek bu değişimin yönüne dair eğilimleri 2000'li yılların kent politikaları ile ele alacaktır.

**Anahtar kelimeler:** Deprem, İstanbul, Denizköşkler, sosyo-mekansal farklılaşma.

#### ABSTRACT

1999 Gölcük depreminin İstanbul ilinde en çok etkilediği ilçe Avcılar'dır. Depremden bugüne Avcılar Türkiye'nin toplumsal hafızasında deprem ile anılan bir yerdir. Bu durum depremin yarattığı fiziksel hasarlar ve can kayıplarının ötesinde sosyal ve ekonomik etkilerden kaynaklanmaktadır. İlçe, 1980'lerin ortalarından itibaren kentleşme eğilimleri ve politikaları paralelinde inşaat faaliyetlerinin yoğunlaştığı bir bölgedir. Avcılar'ın kentsel olarak taşıdığı bazı nitelikler ve yeni konut sunum biçimleri bilhassa güney kısmına ve merkez hattına İstanbul'daki orta ve üst orta sınıfları bu dönemde ilçeye çekmiştir. 1999 depremi, Avcılar'ın gerek mekânsal gelişimi gerekse toplumsal yapısında büyük bir kırılma yaratmıştır. Deprem öncesinde ilçenin güney kısmına, E-5'in (D-100 karayolu) altında kalan sahil bandındaki bölüme ve merkez hattına, yerleşen orta sınıfların çeşitli katmanları depremin ardından ilçeyi terk etmiştir. Avcılar'ın sınıfsal coğrafyası depremle birlikte değişmiştir. Mahallerde depremin tezahürlerine göre gayrimenkul fiyatlarının yeniden değerlendirildiği spekülasyon bir ortam oluşmuştur. Bu durum Denizköşkler Mahallesi'nde kristalize olurken, depremin sonuçları tüm ilçenin gelecek 20 yılını etkilemiştir. Denizköşkler'in orta sınıf sakinleri evlerini çok ucuz fiyatlarla satmış, Beylikdüzü ve Bahçeşehir gibi en yakındaki yeni orta sınıf meskenlere taşınmıştır. Mahalledeki konut satış ve kira



fiyatları ucuzlayınca bu kez İstanbul'dan ve ilçeden dar gelirli ve yoksul bir kitle Denizköşkler'e yerleşmiştir. Ayrıca mahalle, kent merkezinde marjinalize edilen ve kentin içinde görünmez olmaya, anonimleşmeye çalışan gruplar (göçmenler, madde kullananlar, evsizler) için sığınacak bir yere dönüşmüştür. Deprem sonrasında ise kentin büyümesi ve gelişmesi kuzey aksında gerçekleşmiştir. TEM Otoyolu'nun kuzeyinde yer alan İspartakule yeni orta sınıf yerleşimleri olan toplu konut projelerinin yer aldığı bir bölge ile bu süreçte kurulacaktır. Bu çalışma bir mahalleyi baz alarak bir doğal afet olarak tanımlanan depremin kentsel coğrafyada yarattığı sınıfsal, mekânsal ve sosyal değişimin izlerini sürerek bu değişimin yönüne dair eğilimleri 2000'li yılların kent politikaları ile ele alacaktır.

**Keywords:** Earthquake, Istanbul, Denizköşkler, socio-spatial differentiation.

## GİRİŞ

Avcılar ilçesinin güneyinde yer alan Denizköşkler mahallesi D-100 karayolu ve Marmara Denizi'ne kıyısı olan yaklaşık 50 bin kişinin (TÜİK, 2023) yaşadığı bir sahil yerleşimdir. Mahallenin gelişiminde sınırı olan diğer mahallelerle yakın ilişki öne çıkmakta 1980'li yıllara kadar Ambarlı, Merkez ve Gümüşpala mahallelerinin bir uzantısı olarak gelişmiştir. 1980'lerden önce mahalle tarım ve sayfiye yaşamı hâkim olmuş, daimî olarak ikame eden nüfusun yoğunluğu az olmuştur. Merkeze yakın olması, sahil kıyısında yer alması ve Londra Asfaltı ile olan sınırı, mahallenin sonraki yıllardaki ani ve hızlı gelişiminde etkili olan faktörlerdir.

Mahallenin mekansal tarihinde ana kırılmalar 1980 sonrasında yaşanmıştır. 1980'li yılların ortalarından itibaren mahallede artan inşaat faaliyetleri, üretilen konutların arasında ilçe için yeni denebilecek konut tiplerinin olması, 1990'lara doğru kentin farklı bölgelerinden orta sınıf katmanların mahalleye yerleşmeye başlamıştır. Özellikle 1990'lı yıllarda gayrimenkul değerlerinin oldukça yükseldiği orta sınıfların yaşam kültürünün hâkim olduğu Denizköşkler İstanbul'un farklı yerlerinden nüfusu çekmiştir. 1999 depremiyle mahallenin bu nitelikleri ve gelişmeleri altüst olmuştur. Bu çalışma Denizköşkler mahallesinde yaşanan bu dönüşümün ayrıntılarına odaklanacaktır. Bu bağlamda konumuzun odağını oluşturan 1999 depremi öncesinde hem ilçenin hem de mahallenin tarihine dair genel bir tarihsel çerçeve sunulacak ve ardından depremle birlikte oluşan değişim irdelenecektir.

## YÖNTEM

Bu çalışma devlet arşivleri, resmi sayısal veriler, gazete ve dergi arşivleri ile Avcılar'da gerçekleştirilen araştırma projesinin<sup>1</sup> bulgularının seçilmiş ve sınırlı bir bölümüne yer verilerek oluşmuştur. Cumhuriyet Devlet arşivlerinde yer alan resmi kayıtlar, kadı sicilleri ve Başbakanlık arşivi gibi arşiv kaynaklarından elde edilen bazı kayıtlar ile özellikle eski gazete ve dergi arşivlerinde yer alan haber, gazete ilanı gibi kaynaklar ilçenin toplumsal tarihine dair önemli göstergeler sunmaktadır. Ancak bundan sonraki kısımda ele alınacak kısım esas olarak sözlü tarih görüşmelerine dayanan alan araştırmasının bulgu ve analizlerinin yine sınırlı bir bölümüne dayanmaktadır<sup>2</sup>.

## BULGULAR

### Avcılar ve Denizköşkler'e Kısa Bir Bakış

Avcılar, İstanbul'un batı ucunda tarihsel olarak eski ve büyük çiftlik alanlarının olduğu bölgede yer alan, ADNK verilerine göre 2022 nüfusu 452.132 kişiden oluşan (TÜİK, 2023) 10 mahalleye sahip bir ilçedir. İlçe güneyinde Marmara Denizi ile doğusunda Küçükçekmece gölü ile sınıra sahip olan özgün bir ekolojik yerleşime sahiptir. Güneyde sahil bandında yer alan sahil yolu tali bir yol olarak kullanılırken, D-100 (E-5) karayolu ve TEM otoyolu ilçeyi paralel olarak üç kısma ayırmaktadır.

Avcılar ve bölgesi Osmanlı İmparatorluğu'nun önemli tarım alanlarından biridir. Bilhassa tahıl ürünleri üretimi açısından bölge bir anlamıyla tahıl ambarı olarak işlev görmüştür. İmparatorluk döneminde

<sup>1</sup> Avcılar Toplumsal ve Mekânsal Tarih Projesi Avcılar Belediyesi'nin istek ve desteği ile gerçekleşmiştir. Bu çalışmada araştırmanın sözlü tarih-mülakatlardan oluşan verilerine doğrudan başvurulmamış daha ziyade ikincil kaynaklardan oluşan analizlere ve nitel görüşmelerdeki aktarımlardan süzülen dolaylı bilgilere yer verilmiştir

<sup>2</sup> Araştırma projesi ilçenin 10 mahallesini kapsayan 2 yıl süren ve 130 katılımcıdan oluşan kapsamlı bir projedir. Bu metin ise bu mahallelerden birinin çok sınırlı bir dönemine odaklanmaktadır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Müslüma ve gayrimüslim toplulukların yaşadığı köy ve çiftlik alanlarında ayrıca köylüler ve devlet erkani üyesi olan çiftlik sahipleri mevcuttur (Eyüp Mahkemesi, Hüküm no: 653, 1741-1748; Cumhurbaşkanlığı Devlet Arşivleri Başkanlığı, Belge no: H-29-11-1217, 1803; Cumhurbaşkanlığı Devlet Arşivleri Başkanlığı, Belge no: 1527-0-0, 1852). Cumhuriyetin kuruluşu ile çiftlikler, tarım alanları ve nüfus dokusundaki heterojen yaşam büyük farklılaşmalar yaşa da tarıma ve hayvancılığa dayanan ekonomik yaşam 1950'lere kadar sürmüştür. Balkan Savaşları, 1. Dünya Savaşı ve Cumhuriyet'in kuruluşu gibi gelişmelere paralel olarak bölgedeki nüfus burayı terk etmiş, mübadel ile Yunansitan'dan, serbest göçmen olarak ise ikisi Bulgaristan'dan gelen üç yeni göçmen grubu Avcılar'a yerleşerek bugünün mahallelerini oluşturan üç köyü (Ambarlı, Amindos (Merkez mahallesi), Firüzköy) kurmuşlardır (Lozan Mübadilleri Vakfı, 2022; Dinçtürk, 2018; Karagöz, 2000).

1950'lerde İstanbul metropolitan alanındaki genişlemeden Avcılar ilçesi yoğun olarak etkilenmiştir. 1950-1980 arasında İstanbul'da yaşanan hızlı kentleşme ve sanayileşmenin yarattığı baskı ile geniş tarımsal araziler parselizasyona uğrayarak küçük parçalara bölünmüş, arazilerin mülkiyetlerinde el değişimleri gerçekleşmiştir. Bunun yanı sıra İstanbul'un eski kent merkezinden kentin çeperine doğru saçaklanan sanayinin (Kıray, 2003; Tümertekin, 1997; Tekeli, 2009) önemli yerleşim alanlarından biri de Avcılar ilçesi olmuştur. 1960'ların ortalarından itibaren kademeli olarak artarak yeni sanayi kuruluşları ilçeye gelerek bölgedeki arazi örüntülerini değiştirmiş, ekonomik üretimi farklılaştırmış ve yeni bir emek göçünü buraya çekmiştir. 1980'li yıllara kadar bölge bir taraftan sanayileşme ve kentleşme baskısı ile çeşitli dönüşümlere maruz kalmış diğer taraftan ise tarım, balıkçılık, hayvancılık, sayfiyeciliğe dayanan ticari aktiviteler gibi yerel ekonomik faaliyetler sürmüştür (Kaya-Erdoğan, 2023).

Denizköşkler mahallesi yukarıda genel hatlarıyla bahsettiğimiz bu tarihsel arka planda Cumhuriyet'in kuruluşuyla bölgedeye gelen göçmenlerin eski tarım arazilerinin olduğu bir sahil mahallesidir. Aynı zamanda Londra Asfaltı genişletilmeden önce dar bir yol ile ayrıldığı kuzeyinde yer alan Gümüşpala mahallesinin bir uzantısı gibidir. Londra asfaltının genişletilmesi, parselizasyon uygulamalarından yüksek düzeyde etkilenen Denizköşkler mahallesinde arazilerin el değişimi 1950'li yıllardaki gazetelere yansımaktadır.

1950'li yıllardaki gazete ve arşiv haberlerinden, bu dönemde gerçekleşen parselasyonlardan Ambarlı ve Avcılar köylülerinin öncelikle çeperlerde kaldığı için Denizköşkler'de kalan arsalarını satma yoluna gittikleri anlaşılmaktadır. Köylülerin geniş arazileri emlak aracılığı tarafından satın alınarak ve ifraz edilerek İstanbullulara satılmıştır. Arsa satış ilanlarında Marşal Bulvarına atıfla, Florya koyunun batı sahili olarak servis edilen Deniz köşklerdeki köylülere ait araziler dönemin İstanbul menşeli emlak firmaları tarafından satın alınarak küçük parçalar halinde sattığı görülmektedir (Cumhuriyet Gazetesi, 1958; Cumhuriyet Gazetesi, 1953). Arazilerin ölçüğünde ve mülkiyetinde yaşanan bu değişim 1980'li yıllardaki mekânsal gelişmeleri etkilemiştir.

1960'lı yıllardan itibaren bölgede canlanan sayfiye yaşamına da Denizköşkler mahallesi ev sahipliği yapmıştır. 1960'lardan sonra Avrupa Yakası'nın sakinlerinin Florya'dan Kumburgaz'a kadar giden sahil bandında sayfiye bölgesi olarak kullandığı yerlerden biri olan Denizköşkler hem yazlık konutlar hem de kamplarla İstanbul merkezinden ücretli orta sınıfları ağırlamıştır. Doğu-batı yönünde sırayla Söğütü, Lido ve son olarak İETT kampı yer almıştır (Ergut, Akpınar ve Akay, 2016). Ayrıca İstanbul'un Etiler, Fatih gibi merkezlerinden piknik yapmaya gelen günü birlik ziyaretçileri de olmuştur. 1970'lerle birlikte mahalleye Anadolu göçmenleri yerleşmeye başlasa da mahalledeki nüfus artışı ve yapılaşma esas olarak 1980 sonrasında gerçekleşmiş bu döneme kadar sayfiye yaşamı ve dokusu bu sahil mahallesine karakterini vermiştir.

İlçenin ve mahallenin 1980 öncesindeki görünümü yukarıda genel hatlarıyla verilen tarihsel özellikleriyle kentin kenarında kalan bir tarım ve sayfiye alanı olarak tarif edilebilir. Mahallenin tarihsel kırılmaları ise bu çalışmanın da konusu olacak şekilde 1980 sonrasında gerçekleşmiştir. Bunlardan ilki 1980'lerin ortalarından itibaren başlayan ve 1990'lı yıllarda adeta patlama yaşanan yapılaşmanın hem fiziki hem sosyal doku üzerindeki etkisidir. İkincisi ise ikincisi ise 1999 depreminin, mahallenin bu niteliklerini ve gelişmeleri altüst ederek yeni bir sınıfsal coğrafya oluşturmasıdır.

### 1980 Sonrasında Yaşanan Değişim

12 Eylül askeri darbesi sonrasında, diğer belde belediyeleri gibi, Avcılar Belediyesi de lağvedilmiştir. 1984-1992 yılları arasında Küçükçekmece ve Bakırköy ilçelerine bağlı kalmıştır. 1992<sup>3</sup> yılında yeniden ilçe belediyesi kurulmuştur (Resmî Gazete, Sayı no: 21247, 1992). 1984-1992 ve 1992-1999 dönemlerinde yine ANAP'lı belediyeler tarafından yönetilmiştir. ANAP'ın inşaat ve kentsel imar hareketlerine dayanan birikim modeli '80 ve '90'lı yılları şekillendirmiştir.<sup>4</sup>

1980'lerin ikinci yarısında metropoliten alandaki sanayinin yeniden kent dışına doğru çıkarılmasıyla ticaret ve sanayinin Batı yönündeki büyümesi Avcılar'ı da kapsayarak hız kesmeden devam etmiştir.<sup>5</sup> Müteahhit eliyle apartmanlaşma, yapı kooperatifleri tarafından üretilen toplu konutlar ve diğer konut biçimleri sıçramalı olarak artarak hâkim yapı formuna dönüşmüştür. Bu 20 yıllık süreç boyunca konut ve istihdam alternatifleri sunan ilçe, İstanbul'un farklı semtlerinden yeni kitleleri kendisine çekmeye devam etmiştir.<sup>6</sup> İlçe belediyesinin yeniden açılması sonrasında arazi ve konut fiyatları oldukça yükselmiş, İstanbullu orta sınıfların ilçeye ilgileri artmıştır. Bu gelişmeler en açık biçimde Denizköşkler mahallesinde görünür hale gelmiştir. Denizköşkler'de apartman-toplu konut biçiminde üretilen üç tip konut tipi küçük girişimci niteliğindeki yap-satçı müteahhitler, yapı kooperatifleri ve orta ölçekli müteahhitler tarafından üretilen lüks konutlar biçimindedir.

1970'ler mahalleye yerleşmeye başlayan ve 1980 sonrasında nüfus yoğunluğu artan Anadolu göçmenleri mahallede inşaat ve ticaret sektöründe konumlanmış, mahallenin yapılaşmasında önemli rol oynamışlardır. Mahalle müteahhitleri olarak adlandırabileceğimiz sınırlı sermaye olanaklarına sahip küçük girişimci olan bu kişilerin birçoğu inşaat sektöründe çekirdekten yetişerek yap-satçı konut üretim modelini mahallede uygulamışlardır. Bir başka deyişle mahalledeki yap-satçı apartmanlaşma Anadolu göçmenleri eliyle olmuştur. Yine Anadolu göçmenlerinin bir bölümü tarafından işletilen, D-100 karayolunda yer alan mobilya, koltuk döşeme, marangozhane gibi inşaat sektörü ile ilişkili ticarethaneler bu tarihlerde mahalle yaygınlaşmıştır.

Yapı kooperatifleri Türkiye'de 1970'lerden sonra ve 1980'li yıllarda konut talebi olan kesimleri örgütleyen, kredi kaynakları ve ödeme kapasitelerine göre bir araya getiren örgütlenmelerdir. (Tekeli, 2009). Denizköşkler'deki yapı kooperatifleri de 1980'lerden sonra mahalleye giriş yapmıştır. 1980'lerden sonra yapı kooperatiflerine sağlanan imar ve inşaat avantajları, Denizköşkler mahallesindeki geniş, boş ve ucuz sayılabilecek arazi olanaklarıyla, kent merkezinden yeni göçlerin mahalleye akışına neden olacaktır. Kooperatifler, kentin diğer semtlerinde ağırlıklı kiracı olarak yaşayan, sabit ve düzenli geliri olan kamu ve özel sektördeki memur, işçi, teknisyen, idari personel, öğretmen, muhasebeci, doktor gibi kesimlerin "ev sahibi" olma amacıyla giriştikleri oluşumlardır. Dönemin güvenceli işlerinde çalışan, nispeten eğitim düzeyi yüksek, alt-orta ve orta sınıf profili, 1985 sonrasında üretilen toplu konut tarzındaki yapı kooperatifleri aracılığıyla mahalleye yerleşmeye başlamıştır.

Denizköşkler mahallesinde orta ölçekli inşaat firmaları ile yine yapı kooperatifleri tarafından dönemin inşaat teknolojisi, nitelikli yapı malzemesi ve mimari tasarımı kullanarak üretilen meskenler (yazlık siteler, villalar gibi) de İstanbul ölçeğinde üst orta-üst sınıfları kendisine çekmiştir. Üretilen toplu konut tarzındaki yapı kooperatifleri/şirketleri aracılığıyla «orta sınıflara» hitap eden yazlık/yazlık-kışık meskenler (MEİS Sitesi, Avcılar Tatil Sitesi, Martı Sitesi ve özellikle Derya Blokları yazlık amacıyla üretilmiş sitelere örnek gösterilebilir.

Bu sitelerde dönemin zenginleri ve zenginliğini temsil eden kesimleri yaşamıştır. Bu bağlamda Denizköşkler mahallesi 1999 depreminden önce orta sınıfların farklı katmanlarının mahallede bir arada

<sup>3</sup> İstanbul Büyükşehir sınırlarındaki son köy olan Firuzköy'ün de dâhil edilmesiyle; Ambarlı, Avcılar (Merkez), Cihangir, Denizköşkler, Firuzköy, Gümüşpala ve Mustafa Kemal Paşa ve Üniversite mahalleleri olmak üzere sekiz mahalle olarak kurulmuştur (Milliyet Gazetesi, 1992).

<sup>4</sup> ANAP'lı kentleşme döneminde hızlı yapılaşma, imar afları, yeni ulaşım aksları ile kentin çeperlerindeki arazi fiyatlarının artması, kent merkezindeki nüfus için çeperlerin çekim merkezi haline gelmesi, kaçak yapılaşma, kayırmacı imar kararları ve kıyılarda dolgu yapılaşması gibi müdahaleler söz konusu olmuştur.

<sup>5</sup> 1980-1990 arasında nüfusu dört kat artarak 127 bin kişiye ulaşmıştır (Şahin, 2015).

<sup>6</sup> Güneşli, Bahçelievler, Bakırköy, Kocasinan, Küçükçekmece ve Sefaköy gibi yakın bölgelerden yeni göçler gelmiştir.

yaşadığı mahallenin sosyal, kültürel ve ekonomik dokusunun orta sınıf alışkanlıkları ve tercihleri tarafından şekillendiği bir yerdir. Fatih, Kadıköy, Bakırköy gibi eski orta sınıf mahallelerinden yeni göçleri kendisine çeken Denizköşkler'in bu dokusu 1999 depremi ile kesif bir biçimde farklılaşmıştır.

### Depremın Ardından

1999 depremi, Avcılar'ın gerek mekânsal gelişimi gerekse toplumsal yapısında büyük bir kırılma yaratmıştır. Deprem öncesinde ilçenin güney kısmına, E-5'in (D-100 karayolu) altında kalan sahil bandındaki bölüme ve merkez hattına, yerleşen orta sınıfların çeşitli katmanları depremin ardından ilçeyi terk etmiştir. 1999 Gölcük depremiyle Avcılar'da 27 binanın yıkılmış, 216 can kaybı yaşanmıştır. Bu binalar dışında hasar alan binalar da vardır. Yıkılan binalar ağırlıkla Gümüşpala, Denizköşkler, D-100 karayolunun kenarında yer alıp kolonları ticarethaneler tarafından kesilen yapılardır. Denizköşkler zemin yapısı, fay hatlarına yakınlığı nedeniyle, depremin fiziki etkilerinden daha fazla etkilenmiş ve depremi daha yoğun olarak hissetmiştir. 1999 yılında Kasım ayında Düzce depreminin yaşanmasıyla mahalledeki varsıl nüfus hızla mahalleyi terk etmiş ardından orta sınıflar gayrimenkullerini rayiçlerinin çok altındaki fiyatlar ile satmıştır. Denizköşkler'in orta sınıf sakinleri yakın bölgelerde, batı yönünde Beylikdüzü, kuzeyde ise Bahçeşehir-Ispartakule gibi depreme dayanıklı olduğu düşünülen yeni orta sınıf konutlarının 2000'lerin ilk yarısından itibaren yaygınlaştığı alanlara göç etmiştir. Bunun dışında Anadolu yakasına ya da Sarıyer gibi depreme dayanıklı ilçelere gidenler daha köklü yer değişimlerini tercih etmişlerdir. Ayrıca özellikle Trakya (Çanakkale, Tekirdağ gibi) ile yoğun bağlantıları olan mahalle sakinlerinin bazıları ise bu Çanakkale, Tekirdağ gibi kentlere taşınmıştır. Mahallenin eski sakinleri arasında kalanların işçi, memur emeklilikleri gibi dar gelirli gruplardan oluştuğu söylenmektedir. Mahallede yaşayan kiracılar arasında da benzer bir durum söz konusu olmuştur.

Mahalle bir süre için durgunluk dönemi olarak tarif edilen bir süreç deneyimlenmiştir. Ancak mahalledeki konut satış ve kira fiyatları ucuzlayınca bu kez İstanbul'dan ve ilçeden dar gelirli ve yoksul bir kitle Denizköşkler'e yerleşmiştir. Avcılar içindeki Gümüşpala, Parseller (Mustafakemalpaşa ve Üniversite), yakın civardaki Sefaköy, Güneşli gibi işçi mahallelerinden «kentte konut alım ihtimali» olmayan kesimlerin konut alımıyla ya da kiracı olarak bölgeye yerleşimi başlamıştır. Ayrıca mahalle, kent merkezinde marjinalize edilen ve kentin içinde görünmez olmaya, anonimleşmeye çalışan gruplar (göçmenler, trans bireyler, madde kullananlar, evsizler) için sığınacak bir yere dönüşmüştür. Yoksulluk ve güvencesizlik hallerini gündelik yaşamının bir parçası olarak yaşayan bu yeni nüfus için deprem riski yaşamın diğer riskleri gibi bir risk faktörüdür. Mahalle 2000'lerin ortalarından itibaren, Safraaltı Afrika, Irak, İran ve ardından 2010'lardan sonra daha büyük kitlelerle Suriye, Irak, İran, Filistin ulus aşırı göçmenlere ev sahipliği yapmaktadır.

Depremle birlikte yaşanan nüfus değişimi demografik ve sosyolojik bir tarifi içerir. Giden nüfusun varsıllığının ötesinde eski mahalle sakinleri ve yerliler açısından hem bölgeye gelen hem de giden nüfusa dair sıfatlandırmalarda mali ve ekonomik sermayelerinin dışında kültürel ve sosyal sermayeleri farklılaşan iki uç gruptan bahsedilmektedir. Giden nüfusun, modernist bir tasavvur içerisinde, kentliliği, medeniliği ve Avrupalılığı temsil eden bir kitle olduğu düşünülmektedir. Bu anlamıyla seküler, kentli ve eğitilmiş bir topluluğun kaybı bir boyutuyla da sosyal ve siyasal bir kayıp anlamına gelmektedir. Onların gidişleriyle mahallede “kültürün” ve “seviyenin düştüğü” sıklıkla vurgulanan bir unsurdur. Gelenler ve gidenler arasında bir tür ayrımcı bir argüman üretmekten imtina eden pozisyonlar dahi deprem sonrasında mahallenin “nezihliğini” kaybettiğini ifade ederek bu farka işaret etmektedir. Bu fark mahalleli açısından ekonomik olduğu kadar, aynı zamanda estetik bir fark olarak tarif edilir.

Deprem sonrasında ilçenin ve bir bakıma da İstanbul'un kentin büyümesi ve gelişmesi kuzey aksında gerçekleşmiştir. TEM Otoyolu'nun kuzeyinde yer alan Bahçeşehir ve Ispartakule<sup>7</sup> yeni orta sınıf yerleşimleri olan toplu konut projelerinin yer aldığı bir bölge kurulmuş diğer taraftan 2009 yılında belediye olan Beylikdüzü ilçesinin oluşumunda ve sosyo-kültürel dokusunda Avcılar'dan giden bu kitlenin etkisi olduğu düşünülmektedir. Özellikle kuzey aks, merkezi düzeyde alınan imar değişikliği kararlarıyla büyük sermayeli inşaat şirketleri ya da kamu-özel iş birliği ile inşa edilmiştir. Türkiye'nin

<sup>7</sup> Ispartakule resmi olarak Tahtakale mahallesine bağlı bir bölgedir. Mahallenin coğrafi büyüklüğü ve Tahtakale mevki ile arasındaki sınıfsal farklılıklar nedeniyle Ispartakule mevki ve Tahtakale mevki olarak iki ayrı bölge olarak anılır.



2000'lerle birlikte yeniden benimsediği "inşaata dayalı büyüme ve kalkınma" politikalarının bir prototipi biçimindedir.

### TARTIŞMA VE SONUÇ

Deprem yıkımlar açısından en çok Denizköşkler'i etkilerken sosyal ve ekonomik yaşamında radikal bir kopuşa neden olmuştur. Avcılar'daki mahallerde depremin tezahürlerine göre gayrimenkul fiyatlarının yeniden değerlendirildiği spekülasyon bir ortam oluşmuştur. Bu durum Denizköşkler Mahallesi'nde kristalize olurken, depremin sonuçları tüm ilçenin gelecek 20 yılını etkilemiştir. Deprem sonrasında, deprem riski ve risk söylemi üzerinden kentin yeniden şekillendiği 2000'li yıllarda mahalledeki eski nüfus yeni orta sınıf yerleşimlerine kaçarken, kentin yoksul ve dışlanan kesimleri için mahalle bir tür sığınak haline dönüşmüştür. Gayrimenkul fiyatlarının aniden ve spekülasyon olarak düşmesi, kentin ekonomik olarak güçsüzlerinin Denizköşkler'e yerleşmesine neden olmuştur. Bunun yanı sıra bölgenin yaşadığı tenhalaşma bir anlamda anonim kalmaya çalışan, radikal bir yoksulluk düzeyinde ve sıradan gündelik hayatlarında yüksek risklerle yaşayan kesimleri mahalleye çekmiştir. Bu anlamda kent içinde güvensiz ve riskli yaşamlar sürdürenlerin deprem riski olan konutlara yerleştiği bir denklem oluşacaktır. Mahallede geçmişten bu yana yaşayan sakinler açısından ise bu değişim mekânsal etkilerinden ziyade sosyal etkileriyle hala kanıksanmamış bir dönüşüm olarak yaşanmıştır. Ancak bir bütün olarak 1999 depremi sonrasında gerek inşaat sermayesinin yatırım eğilimleri gerek kamuoyunun bu bölgeye yönelik duyarlılığı ve gerekse de yasal mevzuata getirilen sınırlandırmalar Denizköşkler'i de kapsayacak biçimde ilçenin güney aksında inşaat faaliyetlerinin kesintiye uğramasına neden olmuştur. Bu durum bir taraftan bina bazlı dönüşümü engellese de 2000 sonrasında İstanbul'da yaşanan "sınırsız yapılaşma" halini yansıtan ve ilçenin komşusu olan Küçükçekmece ve Esenyurt'daki görünümle karşılaştırıldığında Avcılar hala nefes alan bir yerdir.

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## ENGELLİ ERİŞİBİLİRLİĞİNİN DEĞERLENDİRİLMESİ: BİTLİS EREN ÜNİVERSİTESİ MÜHENDİSLİK MİMARLIK FAKÜLTESİ VE YAKIN ÇEVRESİ

### EVALUATION OF DISABLED ACCESSIBILITY: CASE OF BITLIS EREN UNIVERSITY FACULTY OF ENGINEERING ARCHITECTURE AND SURROUNDINGS

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#### ÖZET

Eğitim ve sağlıklı/kaliteli bir çevrede yaşam temel insan hakkıdır. Bu nedenle toplumun her bireyinin eğitim alabilmesi ve optimum standartlara uygun alanlarda sosyalleşebilmesi için üniversite yapılarının evrensel tasarım ilkelerine göre engelsiz planlanması gerekmektedir. Evrensel tasarım ilkelerini şekillendiren kapsayıcı yaklaşımına göre; yapı çevrede engelsiz erişim ve kullanım alanları oluşturulmalı ve rasyonel çözümler üretilmelidir. Ülkemizde engelli bireylerin kentsel alanlara ve yapılara ulaşılabilirliğinin sağlanması için yapılmış çalışmalarda engelli erişilebilirliği için ulusal politika/ yasa ve uluslararası kriterler çerçevesinde standartlar geliştirilmiştir. Bu çalışmanın amacı da geliştirilen standartlara göre genç bir üniversite olan Bitlis Eren’de eğitim yapılarının erişilebilirliğini değerlendirilmiştir. Üniversite eğitim yapıları içerisinde laboratuvarları, atölyeleri, çalışma salonları, dinlenme alanları ve kütüphaneleri de barındırabilen ders dışı kullanıma olanak tanıyan sosyal etkileşimin olduğu, gerek öğrenci gerek ziyaretçi gerekse çalışanları tarafında yoğun olarak kullanılan binalardır. Bu nedenle tüm bireyleri kapsayan eşitlikçi bir yaklaşıma göre engelsiz bir ortamın oluşturulması yasal ve vicdani bir sorumluluktur. Dolayısıyla üniversite yapılarının irdelenmesi varsa sorunların tespit edilerek önerilerin sunulması yapılacak proje çalışmalarına katkı sunacaktır. Bu kapsamda mühendislik mimarlık fakültesi ve yakın çevresinin; bina girişleri, otoparkları, kaldırım ve yolları, yönlendirme unsurları gibi yatay sirkülasyon; merdiven, rampa ve asansörler gibi dikey sirkülasyon ulaşılabilirliğinin; sınıf, koridor ve ıslak hacimlerin kullanılabilirliğinin, aydınlatma ve bilgilendirme elemanlarının uygunluğunun erişilebilirlik ölçütlerine göre ortaya çıkarılması hedeflenmiştir. Literatürde yer alan ölçütlere göre yerinde gözlem ve incelemeler yapılmıştır. Yerinde yapılan ölçüm ve gözlemler proje ve fotoğraflar üzerinde gösterilerek bütüncül bir okumaya uygun hale getirilmiştir. Yapılan çalışma da evrensel tasarım anlayışına göre dezavantajlı grupta yer alanlar için dolaşım ve kullanımda eksiklerin ve sorunlu bölgelerin olduğu tespit edilmiştir. Yapılan tespitlere göre yönetsel yapıda ki tüm paydaşların yapabileceği çalışmalar için öneriler sunulmuştur.

**Anahtar kelimeler:** Evrensel tasarım, engelli erişilebilirliği, engelsiz yapı çevre, Bitlis Eren Üniversitesi.

#### ABSTRACT

Education and living in a healthy/quality environment is a fundamental human right. Therefore, universities must be planned accessibly according to the universal design principles for every individual to access education and socialize in optimum standards. According to the inclusive approach that shapes the universal design principles, barrier-free environments should be created in the built environment, and rational solutions must be found. In Türkiye, standards were developed under national policies/laws and international criteria in studies conducted to provide access for disabled individuals to urban areas and facilities. This study aims to evaluate the barrier-free access to education buildings at Bitlis Eren, which is classified as a young university according to certain standards. University education buildings vary according to their function and location, and they contain laboratories, workshops, study halls, rest areas, and libraries used by students, visitors, and personnel, enabling out-of-class use with high social

interaction. Therefore, it is a legal and conscientious responsibility to create barrier-free environments in educational facilities and vicinities of universities inclusive of every individual, including disadvantaged groups. Accordingly, examining university structures, identifying issues, and suggesting solutions shall contribute significantly to future projects. In this context, the study aims to reveal the accessibility of the horizontal circulation elements such as building entrances, parking lots, pavements, roads, and directive elements, vertical circulation elements such as stairs, platforms, and elevators, the usability of the toilets such as classrooms, hallways, and the suitability and accessibility of lighting fixtures and informative posts at the faculty of engineering and architecture and its vicinity according to the accessibility measures. Literature was reviewed for universal design and barrier-free environment in line with the aim of this study. On-site evaluations are highlighted on projects, and an extensive reading is provided. The data obtained with photographs taken in the field study were displayed along with paragraph-supported narratives. It is determined in the study that the university campus is not accessible by disadvantaged groups according to the universal design approach. Suggestions were proposed for each stakeholder in the administrative structure according to the determinations made in the study. Suggestions were proposed for each stakeholder in the administrative structure according to the determinations made in the study.

**Keywords:** Universal design, disabled accessibility, barrier-free built environment, Bitlis Eren University.

### GİRİŞ

Üniversite kampüs alanları ve yapıları toplumsal olarak bilimsel ve sosyal alanda gelişimin kilit noktalarından biridir. Yapısı gereği çok fonksiyonlu olan üniversitelere her bireyin erişiminin eşit olarak sağlanması toplumun gelişmişlik düzeyi ve sağlığı için önemlidir. Eğitim ve sağlıklı/kaliteli bir çevrede yaşam temel insan hakkıdır. Temel hak ve özgürlükler çerçevesinde engelli bireylerin de üniversite eğitiminden eşit şekilde yararlanabilmesi sağlanmalıdır. Dünya Sağlık Örgütü'nün engelli tanımı; "Bir bozukluk ya da özür nedeniyle yaş, cinsiyet, sosyal, kültürel faktörlere bağlı olarak, kişiden beklenen rollerin kısıtlanması ya da yerine getirilememesi" şeklindedir. Engelli sınıflandırılması; ortopedik (bedensel), görme, işitme, dil ve konuşma, zihinsel ve süregen hasta olarak yapılabilir (Arslan ve Ankaya, 2020; s.111). Doğuştan veya sonradan ortaya çıkabilecek kalıcı veya geçici fiziksel kısıtlanma nedeniyle toplumun her bireyinin eğitim alabilmesi ve optimum standartlara sahip uygun alanlarda sosyalleşebilmesi için üniversite yapılarına herkesin kolay erişiminin bulunması gerekmektedir.

Evrensel tasarım günümüzde hareket kısıtlılığı olan; kalıcı/geçici engeli olanlar, yaşlı, hamile, bebek aralı ve çocuk gibi hareket kısıtlılığına sahip bireyler dâhil olmak üzere herkesi kapsamaktadır (Zeyrek Çepehan & Güller, 2020; s.396). Farklı dezavantajlı gruplara hayatın olağan akışı içerisinde eşit şartlar sağlayarak onlara ötekilerin yanında bir pozisyon kazandırmaktadır (Hacıhasanoğlu, 2003; s.99). Ronald L. Mace tarafından temelleri atılan kavrama kılavuz olabilmesi için North Carolina State Üniversitesi Evrensel Tasarım Merkezi 1997'de 7 ilke yayımlamıştır (Hilmioğlu & Seçer Karıptaş, 2022). Evrensel Tasarım Merkezi'nce belirlenen ilkeler; kullanımda eşdeğerlik ve esneklik, basitlik ve sezilebilirlik, algılanabilir bilgilendirme, hatanın tolere edilmesi, fiziksel gücün az kullanımı, yaklaşım ve kullanım ölçü ve mekânı olarak sınıflandırılmaktadır (Kaplan 2007; s.52). Evrensel tasarım ilkelerini şekillendiren kapsayıcı yaklaşımına göre; yapılı çevrede engelsiz erişim ve kullanım alanları oluşturulmalı, rasyonel/sürdürülebilir/işlevsel/estetik çözümler üretilmelidir.

Ülkemizde ise evrensel tasarım yaklaşımı söylemlerinden önce engelli bireylerin kentsel alanlara ve yapılara erişilebilirliği için ulusal politika/ yasa ve uluslararası kriterler çerçevesinde standartlar geliştirilmiştir. Engelli bireylere yönelik ilk olarak 1997'de imar kanununda TSE standartlarının geçerliği olduğu belirtilerek düzenlemeler yapılmıştır. (Özkaraca ve İnceoğlu, 2021; s.1895). Ülkemizde binalar, yapılı çevre düzenlemeleri, ulaşım sistem ve donanımları, hissedilebilir yüzeyler gibi engelli erişiminde kullanılan yardımcı ürünler, düşey sirkülasyon donanımları, trafikte sesli ve uyarı sinyalizasyonları için TS 9111 (güncel 2023), TS 12576 (güncel 2012), TS 12460 (1998), TS ISO 23599 (güncel 2021), TS 13536 (güncel 2023), TS 23600 (güncel 2012), TS EN 81-70+A1 (güncel 2022) gibi standartlar yer almaktadır (TSE 2023). Yine 1997'de Özürlüler İdaresi Başkanlığı kurulmuştur.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

2005 yılında da Özürlüler Kanununun kabulü ve 2009 yılında BM Engelli Hakları Sözleşmesine taraf olunmasıyla engellilere yönelik çalışmalar artmıştır. Erişilebilirlik kavramı da ilk kez 2005 Engelliler Hakkında Kanunu'nda, 2014 yılında yapılan düzenleme ile yer almıştır (Bulut ve Hallaç, 2023 s.75). Başbakanlık Özürlüler İdaresi Başkanlığı'nın 2011 yılında kapatılmasıyla engelliler ile ilgili düzenlemeleri yapma yükümlülüğü devredilmiştir. 2012 yılı 6353 sayılı kanun ile 2005 yılı 5387 sayılı kanunda değişiklik yapılmıştır. Böylece erişilebilirlik standartlarının uygulama ve denetimleri her ilde Aile ve Sosyal Politikalar, İçişleri, Çevre ve Şehircilik, Ulaştırma, Denizcilik ve Haberleşme Bakanlıkları ile engelliler ile ilgili konfederasyonların temsilcilerinden oluşan komisyon tarafından yapılması ve eksikleri tamamlaması için 8+2 yıllık sürenin verilmesi hükümleri düzenlenmiştir (URL-1). Aile ve Sosyal Politikalar Bakanlığı Özürlü ve Yaşlı Hizmetleri Genel Müdürlüğü'nce (2011) Yerel Yönetimler İçin Ulaşılabilirlik Temel Bilgiler Teknik El Kitabı hazırlanmıştır. 2012 yılında erişilebilirlik standartlarının uygulama ve denetimleri her ilde Aile ve Sosyal Politikalar, İçişleri, Çevre ve Şehircilik, Ulaştırma, Denizcilik ve Haberleşme Bakanlıkları ile engelliler ile ilgili konfederasyonların temsilcilerinden oluşan komisyon tarafından yapılması ve eksikleri tamamlaması için 8+2 yıllık sürenin verilmesi hükümleri düzenlenmiştir (URL-1). Aile ve Sosyal Politikalar Bakanlığı Özürlü ve Yaşlı Hizmetleri Genel Müdürlüğü'nce (2011) Yerel Yönetimler İçin Ulaşılabilirlik Temel Bilgiler Teknik El Kitabı hazırlanmıştır.

2013 yılında da Aile ve Sosyal Politikalar Bakanlığı tarafından "Erişilebilirlik İzleme ve Denetleme Yönetmeliği" çıkarılmıştır (Özkaraca ve İnceoğlu, 2021; s.1896, TSE 2023). Engelli ve Yaşlı Hizmetleri Genel Müdürlüğü tarafından (2020) Erişilebilirlik Kılavuz'u yürürlükte olan standartlara göre hazırlanmıştır.

Üniversiteler için de 2010 yılında ilk kez yayınlanan yönetmelik güncellenerek 2014 yılında "Yükseköğretim Kurumları Engelliler Danışma ve Koordinasyon Yönetmeliği" olarak yayınlanmıştır (URL -1). YÖK 2018'ten bu yana "Engelsiz Üniversite"lere "Bayrak ve Nişan" Ödülü kapsamında "Mekanda erişilebilirlik" sağlayanlara turuncu, "eğitimde erişilebilirlik" sağlayanlara yeşil, "sosyokültürel faaliyetlerde erişilebilirlik" sağlayanlara ise mavi bayrak verilmektedir (URL-1).

Ülkemizde mevzuat ve kılavuzlarda belirlenen standartlar çerçevesinde engelli erişilebilirliğini kent ve yapı ölçeğinde teknik açıdan ve bilinç/farkındalık/sürdürülebilirlik yönüyle sosyal açıdan değerlendirmeye ve kampüs alanlarının/yapılarının incelenmesine yönelik çalışmalar bulunmaktadır. Malkoç True ve Sönmez Türel (2013), mevcut yapı çevrenin fiziksel engellilerin kullanılabilirliğini, Kaplan ve Öztürk (2004), metro istasyonu gibi kamusal iç mekanların düzenlenmesinde, sürdürülebilir kentsel yaklaşımlar içinde engelsiz tasarımın yasal çerçevesini, Ünver ve Yamaçlı (2014) evrensel/kapsayıcı tasarımın idari ve/veya teknik yönünün yanında sürdürülebilirliğin sağlanması için bir kültür olarak salt meslek grupları değil tüm bireyler tarafından benimsenmesi/benimsenmesinin önemini, Arat ve Güner (2020) üniversite alanını; evrensel tasarım ilkeleri ve "Engelsiz Kampüs Projesi" için belirlenen inceleme ölçütleri karşılaştırarak, Özdemir (2020) üniversite eğitim yapısı ve yakın çevresi için erişilebilirlik düzeyi haritası oluşturup erişilebilirlik ölçütünün uygunluk değeri formülü ile tespit ederek, sorunların iyileştirilmesine yönelik, Tan ve Tunçbilek Karakaya (2023); erişilebilirliği yürürlükte yer alan mevzuat/standartlar ve evrensel tasarım ilkeleri kapsamında iç mekânda kültür merkezi örneğinde; Sirel vd. (2012) kampüs alanının ulaşılabilirliğini mevzuat standartlarına göre, Pouya ve Kocaarslan (2020), Hilmioğlu ve Seçer Kariptaş (2022) üniversite kampüs planlamasını engelsiz tasarım yaklaşımına göre, Özkaraca ve İnceoğlu (2021) erişilebilir güzergahların belirlenerek erişilebilirlik haritalama çalışmalarının yapılması ve çevrimiçi web sayfaları/uygulamalara altlık oluşturması için kampüs ulaşılabilirliğini değerlendirmektedir.

Bu çalışmanın amacı da geliştirilen ölçütlere göre genç bir üniversite olarak sınıflandırılan Bitlis Eren Üniversitesi'nde eğitim yapıları için Mühendislik Mimarlık Fakültesi ve yakın çevresi özelinde engelli erişilebilirliğinin değerlendirilmesidir. Üniversite eğitim yapıları fonksiyonuna ve bulunduğu konuma göre değişkenlik göstermekle beraber aynı bina içerisinde laboratuvarları, atölyeleri, çalışma salonları, dinlenme alanları ve kütüphaneleri de barındırabilen ders dışı kullanıma olanak tanıyan sosyal etkileşimin olduğu, gerek öğrenci gerek ziyaretçi gerekse çalışanları tarafında yoğun olarak kullanılan binalardır. Bu nedenle üniversite eğitim binaları ve yakın çevreleri için dezavantajlı gruplar dâhil olmak üzere tüm bireyleri kapsayan eşitlikçi bir yaklaşıma göre engelsiz bir ortamın oluşturulması yasal ve vicdani bir sorumluluktur. Kent kimliği için simgesel olan üniversite yapılarının evrensel tasarım ve

uygulamalarla örnek oluşturması engelsiz bir yaşam için farkındalığın artmasında da yardımcı olacaktır. Dolayısıyla üniversite yapılarının irdelenmesi varsa sorunların tespit edilerek önerilerin sunulması yapılacak proje çalışmalarına katkı sunacaktır.

### ÇALIŞMA ALANI VE YÖNTEM

Çalışma alanı Bitlis Eren Üniversitesi Mühendislik Mimarlık Fakültesi ve yakın çevresi olarak belirlenmiştir. Bitlis Eren Üniversitesi 29 Mayıs 2007 tarihinde 5662 Sayılı Kanun ile kurulmuştur. Ana kampüs alanı merkeze yaklaşık 12 km mesafede bulunan Rahva Mevkii Beş Minare Mahallesi'dedir (Şekil 1).



Şekil 1. Bitlis Kenti (a) (URL-2), Beş Minare Mahallesi ve kampüs alanı sınırları (b) (URL-3)

Rahva Mevkii'nde belirlenen 2.356.702 m<sup>2</sup> yüzölçümlü (235,67 hektar) alanda (Şekil 2) inşaa faaliyetleri başlanarak 2009 yılından itibaren fakülte binaları aşamalı olarak kampüs alanında eğitim ve öğretim faaliyetlerine başlamıştır. Mühendislik mimarlık fakültesinde inşaatı Eren Holding tarafından tamamlanılarak üniversiteye hibe edilmiş olup 2014 yılı itibariyle bina aktif olarak kullanılmaktadır. Faaliyete başlayan ikinci eğitim yapısıdır. Ana kampüs alanına girildiğinde karayoluna paralel ilk aks üzerinde merkezi derslikler, fen edebiyat fakültesi ve merkezi kafeterya-yemekhane blokları kesişiminde yer almaktadır (Şekil 2). Çalışma kapsamında fakülte binası ve yakın çevresinin; bina girişleri, otoparklar, kaldırım ve yollar, yönlendirme unsurları gibi yatay sirkülasyon, merdiven, rampa ve asansörler gibi düşey sirkülasyon ulaşılabilirliği ile sınıf, koridor ve ıslak hacimlerin kullanılabilirliğinin, aydınlatma ve bilgilendirme elemanlarının uygunluğunun erişilebilirlik standartlarına göre ortaya çıkarılması hedeflenmiştir. Belirlenen hedefler doğrultusunda; evrensel tasarım ve engelsiz erişilebilirlik için literatür taraması yapılmıştır. Çalışma alanı değerlendirilirken Erişilebilirlik Kılavuzu ve Yerel Yönetimler için Ulaşılabilirlik Temel Bilgiler Teknik El Kitabı kullanılmıştır. Yerinde gözlem ve incelemeler yapılmıştır. Yerinde yapılan ölçüm ve çekilen fotoğraflarla beraber elde edilen veriler paragraf destekli anlatımlarla aktarılmıştır.

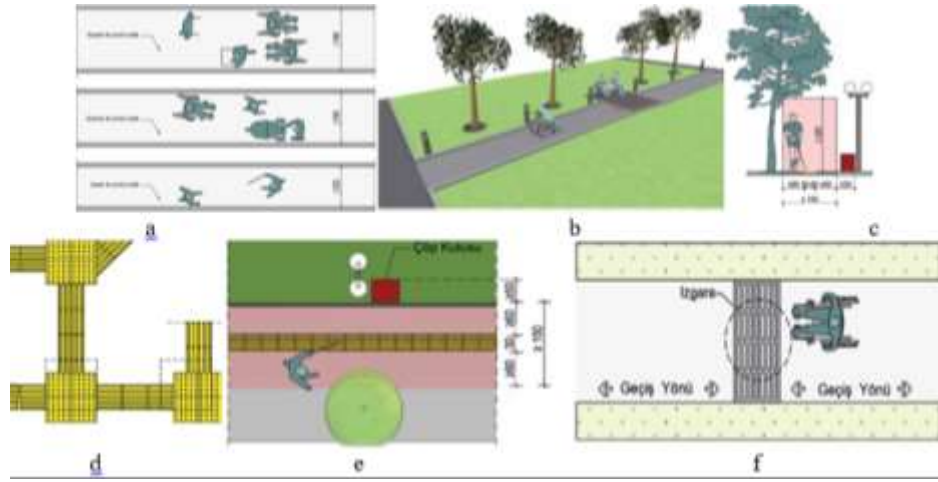




Şekil 2. Kampus planı (a) (Yapı İşleri arşivi), Kampus uydu görüntüsü (b) (URL-4), (c, d) Kampus eğitim yapıları görünüm (URL-5, URL-6)

**Çalışmada kullanılan yürürlükte olan mevzuat ve standartlara göre hazırlanmış Erişilebilirlik Kılavuzu (2012) ve Teknik Bilgiler El Kitabında (2011) yer alan ölçü ve öneriler;**

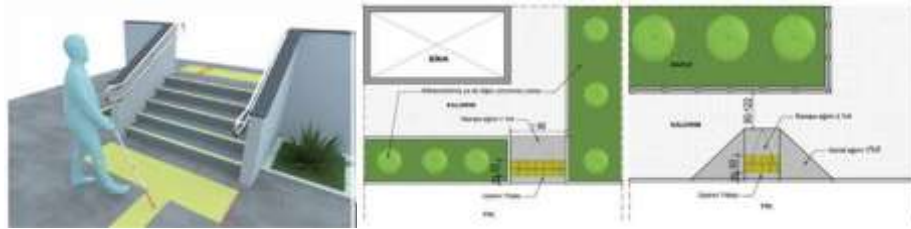
- **Yaya yolları ve kaldırımlar;** TS standartlarında özellikle tekerlekli sandalye geçişi ve kullanımında farklı açı derecelerindeki manevra alanı düşünülerek genişlik en az 1.5 m istenmekte, ideal olarak ise 2 m olması önerilmektedir. Erişilebilirlik kılavuzunda da kullanımda yoğunluğa bağlı olarak en az 1.2 m, 1.5 m ve 1.8 m olarak değişmektedir (Şekil 3). (Erişilebilirlik kılavuzu, 2012; El Kitabı, 2011)
- Kaldırım ve yürüme yollarının eğimi ise; enine %2; boyuna %4'ten küçük olmalıdır. Eğimli bahçe yollarının eğimi de en fazla %5 olmalı, 150\*150 cm boyutlarında dinlenme alanları bulunmalıdır (Şekil 3). Her 30 m'de bir dinlenme bankı olmalıdır. Dolaşımı engellememesi için aydınlatma ve bitkilendirme unsurları; baş yüksekliğini kurtaracak şekilde en az 220 cm olarak ayarlanmalıdır (Şekil 3). (Erişilebilirlik kılavuzu, 2012; El Kitabı, 2011)
- Yüzeyde dolaşımı kolaylaştırıcı, kaydırmaz ve sert döşeme kaplaması seçilmeli ve kaplamalarda derz aralıkları en fazla 5 mm olmalıdır. Görme engelliler için drenaj kanallarına uzak hissedilebilir yüzeyler dizayn edilmelidir. Yaya dolaşımına paralel 10 m'den uzun alanlarda 60 cm genişlikte olan kılavuz izlerden, yön değiştirmeler için de uyarıcı yüzeylerden faydalanılmalıdır (Şekil 3). 30-60 cm genişliğindeki kılavuz izlerin her iki yanında 60 cm boşluk bulunmalıdır. (Erişilebilirlik kılavuzu, 2012)
- Yatay sirkülasyonda hareketi engelleyecek altyapı ve kentsel donatı elemanlarından kaçınılmalı, yol üzerinde çıkıntı ve çukurluklar olmamalı, yer altı tesisat kapakları dizaynı buna göre yapılmalıdır. Engelli dolaşımında kaldırımda  $\pm 1,3$  cm'den fazla ızgara, mantar, zincir gibi düzensizlikler ve  $\pm 0,6$  cm'den fazla kot farkı altyapı kapakları elektrik direği ve panolar bulunmamalıdır. ızgara konulması gerektiğinde ise yürüyüş doğrultusuna dik olacak şekilde konumlandırılmalıdır (Şekil 3). (Erişilebilirlik kılavuzu, 2012)



Şekil 3. (a)Farklı hareket kısıtlılığı olanlar için geçiş önceliği, (b) Eğimli bahçe yolu düzenlemesi, (c) Dolaşımda dikey ölçüler, (d) Kılavuz izler ve yön değiştirme uyarıcı yüzeyi, (e) Yatay dolaşım ölçüleri, (f) Izgara düzeni. (Erişilebilirlik kılavuzu, 2012).

• Merdivenler yürüyüş güzergahına dik olacak biçimde yürüme yüzeyi pürüzlü, kaymayı önleyen kaplamadan tasarlanmalıdır (Şekil 4). Açık alanda yer alan merdivenlerin iki yanında doku farklılığı olan küpeşteler, basamak ucunda 2,5 cm eninde koruyucu kaymaz şerit ve merdivenlerin başlangıç ve bitimindeki duyumsanabilir yüzeyler olmalıdır. Duyumsanabilir yüzey, ilk basamaktan hemen önce başlamalı, merdiven bitiminde ise merdiven genişliği kadar boşluktan sonra yer almalıdır. Duyumsanabilir yüzey en az 60 cm genişliğinde ve renk ve doku bakımından farklı ve algılanabilir olmalıdır. Basamaklar düz ve damlalıksız yapılmalıdır. Basamak kol genişliği en az 180 cm, basamak adım genişliği en az 30 cm olmalıdır. (Erişilebilirlik kılavuzu, 2012; El Kitabı, 2011).

• Rampaların boyutları kullanım yoğunluğuna, aşılması gereken yükseklik farkına ve seçilen rampa tipine göre değişmektedir. BM en az rampa genişliğini düz rampalarda 90 cm, 90° dönüşlü rampalarda 140 cm, 180° dönüşlü rampalarda 90 cm, ADA rampanın tipi belirtilmeden 91,5 cm olarak önerilmektedir. Erişilebilirlik kılavuz'nda kaldırım kenarı rampaları net (temiz) genişliği, koruma bordürü ve tirabzan gibi üzerinde bulunan tüm donanımlar hariç en az 90 cm genişliğinde önermektedir. Rampalar en fazla %8 eğimle yapılmalı, mümkünse üç yöne eğimli tercih edilmelidir (Şekil 4). Görme özürülüler için rampaların başında ve sonunda düz ve değişik dokuda bir alan bulunmalıdır. Dış mekânlardaki 20 cm yüksekten fazla bir kot farkını geçerken rampanın bir veya iki tarafına küpeşte yapılmalı, emniyet bakımından rampa başlangıç ve bitiminde 45 cm daha devam etmelidir. Yola bağlanan tek yüzeye eğimli rampaların kenarlarında yürünmez farklı doku veya bitkilendirme çalışmaları yapılmalı, uyarıcı yüzey işaretleri kullanılmalıdır. (Erişilebilirlik kılavuzu, 2012; El Kitabı, 2011)



Şekil 4. Merdiven özellikleri, Tek ve üç yöne eğimli rampa düzeni (Erişilebilirlik kılavuzu, 2012).

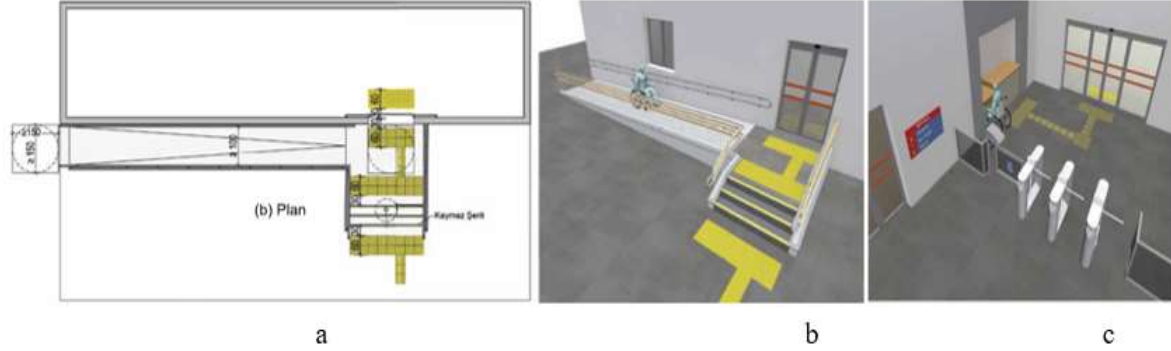
• **Bina girişleri;** Bina girişleri tercihen düzayak, kolay erişilebilir ve algılanabilir tasarlanmalıdır. Giriş kapısı kolay açılabilir ve manevra alanı için genişliği en az 150 cm olmalıdır (Şekil 5). Büyük cam yüzeyler 10-30 cm, 90-100 cm ve 130-140 cm yüksekliklerde işaretlenmelidir. Bina giriş merdivenlerinden itibaren iç ve dışta, derinliği 210 cm'den fazla olan binalarda da girişten danışma bankosuna kadar hissedilebilir yüzey işaretleri bulunmalıdır. Az görenler için yüzeylerde algılamayı kolaylaştırmak amacıyla renkler zıtlık oluşturacak şekilde kullanılmalıdır. Bina giriş rampaları net en az 100 cm genişlikte ve her 9 m'de bir 150\*150 cm sahanlıklı olmalıdır. 15 cm'i aşan yükseklikte ve 200



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

cm'yi aşan uzun rampalarda tırabzan veya duvar olmalıdır (Şekil 5). Giriş rampası başlangıç ve bitişlerde uyarıcı yüzeyler kullanılmamalıdır. Az gören engelliler için basamak adım yüzeyi ile rıht yüksekliği arasında kolay algılanabilir renk farklılığı olmalı ve kaymaz şeritler kullanılmalıdır (Şekil 6). Rampa ve merdivenlerde takip duvarı yoksa tırabzan ve küpeştelere her iki tarafa da yapılmalıdır. Rampa eğimi kot farkına göre ayarlanmalıdır (Şekil 6). Turnikeler net geçiş genişliği en az 90 cm olmalıdır. Geniş cam yüzeyli giriş kapıları 90 ve 130 cm yüksekliklerde işaretlenmelidir. (Erişilebilirlik kılavuzu, 2012; El Kitabı, 2011).



Şekil 5. (a)Bina giriş ölçüleri, (b) Giriş rampa ve merdiven düzenlemesi, (c) Danışma bankosu-giriş düzeni. (Erişilebilirlik kılavuzu, 2012).

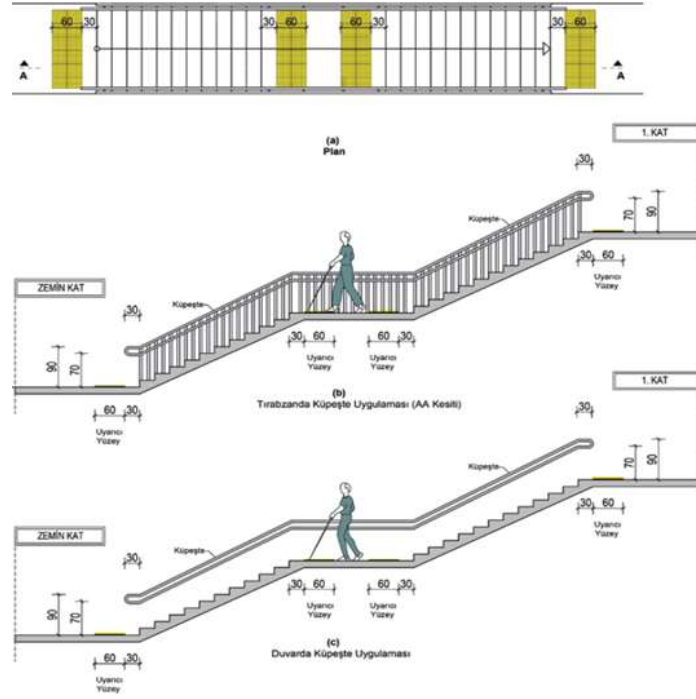


Şekil 6. Merdiven kaymaz şerit ölçüleri, Rampa eğimleri. (Erişilebilirlik kılavuzu, 2012).

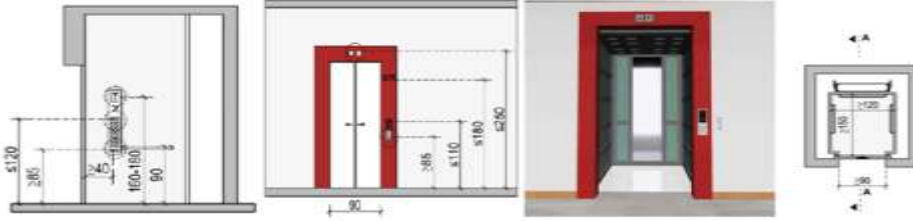
• **Bina merdivenleri;** Rampalar gibi merdivenlerinde erişilebilir düzenlemelere sahip olmalıdır (Şekil 7). Bina içi merdivenlerinde merdivenin başlangıç ve bitişlerini takiben 30 cm'den sonra 60 cm derinlikte uyarıcı yüzeyler kullanılmalıdır. Bina merdivenleri yangın kaçışı ile ortak kullanılıyorsa hissedilebilir yüzeyler yanmaz malzemeden olmalıdır. Her iki tarafında 10 cm dikme aralıklı tırabzan veya parapet/duvar ile 2 kademeli (70 ve 90 cm'de) küpeşte bulunmalıdır. Küpeştelere başlangıç ve bitişten sonra 30 cm daha uzatılmalıdır.

Az gören engelliler için algılanabilmesi amacıyla merdivenler yürüyüş güzergâhına dik tasarlanmalıdır. Basamaklar damlalıksız olacak şekilde göz kamaştırmayan, düz, kaymaz ve sert malzemeden yapılmalı, rıht ve basamaklar zıt renklerle algılamayı kolaylaştırmalıdır. En fazla 12 basamakta bir sahanlık olmalı ve açık renkli rıhtlar kullanılmamalıdır. İç mekanda basamak derinliği en az 27 cm, rıht yüksekliği en fazla 16 cm, binada asansör varsa 18 cm olacak şekilde yapılmalıdır. Basamak uçlarında 4-5 cm kaymaz şeritler uygulanmalı veya kaymayı engelleyici işlem yapılmalıdır. (Erişilebilirlik kılavuzu, 2012; El Kitabı, 2011)

• **Asansör;** Asansörler bina girişine en fazla 30 m mesafede, düzayak güzergâhta en az 120\*150 cm boyutlarında, kapı ve zemin yüzeyleri çevresine zıt renkte, kot farkı ve çukıntı olmayacak şekilde tasarlanmalıdır (Şekil 8). Kabin içi ve dışı kontrol/gösterge paneli kolay anlaşılır, okunaklı, hissedilebilir ve uygun yükseklikte olmalıdır. Sesli uyarı sistemi ve Braille alfabesi kullanılmalıdır. (Erişilebilirlik kılavuzu, 2012; El Kitabı, 2011)

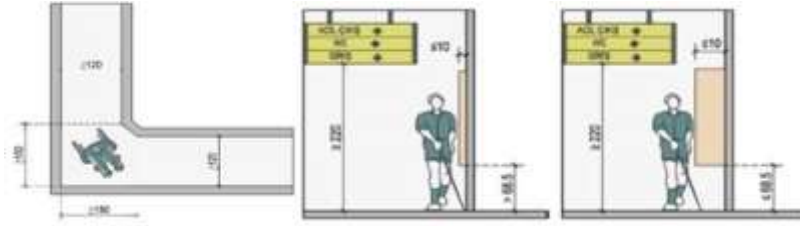


Şekil 7. Merdiven ölçüleri (Erişilebilirlik kılavuzu, 2012)



Şekil 8. Asansör ölçüleri (Erişilebilirlik kılavuzu, 2012)

- **Bina yatay dolaşım;** Katlarda erişimi zorlaştıracak kot farklılıkları bulunmamalı, en az 120 cm genişlikte 220 cm yükseklikte, yatay ve düşeyde engelleri bulunmayan koridorlar tasarlanmalıdır (Şekil 9). Yön değiştiren veya yatayda engeli olan koridorlar tekerlekli sandalye manevra alanına uygun geçiş sağlamalıdır. Monte edilmesi gereken nesnelere dolaşımı engellemeyecek şekilde dizayn edilmelidir. Yönlendirme ve bilgilendirmeler açık, okunaklı ve anlaşılır olmalıdır. (Erişilebilirlik kılavuzu, 2012)



Şekil 8. Tavsiye edilen koridor ölçüleri (Erişilebilirlik kılavuzu, 2012)

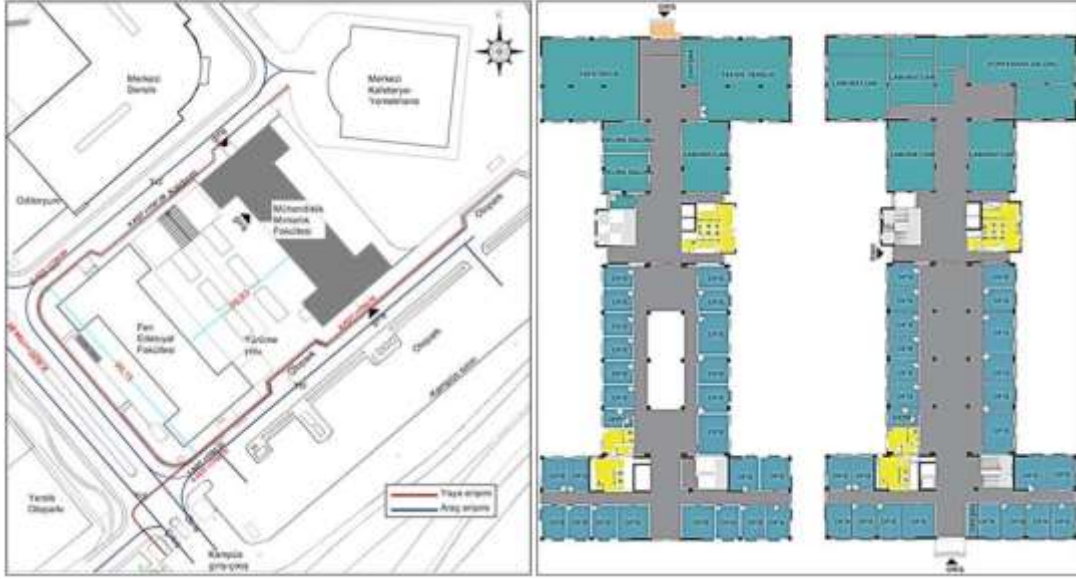
- **Islak hacimler;** Tuvaletler erişimi kolay ve iyi yönlendirilmiş, mümkün olduğunca bağımsız, 800 m<sup>2</sup>'den büyük binalar için bir kadın bir erkek veya yoğunluğa göre bir adet olmalıdır. Erişilebilir tuvaletlerde hareket için çap en az 150 cm'dir (Şekil 9).



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

düzenlenmeli, görme engelliler için hissedilebilir yüzeyler, uygun aydınlatma ve uyarı/bilgilendirme donatıları dolaşım aksı boyunca bulundurulmalıdır. Çalışma kapsamında incelenen MMF<sup>1</sup> eğitim binası konumu itibariyle merkez noktalarından biridir. Bina yakın çevresinde, merkezi ulaşım aksı, eğitim ve ortak kullanım yapıları ve merkezi açık otopark bulunmaktadır.



Şekil 12. Kampus yaya - araç erişimi, +0.50 ve +4.50 m kotu kat planları (Araştırmacı tarafından işlenmiştir)

- Kampüsün merkezi planlı yapılaşma düzeni ve yolların birbiri ile bağlantılı olması, yaya sirkülasyonunda binaya erişimi kolaylaştırmaktadır. Ancak kampüs girişinin engelli geçişine göre düzenlenme biçimi sorunludur. Engelli bireylerin kullanacakları turnike alanlarında yönlendirme amaçlı hissedilebilir yüzey uygulaması yetersiz ve hatalı olup, mevcut rampalar eğim, boyut ve biçim açısından standartlara uygun değildir (Şekil 13). Kampüs girişinden binaya ulaşımı sağlayan yaklaşık 240 m uzunluğunda bir erişilebilir aks dizayn edilmiştir (Şekil 14). Ancak komşuluğu olan merkezi yapılar<sup>2</sup> ve dinlenme alanına engelsiz şekilde ulaşım sağlanamamaktadır (Şekil 15). Yine bu aks üzerinde başlangıcından bitimine kadar engelli bireylerin faydalanabileceği dinlenme alanları bulunmamaktadır. Bina etrafında dinlenme alanları bulunmaktadır. Ancak bu alana erişim sorunludur. Bu bölümde kot farkı yaklaşık 3.60 m olup, rampa bulunmamaktadır. Alana bağlanan merdivenler ise boyut olarak standartlara uymaktadır. Ancak merdivene yaklaşım ve basamak yüzeyi standartlara uymamakta, uyarıcı yüzeyler ve korkuluk bulunmamaktadır.



Şekil 13. Kampüs girişi

<sup>1</sup> Mühendislik Mimarlık Fakültesi

<sup>2</sup> Merkezi kafeterya ve yemekhane ile merkezi birimler (oditörüm, kütüphane, öğretici işleri ve derslikler bloğu)



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023



Şekil 14. Ulaşım aksı



Şekil 15. Merkezi yapılar ve dinlenme alanı

- Tüm kaldırım güzergâhında dolaşım genişlikleri ve eğimi standartlara uygundur. MMF etrafı kaldırım genişliği en dar noktada 2 m, enine eğim; kuzeydoğu-güneybatı aksında % 1,2, kuzeybatı-güneydoğu aksında %2, boyuna eğim kuzeydoğu-güneybatı aksında % 1,7, kuzeybatı-güneydoğu aksında %3,27 olarak tespit edilmiştir (Şekil 16). Kaldırım yüzeyi kaplaması sert ve kaymaz bazalt plak olup, derz aralıkları 5 mm'nin altındadır (Şekil 16). Bununla birlikte bina etrafı ve donatı alanları kilitli beton parke taşından olup derz aralıkları 16 mm'den fazladır. Bu alanlar erişilebilirlik açısından standartlara uygun değildir.



Şekil 16. Kampus yaya kaldırım düzenlemeleri

- Dolaşımında hareketi engelleyecek yatay ve düşey unsurlar bulunmamalıdır. Tüm donatı elemanlarının yüksekliği 220 cm üzerinde olup bu açıdan standartlara uygundur. Aydınlatma elemanları yüksekliği 6 ve 10 m, en düşük seviyede ağaçların yüksekliği 2.3 m'dir. Dış mekânda yönlendirme tabelaları açıklayıcı ve okunaklı olup kaldırıma yaklaşma mesafesi standartlara uygundur. Dinlenme alanı elemanları da standartlara uygundur. Görme engelliler için hissedilebilir yüzey uygulaması kampüs girişinden bina önüne kadar aks boyunca devam etmektedir. Ancak aydınlatma elemanları, rögar kapakları ve çöp kutuları gibi yeraltı tesisatı ve kentsel donatı elemanları bu aks üzerinde erişimi zorlaştırmaktadır. Bu unsurlar kaldırımda kot farklılıkları oluşturmakta ve yer yer kılavuz izler üzerinde/60 cm yaklaşma sınırı altında bulunmaktadır (Şekil 17). Uyarıcı yüzeyler yön değiştirmede standartlara uygun konum ve boyutlarda kullanılmamıştır.



Şekil 17. Engelli dolaşımı için uygun olmayan düzenlemeler

- Bina etrafında ve erişim için planlanan yolda kaldırım kot farkı en fazla 18 cm ölçülmüştür. Bu hat boyunca yer alan rampaların genişliği en az 90 cm'dir. Kampüs girişi hariç rampaların genişlikleri standartları karşılamakta olup, %7,8-8,5 arasında değişen eğimleri, uzunlukları ve hatalı yüzeyleri ile erişilebilirlik açısından uygun değildir (Şekil 18). Rampalar 20 cm altında kaldığı için korkuluk yapılmasına gerekli değildir.



Şekil 17. Engelli dolaşımı için uygun olmayan rampalar

- Bina girişleri görüş hattında kolay algılanabilir özelliktedir. Bina girişlerinden bir tanesi rampa veya merdiven asansörü olmadığından tekerlekli sandalye için uygun değildir. Diğer iki girişten biri hemzemin, biri de rampalı düzene sahiptir. Bina giriş merdiven ve sahanlıkları boyut olarak tekerlekli sandalye için manevra alanına sahiptir. Bina giriş sahanlıkları 130\*360 ve 154\*440 cm ebatlarında; rıht yükseklikleri 18'dir. Bina giriş rampası 110 cm net genişliktedir. Rampa düzenlemesi %18,5 eğim ile erişilebilir standartlara sahip değildir. Bina giriş merdivenlerinin basamaklarında kaymaz şeritler bulunmamakta ancak az pürüzlü ve kaymaz bazalt plak taşı ile döşenmiştir. Merdiven kenarlarında bulunan küpeşterlerin yükseklikleri 90 cm'dir. rıhtların açık renk kullanımı uygun değildir.
- Bina girişlerindeki camlı kapılar ise 92 cm seviyelerde kayıtları olup standartları karşılamaktadır. Benzer şekilde 93 cm net genişliğe sahip turnike geçişleri de kullanım açısından uygundur. Ancak bina giriş kapısı iç ve dış mekanda uyarıcı yüzeyler ve girişten danışma bankosuna kadar yönlendirici yüzey işaretleri bulunmamaktadır. Az görenler için algılamayı kolaylaştırıcı zıt renk kullanımı mevcuttur. (Şekil 18). Giriş rampası başlangıç ve bitişlerde uyarıcı yüzeyler kullanılmamalıdır. Rampa ve merdivenlerde takip duvarı yoksa tirabzan ve küpeşterler her iki tarafa da yapılmalıdır. Tirabzanlar yükseklik ve kademeleri erişilebilir değildir.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023



Şekil 18. Bina girişleri

- Bina içi merdivenleri aynı zamanda acil çıkışlar içinde kullanılmaktadır. Ancak merdivenin başlangıç ve bitişlerini takiben 30 cm'den sonra 60 cm derinlikte uyarıcı yüzeyler kullanılmamıştır. Her iki tarafında tırabzan, küpeşte bulunmamaktadır. Az gören engelliler için algılanabilmesi amacıyla merdivenler yürüyüş güzergâhına dik tasarlanmamıştır. Basamaklar pahlı ve damlalıklı olup kaymaz şeritler bulunmamaktadır. Bununla beraber renk kullanımı ve boyutlar açısından erişilebilirdir. Asansörlerin ulaşılabilirlik ve sesli uyarı sistemi, Braille alfabeli/tekerlekli sandalye kullanımı için uygun yükseklikteki kontrol paneli ile kullanım açısından erişilebilirliği uygundur.



Şekil 19. Merdiven ve asansör düzenlemeleri

- Kat koridorları en dar yeri 200 m olup, geçiş ve manevralar için yeterli alana sahiptir. Koridorlarda yatayda ve düşeyde dolaşımı engelleyen unsurlar bulunmamaktadır. Kantin ve çalışma salonu gibi ortak kullanım mekânları da yerleşim düzeni açısından erişilebilir standartlara sahiptir. Sınıflarda ise sıraların sabitlenmiş olması nedeniyle esnek bir düzenleme bulunmamaktadır. Tüm mekânların kapı genişlikleri en az 93 cm, kapı kolları yüksekliği 105 cm olup standartları karşılamaktadır. Pencerelerde ise parapetler 100 cm yükseklikte olup standartlara uygundur. Ancak tekerlekli sandalye kullananlar için dışarıyı görmeye imkân veren erişilebilirlikte değildir. Her katta bir adet bağımsız engelli wc bulunmaktadır. Bu tuvaletler yeterli manevra alanına sahip olmakla beraber önerilen erişilebilir yerleşim düzeninde değildir. Ayrıca depo olarak kullanılan ıslak hacimlere koridorda doğrudan algılanmamakta olup yönlendirme zayıftır.



### Şekil 20. Erişilebilir tuvalet, koridor ve ortak kullanım alanları

- Kampus alanında merkezi bir kapalı otopark ve MMF bina etrafında merkezi açık otopark ile kaldırım kenarı otopark düzenlemeleri bulunmaktadır (Şekil 21). Otoparklar boyutları açısından sınırları olmadığı için standartları karşılamaktadır. Ancak engelli kullanımı için ayrı bir işaretlendirme yapılmamıştır. Kaldırım kenarı ve açık otoparklardan bina komşuluğunda olduğu için erişim mesafesi oldukça kısadır. Ancak bina etrafı rampaların eğimi standartları karşılamamakta, açık otopark kaldırımında ise geçişi sağlayacak rampa bulunmamaktadır.



Şekil 21. Otopark alanları

### SONUÇ

Bitlis Eren Üniversitesi Mühendislik Mimarlık Fakültesi ve yakın çevresi erişilebilirlik standartları bağlamında değerlendirilmiştir. 2007 yılı sonrası kurulan ve fiziki yapısı ile genç olan yerleşkede bina içi ve dışında erişilebilirlik düzenlemelerinde standartlara ulaşılmaya çalışılmıştır. Bina içi kullanım ve erişimde merdiven konumu dışında yapısal sorunlar görülmemektedir. Tespit edilen eksiklikler iyileştirmeye yönelik yapılabilecek onarım çalışmaları ile eklenebilir. Yapılan tespitler sonucunda görülmektedir ki; engelli erişilebilirliği kampüs girişinden binaya erişim olarak algılanmakta, zorunlulukları çözmek için farklı işler kapsamında ve dönemlerde yapılan düzenlemeler uygulama da çakışmamaktadır. Oysaki kampüs yapıları yakın çevresi ile bütünlük oluşturmalı, engelsiz tasarımların; altyapı, çevre düzenlemeleri ve bina projelerinde birbiriyle uyumlu olması gerekmektedir. Üniversite içerisinde yer alan eğitim binaları çevresindeki farklı fonksiyonlara sahip yapılarla bağlantılıdır. Ayrıca kampüsler özellikle küçük kentler için en elverişli sosyalleşme alanlarıdır. Merkezi planlı yerleşim düzenine sahip Bitlis Eren yerleşkesinde farklı hareket kısıtlılığına sahip dezavantajlı bireylerin sosyalleşebilmesi ve “diğerleri” ile bağ kurabilmesi varolan tüm alanların özgür ve konforlu şekilde kullanımı ile mümkün olacaktır. Bu nedenle çalışmada tespit edilen eksikliklerin giderilmesi gerekmektedir. Detayların yaratacağı kullanımda olumlu ve büyük etki gözönüne alınmalıdır. Bu kapsamda;

- Eğimli olan bina etrafının erişilebilirlik standartlarına göre düzenlenmesi,
- Bina girişleri merdivenlerinde korkuluk ve tirabzanların yeniden düzenlenmesi,
- Basamak kol genişliğine göre giriş ve dış mekân merdivenlerinde ek tirabzan, küpeşte yapılması,
- Öğrenci girişlerinin yapıldığı ve tekerlekli sandalye kullanımı için dizayn edilmiş rampa eğiminin yeniden düzenlenmesi,
- Konumu rasyonel olan ancak uygulamada standart dışında kalan kaldırım rampalarının yeniden düzenlenmesi,
- Bina yakın çevresinde bulunan yapılar ve merkezi açık otopark bağlantıları için yeni rampaların standartlara uygun olarak eklenmesi
- Hissedilebilir yüzey uygulamalarının bina girişlerine eklenmesi,
- Bina dışında ise hatalı olan hissedilebilir yüzey bölgelerinin onarılarak düzenlenmesi,
- Donatı elemanları, yeraltı tesisatı kapakları gibi engellere denk kılavuz izlerin ve uyarıcı yüzeylerin düzenlenmesi veya yeni bir rota belirlenerek yapılması,
- Bina içi merdivenlerinin tirabzan ve kaymaz şerit gibi düzenlenmelerle iyileştirilmesi,

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

➤ Yangın merdiven ile ortak kullanılan çıkışlar için uygun yönlendirme işaretlerinin bırakılması ve sesli ikaz sisteminin yapılması önerilmektedir.

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**INTERNATIONAL ANKARA CONGRESS ON  
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October 13-14, 2023**

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TÜRKİYE'DE DIŞ TİCARETİN BELİRLEYİCİLERİNİN ANALİZİ  
ANALYSIS of the DETERMINANTS of FOREIGN TRADE in TURKEY

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**ÖZET**

Bazı makroekonomik değişkenler bir ülkenin dış ticaret performansını büyük ölçüde etkiler ve dış ticaret politikalarının belirlenmesi ve uygulanmasında önemli roller oynayabilirler. Bir ülkenin gayri safi yurt içi hasılası, dış ticareti etkileyen temel faktörlerden birisidir. Büyük ve büyümekte olan ekonomiler genellikle daha fazla dış ticaret hacmine sahip olan ülkeler olarak görülmektedirler. Döviz kuru da dış ticaretin önemli belirleyicilerindendir. Düşük bir ulusal para birimi değeri, ihracatı artırabilirken, yüksek bir kur değeri ithalatı teşvik edebilir ve dış ticaret açığına yol açabilir. Yüksek faiz oranları genellikle yerel para birimini çekici hale getirir ve dış ticaret dengesini etkileyebilir. Düşük enflasyon oranları, yerli ülkenin ürünlerini daha cazip hale getirerek ihracatı etkileyebilir. Diğer yandan düşük enflasyon döviz kuru istikrarını destekleyebilir ve dış ticareti teşvik edebilir. Bir ülkenin siyasi istikrarı da, dış ticareti etkileyen önemli faktörlerdendir. İstikrarsızlık ve siyasi çalkantıların, dış ticaret üzerinde olumsuz etkilerinin olduğu da literatürdeki çalışmalardan anlaşılmaktadır.

Bu çalışmanın amacı 1974-2022 yıllık verileriyle Türkiye Ekonomisi örneğinde, zaman serileri ekonometrisi yöntemlerini kullanarak dış ticaretin belirleyicilerini ekonometrik olarak tahmin etmektir. Elde edilen sonuçlar dış ticaret politikasının şekillendirilmesinde politika yapıcılara sunulabilecek bir kaynak olarak kullanılabilir.

**Anahtar Kelimeler:** Makroekonomik Göstergeler, Dış Ticaret, Zaman Serileri Analizi

**ABSTRACT**

Some macroeconomic variables greatly affect a country's foreign trade performance and can play important roles in determining and implementing foreign trade policies. A country's gross domestic product is one of the main factors affecting foreign trade. Larger and growing economies are generally seen as having a higher volume of foreign trade. The exchange rate is also an important determinant of trade. A low value of the national currency can boost exports, while a high exchange rate can encourage imports and lead to a trade deficit. High interest rates often make the domestic currency attractive and can affect the balance of trade. Low inflation rates can affect exports by making the domestic country's products more attractive. On the other hand, low inflation can support exchange rate stability and encourage foreign trade. The political stability of a country is also an important factor affecting foreign trade. It is also understood from the studies in the literature that instability and political turmoil have negative effects on foreign trade.

The aim of this study is to econometrically estimate the determinants of foreign trade by using time series econometric methods in the case of Turkish economy with 1974-2022 annual data. The results obtained can be used as a resource that can be presented to policy makers in shaping foreign trade policy.

**Keywords:** Macroeconomic Indicators, Foreign Trade, Time Series Analysis



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## UNESCO'NUN SÜRDÜRÜLEBİLİR KALKINMA HEDEFLERİNE KATKISI: BİLİM VE EĞİTİMDE BİT

## UNESCO'S CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS: ICTS IN SCIENCE AND EDUCATION

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### ÖZET

Bu makale, UNESCO'nun bilgi ve iletişim teknolojilerinin (BİT) kullanımı yoluyla bilim ve eğitim alanında Sürdürülebilir Kalkınma Hedeflerine (SKH'ler) katkısını incelemektedir. BİT'lerin, bilgi ve bilgiye erişimi artırması, araştırma ve inovasyonun verimliliğini ve etkinliğini artırması ve eğitim kalitesini iyileştirmesi nedeniyle SKH'lerin gerçekleştirilmesinde önemli bir rol oynadığını belirtmek gerekir. BİT'in SKH'nin 17 hedefinin çoğunu destekleme potansiyeline sahip olduğunu ve UNESCO'nun bu potansiyeli gerçekleştirmek için çeşitli programlar ve girişimler yürüttüğünü göstermektedir.

Makalede, UNESCO'nun BİT'lerin bilim ve eğitimde kullanımına yönelik faaliyetlerinin somut örneklerini analiz edilmektedir. UNESCO'nun küresel zorlukları ve sürdürülebilir kalkınmayı ele almak için BİT'leri kullanarak SKH'lere önemli bir katkıda bulunduğu sonucuna varmaktadır.

UNESCO, küresel bir BİT erişimi ve kullanımını artırmaya yardımcı olmak için "BİT için herkes" kampanyası yürütmektedir. Ayrıca, UNESCO, SKH'ye ulaşmak için BİT'i kullanan öğretmenleri ve öğrencileri desteklemek için çeşitli eğitim programları ve kaynakları sunmaktadır.

Makale, BİT'in SKH'ye ulaşmak için güçlü bir araç olabileceğini, ancak bu potansiyeli gerçekleştirmek için politika yapıcılar, eğitimciler ve bireyler tarafından ortak bir çabanın gerekli olduğunu vurgulamaktadır.

**Anahtar kelimeler:** UNESCO, SKH'ler, BİT'ler, bilim, eğitim, sürdürülebilir kalkınma

### ABSTRACT

This article examines UNESCO's contribution to the Sustainable Development Goals (SDGs) in science and education through the use of information and communication technologies (ICTs). It should be noted that ICTs play an important role in achieving the SDGs by increasing access to information and knowledge, enhancing the efficiency and effectiveness of research and innovation, and improving the quality of education.

The paper analyses concrete examples of UNESCO's activities on the use of ICTs in science and education. It concludes that UNESCO is making an important contribution to the SDGs by using ICTs to address global challenges and sustainable development.

UNESCO is running an "ICT for all" campaign to help increase global ICT access and use. Furthermore, UNESCO offers various training programmes and resources to support teachers and students using ICT to achieve the SDGs.

The article highlights that ICT can be a powerful tool for achieving the SDGs, but that a concerted effort by policy makers, educators and individuals is needed to realise this potential.

**Keywords:** UNESCO, SDGs, ICT, science, education, sustainable development



### GİRİŞ

Modern bilgi ve iletişim teknolojileri (BİT'ler) bilim ve eğitimin gelişiminde önemli bir rol oynamaktadır. Bilim insanlarının ve araştırmacıların bilgi paylaşımlarını, işbirliği yapmalarını ve yeni bilgilere daha hızlı ve daha verimli bir şekilde erişmelerini sağlarlar. Eğitimde BİT'ler öğrenme kalitesini artırmak, öğrenmeyi kişiselleştirmek ve daha ilgi çekici ve etkileşimli bir öğrenme ortamı yaratmak için kullanılmaktadır.

BİT'ler bilim insanlarına ve araştırmacılara bilimin ilerlemesine katkıda bulunan bir dizi fayda sağlar:

1. Bilgiyi daha hızlı ve verimli bir şekilde paylaşmak: Bilim insanları verileri, araştırma sonuçlarını ve fikirleri hızlı ve kolay bir şekilde paylaşır. Bu, bilimsel araştırma sürecini hızlandırabilir ve daha verimli hale getirebilir.
2. Birbirinizle işbirliği yapın: Dünyanın her yerinden araştırmacılar, coğrafi konumlarından bağımsız olarak birbirleriyle işbirliği yaparlar. Bu da daha yenilikçi araştırma sonuçlarının ortaya çıkmasını sağlayabilir.
3. Yeni bilgilere erişim sağlayın: Bilim insanları geleneksel kütüphanelerde ve laboratuvarlarda bulunmayan yeni bilgilere erişebilir. Bu, araştırma ufkunu genişletir ve yeni keşiflere yol açar.

UNESCO, eğitim alanında önde gelen uluslararası bir kuruluştur. BİT'lerin eğitimde kullanımının teşvik edilmesinde önemli bir rol oynamaktadır.

UNESCO'nun eğitim alanındaki temel önceliklerinden biri, UNESCO Üye Devletlerine eğitimin enformatikleştirilmesi, eğitim kurumlarının yönetimi için modellerin tanıtılması yoluyla ulusal eğitim sistemlerinin modernleştirilmesi, BİT ve pedagojiyi entegre etme mekanizmalarını kullanarak eğitim sürecinin düzenlenmesi ve modern BİT'lerin ve gelişmiş pedagojik yöntemlerin günlük öğrenme faaliyetlerine dahil edilmesi yoluyla eğitim kalitesinin artırılmasına yönelik zorlukların ele alınmasına yönelik stratejilerin formüle edilmesinde ve politikaların uygulanmasında yardımcı olmaktır.

### ARAŞTIRMA VE BULGULAR

UNESCO yirmi yıldır düzenli olarak Bilim Raporları yayınlamakta ve dünya çapında bilim, teknoloji ve inovasyonun (BTI) durumunu raporlamaktadır. "Akıllı Gelişim için Zamana Karşı Yarış" başlıklı yedinci UNESCO Bilim Raporu 2021 yılında yayımlanmıştır. Rapor, dünyadaki BTI gelişimindeki ana eğilimlere genel bir bakış sunmaktadır [2].

Rapor, iklim değişikliği, yoksulluk ve eşitsizlik gibi küresel zorlukların üstesinden gelebilecek ve herkes için daha sürdürülebilir bir gelecek inşa edebilecek bilimin önemini vurgulamaktadır.

Yayında şu notlar yer almaktadır, 21. yüzyılda bilimin karşı karşıya olduğu bir dizi zorluk bulunduğunu, bunlardan birinin bilime ve eğitime eşit olmayan erişim, diğerinin ise kaynaklar ve yetenekler için artan rekabet olduğunu belirtiyor.

Bu zorlukların üstesinden gelmek için rapor bir dizi tavsiyede bulunmaktadır. Bunlar arasında şu tavsiyeler yer almaktadır:

- Bilim ve eğitime yapılan yatırımların artırılması
- Daha kapsayıcı ve eşitlikçi bir bilim sistemi inşa etmek
- Ülkeler ve bölgeler arasında işbirliği.

Yukarıdakilerin tümü şu sonuçlara varmamızı sağlamaktadır: dünya bilimsel bilgi ve teknolojiye benzeri görülmemiş bir büyüme dönemi yaşamaktadır; bilim, küresel zorlukların ele alınmasında giderek daha önemli bir rol oynamaktadır.

UNESCO, farklı sektörlerde ve farklı seviyelerde eğitimde BİT'leri geliştirmeyi ve tanıtmayı, ayrıca öğrenme kalitesini artırmayı, öğrenmeyi kişiselleştirmeyi ve daha çekici ve etkileşimli öğrenme ortamları yaratmayı amaçlayan bir dizi programı desteklemektedir:

*Herkes için Eğitim Programı*

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Herkes için Eğitim (EFA) UNESCO'nun önemli programlardan biridir. EFA-nın amacı, sosyal statüleri veya konumları ne olursa olsun herkesin kaliteli eğitime erişimini sağlamaktır. BİT'ler bu hedefe ulaşmada önemli bir rol oynamaktadır. UNESCO, uzak bölgelerdeki öğrencilerin ve engelli öğrencilerin eğitime erişimini sağlamak için BİT'lerin kullanımını desteklemektedir.

## *Gelecek için Eğitim ve BİT Programı*

Program, BİT'lerin geliştirilmesini ve uygulanmasını desteklemenin yanı sıra BİT'lerin eğitimdeki potansiyeline ilişkin farkındalığı artırmaktadır.

## *Teknik ve Mesleki Eğitim ve Öğretim Programı*

Teknik ve Mesleki Eğitim ve Öğretim (TVET) Programı, dünya çapında kaliteli ve kapsayıcı TVET sistemlerini teşvik etmeyi amaçlamaktadır. Program, ülkelerin etkili TVET politikaları ve uygulamaları geliştirmelerine ve uygulamalarına ve paydaşlar arasındaki işbirliğini güçlendirmelerine yardımcı olmaktadır. UNESCO'nun TVET programı, hükümetler, eğitim kurumları, işverenler, sendikalar ve diğer paydaşlarla yakın işbirliği içinde uygulanmaktadır. Ayrıca Uluslararası Çalışma Örgütü ve Ekonomik İşbirliği ve Kalkınma Örgütü gibi diğer uluslararası kuruluşlarla da işbirliği yapmaktadır.

## *Sürdürülebilir Kalkınma Eğitim Programı*

Program sürdürülebilir kalkınma için eğitimi teşvik etmeyi amaçlamaktadır. BİT'ler sürdürülebilir kalkınma eğitiminde önemli bir rol oynamaktadır. UNESCO, sürdürülebilir kalkınma konularında farkındalık yaratmak ve bu konuları ele almak için gereken becerileri geliştirmek için BİT'lerin kullanımını desteklemektedir.

Eğitimde BİT kullanımıyla ilgili UNESCO programlarından bazı somut örnekler aşağıda verilmiştir:

### **Açık Eğitim Kaynakları Projesi**

Açık Eğitim Kaynakları (OER) kullanım, yayma ve uyarılma için ücretsiz olarak sunulan eğitim materyalleridir. UNESCO, eğitimi herkes için daha erişilebilir ve kullanılabilir hale getirmek için OER projesini desteklemektedir.

### **Uzaktan Eğitim Projesi**

Uzaktan eğitimin kullanımını teşvik etmeyi amaçlamaktadır. Uzaktan eğitim, eğitim materyallerini sunmak ve öğrencilere geri bildirim sağlamak için BİT'leri kullanan bir eğitim şeklidir. UNESCO, eğitimi uzak bölgelerdeki öğrenciler için daha erişilebilir kılmak amacıyla Uzaktan Eğitim Projesini desteklemektedir.

### **Hayat Boyu Öğrenme Projesi**

Proje, UNESCO'nun eğitim alanındaki önemli programlarından biridir. Proje, yaş, cinsiyet, sosyal statü veya coğrafi konumdan bağımsız olarak tüm insanlar için yaşam boyu öğrenmeyi teşvik etmeyi amaçlamaktadır.

Azerbaycan'ın eğitim alanında UNESCO ile başarılı bir işbirliği içinde olduğunu belirtmek gerekir. Azerbaycan'da eğitim alanında UNESCO ile işbirliği, hem bu örgütün evrensel programlarını hem de ülkedeki belirli eğitim alanlarına odaklanan projeleri içermektedir. UNESCO'nun doğrudan desteğiyle 1999 yılında Azerbaycan'ın iki yükseköğretim kurumunda UNESCO Kürsüleri kurulmuştur: Bakü Devlet Üniversitesi'nde "İnsan Hakları ve Bilgi Hukuku" (2015), Eğitim ve İleri Eğitimde Yenilikçi Teknolojiler Merkezi'nde "BİT Yaklaşımıyla Öğretmenlerin Mesleki Gelişiminin Güçlendirilmesi" (2017). [3]

18-21 Aralık 2006 tarihlerinde Bakü'de Azerbaycan Eğitim Bakanlığı tarafından UNESCO'nun mali desteğiyle "Azerbaycan'da mesleki eğitimin geliştirilmesi" konulu uluslararası bir seminer ve "Azerbaycan'daki yüksek öğretim kurumlarında kredi sisteminin uygulanması" konulu ulusal bir seminer düzenlenmiştir.

Azerbaycan'da uygulanan UNESCO projeleri de dikkat çekmektedir: 1) "Azerbaycan Cumhuriyeti'nde Okul Öncesi Eğitimin Geliştirilmesi Stratejisinin Uygulanması": Ülkede okul öncesi eğitimin kalitesini artırmayı amaçlamaktadır. 2) "Azerbaycan Cumhuriyeti'nde Kapsayıcı Eğitimin Geliştirilmesi": Engelli

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

çocuklar da dahil olmak üzere tüm çocukların eğitime eşit erişimini sağlamayı amaçlamaktadır. (3) "Azerbaycan Cumhuriyeti'nde Mesleki ve Teknik Eğitim ve Öğretimin Geliştirilmesi": Ülkede mesleki ve teknik eğitim ve öğretimin kalitesini artırmayı amaçlamaktadır.

Bu programlar çerçevesinde çeşitli faaliyetler uygulanmaktadır:

- Öğretmenlerin ve diğer pedagojik personelin eğitimi
- Eğitim materyalleri ve kaynaklarının geliştirilmesi
- Araştırma ve izleme
- Diğer kuruluşlarla işbirliği

Bu da UNESCO ile işbirliğinin Azerbaycan'ın eğitim alanındaki ulusal hedeflerini gerçekleştirmesine yardımcı olduğu, diğer ülkeler arasında deneyim ve bilgi alışverişini kolaylaştırdığı ve eğitimin geliştirilmesi için uluslararası fonların çekilmesine yardımcı olduğu sonucuna varmamızı sağlıyor.

## SONUÇ

Çalışma sonucunda, BİT'lerin UNESCO'nun çalışmalarının verimliliğini ve etkinliğini artırmak için kullanılabilmesi sonucuna varmamızı sağlayan materyal elde edilmiştir. Bununla birlikte UNESCO, BİT'lerin bilim ve eğitimde kullanımına yönelik etkili programlar ve projeler geliştirmek ve uygulamak için diğer kuruluşlarla işbirliği yapmaya devam etmelidir. Ayrıca, BİT'lerin bilim ve eğitimdeki etkinliğini değerlendirmek için araştırmalara ihtiyaç duyulduğu da eklenmelidir.

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TÜRKİYE’DE BULUNAN YÖNETİM BİLİŞİM SİSTEMLERİ BÖLÜMLERİNİN YÖK  
ATLAS VERİLERİNİN KÜMELEME ANALİZİ

CLUSTER ANALYSIS OF YÖK ATLAS DATA OF MANAGEMENT INFORMATION  
SYSTEMS DEPARTMENTS IN TÜRKİYE

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**ÖZET**

Günümüzde hızla gelişen teknolojinin kurum ve kuruluşlara çeşitli faydaları bulunmaktadır. Hangi kurum olursa olsun, artık bilişim sistemleri etkin bir biçimde kullanılmaktadır. Birçok alanda olduğu gibi işletme alanında da bilişim sistemlerinin önemi artmaya devam etmektedir. Böylece Yönetim Bilişim Sistemlerinin de önemi artmış ve birçok alanda kendisine yer bulmuştur. Yönetim Bilişim Sistemleri, insanı, teknolojiyi, sistem teorisini ve bilgi yönetimini birleştiren bir akademik alandır. İşletme ve bilgisayar bilimlerinin kesişim noktasında bulunmaktadır ve işletmelerdeki bilişim sistemlerinin alt yapısı, ihtiyaçları ve planlaması gibi konularla ilgilenmektedir. Türkiye’deki Devlet Üniversitelerinde Yönetim Bilişim Sistemleri ismiyle faaliyet gösteren 51 tane bölüm bulunmaktadır. Bu bölümler akademik kadro, akademik çalışma, başarı sıralaması gibi birçok farklı özelliklere sahiptir. Bu çalışmada Türkiye’de üniversitelerde eğitim öğretim faaliyeti gösteren Yönetim Bilişim Sistemleri bölümlerinin farklı değişkenler açısından incelenmesi ve kümeleme analizi ile kategorilendirilmesi amaçlanmıştır. Yükseköğretim Kurumu Program Atlası (YÖK ATLAS) kullanılarak Yönetim Bilişim Sistemleri bölümlerine ait çeşitli veriler çekilmiş ve bu şekilde veri seti oluşturulmuştur. Elde edilen veri seti 10 farklı öznitelik ile oluşturulmuştur. Bu öznitelikler; akademisyen sayısı, son kişi puan, son kişi başarı sırası, tavan başarı sırası, ortalama diploma not, tercih eden aday sayısı, bir kontenjana talip olan aday sayısı, ortalama tercih edilme sırası, birinci sırada tercih eden sayısı, akademik çalışma sayısı. Bölümlere ait özniteliklere ilişkin betimleyici istatistikler verilerek bölümler arasındaki farklılıkların kaynakları gösterilmiştir. Daha sonra bu 10 öznitelik kullanılarak bölümler kümelendirilmiştir. Çalışma sonucunda Yönetim Bilişim Sistemleri bölümlerinin betimleyici istatistik sonuçlarında akademisyen sayısı ve ortalama diploma notu hariç diğer değişkenleri farklılaşmaktadır. Akademik çalışma sayısı ortalama 287 değer iken, standart sapması 159 olmuştur. Yönetim Bilişim Sistemlerindeki akademisyenlerin akademik çalışma sayıları farklılaşmaktadır. Kümeleme analizi sonucunda dört farklı küme elde edilmiştir. Her kümede yer alan bölümler verilerek diğer bölümlerden farklılaşan bölümlerin ortak özellikleri belirtilmiştir. Üniversitelerin aynı kümede yer almaları ortalama tercih edilme sıralarının birbirine yakın olmasından dolayı kaynaklandığı söylenebilir. Ayrıca, öğrencilerin bölümleri tercih etme sıralamaları ile bir kontenjana başvuran öğrenci sayıları gibi değişkenler arasında önemli farklılıklar bulunmaktadır.

**Anahtar kelimeler:** Yönetim Bilişim Sistemleri, YÖK ATLAS, Kümeleme Analizi.

**ABSTRACT**

Today, rapidly developing technology has various benefits for institutions and organizations. Regardless of the organization, information systems are now used effectively. As in many fields, the importance of

information systems in the field of business continues to increase. Thus, the importance of Management Information Systems has increased and it has found its place in many fields. Management Information Systems is an academic field that combines people, technology, system theory and information management. It is located at the intersection of business and computer science and deals with issues such as the infrastructure, needs and planning of information systems in businesses. There are 51 departments operating under the name of Management Information Systems in State Universities in Turkey. These departments have many different features such as academic staff, academic study, success ranking. In this study, it is aimed to examine the Management Information Systems departments in universities in Turkey in terms of different variables and to categorize them with cluster analysis. Using the Higher Education Institution Program Atlas (YÖK ATLAS), various data on Management Information Systems departments were extracted and a data set was created in this way. The obtained data set was created with 10 different attributes. These attributes are; number of academicians, last person score, last person success rank, ceiling success rank, average diploma grade, number of preferred candidates, number of applicants for a quota, average order of preference, number of first preference, number of academic studies. Descriptive statistics for the attributes of the departments are given and the sources of differences between the departments are shown. The departments were then clustered using these 10 attributes. As a result of the study, in the descriptive statistics results of the Management Information Systems departments, except for the number of academicians and average diploma grade, other variables differ. While the average number of academic studies was 287, the standard deviation was 159. The number of academic studies of academicians in Management Information Systems varies. Four different clusters were obtained as a result of clustering analysis. By giving the departments in each cluster, the common characteristics of the departments that differ from other departments are indicated. It can be said that the fact that the universities are in the same cluster is due to the fact that their average order of preference is close to each other. Moreover, there are significant differences between variables such as the order in which students prefer departments and the number of students applying for a quota.

**Keywords:** Management Information Systems, YÖK ATLAS, Cluster Analysis.

## GİRİŞ

Gelişen teknoloji ve bu teknolojinin kişi ve kuruluşlara kazandırabileceği ciddi avantajlar bulunmaktadır. Hangi sektör olursa olsun kişiler ve kurumlar bilişim sistemlerini etkin bir şekilde kullanabilmelidir. Birçok alanda olduğu gibi işletme alanında da bilişim sistemleri eğitimi artık programda önemli bir yer almaya başlamıştır. Böylece Yönetim Bilişim Sistemleri (YBS)'nin önemi artmış ve birçok araştırmacının da bu konuda araştırma yapmasını sağlamıştır (Damar & Bölen, 2021). Türkiye'de ilk kabul edilen YBS lisans programı, 1991 yılında Marmara Üniversitesi İşletme Fakültesi bünyesinde açılan İşletme Enformatiği bölümüdür. Ancak, Yönetim Bilişim Sistemleri adıyla kurulan ilk bölüm 1995 yılında Boğaziçi Üniversitesi'nde açılmıştır.

YBS, yönetim ve bilişim kavramlarının bir araya gelmesi ile ismini almaktadır. Bilgi teknolojileri stratejileri, bu teknolojilerin kullanımı ve örgütsel değişim ile bütünleşmesi konularını temel alan birçok akademik disiplinin kesişme noktası olan disiplinler arası yeni bir disiplin olarak tanımlanmaktadır (Bensghir, 2002, s. 77). YBS'nin ana çalışma konusu, işletme içerisinde uygun şekilde bilgi, görev, veri akışı vb. sağlanması, karar alma süreçlerinin iyileştirilmesi ve yönetim süreçlerinin daha verimli hale getirilmesidir. Bu disiplin, bilişim, yönetim, işletme gibi birçok alanı içerdiği için çok disiplinli bir alan olarak kabul edilir. YBS'nin amacı, işletmelerin bilgi teknolojilerinden en iyi şekilde faydalanmasını sağlamak, iş süreçlerinin optimize edilmesini ve verimliliğin artırılmasını hedeflemektedir (Aslay et al., 2021).

Literatür incelendiği zaman YBS bölümü ile ilgili olarak yapılan lisansüstü tezlerin incelenmesi (Yarlıkaş, 2015), YBS literatüründe çok kriterli karar verme tekniklerinin incelenmesi (CEBECİ, 2021), Türkiye'nin 2010 Sonrası Yönetim Bilişim Sistemleri Alanında Uluslararası Q1 Dergilerinde Durumunun incelenmesi (Muhammet & Aydın, 2021), yönetim bilişim sistemleri disiplininde hazırlanan lisansüstü tezlerin gizli dirichlet ayrımı algoritmasıyla konu modellenmesi gerçekleştirilmiştir (Çallı et al., 2021), Yönetim Bilişim Sistemleri disiplininin Türkiye'deki araştırmacı dokusu incelendiği

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

çalışma (Damar & Bölen, 2021) gibi çalışmalar bulunduğu görülmektedir. Fakat şu ana kadar YBS bölümleri ile ilgili gerek akademik gerekse öğrenci yönünden verileri derleyerek YBS bölümleri ile ilgili bir kümeleme çalışması yapılmadığı görülmektedir.

Bu araştırmada, YBS bölümlerinin bazı değişkenler açısından incelenmesi ve kümelenebilirliği gerçekleştirilmiştir. Böylece ülkemizdeki YBS bölümleri ile ilgili genel durum ortaya konmuş olacak ve YBS'nin gelişimi için üniversitelerin ve bölümlerin izleyeceği yollar bulunabilecektir.

## YÖNTEM

Çalışmada YÖK ATLAS veri tabanı sistemi kullanılarak Yönetim Bilişim Sistemleri Bölümleri bilgileri çekilmiştir. Toplam 51 üniversiteye ait bölüm bilgilerine ulaşılarak Tablo 1'de verilen değişkenler kullanılarak veri seti elde edilmiştir.

**Tablo 1.** Üniversitelere ait Yönetim Bilişim Sistemleri Bölüm Bilgileri

No	Değişken adı	Kısaltma
1	Akademisyen Sayısı	AS
2	Son kişi puan	SKP
3	Son kişi başarı sırası	SKBS
4	Tavan başarı sırası	TBS
5	Ortalama diploma not	ODN
6	Tercih eden aday sayısı	TAS
7	Bir kontenjane talip olan aday sayısı	BKTOAS
8	Ortalama tercih edilme sırası	OTES
9	Birinci sırada tercih eden sayısı	BSTES
10	Akademik Çalışma Sayısı	AÇS

Elde edilen veriseti Python programlama dili ve Jupyter Notebook IDE kullanılarak işlenmiştir. Öncelikle verilerin betimleyici istatistik bilgileri verilmiştir. Ortalama, standart sapma, en küçük ve en büyük değerler verilerek YBS bölümlerinin genel durumu incelenmiştir.

Daha sonra verilere kümeleme analizi gerçekleştirilmiştir. Kümeleme analizi Denetimsiz öğrenme (Unsupervised Learning) olarak da bilinen bir makine öğrenmesi tekniğidir. Verileri birbirlerine olan uzaklık ya da yakınlık ölçütüne göre bir araya getirerek veri setindeki gizli örüntüleri bulmayı amaçlar. Kümeleme analizi hiyerarşik ve hiyerarşik olmayan kümeleme olmak üzere iki farklı şekilde uygulanır. Bu çalışmada hiyerarşik kümeleme yöntemi tercih edilmiştir. Bunun en önemli nedeni eldeki verinin kaç kümeye ayrılacağına bilinmemesi ve veri setinin büyük miktarda veri içermemesidir (Alpar, 2011). Hiyerarşik kümelemede veri setinde yer alan her bir gözlem ilk başta kendisi bir küme olacak şekilde başlar. Sonra aralarındaki en yakın uzaklık bulunan gözlemler bir araya getirilerek gözlemler birleştirilir. Bu işlemin tersi olarak da ilk başta bütün gözlemler tek bir kümede yer alan ve her aşamada uzak mesafede olan gözlemlerin ayrıldığı bir yöntemde bulunmaktadır. Bu çalışmada ise birleştirici kümeleme olarak bilinen her gözlemi önce ayrı bir küme kabul ederek gözlemleri birleştiren yöntem seçilmiştir. Uzaklık ölçüsü olarak Öklid Uzaklığı, birleştirme yöntemi olarak da Ward birleştirme yöntemi uygulanmıştır.

## BULGULAR

Bölgümlere ait değişkenlerin betimleyici istatistik değerleri Tablo 2'de verilmiştir.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

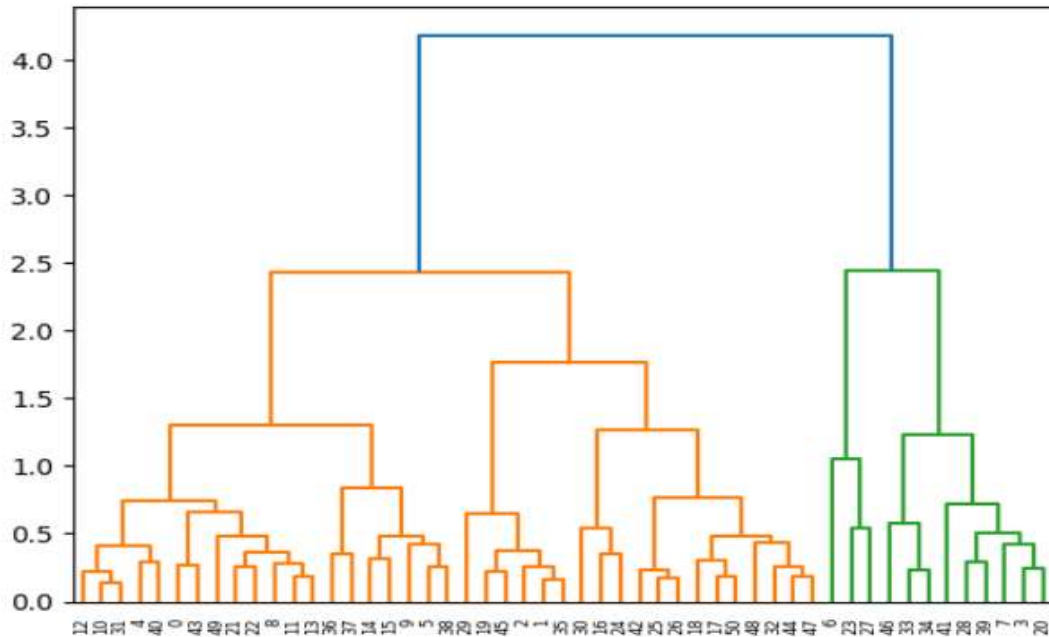
October 13-14, 2023

Tablo 2. Bölümlere ait betimleyici istatistik bilgileri

Değişken	mean	std	min	25%	50%	75%	max
AS	7,8	3,2	2,0	5,0	8,0	10,0	14,0
SKP	346,4	43,2	270,1	318,0	336,5	365,4	502,6
SKBS	220.478,6	133.998,3	351,0	129.392,0	206.632,0	305.694,5	653.790,0
TBS	133.115,8	89.603,7	60,0	69.442,0	126.841,0	180.895,5	364.219,0
ODN	81,6	3,6	75,1	79,2	80,9	84,0	92,7
TAS	1.988,8	1.541,6	559,0	1.110,5	1.555,0	2.280,5	8.417,0
BKTOAS	43,0	47,0	7,8	24,7	29,4	41,5	271,5
OTES	8,9	1,8	4,0	7,5	9,5	10,0	12,1
BSTES	240,5	454,4	20,0	57,0	100,0	201,0	2.554,0
AÇS	287,7	159,1	14,0	175,0	266,0	351,0	692,0

Tablo 2’de bölümlere ait veriler arasında ciddi farklılıklar olduğu görülmektedir. Bunun en önemli göstergelerinden birisi de değişkenlere ait standart sapma değerleridir. Örneğin AÇS değişkeni açısından ortalama değer yaklaşık 287 iken standart sapma değeri yaklaşık 160 olmaktadır. Yani YBS bölümleri için bir akademisyen ortalama 287 çalışma yapmıştır fakat bölümlerde bulunan akademisyenler arasında AÇS bakımından büyük farklar vardır. Bazı akademisyenlerin 14 çalışması varken bazı akademisyenlerde bu sayı 692 değerine ulaşabilmektedir. Bu sayılara Tablo 2 içerisinde min ve max sütunları ile ulaşılabilir.

YBS bölümlerine ait verilere ayrıca kümeleme analizi de gerçekleştirilmiştir.



Şekil 1. Kümeleme sonucuna ait dendrogram grafiği

Kümeleme analizi sonucunda elde edilen kümelerde yer alan üniversiteler ise Tablo 3’de verilmiştir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Tablo 3. Kümelerde yer alan üniversiteler

1. küme	<ul style="list-style-type: none"><li>• Afyon Kocatepe Üniversitesi</li><li>• Akdeniz Üniversitesi (Antalya)Manavgat Sosyal ve Beşeri Bilimler Fakültesi</li><li>• Bayburt Üniversitesi</li><li>• Bilecik Şeyh Edebali Üniversitesi</li><li>• Bilecik Şeyh Edebali Üniversitesi (İ.Ö)</li><li>• Bursa Uludağ Üniversitesi</li><li>• Gümüşhane Üniversitesi</li><li>• Hatay Mustafa Kemal Üniversitesi</li><li>• İskenderun Teknik Üniversitesi (Hatay)</li><li>• İzmir Demokrasi Üniversitesi</li></ul>	<ul style="list-style-type: none"><li>• Kafkas Üniversitesi (Kars)</li><li>• Malatya Turgut Özal Üniversitesi</li><li>• Muğla Sıtkı Koçman Üniversitesi</li><li>• Selçuk Üniversitesi (Konya)</li><li>• Tarsus Üniversitesi (Mersin)</li><li>• Trakya Üniversitesi (Edirne)</li><li>• Burdur Mehmet Akif Ersoy Üniversitesi</li><li>• Kırşehir Ahi Evran Üniversitesi</li><li>• Mersin Üniversitesi (Mersin)Silifke Uygulamalı Teknoloji ve İşletmecilik Yüksekokulu</li></ul>
2. küme	<ul style="list-style-type: none"><li>• Adana Alparslan Türkeş Bilim ve Teknoloji Üniversitesi</li><li>• Akdeniz Üniversitesi (Antalya)Uygulamalı Bilimler Fakültesi (İÖ)</li><li>• Aksaray Üniversitesi</li><li>• Atatürk Üniversitesi (Erzurum)</li><li>• Atatürk Üniversitesi (Erzurum) (İÖ)</li><li>• Aydın Adnan Menderes Üniversitesi</li><li>• Aydın Adnan Menderes Üniversitesi (İÖ)</li><li>• Bandırma Onyediy Eylül Üniversitesi (Balıkesir)</li><li>• Bandırma Onyediy Eylül Üniversitesi (Balıkesir)(İÖ)</li><li>• Bartın Üniversitesi</li><li>• Bartın Üniversitesi (İÖ)</li></ul>	<ul style="list-style-type: none"><li>• Düzce Üniversitesi (Düzce)</li><li>• Düzce Üniversitesi (Düzce)(İÖ)</li><li>• Karadeniz Teknik Üniversitesi (Trabzon)</li><li>• Necmettin Erbakan Üniversitesi (Konya)</li><li>• Necmettin Erbakan Üniversitesi (Konya) (İÖ)</li><li>• Osmaniye Korkut Ata Üniversitesi (Osmaniye)</li><li>• Pamukkale Üniversitesi (Denizli)(İÖ)</li><li>• Sivas Cumhuriyet Üniversitesi (Sivas)</li><li>• Mersin Üniversitesi (Mersin)Erdemli Uygulamalı Teknoloji ve İşletmecilik Yüksekokulu</li></ul>
3. küme	<ul style="list-style-type: none"><li>• Ankara Hacı Bayram Veli Üniversitesi</li><li>• Gazi Üniversitesi (Ankara)</li></ul>	<ul style="list-style-type: none"><li>• İstanbul Üniversitesi</li></ul>
4. küme	<ul style="list-style-type: none"><li>• Akdeniz Üniversitesi (Antalya)Uygulamalı Bilimler Fakültesi</li><li>• Ankara Yıldırım Beyazıt Üniversitesi</li><li>• Dokuz Eylül Üniversitesi (İzmir)</li><li>• İzmir Bakırçay Üniversitesi</li></ul>	<ul style="list-style-type: none"><li>• Marmara Üniversitesi (İstanbul) (İngilizce)</li><li>• Marmara Üniversitesi (İstanbul) (Almanca)</li><li>• Pamukkale Üniversitesi (Denizli)</li><li>• Sakarya Üniversitesi</li><li>• Boğaziçi Üniversitesi (İstanbul)</li></ul>

### TARTIŞMA VE SONUÇ

Bu çalışmada Türkiye’de bulunan YBS bölümlerinin 10 farklı öznelik kullanılarak incelenmesi ve kümelenmesi gerçekleştirilmiştir.

YBS bölümlerinin betimleyici istatistiklerine göre AS ve ODN değişkenleri haricinde diğer değişkenlere göre bölümler arasında ciddi farklılıklar bulunmaktadır. Bu farklılıklar standart sapma değerleri ile tespit edilebilmektedir. Örneğin AÇS değişkenine göre ortalama 287 değer olmakta iken standart sapma değeri 159 olmuştur. Yani YBS bölümlerinde görevli akademisyenlerin akademik çalışma sayıları arasında ciddi farklılıklar vardır. Bazı akademisyenler akademik yayınlarda oldukça aktif iken bazılarının ise oldukça az çalışması olduğu görülmektedir. Ayrıca bölümleri tercih eden öğrencilerin birinci sırada tercih etmeleri, bir kontenjane talip olan öğrenci sayıları gibi değişkenler açısından da ciddi farklılıklar vardır. Bu durum da öğrencilerin bazı üniversiteleri daha çok istediklerini göstermektedir. Örneğin bazı bölümlerin tercih edilme sayısı (TAS) 559 iken bazı bölümler için bu sayı 8.419 olabilmektedir. Bu durumun altında yatan nedenlerden birisi üniversitelerin şehir ve kampüs olanakları olabilir. Çünkü İstanbul, Ankara ve İzmir gibi illerde bu oranlar çok yüksek iken Gümüşhane ve Kars gibi illerde ise bu oranlar düşebilmektedir.

Örneğin; 2.kümede bulunan üniversitelerin genellikle ikinci öğrenim bölümleri de aynı kümede toplanmıştır. Bu üniversitelerin ortalama tercih edilme sıralarının birbirine yakın olmasından kaynaklandığı söylenebilir.

Çalışma kapsamında ayrıca bölümlere kümeleme analizi de gerçekleştirilmiştir. Kümeleme sonucunda 3. Küme içerisinde sadece üç bölümün bulunduğu görülmüştür. Bu üç bölümün diğer bölümlerden ayrışmasını incelemek için bu bölümlere ait ortalama değerler Tablo 4’de verilmiştir.

**Tablo 4.** Diğer bölümlerden ayrışan üç bölüme ait ortalama değerler

AS	SKP	SKBS	TBS	ODN	TAS	BKTOAS	OTES	BSTES	AÇS
6.6	400.6	64658.3	23036	87.06	7308	217.4	5.466	1717.3	301.6

Tablo 4 incelendiği zaman bu üç bölümün akademisyen sayısı ve akademik çalışma sayısı bakımından diğer bölümlerden çok farklı olmadığı görülmektedir. Fakat diğer sekiz değişken bakımından ise oldukça farklılaştığı tespit edilmiştir. Örneğin BSTES bakımından bu üç bölüm 1717 değerine sahipken diğer bölümler ortalama 240 değerine sahiptir. Yine bu üç bölüm SKBS bakımından ortalama 64.658 iken diğer bölümlerin ortalamasının yaklaşık 220 olduğu görülmektedir. Bu sonuçlar bu üç bölümü oldukça başarılı öğrencilerin istediğini göstermektedir. Bu durum bu üniversitelerin büyük şehirlerde olmaları ve köklü üniversiteler olmalarından kaynaklanabilir.

Hem betimsel analiz hem de kümeleme analizi bazı bölümlerin akademisyen sayısı ve akademik çalışma sayısı bakımından çok önde olmamasına rağmen çok ciddi öğrenci talebi olduğunu göstermektedir. Literatürde öğrenciler için en önemli kriterin öğrenim görecekları bölüm olduğu daha sonra devlet üniversitesi olup olmadığı ve üniversitenin saygınlığı, şehrin coğrafi konumu ve sosyo-kültürel olanakları kriterleri olduğunu belirtilmiştir (Ağaoğlu & Yurtkoru, 2014; Koçak et al., 2021). Bir başka çalışmada ise öğrenciler için sosyal etkinlik ve akademik itibarın oldukça önemli olduğunu göstermiştir (Apaydın & Seçkin Kapucu, 2017)

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DISCRIMINATION OF *CYPRINION MACROSTOMUS* AND *CYPRINION KAIS* FROM  
THEIR SCALES BY GEOMETRIC MORPHOMETRIC METHODS

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ABSTRACT

There are two species of the genus *Cyprinion* in Turkey's inland waters, *Cyprinion macrostomus* and *Cyprinion kais*. *C.kais* (Smallmouth lota kor Kais kingfish), is a rayfinned fish species in genus of *Cyprinion*. It founds in drainage basins of Tigris and Euphrates rivers and is also found in Queiq system, that appear to have been completely extirpated from this basin after the river dried up. Its ranges covers Turkey, Iraq, Syria and Iran. Its preferred habitat is the flowing waters in larger warm stream and river from where it migrate to canals and possibly other artificials water bodies in search of food. *Cyprinion macrostomus*, also known as Kangal fish, is a ray-finned carp. Its homeland is Iran, Syria and Turkey. The body of *Cyprinion macrostomus* individuals is highly built and the scales are large, the mouth is ventral, the upper and lower lips are thick, there is a pair of very short whiskers around the mouth, the posterior edge of the longest hard light of the linear fin is highly serrated, the caudal fin is deeply indented and the tip of the caudal lobes is pointed. Fish scales are widely used for age determination, determining populations, and estimating the growth of a variety of commercially and ecologically important species.

In this study, geometric morphometric methods were used to distinguish these two species from their scales. The scales of 82 (49 female, 33male,) *C. kais* and 81 (39 female, 42 male) *C. macrostomus* specimens from the same locality in the Tigris River were taken from the anterior dorsal fin and the upper part of the linelateral, and the age-determined scales were photographed with a Canon SX7 model binocular fitted with an Olympus digital camera under the same condition and six landmarks were taken in tps Dig ver. 2.32 (Rohlf, 2016) and six landmarks were taken. Procruste analysis was then performed. After separating shape and the size, ANOVA, CVA, PCA, MANOVA and CFA analyses were performed. As a result of the analysis, the species differed sufficiently in size and shape (Size ANOVA:  $F=79.32$ ,  $p<0.001$ ; Shape ANOVA:  $F=36.51$ ,  $p<0.0001$ , MANOVA: Pillai tr.=0.53,  $p<0.0001$ ), and size and shape were different between the sexes (Size ANOVA:  $F=6.92$ ,  $p=0.0093$ ; Shape ANOVA:  $F=5.64$ ,  $p<0.001$ , MANOVA: Pillai tr.=0.11,  $p=0.01$ ). For the species, the first of two principal component explained 39.9% and 16.6% of the total variation, respectively. Accuracy was reclassified with 85% accuracy in DF analysis. As a result, when we look at the species difference of *Cyprinion macrostomus* and *Cyprinion kais* (Canonical Variance Values CVA), Mahalanobis distance is 2.1,  $P=0.0001$ . Procrustes distance is 0.007,  $p=0.0001$ , indicating that the species are sufficiently distinct from each other. Analyses showed that the scales of *C macrostomus* and *C kais* are sufficiently different in size and shape, and a distinction based on scales was found to be significant.

**Keywords:** Cyprinidae, *Cyprinion*, 2D Landmark, Geometric Morphometry, Discriminant

INTRODUCTION

*Cyprinion* (Heckel, 1843) is the genus distributes from the western Syria and the southern Arabia Peninsula to western tributary of the Indus Rivers in Punjab (Pakistan). A total of 5 species have been observe in Iran, including 3 *Cyprinion* species lives in the Tigris/Euphrates Basin (Coad 1995). The distribution and morphological characteristics of *C. macrostomus* and *C. kais* in Turkey were studied by (Ünlü 1999). Revision of *C macrostomus* and *C kais* were made by (Banarescu and Straschil, 1995). The relationships between otolith and fish size in *C. kais* was studied by (Dörtbudak and Özcan, 2019). The otolith morphometry and geometry of *C. macrostomus* and *C. kais* were studied by Dörtbudak et al. (2022). No study on the scale geometry of *C macrostomus* and *C kais* was found in the literature.

Fish scales are a useful for identifying fishes at the genus and species level, as well as for fish phylogeny, age determination, sexual dimorphism and habitats affecting development studies (Esmaceli et al., 2007; Jawad, 2005; Miranda and Escala, 2000; Poulet et al., 2005). Although fish scales are considered to be an important value in the classifications of fish, fish scales have proven to be inefficient at the species level, and it has been determined that fish scales are used as an age index as well as for the life history of the fish. It was noted that the external structure of fish and fish scale patterns are useful in establishing phylogenetic relationships (Van Oosten, 1957). More recently, scanning electron microscopy (SEM) studies have revealed the detailed shape designs and shapes of Teleostei scales, renewing interest in using the surface structure of scales for taxonomic purposes (De Lamater and Courtenay, 1973). The different growth characteristic of fish populations due to various external factor, seasonal or habitat variabilities, availability of food resources, and thus their scale at first contact with environment, all point to an important phenotypic trait related to these factors (Şerban and Grigoraş, 2018). Fish scale identifications is valuable tool for fish biology. For example, in sediment analyses, scales can provide a valuable informations on historical fish population dynamics and paleo-productivity Patterson et al. (2005); Valdés et al. (2008); Drago et al. (2009). In addition, scales have been successfully used in the dietary studies to determine prey species identity for a variety of fish-eating species. Some example include studies using fish scale found in fecal samples of harbor seals (*Phoca vitulina*) (Cottrell et al., 1996), in vomited pellets of the herring gulls (*Larus argentatus*) (Ewins et al., 1994). In the case of marine mammals, fish scale analysis provide a non-invasive and directly method to identify of the target species of top marine predators (Bearzi et al., (2006); Ford & Ellis, (2006).

Classical morphometric studies are used to determine diversity and difference of shapes. These methods don't provide information about the whole shape. For this reasons, geometric morphometry is used in full shape analysis. The combination of classical morphometry and geometric morphometry in anatomical structures such as otoliths plays an important role in revealing difference between species and population (Vignon, 2012; Rohlf-Marcus, 1993; Zelditch et al., 2004). Geometric and morphometric methods were used to analyze the scales of *Capoeta trutta* (Heckel, 1843) and *Capoeta umbla* (Heckel, 1843). Fish scale morphology has been use to identify inland fishes of North America (Daniels, 1996) and also to prepare taxonomic key for freshwater ecosystems of various regions such California (Casteel, 1972), Britain and Ireland (Maitland, 2004). Fourier analysis of fish scale has been used to discriminate between stocks (e.g. Jarvis et. al., 1978; Richards and Esteves, 1997; Poulet et. al., 2005) and, more recently, Ibáñez et al. (2007) applied geometric morphometric method to scales to identify general species and local population with in Mugilidae.

In this study, geometric morphometry and shape analysis of the scales of *C. kais* and *C. macrostomus* were performed to reveal the similarities and difference of these two species and the variability in shape due to racial influence.

#### **MATERIAL AND METHODS**

In this study, 82 (49♀♀, 33♂♂) *C kais* and 81 (39♀♀, 42♂♂) *C macrostomus* samples were taken from the same region in the Tigris River and their ages were determined under the same conditions. and the scales taken from the front and upper part of the lateral line of the dorsal fins of the fish were determined, and only one scale from each fishes sample was photographed with an Olympus digital camera and Canon SX7 model binoculars under the same conditions at 40X magnification, and then tpsDig ver. It was taken with 2.32 (Rohlf, 2016) software (Figure 1). After performing GPA (General Procrustes Analysis), PCA (Principal Component Analysis), ANOVA (Analysis of Variance), CVA (Canonical Variance Analysis) and DFA (Discriminant Function Analysis) analyzes were performed with MorphoJ 1.06d (Klingenberg, 2011) and PAST3.11 (Hammer et al., 2001).



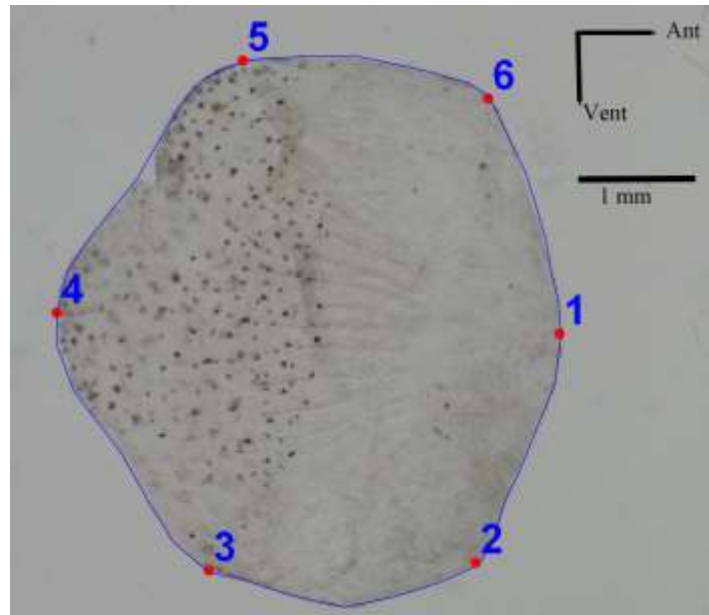


Figure 1: The landmarks location on scale (Photo: *C. macrostomus* scale, Ant.: Anteriör, Vent: Ventrale).

## RESULTS

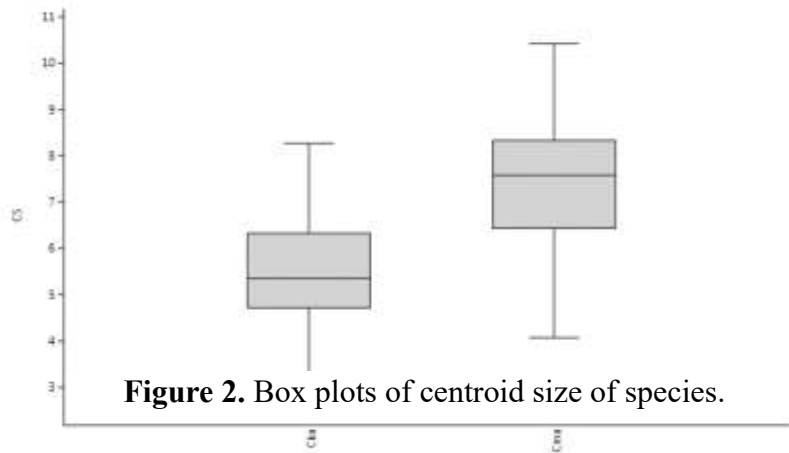
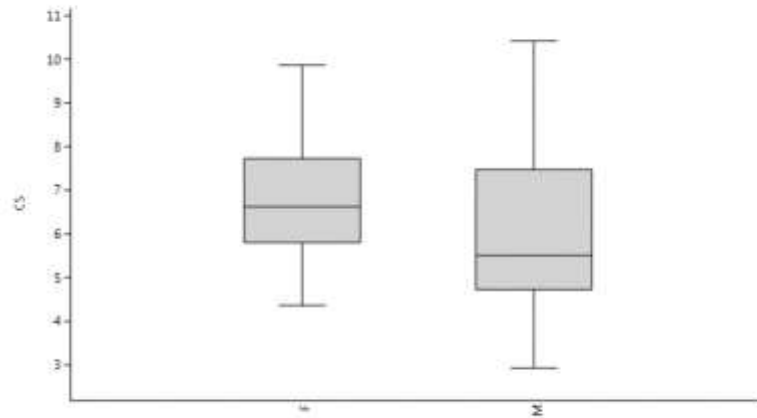
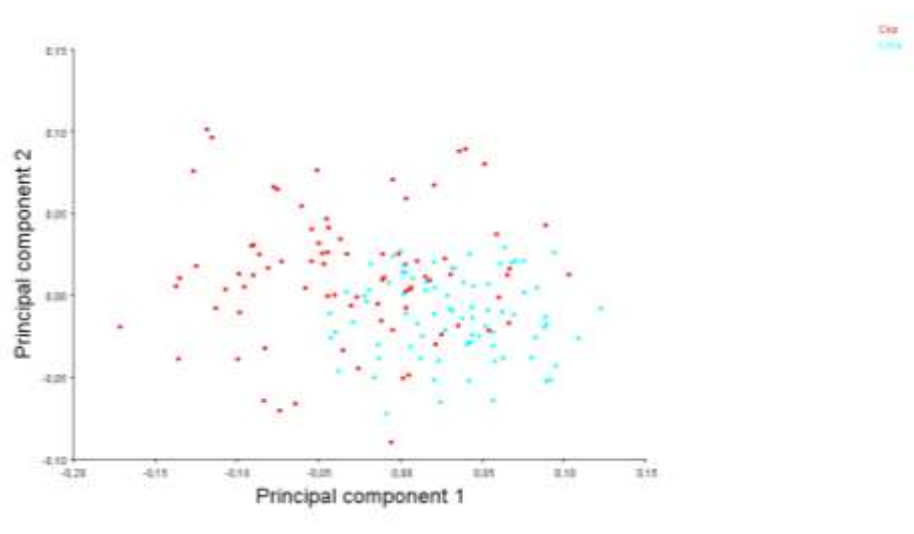


Figure 2. Box plots of centroid size of species.



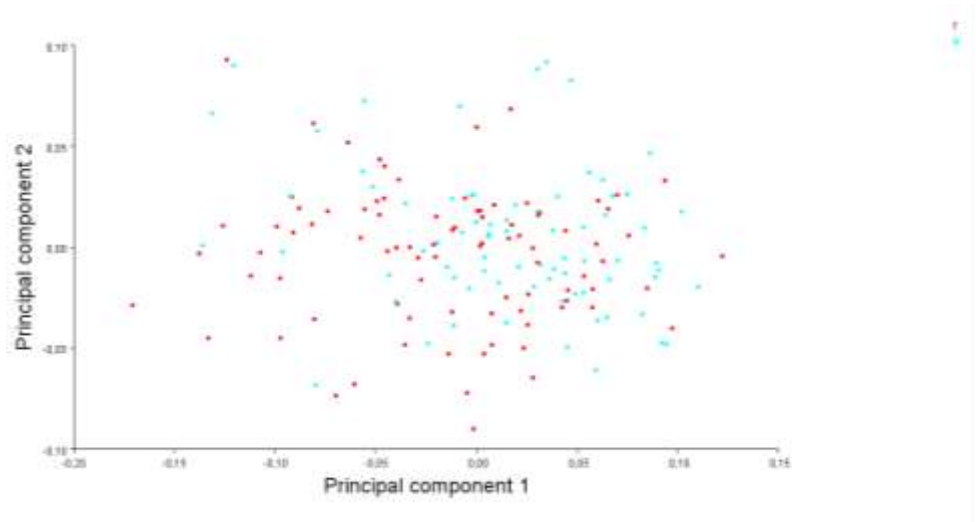
**Figure 3.** Box plots of centroid size of sex of species

The difference in scale sizes (CS:Centroid size) between *C kais* and *C macrostomus* species is statistically significant ( $F=79.32$ ,  $p<.0001$ ) and the scale size is larger in *C macrostomus* species (Figure 2). Likewise, there was a difference in scale size (CS) between genders ( $F = 6.92$ ,  $p = 0.0093$ ) and the scales were found to be larger in females (Fig. 3). According to the ANOVA (Analysis of Variance) and MANOVA (Multiple Variance Analysis) results, significant differences were found among the species in terms of shape (for ANOVA:  $F = 36.51$ ,  $p <.0001$  and for MANOVA:  $\text{pillai tr} = 0.53$ ,  $p <.0001$ ). Although there is a difference between genders in terms of scale shape, it is not as high as between species (for ANOVA:  $F = 5.64$ ,  $p<.0001$  and for MANOVA:  $\text{pillai tr} = 0.11$ ,  $p= 0.0161$ ).



**Figure 4.** Scatter plot of Principal component analysis of species.

In the PC (Principal Components) Analysis for species, the first components explain 39.9% of the total variation and the second components explain 16.4% of the total variation, but there is no clear separation on the PC1 and PC2 axes (Figure 4).

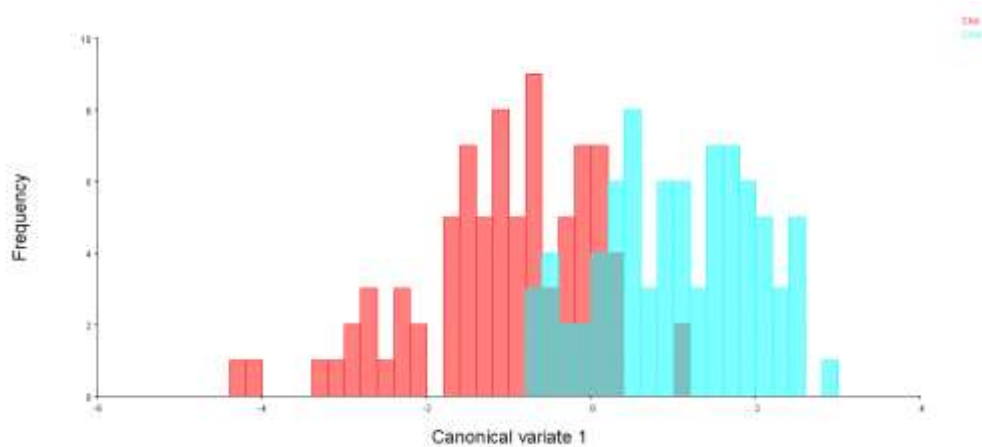


**Figure 5.** Scatter plot of Principal component analysis of sex of species.

For genders, the first components explain 44.8% the second components explain 15% of the total variation and there is no grouping along the first two axes (Fig. 5).

**Table 1.** Mahalanobis distance and p value of CVA result for species and sex. (\*\*p<.0001, \*p<.05 ).

Groups	<i>C. macrostomus</i>	Male
<i>C. kais</i>	2.1**	
Female		0.71 *



**Figure 6.** Canonical variance analysis plot of species.

In Canonical Variance (CV) analyses, the permutations p value ( $p < .0001$ ) of the mahalanobis (2.1) and procrustes (0.07) distances between the two species show that difference is highly significant. Although there is a partial overlap in the CVA plot, the distinction between the two species is quite broad (Figure 4A). In CVA by gender, permutation p value of Mahalanobis distance (0.71) ( $p = 0.0081$ ) showed the difference, while for Procrustes distance, permutation p value of Procrustes distance (0.03) ( $p = 0.0018$ ) (table 1 and Figure 6).

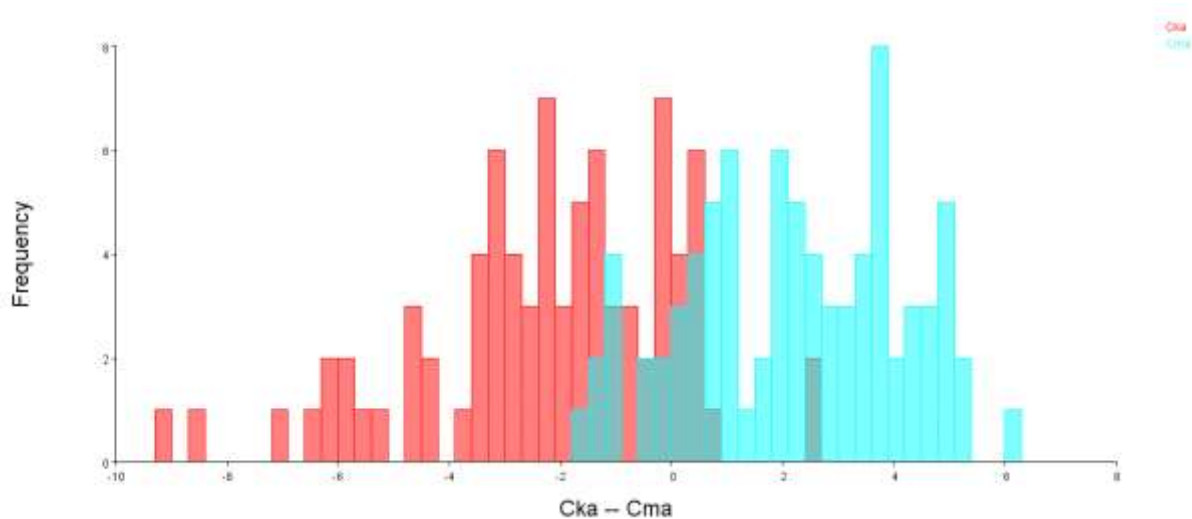
# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

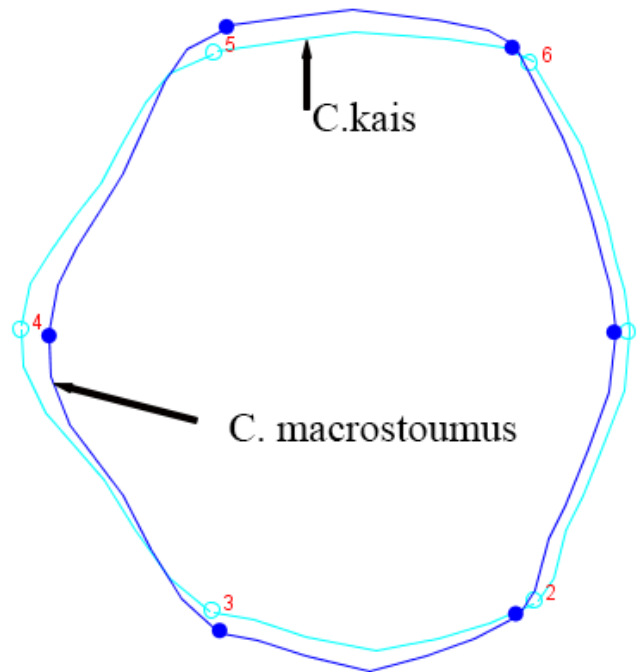
**Table 2.** DFA results for species and sex (\*\*p<.0001, \*p<.05, f p(param.): Parametric p value, p(param.) permütation p value).

Groups	<i>C. macrostomus</i> T <sup>2</sup> /p(param.)/p(param.)	Male T <sup>2</sup> ,p(param.),p(param.)
<i>C. kais</i>	180.0/ **/ **	
Female		20.4/*/*

In the DF (Discriminant Function) analysis, parametric p values for T2 (mahalanobis distance) between the two species and permutation p values for the distance between mahalanobis and procrustes (p<.0001) show that the differences is quite high. As result of reclassification made by analyses, it was classified with an accuracy of 85%. In the DF (Discrimination Function) analysis for genders, parametric p values for T2 (mahalanobis distance (p=0.016) and permutation p values for mahalanobis distance (p=0.001) show that there is a difference. (Table 2 and Fig 7).



**Figure 7.** Discriminant Fonksiyon Analysis plot of species.



**Figure 8.** Shape difference between *C. kais* (light blue) and *C. macrostomus* (dark blue) fish scales. The scale mean shape difference based on DFA, *C. macrostomus*'s scales were longer than *C. kais*'s ones at dorso-ventral side. However, *C. kais*'s were larger at antero-posterior side (Fig. 8).

#### DISCUSSION AND CONCLUSION

In this study, Çiçek et al. (2017) successfully applied geometric morphometric methods on *Capoeta trutta* and *Capoeta umbla* species. In this study, the same success was achieved on *Cyprinion macrostomus* and *Cyprinion kais* species. As a result of the analysis, it was determined that *Cyprinion macrostomus* specimens were larger than *Cyprinion kais*. In the size analysis performed according to gender, it was seen that female samples were larger than males. These results show that fish species can be successfully distinguished by morphometric geometric analysis.

This type of analysis has been used successfully in previous studies. For example, studies on fish scale and otolith morphometry and geometry (Richard and Esteves, 1997; Ibanez et al., 2007-2016; Poulet et al., 2005; Staszyn et al., 2012; Teimori, 2016; Çiçek et al., 2017; Bilici, 2020; Dörtbudak et al., 2022) have yielded important results in this field. In addition, studies examining the relationship between fish size and otolith morphometry (Clabaut et al., 2007; Dörtbudak and Özcan, 2019) were also effective in determining the species.

Geometric morphometric analyzes provide high accuracy in species discrimination, and this method successfully detects diversity among species. The fact that this method is easy, effective, low-cost, reliable and simple may provide a great advantage in future studies. Fish scales are an important feature for identifying and distinguishing species. Therefore, geometric morphometric analysis may be a very important tool in future biological research.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**THE ROLE OF THE FAMILY IN FOSTERING RESILIENCE FOR STUDENTS WITH  
SPECIAL EDUCATIONAL NEEDS IN THE MODERN INCLUSIVE CLASSROOM  
SETTINGS**

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*Faculty of Disability Management and Special Education,*

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**ABSTRACT**

The present study explores the role of the family in fostering resilience for students with special educational needs in modern, inclusive classroom settings. The concept of resilience, the ability to survive and bounce back from crisis and adversity, may greatly assist study, intervention, and preventative initiatives that aim to improve couples and families. Students with SEN have long been lauded as resilient, but children from broken homes have been mostly ignored. The current study on the emotional well-being and development of students with SEN has brought the concept of resilience to the centre. In favour of exploring and creating resilience in students with SEN, especially those who have survived problematic settings, therapists and academics have often overlooked the resilience seen in families and established in relationship and family intervention. Resilience in a family can be seen by its ability to overcome challenging situations and emerge stronger emotionally and mentally. It provides a concise scientific assessment of the elements that improve family resilience by examining the concept's dimensions, operational models, and the features of children with SEN and families that contribute to resilience in modern inclusive classroom settings. It presents several methods for assessing and treating families that consider the concept of resilience to embrace ideas and techniques centred on identifying and implementing solutions. You will swiftly bounce back from adversity when you are resilient. Protective factors strengthen resilience, while risk factors weaken it. Those who are resilient can quickly recover from setbacks and go on to create even stronger social networks and communities. Those students with SEN who are more resilient than their peers from similar safe environments are more likely to thrive in adversity. Throughout a lifetime, it impacts many aspects of a person's life, including their health. Study keeps piling up on the positive effects of resilience on things like health, happiness, achievement in school and the workplace, and recovery from condition. Family resilience broadens our understanding of well-functioning families by providing a framework for identifying and enhancing the mechanisms that help students with SEN in modern inclusive classroom settings. Family relationships, mental pressures, coping strategies, and environmental factors shape the many faces of relational resilience. The ability to think and tell stories together coherently, collaboratively, competently, and confidently is essential for coping. Fast societal change and uncertainty necessitate interventions that help families become more resilient for students with SEN in modern inclusive classroom settings.

**Keywords:** Role, Family, Fostering, Resilience, Students with Special Educational Needs, Modern, Inclusive, and Classroom Settings

**Introduction**

The family tends to become more prominent in society during times of stress. A strong family can help one other out when times get tough. It was created to deepen our familiarity with the concept of resiliency in the family system. Resilience in the family can be seen as both a personality quality and an approach to life. Several protective factors strongly indicate that a family can bounce back from adversity. As per the process theory of family resilience, strong families mature due to overcoming several hardships. Resilient families can be fostered through systems integrating ecological and

developmental perspectives. We use these perspectives to analyze the family's role in various academic and societal contexts. Study on happy, healthy families is then used to develop these thoughts further. There are many things we know that help families bounce back from hardship. This precaution is currently in effect. Academics are interested in the elements that serve as buffers against family conflict and those that increase the likelihood of it occurring. Several studies have considered cultural factors to show how a family builds resilience in a way that is specific to or native to the areas in which they live. (Herdiana, I., Suryanto, N. I. D. N., & Seger Handoyo, N. I. D. N, 2018). Modern family members have several responsibilities, including caring for their health and creating a nurturing home for their children's emotional, social, intellectual, and physical development. For a low-income family, the pressures of daily living may feel overwhelming. Family dissolution is common when members deal with poverty, substance abuse, poor health, or emotional distress. Several challenges might arise for the family of a child with special educational needs in school, including the child's disability, the financial burden of medical expenses or appropriate care, the loss of control, egos, attitudes, loneliness, anger, guilt, grief, and security. Without any safeguards in place, a family issue could develop rapidly. These persistent challenges may have multiple causes, including the children's disability, the stress of caring for a disabled child, or the reaction of a single family member. No matter how severe the disability is, parents of challenged children must accept that their child will never achieve the goals and dreams they have set for them. Many households are unable to make the journey. It is not shocking that a family may go through hell when they have a disabled child in the house. There is a chance of this happening. The effects of having a disabled child on a family are explored, as are strategies for coping with the challenges. The human services sector has noticed increased mental health and managing problems. Families who are emotionally, mentally, and behaviourally resilient can overcome adversity and grow stronger. An overview of the study on family resilience is provided, touching on themes such as the many types of resilience, how they work, and how having students with SEN and a particular family feature might increase a family's adaptability. The author concludes by advocating for expanded academic and pedagogical attention to family resilience for students with SEN in modern inclusive classroom settings.

### **Understanding of Resilience**

Resilience is the ability to recover rapidly from unexpected and unplanned stress and unusually high or low demands. Hazard reduction" is defined as efforts made before a disaster strikes to lessen its impact, as well as those made after, to help people recover and move on with their lives (Tierney, 2003). It explains that resilience is the sum of outcomes of achieving established goals concerning vital systems and their main functions, consistent with principles that can guide realistic strategies and techniques across every aspect of the homeland security mission. Kahan et al. (2009) define resistance, absorption, and restoration as the three pillars of resilience. One definition of *resilience* is the ability to recover from adversity quickly, ideally to a better state than before the tragedy hit. A person's resistance can be assessed by their capacity to withstand potentially harmful stimuli. Resilience is the capacity to withstand and recover from the adverse effects of risk exposure (Gilbert, 2010). It asserts that a person must experience tremendous adversity to display resilience. Resilient people do better in the long run than their more average-developing peers (Luthar & Chichetti, 2000; Rutter, 2005). As defined by Fonagy et al. (1994), resilience is the ability to keep growing at one's normal rate while experiencing adversity. Maintaining one's emotional and physical health despite challenges is a sign of resilience (Russo et al., 2012; Rutter, 2012b; Southwick & Charney, 2012). Regardless of its significance, resilience is rarely defined. Protective elements contributing to resilience are identified, and the notions of resilience are explored. We then discuss the challenges of providing an operational definition of resilience and applying a single definition across populations. It covers a wide range of approaches to improving resilience and thoroughly assesses their relative merits and drawbacks. Finally, it offers a range of instances showing how resilience principles can be implemented in the real world. It would help to have resilience when you want to face adversity squarely and come out on the highest point. Resilience is essential for survival, yet it is often reduced to just bouncing back while encompassing much more than that. Someone resilient can weather adversity and emerge from it better off than before. It is set against the context of the traditional rehabilitation procedure for students with SEN in modern inclusive classroom settings.

### **Developing Resilience**

The culture and society shape an individual's identity and capacity to bounce back from adversity (Gunnestad, 2006). The normal human resources of a child's intellect, brain, body, family, relationships, and community contribute to their resilience over time (Masten, 2001). Boosting one's ability to bounce back from adversity is possible in several ways. Students might develop resilience through self-reflection and problem-based learning (Chen, 2011). Resilience is the capacity of individuals and groups to withstand, adapt to, and ultimately thrive in the face of adversity. Another way of looking at it is as a case of successful adaptation in the face of significant adversity (Luthar et al., 2000). However, some people are born with resilience; most of us develop it through a combination of genes and environment (Masten, 2001). There are two phases to the process. When we talk about resilience, we refer to the capacity to recover from adversity and progress quickly. The only way to improve your resilience is to suffer through hell. Strength of character is essential for achievement. One can only be able to return from hardship once exposed to it. Humans are particularly susceptible to stresses that lower resilience because of the vulnerabilities of the cognitive, emotional, motivational, and other systems involved in adaptation (Masten, 2001). The possibility that children will develop into resilient adults increases when families are involved in their education, provide for their basic needs, and value the interests and ambitions of each child. Children in the company of a nurturing adult have a greater capacity to deal with adversity. There was no link between having biological parents present and a more favourable outcome (Clark, 1983; Fine & Schwebel, 1991). People with mental illness and suicide ideation can be resilient when they continue working toward their goals, keeping in touch with their support systems, and living as they normally would (Harris et al., 2019). According to the American Psychological Association, resilience's four cornerstones are a social network, health, outlook on life, and a sense of purpose. According to the book *Building Your Resilience* (2012), people who are flexible enough to try new things, kind enough to help others, and ambitious enough for themselves are the most resilient. Psychologists may consider teaching classes on helping seniors develop and preserve the ability to adapt to the rapid change that characterizes modern life. Psychologists have found that two methods to strengthen resilience include maintaining close relationships with loved ones and having a clear sense of purpose in life (Edwards et al., 2015). Society and culture significantly impact resilience since they shape who we become and how strong we are (Gunnestad, 2006). Methods to strengthen one's ability to bounce back from adversity are plentiful. Self-reflection and problem-based learning have been proposed as means by which students can build resilience (Chen, 2011). A vast range of human suffering must be endured throughout a lifetime, from the everyday aches and pains to the unimaginable loss of a spouse and loved one or the terrible diagnosis of a life-threatening illness and disability. Years of problem-solving, goal-attainment, and social-adaptation abilities can benefit students with SEN by giving them better access to knowledge and instruction in modern inclusive classroom settings.

### **Fostering Resilience in Students with Special Educational Needs**

Resilience is highly valued while developing treatments to aid patients in managing stressful conditions. The classroom is an essential environment for fostering resilience in students with SEN. A program to help young people at risk learn to manage their feelings and persevere will be tested in this cluster randomized controlled experiment. Successfully adapted children with SEN grew raised in places with ready access to loving relatives and strong social networks. Children who overcame big obstacles valued the encouragement from adults and their peers. We tend to look outside ourselves for responses, pointing fingers at things like poverty or a particularly challenging family. Children can survive and thrive in hardship (Linley & Joseph, 2004). Therefore, this should encourage us. When we talk about resilience, it is essentially the ability to recover from adversity. Several studies indicate the importance of a good attitude, social support, flexibility, and self-confidence in fostering resilience. Resilience can be fostered by developing optimistic attitudes and beliefs, such as the willingness to try again, the persistence to see a task through to completion, the assurance that one can triumph over any challenge, and the conviction that one is strong. Positive, growth-focused outlooks help students with SEN do better in school. The protective effects of loving and appreciative feelings against depression and other mood disorders are well-documented. Students with SEN who are socially whole are the ones who are resilient enough to overcome setbacks. Those who are self-aware and generous have a greater chance of overcoming hardship. They maintain their composure by anticipating challenges and carefully considering potential

responses. Finally, resilient people believe in their strengths no matter how challenging the situation. Fostering a strong foundation for mental wellness is the primary focus of the curriculum. Self-awareness, emotional regulation, social and linguistic competence, problem-solving abilities, and social support are traits you can cultivate with this method. Since this is a cluster-randomized educational intervention, we expect rapid increases in involvement and commitment. By assisting young people in fostering resilience, they will be better equipped to deal with the challenge's students with SEN face in modern inclusive classroom settings.

### **The Significance of Family Resilience**

Families that can adapt to fresh circumstances more easily tend to do well. It's natural to feel like the world is ending when you lose everything you know at once, including your home, your school, your job, and your means of transportation. Family resilience can mean either bouncing back to the way things were before a disaster happened and bouncing forward by forging a new normal after a catastrophe. The members of a family, their track record of overcoming hardship, and the internal and external resources available to them all contribute to the family as a whole being resilient. Family resilience is based on general systems theory, which includes family systems theory and allied therapy models, and on earlier research on stress and coping in individuals. The work of developing a comprehensive theory that incorporates these is ongoing. Therefore, there are many questions that need answering before we can properly define and evaluate family resilience. The implications for developing and using the theory are enormous. This essay seeks to contribute to the clarity and grasp of this developing concept by examining the theoretical underpinnings upon which the concept of family resilience has been developed and is continuing to evolve. The challenges of putting into practice indicators of risk, protective variables, and successful outcomes are made clear by our efforts to establish a relationship between individual, community, and family resilience. The role that context and dominant social discourses play in determining individual and societal susceptibilities to risk is discussed, as is the importance of community engagement as a basic resource for building resilience. The rest of the essay examines the remaining challenges in the study of family resilience, which is important since the concept of family resilience can be applied to treatments and practice within the field of care for children and young people (Maurović, I., Liebenberg, L., & Ferić, M, 2020). The dynamics of a person's family may slow or speed up their healing process. While there is much more to discover about parenting, we do have a better grasp of what makes for happy homes. An evaluation of the literature finds a paucity of study devoted to the topic of family resilience. There are two different schools of thought that have evolved in the scholarly writings. The first category of studies relates to the home and its residents. The second approach prioritizes the child's immediate family in the formative years. There is a dearth of literature on the subject of how particular parenting styles could develop resilience, despite the fact that research has proven that resilience principles can be acquired in the family. This chapter seeks to address the dearth of literature on the topic of parenting and family resilience and the critical role that parents play in shaping the lives of children and adolescents by gaining an understanding of how parenting practices may influence the growth of resilience in families and discussing clinical and research implications (Fernandez, I. T., Schwartz, J. P., Chun, H., & Dickson, G, 2013). In an honest discussion, the strengths and faults of a family become clear. Some people find solace in mourning rituals, while others are deeply disturbed by them. One simple way to spread joy across the house is to recall and enjoy happy times in the past. The parents are setting a positive example by discussing difficult feelings with their children. Last but not least, humour is a wonderful asset to any household because of its stress-relieving properties and its potential to aid students with SEN in achieving academic success in modern inclusive classroom settings.

### **Advantages of Family Resilience Framework**

The concept of family has been growing due to global social and economic changes and the rising diversity and complexity of family life. Systemic family process research has been conducted for decades, allowing for a more precise evaluation of relationship and family well-being (Lebow & Stroud, 2012). *Family resilience* is defined as the capacity of a family to triumph over challenges and become even stronger as a unit, which is especially helpful for students with SEN. Based on the study, we describe the most significant processes in family resilience, focusing on the cyclical and mutually reinforcing nature of transactional processes within and between families and their social environments.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

The strength of a family can be measured by how well its members rely on one another through challenging times (Walsh, 2003a). Since every family is unique in its pressures, resources, and developmental obstacles, most family instruments and typologies only provide a snapshot of interaction patterns. Due to the mental health industry's deficient focus and the problem-filled lives of low-income families, priorities may shift, and asset development may be stalled. Demonizing people with differences may be aided by reducing them to diagnostic categories or a single, idealized portrait of the resilient family. The term resilience is used to characterize the strength of a family unit in the face of hardship and its ability to recover and thrive. Although happy families may have commonalities, there is no guaranteed formula for domestic bliss. Consider the family's beliefs, bonds, and disagreements while weighing its strengths and flaws. Core processes may change over time as people and families adapt to new circumstances and develop new bonds with one another (Walsh, F. 2021). Diagnosis and treatment are focused on identifying effects rather than reasons behind them. The family resilience framework is useful for guiding your thinking as you address challenging family situations. In this hypothetical scenario, the benefits of adversity are recognized. Walsh (2002) contends that families need a resilience framework in order to flourish in the face of adversity. The belief in the patient's or family's ability to overcome hardship is central to a resilience-based intervention (Walsh, 2002). Having a plan in place is important to help you and your loved ones recover from adversity. Interventions that play up people's strengths rather than address their flaws work to improve the systems that allow them to bounce back from adversity and adjust to new circumstances. This research investigates what makes for resilient families using the Resiliency Model of Family Stress, Adjustment, and Adaptation lens. A recent study on resilient families has led to widespread acceptance of the McCubbin (2001) paradigm as a strategy for promoting resilience. Using resilience-focused maps can help evaluate and organize family intervention and preventive initiatives. The Walsh Family Resilience Framework was developed after 30 years of study on resilience and family dynamics (Walsh, 2003; Walsh, 2016b). This theoretical structure singles out nine fundamental interactions that work to strengthen families. Researchers and clinicians working with dysfunctional families have found that focusing on three aspects of family functioning—shared values, organizational strengths, and communication styles—is essential. It may be useful to try to make sense of the multiple forces at play by drawing a map of the entangled links within and beyond the family. A vulnerable family member's growth is greatly aided by having supportive relatives. Research shows that the influence of family members on a child's growth is long-lasting, especially amid adversity (Ungar, 2004). Few people in a child's life can have a greater impact on their growth and development than their grandparents, godparents, aunts, uncles, cousins, nephews, and nieces. The family unit is considered when determining susceptibility and resistance for students with SEN in modern inclusive classroom settings.

## Conclusion

Positive and negative family dynamics can both be explained by the factors identified in this study. Students can understand intellectual and emotional growth more deeply by reflecting on personal examples of resilience. There is much to be learned from the experiences of families who have triumphed over extreme adversity. The concept of resilience facilitates understanding student achievement and the role of supportive people like teachers, parents, and mentors. Given the early stage of research into student resilience, we stress the importance of continuing the dialogue, especially among students, and call attention to gaps in knowledge. The resilience study focuses on interventions that target children's emotional and mental well-being. Instead of forcing children into predetermined categories, it encourages them to discover who they are as unique individuals. Using these methods in the classroom raises students' potential for acquiring knowledge and developing into contributing people. Families' well-being and resilience are essential, but evidence suggests that helping families may not always make a difference when adversity strikes. Students with SEN do not lose their right to full classroom inclusion. A community must satisfy its members' basic needs to ensure they can thrive autonomously. Our outcomes suggest that modern, inclusive classrooms for children with SEN must cater to a wide range of family requests, demonstrating the significance of families and their challenges. It is important to help underprivileged families become more resilient since social norms discourage them from asking for help. Understanding the effects on family resilience in different contexts is crucial for SEN students in modern inclusive classroom settings.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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BEYDİLİ BOYU'NUN ORTA ÇAĞ TÜRK İSLAM DEVLETLERİNDE BIRAKTIĞI SİYASİ  
İZLER

POLITICAL TRACES OF THE BEYDILI TRIBE IN MEDIEVAL TURKISH ISLAMIC  
STATES

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**ÖZET**

Bilindiği üzere Türkler birçok boydan meydana gelen güçlü bir ırktır. Tarihte güçlü devletler kurmuş olmaları, bu boy teşkilatlarının alt yapısında örgütlenen cemaat ve oymakların disiplinli bir yaşam sürdürmeleri ile mümkün olmuştur. Türk boyları içerisinde en kalabalık boy kendilerine XI. yüzyıldan itibaren, Türkmen de denilen Oğuzlar boyudur. Oğuznâme olarak bilinen Türklerin cihan devleti kurma ve dünyaya hükmetme hikâyelerinde vurgulanan noktalardan biri, Bozokların mevki ve makam olarak Üçoklardan üstün oldukları ve orduda sağ kanadı oluşturduklarıdır.

Beydili boyu, Oğuz Kağan'ın oğlu Yıldız Han'a bağlı bir boydur. Yani Oğuzların Bozok koluna mensuptur. Kaşgarlı Mahmut'un eseri Divan-ü Lügat-it-Türk, Reşidüddin Fazlullah, Ebu'l Gazi Bahadır Han'ın "Şecere-i Terakime", Fahrettin Mübarekşah'ın eseri gibi dönem kaynaklarında Beydili boyunun bir Oğuz boyu olduğu geçmektedir. Bu kaynaklara göre Beydili kelimesinin anlamı; "*büyükler gibi aziz, büyüklerin sözleri gibi aziz, beyler sözü azizdir; sözü hürmetli, hürmetli devletli*" gibi anlamlara gelmektedir. Bir Oğuz boyu olan bu boya Beydili denmesinin sebebi diğer yörük Türkmenleri içerisinde yöneticilik vasfı olan 5 büyük boydan biri olması nedeniyledir. Dönem kaynaklarına göre Beydili boyu, Hazarlar, Büyük Selçuklu İmparatorluğu, Safevî Devleti, Memlük Devleti ve Dulkadiroğulları Beyliği, gibi devletlerin kuruluşunda yer alan boylardan birisi olmuştur. Ayrıca XI-XIII. yüzyıllar arasında Orta Asya'nın büyük bir bölümünü Harezmsahlr unvanıyla yöneten Anuşteginogullarının Oğuz Türklerinin Beydili boyundan geldiğini belirten tarihi kaynaklar da vardır. Bunun yanında Osmanlı Devleti zamanında da birçok seferde kilit rol oynamış ve etkili olmuş bir boydur. Bu çalışmada Beydili boyunun diğer Oğuz boyları içerisindeki öneminden ve kuruluşunda etkili oldukları devletlerden bahsedilerek Türk Tarihinde bıraktıkları izler aktarılmaya çalışılmıştır.

**Anahtar Kelimeler:** Oğuz Kağan, Beydili boyu, Orta Çağ, Üç-ok, Boz-ok.

**ABSTRACT**

As it is known, Turks are a strong race consisting of many tribes. The fact that they have established strong states in history has been possible with the disciplined life of the communities and tribes organised in the substructure of these tribe organisations. The most populous tribe among the Turkic tribes is the Oghuz tribe, also called Turkmen, since the XI century. The Oghuz tribe was divided into two branches called Boz-oq and Üch-oq. One of the points emphasised in the stories of the Turks, known as Oğuzname, about the establishment of a world state and ruling the world is that the Boz-oq are superior to the Üch-oq, in terms of position and authority and that they constitute the right wing in the army.

Beydili tribe is a tribe of Yıldız Khan, son of Oghuz Khan. In other words, he belonged to Boz-oq branch of Oghuz. In period sources such as Kaşgarlı Mahmut's work of Divan-u Lugat-it-Turk, Rashid-al-Din Fazlullah Hamadani, Şecere-i Terakime, work of Ebü'l-Gâzî Bahadır Han, Fahrettin Mübarekşah's works, it is mentioned that Beydili tribe is an Oghuz tribe. According to these sources, the meaning of the word Beydili is; "saint like the elders, saint like the words of the elders, saint like the words of the elders, the word of the Beys is saint; his word is reverent, reverent, reverent, state"... and so on. This tribe, which is an Oghuz tribe, is called Beydili because it is one of the 5 big tribes among the other

nomadic Turkmen who have the qualification of management. According to period sources, Beydili tribe was one of the tribes that took part in the establishment of states such as Khazars, Great Seljuk Empire, Safavid State And Mamluk State and Dulkadirogullari Principality. In addition, There are historical sources that state that the Anushteginids, who ruled vast parts of Central Asia from XI-XIII.yy the title of Khwarazmshahs, descended from the Beydili tribe of the Oghuz Turks. Besides that, it is a tribe that played a key role and was effective in many expeditions during the Ottoman Empire. In this study, the importance of Beydili tribe in other Oghuz tribes and the states they were effective in the establishment of were mentioned and the traces they left in Turkish History were tried to be conveyed.

**Keywords:** Oghuz Khan, Beydili tribe, Middle Ages, Boz-ok , Üç-ok

## GİRİŞ

Beydili boyu bir Oğuz boyudur. Bu bağlamda Oğuz boylarının kökenine inilecek olunursa Asya Hunlarına kadar gitmek gerekmektedir.

İlk Hun Hükümdarı Teoman'ın oğlu olan Oğuz Kağan'ın, M.Ö V. yy.da Türk boylarını birleştirip Türk birliğini kurduğu ile ilgili bilgiler mevcuttur (Uçakcı, 2015: 50). Bazı kaynaklar ise Oğuz Kağan ile Asya hükümdarı Mete Han'ın aynı kişi olduğunu kabul etmektedir (Pamir, 2022: 2; Onay, 2013: 32; Alıç, 2013: 28). Oğuz adının ilk geçtiği belgeler olan Yenisey Kitabesi'ne göre Oğuzlar, VII. yy.da Barlık Irmağı bölgesinde Öz Yeğen Alp Turan adlı bir reis liderliğinde yaşamaktaydılar (Uçakcı, 2015: 50; Alıç, 2013: 20).

Oğuz kelimesi basit anlamda “*kabile*” manasına gelmektedir. Uygularda “*oğuz*” sözü kabile manasında kullanılmaktadır. Zaten Oğuz kabile teşkilatı hakkında bilgi veren en önemli kaynak Oğuz destanıdır (Orkun, 1935: 6-8). Dokuz (Tokuz) Oğuz adına kaynaklarda ilk defa Orhon/Köktürk yazıtlarında rastlanır. Bu yazıtlarda Bilge Kağan “*Türük Oguz begleri bodun eşidin*” yani *Türk Oğuz Beyleri milleti, işitin*” demektedir (Karadoğan, 2006: 13). Oğuz kelimesinin kökeni hakkında çeşitli görüşler ileri sürülmüştür. Bunlardan “*ok kelimesiyle en eski Türkçe’de çokluk eki olan “z”den oluşan okuzdan (oklar)*” geldiği hakkındaki görüş en isabetli olanıdır. Göktürk Kitabelerine göre; “*Oğuzlar (İslâm kaynaklarında Guz) dokuz boydan meydana gelmiş bir budundur. Bundan dolayı Tokuz (Dokuz) Oğuz diye de anılır.*” (Sümer, 1972: 1). Bunun dışında Göktürk hânedanı ikinci kez Kutluğ Kağan önderliğinde kurulduğunda Dokuz Oğuzlar da Tula ırmağı (Tuğla Ügüz) civarlarında yaşıyor ve dönemlerinin en kuvvetli kavmi (budun) olarak biliniyorlardı (Sümer, 2004: 500).

Uygur harfleriyle yazılmış Oğuznâme ile İslâmî devirde yazılan Oğuznâmeler temel alındığında Oğuzlar, Boz-ok’lar ve Üç-ok’lar adlarıyla iki ana kola ayrılmıştır. Oğuznâmelerde verilen bilgiye göre Oğuz Kaan yaşlılığında ilk hatunundan doğan üç büyük oğlu *Kün, Ay ve Yıldız*’ın ülkesinin doğu tarafına, ikinci hatunundan doğan üç küçük oğlu *Kök, Tağ ve Tengiz*’i de ülkesinin batı tarafına gönderir. Doğuya giden büyük oğulları yolda altın bir yay, batıya giden küçük oğulları da yolda gümüş bir ok bulup Oğuz Kağana getirirler. Oğuz altın yayı üç parçaya bölüp “*yay gibi atık olun*” diyerek üç büyük oğluna, üç gümüş oku da üç küçük parçaya bölerek ve “*ok gibi doğru olun*” diyerek üç küçük oğluna parça eder ve yayı verdiği büyük oğullarına “*Boz-ok*”, ok verdiği küçük oğullarına da “*Üç-ok*” adını koyar. Ayrıca kendisinden sonra hükümdarlığın Boz-oklara ait olduğunu ve ordunun sağ kolunu teşkil edeceklerini, Üç-okların ise Boz-oklara bağlı olacağını ve orduda sol kolu teşkil edeceklerini bildirir. Böylece Oğuz’un bu altı oğlundan türeyen 24 oğuz boyunun sosyal, askeri ve idari teşkilatındaki yerleri, yetki ve görevleri belirlenmiş olur. İslâmî Oğuznâmeler’e göre; “*Yengi Kentli Arkıl Hoca, Oğuz boylarının damga, ongun ve kurban etinden kendilerine düşen paylarını tespit edip Oğuz töresine göre düzenlemiştir. Oğuz Kaan bunu çok beğenir, sevinir ve dua eder.*” (Eraslan,1986: 5-6; Uçakcı, 2015:51; Orkun, 1935: 8-9).

Oğuznâme’de önemli olan hususlardan biri, Boz-okların tahta varis olmaları ve orduda sağ kanadı teşkil etmeleri nedeniyle, Üç-oklardan mevki ve makam bakımından üstünlüğüdür (Eraslan, 1986: 6). Oğuzlara ait destan mahiyetindeki eserlere göre, siyasî üstünlük Boz-ok’larda olup, Oğuz hükümdarları olan hanlar ve yabgular *Kayı, Yazır, Avşar, Eymür* ve *Beydili* gibi boylar bu kola mensuptu. Bu sebeple Boz-ok’lar, siyasî toplantılarda, savaşlarda, *toy* denilen umumî eğlencelerde ve *şölen* adı verilen beylere (beg) mahsus ziyafetlerde Türkler açısından en şerefli mevki görülen sağ tarafta

yer alıyorlardı (Togan, 1982: 77; Sümer, 1953: 65). Sağ kol olan Boz-okların yaylakları *Sayram Sınırlar ve Başgurd dağlarından Qarabah (Qaraağaç?)*'a kadar olan bölgedir. Kışlak yerler Boz-oklar için *Borsug, Aqtaq, Namalmış (Tamalmış), Basarqumu*'dur (Togan, 1982: 53; Sümer, 1953: 65).

Bu bağlamda Beydili Boyunun mensup olduğu Boz-oklar, Oğuz Han'ın ikinci (gökten inen) eşinden olan üç oğlu (*Günhan, Ayhan ve Yıldızhan*) ve onlardan türeyen boylardır. Altın Yay'ın sahibidirler. 24 Oğuz boyundan 12'sini oluştururlar. Beydili Boyu da Oğuz Kağan'ın oğlu Yıldız Han'a bağlı bir Oğuz boyudur. Oğuzların Boz-ok Kolu'nun Yıldız Han soyundan olan bu boya "*Beydili*" denmesinin sebebi, diğer yörük Türkmenleri içerisinde yöneticilik vasfı olan en kalabalık 5 büyük boydan biri olmasıdır. Çünkü, *Kayı, Avşar, Beydili*, boyları hükümdar çıkaran boylardandır (Halaçoğlu, 2002: 1462).

Kaşgarlı Mahmut'un yazdığı *Divan-ü Lügât-it-Türk'te* Beydili (Beg-dili, Beg-dili) Boyu, 22 Oğuz boyu içinde 7. sırada zikredilmiş ve hayvanlarına ve eşyalarına vurdukları damga (𐰽 𐰺) şeklinde gösterilmiştir (Kaşgarlı Mahmut, 1985: 56). Beydililerin et bölüşümünde ülüşü yani sünüğü "*sağ umaca (sağ kaburga)*", Ongunu olarak ise "*Tavşancıl (behri kuzgun)*" görülmektedir (Şanda, 2017: 65; Uçakçı, 2015: 260). Beydili boyu hakkında dönem kaynaklarının birçoğunda bilgi yer almaktadır. Örneğin Reşidüddin, Beydili boyunu hükümdar çıkaran beş büyük boydan biri olarak kabul ederken (Sümer, 1972: 297; Şanda, 2017: 65; Sümer, 1953: 78-79; Halaçoğlu, 2002: 1462), Beydili'nin kelime anlamı "*büyükler gibi aziz, büyüklerin sözleri gibi aziz, beyler sözü azizdir; sözü hürmetli, hürmetli, devletli*" şeklinde vererek boyu 11. sırada göstermiş, damgalarının da (𐰽) olduğunu bildirmiştir (Uçakçı, 2015 :260; Sümer, 1972: 210-211; Togan, 1982: 51; Halaçoğlu, 1992: 56). Ahmet Yesevi menâkıbında *Sır-derya ve Çu* havzalarında hâkim kabileler arasında Beydili beyleri de bahsedilmiştir (Togan, 1982: 105,113).

XV. asırda eserini yazan Yazıcı Oğlu'nun 24 Oğuz boyunu gösteren listesinde Beydili boyunun Yıldız Han'dan gelmiş olduğu ve Oğuzların Boz-ok koluna mensup oldukları belirtilmiştir. Eseri "*Şecere-i Terakim*"i 1660'lı yıllarda yazan Ebul Gazi eserinde Oğuzların 11. Boyu olarak Beydili boyunu zikretmiştir. Bunun yanında vurgulanması gerekir ki eserini Kaşgarlı Mahmut'tan 130 yıl sonra, yani 1206'da yazan Fahrettin Mübarekşah'ın Oğuz boyları sıralamasında Beydili boyu 15. sırada yer almakta iken (Kaşgarlı Mahmut 7. sırada yer vermekteydi) 1555-1556 yıllarında yazan Salar Baba'da ise Ebul Gazi, Reşidüddin ve Yazıcıoğlu gibi Oğuzların 11. Boyu olarak Beydili boyu zikredilmektedir (Ataniyazov, 1999: 3-5).

Beydililer Oğuz boyuna bağlı bir Türkmen aşiretidir. Tarihten günümüze Beydili; başta Kaşgarlı Mahmut'un *Divan-i Lügât-it Türk* adlı eserinde olmak üzere birçok hatırı sayılır eser ve arşiv kayıtlarında "*Begtili, Bağtili, Beydili*" başta olmak üzere "*Beydili-Beydilli, Beğdili-Beğdilli, Beğdilü-Beğdillü, Baydili-Baydilli, Badili-Badilli, Badılı-Badılı, Beydili-Beğdilli, Beğdilü-Beğdillü, Baydili-Baydilli, Badili-Badilli, Badılı-Badılı*" şeklinde gösterilmektedir. Çalışmamızda bu isimlerden "*Beydili*" ismi kullanılmıştır.

### 1. Beydili Boyunun Türk-İslâm Devletlerindeki İzleri

Beydili boyunun siyasi arenada önemli izler bırakması elimizdeki kaynaklara göre X.yy.dan sonra olmuştur. Çünkü bu yüzyıldan sonra Beydili'nin Maveraünnehir, Anadolu, İran, Suriye, Irak, bölgelerinde daha aktif olduğu ve alt oymak ve cemaatleri ile birlikte birçok devletin kurulmasında veya idari yapısında önemli görevler aldığı görülmektedir. Beydili boyunun Büyük Selçuklu Devleti'nin yıkılmasına kadar Oğuzlarla birlikte hareket ettiği ve onlarla aynı mıntukalarda yaşadığı görülmektedir. Faruk Sümer'e göre; "*X. yüzyılda Oğuzlar, Hazar denizi'nden Sir (Seyhun, İnci) ırmağının orta yatağındaki Farab (XI. yüzyılda Türkçe adı ile Karaçuk) ve Isfıcab'a (İsbicab- Sayram)' kadar olan yer ile bu ırmağın kuzeyindeki bozkırlarda yaşıyorlardı. İstahri (yazılışı 951'den önce) onları Karluk, Kimek, Bulgar ve Hazar ülkeleri ile Hazar Denizi'nden Isfıcab'a kadar uzanan İslâm sınırı arasında göstermiştir. X. yy. İslâm coğrafyacıları İnci'nin kuzeyinde ve Hazar Denizi'nin doğusundaki geniş çöl bölgesine Oğuz çölü (mefâzat ul-guzziye) adını vermişlerdir.*" (Sümer, 1958: 134-135).

İsmail Uçakçı'ya göre; "*Oğuz Boylarının sağ kolunu oluşturan Boz-okların, Anadolu'ya gelmeden önceki yurdu (yaylağı), Orta Asya da bulunan Sayram ve Kazgurd'dan başlayıp Kartag'a kadar uzanırdı. Başka bir ifadeyle Taşkent'in kuzeyindeki dağlardı. Kışlakları ise, Borsuk ve Akdağ mıntukasıdır. Bu bilgiler bugünkü Karakurum civarındadır. Fetihle, hatta fetih önceleri bölgede yurt*



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

*tuttuğu anlaşılın Boz-oklar, 1243 yılında bölgenin Moğollar tarafından ele geçirilmesi üzerine zorunlu olarak güneye (Halep ve Şam yöresi) göç etmek zorunda kalmışlardır.” (Uçakcı, 2015: 55).*

Beydili boyunun yaşadığı coğrafyalarda hüküm süren Türk İslâm Devletleri ve beylikleri nazarında pek çok hizmeti olmuştur. Dönem kaynaklarında Oğuzların önemli bir kolun Selçuklu Devleti'nin kuruluşunda yer aldıkları ve Anadolu'nun fethine katıldıkları; Selçuklu fütuhatında yer almayanların ise Horasan'da Sultan Sencer'i yenen Oğuzlar arasında yer aldıkları görülmektedir (Halaçoğlu, 1992: 56-57). Beydililer Moğol istilasını sonrası Oğuzlar ile Anadolu'ya gelmeden önce siyasi arenada Aral Gölü'ne akan Amu Derya-Nehri'nin aşağı mecrasının her iki tarafında uzanan toprakları kaplayan Harzem mevkinde hâkim (Taneri, 1977: 10) olan *Harezşahlar Devleti (1092-1231)*'nin kuruluşunda etkili olmuşlardır. Anuştegin-oğulları tarafından 1092 yılında kurulan Harezşahlar Devleti'nin Orta Çağ Türk-İslâm devletleri içinde müstesna bir mevki vardır (Kafesoğlu, 1992: 1). Harezşahlar Devleti'ni kuran Anuştegin/Nuş-tegin, Garcistanlı bir Türk kölesidir. Cüveynî, Anuştegin'in Garceli bir Türk kölesi olduğunu desteklemekte (Cüveynî, 1988: 5) Reşîdüddîn ise “*Oğuznâmesi*”nde onu Oğuzların Beydili boyuna bağlamakla (Togan, 1982: 77) mühim bir eksikliği tamamlamaktadır. Herhalde bu noktadan hareket etmiş olacak ki Köprülü, Harezşahların siyah bayrak taşıyarak kendilerini Büyük Selçuklu Devleti'nin varisi olarak gördüğünü belirterek (Köprülü, 1992: 250), Harezşahlar ile ilgili Reşîdüddîn'in bu kaydını kabul etmiştir (Kafesoğlu, 1992: 39). Fakat Harezşahlar bahsi esas itibarıyla Cüveynî'ye dayanmakta olmasına rağmen, *Tarih-i Cihan-ı Güşa*'da bulunmayan Reşîdüddîn'in bu ilavesi, Barthold tarafından dikkate alınmamıştır (Taneri, 1977: 10-11). Yılmaz Öztuna da Harezşahlar'ı Beydili boyuna bağlamakta ve hanedanın soy seceresini aşamalı bir sıra ile ifşa etmektedir (Öztuna, 1996: 514). Faruk Sümer, “*Boz-oklu Oğuz Boylarına Dair*”, adlı makalesinde; “*Reşîdüddîn'in sözlerine göre Harezşahlar ailesini yetiştirmiş bu kabile*” diyerek Harezşahlar'ın bu boy tarafından kurulduğunu kabul etmektedir (Sümer, 1953: 78). Görüldüğü gibi Harezşahlar'ın menşei konusunda farklı tartışmalar olmuş olsa da birçok kaynak ve müellif, onların Oğuzların Beydili boyuna mensup olduğunu bildirmektedir.

Beydili boyunun kuruluşunda etkili olduğu Harezşahlar Devleti, Harzem bölgesinde ekonomik hayatın canlanmasında etkili olmuş ve kültürel hayatta birçok ilim adamını yetiştirmiştir. Bu devletin yıkılması ile Moğolların batıya ilerlemesi hızlanmış, Orta Asya, İran, Suriye hatta Anadolu coğrafyasına kadar uzanacak Moğol baskısı başlamıştır.

Harezşahlar Devleti'nin Celaleddin Harzemşah'ın ölümünden sonra yıkılması ile Beydili boyunun Horasan ve Anadolu'ya doğru göç ettiği görülmektedir. Aslında Anadolu'da yaşayan Beydili cemaatlerine bakıldığında Beydililerin Anadolu'ya geliş süreci ile ilgili iki önemli nokta karşımıza çıkmaktadır. Birincisi 1071 Malazgirt Zaferinden sonra diğer Oğuz boyları ile birlikte Anadolu'nun fetih politikasına katılanlar, diğeri ise Harezşahlar Devleti'nin yıkılmasından sonra bölgede hâkim olan Moğol istilasından kaçarak Anadolu'ya gelen Oğuzlar arasında yer alan Beydililer. Anadolu'da etkili olan Beydili oymak ve cemaatlerin daha çok Moğol saldırısından sonra Anadolu'ya geldiği görülmektedir.

Harezşahlar Devleti'nin yıkılması ile sadece Beydili boyu değil, diğer Türk boyları da bölgede artan ve XIII. yüzyılda kendisini daha fazla hissettiren Moğol baskısı nedeniyle farklı yerlere doğru göç etti. Bu göç hareketi içinde Oğuz boylarının da olduğu görülmektedir. Bu göç dalgası sonrasında Oğuz boylarına mensup birçok kol, Anadolu'nun çeşitli bölgelerine yerleştiler. (Halaçoğlu, 2010: 88). Beydili boyu da Moğol istilasının başlaması üzerine Azerbaycan ve Doğu Anadolu, daha sonra da Suriye'ye göç etmiştir. 1260-1277 yılları arasında Maraş'ın Memlükler tarafından alınması üzerine özellikle Beydili, Avşar ve Bayat Türkmenlerinin Maraş çevresine yerleştiği görülmüştür. Suriye' bölgesine gelen Beydililer ise İran bölgesinde Safevî Devleti (1502-1736)'nin kurulmasında etkili olurken diğerleri Yeni İl ile Halep Türkmenleri içinde ve İç İl yöresinde yurt tutmuşlardır (Şanda, 2017: 65: Halaçoğlu, 1992: 56-57).

Moğol istilasından sonra sadece Anadolu'nun doğusunda değil, batı Anadolu'da da Oğuz boylarının göç noktası olan yerleşim birimleri vardır. Bu bağlamda ön plana çıkan Denizli ve yöresinde, Beydilli boyunun “*Fakihler, Taşkın / Taşkınlar, Emirhacılar / Emirhacılı*” gibi boy ve aşiretlerinin varlığını tarihi kaynaklar ve alan araştırmaları göstermektedir. Özellikle Çal, Bekilli ve Çivril, Buldan, Güney bölgesi Beydilli yerleşimi açısından önemli noktalar (Tok, 2015: 620-624).



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

XIII.yy.da Beydililerin gelip yerleştiği yerlerden bir diğeri de *Kars, Ağrı, Erzurum, Erzincan* gibi *Doğu Anadolu illeri* ve *Şanlıurfa, Gaziantep, Adıyaman, Mardin* gibi Güneydoğu illeridir. Ayrıca İç Anadolu'da *Ankara, Yozgat, Karaman* çevresine ve Akdeniz'de *Mersin, Tarsus, Çukurova* çevresine yerleştikleri ve bu yüzyılın sonunda kurulan Osmanlı Devleti döneminde de varlıklarını ve yaşam tarzlarını devam ettirdikleri görülmektedir (Şanda, 2017: 66).

Tarihçi Tufan Gündüz'e göre doğu ve Güneydoğu Anadolu'daki konar-göçer Türkmenlerine "Bozulus" adını almaktadır. Beydili boyu da "Asıl Bozulus'a" dahil olan aşiretler arasında geçmektedir (Gündüz, 1997: 44,57). Bozulus arasındaki bu Beydili şubesi şüphesiz *Akkoyunlu Devleti (1378-1501)* lehine faaliyetlerde bulunmuş olan bu addaki kuvvetli bir teşekkülün kalıntısıdır (Sümer, 1953: 85; Demirtaş, 1949: 361). Faruk Sümer bu konuda; "Akkoyunlu faaliyetine iştirak etmiş olduğunu bildiğimiz Beydililerin diğer bir kısmı Safevî hizmetindeki Beydili şubesinin meydana gelmesinde âmil olmuş olacağı gibi, diğer bir kısım zümreler de her halde kabilevi adlarını bırakarak yeni isimler almışlardır." demektedir (Sümer, 1953: 85). Beydili aşiretinin kollarından biri Kızılbaş aşiretler birliği içinde yer almış ve Safevîlerin Osmanlılara karşı mücadelelerine katılmıştır (Gündüz, 1997: 57). Dolayısı ile görülmektedir ki Beydililerin asıl mühim bakiyeleri, Safevî hizmetinde bulunmakta idiler (Demirtaş, 1949: 361). Bu bakiyelerden biri Safevî devrinde İran'da yaşayan meşhur Kızılbaş *Şamlu* kabilesidir (Sümer, 1953: 78-79). İran'a giden Beydililer Safevî Devleti'nin kuruluşunda önemli rol oynayan Şamlu boyunun önde gelen grubunu oluşturmuşlardır. Şamlular Ustaclular ile beraber, Halep Türkmenlerinin koluydular. *Şamlular*, yazın *Sivas Uzun-Yayla*'da oturan, kışın *Halep* bölgesinde yaşayan *Beydili, Harbendeli, İnallu* gibi Türkmenlerden meydana gelmiştir. Devletin kuruluşunda ve ilk devirlerde asıl mühim rolleri bu oymaklar oynamışlardır (Sümer, 1972: 152-153, 297).

XVI. yüzyıla ait vergi kayıtlarından anlaşıldığına göre Halep bölgesinden Şah İsmail'in hizmetine giren ve Safevî Devleti (1502-1736)'nde oldukça etkin roller oynayan Şamlular, 7 büyük Kızılbaş kabilesinden birisiydi. Şamlu ümerasını yetiştirmiş olmakla birinci mevkiye bulunan Beydili oymağı aynı zamanda Oğuz boy adını taşıyan yegâne teşekküldür (Sümer, 1953: 79-80). Bunlar gibi henüz Osmanlı hâkimiyetine girmemiş olan ve muhtemelen şeyh Cüneyd'in Anadolu seyahati sırasında ona bağlanmış olan Varsak Türkmenleri de sayıca oldukça az olmak üzere Şah İsmail'in hizmetine girmişlerdi (Gündüz, 2015: 70).

Harezşahlar (1092-1231) ve Safevîlerin (1502-1736) dışında Beydililerin siyasi hayatında etkili olduğu bir başka devlet Dulkadiroğulları Beyliği (1348-1522)'dir. Dulkadirli Türkmenleri *Maraş, Kayseri, Ürgüp* başta olmak üzere *Sivas'a* bağlı *Gemerek ve Gürün, Karataş Burnu'ndan İskenderun'a* kadar uzanan Akdeniz'in kıyı şeridi, *Hatay ve Antep'in* kuzeydoğu kısımları, doğuda *Besni ve Harput'u* içine alan bölgede etkililerdi. Dulkadirli Türkmenleri Lazkiye, Şam, Azaz ve güneydoğuda Diyarbakır'da kışlaları, Erzurum-Kars taraflarında yaylaları olan çok geniş bir coğrafyada etkililerdi (Sarı, 2015: 121). Dulkadirli halkını teşkil eden cemaatler ise çoğunlukla *Bayat, Avşar ve Beydili* boylarından idiler. Ancak Dulkadir beylerinin bu boylardan hangisine mensup oldukları bilinmemekle (Yınanç, 2002: 1412) beraber Dulkadir Beyliği'nin kurulması ve siyasi hayatında bölgede var olan Beydili boyunun (Sarı, 2015: 124-125) ve bu boya ait *Alagözlü, Bozlu, Cerid ve Tecirli* oymaklarının etkili olduğu görülmektedir (Şanda, 2018: 11). Üstelik Beydili boyundan olan ve Halep'e yerleşen Türkmenler yazın *Arapgir, Canik, Divriği, Boz-ok, Çorum, Amasya ve Sivas* yaylaklarında yaylayıp, kışı *Antakya* ile *Şam* arasında geçirmekteydiler (Halaçoğlu, 2010: 88). Hatta XVI. sonlarında Dulkadirli ulusuna ait bir defterde bu kabileye mensup, 33 kişilik bir oymaktan bahsedilmektedir. Bu Beydili oymağının Kemer'de bir tarlada kışı ve muhtelif yerlerde yazı geçirdiği ayrıca sipâhi ve sipahizade olup, bu bölgeye diyar-ı şarktan geldiği aynı defterde kaydedilmektedir (Demirtaş, 1949: 362).

Dulkadir Beyliği'nde olduğu gibi İçel bölgesinde yaşayan Beydili oymaklarının, Ramazanoğulları Beyliği'nde etkin oldukları da görülmektedir. Faruk Demirtaş, "Osmanlı Devrinde Anadolu'da Oğuz Boyları" adlı çalışmasında bu konuda şöyle demektedir:

"Ramazanlı ulusuna dahil bulunan Beydili şubesi, defterlerimizin yazılmış olduğu devirlerde umumiyetle İçel muntakasındaki muhtelif köylerde tamamiyle yerleşmiş bir halde bulunuyordu. Bu şubeden yalnız İçel muntakasından yaşayan 56 evlik bir oymak, Kanuni devrinde henüz göçebe hayatını muhafaza etmekte idi. Tarsus muntakasındaki Kosun boyuna tabi olan 54 evlik diğer bir Beydili oymağı da adı geçen devirde muhtelif ekinliklerde ziraat etmekte, fakat henüz tam manasiyle yerleşmemiş

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

*bulunmaktadır. Umumiyetle İçel ve Tarsus muntakalarınca yerleşen Beydililerin. şimalde, Lârende ve Ereğli muntakalarında da iskân faaliyetinde buldukları anlaşılmaktadır.” (Demirtaş,1949: 362).*

Akkoyunlu Devleti'nin kurucu unsurlarına bakıldığı zaman devletin kurulmasında Halep Türkmenlerine bağlı Beydililerle birlikte, *Harbendeli, Eymür, Döğ, Acurlu, Aplü* gibi aşiretlerin etkili olduğu görülmektedir. Bu aşiretler hem Akkoyunlu Devleti'nin kurulmasında hem de topraklarının genişlemesinde önemli rol oynarken özellikle Beydililerin bazı dönemlerde Akkoyunlu Devleti'nin yönetiminde, idari ve askeri görevler aldığı görülmektedir (Şanda, 2018: 11). Ayrıca Günümüzde konfederasyonun daha iyi bilinen, Afşar, Bayat, Halaç, Kaçar, Karagözlü, Beydili'nin bir kolunu oluşturduğu *Şamlu* ve *Igder* kavimlerinden -Akkoyunlu, Karakoyunlu, Beydili ve Musellu boy isimleriyle- geriye kalan kalıntılar mevcuttur. Diğer bir deyişle, geniş Bayadistan topraklarında yaşayan kavimlerin çoğu en azından ismen Kaşgay konfederasyonunda temsil edilmekteydi (Bulut, 2002: 1179). Hatta Kaşgay Türkleri arasında günümüzde dahi yaşayan taifelerden biri olan “*Büyük Keşkül*” taifesi arasında Beydili boyu da geçmektedir. (Çelik, 2002: 1131)

Anadolu dışında etkin olan ve varlığını XVI. yy.a kadar sürdüren Türk İslâm Devletlerinden Memlükler (1250-1517)'e bakıldığında da yine Beydiline ait oymakların Memlüklerin siyasi faaliyet alanlarında etkili olduğu görülmektedir.

1260'tan itibaren Moğolların istilasının Suriye'de başlaması sonrası Memlükler'in Ayn Calut savaşında Moğolları yenilgiye uğratmasıyla Suriye bölgesi Memlük yönetimine girmiştir. Bunun üzerine Sultan Baybars zamanında 40 bin çadırılık büyük bir Türkmen topluluğu Halep bölgesine gelerek yerleşmiştir. Bunların kışlığı Kuzey Suriye, yaylakları ise Maraş, Uzun Yayla ve Sivas'a kadar uzandığı görülmektedir. Böylece XIII. yüzyılın ikinci yarısından itibaren Kuzey Suriye Türkmen yurdu haline gelmiştir. Buranın Türkmen yurdu olmasında önemli olan guruplar Oğuzların Boz-ok koluna mensup olan Döğ, Bayat, Afşar, yanında Beydili boyuna mensup oymaklardır. Bu oymak ve cemaatler Halep'ten Şam bölgesine kadar uzanmışlardır (Umar, 2002: 1018).

Memlük sultanlarından Berkayaruk zamanında, devletin bütün askerî gücünü gösteren siciller oluşturulmuş ve devletin bel kemiğini oluşturan mesleği profesyonel askerlik olan Memlük sınıfına listede öncelik verilmiştir. Sonra Arap aşiretlerinin yardımcı birliklerini sayılmış ve daha sonra Gazze'den Diyarbakır'a kadar uzanan bölgede yaşayan Türkmenleri sayılmıştır. Bu Türkmenler içinde Beydili boyu da vardır (Kopruman, 2015: 366). Yani Kaşgarlı Mahmut'tan 170 yıl sonra Memlük Sultanının izniyle Gazze'den Diyarbakır'a kadar olan bir sahaya yayılan *Avşar, Döğ, Beydili, Bayat* gibi boyları (Gündüz, 2015:13) buranın siyasi ve sosyal hayatına damga vurmuştur.

Bununla birlikte Beydili boyunun Suriye'deki varlığının daha önemli hale gelmesi Osmanlı Devleti (1299–1923) dönemini kapsamaktadır. Osmanlıların Suriye'yi fethiyle birlikte Türkmenlerin Suriye'ye yerleşmeleri daha kolay olmuştur. Sadece güney bölgelerde değil Anadolu coğrafyasında da XVI. yüzyıl tahrir defterlerinde Anadolu'da 23 Oğuz boyuna ait toplam 1428 köy, mezra, çiftlik ve kasaba adı vardır. Bu boylar içerisinde 30 yerleşme adı ile Beydili boyu yer almaktadır (Gümüşçü, 2002: 603). XIII. yüzyıl sonunda kurulan Osmanlı Devleti'nin sınırları içerisinde yaşayan Beydililer, yaşam tarzlarını Osmanlı hâkimiyeti altında da yüzyıllar boyunca devam ettirmiştir. Beydililer, yaşam tarzlarının bir gereği olarak yaylak ve kışlaklar arasında göç ederken hayvancılıkla uğraşmıştır (Şanda, 2017: 66).

Suavi Aydın, “*Tarihsel Oğuz Aşiret Grupları Bağlamında Konar-Göçerlik ve Aşiret Sorunu*” adlı çalışmada Osmanlı Devleti'nin Türkmenlerle ilgili politikası hakkında şu ifadeler bulunmaktadır;

*“Osmanlı devlet aygıtı, Türkmenleri kendi idarî tasarruflarına göre sınıflandırmaya çalışmıştır. Bu idarî birimler içindeki cemaat ve aşiretlerin zaman zaman bu idarî birimlerin dışına çıkmalarına veya kaçmalarına rağmen, başlangıçta oluşturan veya daha önceki emirliklerden devralınan idarî sahalar korunmaya çalışılmıştır. Örneğin, Osmanlı yayılması sırasında Osmanlıların kayda geçirip kendi idarî sistemleri içinde benimsediği veya zaman zaman yeni idarî düzenlemelere gitmek gerektiği için yeniden yapılandığı, “Bozulus”, “Ankara Yörükleri”, “Yeni-İl” ve “Eski-İl” Türkmenleri gibi idarî sınıflandırmalar bu tasarrufun ürünüydü. Örneğin “Yeni-İl” içinde yer alan geniş zümrede birbirinden çok farklı aşiretler vardı. Osmanlı'nın tasnifi bu bakımdan mekânsal ve idarî olup aşiret konfederasyonlarını veya cemaat hiyerarşilerini esas almamıştı. Yeni-İl içinde yaylayan Türkmenler kışlak olarak Halep bölgesini kullandığı için onlara “Halep Türkmeni” de deniliyordu.” demektedir (Aydın, 2015: 591).*

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Halep Türkmenlerinin Osmanlı kayıtlarındaki varlığı bugün Beydili boyu hakkında daha fazla bilgi edinmemize olanak vermektedir. Zira bu Türkmenlerin kışlak mahalleri Halep bölgesi olmasına rağmen, büyük çoğunluğu yaylak mahalli olarak Anadolu'yu kullanmaktaydılar. Osmanlı idaresine girdiği andan itibaren detaylı olarak tahrir defterlerine yansydıkları için haklarında detaylı bilgilere sahip olunabilmektedir. Bu bilgilere göre sosyal ve idarî yapılarını büyük ölçüde muhafaza eden Halep Türkmenlerini oluşturan boylar arasında Beydili boyu önemlidir (Şahin, 2002: 415). Aslında Halep Türkmenleri daha Akkoyunlular zamanından beri Halep ve civar yerleşimlerde ikamet etmekte olan *Harbendeli, Beydili, Eymür, Döger, Acurlu, Avşar ve Alpli* gibi bazı cemaatlerden oluşan *Bozulus* Türkmenleri içinde yer almıştır (Aygün, 2018: 907). Halep bölgesine ait tahrir defterlerinde, Halep Türkmen ili; *Beydili (Beğdili), İnallu, Köpeklü Avşarı, Gündüzlü Avşarı, Beyliklü (Beğlik Avşarı), Harbendeli, Bayad ve Peçenek-Şah Meleklü* olmak üzere 8 taifeden ve çok sayıda müstakil cemaatlerden meydana gelmiştir (Çakar, 2002: 765). XVI. yüzyılda ise bu cemaat sayısının 10'u bulunduğu görülmektedir. Bunlar *Beydili, İnallu, Avşar veya Köpeklü Avşarı, Gündüzlü veya Gündüzlü Avşarı, Beylik Avşar veya Beyliklü, Harbendeli, Bayad, Eymirlü kabileleri, Peçenek ve Şah Meliklü ile Oyratlu ve Osmanlı ve Kösecelü taifeleridir* (Özkılınç ve diğerleri: 2010: 21).

Halep Türkmenlerine ait tahrir defterlerinde yer alan önemli bilgilerden bir tanesi de bunların Hicrî 928/1521 tarihinde Halep, Adana ve Tarsus'ta bulunan boy beyleri olduğuna dairdir. Bunlar arasında Hicrî 943/1536 tarihi defterde de boy beylerinden bahsedilmektedir. Beydili boyuna bağlı Bozkoyunlu taifesinin boy beyi olan *At Güden Ahmet Bey* ve yakınları 11 kişi olarak verilmiştir. Bunlardan vergi alınmadığı yer alan bilgiler arasındadır (Özkılınç ve diğerleri, 2010: 20). Ayrıca 1596 yılına ait defteri Halep civarındaki bütün konar-göçerleri kapsadığı için "*Yörügan-ı Halep Defteri*" olarak adlandırılmıştır. Bu Türkmenler arasında Beydili Türkmenleri de yer almaktadır (Akis, 2004: 10). "Yörükân-ı Hâssa" başlığı altında verilen Halep Türkmenleri arasında yer alan Beydili Taifesi, (Özkılınç ve diğerleri, 2010: 24-34) Halep'ten Diyarbakır'a kadar olan bölge ile Sivas- Kangal yöresi, Tarsus, İç-il yani Silifke-Gülner-Mersin bölgelerinde yaşamışlardır (Halaçoğlu, 2010: 90). Ayrıca Osmanlı Devleti birçok önemli savaşta Beydili beylerini de göreve çağırmıştır. Örneğin 1101 senesindeki Avusturya Seferine Beydili boyunun da iştirak ettiği (Sümer, 1953: 83; Demirtaş, 1949: 360) bilinmektedir.

Kanuni devrinin ilk yıllarından itibaren Halep Türkmenlerine dair defterlerde daima ilk önce zikredilen boy Beydili boyu olmuştur. Halep Türkmenleri arasında bulunan ana Beydili kolu bu Türkmen topluluğunun en büyük teşekkülü olarak 40 obadan müteşekkil idi. Bu obalarla ilgili Faruk Sümer "*Oğuzlar (Türkmenler) Tarihleri-Boy Teşkilatı-Destanları*" adlı eserinde şöyle demektedir:

"Bunlardan birinci oba boyun adını taşımakta ve 260 vergi nüfusuna sahip bulunmaktadır. Aynı obanın 20 evlik ufak bir kolu da Halep vilâyetinin doğu taraflarında yaşamakta idi. Küçük-Karacalu ve Büyük-Karacalu obalarından sonra Kürtler obası geliyor ki, bu obanın mühim bir kolunun da Boz-Ulus arasında yaşadığı görülmektedir. Daha önce de işaret edildiği üzere, o zamanlarda Türkmenler arasında bazı inançlar ile ilgili olarak Arab, Tatar, Kürd ve Çerkeş gibi kavim adları erkek çocuklara konulmakta veya lâkab olarak verilmekte idi. Bayram oğlu Veli Kethüda ve Bozlu obalarını müteakip Beydili boyunun Boz-Koyunlu adlı en mühim obası zikrolunuyor. Bu oba 1520-1525 yıllarında birkaç kola ayrılmış olup, bunların başında beğ ünvanlı şahıslar görülmektedir. Bunlardan 25 vergi evi kadar olan birinci Bozkoyunlu kolu tamamiyle beğ/bey ünvanlı şahıslardan meydana gelmiştir. Bu kolun başında o zaman *At Güden Beğ oğlu Karaman Beğ* vardı. Aynı obanın ikinci kolu da *Mahmud Beğ*'in idaresi altında idi. Boz-Koyunlu obasının Beydili boyunun boy beyi ailesini teşkil ettiği anlaşılıyor. Rakka iskânında Beydili boyunun başında bulunan *Firuz Bey oğlu Şâhin Bey* de bu boy beyi obasından yani Boz-Koyunlu'dan idi...Müverrih *Naima Beydili Türkmenlerinin Halep'ten Diyarbakır'a kadar uzanan sahanın en güzel yaylaklarına sahip olduklarını yazıyor. Fakat yine aynı müverrihin sözlerine göre, Beydili Türkmenleri bu güzel yaylaklarında rahat durmayarak çiftçilerin ekinlerini davarlarına çığnettikleri gibi, vergilerini vermekten de kaçınmışlardı. Bu sebeple 1039 (1630) yılında Bağdad'ın geri alınmasına memur edilmiş olan *Vezir-i Azam Hüsrev Paşa Halep'den hareket etmeden önce kuvvet göndererek bu boyu yola getirmiş, vergi borçlarına mukabil de 10 000 koyun ve yüz kadar develerini zapt ettirmiştir.*" (Sümer, 1972: 297-299).*

Osmanlı Devleti'ne bağlı olarak göçebe yaşamlarını devam ettiren Beydili boyuna bağlı oymak ve cemaatler uzun bir süre yerleşik hayata geçmemiş ve göçebe yaşamlarını devam ettirmişlerdir. Yaylak ve kışlaklar arasındaki bu göç hareketi sırasında bazı Beydili oymakları yolları üzerinde bulunan



yerleşiklere ve ekinlerine zarar vermiştir. Bu durum yerleşiklerle göçebeler arasında sık sık sorunların yaşanmasına neden olmuştur (Şanda, 2017: 66). Kanuni döneminden itibaren bu sorunun devleti de meşgul ettiği tarihci Naima'nın aktarımları ile daha iyi görülmektedir. Bu sebeple Osmanlı Devleti yeni çözüm yolları arayışına girmiştir.

Bölgede yağma ve eşkıyalık yaparak kendisi için sorun yaratan Beydili Türkmen taifeleri için Osmanlı yöneticileri birçok tedbir almıştır. Bu tedbirlerden biri de Beydili oymaklarının buldukları bölgelerden alınarak başka yerlere zorunlu iskâna tabi tutulması şeklinde olmuştur. Burada Osmanlı Devleti'nin Beydili boyunu iskâna tabi tutmasının tek nedeni eşkıyalık ve yağma hareketlerinin olduğunu söylemek eksik kalır. Çünkü Osmanlı devlet politikası ile ilgili bilinen genel özellik, göçebe olan toplulukları yerleşik hayata geçirmek, fethedilen yerlerin İslamlaşmasını ve Türkleşmesini sağlamak, boş ve ekilmeyen arazileri tarıma açmak ve üretimi artırmak, vergi vermeye yanaşmayan toplulukları kontrol altına alarak düzenli bir şekilde vergi ödemelerini sağlamaktır. Bu gibi nedenlerden dolayı kışı Halep'te yazı ise Sivas'ın güneyinde Yeni-il bölgesinde geçiren Halep Türkmenleri ve XVI. yy. başlarında bölgede önemli bir unsur olan Halep Türkmenleri içindeki Beydili boyuna ait oymakların iskâna tabi tutulmuş olması muhtemeldir. Halep Türkmenlerinden bir kısım oymaklar ile Yeni-il Türkmenlerine bağlı Beydili obaları ve Boz-Ulus Türkmenlerinden bazı topluluklar, Harran ve Akçakale'den itibaren güneye doğru Culab ve Belih ırmakları boyunca Rakka'ya kadar iskân olunmuşlardır (Umar, 2002: 1018-1019). Gerçekleştirilen iskân faaliyetlerinin en büyüklerinden biri 1691 yılında Padişah fermanıyla yapılmıştır. Bu fermanla Beydili Aşireti ve ona tabi olan oymaklar, Yeni-İl ve Halep eyaletlerinden alınarak Rakka'ya iskân edilmiştir (Şanda, 2017: 67).

İskana tabi tutulan oymakları arasında özellikle Beydili'nin Yeni-il'deki şubelerini meydana getiren *Bozkoyunlu*, *Kara Şeyhlü*, *Beymişlü* ve *Arablu* oymakları başta gelmekte idi. Bu iskân hadisesi sırasında Bozkoyunlu cemaatinin başında *Firuz Bey oğlu Şâhin Bey* bulunuyordu ki, Firuz Bey, bugün Beydili Türkmenlerinin Rakka iskânı hatıraları arasında önemli bir yer tutmaktadır (Sümer, 1953: 83; Altınay, 1930: 100-102). Rakka bölgesinde iskân olunan Türkmenlerin ekserisi daha bir yıl geçmeden buldukları yerleri terk ederek Anadolu'ya kaçmıştır. Bunlar gittikleri yerlerden geri getirilerek tekrar yerleştirilmiş olsa da eski hareketlerini tekrarlamışlardır (Altınay, 1930: 117-118,124,179-181,202-203). Ancak çöl ikliminin hüküm sürdüğü Rakka, Balis ve Belih bölgelerindeki Türkmenler, kuzeye göç ederek *Azaz*, *Bab*, *Menbiç*, *Carablu*, *Çobanbeğ* ve *Gaziantep'in* güneyine yerleşmişlerdir. XIX. yüzyılda Rakka bölgesi, yerleştirilen Türkmenlerin terk ettiği bir saha durumuna gelmişti. Bunun üzerine bu yüzyılın ikinci yarısında Afşar oymakları buralara iskân edilmişlerdir. (Umar, 2002: 1018-1019)

Osmanlı Devleti, Rakka'da yerleşip kalmak korkusu ile, yeniden Anadolu'ya dağılmış olan aşiretleri birer birer buldurup cebir ve şiddet kullanarak Rakka'ya geri gönderme politikasını uzun bir süre devam ettirmiştir. Ancak tüm çabalarına rağmen Osmanlı Devleti'nin bu iskân teşebbüsü ile amaçladığı sonuçlar gerçekleşmemiştir. Çünkü Beydili başta olmak üzere Türkmen aşiretleri, Rakka bölgesinin iklim koşullarına adapte olamamış ve devlet yetkilileri de bu durumu göz ardı etmiştir (Sümer, 1953: 84; Altınay, 1930: 117 -118,124,179-181,202-203). Ayrıca sürgün sırasında yaşanan hastalık, ölüm...vb. acılar ile Rakka Sürgünü, iskâna tabi tutulan Beydili aşiretlerinin hayatında izlerini her daim taşımıştır. Örneğin Beydili boyunda bozlak, barak, uzun hava, ağıt ve türküler çok fazla kendisini hissettirmektedir.

### SONUÇ

Beydili boyu, Oğuz boyundan biridir ve özellikle X.yy'dan tarihsel olarak etkili bir topluluk olmuştur. Beydili boyuna bağlı toplulukların, günümüzde Karakurum yakınlarında diğer Oğuz boylarıyla ayrılımlarının temel nedenleri iki ana faktöre dayanmaktadır. İlk olarak, Selçuklu Devleti'nin Anadolu fetih politikalarına katılmışlardır. İkincisi, Selçuklu Devleti'nin çöküşü ile ortaya çıkan otorite boşluğunda, Harzem bölgesinde siyasi olarak örgütlenip Harezmsah Devleti'nde etkili olmuşlardır. Beydili boyu sayesinde Harezmsah hanedanı yetişmiş ve Orta Çağ'ın en güçlü Türk İslam unsurlarından biri olmuş, özellikle Moğolların batı ilerlemesine karşı bir engel oluşturmuşlardır.

Kuşkusuz, Harezmsahlar Devleti'nin güçlü olduğu dönemde, Anadolu'da Anadolu Selçuklu Devleti'nin egemenliği altında fetih politikaları daha hızlı gerçekleşmiştir. Ancak Harezmsah Devleti'nin çöküşü ve Moğol istilası tüm Türk dünyasında etkisini göstermiştir. Beydili boyu, devletin kuruluşundan itibaren

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Moğol istilasından kaçarak İran, Suriye, Irak ve Anadolu'nun iç bölgelerine kadar gelmiş ve özellikle Anadolu'nun Türkleşmesine katkıda bulunmuştur.

Beydili boyu sadece Anadolu'nun Türkleşmesine etki etmekle kalmamıştır. XIII. yy.dan sonra göç ettikleri bölgelerde birçok devletin veya beyliğin kurucu unsurları olmuş veya önemli pozisyonlara gelmiştir. Memlükler ve Safevî gibi Orta Çağ devletleri başta olmak üzere Akkoyunlu, Karakoyunlu, Dulkadiroğulları, Ramazanoğulları gibi beyliklerde önemli roller üstlenmişlerdir. Bu nedenle, XIII.yy.dan itibaren sadece Anadolu değil, İran, Suriye ve Irak bölgelerinin sosyal, siyasi, ekonomik ve kültürel yaşamında etkileri olmuştur. Beydili cemaat ve aşiretleri, Osmanlı Devleti'nin kuruluşu ile birlikte Osmanlı'ya tabi olmuştur. Osmanlı-Beydili ilişkileri uzun bir tarihsel dönemi kapsamaktadır. Çünkü Osmanlı Devleti kimi zaman savaşlarda asker topladığı Beydili cemaatleri ile Rakka sürgünü sırasında çatışma yaşamış ve XVII.yy.a kadar süren ilişkileri inişli çıkışlı bir seyir izlemiştir. Beydili boyuna ait oymak ve cemaatler yayıldıkları tüm bu coğrafyalarda hala varlığını devam ettirmektedir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## PERMEASYON ENJEKSİYONU, ÇATLATMA ENJEKSİYONU VE KOMPAKSİYON ENJEKSİYON YÖNTEMLERİNİN HESAP VE TASARIM KRİTERLERİ AÇISINDAN İRDELENMESİ

### ANALYSIS OF PERMEATION INJECTION, FRACTURING INJECTION, AND COMPACTION INJECTION METHODS IN TERMS OF CALCULATION AND DESIGN CRITERIA

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#### ÖZET

Yapılaşma planlanan sahalarda, zemin araştırmaları çalışma alanının geoteknik karakterinin ortaya konulması büyük önem taşımaktadır. Bahse konu zemin araştırmaları neticesinde tespit edilen zemin problemlerine yönelik uygulanabilir, ekonomik ve emniyetli çözümler geliştirmek ise geoteknik mühendislerinin sorumluluklarında biridir. Bu sebeple araştırmacılar, zemin problemlerini çözüme kavuşturmak adına farklı zemin iyileştirme yöntemleri geliştirmiştir. Bu yöntemlerin uygulama sahası ve malzeme seçimine bağlı olarak birbirlerine göre üstün oldukları ve zayıf oldukları yönleri mevcuttur. Karar verici pozisyondaki uzmanların, uygulanabilirliği ve etkisi ispatlanmış zemin iyileştirme yöntemlerinin tamamı hakkında bilgi sahibi olması ve gerekli durumlarda uygun sahalarda için kullanım önerisinde bulunması gerekmektedir.

Bu çalışma özelinde zemin enjeksiyon yöntemleri araştırılmıştır. Enjeksiyon yönteminin ne olduğu tanımlanmış ve kullanım alanları anlatılmıştır. Çalışma kapsamında, geliştirilmiş enjeksiyon yöntemleri incelenmiş; hangi tür zeminlerin enjeksiyon uygulamaları ile iyileştirme yapılması durumunda olumlu sonuçlar verdiği gözlemlenmiştir. Zemin türlerine göre seçilmesi gereken enjeksiyon çeşitleri “Zemin türü-Etkili Enjeksiyon çeşidi” ilişkisi ile özetlenmiştir.

Konu ile ilgili olarak yapılan araştırmalardan edinilen bilgiler ışığında enjeksiyon maksatlı kullanılan ve enjeksiyon sonrası zemin özellikleri açısından olumlu katkı veren materyallerin değerlendirilmesi ve karşılaştırması gözler önüne serilmiştir. Benzer şekilde enjeksiyon malzemesi ve zemin uyumuna yönelik araştırmalar yürütülmüş; literatür verileri ışığında etkinliği kanıtlanmış ve kullanılmakta olan enjeksiyon malzemelerinin hangi zeminlerde seçilmesinin etkili olacağına yönelik sınıflandırmaya yer verilmiştir.

Enjeksiyon yöntemi ile zemin iyileştirmesine yönelik olarak geliştirilmiş ampirik yaklaşımlar çalışma kapsamına ele alınıp özetlenmiştir. Bahse konu yöntemlerin enjeksiyon uygulamalarının etkisini ifade etme hususunda kullandıkları kabuller karşılaştırılmıştır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Enjeksiyon metodunun kullanılmasının avantajları ve elde edilen iyileştirme etkilerinin yanı sıra, bahse konu zemin iyileştirme yönteminin kullanılmasının meydana getirdiği çevresel riskler de bu çalışma kapsamında incelenmiştir. Enjeksiyon malzemesi seçimi ve uygulama yöntemine bağlı olarak etkilenebilecek zemin özellikleri ile ilgili değerlendirmelere yer verilmiştir.

Bu çalışma kapsamında incelenen ve değerlendirilen araştırmaların etkinliğini gözler önüne sermek adına Enjeksiyon yöntemi ile zemin iyileştirmesi gerçekleştirilen örnek bir vaka incelenmiştir. Bahse konu zemine ilişkin iyileştirme öncesi ve iyileştirme sonrası elde edilen deneysel veriler ortaya konulmuş; zemin iyileştirmek üzere kullanılan enjeksiyon yönteminin zemin özelliklerine katkısı sonuçlara dayalı olarak karşılaştırmalı şekilde değerlendirilmiştir.

**Anahtar Kelimeler:** permeasyon enjeksiyonu, çatlatma enjeksiyonu, kompaksiyon enjeksiyonu

## ABSTRACT

In construction planned sites, ground investigations are of great importance to determine the geotechnical characteristics of the working area. Identifying ground problems through these investigations is the responsibility of geotechnical engineers, who aim to develop feasible, economical, and safe solutions. Therefore, researchers have developed various ground improvement methods to address ground problems. These methods have their own strengths and weaknesses depending on the application area and material selection. It is essential for decision-makers and experts in relevant positions to be knowledgeable about proven and effective ground improvement methods and to provide usage recommendations for appropriate areas when necessary.

In this study, ground injection methods were researched. The definition and application areas of injection methods were explained. Enhanced injection methods were examined within the scope of the study, and positive results were observed when improvement was carried out with injection applications in specific types of soils. The types of injections that should be selected based on soil types were summarized in relation to the "Soil Type-Effective Injection Type" relationship.

Based on the information obtained from research on the subject, this study evaluates and compares materials used for injection purposes that contribute positively to soil properties after injection. Similarly, research was conducted on the compatibility of injection materials with the soil, and based on literature data, a classification was provided regarding which soils the applied injection materials would be effective on.

Empirical approaches developed for soil improvement with the injection method were discussed and summarized within the scope of this study. The assumptions used by these methods to express the effect of injection applications were compared.

In addition to discussing the advantages of using the injection method and the improvement effects achieved, this study also examined the environmental risks associated with the use of this ground improvement method. Assessments were made regarding soil properties that could be affected depending on the choice of injection material and application method.

To showcase the effectiveness of the research examined within this study, an example case of soil improvement using the injection method was analysed. Experimental data obtained before and after improvement for the mentioned soil were presented, and the contribution of the injection method used for soil improvement was evaluated comparatively based on the results.

**Keywords:** Permeation injection, Compaction injection, Fracturing injection

## GİRİŞ

Büyük şehirlerde arazilerin kıymetli olması her zemine yapı yapma zorunluluğunu da beraberinde getirmektedir. Bu durum da da üzerinde durulması gereken sistem zemin ıslah sistemleridir. Her problemin kaynaklandığı parametrelerin farklı olması sebebiyle çözüm yollarında da farklılıklar ve çeşitlilikler söz konusudur. Bu çalışmada ele aldığımız zemin enjeksiyon yöntemleri en temelinde

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

zemine farklı bir malzemenin enjeksiyonu demektir. Zeminin cinsine ve enjekte edilen malzemenin cinsine göre bu yöntemlerde temel farklılıklar söz konusudur. Bu teknikleri permeasyon (emdirme, sızdırma), çatlatma anjeksiyonu ve kompaksiyon enjeksiyonu olarak üç temel grupta toplamamız mümkündür. Zemin yapısında herhangi bir değişiklik yapmadan sadece zemin arası boşlukların düşük vizkosoteli akışkan bir karışımla doldurulduğu siteme permeasyon enjeksiyonu denir. Bu sistemde malzeme zemine düşük basınçla verilir, içine verilen malzeme akışkan bir malzemedir ve enjekte edilen malzemenin zemin daneleri arasındaki boşlukları doldurarak geçirimsiz bir tabaka oluşturmak hedeflenir. Enjeksiyonun yapıldığı zeminin cinsine bağlı olarak da kullanılan enjeksiyon şerbetinin malzemesi tercih edilir. Bu enjeksiyon modelinde su-çimento karışımı ya da kimyasallar da zemine enjekte edilebilir.

Çatlatma enjeksiyonunda da permeasyona benzer olarak düşük viskoziteli bir şerbet kullanılır ancak farkı basıncının yüksek olması ve zemin danelerinin yerdeğiştirmeye zorlanmasıdır. Çatlatma enjeksiyonu geçirimsizliği daha düşük olan zeminlerde yaklaşık olarak 0,5mpa ile 4 mpa arasında bir basınçla enjeksiyon şerbetinin zemine enjekte edilerek zeminin ıslah edilme yöntemidir. Zeminin belirli bölgelerine girilerek basınçla boşluk doldurma işlemi yapılır, yapraklanmaya benzer şekilde iyileştirme yapılır.

Kompaksiyon enjeksiyonu yönteminde ise basıncın daha da artırılmasıyla zeminde bulunan küçük dane çapına sahip kil ve silt danelerine yanal ötelenme yaptırarak, boşlukların içerisine girmeden enjekte edilen bölge etrafında genişleyen bir kütle oluşturularak zemin iyileştirilir. Bu durumda enjeksiyon noktasının çevresindeki zeminler sıkıştırılarak iyileştirilmiş olur. Bu enjeksiyon yönteminde kullanılan beton şerbetinin kıvamı daha yoğundur.

Çimento enjeksiyonlarının kuşlarda enjekte edilebilirliğini yönelik iki farklı yöntem üzerine çalışmışlar ve adimsal yönteminde girdi olarak sadece  $D_{15}/d_{85}$  gradasyon oranının kullanılmasına rağmen değişkenleri  $D_{15}/d_{85}$ , P,S/Ç,  $D_r$  ve FC den oluşan beş değişken kullanarak daha başarılı sonuç elde etmişlerdir. (Akbaş & Tekin , 2010)

Dere kumu ve kırmataş malzemelere enjeksiyon uygulaması yapılmış ve dere kumuyla yapılan denemelerdeki basınç dayanımlarının kırmataşla yapılan basınç dayanımlarından daha yüksek olduğu belirlenmiştir. Bu durumun sebepleri incelendiğinde de bazaltın kireçtaşıdan daha yüksek dayanımda olması düşüncesine varılmıştır. Ayrıca dere kumu kullanılan malzemelerde hasarın agrega çevresinde, kırma taştan ise taşın kırılması olarak hasar aldığı düşünülmektedir. (Aksoy, İnal, & Gör, 2015)

Enjeksiyon basıncı (Ep) başlangıçta artan bir orana sahipken limit basınca ulaştığında sabit kalır. Belirli bir zaman atalığı (t), uygulanan niha etkin yarı çap (R) olarak tanımlandığında: dolguya başlandığında birim zamandaki enjeksiyon oranı (qe lit/dak) yüksektir ve zamanla alarak sifıra yaklaşır. (Lombardi , 1985)

Enjeksiyon karışımının uygulanabilirliği zemin tipine göre enjekte edilebilirliği ile ilişkilidir. Bu durumda gerekli parametreler uygun akış, gerekli dayanım alma özelliği, optimum priz hızı ve enjeksiyon malzemesinin içeriğine bağlı olarak büzülme stabilitesi olarak değerlendirilebilir. Daneli zemini iyileştirilmesi için uygulanacak enjeksiyon şerbetinin yoğunluğu, viskozitesi, priz süresi, dane boyutu ve dane dağılımı uygulanabilirlik için çok önemlidir.

En çok kullanılan enjeksiyon malzemesi su/çimentodur, bunun sebebi de kolay bulunması, maliyetinin kimyasallara göre düşük olması, mukavemetinin yüksek olmasıdır. Kullanımdaki en önemli dezavantajı ise geç priz almasıdır ki bu durumda da enjeksiyon şerbetinde kullanılacak priz hızlandırıcı ile soruna çözüm bulunabilir. Ayrıca karışımdaki su çimento oranı arttıkça uygulanabilirlik artarken dayanım da düşer dolayısıyla şerbeti kullanım alanına göre su/çimento oranını optimumda tutmak önemlidir. Uygulanabilirlik için su /çimento oranının artırılmadığı noktalarda ise dayanımda ödün vermemek için kimyasal katkıları kullanmak mümkündür, bunlar genellikle priz hızlandırıcılar, akışkanlaştırıcılar ve segregasyon önleyici katkılarıdır.

$$R = a.p/\tau + r \quad (1)$$

R=Enjeksiyon etkin yarı çapı

2a=çatlak genişliği

$E_p$ =enjeksiyon basıncı,

$\tau$  = karışım malzemesinin akma direnci

$2r$ = kuyu yarıçapı

Bu eşitlik yatay çatlaklar için düşey yapılan enjeksiyonlarının delgi ve enjeksiyon çapını belirlemek için uygundur.

Zeminlerin dane boyutu ve cinsine bağlı olarak zemine enjekte edebildiğimiz malzemenin cinsi ve enjeksiyon basıncı da değişiklik gösterir. Amaç boşlukların doldurulması olduğu için kumlu zemindeki boşlukları düşük basınçla doldurmak mümkünken, kili ve siltli zeminlerde daha yüksek basınçlı uygulamalar tercih etmek gerekir. Şekil 1.3 de zemin cinsine bağlı kullanılacak enjeksiyon cinsi grafiği verilmiştir.

Enjekte edilebilirlikte dane çapı (N) çok önemlidir bu durumda N aşağıdaki formülle hesaplanabilir.

$$N = D_{15}(\text{zemin})/D_{85}(\text{karışım}) \quad (2)$$

Bu durumda  $N > 25$  olursa karışımın zemine başarılı bir şekilde enjekte edilmesi mümkündür. Eğer  $N < 11$  olursa enjeksiyon uygulaması mümkün değildir.

(Burwell, 1958) yaptığı çalışmada dane çapı (D) nin tek başına enjekte edilebilirlikte yeterli olmadığını ve enjekte edilebilirliğin limitlerine yaklaşıldığında karışımın uygunluğunun kontrol edilmesi gerektiğini vurgulamıştır.

$$N = D_{10}(\text{zemin})/D_{95}(\text{karışım}) \quad (3)$$

Bu durumda da  $N > 11$  ise enjeksiyon uygulanabilir,  $N < 5$  ise uygulanması önerilmez olarak tespitlerde bulunmuştur.

## 2.ARAŞTIRMA VE BULGULAR

Enjeksiyonların dayanım ve karakteristik özelliklerinin hesaplanması hususunda iki fazlı karışım modelleri öne çıkmaktadır. Bu bağlamda çimentolu enjeksiyonlarda idealize zemin metodu ile enjeksiyon kabiliyetlerinin kestirilebileceği öngörülmektedir (Omine, Ochiai, & Bolton, 1999).

Buna göre Gerilme-Şekil değiştirme parametreleri için idealize edilmiş zeminde çimentolu faz ile tabii zemin fazının karakteristik özelliklerinin hacimce oranlaması olarak öngörülmektedir. Denklem 3 ve Denklem 4'de bahse konu yaklaşımlar görülmektedir.

$$\bar{\sigma} = f_s \times \bar{\sigma}_s + (1-f_s) \times \bar{\sigma}^* \quad (3)$$

$\bar{\sigma}_s$  = Homojenize Zeminin Gerilme değeri

$f_s$  = Çimento Fazı hacmi

$\bar{\sigma}^*$  = İyileştirilecek zeminin Gerilme değeri

$$\bar{\varepsilon} = f_s \times \bar{\varepsilon}_s + (1-f_s) \times \bar{\varepsilon}^* \quad (4)$$

$\bar{\varepsilon}_s$  = Homojenize Zeminin Şekil Değiştirme davranışı

$\bar{\varepsilon}^*$  = İyileştirilecek zeminin Şekil Değiştirme davranışı

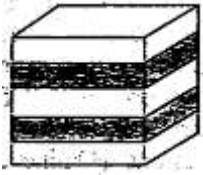
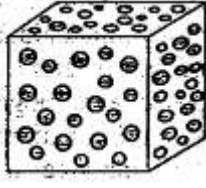
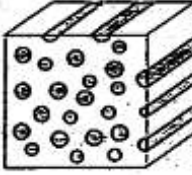
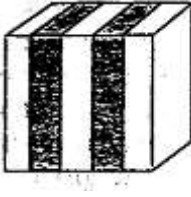
Burada birim şekil değiştirmeye karşılık gerilme değerini iyileştirirken  $\bar{\sigma}_s$  ile  $\bar{\sigma}^*$  arasında Stres dağıtım katsayısını adında bir sabit için yaklaşımda bulunulmuştur. Buna göre aradaki bağıntı denklem 5'te gösterildiği gibi önerilmiştir.

$$\bar{\sigma}_s = b \times \bar{\sigma}^* \quad (5)$$

Bu noktada iyileştirilmiş zeminin Young Modülünü tahmin edebilmek adına birim gerilime maruz zeminler için enjeksiyon geometrisi kabulüne doğrudan bağlı olarak Stres dağıtım katsayısı değişkenlik göstermektedir. Bahse konu parametrenin tespitinde  $S_{iiii}$  (Eshelby katsayısı) aşağıdaki tabloda belirtildiği gibi tespit edilip kullanılmaktadır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

	Düşey Katmanlı	Küresel Kapalı Dağılım	Kolon Şekilde Dağılım	Düşey Katmanlı Dağılım
<b>Karışım Türü</b>				
<b>Stres Dağılım Katsayısı (b)</b>	$\left(\frac{E_S}{E^*}\right)^n$			
<b>Eshelby Katsayısı (Siiii)</b>	1	0.4667 - 0.6 (Tabi Zemin Poisson oranı 0 - 0.5 için)	0.625 - 0.75 (Tabi Zemin Poisson oranı 0 - 0.5 için)	0
<b>n = (1 - Siiii)</b>	0	Yaklaşık 0.5	0.375 - 0.25	1

Tablo 1 Stres dağılımı Eshelby katsayısı ilişkisi (Omine, Ochiai, & Bolton, 1999)

Zemin şartları enjeksiyon şekli ve benzeri parametreler ile şekillenen karışım türü kabulünün ardından ortaya konulmuş olan karışımın Young modülü ise Denklem 6'da verilen esasa göre hesaplanabilir.

$$\bar{E} = \frac{(b-1)f_S + 1}{\frac{f_S b}{E_S} + \frac{(1-f_S)}{E^*}} \quad (6)$$

$E_S$  = İyileştirme Materyalinin Elastisite Modülü

$E^*$  = İyileştirilen Zemin Biriminin Elastisite Modülü

Benzer şekilde iyileştirilmiş zeminin Poisson oranının tespiti ile ilgili olarak aşağıda Denklem 7'te verilen önerme kullanılabilir.

$$\bar{\nu} = \frac{f_S b \frac{\nu_S}{E_S} + (1-f_S) \frac{\nu^*}{E^*}}{\frac{f_S b}{E_S} + \frac{(1-f_S)}{E^*}} \quad (7)$$

$\nu_S$  = İyileştirme Materyalinin Poisson Oranı

$\nu^*$  = İyileştirilen Zemin Biriminin Poisson Oranı

İyileştirilmiş zemine ait kayma modülü değeri aşağıda gösterilen Denklem 6'da gösterilen şekilde önerilmiştir.

$$G = \frac{(b-1)f_S + 1}{\frac{f_S b}{G_S} + \frac{(1-f_S)}{G^*}} \quad (8)$$

$G_S$  = İyileştirme Materyalinin Kayma Modülü

$G^*$  = İyileştirilen Zemin Biriminin Kayma Modülü

Yukarıda belirtilen çalışmalar neticesinde iyileştirilmiş zemin birimine yönelik fiziksel özelliklerin tahmin edilebileceği önerilmiştir. Buna göre hesap adımları neticesinde elde edilen verilerden başta sıvılaşmaya karşı güvenlik şartlarının iyileştirilmesi maksatlı uygulamalar olmak üzere çeşitli amaçlarda kullanılacak olan enjeksiyonların etkinliği uygulama öncesinde tahmin edilmektedir. Buna karşın ampirik yaklaşımların zemin gibi taneli ve eş dağılıma sahip olmayan birimler kümesi halinde bir yapılaşmada kesinlik ihtiva eden çıkarımlara işaret edemeyeceği gözden kaçırılmamalıdır.



### **3.SONUÇLAR VE TARTIŞMA**

Enjeksiyon uygulamalarının özellikle son yüzyılda gelişen ve kullanımı artan bir yöntem. Bunun sebini de artan teknolojiye bağlı olarak yüksek katlı yapıların yapılması, sıvılaşma potansiyeli olan zeminlere artan arazi fiyatları sebebiyle yapı yapmanın gerekliliği, ya da tünellerin açılması, barajların yapılması gibi insanoğlunun hayatını daha kolaylaştırabilecek uygulamalar sebebiyle zeminin doğal formasyonunun bozulması ya da zemin taşıma kapasitesinin yeterli olmadığı zeminlerde bile yapı yapma gerekliliğinin olmasıdır.

Yapılan çalışmada hangi tür zemine hangi tür enjeksiyon malzemesinin ne kadar basınç altında enjekte edildiği araştırılıp buna ait elde edilen verilerde zeminin ve enjeksiyon malzemesinin dane çapı ve su/çimento oranlarına göre kullanım alanları sınıflandırılmıştır.

Zemin enjeksiyonu yapıldıktan sonra bu malzemenin bu zeminde nasıl bir etki oluşturacağı ve enjeksiyon şerbeti ve zeminin nasıl bir dayanım alacağı homojenleştirme metoduyla irdelendi. Bu methotta enjeksiyon şerbeti ve zemin danelerinin homojen dağılım gösterdiği kabulü yapılarak zeminin ve kullanılan enjeksiyon malzemesinin elastisite modülleri yardımıyla zemine ait yeni bir elastisite modülü belirlenmeye çalışıldı. İyileştirme materyalinin poisson oranından iyileştirilmiş zeminin poisson oranı hesaplandı. Son olarak da iyileştirilmiş zemine ait kayma modülü hesaplanarak zeminde oluşarak kayma kuvvelerine karşı zeminin direncine bakılmış oldu.

Bu çalışma doğru zemine doğru materyal enjekte edilirse artan basınç dayanımı ve zemin taşıma kapasitesi ve zemin kayma dayanımı gibi kavramların hangi parametrelere bağlı olarak ne oranlarda iyileştiğini özetlemeye çalışmıştır. İnşaat mühendisliğinde yapılan işlerin sağlamlasının deprem olduğu düşünüldüğünde bu yöntemin doğru kullanıldığında çok iyi ve uygun bir yöntem olduğu ancak çok detaylı araştırmalara ve çalışmalara ihtiyacı olduğu bir gerçektir. Bu yöntemle ait en büyük belirsizliklerden biri zemini çatlak ve boşluk yapısını tam olarak bilmediğimiz, yapılan çalışmalarla tahmin etmek zorunda kaldığımız için yapılan enjeksiyonun ve yapılan hesapların işleyişinin aynı doğrultuda olmamasıdır. Yapılan kabullerin aksine zemin homojen olmayan bir yapıya sahiptir ve bu durumu zemin etüd çalışmaları ile yapılan sondaj, jeofizik ve laboratuvar çalışmaları ile anlamaya çalışmaktayız. Bununla beraber sahada uygulamanın kolaylığı ve diğer yöntemlere göre daha ucuz olması sebebiyle özellikle kohezyonsuz zeminlerde kontrolsüzce uygulanmaktadır. Bu anlamda özellikle bu yöntemle ait uygulamaların yapılması kontrol altına alınmalı ve uygulama sonrası sağlama ve yapılan hesaplara paralel bir uygulama yapıldığının ispatları gerekli yöntemle yapılarak raporlanmalıdır. Özellikle yapılan çalışmalarda yöntemin çalışma prensibinin zeminin boşluklarını doldurmak olarak tanımlanması ve durumdaki sorunlara çözüm bulmak amacıyla tasarlanması sebebiyle çok gerekli olduna değinilmiştir. Ancak ortalama kullanım ömrü sadece 40-50 yıl olana betonarme yapıların altına sıvılaşma kaynaklı hasarı alması amacıyla ya da zemin taşıma gücünün artırılması amacıyla yapılması zorunlu olmamakla beraber daha uygulanabilir ve kontrol edilebilir yöntemlerle çalışmak hem yapı hem de zemin için daha güvenli olacaktır.

Uygulama kolaylı ve fiyat olarak daha ekonomik olması sebebiyle tercih sebebi olan enjeksiyon yönteminin yer altında geçirimsiz tabaka oluşturması varolan ve en çok ihtiyaç duyduğumuz suyun akış yönünün değiştirilmesi ve hatta kullanılan malzemelerle mevcut yeraltı suyunun kimyasal enjeksiyonlarla kirletilmesi uzun vadede doğal kaynaklara çok büyük zararlar verme potansiyeline sahiptir. Bu durumda çevreye daha az zararlı malzemelerle ya da yöntemlerle çalışılması ve uygulama denetimlerini sıkı olması gerektiği kanısına varılmıştır. Yapı ve zeminle ilgili olan ve çözülmesi gereken sorunlar zorlu olmakla beraber mühendislik uygulamaların gelişmesiyle hem etkili hem de çevreyle uyumlu doğal yöntemler üzerine çalışmalar yapmak faydalı olacaktır.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## KİL ZEMİNLERİN ŞİŞME MEKANİZMASI VE ŞİŞMEYE YÖNELİK HESAP YAKLAŞIMLARININ SONLU ELEMANLAR MODELİYLE DEĞERLENDİRİLMESİ THE SWELLING MECHANISM OF THE CLAY SOILS AND EVALUATION OF THE EMPIRICAL APPROACHES WITH FEM MODELLING SOFTWARE

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### ÖZET

Artan nüfus sebebiyle yapılaşma amacıyla kullanılması uygun olmayan çeşitli mühendislik problemlerine sahip zeminler yaşam alanlarının inşa edilmesi maksatlı olarak kullanılmaya başlanmıştır. Bahse konu zemin problemleri sahada mevcut zeminin türü ile doğrudan ilgilidir. Bu tip zeminlerin yapılaşma maksatlı olarak kullanılabilir duruma getirilmesi maksatlı olarak kapsamlı araştırmalar yapılmalı ve doğru mühendislik çözümleri geliştirilmelidir.

Çalışma sahalarında en çok gözlenen zemin türlerinden biri de kil zeminlerdir. Killer kimyasal yapısı ve geometrisi ile birbirinden ayrılan çeşitlere sahiptir. Bu kil türleri yapılarına bağlı olarak birtakım mühendislik problemini de beraberlerinde getirebilmektedir.

Bu çalışma kapsamında bazı kil türlerinde gözlenen ve ciddi mühendislik problemlerine yol açan killerin şişme-büzülme davranışı üzerine inceleme yapılmıştır. Buna göre killerin türleri incelenmiş ve kimyasal birleşim çeşitlerine yer verilmiştir. Şişen killer sınıflandırılmış ve killerin su emme mekanizması sebepleri ile açıklanmıştır. Su emme davranışının ve yük değişimlerinin şişme davranışı üzerine etkisi ortaya konulmuştur. Killerin şişme büzülme davranışına dair araştırmacıların yapmış olduğu çalışmalar neticesinde elde edilen bilgiler özetlenmiştir. Şişme büzülme davranışının sonuçları ve meydana getirebileceği problemlere değinilmiştir. Araştırmacıların deneysel veriler ışığında ortaya koymuş oldukları ampirik hesap yaklaşımlara yer verilmiştir.

Çalışmamız kapsamında, ortaya konmuş olan ampirik hesap yaklaşımların şişme davranışını tahmi etme konusunda doğruluk seviyesini incelemek ve şişme davranışını somut veriler ile ortaya koymak üzere Bursa ili Nilüfer ilçesinde yapıyı planlanan örnek bir vakaya ait zemin incelemeleri ve yük dağılımlar marifeti ile şişme-büzülme davranışı Plaxis 2D (V.21) sonlu elemanlar yazılımında modellenmiştir. Hesap sonuçları ampirik yaklaşımlar ile kıyaslandığında geliştirilen bazı hesap modellerinin gerçekçi tahminler ortaya koyduğu gözlenmiştir. Buna karşın bazı hesap modelleri ise davranışı modelleme hususunda gerçekten uzak sonuçlar önermiştir.

Sonuç olarak şişme davranışında yük dağılımının önemi ortaya konulmuştur. Arazide yüke bağlı olarak gelişebilecek şişme büzülme davranışının neden olabileceği eksantrik oturmaların sonuçları gözlemlenmiştir. TBDY 2018'de şişme davranışına karşı yapılması gereken tahkiklere yönelik esaslar

incelenmiştir. Yapılan analizde kullanılan modelleme adımları ile yönetmelik arasındaki farklar tespit edilerek iyileştirmeye yönelik önermelerde bulunulmuştur.

**Anahtar Kelimeler:** kil, şişme, şişme basıncı, şişme yüzdesi

## ABSTRACT

Due to the increasing population, various engineering problems associated with unsuitable soils for construction purposes have begun to be used for the purpose of urban development. These soil problems are directly related to the type of existing soil in the field. Comprehensive research and accurate engineering solutions should be developed to make these types of soils suitable for construction purposes.

One of the most commonly observed soil types in construction sites is clay soils. Clays have various types that differ in their chemical composition and geometry. Depending on their structures, these types of clays can bring along certain engineering problems.

In this study, an investigation was conducted on the swelling-shrinkage behavior of clays observed in some clay types. Accordingly, the types of clays were examined, and various chemical compositions were discussed. Swelling clays were classified, and the reasons for the clay's water absorption mechanism were explained. The effects of water absorption behavior and load changes on swelling behavior were presented. The information obtained from researchers' studies on the swelling-shrinkage behavior of clays was summarized. The results of the swelling-shrinkage behavior and the problems it can cause were addressed. Empirical calculation approaches based on experimental data provided by researchers were presented.

In our study, the empirical calculation approaches that were proposed were examined for their accuracy in predicting swelling behavior and to present swelling behavior with concrete data through soil investigations and load distributions for a planned construction case in Nilüfer district of Bursa province. The swelling-shrinkage behavior was modeled using Plaxis 2D (V.21) finite element software. When the calculation results were compared with empirical approaches, it was observed that some developed calculation models provided realistic predictions. However, some calculation models offered results that were far from accurately modeling the behavior.

In conclusion, the importance of load distribution in swelling behavior was emphasized. The results of eccentric settlements that swelling-shrinkage behavior may cause depending on the load in the field were observed. The principles regarding investigations to be conducted against swelling behavior in TBDY 2018 were examined. Differences between the modeling steps used in the analysis and the regulations were identified, and suggestions for improvement were made.

**Keywords:** clay, swelling, swelling pressure, swelling percentage

## GİRİŞ

Son zamanlarda insan nüfusunda gözlemlenen büyük artışlar ile ekonomik ve sosyal sebeplerden kaynaklanan göç hareketleri, özellikle büyükşehirlerde barınma ve yaşam alanlarına duyulan ihtiyacı her geçen gün arttırmaktadır. Bu ihtiyacı karşılamak için planlanan yeni yapılaşmaların yer alacağı bölgelerde, sadece mühendislik açısından yeterli ve herhangi bir iyileştirmeye gerek duymadan yapılaşmaya uygun zeminler bulunmamaktadır. Çeşitli geoteknik problemleri barındıran zeminlerin de yapılaşma amaçlı değerlendirilmeleri günümüz şartlarında zorunlu hale gelmiştir. Bu tip zeminlerin yapılaşmaya uygun duruma getirilmesi için öncelikli olarak, mühendislik davranışlarının iyi araştırılması ve söz konusu problemin doğru teşhis edilmesi gerekmektedir.

Zeminlerde gözlemlenen problemler temel olarak zemin türlerine göre çeşitlilik göstermektedir. Çalışma sahasında en sık rastlanan zemin türlerinden biri de killi zeminlerdir. Killer farklı kimyasal yapıya sahiptirler ve bu yapıya göre sınıflandırılmaktadırlar. Bazı kil çeşitlerinin zemindeki varlıkları kimi mühendislik problemlerini de beraberinde getirebilmektedir.

Kil, tortul kayaçların zamanla ayrışmasıyla oluşmuş ve dane çapı 2 mikrondan daha küçük kolloidal yapıya sahip bir zemin cinsidir. Bu tanımlamanın yanında davranış özelliklerini belirleyen en büyük etkenlerden biri de kimyasal ve mineralojik yapılarıdır.

Bahse konu kimyasal ve mineralojik yapı sebebiyle bazı killer ciddi miktarda Şişme-Büzülme davranışı gösterebilmektedir. Şişme mekanizması kilin bünyesine su alması sebebiyle efektif gerilmesinde meydana gelen azalma sonucu kabarması şeklinde gelişebilir. Ek olarak doygun durumdaki killerin üst tabakalarının kazılması veya üzerindeki yapıların yıkılması gibi durumlarda da gerilme azalacağından kabarma görülebilir. Buna zıt şekilde killi malzemenin bünyesindeki suyu bırakması da büzülme davranışına ve oturmalara yol açabilmektedir. Yapısal hasarlar genellikle zeminin bazı bölgelerinde farklı karakterlerde birimler olması veya yüklemelerin kendi içerisinde farklılık göstermesi sebebiyle olur. Yapı ağırlıklarının çok düşük olması ve kazı yükünü ikame edememesi de şişme davranışı kaynaklı hasarlar için elverişli ortam oluşturur. Buna bağlı olarak ağırlığı düşük ve yüzey alanı büyük yapıların (örneğin yol ve kanalizasyon yapılarını) hasar almaları daha muhtemeldir.

Bu çalışmamızda killerin şişme mekanizması ile ilgili olarak deneysel veriler ışığında geliştirilen ampirik yaklaşımların, sonlu elemanlar metodu ile tasarlanmış örnek vaka üzerinde karşılaştırılması amaçlanmıştır. Farklı çalışmalarda geliştirilen ve farklı parametrelere bağlı bu yaklaşımların vaka için ortaya koydukları tahminlerin doğruluk düzeyini test etmeye çalışılmıştır. Elde edilen veriler ışığında hem yük dağılımları hem daha önceki çalışmalar hem de TBDY 2018 özelinde değerlendirmelerde bulunulacak ve önermelere yer verilecektir.

### ARAŞTIRMA VE BULGULAR

Bu alanda daha önce yapılan çalışmalar ortaya koymuştur ki; şişme potansiyeline sahip bir kilin doygun olmaksızın bulunması, ardından bahse konu zeminin suya doygun hale gelmesi kabarma hasarları için en riskli durumu oluşturur (Dif & Bluemel, 1991).

Sanılanın aksine şişme davranışı kaynaklı gelişen hasarlar oldukça yaygındır. Dünya genelinde zeminlerin şişme mekanizması sebebiyle gelişen hasarların maliyet açısından değerlendirildiğinde sel ve deprem gibi doğal afetlerden daha yüksek sonuçlara sahip olduğu görülmüştür (Nelson & Miller, 1992).

Şişme davranışının su ile ilişkisine yönelik yapılan çalışmalar sonucunda elde edilen veriler göstermiştir ki; başlangıç su muhtevası düşük killerde suya uygunluk arttıkça şişme basıncı düşmektedir. Bu durum da şişme mekanizmasının su ile ilişkisi konusunda kabul edilen yaklaşımı doğrular (Yıldırım, 2002). Şişmenin önlenmesine yönelik olarak şişen zemin birimlerinin sahadan uzaklaştırılması yahut suya erişiminin önlenmesi önerilmiştir. (Yılmaz & Karacan, 1998).

Şişme potansiyeli, kilin fiziksel ve kimyasal özelliklerine, ihtiva ettiği kil miktarına ve kil kısmının mineralojik yapısına göre değişiklik göstermektedir. Etki eden parametrelerin fazla olması sebebiyle sadece bahse konu bir parametre ile kompleks şişme davranışını doğru tahmin etmek gerçekçi bir çözüm olmayacaktır. Kilin mineralojik yapısı ve kil içeriğinin hacimce oranı şişme davranışının belirleyici karakteristik özellikleridir.

Bahse konu killerin su emmesine sebep olan kimyasal etken iyon ilgisidir. Bu sebepten killerin polarizasyon durumu şişme potansiyellerinde farklar meydana getirir. Benzer şekilde partikül yüzey alanı da su emme hususunda önemli bir değişkendir. (Grim, 1974).

Killer kaya minerallerinin kimyasal bozunmaya uğraması neticesinde oluşan küçük ve kristal yapıda malzemelerdir. Kil materyal üzerine yapılmış mikroskopik ölçekli incelemeler, bahse konu materyalin kristal levhalar halinde ve katmanlı olarak birim haline geldiğini göstermektedir (Taşçı, 2011).

Kil iki temel birimden meydana gelmektedir. Bu iki temel birim Silika katyonu etrafında 4 Oksijen anyonundan oluşan Tetrahedron yapı ve Alüminyum (veya Magnezyum) katyon etrafında 6 oksijen anyonundan oluşan oktahedron yapı şeklindedir. Kil Mineralleri bu yapılara farklı metalik iyonların bağlanması neticesinde oluşup çeşitlenmektedir. (Taşçı, 2011)

### Kil Türleri

Doğada üç formda kil yaygın olarak bulunmaktadır. Bunların ilki olan Kaolinit, tabakalar halinde bir tetrahedral bir oktahedral yapı katmanın birbiri üzerine sıralanarak tane haline gelmesinden oluşur. En düşük şişme potansiyeline sahip yapı olarak bilinmektedir. Bir diğer yaygın kil olan montmorillonit iki silika levhası ve bir alümina levhasından meydana gelmektedir. Küçük tane yapılıdır, oktahedral lehva kaynaklı negatif yük boşluğu ve silika levhalar arasındaki Van Der Waals bağlarının zayıf olması sebebiyle su çekim gücü yüksektir. İllit ise katman şekli olarak montmorillonit ile aynı olsa da ara katmanlarda potasyum iyonu bulunduğu için iyonlara ve suya karşı daha zayıf bir çekim göstermektedir (Taşcı, 2011).

### Killerde Şişme Mekanizması

Genel anlamda kil karakterli bir zeminde şişme mekanizması montmorillonit varlığı ile ilişkilendirilebilir. Alt bir sınıflandırma olarak montmorillonitler arasında da tek değerli katyon bulunduranların aktivitesi iki değerlikli katyon bulunduran montmorillonitlerden daha yüksektir (Taşcı, 2011).

Bu bağlamda zarar verici şişme tarifi için montmorillonit mevcudiyeti, doğal su muhtevasının plastik limit düzeyinde olması ve su nüfuzunun önünü açan kaynak varlığı gösterilebilir. (Gromko, 1974)

Killerin şişme davranışı ile ilgili olarak elde edilen laboratuvar ve saha verilerinin yorumlanması ile ilgili olarak farklı çalışmalar neticesinde geliştirilmiş farklı yaklaşımlar mevcuttur.

ABD Arazi ıslah kurumu şişmeyi tanımlamak adına serbest şişme deneyini geliştirmiştir (Holtz & Gibbs, 1956). 40 no'lu (0,425 mm) elekten geçen 10 cm<sup>3</sup> numunenin 100 cm<sup>3</sup> su ile doygun vaziyette silindire dökülmesinden ve şişmenin gözlenmesinden ibarettir (Holtz, Kovacs, & Sheahan, 1981).

Şişme potansiyelinin, sınıflandırma deney sonuçlarına göre değerlendirilmesine yönelik Holtz 1959 yılında yaptığı çalışma kapsamında aşağıda verilen Tablo 2.1'deki önermede bulunmuştur.

Şişme Derecesi	Toplam Hacim Değişiminin Yüzdesi Olarak Muhtemel Genişleme (Kurudan Doygun Duruma) (EI)*	Kolloidal İçerik (%-1µm)	Plastisite İndeksi PI	Büzülme Limiti SL
Çok Yüksek	>30	>28	>35	<11
Yüksek	20-30	20-31	25-41	7-12
Orta	20-10	13-23	15-28	10-16
Düşük	<10	<15	<18	>15

\*6.9 kPa'lık Sürşarj altında (EI : Genleşme İndisi ASTM 2010 D 4829)

Tablo 0.1 Sınıflandırma Deney Sonuçlarına Göre Şişme Potansiyeli (Holtz, 1959)

Yukarıda bahsi geçen çalışmaya benzer şekilde genleşme potansiyelinin Genleşme indisi ile direkt ilişkili olduğunu gösteren yaklaşımlar da mevcuttur (Nelson & Miller, 1992) (Briaud, Zhang, & Moon, 2003).

Şişme davranışı üzerine yapılan çalışmalarda şişme davranışının tahminine yönelik birden fazla hesap yaklaşımı önerilmiştir. Kim muhtevası- plastisite indisi gibi malzeme özelliklerinin şişme tahmini için yol gösterebileceği ile ilgili kabuller mevcuttur (Van Der Merwe D. , 1964). Benzer şekilde arazi kuru birim ağırlığı ile likit limit parametreleri kullanılarak şişme-göçme mekanizmasını öngörmeyi hedefleyen çalışmalar bulunmaktadır (Holtz, Kovacs, & Sheahan, 1981) (Gibbs, 1969) (Mitchell, 1975)

Çalışmamız kapsamında daha önce de ifade edildiği üzere şişme mekanizmasının açıklanması yönelik değişkenler incelendiğinde su emme ve su muhtevası öne çıkan değişkenlerdir. Bu bağlamda yapılmış çalışmalar Emme (kPa)-Su içeriği (%) grafiğine göre kil aktivitesinin öngörülebileceğini ortaya koymuştur (McKeen, 1992).

Şişme potansiyeli, kil aktivitesi ve kil muhtevası gibi parametrelerin doğrudan bağımlı olması sebebiyle aktivite ve şişme potansiyeline yönelik olarak tahmin yürütülmesine olanak tanıyan yaklaşımlar bulunmaktadır (Seed & Lundgren, 1962).



Killerin su muhtevasına göre davranış değişimini gösteren likit limit ve plastik limit parametrelerine bağlı olarak Plastisite indisi ve likit limit-Plastisite indisi oranı killerin şişme tahmini üzerine kullanılmak üzere önerilen bir başka yöntemdir (Marin-Nieto, 2007) (Holtz, Kovacs, & Sheahan, 1981).

Şişme potansiyeline ilişkin deneysel verilere dayanan ve plastisite indisi, kil muhtevası, likit limit gibi parametrelere dayanan çalışmalar mevcuttur (Seed & Lundgren, 1962) (Snethen, 1980) (BRE, 1980) (Chen, 1988).

Bunlara ek olarak şişme neticesinde ortaya çıkan hacim değişikliği ve şişme basıncı gibi parametrelere bağlı olarak hafif yapılar üzerine gelebilecek olan hasara yönelik tahminleri barındıran çalışmalar bulunmaktadır (Wayne, Osman, & Elfatih, 1984).

Killerin şişme yüzdesini ifade etmek üzere Denklem 1’de verilen ampirik yaklaşımı geliştirmiştir (Seed & Lundgren, 1962).

$$S = 3.6 \times 10^{-5} \times \left( \frac{P_I}{\text{kil muhtevası}} \right)^{2.44} \times (\text{Kil Muhtevası})^{3.44} \quad (1)$$

### **Şişen Killere Yönelik Örnek Vaka İnceleme Alanı**

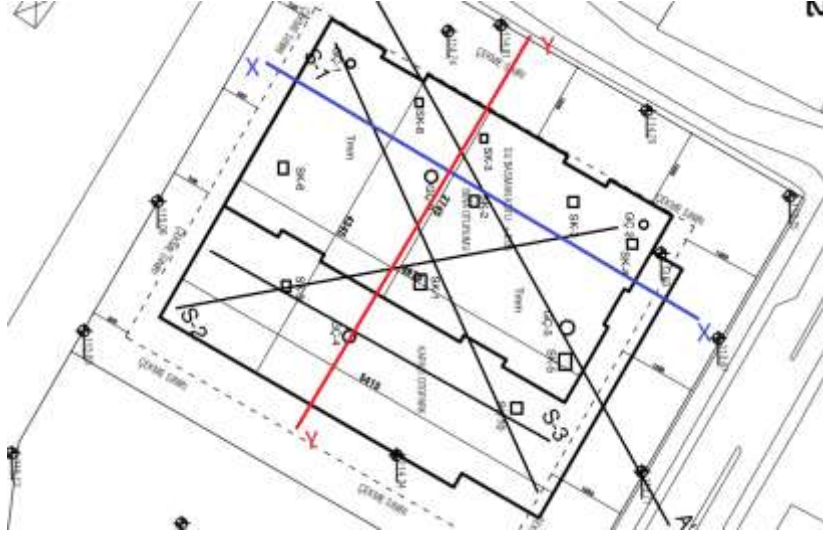
Killerde meydana gelen şişme davranışının daha anlaşılır şekilde incelenebilmesi ve şişmenin yapı üzerine etkisinin gözlenebilmesi adına Bursa Nilüfer’de yapıyı planlanan bir projeye ve tatbiki planlanan zemin analizlerine bu çalışma kapsamında yer verilmiştir.

Buna göre İhsaniye Mahallesi’nde 4.427,00 m<sup>2</sup> arsa üzerine inşa edilmesi planlanan projenin zemin inceleme çalışmaları için 10 adet sondaj kuyusu açılmış ve Standart Penetrasyon Deneyi uygulanmıştır. Bu kuyulardan çeşitli kotlarda alınmış numuneler üzerine de Üç eksenli basınç Deneyi, Direkt kesme Deneyi, Konsolidasyon Deneyi, Hidrometre Deneyi, Özgül Ağırlık tespiti ve elek analizi yapılmıştır.

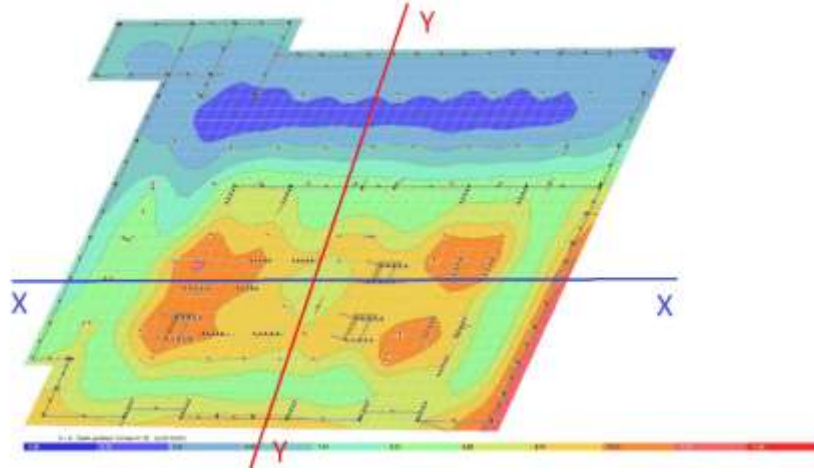
Çalışma sahasından ve laboratuvar verilerinden yola çıkılarak kil muhtevası yüksek zeminin şişme riskleri ihtiva edeceği düşünülmüştür. Mimari proje kapsamında kazı derinliği 6.20 metre olduğundan kaldırılacak toprak yükü yapı yükü ile ikame edilemezse şişme reaksiyonu kaçınılmaz olacaktır.

Çalışmanın bu kısmında bahse konu alanda yapılması planlanan yapı için arazi deneyleri ve laboratuvar çalışmaları ışığında Zemin idealizasyonu yapılmış ve Şekil 2.1’de verilen kuyu dağılımı ve temsili kesitler üzerinden XX ve YY bölgeleri için Plaxis 2D (V.21) Sonlu elemanlar programı marifeti ile Kazı-Kabarma-Tekrar Yükleme senaryoları incelenmiştir.

Modellenen kazı aşamasını müteakip olarak kesitlere yapılacak yüklemeler için tasarlanan yapının bahse konu kesitlerinde analiz sonucu elde edilen Yapı Yükü + Hareketli Yük kombinasyonları Şekil 2.2’de görüldüğü üzere yayılı yük olarak kesite uygun idealizasyon ile dağıtılmıştır.



Şekil 0.1 Kuyu Dağılımı ve İdealize Kesit Seçimi (Erse Mimarlık, 2023)



Şekil 0.2 İdealize Kesitler İçin G+Q Yük Dağılımları (Erse Mimarlık, 2023)

Arazi deneyleri kapsamında elde edilen farklı kotta 12 numuneye konsolidasyon deneyi uygulanmıştır. Plaxis yazılımında şişme davranışını modellemek adına material model olarak Soft Soil kullanılacağından bahse konu konsolidasyon deneyi sonuçlarından  $C_c$  (Sıkışma İndisi) ve  $C_s$  (Kabarma İndisi) değerleri hesaplanmış ve derinliklerine göre idealize edilmiştir.

$C_c$  (sıkışma İndisi) değeri Boşluk oranı-Gerilme logaritmik eğrisinin maksimum yükleme kesimindeki eğimi olarak Denklem 2 marifeti ile;  $C_s$  (Kabarma İndisi) değeri ise Boşluk oranı-Gerilme logaritmik eğrisinin geri boşaltma kesimindeki maksimum yükten düşüş kesiminin eğimi olarak Denklem 3 marifeti ile hesaplanmıştır. Hesaplar Tablo 2.2'de gösterilmiştir (Holtz, Kovacs, & Sheahan, 1981).

$$C_c = \frac{(e_1 - e_2)}{\log\left(\frac{\sigma'_2}{\sigma'_1}\right)} \quad (2)$$

$$C_s = \frac{(e_3 - e_2)}{\log\left(\frac{\sigma'_2}{\sigma'_3}\right)} \quad (3)$$

\*2 noktası düzleme denk gelen maksimum gerilme 1 noktası önceki yükleme ve 3 noktası sonraki yük boşaltılmış gerilmeyi ifade eder.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

	Kuyu Adı	Derinlik	$e_0$	Cc				Cs				Cc		Cs		Değerler	
				$e_1$	$e_2$	$\sigma'_1$	$\sigma'_2$	$e_1$	$e_2$	$\sigma'_1$	$\sigma'_2$	$\Delta e$ ( $e_1 - e_2$ )	$\Delta \sigma$ [ $\log(\sigma'_2) - \log(\sigma'_1)$ ]	$\Delta e$ ( $e_1 - e_2$ )	$\Delta \sigma$ [ $\log(\sigma'_2) - \log(\sigma'_1)$ ]	Cc	Cs
Deneý 1	SK-1	4.00-4.50	0.7838	0.6381	0.5910	402.07265	794.33865	0.6011	0.591	402.07265	794.33865	0.0471	0.295701162	0.0101	0.295701162	0.159282	0.034156
Deneý 2	SK-1	7.00-7.50	0.6603	0.5441	0.5147	402.07265	794.33865	0.5207	0.5147	402.07265	794.33865	0.0294	0.295701162	0.0060	0.295701162	0.099425	0.020291
Deneý 3	SK-2	4.00-4.50	0.8133	0.6634	0.6215	402.07265	794.33865	0.6301	0.6215	402.07265	794.33865	0.0419	0.295701162	0.0086	0.295701162	0.141697	0.029083
Deneý 4	SK-3	5.00-5.50	0.7803	0.6534	0.6111	402.07265	794.33865	0.6177	0.6111	402.07265	794.33865	0.0423	0.295701162	0.0066	0.295701162	0.14305	0.02232
Deneý 5	SK-3	8.50-9.00	0.8146	0.6554	0.6067	402.07265	794.33865	0.6166	0.6067	402.07265	794.33865	0.0487	0.295701162	0.0099	0.295701162	0.164693	0.03348
Deneý 6	SK-4	4.00-4.50	0.7003	0.5889	0.5509	402.07265	794.33865	0.5546	0.5509	402.07265	794.33865	0.038	0.295701162	0.0037	0.295701162	0.128508	0.012513
Deneý 7	SK-5	2.50-3.00	0.7040	0.5870	0.5517	402.07265	794.33865	0.5564	0.5517	402.07265	794.33865	0.0353	0.295701162	0.0047	0.295701162	0.119377	0.015894
Deneý 8	SK-6	4.00-4.50	0.8304	0.7175	0.6797	402.07265	794.33865	0.6845	0.6797	402.07265	794.33865	0.0378	0.295701162	0.0048	0.295701162	0.127832	0.016233
Deneý 9	SK-7	4.00-4.50	0.7049	0.5950	0.5460	402.07265	794.33865	0.5556	0.5460	402.07265	794.33865	0.049	0.295701162	0.0096	0.295701162	0.165708	0.032465
Deneý 10	SK-8	4.00-4.50	0.6214	0.5311	0.5019	402.07265	794.33865	0.5051	0.5019	402.07265	794.33865	0.0292	0.295701162	0.0032	0.295701162	0.098748	0.010822
Deneý 11	SK-9	4.00-4.50	0.4844	0.4043	0.3765	402.07265	794.33865	0.3789	0.3765	402.07265	794.33865	0.0278	0.295701162	0.0024	0.295701162	0.094014	0.008116
Deneý 12	SK-10	4.00-4.50	0.6288	0.5160	0.4774	402.07265	794.33865	0.4853	0.4774	402.07265	794.33865	0.0386	0.295701162	0.0079	0.295701162	0.130537	0.026716

Tablo 0.2 Cc ve Cs hesapları

Killerdeki şişme davranışını daha hassas modelleyebilmek adına Cc ve Cs için yapılmış Zemin idealizasyonu Tablo 2.3'de verilmiştir. Çakıllı Killi Siltli Kum Birimde kullanılacak olan Mohr-Coloumb modeli için gerekli Elastisite modülü değeri için ortalama SPTN1-60 değerinden Denklem 4'te gösterilen yaklaşım ile hesap yapılmıştır (Önalp & Sert, 2006). Direnajsız kayma mukavemeti ve içsel sürtünme açısı değerleri için ilgili kotlarda yapılmış laboratuvar deneyleri verileri kullanılarak ortalama seçim gerçekleştirilmiştir.

$$E_u = 0.3 \times 4.5 \times (\text{SPTN1-60}) \text{ (Mpa)} \quad (4)$$

Başlangıç Derinliği	Bitiş Derinliği	Katman Adı	Cc	Cs	$e_0$	Cu	$\Phi^\circ$	$\gamma$ (Kn/m <sup>3</sup> )
0	3.5	K1 Kil	0.11938	0.01589	0.6603	63.53	6.20	19
3.5	4.75	K2 Kil	0.13079	0.02126	0.6959	56.60	5.91	19
4.75	6.25	K3 Kil	0.14305	0.02232	0.7803	61.99	4.80	19
6.25	8	K4 Kil	0.09942	0.02029	0.6603	67.60	5.67	19
8	20	K5 Kil	0.16469	0.03348	0.8146	66.11	5.07	19

**Kuyularda Çeşitli Kotlarda Mevcut Çakıllı Killi Siltli Kum Katman için İdealizasyon**

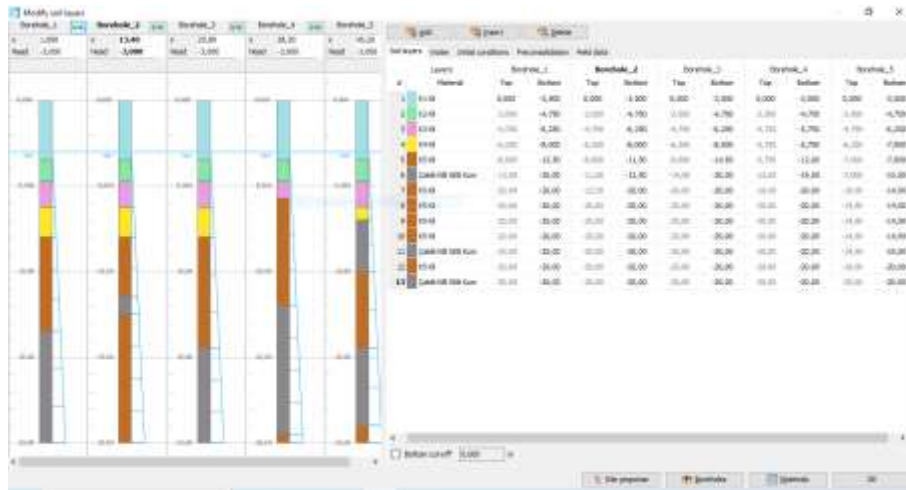
SPTN1-60 33

$E_u = 0.3 \times 4.5 \times 33 = 44.55 \text{ Mpa}$

$\gamma$  (Kn/m<sup>3</sup>) 19

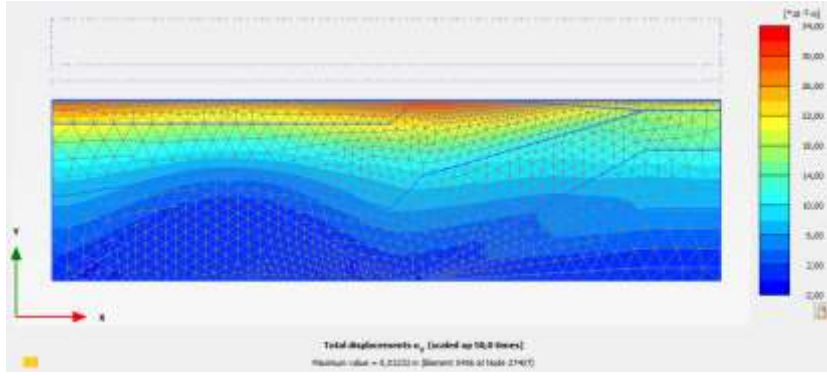
Tablo 0.3 İdealize Zemin Parametreleri

X-X ekseninde SK-4, SK-7, SK2, SK-3 ve SK-8 kuyuları kullanılarak edilerek Şekil 2.3'de verilen idealize zemin kesiti çıkarılmıştır.



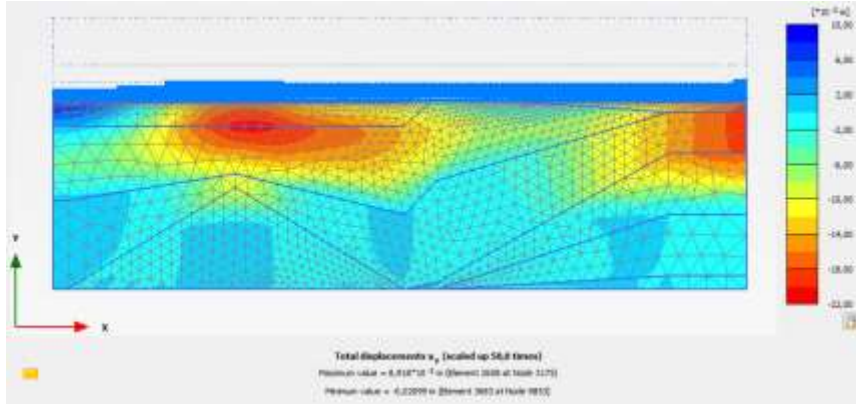
Şekil 0.3 X-X Kesiti İdealize Zemin kuyuları

Zeminde 6.2 metre derinliğinde kazı gerçekleştirildiğinde meydana gelecek kabarma miktarını gösteren kazı fazı şekil 2.4'de gösterildiği gibidir.



Şekil 0.4 X-X Kazı Fazı şişmeler

X-X ekseninde statik analizden elde edilen veriler ışığında kazı yüzeyine soldan sağa olacak şekilde sırasıyla; 4.70 metre uzunluğunda 65.53 KN, 3.5 metre uzunluğunda 80.64 KN, 8.75 metre uzunluğunda 103.1 KN, 33 metre uzunluğunda 92.90 KN ve 1 metre uzunluğunda 114.4 KN yayılı yük uygulanmıştır. Elde edilen deformasyon grafiği Şekil 2.5'deki gibidir.



Şekil 0.5 X-X kesiti yükleme deformasyonları

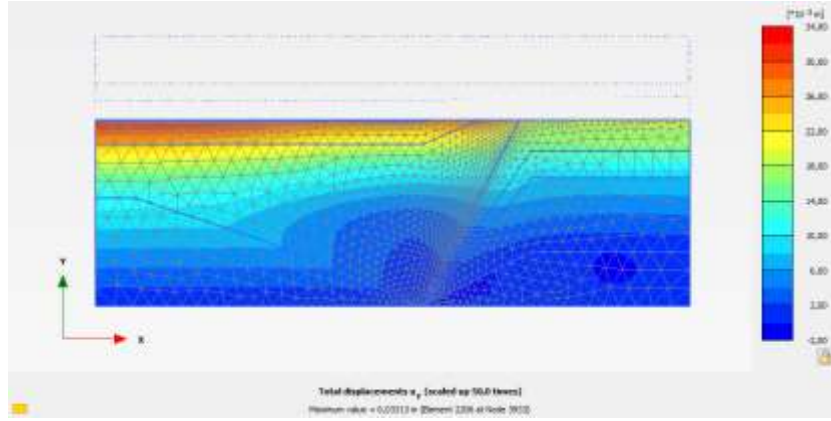
Benzer bir bakış ile Y-Y kesiti için yapılan idealizasyon için SK-1, SK-2, SK-3 ve SK-9 kuyularından faydalanılmıştır. Buna göre idealize zemin kesiti için kuyular Şekil 2.6'da görüldüğü gibidir.



Şekil 0.6 Y-Y idealize zemin kuyuları

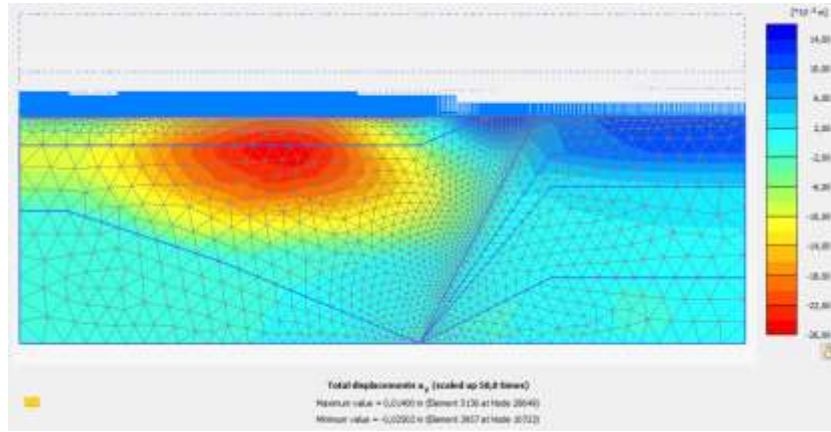
Zeminde 6.2 metre derinliğinde kazı gerçekleştirildiğinde meydana gelecek kabarma miktarını gösteren kazı fazı şekil 2.7'de gösterildiği gibidir.





Şekil 0.7 Y-Y Kazı Fazı Şişmeler

Y-Y ekseninde statik analizden elde edilen veriler ışığında kazı yüzeyine soldan sağa olacak şekilde sırasıyla; 3.0 metre uzunluğunda 95,55 KN, 3.0 metre uzunluğunda 80.54 KN, 14,50 metre uzunluğunda 95,55 KN, 6 metre uzunluğunda 80.54 KN ve 17,55 metre uzunluğunda 50,52 KN yayılı yük uygulanmıştır. Elde edilen deformasyon grafiği Şekil 2.8'deki gibidir.



Şekil 0.8 Y-Y kazı seviyesinde yükleme kaynaklı deformasyonlar

Analizlerden elde edilen veriler neticesinde kazı yüzeyinin deformasyonunu inceleme açısından meydana gelen oturma ve kabarmalar Tablo 2.4'de gösterilmiştir.

	Maksimum YüzeY Deformasyonu (cm)	Minimum YüzeY Deformasyonu (cm)	Maksimum Seviye Farkı (cm)
X-X KAZI FAZI	3.232	2.061	1.171
X-X YÜKLEME FAZI	0.892	-1.784	2.676
Y-Y KAZI FAZI	3.313	1.843	1.47
Y-Y YÜKLEME FAZI	1.4	-1.935	3.335

\* (+) değerler şişme (-) değerler oturma durumunu temsil etmektedir.

Tablo 0.4 Fazlara Göre yüzeY deformasyonları

Buna göre yapının teşkil edileceği zeminde mevcuttur. Temel altında yalnızca şişme kaynaklı olarak 3,4 cm mertebelerine varan farklı oturmalar meydana gelebilmektedir. Buna karşın planlanan yapı yayılı temel üzerine teşkil edilecek olduğundan bahse konu yüzeY deformasyonları, yapı elemanları üzerinde kayda değer bir yükleme yahut deformasyona sebep olacak denli büyük değildir.

Bu çalışma kapsamında elde edilen veriler daha önceki çalışmalarda geliştirilmiş olan ampirik yaklaşımlar ile karşılaştırıldığında, Şişme derecesinin tahminine yönelik geliştirilen yöntemlerin sonuçları Tablo 2.5'de verilmiştir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Çalışma	Holtz (1959)	Van Der Merwe (1964)	Mitchell ve Gardner (1975)	Mckeen (1992)	Chen (1988)
Sınıflandırma Parametresi	Kolloidal İçerik-PI-SL	Plastisite İndisi-Kil Muhtevası	Likit limit-Kuru Birim Ağırlık	Su Emme-Su Muhtevası	Kil Muhtevası-Likit Limit-Şişme Basıncı
Şişme Derecesi (Tespit)	YÜKSEK	YÜKSEK ŞİŞME	ORTA - DÜŞÜK ŞİŞME	ORTA - DÜŞÜK ŞİŞME	YÜKSEK
Çalışma	Seed (1962)	Marin - Nieto (1997 - 2007)	Snethen (1980)	BRE (1980)	
Sınıflandırma Parametresi	Kil Yüzdesi-Şişme Potansiyeli	Log(PI) - Log(LL/PL)	PI(%)	PI(%)	
Şişme Derecesi (Tespit)	YÜKSEK	GENİŞLEYEN ZEMİN	ŞİŞME İHTİMALİ YÜKSEK	ŞİŞME İHTİMALİ YÜKSEK	

Tablo 0.5 Şişme Yüzdesine yönelik hesap yaklaşımları verileri

Buna göre Yüksek şişme derecesi öngören çalışmalar olan Holtz (1959), Van Der Merwe (1964), Seed (1962) veriler bu vaka özelinde gerçekçi önermeler vermemiştir.

Düşük-Orta Şişme miktarı değerlendirmesi elde edilen Mitchell ve Gardner (1975), Mckeen (1992) çalışmaları sınıf anlamında analiz verilerini doğrulamakta ancak tek başlarına yeterli olmamaktadır. Marin Nieto (1997 – 2007), Snethen (1980), Chen (1988) ve Bre (1980) çalışmaları kilin şişme ihtimali üzerine değerlendirme sonucu verdiği için veriler analiz sonucu ile uyum sağlamaktadır. Ancak veri sonuçları yalnızca ön değerlendirme olarak kabul edilebilecek denli kabadır.

Wayne (1984) çalışmasına göre analiz sonuçlarına göre şişme yüzdesine göre hafif yapı için hasar miktarı düşük olarak değerlendirilmektedir ki bu veri doğru kabul edilebilir. Ancak Şişme Yüzdesi Denklem 1’de gösterildiği gibi ampirik yaklaşım üzerinden belirlenmeye çalışıldığında ortalama olarak %4.63 çıktığından; fazlaca güvenli tarafta kalınarak hesaplanmış olan bu değer diğer çalışmaların sonuçlarında da sapmaya yol açmaktadır.

## SONUÇLAR

Bu değerlendirmeler ve sonlu elamanlar modeli sonucu-Ampirik hesap yaklaşımları kıyaslamaları neticesinde Killerde kabarmanın incelenmesi üzerine geliştirilmiş olan ampirik hesap metodlarının, genel kanaate ana hatları ile uyumlu olduğu ancak sapmaların gözlemlendiği tespiti yapılabilir. Bu noktada gerekli saha çalışmaları ve analizler yardımı ile bahse konu yaklaşımları geliştirmek üzere çalışmalar sürdürülmelidir.

İnceleme sahalarında bulunan kil ve killi birimlerin kimyasal yapısı iyi araştırılmalı ve şişme açısından riskli gruplara yönelik ön tespitler ile araştırmalara yön verilmelidir.

Şişme konusunda yapılan analizlerde G+Q maksimum yüklerinin yanı sıra eksantrik yükleme koşulları ve yük dağılımları mutlaka dikkate alınmalı ve oturma-şişme bölgeleri arasındaki farklar iyi değerlendirilmelidir.

TBDY’de şişme ve şişme hasarları ile ilgili olarak, bu davranışa karşı gerekli laboratuvar deneylerinin yapılması gerekliliği ve şişme potansiyeli olan zeminlerde yapılacak çalışmalarda şişme kaynaklı oluşabilecek hasarlar göz önünde bulundurularak tasarım yapılması gerekliliği haricinde bir bilgiye yer verilmemiştir. Bu bağlamda yönetmelik anlamında da daha kapsayıcı ve açıklayıcı yönerge ihtiyacı gerekli görünmektedir (TBDY 2018 16.2.2.2. ve 16A.3.2).

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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ÖLÜM SÜRECİNDE MANEVİ DANIŞMANLIK HİZMETLERİNİN ÖNEMİ  
THE SIGNIFICANCE OF SPIRITUAL COUNSELING SERVICES IN THE PROCESS OF  
DEATH

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**ÖZET**

Ölüm, insan hayatındaki en önemli gerçeklik olmasına rağmen özellikle yaşadığımız çağda mutluluğa engel korku kaynağı olarak algılanmış ve güncel bir mesele olmaktan uzak tutulmuş bir konudur. Hayatı boyunca ölümü düşünce dünyasına dâhil etmemiş bir birey, yakın çevresinde bir ölüm vakasıyla karşı karşıya kaldığı bir süreçte duygusal ve anlamsal dalgalanmalara girebilmekte, bazı ruhsal zorlanmalar yaşayabilmektedir. Danışanın manevi yönüne hitap edemeyen seküler danışmanlık hizmetlerinin ölüm sürecinde bireye ihtiyacı olan manevi desteği tam olarak sağlayamadığı uzmanlar tarafından ifade edilmektedir. Bireye yaşadığı anlam sorunları ve ihtiyacı olan manevi desteği sağlayabilecek manevi danışmanlara ihtiyaç bulunmaktadır.

Bütün insanları kuşatan manevi/dini inançlar ve pratiklerin; insanlara sağlıklı hallerinde, hastalıklarında, mutluluklarında, bunalımlarında, hayatlarında olduğu gibi ölümlerinde de olumlu anlamda katkı sağladıkları bilimsel araştırmalarla tespit edilmiş hakikatlerdir. Bireyin yaşadığı ruhsal ve fiziksel rahatsızlıklarda, bu manevi/dini inanç ve pratikler yaşadığı acı ve sıkıntıya bir değer/anlam verir. Bu anlamlandırma bireye ruhsal ve fiziksel rahatsızlıklarının iyileşmesinde destekleyici bir rol üstlenir. Hayatın anlam kazanmasına destek veren manevi/dini inançlar, ölüm konusunda da bireyi yalnız bırakmamaktadır. Yaşadığı hayatın bir anlamı olduğu gibi ölümün de bir değeri olduğunu insana bildirir. Bu durumda insan yaşadığı stresi kontrol altında tutabilir. Manevi danışmanlar ise bu ilgiyi bireylere doğru yerde ve zamanda verebilecek olan kişiler olarak görev yapmaktadır.

Bu süreçte manevi danışman bireye ölümün anlamını hatırlatırken aynı zamanda ölümün, yaşamın bir gerekliliği olduğunu belirterek aslında hayatın da anlamını göstermiş olmaktadır. Ölmek üzere olan bireye sunulan manevi danışmanlık kadar hastanın yanında refakat eden bireyin de içinde bulunduğu süreci sağlıklı geçirebilmesi ve hayatı anlamlandırması noktasında da destek verilmesi önemli görülmektedir. Manevi danışmanın ölüm sürecindeki bir diğer danışmanlık hizmeti de yakını kaybetmiş bireylere yöneliktir. Yas süreci olarak adlandırılan bu sürecin sağlıklı geçirilebilmesi için manevi danışmana ihtiyaç duyulduğu ifade edilmektedir. Manevi danışmanın yol göstericiliği hem ölmek üzere olan birey için hem refakatçi için hem de yakını ölmüş bireyler için önem taşımaktadır.

**Anahtar Kelimeler:** Manevi Danışman, Ölüm, Yas, Ruh Sağlığı.

**ABSTRACT**

While death is arguably the most significant inevitability in human life, it has been largely stigmatized in contemporary society as a source of fear, and it has been kept at a distance from current issues. An individual who has never included thoughts of death in their mental landscape can experience emotional and existential fluctuations when faced with a death case in their immediate environment. Secular counseling services that fail to address the spiritual aspect of an individual often cannot provide the necessary spiritual support during the dying process, as experts have pointed out. There is a need for spiritual counselors who can provide individuals with the existential support they require and help them navigate their issues related to meaning during the process of death.

Scientific research has established that the spiritual/religious beliefs and practices that encompass all people positively contribute to their lives in both healthy and ill states, happiness, depression, and even in death. In cases of individuals experiencing physical and psychological distress, these spiritual/religious beliefs and practices provide a sense of value and meaning to their suffering. This sense of meaning plays a supportive role in the healing of their physical and psychological discomfort. Spiritual/religious beliefs that support the meaning of life also do not abandon individuals in the face of death. They inform individuals that, just as life has meaning, death also has value. In this way, individuals can control their stress. Spiritual counselors serve as individuals who can provide this attention to individuals at the right place and time.

During this process, spiritual counselors remind individuals of the meaning of death while also emphasizing that death is an inevitability of life. In doing so, they essentially reveal the meaning of life. With this understanding, individuals can keep their stress under control. Spiritual counselors play an essential role in this respect.

In this process, spiritual counselors also provide guidance for individuals who are about to die, as well as for the companions accompanying them, and for individuals who have lost loved ones. This guidance, known as the mourning process, is considered crucial for a healthy experience. For all these reasons, the presence of a spiritual counselor is significant in this context.

**Keywords:** Spiritual Counselor, Death, Grief, Mental Health

## GİRİŞ

Ölüm olgusu her zaman felsefeyi ve teolojiyi yakından ilgilendirmiş bir konu olarak görülmüştür (Duman, 2021, s. 90). Kelime olarak ölüm; Arapça ‘*mevt, vefat, helak*’, İngilizce, ‘*death*’, Almanca ‘*tod*’ sözcüklerine karşılık gelmektedir (Ulusoy, 2003, s. 592). Yaşamın tersi olarak “hayatın son bulması”, “ruhun bedenden ayrılarak kişinin maddi hayat kaynağını yitirmesi” (*Ölüm*, t.y.) anlamına gelir.

Ölüm olgusu hakkında pek çok tanım yapıldığı görülmüştür. Farklı ölüm tanımlarına göre şöyle bir sonucun ortaya çıktığı belirtilmiştir: Ölüm, maddi olarak canlı bir halde olan organizmanın, yaşamın devamını sağlayan yeni hücreleri üretebilme ve yenileme becerilerinin ortadan kalkmasıyla, yaşamsal fonksiyonların merkezi olan; kalp, beyin gibi organlardan birinin ya da daha fazlasının zarar görmesi ve yaşamsal faaliyetleri sürdüremeyecek halde olması nedeniyle hayatın sona ermesi olarak aktarılmaktadır. Dini ve manevi açıdan tanımında ise ölüm, ruhun bedenden ayrılması olarak ifade edilmektedir (Karaca, 2000, s. 86).

Ölüm, bütün insanların merakını celbeden, üzerine çok fazla düşündükleri bir olgudur. İki yönlü gerçekliği olan ölüm, hayat kadar insanların merak ettiği bir konu olmuştur (Hökelekli, 2017, s. 21). Ölümün bütün insanlar için nihai tek gerçek olması aslında herkes için eşit ve kaçınılmaz bir olgudur. Varolmanın ayrılmaz bir parçası olarak bütün insanların ilgi duyduğu gizemli bir konu olan ölüm, anlamını ve ölüm ile ilgili oluşan soruların cevabını bulmak hayatın da anlam kazanmasında önemli bir rol oynamaktadır (Yıldız, 2006, s. 1).

Bireyin hem anlam dünyasındaki hem de toplumsal algılanış açısından ölüm, basit bir olay olarak karşılanmamaktadır. Ölümün doğal bir sürecin parçası olduğunu kabul edebilen insan aynı zamanda psikolojik bir çelişkiye girerek aslında ondan mümkün olduğunca da uzak durmak ister. Ölümün varlığını kabul eden bilinç ile ölümü inkâr eden aynı bilinç olmasına rağmen çelişkili bir durum meydana geldiği görülmektedir (Hökelekli, 1991, s. 153). Her toplumda gizemli bir soru olarak karşımıza çıkan ölümün anlamının bir kültürden diğerine, bir devirden başka bir devire değiştiği görülmektedir. Aynı şekilde her insan için de farklı anlamlar taşıdığı görülmüştür. Bazı insanlar için ölüm stres kaynağı iken bazı insanlar için bir kurtuluş, bir kavuşma olarak anlamlandırılmıştır. Bu farklılığı meydana getiren ise her bireyin farklı kültür, inanç ve manevi yapısıyla doğrudan ilgili olduğu tespit edilmiştir (Yıldız, 2006, s. 2).

Günlük yaşamında birey kendisine ölümü hatırlatacak birçok şeyle karşılaşabilirken, gördüklerine karşı algısını kapatmak ve ölümü düşünmekten uzak durmak ister. Dünyaya olan yoğun meyil,

modernleşmenin de etkisiyle hayatı hızlı ve hiç ölmeyecekmiş gibi yaşaması, ölüm düşüncesini bireyin aklından uzaklaştırmaktadır (Kam, 1990, s. 90). Bununla birlikte insan, teknolojinin ve haber kanallarının genişlemesiyle gün içinde pek çok ölüm haberi duymakta bu durum da bireyin ölüme karşı duygusal bir bağımsızlık kazanmasına zemin hazırlamaktadır. Tıbbın ilerlemesi ve sağlık alanında artan imkânların oluşturduğu güven duygusu aynı zamanda bireyin gençliğine olan güveni ve ölüm olaylarının genellikle hastane içerisinde gerçekleşiyor olması insanların algısında ölüme karşı sınırlı bir alanın çizilmesine ve dolayısıyla bireyin ölüm düşüncesinden uzak kalmasına neden olmaktadır (Cüceloğlu, 2003, s. 368).

### **Manevi Danışmanlık Ve Rehberlik Tanımları**

Psikoloji, bütün dünyada yapılan birçok teorik ve uygulamalı çalışmalar neticesinde yeni bilgiler, kavramlar ve farklı bakış açıları geliştirmektedir. Yürüttüğü çalışmalarda insanı bütün yönleriyle ele alarak daha iyi anlamayı hedef edinmiştir. Bu güne kadar yapılan pek çok psikoloji çalışması hem insanı her yönüyle ele alarak anlamayı hem de değişen zamana göre insanın ortaya koyduğu farklı düşünce ve davranışları algılamaya ve incelemeye çalışmaktadır (Düzgüner, 2018, s. 17).

Artan çalışmalar neticesinde insanın manevi yönünü de ele almaya başlayan psikoloji bilimi, bu minvalde araştırmalarını artırmıştır. Özellikle Din Psikolojisi alanında kendini gösteren bu gelişme, Amerikan Psikoloji Derneği'nin (APA) 36. Bölümünde yer alan Din Psikolojisi, yeni elde edilen bu çalışmaların verileri ışığında, 2011 yılında kurumsal adını "Din ve Maneviyat Psikolojisi" olarak tanımlamıştır (Düzgüner, 2018, s. 17).

İnsanı anlamaya yönelik çalışmalar yapan psikoloji aynı zamanda insana faydalı olmayı ve onu farklı yönleriyle de ele almaya başlaması yeni kavramları meydana getirmiştir. Bu kavramlardan biri de manevi kavramdır. Henüz ülkemizde ve Batı'da net bir tanımı yapılamamıştır (Kılınçer, 2017, s. 25).

Manevi danışmanlık, felsefe, antropoloji, teoloji, psikoloji gibi farklı disiplinlerin kesiştiği bir noktada yer almaktadır. Manevi danışmanların, danışanlarına sunmuş olduğu hizmet bütüncül bir danışmanlık sürecini ifade etmektedir. Yapılan pek çok tanım incelendiğinde ortak tek bir tanımın yapılmasının kabul edilebilir olmadığı görülmüştür. Her toplum ve birey için farklı anlamlar içeren ve çevirilerden kaynaklanan pek çok farklı tanım yapıldığı bilinmektedir. Ancak manevi danışmanlığın hem kullanıldığı kavram hem de çalışma biçimi olarak Batı/Hristiyan dünyasında karşılık bulduğu ifade edilmektedir (N. Altaş & Köylü, 2012, s. 25).

Batı/Hristiyan dünyasında tarihsel süreci ve toplumsal şartları bakımından böyle bir çalışma yürütülebilecek bir zeminin hazır olduğu görülmüştür. Manevi danışmanlık Batı'da genel kullanım olarak "Pastoral Care and Counseling" olarak isimlendirilmiştir. "Pastoral care", dini/manevi danışmanlık hizmetinin kavram karşılığı olarak kullanılırken, "pastoral counseling", dini danışmanlık hizmeti olarak isimlendirilmiştir ve zamanla manevi/dini danışmanlık hizmeti olarak yaygınlık kazanmıştır (Ege & Uğurlu, 2018, s. 1059).

Genel itibariyle yapılan tanımların ortak noktası olarak manevi danışmanlık ve rehberlik; bireyin dini anlamda yaşadığı sorunları; güncel yaşantıya uyumlu olan, bilimi ve dini uygun bir şekilde kullanarak, zamanın gerekliliklerine cevap verebilecek nitelikte, bireyin sosyal çevresine uyum sağlayabilmesine yardımcı olan, dini olsun ya da olmasın her konuda kendisini gerçekleştirebilmesini destekleyen, uzman kişiler tarafından uygulanan psikolojik yardımlardır (Söylev, 2020, s. 82).

Bütüncül bir yaklaşım metodu sergileyen manevi danışman, danışanın karşılaştığı zorlu hayat durumları karşısında, bireyin içsel kargaşasını azaltmasına ve bireyin manevi bütünlüğünün korumasını hedeflemektedir (Koç, 2012, s. 205).

Manevi danışman ve rehber, bireyin sorunlarına dini bir çerçevede çözüm bulmak için disiplinler arası bir çalışma yürütür. Dini bilgileri psikoloji biliminin alt yapısıyla yorumlayarak bir hizmet sunar (Ağilkaya Şahin, 2014, s. 3).

Manevi danışmanlık ve rehberlik ülkemizde yeni mesleklerleleşmiş bir alan olsa da bu alana olan ilginin artmakta olduğu söylenmektedir (Şahin, 2018, s. 44). Manevi danışmanlık hizmeti, 633 sayılı kanunla

Diyanet İşleri Başkanlığına verilmiş ve bu danışmanlık hizmeti toplumun pek çok farklı kesimine sunulmaya başlanmıştır (Ceylan & Özaydin, 2020, s. 289).

Her dönem farklılaşarak gelişim ve değişim gösteren dünyada hemen her sorunu çözebileceği düşünülen teknolojik gelişmelerin olduğu düşünülüyor olsa da bireyin dini ve manevi sorunlarına cevap veremeyen seküler danışmanlık, bireyleri manevi ve dini bir klavuz/rehbere başvurma ihtiyacını aktif bir şekilde ortaya çıkarmaktadır. Manevi ve dini bir danışmanı tercih etmenin en önemli nedenleri; bireylerin kendisini dini yönden yeterli görmemesi, dini konularda bir hata yapma endişesi ve bu sebeple suçluluk duygusuna kapılmak gibi konulardan arınarak huzurlu ve mutlu bir hayata ulaşma gayesidir. Bireye ulaşmak isteği huzurlu yaşamı sağlarken kendisine yön verecek ve doğru bilgiyi aktaracak kişinin aynı zamanda bu bilgiyle kendisine rehberlik etme ihtiyacını da beraberinde getirmiştir (Cebeci, 2010, s. 60). Ortaya çıkan psikolojik, sosyolojik ve teolojik ihtiyaçlar nedeniyle bireylerin manevi danışmanlığa olan ihtiyacına vurgu yapılmıştır (Koç, 2016, s. 67). Bireyin hayatı boyunca karşılaştığı mutsuzluk, çaresizlik, yalnızlık, güçsüzlük, hastalık ve korku hissettiği bütün dönemlerde manevi danışma ve rehberliğin önemli bir yer aldığı söylenmektedir (Söylev, 2020, s. 187).

Dini kavramlar ve pratikler, zorlu yaşam olayları karşısında bireye tatmin edici olumlu bakış açısı kazandırmayı ve yaşanan olumsuz durumlar karşısında, bir planın sonucu olarak bu durumun meydana geldiği kabullenişini sağlamaktadır (Gürses, 2008, s. 372). Dini inançlar temelde bireye, hiçbir yerde bulamayacağı türden bir güven duygusu vermektedir. Güven duygusu içinde olan insan da psikolojik olarak daha sağlıklı bir birey olur. Yaşamda meydana gelen acılara ve güçlüklerle karşı anlam kazandıran din, bireye aynı zamanda moral, destek ve manevi motivasyon vererek ruh sağlığının korunmasını da desteklemektedir (Ayten & Öztürk, 2012, s. 65).

Psikoterapi sürecinde manevi içerikli müdahalelerin tercih edilebilirliği üzerine yapılmış araştırmalarda, seküler danışma terapi sürecinde uygulanan yöntem ve tekniklerin, manevi danışmanlık ve rehberlik sürecinde kullanılan yöntem ve tekniklerle birbirine oldukça benzemesinden dolayı manevi danışmanlık, psikoterapi ve psikolojik danışmanlık arasında bir fark olmadığı ifade edilmiştir. Ancak seküler danışmanlıktan farklı olarak manevi danışmanlıkta, alınmış olan psikoloji ve teoloji eğitimleriyle beraber kullanılan psikolojik yöntem ve tekniklerde dini ve manevi temelli kaynaklardan istifade edilmiştir (Koç, 2012, s. 204).

Son yıllarda psikoterapi sürecine dâhil edilen manevi ve dini temelli müdahalelerle ruhsal sağaltımın daha aktif; fiziksel ve ruhsal iyileşme oranlarının ise daha yüksek olduğu, tedavinin kalıcığının da büyük ölçüde arttığı tespit edilmiştir (Acar & Karaca, 2019, s. 210).

### **Ölüm Sürecinde Manevi Danışmanlık**

Manevi danışmanlık türünün en sık uygulanan ve en eski türlerinden olan ölüm süreci manevi danışmanlığı ve ölüm sürecine yaklaşmış bireylere yönelik danışmanlığın, hastanelerde ve ev ortamlarında sıkça uygulandığı belirtilmiştir. Türk-İslam kültüründe hasta ziyareti ve ölümü beklenen hastanın ziyareti büyük önem taşımaktadır. Ölmek üzere olan insanın yalnız bırakılmadığı ve bireye Kur'an-ı Kerim tilavetiyle eşlik edildiği kelime-i tevid, kelime-i şadet telkin ve tavsiyelerinde bulunduğu gözlemlenmiştir (Ağilkaya Şahin, 2017, s. 423).

Ölüm sürecine giren bireylerde genellikle affetme ve affedilme gibi ihtiyaçlar ortaya çıkar. Bunun altında yatan sebep ise genellikle manevi ve dini ihtiyaçlar olarak belirtilmektedir (Ağilkaya, 2008, s. 38). Ölüm sürecine girmiş olan bireyin manevi ihtiyaçlarından önce ölmekte olan insana ait özellikleri bilmek gerekmektedir. Ölmekte olan bireyin üç özelliğinden bahseden Martin Luther'in maddeleri Türk-İslam geleneğine göre harmanlanarak şu şekilde sunulmuştur:

1. Ölüm bir veda olmakla birlikte nihai bir son değildir, bu sebeple insan elinde olan vaktini iyi kullanmalıdır.
2. Ölmek üzere olan bireyin elinde olan en güzel fırsat vedalaşabilecek olmasıdır. Aynı zamanda affetme ve affedilme için de verilmiş bir zamanın olması elindeki en değerli şeydir.
3. Ölüme yaklaşmış olan insan dünya ile vedalaşıp gerçek yurdu olan ahirete ve Allah'a olan yakınlığı artmaktadır (Ağilkaya Şahin, 2017, s. 424).



İnsanlar ölümcül bir hastalığa yakalandığında ya da farklı bir sebep ile öleceklerini öğrendikleri zaman bu habere karşı bazı tepkiler vererek belirli aşamalardan geçmektedirler. Bu aşamalar Elisabeth Kübler Ross tarafından tespit edilmiştir. Kanseri hastaları ile yaptığı bir çalışma neticesinde sıraladığı bu tepkilerin daha sonra diğer hastalıklar ve engellilik durumları gibi pek çok durum için geçerli kabul edilmiştir (Ayten & Özkan, 2020, s. 22). Bu aşamalar farklı kültürlerle göre değişebilmektedir. Örneğin Türkiye’de yapılan bir araştırmada bu aşamalara adalet arayışı da dâhil edilmiştir. İçinde bulunduğu süreci kabullenme aşamaları şu şekilde oluşmuştur: “İnkâr; yaşadığım durum gerçek olamaz, bir hata olmalı” ve ardından geçici bir kabullenme, “öfke ve kızgınlık; neden ben? Herkes dışarda hayatına devam ederken ben şimdi ölecek miyim?”, “suçluluk; benim yüzümden”, “adak adama/pazarlık; biraz daha zamanım olsa bütün görevlerimi yerine getirirdim”, “adalet arama; hak etmedikleri bir ceza”, “depresyon; bundan başka çare kalmadı”, “kabullenme ve umut; artık veda etme vakti” şeklinde sıralanmıştır (Özkan, 2017).

Bu aşamalar genellikle birbiri ardına gerçekleşir. Bir aşama başlar, biter ve diğerine geçer. Fakat bazı durumlarda birey bir aşamayı geçmek yerine geriye dönebilir. Yaşadığı acılı durumu kabullendikten sonra birey yeniden inkâr aşamasına geçebilir (Ayten & Özkan, 2020, s. 23).

Yaşadığı yas sürecinde bireylerin anlam arayışına girdiği gözlemlenmiştir. “Neden benim başıma geldi, neden diğer insanlar değilde ben?” gibi sorular sorarak bir anlam bulmak istemektedir. Bireye bu noktada inancı manevi bir çözüm yolu göstermektedir. Dünyada yaşanan acıların, yaşanan güçlüklerin ve hatta ölümün boş yere yaşanmadığını, yaşadığı acı ve zorlukların dünya hayatında yapmış olduğu bazı hataların affına neden olacağını teminatını bireye yine inancı vermektedir. Bu nedenle insan yaşadığı acının kendisi için bir anlamı olduğunu düşünerek, yaşadığı bütün zorlukların değerli olduğunu anlamaya başlayacaktır (Aydın, 2021, s. 32).

#### **Ölmek üzere olan bireylere yönelik manevi danışmanlık**

Ölüme yakın olduğunu hisseden ya da ölmek üzere olan bireylerin birçoğu yalnız kalmak istemez. Ölümün, kendisini sevdiklerinden ayıracağı düşüncesi, ölümü zihninde senaryolaştırması ve öleceği bilgisi sebepleriyle yalnız mücadele etmek bireye oldukça zor gelmektedir. Bu durumdaki bireyler yanlarında kendisine refakat edebilecek insan arayışına girme eğiliminde olurlar. Yakınlarından birini bulamadıklarında bakım personeli, terapist ya da manevi danışmana ulaşmak isterler. Onlarla kurdukları iletişimde ölümü hep sembollerle ifade ederek, içinde bulunduğu süreci anlamayı ve anlaşılmayı beklerler. Kendilerine bu sembollerle anlamlandırma konusunda yardımcı olabilecek kişiler yine manevi danışmanlardır (Ağılkaya Şahin, 2017, s. 425).

Ölmekte olan insanın bir diğer özelliği ise hayatının kritiğini yapmaktır. Bu esnada hayatlarında önemli başlangıç ya da bitişleri, tercihleri yeniden gözden geçirirler. Bazen iyi yaptıklarını düşündükleri işler için mutlu olur bazen de yanlış kararları için üzüntü içinde olurlar. Ölmek üzere olan insanların yaşam bilançosunu gözden geçirirken en çok yapmak istediği şey anlatmaktır. Anlatırken aslında hayatla barışma gayreti içinde olurlar. Bu mahrem anlarında yine onları dikkatle dinleyebilecek birine ihtiyaç duyarlar. Bunun için yine en ideal kişiler manevi danışmanlardır (Ağılkaya Şahin, 2017, s. 427).

Ölmek üzere olan bireylere refakat edilirken önce onların ihtiyaçlarına dikkat etmek gerekir. Ancak ölümü bekleyen bireyin ihtiyacını anlamak her durumda kolay değildir. Bireyin öncelikle fiziksel ihtiyaçlarına odaklanarak, yaşadığı ağrı ve acıların giderilmesi, hareket kısıtlılığı varsa destek verilmesi, hastalık, yaşlılık ya da ilaçların etkisiyle oluşabilecek hafıza ve dikkat sorunlarında duyarlı olunması gibi hususlar ön planda tutulmalıdır. Fiziksel ihtiyaçlarına odaklanmak bireyin süreci daha katlanılabilir geçirmesine olanak sağlar. Bu sebeple ilk destek fiziksel açıdan eksiklikleri tamamlamak olmalıdır. Bedensel ihtiyaçların ardından kişinin sosyal ihtiyaçları göz önüne alınmalıdır. Ölümü bekleyen birey yalnız kalmaktan ve terkedilmiş olmaktan korku duyar. Kendisini seven insanların varlığı bireye güven duygusu verir. Bu sosyal ihtiyacının tamamlanması bireyin insan onurunun ve kişiliğinin bütünlüğünün koruma altına alınmasıyla ilgilidir. Yoğun bir anlatma ihtiyacı hisseden birey bu aşamada kendisini açıkça ifade etmek, yanlış anlaşılmalara düzeltmek ister. Bu ihtiyaç aslında bireyin affedilme ve affetme ihtiyaçlarını ortaya çıkarır. Bunun temel sebebi ise dini ihtiyaçlar olarak meydana gelir. Ölüm sürecindeki bireyin temelde oluşan bir diğer ihtiyacı da manevi ve dini temelli teselli edilerek, yeniden umut edebilmektir. Ölüme yakın olan bireyin manevi ve dini tecrübelerle olan ihtiyacını görebilecek kişi yine manevi danışmanlardır (Ayten & Özkan, 2020).



### **Yakınını kaybetmiş bireylere yönelik manevi danışmanlık**

Her türlü kayıp bireyin hayatında olumsuz bir etki oluşturmaktadır. Bu kayıp fiziksel ya da duygusal kayıplar olabilir. İnsanın mal varlığını veya işini kaybetmesi, eşinden boşanması ya da sevdiği, tanıdığı birinin ölmesi durumları bireye kayıp duygusunu yaşatmaktadır. Kayıp süreci de beraberinde pek çok kavram getirmektedir. Mesela kayıp; herhangi bir nesne ya da olgunun kaybı, insanın kaybı, keder ve acı; kaybın arkasından oluşan duygusal durum, Yakınının ölümü; ölüm nedeniyle bireyin sevdiği birini kaybetmesi, matem, yas; yakınını ölüm sebebiyle kaybetmiş birinin yaşadığı üzüntünün zamanını temsil etmektedir. Bütün bu kavraların ölüm nedeniyle ortaya çıktığı gözlemlenmektedir (Kara, 2016, s. 252).

Ölümün arkasından ortaya çıkan kayıp süreci için verilen manevi danışmanlık ve rehberlik hizmetinde önemli olan bireyin yaşadığı duyguyu ve kaybın gerçek olduğunu kabullenmesidir. Manevi danışmanın bu noktadaki görevi, danışanına yaşadığı duyguların farkına varmasında süreci sağlıklı bir şekilde geçirebilmesine destek olmaktır. Danışanına ölen yakını olmadan yaşamına devam edebileceğine yönelik rehberlik etme ve destekleme ve bireyin yaşadığı kaybın arkasından meydana gelen anlam karmaşasında ona yardımcı olmaktır. Manevi danışmanın danışanını kayıp sonrası çevresindeki ilişkilerine yeniden yönlendirerek bireyde biriken duygusal enerjinin yönlendirilmesinde yardımcı olması gerektiği vurgulanmıştır (Kara, 2016, s. 253).

Hasta yakınına refakat eden bir kişi, kendi hastası ya da başka bir hastanın ölümüyle karşılaşabilir. İnsanın, hastalığının son zamanlarında olan yakını için ölümü kabullenmesi çok zor bir durumdur. Kişi yakınına iyileşeceği ve yeniden eve dönecekleri umudunu taşıyarak ölümü düşünmekten uzak durmak ister. Ne kadar ölüm düşüncesinden uzak kalmak istesede hiçbir insan bu gerçeklikten kaçamaz. Yaşadığı durumun zorluğu yanında refakat ettiği hastaya da bakım vermek; yüzleşmekten korktuğu ölüm ve yakınını kaybetme korkusunu tekrar tekrar yaşamasına sebep olur. Bu noktada ölüm refaketinde bulunan bireye verilebilecek en önemli tavsiye, ölümün doğal sürecin bir parçası olduğu, yaşam gibi ölümünde varolmanın bir parçası olduğunu hatırlatmak ve bu bakış açısını kendisi ile bütünleştirebilmesine destek vermek olacaktır (Ozkan vd., 2013, s. 324).

Araştırmalar sonucunda elde edilen verilere göre bireyin sevdiği birinin kaybını yaşaması halinde hayatındaki manevi konulara olan yöneliminin artmakta olduğu gözlemlenmiştir. Manevi yönelimler bireyin hayatın anlamına ve kendi varlığına olan inançları kapsamında, insana sevdiği kişi ile yeniden beraber olabileme imkânı sunduğu için hayata daha da umutla bakabilmesine destek vermektedir (Yaman, 2017, s. 284).

Araştırmalar, yakınını kaybetmiş bireylerin yaşadığı ölüm korkusuyla baş edebilmenin yanında farklı olumlu etkilerinde yaşanabileceğini göstermektedir. Yakınının ölümünü tecrübe etmiş bireylerin, başa çıkmadaki becerilerinin arttığı ve ölüm farkındalığının oluşmasında olumlu etkilerin meydana geldiği görülmüştür. Ölüm refakati yapan kişinin yüksek kaygı, korku, uykusuzluk ve depresyon gibi tepkiler verebildiği görülmektedir. Bu tepkilerin en aza indirilebilmesine yardımcı olacak düşünce ölümün insan için bir düşman olmadığını kabul etme düşüncesidir. Ölümün hayata anlam katan kaçınılmaz bir parçası olduğunu bilmek, kabullenmeyi kolaylaştırmaktadır. Ölümü hayatın bir sınırı olarak görmeye başladığında, hayatı daha iyi ve doğru yaşanmasını sağlayan bir öğüt olarak algılanabilir (H. Altaş, 2020, s. 147).

Ölümün olduğu yerde mutlaka yas da vardır. Manevi danışmanların ölümle karşılaşması aynı zamanda yasla karşılaşmasıdır. Ancak yas her zaman ölümün ardından gerçekleşen bir durum değildir. Her türlü kayıp, ayrılık, değişim insanın hayatına yas sürecini getirebilir. Buradaki ortak unsur hep bir ayrılığın gerçekleşiyor olmasıdır. Yas bir şeyin elden gitmesine karşı verilen duygusal bir tepkidir (Ağılkaya Şahin, 2017, s. 438).

İnsan sevdiği birinin ya da yakından tanıdığı birinin ölümünü gördüğünde bu durum kendisine büyük bir acı verir. Ölümün hissettirdiği acı ile yaşanan yoğun duygusal ve fiziksel tepkiler doğal tepkilerdir. Ölen bir kişinin ardından bireyde oluşan yalnızlık ve eksiklik hissetmesine, durağan tepkiler vererek içine kapanmasına “yas” denir (Hökelekli, 2017, s. 51). Bireyin sevdiği birinin ölümü ardından yas tutuması da doğal bir süreçtir (Sami, 2019, s. 37). Ölümü yaşamış bireyin duygusal tepkiler göstermesi, kendine ait bakımlarını aksatması, işini kaybetmesi, çalışma motivasyonunu yitirmesi, sosyal ilişkilerden uzak durmak istemesi gibi bazı aşamalar meydana gelebilir. Ancak bireyin yaşamını normal ve sağlıklı bir şekilde devam ettirebilmesi için içinde bulunduğu yas sürecini yaşaması gerekmektedir. Yani bireyin,

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

ölümün acı verici duygusunu hayatın bir parçası olarak kabul ederek yaşamını sürdürmeye devam edebilecek duruma gelmesi gerekmektedir (Zara, 2011, s. 74).

Dini inançlar insanların yasa verdiği tepkileri etkileyen önemli bir faktör olarak görülmektedir. Yapılan bir araştırmada dindar bireylerin, yas sürecinde kullandıkları dini inanç ve pratiklerinin yas sürecini sağlıklı bir şekilde tamamlayabilme motivasyonuna ulaştığı tespit edilmiştir (Hökelekli, 2017, s. 135).

Her insan yaşadığı ölüm karşısında aynı yas tepkilerini vermez. Bazıları yası doğal akışına göre bütün evreleri tek tek geçirerek bu süreci yaşar ve sona erdirir. Bazıları ise ilk anda yas sürecine girmez ve erteler ya da yas sürecindeki bir evrede uzun süre takılıp kalabilir (Öztürk, 2007, s. 4).

Yas süreci yaşayan bireyler yas evrelerini şu şekilde yaşar:

1. Şok; ilk anda insan içinde bulunduğu durumu anlamakta güçlük çeker ve durumu inkâr etmeye başlar. Şok evresi birkaç hafta kadar sürebilir. Birey ölen kişinin ardından boşluk hissine kapılır. Nefes alırken zorluk yaşamak gibi bazı fiziksel zorlanmalar yaşayabilir. Birey ölen yakınına düşündükçe kendisini suçlu ve günahkâr issetmeye başlayabilir.
2. Özleme; ölen kişinin ardından oluşan yoğun özlem duygusu kişiyi depresyon haline sokabilir. Yoğun ağlamalar, çevresindeki insanlardan uzak kalmak isteme, öfke patlamaları, korkular, uyku problemleri ve yeme sorunları meydana gelebilir.
3. Sevilen kişiden kurtulma; hayatına yeni bir düzen kurmaya çalışmak, gelişen yeni hayat şartlarına karşı uyum içinde olmaktır.
4. Kimliğin yeniden kurulması; yeni ilişkilerin tahsis edildiği evredir (Hökelekli, 2017, s. 52).

Yas sürecinde manevi danışmanın görevi, yakınına kaybetmiş bireylerin içinde bulunduğu süreci sağlıklı bir şekilde tamamlamasına yardımcı olmak, danışanın yanında olarak onu destekleyici bir duruş içinde olmaktır (Ağılkaya Şahin, 2017, s. 443).

Çünkü ölüm sonrası yaşanan yas için verilen manevi danışmanlıkta insanlar, inandıkları dinin ölüme karşı bakışını merak eder. Kendi yaşadığı durumun ne olacağını sorgularken, bundan sonra yaşamını nasıl sürdüreceğini, ölen yakınına neler olacağını bilmek ister. Bireye bu yönlendirmenin dinin ve psikolojinin temelleri kullanılarak manevi bir rehber eşliğinde verilmesi gerekmektedir (Kara, 2016, s. 253).

## SONUÇ

Hayat ve ölüm olgusu bütün insanların müşahadesine açık olan bir gerçekliktir. Dünyanın en gerçek ve vazgeçilemeyen olguları olan hayat ve ölüm bir bütün olarak anlam kazanmaktadır. Var olmanında temel şartı olan ölüm bütün insanları ilgilendirmekte ve oldukça merakı celbeden bir konu olarak görülmektedir. Var oluşunun amacını ve ölümün anlamını merak eden insan bu konular üzerinde sıkça düşünmektedir. Bu düşünceler de insanın zaman zaman anlam kargaşasına, varoluşsal bir boşluğu ve ruhsal bunalıma girebilmesine neden olabilmektedir.

Yaşam zorlukları ve ölüm süreci bireyin hayatındaki en mahrem konular arasında yer almaktadır. Ölüm ile yüzleşmekten uzak durmak isteyen birey ne ile karşılaşacağını bilmediği, hiç tecrübe etmediği bir durum olan ölümden olabildiğince kaçmak istemektedir. Bu korkunun ve uzak durmak istemenin temel nedeni ise bilgisizlik ve tecrübesizlik olarak karşımıza çıkmaktadır. Ölüm sürecine girmiş bireylerin anlamlandırma ve süreç içinde hissettikleri yalnızlık, korku, endişe gibi duyguların sağlıklı bir şekilde giderilmesi, soruların cevaplanması manevi danışmanlar tarafından gerçekleştirilebilmektedir. Bireye ölüm sürecinde refakat edebilen sorularına ve sorunlarına özüm bulabilen manevi danışmanlar danışanın içinde bulunduğu süreci en iyi şekilde geçirmesine yardımcı olurken dinin ve psikolojinin temellerinden faydalanarak bu hizmeti vermektedir.

Yakınına kaybetmiş bireylerde oluşan duygusal süreçte yine manevi danışmanlar, danışanına içinde bulunduğu yas sürecini sağlıklı bir şekilde yaşamasına rehberlik ederek, bireye yaşamına devam edebilmesinde destekleyici bir rol almaktadır. Sevdiği birinin ölümünü yaşayan insan da ölümü anlamlandırmak istemektedir. Ölümün anlamını bulmasına rehberlik edebilecek kişiler olan manevi danışmanlar bu aşamada bireye ölümün anlamının tesis edilmesini sağlarken aynı zamanda bireyin hayatı da anlamlandırmasında etkili olmaktadır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DECISION SUPPORT SYSTEMS FOR SMART INDUSTRIAL AUTOMATION AKILLI ENDÜSTRİYEL OTOMASYON İÇİN KARAR DESTEK SİSTEMLERİ

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### ÖZET

Endüstri 5.0 ve dijital dönüşüm kavramlarıyla birlikte çeşitli sektördeki işletmeler, veriye dayalı karar alma ve otomasyon teknolojilerine yönelik yeni bir yaklaşım benimsemiştir. Akıllı otomasyon sistemleri bu süreçte oldukça önemi kazanmıştır. Akıllı otomasyon sürecinde, endüstride genelde ekipman ve prosedürleri çalıştırmak için robotik ve yazılım kullanılmaktadır. Birçok uygulama, kullanıcı deneyimini geliştiren akıllı özellikler sağlamak için IoT, makine öğrenimi ve diğer teknolojileri entegre etmektedir. Bu tür teknolojilerin kullanımı, işletmelere ve insanlara ticari ve ticari olmayan gereksinimlerin başarılı bir şekilde yerine getirilmesinde büyük yardım sağlar. Endüstri 5.0 ya göre, geleneksel süreçlerin önemli risk yönetimi ve verimsizliği nedeniyle kuruluşların endüstriyel süreçleri otomatikleştirmesi beklenmektedir. Karar destek sistemlerinin karar vericiler tarafından karar verme sürecine bilgi desteği sağlayarak, büyük veri dizilerini işlerken kullanımı geniş oranda yayılmıştır. Akıllı karar destek sistemleri, işletmelerin (kuruluşlar, kurumlar) tüm üretim süreçlerine ve hizmetlerine bilgi desteği sağlamaktadır. Akıllı karar destek sistemleri, ürünlerin tasarımında, imalatında, satışında, finansal ve ekonomik analizde, planlamada, personel yönetiminde, pazarlamada, ürün oluşturma desteğinde (operasyon, onarım) ve perspektif planlamasında kullanılmaktadır. Karar destek sistemleri, iş yürütmeye yönelik eylem planının belirlenmesine, değerlendirilmesine ve karar verilmesine yardımcı olan bir bilgisayar görüşü ve programıdır. Karar destek sistemleri büyük miktarda veriyi analiz etme ve temel karar verme faaliyetlerine yardımcı olma, geri bildirim kontrol mekanizmasıyla verileri yakalama, saklama ve alma yeteneğine sahiptir. Bu çalışma, endüstriyel süreçlerde verimliliği artırmak ve operasyonları optimize etmek için kullanılan akıllı otomasyon sistemlerine odaklanmaktadır. Bu çalışmanın amacı karar destek sistemlerinin endüstriyel otomasyon süreçlerini iyileştirmeye yönelik kullanımını incelemek ve işletmelere getirdiği faydaları analiz etmektir. Bu çalışmada karar destek sistemlerinin temel ilkelerini ve endüstriyel süreçlerdeki rollerini açıklayarak büyük veri analitiği, yapay zeka ve makine öğrenimi tekniklerinin uygulanmasının önemini vurguluyoruz. Ayrıca endüstrinin çeşitli sektörlerindeki karar destek sistemi uygulamalarına örnekler veriyoruz. Bu örnekler, bunların üretim süreçlerinde verimliliği artırmak, kalite kontrol süreçlerini optimize etmek, bakım yönetimini geliştirmek ve kaynakları daha etkin bir şekilde yönetmek için nasıl kullanıldığını göstermektedir. Bu çalışma, endüstriyel işletmelerin akıllı otomasyonun avantajlarından yararlanmak için karar destek sistemlerini nasıl etkili bir şekilde kullanabileceğini göstermektedir. Elde edilen sonuçlar, Endüstri 5.0 çağında veriye dayalı karar alma ve verimliliğin artırılması için bu tür sistemlerin benimsenmesinin giderek hayati hale geldiğini göstermektedir.

**Anahtar Kelimeler:** Karar Destek Sistemleri, Otomasyon Sistemleri, Akıllı Sistemler, Yapay Zeka, Makine Öğrenmesi, Endüstri 5.0.



### ABSTRACT

With the concepts of Industry 5.0 and digital transformation, businesses in various sectors have adopted a new approach to data-based decision-making and automation technologies. Smart automation systems have gained great importance in this process. In the process of intelligent automation, robotics and software are generally used in industry to operate equipment and procedures. Many applications integrate IoT, machine learning, and other technologies to provide intelligent features that improve user experience. The use of such technologies provides great assistance to businesses and people in the successful fulfillment of commercial and non-commercial requirements. According to Industry 5.0, organizations are expected to automate industrial processes due to the significant risk management and inefficiency of traditional processes. The use of decision support systems by decision makers when processing large data sets by providing information support to the decision-making process has become widely widespread. Intelligent decision support systems provide information support to all production processes and services of businesses (organizations, institutions). Intelligent decision support systems are used in the design, manufacturing, sales of products, financial and economic analysis, planning, personnel management, marketing, product creation support (operation, repair) and perspective planning. Decision support systems is a computer vision and program that helps in determining, evaluating and making decisions about the course of action for running a business. Decision support systems have the ability to analyze large amounts of data and assist in basic decision-making activities, capturing, storing and retrieving data through a feedback control mechanism. This study focuses on intelligent automation systems used to increase efficiency and optimize operations in industrial processes. The aim of this study is to examine the use of decision support systems to improve industrial automation processes and to analyze the benefits they bring to businesses. In this study, we explain the basic principles of decision support systems and their roles in industrial processes and emphasize the importance of applying big data analytics, artificial intelligence and machine learning techniques. We also give examples of decision support system applications in various sectors of the industry. These examples show how they are used to increase efficiency in production processes, optimize quality control processes, improve maintenance management and manage resources more effectively. This study shows how industrial businesses can effectively use decision support systems to take advantage of intelligent automation. The results show that the adoption of such systems is becoming increasingly vital for data-driven decision-making and improving efficiency in the Industry 5.0 era.

**Keywords:** Decision Support Systems, Automation Systems, Smart Systems, Artificial Intelligence, Machine Learning, Industry 5.0.

### 1. INTRODUCTION

Decision support systems for smart automation in the industry are computer-based systems used to increase efficiency, reduce costs, and optimize operations in industrial processes. These systems bring together functions such as data analysis, forecasting, optimization, and decision-making, enabling the collection, analysis, and interpretation of large amounts of data to monitor, understand, and manage complex industrial processes. Additionally, through real-time data flow, they allow businesses to track their current situations and make instant interventions.

Database technology is also crucial for more efficient use of decision support systems in the industry. Database technology has continuously evolved, and database management systems have been widely implemented. As a result, the total amount of data stored in various databases has dramatically increased. However, behind this vast amount of data lies a wealth of information [1]. If hidden information can be extracted from the database, it can create potential gains for businesses. Furthermore, competition among various industries is intensifying [2]. The intensification of competition among industries has made data-driven and analytical approaches increasingly indispensable. The potential gains that can be obtained from databases and the intensification of competition among industries are significant consequences of today's business world.

Data analysis and decision support systems offer businesses opportunities to better understand their competitors, take rapid action, and gain an edge in the market, allowing them to make strategic decisions based on real-time information. Data-driven strategies become a way to create and sustain a competitive



advantage. Through data analysis and business intelligence, valuable information such as customer behaviors, demand trends, and market trends can be obtained. This information enables not only the creation of better product and service strategies but also more effective management of operations and cost savings.

Decision support systems can benefit industrial automation in various ways, including data analysis and forecasting, rational decision-making, process automation, resource management, quality control, maintenance, and error management. Such systems are becoming increasingly important in conjunction with Industry 4.0 and smart manufacturing concepts. Automation, data exchange, artificial intelligence, and digitization are transforming production processes. As industrial automation becomes more sophisticated, decision support systems provide a competitive advantage for businesses in the industry. With the emergence of Industry 4.0, condition monitoring techniques have evolved from visual inspections and manual analysis of data sets to real-time big data based on high-frequency sensors [3]. Industry 4.0 is an approach that emerged as a result of digitalization and automation in production. This approach aims to make traditional production processes smarter, data-oriented, and flexible.

Studies related to decision support systems are conducted in various sectors in many countries. Initially heavily used in the healthcare sector, decision support systems are now being used and researched in facilities maintenance, human resources, supply chain, consulting firms, and other fields [4-7].

## **2. FEATURES AND CAPABILITIES OF DECISION SUPPORT SYSTEMS**

Decision Support Systems (DSS) serve organizations (typically middle and upper-level management) at the management, operational, and planning levels and assist people in making decisions about rapidly changing and previously not easily determinable problems. They are considered unstructured and semi-structured decision problems. Decision support systems can be entirely computerized, human-powered, or a combination of both [8].

Decision support systems support the decision-making process and easily adapt to changing circumstances. They enable upper-level management to make decisions in individual or group settings. They operate under the control of the user and assist in strategic planning.

Decision Support Systems perform functions such as providing information to decision-makers, conducting data analysis, creating scenarios, and predicting the outcomes of decisions. They are used in various fields within businesses, including strategic decision-making, financial analysis, inventory management, and marketing. Expert Systems, a subset of decision support systems, "assist decision-makers in planning and facilitate decision-making by helping them choose appropriate alternative solutions to eliminate complexities. The key here is providing meaningful information and knowledge" [9]. Expert Systems transform the knowledge and experience of an expert into a computer program and are used to solve complex problems. They typically address issues that require expertise in a specific area and provide recommendations in that domain. In Figure 1, general topics addressing the different aspects of decision support systems and expert systems are presented.

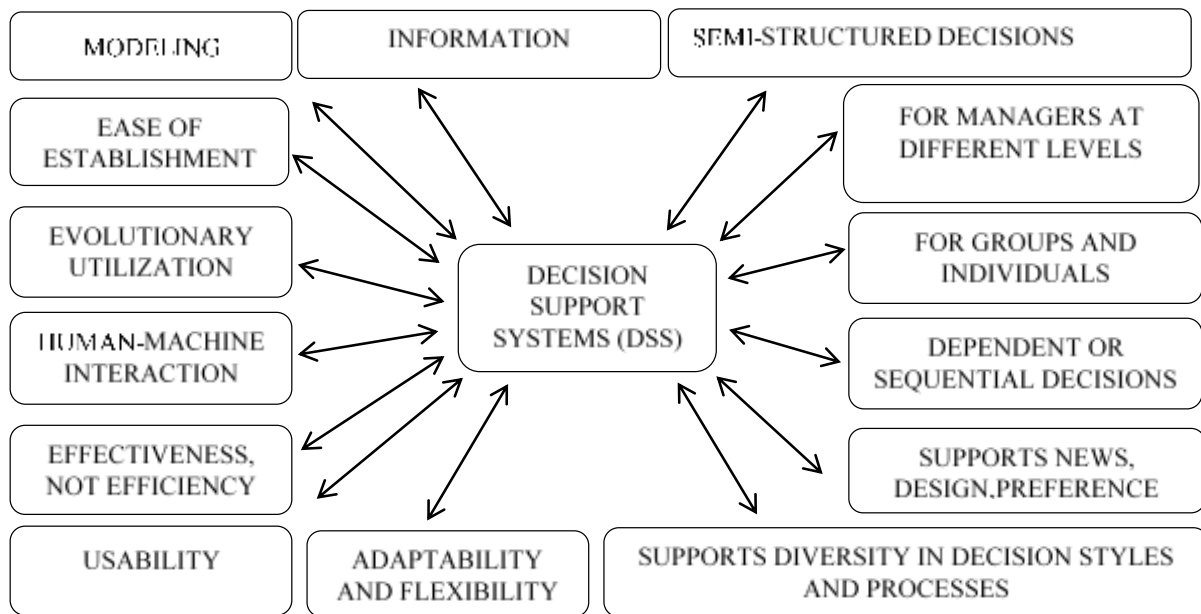


Fig.1. Decision Support Systems and Expert Systems

Businesses use both Decision Support Systems and Expert Systems depending on their needs and objectives. Decision Support Systems are particularly useful for big data analysis and strategic planning, while Expert Systems are ideal for tasks that require specific knowledge and expertise. The integration of these systems also provides businesses with greater flexibility and decision-making capabilities. Both systems are used to enhance decision-making processes and support people in making better decisions.

### **3. SMART AUTOMATION SYSTEMS USED TO INCREASE EFFICIENCY AND OPTIMIZE OPERATIONS IN INDUSTRIAL PROCESSES**

Smart automation systems used to increase efficiency and optimize operations in industrial processes are complex systems created through the integration of various technologies. These systems aim to make manufacturing processes smarter, faster, more flexible, and efficient, with the goal of enhancing the competitiveness of industrial enterprises. Some of the smart automation systems used to increase efficiency in industrial processes include:

- Automation Control Systems
- Industrial Robots
- Artificial Intelligence and Machine Learning
- Internet of Things (IoT)
- Industrial Data Analytics
- Smart Energy Management
- Digital Farmer

Systems like these play a significant role in improving the efficiency of industrial businesses, reducing production costs, lowering error rates, and making them more flexible and competitive.

#### **3.1 Automation Control Systems**

Automation is defined as the technology where a process or procedure is performed with minimal human assistance. Automation (automatic control) involves the use of various control systems for operating machinery, processes in factories, directing applications, stabilization, and reducing human intervention in equipment such as automated vehicles. A control system using control loops governs, commands, or regulates the behavior of other systems and/or devices [10].

These are systems that enable the automatic control of processes in factories, production lines, and industrial facilities. Technologies like Programmable Logic Controller (PLC) and Supervisory Control and Data Acquisition (SCADA) systems are used to monitor, collect, analyze, and control processes.

Automatic control systems are widely used in various industries and application areas. These systems are designed to automatically achieve a desired target or operating condition for a process or system. They are used in industrial production control, traffic flow management, the aviation and aerospace industry, and energy management. In industrial production control, industries such as automotive, chemical, food production, and many others manage their production processes with automatic control systems. For example, the Proportional-Integral-Derivative (PID) controller is commonly used in such applications. PID control method has numerous applications in today's world, including liquid level control, motor control, temperature control systems, and many similar closed-loop control systems [11].

### 3.2 Industrial Robots

Robotic systems used to automate and optimize various tasks in production and industrial processes are systems that increase production speed and quality by performing repetitive and heavy tasks instead of human labor. Industrial robots are used in many tasks such as assembly, packaging, welding, painting, and material handling. They operate in various fields, including the automotive industry, food and beverage industry, logistics and warehouse management, healthcare and medical industry, and more. "In the field of industrial robotics, virtual simulation is a well-known concept for planning and optimizing robotic systems, planning, predicting, scaling, and safely testing different scenarios. Digital human modeling offers the opportunity to integrate a computer-generated human appearance into a forward-looking workspace for examining ergonomic issues. Comprehensive research on digital human modeling for ergonomic analysis in workspace design has been discussed" [12].

It generates additional resources that require management alongside production equipment and staff. Hence, maintenance decision-making algorithms must take into account the fact that specific maintenance tasks can be executed by industrial robots, impacting the scheduling of maintenance activities. These algorithms will allocate suitable maintenance assignments to either humans or robots, taking into consideration factors such as the task's nature, the expertise of humans and robots, the efficiency trade-off between humans and robots for that particular task, and the cost associated with task execution by either robots or humans. Another significant aspect is the uncertainty associated with prognostic information and, consequently, the appropriateness of suggested predictive maintenance actions. Recommendations related to maintenance actions with high uncertainty can pose challenges for robots lacking the comprehensive context understanding and the potential consequences of implementing an inappropriate action. Conversely, humans have the ability to disregard recommendations if they perceive the actions as inappropriate or make real-time adjustments during action execution [13].

### 3.3 Artificial Intelligence and Machine Learning

Big data analytics and artificial intelligence technologies used in industrial processes are applied in areas such as monitoring production line performance, planning maintenance, predicting faults in advance, and improving energy efficiency. "Big data requires artificial intelligence to make real-time decisions. Fundamental techniques of artificial intelligence such as deep learning, computer vision, and reinforcement learning have been used in manufacturing scenarios" [14]. Computer vision has been used for structural health monitoring [15].

Big data-supported analysis, which is one of the crucial technologies in artificial intelligence, enhances the competitiveness of the manufacturing industry by revealing the hidden information value and potential capability within industrial big data [16]. Artificial intelligence and machine learning are used to guide the control and navigation of autonomous vehicles (e.g., autonomous cars or drones).

### 3.4 Industrial Data Analytics

Industrial data analytics helps optimize production processes by analyzing and processing data on the production line, monitors and controls product quality in manufacturing processes. Big data analytics is used to analyze data in facilities and processes to extract valuable insights. Through data analytics, the

performance and efficiency of production processes can be improved, inefficiencies can be identified, and opportunities for improvement can be uncovered.

All industrial big data throughout the product lifecycle encompasses product design, manufacturing, supply chain, marketing, and customer feedback. Depending on the data source, industrial big data is divided into system data (data generated from various enterprise information systems) and Internet of Things (IoT) data (data captured by sensors such as radio frequency identification readers and barcode scanners). The primary sources of industrial big data are shown below [16].

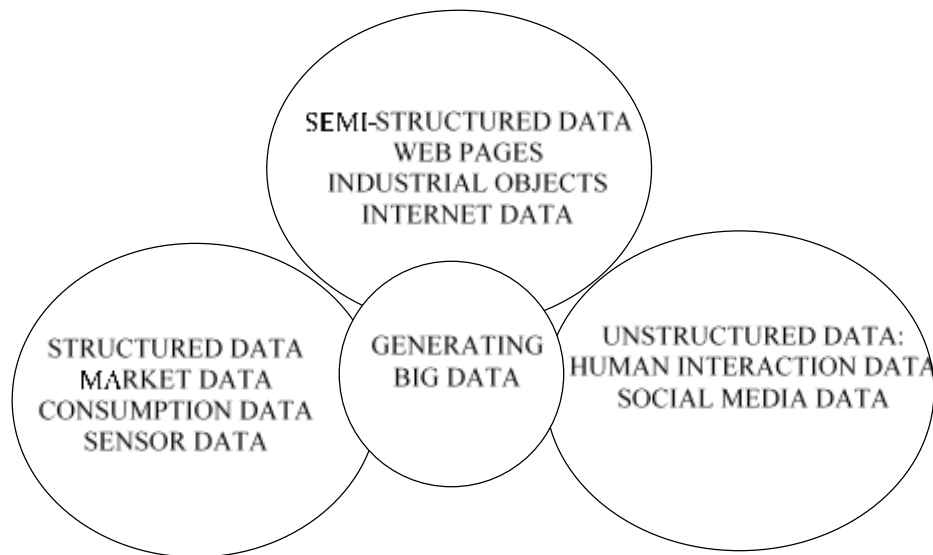


Fig. 2. Sources of Industrial Big Data

In Figure 2, a combination of data from three categories of industrial big data sources (structured data, semi-structured data, and unstructured data) is depicted. These data are collected and analyzed to assist businesses in making more efficient and informed decisions. Sensors, industrial equipment, production processes, and other sources are among the primary sources of industrial big data.

### 3.5 IoT (Internet of Things)

Sensors facilitate the collection and sharing of data by establishing connections between devices and equipment. Thanks to IoT technology, it simplifies processes such as real-time monitoring, remote monitoring and control, and inventory management. Production managers achieve higher reliability and better quality standards by using IoT's analytical capabilities to monitor the status of their products or equipment. Logistics operations emphasize flexibility and speed improvements, relying not only on operational monitoring but also on other planning activities (e.g., loading, sorting, and scheduling) [17].

The core concept of the Internet of Things (IoT) is to perceive the physical world by connecting physical objects to each other [18]. IoT's sensing capabilities rely on various identification and tracking technologies that enable the remote monitoring of physical objects and their tracking without the need for direct visual contact [19].

### 3.6 Smart Energy Management

The systems used for monitoring, analyzing, and optimizing energy consumption help reduce energy costs and achieve sustainability goals. They encompass a range of technologies and methods developed for smart homes and building management, energy management, smart grid management, and industrial management.

Energy management primarily focuses on the optimal use of energy. To achieve this goal, companies must establish the direct responsibilities of an energy management program, appoint an energy manager, allocate resources, and provide the necessary support to achieve effective results [20]. Smart energy

management has become a significant topic in the energy sector and is a method with the potential to have a positive impact on the sustainability and environmental effects of energy consumption.

### **3.7 Digital Farmer**

Smart agriculture technologies used in the agricultural sector optimize production processes and increase efficiency. Sensors, drone and satellite technologies that enable remote sensing, robot technologies, image processing technologies, and artificial intelligence can be listed as smart agriculture applications. Sensors capable of measuring soil and air moisture and temperature enable more informed irrigation and pesticide application processes. Through this application, farmers can access more accurate weather forecasts for their regions, enabling them to make more informed decisions. Another smart agriculture application, smart irrigation systems, simplifies the lives of those involved in agriculture and works wonders, especially in water conservation [21].

Digital farming offers a more efficient, sustainable, and profitable approach in the agricultural sector. These technologies provide farmers with the opportunity to use their resources more effectively, increase crop productivity, and support environmental sustainability goals. Research and applications related to digital farming are of great importance for the future of the agricultural sector.

## **4. FUNDAMENTAL PRINCIPLES OF DECISION SUPPORT SYSTEMS AND THEIR ROLE IN INDUSTRIAL PROCESSES**

Decision support systems (DSS) are computer-based systems used to assist managers and decision-makers in making complex decisions. These systems focus on analyzing large amounts of data, evaluating alternative solutions, predicting potential outcomes, and supporting the decision-making process.

Decision support systems are used in various fields in industry and automation systems. "For a business management to successfully achieve its goals, it needs to expedite the decision-making process very quickly." [22]. They help businesses become more efficient, effective, and competitive. These systems play a significant role in obtaining accurate data, analyzing it, and making decisions based on that data, greatly influencing a business's success. They are crucial in areas such as data analysis, decision-making processes, and operational improvements within businesses.

Decision support systems gather large amounts of data from different sources and process this data appropriately. This data includes critical information related to industrial processes, such as production, inventory, sales, costs, and more. They analyze the data using mathematical and statistical models. These analyses assist in predicting future trends, evaluating performance, and identifying issues. They provide a user-friendly interface that allows users to visualize and interact with the data. This facilitates better access to data for decision-makers and streamlines the decision-making process.

## **5. DECISION SUPPORT SYSTEMS USED IN IMPROVING INDUSTRIAL AUTOMATION PROCESSES**

Decision support systems play a significant role in improving industrial automation processes. These systems become important tools for enhancing the competitiveness of businesses by enabling effective data analysis, process monitoring, error detection, predictions, and optimization of planning processes.

It is natural to make decisions when a requirement arises. Making a healthy decision requires time. However, as the intensity of the requirement increases, the time available for decision-making decreases. As a result, shortcuts are taken in the decision-making process to reach a conclusion more quickly. This, in turn, raises questions about how healthy the decision will be. Effective decision-making is related to knowing the requirement before it emerges. Knowing in advance is linked to the uniformity of the requirements. It is easier to know in advance and make decisions about recurring needs, while making decisions about randomly occurring unexpected situations poses a greater risk for requirements [23].

Computer-based systems known as Decision Support Systems (DSS) that assist businesses and industries in making complex and strategic decisions analyze large amounts of data, provide future predictions based on various scenarios, offer optimized solutions, and support decision-making processes, thereby increasing the efficiency of businesses.



DSSs use steps such as Data Analysis and Monitoring, Error Detection and Troubleshooting, Prediction and Planning, Inventory and Logistics Management, Energy Efficiency, and Resource Management to improve industrial automation processes.

### **5.1. Data analysis and monitoring**

Decision support systems provide real-time monitoring by analyzing the vast amount of data generated in automation processes. This allows businesses to see the current state of affairs and quickly detect anomalies in their processes.

Data analysis helps companies gain greater visibility and develop a deeper understanding of their processes and services. It provides detailed insights into customer experiences and issues. Companies that capture their customers at individual touchpoints and offer personalized approaches can gain a competitive edge and experience revenue growth, particularly [24].

Data analysis and monitoring are powerful tools for making better decisions, effectively utilizing resources, and optimizing processes, and as such, they are widely used in various sectors. They are used in areas such as environmental monitoring, health monitoring, energy monitoring and conservation, financial analysis, and fleet management in the transportation and logistics sector.

### **5.2. Error Detection and troubleshooting**

DSSs can detect errors and issues that may arise in automation processes and help ensure the flawless and reliable operation of systems. Developing a sound testing and validation strategy, tracking error messages and codes for error detection, recording events during system operation, controlling data quality, prioritizing feedback, etc., are all factors to consider, and they play a significant role in quickly resolving issues in processes and increasing productivity.

Error detection and troubleshooting are crucial processes used in various sectors and fields. This process involves data analysis and monitoring techniques for identifying, analyzing, and finding solutions to problems. It is used in software development for error detection, in industrial production processes to enhance product quality and minimize errors, in the healthcare sector for the detection and prevention of medical errors, and in maintenance processes for industrial machinery and equipment.

### **5.3. Prediction and planning**

Decision support systems use forecasting and planning processes to optimize production processes, efficiently utilize resources, and make better decisions. By analyzing historical data, they can predict future trends and provide optimized plans and strategies. This contributes to the more effective and efficient management of industrial automation processes.

Forecasting and planning are critical processes widely used in various sectors and industries. These processes involve data analysis and modeling techniques to predict future events or outcomes and create strategies based on these predictions. They are used in sales forecasting, financial forecasting, production and demand planning, and weather forecasting.

### **5.4. Inventory and logistics management**

Decision support systems are used by industrial businesses to optimize their stocks and make logistics operations more efficient. Increasing efficiency in stock and logistics management is a powerful tool for reducing costs and enhancing customer satisfaction. By optimizing stock levels, it can reduce stock costs and improve the smooth and efficient progression of production processes by enhancing logistics management.

In the optimization of stock levels, it demonstrates how stock and logistics management data analysis, modeling, and technology usage are employed in distribution management for the transportation and delivery of products, ensuring the right amount of product is available at the right time, and how it can be optimized in supply chain management. Research in these areas helps businesses reduce costs, improve service quality, and gain competitive advantages.

### **5.5. Energy efficiency and resource management**



Decision support systems optimize energy consumption in industrial facilities, promote more efficient resource utilization, and enhance environmental sustainability. By monitoring and managing energy consumption in industrial automation processes, they can increase energy efficiency while also facilitating better resource utilization, reducing waste and costs.

Enhancing energy efficiency in buildings and optimizing resource usage, optimizing energy generation, transmission, and distribution, monitoring and analyzing energy consumption, improving energy efficiency, reducing energy costs, reducing water consumption, minimizing waste production, and promoting recycling are some of the topics related to energy efficiency and resource management. Research in these areas aims to promote more sustainable use of natural resources and increase energy efficiency.

### 6. CONCLUSION

Decision support systems play a critical role in effectively and efficiently utilizing industrial applications. These systems help businesses make more informed and strategic decisions using features such as real-time data analysis, predictive models, and optimization algorithms.

Decision support systems enhance the understanding and management of production processes, even in complex manufacturing environments, by providing better visibility and traceability. As a result, businesses can make better strategic decisions, reduce costs, improve quality, and gain a competitive advantage, making them indispensable tools for modern manufacturing and business management. By using these systems, businesses can make better decisions and continuously evolve to succeed in a competitive environment.

Decision Support Systems for Smart Industrial Automation also play a significant role in the field of medicine. These systems are used to improve the processes of collecting, analyzing, and utilizing medical data. In today's complex healthcare environment, making accurate and timely decisions is a critical factor that affects patient health. Decision Support Systems for Smart Industrial Automation can be used as an important tool in overcoming this challenge in the field of medicine. These systems provide healthcare professionals with better access to data, analysis, and the opportunity to optimize their decisions.

Decision Support Systems for Smart Industrial Automation is a critical technological development shaping the future of the industry and manufacturing sector. These systems help businesses achieve higher efficiency, lower costs, improved product quality, and better sustainability goals.

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ÇİFTÇİLER İÇİN WEB TABANLI DESTEK SİSTEMİ  
A WEB BASED SUPPORT SYSTEM FOR FARMERS

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**ÖZET**

Günümüzde artan nüfus verileri ve tarım alanlarının çeşitli sebeplerle azalmaya başlaması gıda güvenliği ve gıda güvenilirliği açısından endişelere neden olmuştur. Bu nedenden dolayı tarımsal üretimin önemi ve verimliliği kavramları önem kazanmıştır. Bitkisel üretimde verim ve kaliteyi etkileyen en önemli unsurların başında kırsal kesimde yaşayan ve ürün yetiştiren çiftçilerin tam bilinçli olmaması ve ürünleri olumsuz olarak etkileyen zararlı organizma olarak adlandırılan hastalık ve zararlı yabancı otlar gelmektedir. Bitki ve bitkisel ürünlerde ürün kayıplarına neden olan hastalık, zararlı ve yabancı otların olumsuz etkilerini önüne geçmek için yapılan her türlü faaliyetlere zirai mücadele olarak tanımlanmaktadır. Zirai mücadelede doğru kaynaktan alınan doğru bilginin tüm üreticilere en kısa sürede ulaşabilmesi büyük önem arz etmektedir. Bu noktada ise teknolojinin tarıma entegrasyonu sağlanması ve tarımda dijitalleşme son yıllarda önemli bir konu haline gelmiştir. Bu yüzden bu çalışmada kullanıcılar tarafından kolayca ulaşılabilen web tabanlı bir yazılım sistemi geliştirilmiştir. Bu yazılım sistemi iki modülden oluşmaktadır. İlk modülde, ülkemizde yedi bölgede yetişen tarım ürünleri kategorize edilerek bu ürünler HTML ve CSS kodları ile görselleştirilerek ürünler hakkında bilgi verilmiştir. İkinci modülde ise çiftçilerin yaşadığı sorunu sistem üzerinden yetkili kişilere danışabilmesi için bir destek talebi sistemi geliştirilmiştir. Bu destek talebi sisteminde çiftçiler sorunlarını yazılı olarak ve görsel yükleme fonksiyonunu kullanarak sorunlarını yetkili kişilere ulaştırması sağlanacaktır. Bu destek talebi sistemi PHP, HTML, CSS ve MySQL yazılım dilleri kullanarak tasarlanmıştır. Sonuç olarak bu çalışmada tasarlanmış olduğumuz web tabanlı tarım destek sistemi ile çiftçilerimizin sorunlarını asgari seviyeye indirmeye ve tarımda verimliliği sağlanmasına katkıda bulunulmuştur.

**Anahtar kelimeler:** Zirai Mücadele, Tarımda Dijitalleşme, Web Tabanlı Sistem, Ürün Verimliliği

**ABSTRACT**

Today, increasing population data and the decrease in agricultural areas for various reasons have caused concerns in terms of food security and food safety. For this reason, the concepts of importance and efficiency of agricultural production have gained importance. One of the most important factors affecting the yield and quality in crop production is the lack of full awareness of farmers living in rural areas and growing crops, and diseases and harmful weeds, which are called harmful organisms that adversely affect the products. All kinds of activities carried out to prevent the negative effects of diseases, pests and weeds that cause product losses in plants and herbal products are defined as

agricultural control. In agricultural control, it is of great importance that the correct information from the right source can reach all producers as soon as possible. At this point, the integration of technology into agriculture and digitalization in agriculture has become an important issue in recent years. Therefore, in this study, a web-based software system that can be easily accessed by users has been developed. This software system consists of two modules. In the first module, agricultural products grown in seven regions of our country are categorized and these products are visualized with HTML and CSS codes and information about the products is given. In the second module, a support request system has been developed so that farmers can consult the authorized persons through the system. In this support request system, farmers will be able to convey their problems to authorized persons in writing and by using the visual upload function. This support request system was designed using PHP, HTML, CSS and MySQL software languages. As a result, with the web-based agricultural support system we have designed in this study, we have contributed to minimizing the problems of our farmers and ensuring efficiency in agriculture.

**Keywords:** Agricultural Control, Digitalization in Agriculture, Web Based System, Crop Efficiency

### GİRİŞ

Günümüzde artan nüfus sayısı ve buna oranla tarıma olan rağbet günden güne azalmaktadır. Bitkisel üretimde özellikle kırsal kesimlerde yaşayan çiftçilerimizin bilinçsizliği, ürünlerde meydana gelen hastalıklar, atadan kalma bilgilerle yapılan zirai mücadele, bilinçsiz ilaç kullanımı ve ezberle zirai mücadeleler, yabancı otlar ve zararlı mikroorganizmalar tarafından olumsuz etkilenmesine neden olan etkenlerin başında gelmektedir. Bu etkenlerin oluşturduğu problemler üretimde %30-35 arasında ortalama bir kayba yol açabilmektedir. Olası bir salgın durumunda ise bu oran %100' kadar ulaşabilmektedir. Bu yaşanan problemlerin çözümü özellikle çiftçilerimiz için önem arz etmektedir.

Bu soruna bir çözüm ve literatüre bir katkı olarak bu projede tarım sektörü için bir web tabanlı destek sistemi geliştirilmiştir. Web programlama dilleri kullanılarak oluşturulan web sayfasında çiftçiler için ürünleri hakkında detaylı bilgiye ulaşabilecekleri bir ürünler modülü oluşturulmuştur. Bu modülde çiftçilerimiz Türkiye'de yetişen, ürünlere dair bilgiler içermektedir, ürünlerinde meydana gelen çeşitli sıkıntıların çözümüne yönelik ise bir sorun modülü geliştirilmiştir.

Ürünler modülünde çiftçilerimiz bu web sayfasında yetiştirdiği ürüne ait detaylı bilgiye ulaşırken, sorun modülünde ise yaşadığı sıkıntıları sorun modülü aracılığı ile yetkili kişilere bildirerek sorunlara yönelik çözümler elde edilmesi amaçlanmıştır. Sonuç olarak geliştirdiğimiz web tabanlı tarım destek sistemindeki ana amacımız çiftçilerin günlük karşılaştığı sorunları en az seviyeye indirmek ve tarımda verimliliği en üst seviyeye çıkarması amaçlanmıştır.

### TARIM VE BİLİŞİM

Çiftçi topluluğuna doğru bilgiye ulaşırken bunu hızlı ve düşük maliyetle yapabilmek için günümüzde teknoloji ve bilişim araçlarından yararlanılmaktadır (Çavdar, 2011). Bitki sağlığını ve sürdürülebilir tarımsal üretimin miktarının ve kalitesinin artırılması için yapılan bu çalışmalara zirai mücadele denmektedir (Kadıoğlu, 2012). Tarımsal üretim ve tarımsal alanların verimliliği için uygun ortam olması gibi birçok faktöre bağlı olmakla beraber ürünlere zarar veren etkenlerin erken teşhisi o kadar da önemlidir. Bu zararlı etmenler uzmanlar tarafından erken tespit edilmeli ve bu zararın çözümüne yönelik uygulanacak mücadele seçilmelidir (Erdoğan, 2006). Tarım ve bilişim günümüz dünyasında birbirine bağlı olan iki önemli sitemdir. Tarım insanların temel ihtiyaçları olan gıda üretimini sağlar ve buna oranla dünya nüfusunun büyümesi ile birlikte giderek daha da önem kazanmaya başlamıştır. Bilişim ise bilgi ve iletişim teknolojileri kullanımını içermektedir. Tarım sektöründe bilişim teknolojilerin kullanılması tarımsal faaliyetleri daha verimli kullanılmasını sağlar. Tarım ve bilişim arasındaki iş birliği tarım sektöründeki verimliliği artırmaktadır. Bu konuda yapılan çalışmalar şöyledir. Yapılan akıllı tarım uygulamaları ve tarım sektöründe ciddi yatırımlar gerçekleşse de üretime geçildiği zaman hala birçok problemle karşılandığı hem bu konudaki uzman kişilerle görüşmede hem de çeşitli araştırmalar sonucunda gözlemlenmiştir. Özellikle kırsal kesimde çalışan çiftçilerde atadan kalma bilgiler, ziraat mühendislerine danışmayı reddetme ve yanlış zirai mücadeleler sonucunda ürünlerine zarar gelmektedirler. Bu durum üretimde verimsizliği sebep olmaktadır (TC Kalkınma Bakanlığı, 2018;



Kaya, 2019, Yavuz ve Dilek, 2019). Kalaxylos internet üzerinde web tabanlı sistemler arasında bilgi paylaşımı sağlayan çalışmalar yürütmüştür. Bu yazılım sistemlerinde üretim bilgileri, dış etkinlerin ürüne verdiği zarar gibi etkenlerin önüne geçilmektedir. Bu yazılım sistemlerinden bazılarında font- end için HTML,CSS ve JavaScript gibi yazılım dilleri, back-end için PHP ve SQL yazılım dilleri kullanılmıştır. Bu web sayfasında hasat verileri, üretime etkileyen faktörler ile hazır bir rapor oluşturarak çiftçiye destek olunmaktadır (Leonat vd. 2019). İnternet üzerinde web tabanlı sistemler arasında bilgi paylaşımı sağlayan çalışmalar yürütülmüştür(Kaloxyllos vd. 2012).Tarım ve hayvancılık sektöründe ise özellikle küçük işletmeler için kullanımı kolay bilgisayar yazılımları ile karşılaşabileceği riskleri önceden tahmin etmek ve tarımda kar ve verimliliği artırmıştır.Bu yazılım sisteminde üretici bilgileri,üretim bilgileri ve dış etkenlerden gelen veriler kullanılarak çiftçiye bir destek sistemi hazırlanmıştır (Akin vd. 2014).Bir farklı çalışmada ise çevresel faktörlerin tarımı nasıl etkilediği vurgulanmış ve çevresel faktörleri(sıcaklık ,hava,nem,toprak)'in gözlemi için IQT sistemi kullanılmıştır.Tarımda yaşanan sorunların üstesinden gelmek için Öztürk vd.(2012) çalışmalarında Arduino kullanarak akıllı sera sistemi önermiştir.Bu sistemde sera içerisindeki günlük işler otonom olarak gerçekleştirilmektedir.

Sonuç olarak tarım ve bilişim birbirini tamamlayan iki alandır. Teknolojinin tarıma entegrasyonu tarımsal verimliliği daha üst seviyeye taşıyacaktır. Bu sayede dünya nüfusunu artan gıda ihtiyaçlarına çözüm bulmak ve tarım sektörünün geleceğini güvence altına alınmış olacaktır.

### YÖNTEM

Çalışma kapsamında yapılan web sayfasının yapımında ilk başta ziraat mühendisleri ve çiftçiler ile görüşülmüştür. Bu görüşmelerde elde edilen sonuçlardan sonra tarımda uğraşan kişilere destek olmak amacıyla bir web sayfasının hazırlanması fikri ortaya çıkmıştır. Bu sebeple ilk olarak yaptığımız web sayfasının temelleri atılmış olup bu konuda yapacağımız web sayfasının bir ön taslağı yapılmıştır ve bu taslak Şekil 1’de gösterilmiştir.



Şekil 1. Web sayfası ana ekran görünümü

Bu noktadan sonra ise yapılacak web sayfasının kodlanması kısmına geçilmiştir. Çiftçilerimizin kolaylıkla kullanılması için HTML ve CSS yazılım dilleri kullanarak bir ara yüz oluşturulmuştur. Çalışma kapsamında yapılan web sayfası temel olarak iki farklı modülünden oluşmakta olup ilk modül olan ürünler modülüdür. Bu modülün oluşturulma sebebi yapılan görüşmelerde tarım konusundaki en büyük eksiklik çiftçilerimizin ürün hakkında yetersiz bilgiye sahip olması, yeni teknolojik gelişmelere hâkim olmaması vb. nedenlerle üründe istenen verime ve kaliteye ulaşamamasıdır. Bu modül ülkemizde yetiştirilen ürünlerle ilgili bilgiler içermektedir. Çiftçilerimiz yetiştirecekleri ürüne dair çeşitli bilgilere bu modül aracılığıyla kolay bir şekilde ulaşabileceklerdir. Bu ara yüzde Türkiye’de yetişen ürünler HTML kodları ile oluşturulmuş olup, CSS kodları ile biçimlendirilerek bu kodların görselleştirilmesi sağlanmıştır. Bu yapılan biçimlendirme ve görselleştirme ile çiftçilerimizin web sayfasındaki bilgilere ulaşması kolaylaştırılmış olup görseller ile de bilgilerin pekiştirilmesi amaçlanmıştır. Şekil 2’de gösterilmiştir.



Şekil 2. Web sayfasının ürün modülü'nün görünümü

Günümüzde gelişen teknoloji ve bu teknolojinin getirdiği yenilikler insanlara önemli fayda sağlamaktadır. Biz de bu çalışmamızda günümüz teknolojisinin bize sunduğu fırsatları değerlendirerek çiftçilerimizin günlük hayatta karşılaştığı sorunlara çözüm üretilecektir. Bunun için çiftçiler ve yetkili kişileri bir araya getirmek için bir sorun modülü tasarladık. Sorun modülüne gelindiğinde ise destek talebi sisteminde ara yüz oluşturmak için HTML, CSS kullanılmış olup PHP ve SQL kodları ile de kullanıcıların destek talebi gönderilmesi sağlanmıştır. Şekil 3'de gösterilmiştir.

Ticketing System

Gönderi Oluştur

Başlık

Email

Mesajınız

Dosya Seçiniz

Dosya Seç Dosya seçilmedi

Create

Şekil 3. Sorun paylaşma modülünün görünümü

Destek sisteminde sorunları yazı ve görsel olarak paylaşabileceği bir ara yüz geliştirilmiştir ve bu gönderiler yetkili kişilerin destek taleplerini görebileceği ara yüze düşmektedir. Çiftçilerimizin ve yetkili kişilerin kayıt yapma ve giriş yapması için HTML, CSS ve PHP kodları kullanarak bir sistem hazırlanmıştır ve ekran görüntüsü Şekil 4'de gösterilmiştir. Bu destek sistemindeki gönderiler ise bir veri tabanında depolanacaktır



## Kayıt Sistemine Hoşgeldiniz

Kullanıcı Ad

E-mail Adresi

Parola

Parola Tekrar

Kaydet

Giriş Yap

Şekil 4. Kayıt olma modülü'nün görünümü

### SONUÇ

Bu çalışmada çiftçiler için web tabanlı destek sisteminin önemi ve potansiyeli incelenmiştir. Bu inceleme sonucunda bu sistemin çiftçilere karşılaştığı zorlukları ve çiftçilerin beklentilerini karşılamaktadır. Çiftçiler bu sistem ile tarım faaliyetlerini daha etkili bir şekilde yürütmeye yardımcı olacaktır. Bu sistemin kullanımı ile çiftçiler, tarımsal verimliliği artırırken aynı zamanda doğru bilgilerin kullanımı ile karşılaştığı riskleri minimum seviyeye indirmiş olacaktır. Özellikle çiftçilerin günlük işlerde karşılaştığı sorunları uygulamadan yetkili kişilere ileterek hızlı ve doğru çözümlere ulaşmış olacaklardır. Bunun haricinde çiftçilerin yetiştirdiği diğer ürünleri konusunda bilgi edinmek için web sitedeki ürünler modülü aracılığı ile yetiştireceği veya yetiştirmekte olduğu ürünü hakkında birçok bilgiye de ulaşabileceklerdir. Ancak bu çalışmada birtakım zorluklar da ortaya çıkabilmektedir. Bu sorunların başında altyapı yetersizliği, sınırlı internet erişimi, internet kullanımı hakkında bilgiye sahip olmama ve eğitim eksikliği gibi sorunlar bulunmaktadır. Bu nedenler bu sistemin yaygın olarak kullanılması için bu sorunların ele alınması ve çözümlerin gerçekleştirilmelidir. Çiftçilerin bu sistemin varlığından haberdar edilmeli ve bu sistem hakkında bilgilendirilmelidir. Sonuç olarak web tabanlı tarım destek sistemi çiftçilerimize önemli katkı sağlayacaktır. Ancak çiftçilerimizin bu platformu rahat bir şekilde kullanması için internet altyapılarının geliştirilmesi ve güçlendirilmesi gerekirken bir yandan da çiftçilerin bilgilendirilmesi gerekmektedir.

### ÇIKARIM

Çiftçiler için web tabanlı destek sistemi, çiftçilerin tarımsal faaliyetlerini daha etkin bir şekilde uygulamaları ve tarımda verimliliği artırmaları için yardımcı olan bir web tabanlı destek sistemidir. Bu destek sistemi çiftçilerimize karar verme sürecinde yol gösterecektir. Web tabanlı destek sistemi çiftçilerimize sunduğu temel içerikler; sorun modülü ve ürün bilgi modülüdür. Sorun modülü; çiftçilerimizin günlük hayatta karşılaştığı sorunları yetkili kişiler ile paylaşarak sorunlarına çözüm bulabileceği modüldür. Ürünler modülü; Türkiye'deki bölgelerde yetişen ürünlere dair her türlü bilgileri içermektedir. Bu sayede çiftçiliklerimiz için bir yol haritası olmuş olacaktır. Web tabanlı destek sistemi çiftçilerimize daha doğru karar alma, tarımda verimliliği artırma ve bilgi kaynaklarını daha doğru bir şekilde kullanmalarına yardımcı olacaktır. Aynı zamanda çiftçilerimizin arasındaki iletişim ve tarım sektöründeki bu platform yayılması destekleyerek tarım sektörünü bir üst seviyeye taşımış olacağız.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## TEŞEKKÜR

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ÜNİVERSİTE ÖĞRENCİLERİNİN EKOLOJİK VATANDAŞLIK DÜZEYLERİNİN İNCELENMESİ

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#### ÖZET

Bu çalışma, üniversite öğrencilerinin ekolojik vatandaşlık düzeylerinin sosyo-demografik özellikler açısından incelenmesi amacıyla tanımlayıcı tipte yapılmıştır. Araştırmanın çalışma grubunu üniversite eğitimi alan farklı sosyo-demografik özelliklere sahip, çalışmaya katılmayı gönüllü olarak kabul eden 215 öğrenci oluşturmaktadır. Araştırmanın verileri, anket formu aracılığıyla elde edilmiştir. Hazırlanan ankette öğrencilerin ekolojik vatandaşlık düzeylerini belirlemek amacıyla Karatekin ve Uysal (2018) tarafından geliştirilen “Ekolojik Vatandaşlık Ölçeği (EVÖ)” kullanılmıştır. Öğrencilerin ekolojik vatandaşlık düzeyleri ile değişkenler arasındaki ilişkiyi belirlemeye yönelik elde edilen veriler değerlendirilirken grup sayısı iki ise İki Grup Arasındaki Farkın Anlamlılık Testi, grup sayısı ikiden fazla ise Tek Yönlü Varyans Analizi (ANOVA) kullanılmıştır. Yapılan analiz sonuçlarına göre, öğrencilerin ekolojik vatandaşlıklarının yüksek düzeyde olduğu belirlenmiştir. Bununla birlikte, öğrencilerin cinsiyeti, aile gelirine ilişkin görüşü, üniversite okurken kaldığı yer, en uzun süre yaşadığı yer ve babasının eğitim durumu ile EVÖ ve alt boyutları arasında istatistiksel açıdan anlamlı bir ilişki bulunmazken ( $p>0.05$ ); öğrenim gördüğü sınıf ile “Katılım” alt boyutu ve EVÖ, annesinin eğitim düzeyi ile “Sürdürülebilirlik” alt boyutu, çevre ile ilgili STK’ya üye olma durumu ile “Sorumluluk”, “Katılım” alt boyutları ve EVÖ; çevre ile ilgili ders alma durumu ile “Sürdürülebilirlik”, “Sorumluluk” alt boyutları ve EVÖ, çevre dersinin gerekliliğine ilişkin görüş ile “Hak ve Adalet” alt boyutu, çevre konulu etkinliklere katılım ile “Sorumluluk”, “Katılım” alt boyutları ve EVÖ arasında istatistiksel olarak anlamlı bir farklılık bulunmaktadır ( $p<0,05$ ). Elde edilen bulgular alanyazında konuyla ilgili yapılan çalışmalarla tartışılmış ve öneriler sunulmuştur.

**Anahtar Kelimeler:** ekolojik vatandaşlık, sürdürülebilirlik, çevre, üniversite öğrencileri

#### ABSTRACT

This descriptive study aimed to assess the ecological citizenship levels of university students in relation to their socio-demographic characteristics. The research sample comprised 215 undergraduate students from varied socio-demographic characteristics who willingly participated in the study. The Ecological Citizenship Scale (ECS) developed by Karatekin and Uysal in 2018 was used to evaluate the relationship between the students' ecological citizenship levels and the variables. According to the results of the study, the students' ecological citizenship was found to be at high level. While there was no statistically significant relationship between the gender of the students, their opinions on family income, their residence while studying at university, place to live longest, and their father's education level in relation to ECS and its sub-dimensions ( $p>0.05$ ); statistically significant differences were found in various

aspects, including the "Participation" sub-dimension and ECS related to the students' field of study, the "Sustainability" sub-dimension and the level of education of the mother, "Responsibility", "Participation" sub-dimensions and ECS and being a member of an environmental association; between taking environmental courses and "Sustainability" and "Responsibility" sub-dimensions and ECS; between the opinion on the necessity of the environmental course and "Rights and Justice" sub-dimension; between participation in environmental activities and "Responsibility", "Participation" sub-dimensions and ECS ( $p<0.05$ ). The results obtained were discussed with the relevant studies in the literature, and recommendations were presented.

**Keywords:** ecological citizenship, sustainability, environment, university students

### GİRİŞ

Çevre; “insanların ve diğer canlıların hayatları boyunca ilişkilerini sürdürdükleri ve karşılıklı olarak etkileşim içinde buldukları biyolojik, fiziki, sosyal, kültürel ve ekonomik ortamdır. Bir başka ifade ile yeryüzünde ilk canlı ile birlikte var olan çevre, bir organizmanın var olduğu ortam ya da şartlar”dır (T.C. Çevre ve Şehircilik Bakanlığı, 2020). Güney’in (2004) tanımına göre ise çevre, “canlı varlıkların yaşamsal bağlarla bağlı oldukları, etkiledikleri ve aynı zamanda çeşitli yollardan etkilendikleri bir ortam”dır.

Ekoloji ise; “canlı varlıkların oranlarını, niceliğini ortaya koyan ve varlıkların çevreleriyle gerçekleşen etkileşimlerinin bağlarını inceleyen bir bilim dalı”dır (Yıldırım, 2017). Hızlı nüfus artışı, insan faaliyetlerinden kaynaklanan sanayileşme, kentleşme, tarımda bilinçsiz uygulamalar, enerji santrallerinin yapımı vb. nedenlerle tarımsal alanların kirlenmesi ve tarım yapabilecek şartların ortadan kalkması sonucunda ekolojik denge bozulmuş, çevresel sorunlar meydana gelmiştir. Çevresel sorunlar topluma olumsuz etkilerde bulunmakta, artık toplumsal bir sorun olarak kabul edilmektedir (Eren Bana, 2020). Bu çevre sorunlarının giderilebilmesi ‘sürdürülebilirlik’ olgusu üzerinde durulmasını gerektirmektedir. Sürdürülebilirlik, “günümüzde var olan kaynakların gelecekte de var olması ve doğa ile yapılabilen tüm olumlu faaliyetlerin gelecek nesiller için de yapılabilmesine olanak sağlaması”dır (Oktaç, 2012). Çevrenin sürdürülebilirliğinin sağlanması için ise bireylerin ekolojik vatandaşlık bilincine sahip olmaları gerekmektedir (Özden ve Öztürk, 2019). Çevresel sorunlar sistemli bir şekilde birbirlerini karşılıklı olarak etkilemeleri nedeniyle çevre sorunlarının karmaşıklığını anlamlandırabilen, sorunların çözümüne odaklanan ve yeni sorunların oluşmaması adına önlem alma konusundaki faaliyetlerde aktif rol oynayan vatandaşlara ihtiyaç duyulmaktadır (Goldman vd., 2020). Ekolojik vatandaşlık, “dünya vatandaşları olarak insanları, toplulukları ve kuruluşları çevresel hakları ve sorumlulukları dikkate almaya teşvik eden bir vatandaşlık türü”dür. Ekolojik vatandaşlığın en çok vurgulanan dört boyutu bulunmaktadır. Bunlar sorumluluk, sürdürülebilirlik, haklar ve adalet ile katılımdır (Uysal, 2018). Ekolojik sorunlara çözüm arayan sorumluluk sahibi bir vatandaş, yaşanan problemlere yönelik tek bir noktada toplanmalıdır. Sorumluluk sahibi bireyler biyolojik çeşitliliğin ve ekosistemin korunması ve sürekliliğinin sağlanmasını temel ilke olarak benimsemektedir (Mengi ve Algan, 2003). Hak ve adalet duygusu gelişen ekolojik bir vatandaş sadece kendisinin veya ülkesinin halkının yaşadığı sorunlarla değil, tüm dünya ülkelerinin sorunları ile ilgilenir (Kılıç ve Tok, 2014). Katılım, bireyin çevresel yönetim süreçlerinde aktif rol oynamasını ve yaşamlarını şekillendirebilmeyi sağlayan süreci ifade etmektedir (Keleş vd., 2005). Sürdürülebilirlik ise, çevrenin korunmasında herhangi bir ayırım yapmaksızın herkesin uyum içinde olabileceği, sosyal ve ekonomik faaliyetleri de içine alan yaşam biçimidir (Koca, 2021). Tüm boyutları ele alınarak ekolojik vatandaşlık kavramının bir tanımı yapılmak istenirse, “henüz doğmamış kuşaklara karşı sorumluluğu olduğunu ve bugünün davranışının yarının insanları üzerinde etkili olacağını düşünen sorumluluk sahibi bireyler” şeklinde tanımlanabilir (Dobson, 2003).

Sürdürülebilir Gelişme ve Araştırma Ağı (The Sustainable Development Research Network/SDRN), ekolojik vatandaş olan bireylerde bulunması gereken bazı özellikleri sıralamışlardır (Uysal, 2018):

1. Ekolojik vatandaş, tüm canlıların besin kaynaklarını da düşünerek alternatif çevre anlayışını benimsemektedir.
2. Ekolojik vatandaş, çevre bütünlüğünü önemseyerek “sürdürülebilir çevre” yaratmaya özen gösterir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Tüm canlıları dikkate alarak önemli risk faktörlerine (iklim değişimi vb.) ortak çözüm yolları üretir.

3. Ekolojik vatandaş, eko davranışların temelinde etik davranışların yer aldığı bilir.

4. Ekolojik vatandaş, tüm dünyayı kapsayan bir adalet anlayışına sahip olduğuna inanır.

5. Ekolojik vatandaş, sorumlulukları gereği ekolojik olmayan bireylere göre bazı açılardan farklı davranışlara sahiptir.

6. Geleneksel vatandaşlık anlayışında insanların birbirine ve yakın çevresine karşı sorumluluklarına odaklanılırken; ekolojik vatandaşlık anlayışında tüm canlılara karşı hak, sorumluluk ve katılım gibi boyutlara dikkat çekilmektedir.

Birleşmiş Milletler Eğitim, Bilim ve Kültür Kurumu (UNESCO), gelecek nesillere sürdürülebilir bir miras bırakmak için gezegenimizin korunması çağrısında bulunmuş; bu hedefte başarılı olabilmek için eğitim, araştırma, teknoloji, finansman, üretim ve tüketim vb. bazı alanlarda önerilerde bulunmuştur. Bireylerin çevre hakkındaki görüş ve tutumları, çevreye yönelik sorunların yaşanmasında önemli bir rol oynamaktadır. Bu nedenle, bireylerin görüş ve tutumlarının çevre dostu olması ancak eğitim yoluyla sağlanabilir (Kanbak, 2015). Bireylerin çevre konusunda eğitim alarak çevreye duyarlı vatandaşlar olması, sürdürülebilir bir miras bırakmanın temelini oluşturmaktadır.

Literatür incelendiğinde gerek ülkemizde (Özdemir Özden, 2011; Erdilmen, 2012; Kayasandık, 2015; Karatekin ve Uysal, 2018; Karatekin, Salman ve Uysal, 2019; Koca, 2021; Demirer, 2021; Uysal ve Karatekin, 2022; Sevim, 2023) gerekse yabancı ülkelerde (Barr, 2003; Jagers ve Matti, 2014; Green, Medina-Jerez ve Bryant, 2016) ekolojik vatandaşlık ile ilgili yapılmış sınırlı sayıda araştırma bulunmaktadır. Bu araştırmalardan Bülbül ve Yılmaz (2019) sosyal bilgiler öğretmen adaylarının, Yılmaz vd. (2019) fen bilgisi öğretmen adaylarının, Karatekin vd. (2019) öğretmen adaylarının, Uysal ve Karatekin (2022) ise sınıf öğretmeni adaylarının ekolojik vatandaşlık düzeylerini incelemiştir.

Gençler, ekonomik ve sosyal sorunları yoğunlaştıran, çevrenin kötüleşen durumundan kaynaklanan, çevresel sorunların olduğu bir dünyada yetişmek zorunda kalmaktadır (Pe'er v., 2013). Bu çevresel sorunlar birbiriyle ilişkili olup birbiri ile bağlantılıdır. Böyle bir dünya, çevre sorunlarının karmaşıklığını kavrayabilen, çevresel-sosyal sürdürülebilirlik fikrine bağlı, mevcut sorunların çözümü ve yeni sorunların oluşmasını önleme yönündeki eylemlere aktif olarak katılan bir vatandaşa gereksinim duyar. Ekolojik vatandaş hem özel hem de kamusal alanlarda çevresel hak ve yükümlülüklerini uygulayan aktif olarak dahil olan bir bireydir (Goldman vd., 2020). Tüm bu özelliklere sahip bireyler ekolojik vatandaş olarak nitelendirilebilir. Bireylerin bu özelliklere sahip olabilmesi için onlarda ekolojik vatandaşlık bilincinin küçük yaşlardan itibaren kazandırılması gerekir. Öncelikle gelecek nesillerin devamı olacak üniversite öğrencilerinin ekolojik vatandaşlık düzeylerinin tespit edilmesi bu açıdan önem arz etmektedir.

Bu çalışma, lisans eğitimi alan öğrencilerin ekolojik vatandaşlık düzeylerinin sosyo-demografik özellikleri açısından incelenmesi amacıyla planlanmıştır. Bu kapsamda araştırmada aşağıda yer alan sorulara cevap aranmıştır:

1. Üniversite öğrencilerinin bazı sosyodemografik özellikleri (cinsiyet, okuduğu sınıf, kaldığı yer, en uzun süre yaşadığı yer vb.) açısından EVÖ ve alt boyutlarından aldıkları puan ortalaması farklılık göstermekte midir?

2. Üniversite öğrencilerinin çevre konularına karşı ilgi ve eğilimleri açısından EVÖ ve alt boyutlarından aldıkları puan ortalaması farklılık göstermekte midir?

## YÖNTEM

### Araştırmanın Deseni, Evren ve Örneklemi

Bu çalışma, üniversite öğrencilerinin ekolojik vatandaşlık düzeylerinin sosyo-demografik özellikleri açısından incelenmesi amacıyla tanımlayıcı tipte yapılmıştır. Araştırmanın evrenini üniversite eğitimine devam eden öğrenciler oluştururken; çalışma grubunu lisans eğitimi alan farklı sosyo-demografik özelliklere sahip, çalışmaya katılmayı gönüllü olarak kabul eden 215 öğrenci oluşturmaktadır.



### Veri Toplama Yöntem ve Araçları

Çalışmada veri toplamak amacıyla iki bölümden oluşan anket formu hazırlanmıştır. Anket formu sosyo-demografik özellikler (cinsiyet, yaş, okuduğu sınıf, okurken yaşadığı yer, ailenin toplam aylık geliri, anne-baba eğitim düzeyleri, en uzun süre yaşadığı yer) ve çevre konularına karşı ilgi ve eğilimlerini (çevreyle ilgili herhangi bir STK'ya üyelik durumu, üniversitede çevre ile ilgili ders alma durumu çevre dersinin gerekliliğine ilişkin görüş ve çevre konusunda düzenlenen etkinliklere katılma durumu) belirlemeye yönelik sorular ile Karatekin ve Uysal (2018) tarafından geliştirilen Ekolojik Vatandaşlık Ölçeği'nin (EVÖ) yer aldığı iki bölümden oluşmaktadır. EVÖ, 24 madde ve 4 alt boyuttan (Katılım (8 madde), Sürdürülebilirlik (7 madde), Sorumluluk (6 madde), Hak ve Adalet (3 madde)) oluşmaktadır. "Katılım" alt boyutu çevre sorunlarının çözümü için eylem gerektiren davranışları, "Sürdürülebilirlik" daha çok doğal kaynakların ve enerji kaynaklarının tasarruflu kullanımına yönelik davranışları, "Hak ve Adalet" yaşadığımız çevrenin dışındaki yerler ve insanlar içinde gösterilmesi gereken davranışları, "Sorumluluk" insanların daha çok yaşadığı çevreyle ilişkili olduğu düşünülen davranışları ölçmeye yöneliktir. Ölçekten alınan puan yükseldikçe ekolojik vatandaşlık düzeyleri yükselmektedir. Ölçek 5'li likert tipi bir ölçektir. 1: Hemen hemen hiç, 2: Nadiren, 3: Bazen, 4: Genellikle, 5: Her zaman olarak puanlanmıştır. Ölçeğin iç tutarlılık güvenirlik katsayısının 0.901 olduğu belirtilmiştir. Bu çalışmada ise Cronbach alfa katsayısı 0.917 olarak "Yüksek derecede güvenilir" bulunmuştur (Alpar, 2011, s.815).

### Veri Toplama Süreci

Veriler, araştırmacılar tarafından hazırlanan Google Forms aracılığıyla toplanmıştır. Çevrim içi anket linki araştırmacıların öğrencilerine, öğrenciler aracılığıyla da farklı öğrencilere gönderilmiştir. Katılımcılara çevrim içi anket formuna erişimlerinden önce çalışma hakkında bilgi verilmiş olup; araştırmanın amacı, araştırma formuyla elde edilen bilgilerin bilimsel amaçla kullanılacağı, bilimsel etik kuralları çerçevesinde gizlilik içinde değerlendirileceği ve başka bir amaçla kullanılmayacağı belirtilmiştir.

### Verilerin Analizi

Çalışmada veriler SPSS programı kullanılarak değerlendirilmiştir. Katılımcılara ilişkin demografik ve açıklayıcı bilgiler frekans, yüzde, ortalama ve standart sapma gibi tanımlayıcı istatistiklerle ifade edilmiştir. Araştırma hipotezlerinin testinde İki Grup Arasındaki Farkın Anlamlılık Testi ve Tek Yönlü Varyans Analizi (ANOVA) testleri yapılmıştır. ANOVA sonucunda istatistiksel olarak anlamlı fark saptandığı durumlarda ikili karşılaştırmalar için Tukey Testi kullanılmıştır. Analizlerden elde edilen sonuçlar %95 güven aralığında ve  $\alpha=0.05$  anlamlılık düzeyinde değerlendirilmiştir.

### BULGULAR

Araştırmaya katılan öğrencilerin %89,8'i kadındır. Yaş ortalaması  $21.62 \pm 2.75$  olarak belirlenmiştir. Öğrencilerin %36,3'ü 4. sınıfta, %31,2'si 3. sınıfta öğrenim görmektedir. Katılımcıların ailenin toplam aylık gelirine ilişkin görüşleri incelendiğinde; yarısından biraz fazlası (%58,2) gelirlerinin giderlerine eşit olduğunu belirtirken; eşit oranlarla %20,9 ile gelirlerinin giderlerinden az veya fazla olduğunu belirten öğrenciler de bulunmaktadır. Öğrencilerin %58,1'i yurttan, %25,6'sı ise ailesiyle birlikte kaldığını belirtmiştir. Ayrıca %48,8'i büyükşehirde, %51,2'si ise diğer (il, ilçe ve köylerde) yerlerde en uzun süre yaşadıklarını ifade etmişlerdir. Çalışmaya katılan öğrencilerin %57,7'sinin annesi ilköğretim ve altı eğitim düzeyinde, %27,9'u ise lise mezunu olduğunu belirtmiştir. Babalarının eğitim düzeyi incelendiğinde ise %42,8'sinin ilköğretim ve altı, %36,3'ünün lise, %20,9'unun ise lisans ve üstü eğitim düzeyinde oldukları belirlenmiştir (Tablo 1).



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 1.** Öğrencilerin Sosyo-demografik Özellikleri

Değişkenler	n	%
<b>Cinsiyet</b>		
Kadın	193	89,8
Erkek	22	10,2
<b>Okuduğu Sınıf</b>		
1	24	11,1
2	46	21,4
3	67	31,2
4	78	36,3
<b>Ailenin toplam aylık gelirine ilişkin görüş</b>		
Gelir giderden az	45	20,9
Gelir gidere eşit	125	58,2
Gelir giderden fazla	45	20,9
<b>Okurken Kaldığı Yer</b>		
Ailesiyle birlikte	55	25,6
Yurt	125	58,1
Diğer (yalnız, akrabalarla veya arkadaşlarla birlikte)	35	16,3
<b>En Uzun Süre Yaşanılan Yer</b>		
Büyükşehir	105	48,8
Diğer (İl, ilçe ve köy)	110	51,2
<b>Annenin Eğitim Düzeyi</b>		
İlköğretim ve altı	124	57,7
Lise	60	27,9
Lisans ve üstü	31	14,4
<b>Babanın Eğitim Düzeyi</b>		
İlköğretim ve altı	92	42,8
Lise	78	36,3
Lisans ve üstü	45	20,9
<b>Yaş</b> Ort: 21,62 ±2,75		

Çalışmaya katılan öğrencilerin %15,3'ü çevreyle ilgili faaliyet gösteren bir STK'ya üye olduğunu; %43,3'ü üniversitede çevre ile ilgili (çevrenin korunması, çevre eğitimi vb.) ders aldığını belirtmiştir. Çevre konusunda düzenlenen etkinliklere (seminer, kongre vb) katıldığını belirtenler katılımcıların %34,9'unu oluştururken; katılımcıların neredeyse tamamına yakını (%97,7) üniversitede çevre konusunda dersin verilmesi gerektiğini düşünmektedir (Tablo 2).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 2.** Öğrencilerin Çevre Konularına Karşı İlgi ve Eğilimlerine Göre Dağılımları

Değişkenler	n	%
<b>Çevreyle ilgili faaliyet gösteren herhangi bir STK'ya üyelik durumu</b>		
Evet	33	15,3
Hayır	182	84,7
<b>Üniversitede çevre ile ilgili ders alma durumu</b>		
Evet	93	43,3
Hayır	122	56,7
<b>Çevre konulu dersin gerekliliğine ilişkin görüş</b>		
Evet	210	97,7
Hayır	5	2,3
<b>Çevre konusunda düzenlenen etkinliklere katılma durumu</b>		
Evet	75	34,9
Hayır	140	65,1

Tablo 3.'te Ekolojik Vatandaşlık Ölçeği'nin tanımlayıcı istatistiklerine ilişkin bulgular yer almaktadır. Tablo 3 incelendiğinde; çalışmaya katılan öğrencilerin Ekolojik Vatandaşlık Ölçeği'nden aldıkları puan ortalaması  $4,17 \pm ,71$  olarak bulunmuştur. Ölçekten alınabilecek en yüksek puanın 5 olduğu göz önüne alındığında; öğrencilerin ekolojik vatandaşlıklarının yüksek düzeyde olduğu söylenebilir. Ekolojik vatandaşlığın boyutları incelendiğinde, "Katılım" alt boyutu için üniversite öğrencilerinin ekolojik vatandaşlık düzeyinin düşük, "Sürdürülebilirlik" için orta, "Sorumluluk" ile "Hak ve adalet" boyutları için ekolojik vatandaşlık düzeyinin yüksek düzeyde olduğu görülmektedir (Tablo 3).

**Tablo 3.** Ekolojik Vatandaşlık Ölçeği'nin (EVÖ) Tanımlayıcı İstatistikleri

EVÖ ve Alt Boyutları	n	Min-max	Ort.	Sdt. Sapma
EVÖ	215	2,33-5,00	4,17	,71
Katılım	215	,88-4,38	1,96	,78
Sürdürülebilirlik	215	,86-4,29	3,02	,67
Sorumluluk	215	1,17-5,00	3,46	,82
Hak ve Adalet	215	2,33-5,00	4,14	,71

Çalışmada yer alan öğrencilerin Ekolojik Vatandaşlık Ölçeği ve alt boyut puanlarının cinsiyet en uzun süre yaşanan yer, çevreyle ilgili faaliyet gösteren bir STK'ya üyelik durumu, üniversitede çevre ile ilgili alma durumu, üniversitede çevre konulu dersin gerekliliğine ilişkin görüş ve çevre konusunda düzenlenen etkinliklere katılma durumuna göre farklılaşma durumunu belirlemek için Independent Samples T testi; okuduğu sınıf, ailenin toplam aylık gelirine ilişkin görüş, okurken kaldığı yer, ebeveynlerinin eğitim düzeyleri açısından farklılaşma durumunu belirlemek için ANOVA testi yapılmıştır (Tablo 4 ve Tablo 5).

Yapılan analiz sonuçlarına göre, öğrencilerin cinsiyeti, aile gelirine ilişkin görüşü, üniversite okurken kaldığı yer, en uzun süre yaşadığı yer ve babasının eğitim durumu ile EVÖ ve alt boyutlarının ortalama puanları arasında istatistiksel açıdan anlamlı bir fark bulunmamıştır ( $p>0.05$ ). Bununla birlikte, öğrencilerin öğrenim gördüğü sınıf ile EVÖ ve "Katılım" alt boyutunun ortalama puanları arasında istatistiksel açıdan anlamlı bir fark bulunmuştur ( $p<0.05$ ). Hangi gruplar arasında fark olduğu belirlemek için yapılan Post hoc analizinin sonuçları incelendiğinde; "Katılım" alt boyutu ve ölçek genel puanları açısından 2. sınıfta okuyan öğrencilerin 4. sınıfta okuyan öğrencilere göre ortalama puanlarının daha yüksek olduğu saptanmıştır. Bu bulgulara göre 2. sınıf öğrencilerinin çevre sorunlarının çözümünde 4. sınıf öğrencilerine göre çevre sorunlarının çözümüne yönelik daha katılımcı davranışlar sergilediği ve ekolojik vatandaşlık düzeylerinin yüksek olduğu söylenebilir (Tablo 4).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Çalışmaya katılan öğrencilerin annesinin eğitim düzeyi ile “Sürdürülebilirlik” alt boyutu boyutunun ortalama puanlar arasında istatistiksel açıdan anlamlı bir fark bulunmuştur ( $p<0.05$ ). Yapılan Post hoc analizinin sonuçları incelendiğinde; annesi lisans ve üzeri eğitim düzeyine sahip öğrencilerin “Sürdürülebilirlik” puan ortalamalarının annesi ilköğretim ve daha az düzeyde eğitime sahip olan öğrencilere göre daha yüksek olduğu belirlenmiştir. Diğer bir ifade ile annesi lisans ve üzeri eğitim düzeyine sahip öğrencilerin doğal kaynakların ve enerji kaynaklarının tasarruflu kullanımına yönelik davranışlarda daha çok buldukları söylenebilir (Tablo 4

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo. 4** Öğrencilerin Sosyodemografik Özelliklerine Göre Ekolojik Vatandaşlık Ölçeği ve Alt Boyutlarına İlişkin Karşılaştırma Sonuçları

Değişkenler	n	Ekolojik Vatandaşlık Düzeyi Ort±ss	Ekolojik Vatandaşlık Ölçeği Alt Boyutları			
			Sürdürülebilirlik Ort±ss	Katılım Ort±ss	Sorumluluk Ort±ss	Hak ve Adalet Ort±ss
<b>Cinsiyet</b>						
Kadın	193	2,91±,60	3,02±,66	1,94±,77	3,46±,81	4,17±,71
Erkek	22	2,98±,71	3,01±,81	2,15±,86	3,46±,94	4,16±,68
	<b>t</b>	-,468	,090	-1,210	,018	,038
	<b>p</b>	,640	,929	,228	,986	,976
<b>Ailenin aylık gelirine ilişkin görüş</b>						
Gelir giderden az	45	3,02±,66	3,05±,74	2,09±,81	3,57±,75	4,34±,72
Gelir gidere eşit	125	2,86±,57	2,99±,60	1,89±,73	3,38±,79	4,09±,71
Gelir giderden fazla	45	3,00±,69	3,08±,78	2,05±,85	3,58±,95	4,22±,66
	<b>F</b>	2,250	,350	1,489	1,455	2,250
	<b>p</b>	,108	,705	,228	,236	,108
<b>Okuduğu sınıf</b>						
1	24	2,82±,50	2,82±,44	1,90±,72	3,35±,69	4,26±,71
2	46	3,12±,62	3,22±,64	2,15±,82	3,75±,77	4,23±,74
3	67	2,94±,60	3,02±,65	2,07±,79	3,40±,81	4,18±,64
4	78	2,81±,63	2,97±,74	1,78±,73	3,37±,87	4,09±,75
	<b>F</b>	2,699	2,176	2,948	2,534	,562
	<b>p</b>	,047* (2-4)	,092	,034* (2-4)	,058	,641
<b>En uzun yaşadığı yer</b>						
Büyükşehir	105	2,86±,59	2,96±,67	1,89±,72	3,39±,83	4,15±,68
Diğer	110	2,98±,64	3,08±,67	2,04±,83	3,52±,81	4,19±,73
	<b>t</b>	-1,425	-1,228	-1,401	-1,160	-,396
	<b>p</b>	,156	,221	,163	,247	,693
<b>Anne eğitim durumu</b>						
İlköğretim ve altı	124	2,86±,62	2,93±,70	1,92±,76	3,38±,79	4,17±,75
Lise	60	2,95±,56	3,07±,60	1,96±,76	3,52±,82	4,16±,63
Lisans ve üzeri	31	3,11±,65	3,29±,63	2,14±,87	3,66±,90	4,17±,69
	<b>F</b>	2,020	3,764	,919	1,635	,003
	<b>P</b>	,135	,025*,401 (1-3)	,197	,997	
<b>Baba eğitim durumu</b>						
İlköğretim ve altı		2,88±,63	2,96±,67	1,94±,80	3,36±,79	4,21±,71
Lise		2,95±,60	3,00±,71	2,03±,73	3,55±,81	4,13±,70
Lisans ve üzeri		2,96±,60	3,20±,59	1,90±,82	3,51±,89	4,15±,72
	<b>F</b>	,446	1,986	,489	1,1155	,238
	<b>p</b>	,640	,140	,641	,330	,789
<b>Okurken kaldığı yer</b>						
Ailesi ile birlikte	55	3,05±,60	3,14±,60	2,15±,82	3,58±,79	4,21±,76
Diğer	35	2,92±,57	3,00±,69	1,88±,70	3,59±,82	4,18±,55
Yurt	125	2,865±,63	2,97±,70	1,90±,77	3,37±,82	4,15±,73
	<b>F</b>	1,817	1,189	2,128	1,705	,138
	<b>p</b>	,165	,307	,122	,184	,871

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Tablo 5 incelendiğinde, çalışmaya katılan öğrencilerin çevreyle ilgili STK'ya üye olma durumu ile "Sorumluluk" ve "Katılım" alt boyutları ve EVÖ'den aldıkları ortalama puanlar arasında istatistiksel açıdan anlamlı bir fark bulunmuştur ( $p<0.05$ ). Çevreyle ilgili STK'ya üye olan öğrencilerin "Sorumluluk" ve "Katılım" alt boyutlarından ve ölçeğin genelinden aldıkları puanlar üye olmayan öğrencilere göre daha yüksek bulunmuştur. Bu sonuç, STK'ya üye olan öğrencilerin çevreye yönelik sorumlu davranışlarda bulunduğu, çevre sorunlarının çözümüne yönelik daha katılımcı davranışlar sergilediği ve ekolojik vatandaşlık düzeylerinin yüksek olduğu söylenebilir.

Katılımcıların çevreyle ilgili ders alma durumu ile "Sürdürülebilirlik" ve "Sorumluluk" alt boyutları ve EVÖ'den aldıkları ortalama puanlar arasında istatistiksel açıdan anlamlı bir fark bulunmuştur ( $p<0.05$ ). Çevreyle ilgili ders alan öğrencilerin "Sürdürülebilirlik" ve "Sorumluluk" alt boyutlarından ve ölçeğin genelinden aldıkları puan ortalamalarının çevreyle ilgili ders almayan öğrencilerden daha yüksek bulunmuştur. Elde edilen bulgulara göre, öğrencilerin doğal kaynakların ve enerji kaynaklarının tasarruflu kullanımına yönelik davranışlarda daha çok buldukları ve daha fazla sorumluluk duydukları ve ekolojik vatandaşlık düzeylerinin yüksek olduğu söylenebilir (Tablo 5).

Çalışmaya katılan öğrencilerin çevre konulu dersin gerekliliğine ilişkin görüşü ile "Hak ve Adalet" alt boyutundan aldıkları ortalama puanlar arasında istatistiksel açıdan anlamlı bir fark bulunmuştur ( $p<0.05$ ). Çevre konulu dersin gerekliliğine inanan öğrencilerin "Hak ve adalet" alt boyutundan aldıkları puan ortalamaları diğer öğrencilere göre yüksektir (Tablo 5).

Üniversite öğrencilerinin çevre konulu etkinliklere katılım ile "Sorumluluk" ve "Katılım" alt boyutları ve EVÖ'den aldıkları ortalama puanlar arasında istatistiksel açıdan anlamlı bir fark bulunmuştur ( $p<0.05$ ). Çevre konulu etkinliklere katılan öğrencilerin "Sorumluluk" ve "Katılım" alt boyutlarından aldıkları puanlar katılmayan öğrencilerden daha yüksek bulunmuştur. Bir başka ifade ile çevre konulu etkinliklere katılan öğrencilerin çevreye yönelik sorumlu davranışlarda bulunduğu ve çevre sorunlarının çözümüne yönelik daha katılımcı davranışlar sergilediği sonucuna varılmıştır (Tablo 5).

**Tablo. 5** Öğrencilerin Çevre Konularına İlgi ve Eğilimlerine Göre Ekolojik Vatandaşlık Ölçeği ve Alt Boyutlarına İlişkin Karşılaştırma Sonuçları

Değişkenler	n	Ekolojik Vatandaşlık Düzeyi Ort±ss	Ekolojik Vatandaşlık Ölçeği Alt Boyutları			
			Sürdürülebilirlik Ort±ss	Katılım Ort±ss	Sorumluluk Ort±ss	Hak ve Adalet Ort±ss
<b>STK'ya üyelik durumu</b>						
Evet	33	3,12±,56	3,07±,71	2,25±,69	3,78±,66	4,24±,70
Hayır	182	2,88±,62	3,01±,67	1,91±,78	3,40±,83	4,15±,71
t		-2,031	-,485	-2,302	-2,474	-,615
p		,043*	,628	,022*	,014*	,539
<b>Üniversitede çevre ile ilgili ders alma durumu</b>						
Evet	93	3,04±,58	3,17±,56	2,04±,81	3,63±,77	4,25±,67
Hayır	122	2,83±,62	2,91±,73	1,91±,75	3,33±,83	4,10±,73
t		-2,558	-2,884	-1,206	-2,754	-1,485
p		,011*	,004*	,229	,006*	,139
<b>Çevre konulu dersin gerekliliğine ilişkin görüş</b>						
Evet	210	2,93±,61	3,03±,67	1,97±,78	3,46±,80	4,19±,69
Hayır	5	2,58±,84	2,74±,64	1,67±,62	3,26±1,52	3,26±,98
t		-1,254	-,944	-,846	-,544	-2,926
p		,211	,346	,398	,587	,004*
<b>Çevre konusunda düzenlenen etkinliklere katılma durumu</b>						
Evet	75	3,15±,58	3,14±,67	2,27±,79	3,81±,70	4,19±,65
Hayır	140	2,80±,60	2,96±,67	1,80±,73	3,27±,82	4,16±,74
t		-4,109	-1,938	-4,437	-4,790	-,286
p		,000*	,504	,000*	,000*	,775

## TARTIŞMA

Bu çalışmada üniversite öğrencilerinin ekolojik vatandaşlık düzeyleri belirlenmeye çalışılmıştır. Araştırmaya katılan öğrencilerin neredeyse tamamına yakını üniversitede çevre konusunda dersin verilmesi gerektiğini düşünmektedir. Günümüzde çevre eğitiminin, vatandaşlık eğitiminin bir bölümü olarak düşünülmesi ve okullarda öğrencilere çevre sorunlarına karşı olumlu davranışların vatandaşlık

sorumlulukları ile bütünleştirilerek verilmesi önerilmektedir (Özdemir Özden, 2011; Yılmaz ve Bayrakçeken, 2017).

Çalışmaya katılan öğrencilerin Ekolojik Vatandaşlık Ölçeğinden aldıkları puan ortalaması  $4,17 \pm ,71$  olarak bulunmuştur. Ölçekten alınabilecek en yüksek puanın 5 olduğu göz önüne alındığında; öğrencilerin ekolojik vatandaşlıklarının yüksek düzeyde olduğu söylenebilir. Bu sonuç araştırmaya katılan öğrencilerin %43.3'ünün çevre ile ilgili ders almasından kaynaklanabilir. Bu ise çevre eğitiminin ne kadar önemli ve etkili olduğunu da göstermektedir. Çalışmada ekolojik vatandaşlığın “Katılım” alt boyutu için üniversite öğrencilerinin ekolojik vatandaşlık düzeyinin düşük, “Sürdürülebilirlik” için orta, “Sorumluluk” ile “Hak ve adalet” boyutları için ekolojik vatandaşlık düzeyinin yüksek düzeyde olduğu görülmektedir. Çalışmamızda katılım boyutunda ekolojik vatandaşlık düzeyinin düşük olması istenmeyen bir durumdur ve katılımın artırılması için çaba gösterilmelidir. Uysal ve Karatekin’in (2022) çalışmalarında sınıf öğretmeni adaylarının ekolojik vatandaşlık düzeyinin “Katılım” boyutu hariç orta düzeyde olduğu; “Katılım” boyutunda ise düşük düzeyde olduğu, günümüzde sorumluluk sahibi olan, eyleme dönük katılımcı, sürdürülebilir davranış özellikleri gösteren, yaşanan çevre sorunları karşısında doğaya hak ve adalet duygusu ile yaklaşan bireyler yetiştirilmesinde çevre eğitim programlarının önemli olduğu vurgulanmıştır. Karatekin, Salman ve Uysal’ın (2019) çalışmasında öğretmenlerin ekolojik vatandaşlık düzeyinin orta düzeyde olduğu, “Katılım” boyutunda düşük, “Sürdürülebilirlik” ve “Sorumluluk” boyutunda orta, “Hak ve adalet” boyutunda ise yüksek düzeyde ekolojik bir vatandaş oldukları belirtilmiştir. Altın ve Akcanca’nın (2023) araştırmasında okul öncesi öğretmenliği öğrencilerinin orta düzeyde ekolojik vatandaşlığı benimsedikleri, öğrencilerin ekolojik vatandaşlığın alt boyutu olan “Sürdürülebilirlik” noktasında yüksek, “Hak ve adalet” çok yüksek, “Sorumluluk” orta, “Katılım” da çok düşük olduğu bulunmuştur. Ekolojik vatandaşlığı içtenlikle benimsemiş bireylerden beklenen çevreyi korumak adına yapılan faaliyetlere etkin bir biçimde katılım göstermeleridir (Mengsi ve Zhengke, 2018). Bu bağlamda öğrencilerin çevre koruma adına düşük olan katılım faaliyetinin yüksek düzeyde ulaştırılması ana hedef olmalıdır.

Öğrencilerin cinsiyeti, aile gelirine ilişkin görüşü, üniversite okurken kaldığı yer, en uzun süre yaşadığı yer ve babasının eğitim durumu ile Ekolojik Vatandaşlık Ölçeği (EVÖ) ve alt boyutlarının ortalama puanları arasında istatistiksel açıdan anlamlı bir fark bulunmazken ( $p > 0.05$ ), öğrencilerin öğrenim gördüğü sınıf ile EVÖ ve “Katılım” alt boyutunun ortalama puanları arasında istatistiksel açıdan anlamlı bir fark bulunmuştur ( $p < 0.05$ ). “Katılım” alt boyutu ve ölçek genel puanları açısından 2. sınıfta okuyan öğrencilerin 4. sınıfta okuyan öğrencilere göre ortalama puanlarının daha yüksek olduğu dikkate alındığında 2. sınıf öğrencilerinin çevre sorunlarının çözümünde 4. sınıf öğrencilerine göre daha katılımcı davranışlar sergilediği ve ekolojik vatandaşlık düzeylerinin yüksek olduğu söylenebilir. Sınıf düzeyindeki artışa bağlı olarak çevreye yönelik tutum, algı ve duyarlılığın olumlu yönde değişmesi beklenirken çalışmamızda 2. sınıf öğrencilerinin 4. sınıf öğrencilere göre ekolojik vatandaşlık düzeyinin yüksek çıkması dikkat çekicidir ve ileri çalışmalarla incelenmesi gerekir. Uysal ve Karatekin’in (2022) çalışmasında ekolojik vatandaşlık düzeyi toplam puanı ile cinsiyet değişkeni arasında anlamlı bir farklılık bulunmazken, sınıf öğretmeni adaylarının ekolojik vatandaşlık düzeyinin sınıf düzeyindeki (Sorumluluk ile Hak ve adalet boyutu hariç) artışa bağlı olarak olumlu yönde değiştiği, özellikle 1., 3. ve 4. sınıfta okuyan sınıf öğretmeni adayları karşılaştırıldığında 4. sınıfta bulunan sınıf öğretmeni adaylarının lehine sonuçlara ulaşılmaktadır. Yılmaz vd.’nin (2019) çalışmasında cinsiyete göre öğretmen adaylarının ekolojik vatandaşlık düzeylerinde ve ekolojik vatandaşlık düzeyini oluşturan “Katılım”, “Sürdürülebilirlik” ve “Sorumluluk” alt boyutlarında anlamlı farklılık olmadığı, ancak ekolojik vatandaşlığı oluşturan “Hak ve adalet” alt boyutunda kadın öğretmen adayları lehine anlamlı farklılık olduğu, sınıf düzeyi arttıkça öğretmen adaylarının çevreye yönelik etik tutumlarının yükseldiği belirtilmiştir.

Çalışmada annesi lisans ve üzeri eğitim düzeyine sahip öğrencilerin “Sürdürülebilirlik” alt boyutu puan ortalamalarının annesi ilköğretim ve daha az düzeyde eğitime sahip olan öğrencilere göre daha yüksek olduğu görülmüştür. Bu sonuca göre annesi lisans ve üzeri eğitim düzeyine sahip öğrencilerin doğal kaynakların ve enerji kaynaklarının tasarruflu kullanımına yönelik daha olumlu davranışlarda buldukları, anne eğitim düzeyinin ekolojik vatandaşlık bağlamında önem arz eden bir değişken olduğu söylenebilir. Demirbaş’ın (2016) çalışmasında ise ailenin eğitim durumunun öğrencilerin görüşlerinde bir farklılaşma oluşturmadığı belirtilmiştir.



Çevreyle ilgili STK'ya üye olan öğrencilerin “Sorumluluk” ve “Katılım” alt boyutlarından ve ölçeğin genelinden aldıkları puanlar üye olmayan öğrencilere göre daha yüksek bulunmuştur. Bu sonuca göre, STK'ya üye olan öğrencilerin çevreye yönelik sorumlu davranışlarda bulunduğu, çevre sorunlarının çözümüne yönelik daha katılımcı davranışlar sergilediği ve ekolojik vatandaşlık düzeylerinin yüksek olduğu söylenebilir.

Araştırmada çevreyle ilgili ders alan öğrencilerin “Sürdürülebilirlik” ve “Sorumluluk” alt boyutlarından ve ölçeğin genelinden aldıkları puan ortalamalarının çevreyle ilgili ders almayan öğrencilerden daha yüksek bulunmuştur. Bu bulgu çevre eğitimin ne kadar etkili olduğunu göstermektedir. Bu sonuca göre, çevre konusunda ders alan öğrencilerin doğal kaynakların ve enerji kaynaklarının tasarruflu kullanımına yönelik davranışlarda daha çok buldukları, daha fazla sorumluluk duydukları ve ekolojik vatandaşlık düzeylerinin yüksek olduğu söylenebilir. Çevre eğitimi yaşam boyu sürmesi gereken bir eğitim sürecidir. Çevre eğitiminin bireyin kişiliğinin şekillenmeye başladığı çocukluğun erken dönemlerinden (okul öncesi dönemde) itibaren verilmesi gerekir (Ogelman & Güngör, 2015). Yılmaz vd.'nin (2019) çalışmasında da öğretmen adaylarının ekolojik vatandaşlık düzeylerinde ve “Katılım”, “Sürdürülebilirlik” ve “Sorumluluk” faktörlerinde çevre dersi alanların lehine anlamlı farklılık olduğu belirtilmiştir. Uysal ve Karatekin'in (2022) çalışmasında ise sınıf öğretmeni adaylarının ekolojik vatandaşlık düzeyinin, çevre eğitimi dersi alma durumuna göre (katılım boyutu hariç) anlamlı bir farklılık göstermediği, katılım boyutunda ise çevre eğitimi dersi alan sınıf öğretmeni adaylarının ekolojik vatandaşlık düzeyinin daha yüksek olduğu belirlenmiştir.

Çalışmada çevre konulu dersin gerekliliğine inanan öğrencilerin “Hak ve adalet” alt boyutundan aldıkları puan ortalamaları diğer öğrencilere göre yüksek bulunmuştur. Bu sonuç, çevre konulu dersin gerekliliğine inanan öğrencilerin çevreye yönelik hak ve adalet anlayışlarının diğerlerine göre daha yüksek olduğunu düşündürmektedir.

Araştırmada çevre konulu etkinliklere katılan öğrencilerin “Sorumluluk” ve “Katılım” alt boyutlarından ve ölçeğin genelinden aldıkları puanlar katılmayan öğrencilerden daha yüksek bulunmuştur. Bir başka ifade ile çevre konulu etkinliklere aktif katılan öğrencilerin çevreye yönelik sorumlu davranışlarda bulunduğu ve çevre sorunlarının farkına vararak çözümünde daha katılımcı davranışlar sergilediği ve ekolojik vatandaşlık düzeylerinin yüksek olduğu sonucuna varılmıştır. Bu durum çevre konulu etkinliklere katılan öğrencilerin daha fazla sorumluluk sahibi olması ve katılımcı davranış göstermesiyle açıklanabilir. Üniversite öğrencilerinin katılımcı davranışlarının, çevre sorunlarının çözümü için oldukça önemli olduğu belirtilmektedir. Bu yüzden katılımı destekleyen davranışlar o çevrenin korunması ve sürdürülebilir hale gelmesinde oldukça etkilidir (Karatekin, Kuş & Meray, 2014). Nitekim Karatekin'in (2019) çalışmasında çevresel faaliyetlere katılım sıklığının ekolojik vatandaşlığın tüm boyutlarını pozitif yönde etkilediği belirtilerek, çevresel etkinliklere katılım sıklığının öğretmenlerin ekolojik vatandaşlık davranışlarının açıklanmasında dikkate alınması gereken önemli bir yordayıcı olduğu vurgulanmıştır. Bu çalışmada olduğu gibi çevre konulu etkinliklere katılımın öğrencilerin çevreye yönelik tutum ve davranışlarını olumlu şekilde etkilediğini ortaya koyan araştırmalar da bulunmaktadır (Keleş, Uzun & Varancı Uzun, 2010; Yılmaz vd, 2019).

### SONUÇ VE ÖNERİLER

Sonuç olarak, çevre koşullarına bağlı olarak ortaya çıkan olumsuzlukların azaltılması, ekolojik vatandaşlık düzeyi yüksek bireylerin yetiştirilmesi, çevresel faaliyetlere katılımın sağlanması ve bunun sürdürülebilmesi için ailelere ve eğitim kurumlarına büyük sorumluluk düşmektedir. Bu nedenle eğitim programlarında ekolojik vatandaşlık düzeyini yükseltecek ve sürekliliğini sağlayacak çevre eğitiminin yer alması oldukça önemlidir.

Bu araştırma sonuçlarına göre aşağıdakiler önerilebilir:

- Ekolojik vatandaşlığın katılım alt boyutu için üniversite öğrencilerinin ekolojik vatandaşlık düzeyinin düşük, sürdürülebilirlik için orta, sorumluluk ile hak ve adalet boyutları için yüksek düzeyde olduğu dikkate alındığında; ekolojik vatandaşlığın özellikle katılım ve sürdürülebilirlik boyutlarında farkındalığı artıran etkinliklerin planlanarak uygulamaya geçirilmesi yararlı olacaktır.
- Ekolojik vatandaşlığa ilişkin özellikle katılım, sürdürülebilirlik boyutlarına yönelik nicel ve nitel araştırmalar planlanmalıdır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- Okul öncesinden, üniversite eğitimine kadar her kademedeki ekolojik vatandaşlık ve çevre duyarlılığına ilişkin bilgilendirici, farkındalık yaratacak eğitim programlarına yer verilmelidir.
- Çevre eğitimi kapsamında çevrenin korunmasında sürdürülebilirlik kavramı vurgulanmalıdır. Özellikle üniversite eğitiminde sürdürülebilirlik bağlamında çevrenin korunmasının öncelikle bireysel olarak kişilerin yaşamlarını çevre dostu şekilde düzenlemelerine bağlı olduğu belirtilmelidir.
- Çevre konusunda seminer, panel ve konferanslar düzenlenerek öğrencilerin aktif katılımları sağlanmalıdır.
- Öğrencilerin çevreye karşı tutum ve davranışlarının medyada yer alan etkinliklerden de etkilendiği dikkate alındığında ekolojik vatandaşlık uygulamaları ve sorumlu davranışlara medyada daha fazla yer verilerek farkındalık artırılmalıdır.
- Bu araştırma üniversite öğrencileri ile yapılmıştır. Hem ilköğretim hem de lise eğitimini kapsayacak çalışmaların planlanarak ekolojik vatandaşlığın gelişimi konusunda daha geniş kapsamlı sonuçların elde edilmesi sağlanabilir.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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TIP 2 DİYABETLİ YAŞLI BİREYLERDE BAŞARILI YAŞLANMA VE İLİŞKİLİ  
FAKTÖRLERİN İNCELENMESİ

IN ELDERLY INDIVIDUALS WITH TYPE 2 DIABETES INVESTIGATION OF  
SUCCESSFUL AGING AND RELATED FACTORS

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**ÖZET**

Yaşlılık süreciyle birlikte hem kronik hastalıkların getirmiş olduğu yük hem de duygusal, ruhsal ve sosyal birtakım sorunlarla başa çıkma başarılı yaşlanma sürecinde oldukça önemli hususlar arasında yer almaktadır. Başarılı yaşlanma; hastalıklardan kaçınma, fiziksel ve zihinsel işlevsellik, hayata aktif katılım, hastalığın yokluğu, psikolojik iyi oluş, yaşam tatmini, finansal güvenlik, hayata pozitif bakış açısı ile bakma gibi anlamlarda kullanılmaktadır.

Bu araştırmada tip 2 diyabetli yaşlı bireylerde başarılı yaşlanma ve ilişkili faktörlerin incelenmesi amaçlanmıştır. Tanımlayıcı tipte olan bu araştırma Kasım 2022-Şubat 2023 tarihleri arasında diyabet polikliniğine başvuran tip 2 diyabetli 254 yaşlı hasta ile yürütülmüştür. Verilerin toplanmasında; tanıttıcı bilgi formu ve Başarılı Yaşlanma Ölçeğinden yararlanılmıştır. Verilerin analizinde tanımlayıcı istatistikler, tek yönlü ANOVA ve Student t testleri kullanılmıştır.

Araştırmaya katılan bireylerin yaş ortalaması  $71.16 \pm 3.67$  yıl, HbA1c ortalama değeri ise  $9.31 \pm 0.94$  olup, %54.7'si erkek, %51.2'si ilköğretim mezunu ve %81.5'i evlidir. Yaşlı bireylerin Başarılı Yaşlanma Ölçeği toplam puan ortalaması  $38.73 \pm 2.16$  olarak hesaplanmıştır. Tip 2 diyabetli yaşlı bireylerin Başarılı Yaşlanma Ölçeği toplam puanı ile yaş, cinsiyet, eğitim ve medeni durum arasında istatistiksel olarak anlamlı ilişki belirlenmiştir ( $p < 0,05$ ).

Bu sonuç doğrultusunda tip 2 diyabetli yaşlı bireylerde başarılı yaşlanma düzeyi ve ilişkili faktörlerin belirlenmesi hastalık yönetiminde son derece önemlidir. Diyabet tanısı alan yaşlı bireylere uygulanan hemşirelik bakımının etkin bir şekilde uygulanması ile hasta memnuniyetinin artırılması ve sağlık harcamalarının azaltılabilmesi için başarılı yaşlanma düzeyleri ve ilişkili faktörlerin belirlenmesinin ülkeler için başarılı yaşlanma politikalarının oluşturulmasına önemli ölçüde yarar sağlayacağı düşünülmektedir.

**Anahtar kelimeler:** Başarılı yaşlanma, tip 2 diyabet, yaşlı.

**ABSTRACT**

Coping with both the burden of chronic diseases and some emotional, spiritual and social problems with the aging process are among the very important issues in the successful aging process. Successful aging; It is used in meanings such as avoiding diseases, physical and mental functionality, active participation in life, absence of disease, psychological well-being, life satisfaction, financial security, and looking at life with a positive perspective.



This study aimed to examine successful aging and related factors in elderly individuals with type 2 diabetes. This descriptive study was conducted with 254 elderly patients with type 2 diabetes who applied to the diabetes outpatient clinic between November 2022 and February 2023. In collecting data; Introductory information form and Successful Aging Scale were used. Descriptive statistics, one-way ANOVA and Student's t tests were used to analyze the data.

The average age of the individuals participating in the research was  $71.16 \pm 3.67$  years, the average HbA1c value was  $9.31 \pm 0.94\%$ , 54.7% were male, 51.2% were primary school graduates and 81.5% were is married. The average total score of the elderly individuals on the Successful Aging Scale was calculated as  $38.73 \pm 2.16$ . A statistically significant relationship was determined between the Successful Aging Scale total score of elderly individuals with type 2 diabetes and age, gender and education variables ( $p < 0.05$ ). In line with this result, determining the level of successful aging and related factors in elderly individuals with type 2 diabetes is extremely important in disease management. It is thought that determining successful aging levels and related factors in order to increase patient satisfaction and reduce health expenditures by effectively applying nursing care to elderly individuals diagnosed with diabetes will significantly benefit the creation of successful aging policies for countries.

**Keywords:** Successful aging, type 2 diabetes, elderly.

## GİRİŞ

Dünya Sağlık Örgütü (WHO) ve bu doğrultuda dünya genelinde birçok ülkede, 65 yaş ve üzerinde bulunan bireyler yaşlı nüfus olarak kabul edilmektedir (Türkiye Sağlıkli Yaşlanma Eylem Planı ve Uygulama Programı 2015-2020, 2015; Bosnes ve ark., 2015; Eloranta ve ark., 2012). Son yüzyıl içerisinde yaşam süresinin artmış olması belirlenen çok önemli gelişmelerden birisi olarak tanımlanmakla birlikte, beklenen yaşam sürelerindeki artış ve doğum oranındaki azalma nedeniyle dünya nüfusu her yıl giderek yaşlanmaktadır (Eloranta ve ark., 2012).

Yapılan istatistiklere göre; 2019 yılı itibari ile dünya genelinde 703 milyon kişinin 65 yaş üstü olduğu bildirilmiş olup, 2050 yılında bu sayının iki katına çıkacağı ve 65 yaş üstü birey sayısının 1.5 milyara ulaşacağı öngörülmüştür. Türkiye’de ise 65 yaş üstü nüfus verileri incelendiğinde, 2015 yılında 6 milyon 495 bin 239 kişi olan yaşlı nüfusunun, 2020 yılında %22.5 artarak 7 milyon 953 bin 555 ulaştığı görülmüştür (TUIK, 2021).

Dünya genelinde ve özellikle de gelişmekte olan ülkelerde 65 yaş üstü nüfusun artmasıyla birlikte, kronik hastalıklarda da artış olduğu görülmektedir. Araştırmalara göre yaşlı bireylerin %90’ında bir, %35’inde iki, %23’ünde üç, %15’inde ise dört ve daha fazla kronik hastalık görülmekte olup (United Nations, 2013; World Health Organization, 2019), en sık görülen kronik hastalığın tip 2 diyabet olduğu bildirilmektedir (International Diabetes Federation, 2021; Satman ve ark., 2013).

Yaşlılık süreciyle birlikte hem kronik hastalıkların getirmiş olduğu yük hem de duygusal, ruhsal ve sosyal birtakım sorunlarla başa çıkma başarılı yaşlanma sürecinde oldukça önemli hususlar arasında yer almaktadır (Nakagawa, Cho, & Yeung, 2021). Başarılı yaşlanma; hastalıklardan kaçınma, zihinsel ve fiziksel işlevsellik, hayata aktif katılım sağlama, herhangi bir hastalığın yokluğu, psikolojik iyi olma hali, finansal güvenlik, yaşam tatmini, yaşama pozitif bakma gibi anlamlarda kullanılmaktadır. Başarılı yaşlanma sürecinin aktif hale getirilmesiyle, yaşlının biyolojik, sosyokültürel, ekonomik ve psikolojik kayıpları ve zararlarının en aza indirilmesi hedeflenmektedir (Ng ve ark., 2009).

Yapılan literatür taramasında tip 2 diyabetli yaşlı bireylerde başarılı yaşlanma ve ilişkili faktörleri inceleyen sınırlı sayıda çalışmaya ulaşılmıştır. Yaşlı bireylerde başarılı yaşlanma ve ilişkili faktörlerin incelenmesinin bireyin diyabetini iyi yönetiminin planmasına katkı sağlayacağı düşünülmektedir. Bu araştırmada tip 2 diyabetli yaşlı bireylerde başarılı yaşlanma ve ilişkili faktörlerin incelenmesi amaçlanmıştır.



## **YÖNTEM**

### **Evren ve Örneklem**

Tanımlayıcı tipte olan bu araştırma Kasım 2022-Şubat 2023 tarihleri arasında tip 2 diyabet tanısı konmuş yaşlı hastalar ile İstanbul'da bulunan bir eğitim araştırma hastanesi diyabet eğitim biriminde yürütülmüştür. Ortalama günlük 3 hasta, aylık 90 hasta diyabet eğitim birimi odasına gelmektedir. Bu nedenle araştırmanın evrenini 360 hasta oluşturmuştur. Örneklem büyüklüğünün belirlenmesinde bilinen bir popülasyon için formül hesaplama kullanılmış; %99'luk güven aralığında örneklem büyüklüğünün 254 hasta olması gerektiği tespit edilmiştir.

Araştırmaya dâhil edilme kriterleri; araştırmaya katılmaya gönüllü 65 yaş ve üzeri olmak, en az altı aydır tip 2 diyabet tanısı ile izlenmek, orta ve ileri evre demansı olmamak ve sözel iletişim kurabilmek olarak belirlenmiştir.

Veriler, araştırmacılar tarafından, uygun tüm önlemler alınarak, çalışmaya katılmayı kabul eden hastalar ile yüz yüze görüşme yöntemi kullanılarak diyabet eğitim birimine ait ayrı bir odada toplanmıştır.

### **Veri Toplama Araçları**

Araştırmanın verileri Tanıtıcı Bilgi Formu ve Başarılı Yaşlanma Ölçeği ile toplanmıştır.

Araştırmacılar tarafından hazırlanan Tanıtıcı Bilgi Formu yaşlı bireylerin bireysel özellikleri ve hastalık özelliklerini belirlemeye yönelik toplam 9 soru yer almıştır. Hastaların HbA1C değeri ise son laboratuvar testlerinden alınmıştır.

Başarılı Yaşlanma Ölçeği; Reker tarafından geliştirilmiş olan ölçek 3 alt boyut ve 13 sorudan oluşmaktadır. Türkçe geçerlilik ve güvenilirliği Hazer ve Özsungur tarafından yapılan bu ölçeğin (Cronbach's Alpha: 0.85); Sağlıklı Yaşam Biçimi, Uyumsal Başa Çıkma ve Hayata Bağlılığı sorgulayan 3 alt boyutu bulunmaktadır. Ölçekten en az 10 en fazla 70 puan alınmakta ve puan arttıkça başarılı yaşlanma durumu artmaktadır (Reker, 2009). Bu çalışmada Cronbach's Alpha kat sayısı 0.78 bulunmuştur.

### **Veri Toplama Araçlarının Uygulanması**

Araştırma etik kurul onayı alınarak ve Helsinki Bildirgesi'ne uygun olarak yürütülmüştür. Araştırmacılar tarafından, araştırmaya dahil edilen tüm katılımcılara araştırmanın amacı ve prosedürü sözel olarak anlatılmıştır. Her gönüllüden yazılı bilgilendirilmiş onay alındıktan sonra veri toplama işlemi tamamlanmıştır.

Veriler, araştırmacılar tarafından, uygun tüm önlemler alınarak (hastanın mahremiyeti, güvenlik önlemleri gibi) çalışmaya katılmayı kabul eden hastalar ile yüz yüze görüşme yöntemi kullanılarak diyabet eğitim biriminde ait ayrı bir odada toplanmıştır. Ölçme araçlarının doldurulması ortalama 10-15 dakika sürmüştür.

### **Verilerin Analizi**

Araştırma verileri, SPSS 22.0 (IBM, Armonk, NY, USA) programı kullanılarak değerlendirilmiştir. Verilerin analizinde tanımlayıcı istatistikler, tek yönlü ANOVA ve Student t testleri kullanılmıştır. Sonuçlar %95 güven aralığında değerlendirilmiş ve anlamlılık  $p < 0.05$  olarak kabul edilmiştir.

## **BULGULAR**

Araştırmaya katılan yaşlı bireylerin yaş ortalaması  $71.16 \pm 3.67$  yıl olup, %80.3'ü 65-74 yaş aralığında, %54.7'si erkek, %81.5'i evli, %51.2'si ilköğretim mezunu, %90.6'sının gelir durumu orta düzey olup, %72.8'i sigara içmemektedir (Tablo 1).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 1. Tip 2 Diyabetli Yaşlı Bireylerin Tanımlayıcı Özelliklerinin Dağılımı (n=254)**

Özellikler	n	%
<b>Yaş (yıl)</b>		
65-74	204	80.3
≥75	50	19.7
<b>Cinsiyet</b>		
Kadın	115	45.3
Erkek	139	54.7
<b>Medeni durum</b>		
Evli	207	81.5
Bekar	47	18.5
<b>Eğitim durumu</b>		
Okur-yazar	68	26.8
İlkokul	130	51.2
Ortaokul	56	22.0
<b>Gelir durumu</b>		
İyi	6	2.4
Orta	230	90.6
Kötü	18	7.1
<b>Sigara içme</b>		
Evet	24	9.4
Hayır	185	72.8
Bırakmış	45	17.7

Tip 2 diyabetli yaşlı bireylerin diyabete ilişkin özelliklerinin dağılımı incelendiğinde; HbA1c ortalama değeri ise  $9.31 \pm 0.94$  olarak hesaplandı. Yaşlı bireylerin %47.6'sının ortalama diyabet tanı süresinin 16 yıl ve üzeri, %50.8'inin diyetine dikkat ettiği ve %54.7'sinin de düzenli egzersiz yapmadığı belirlenmiştir (Tablo 2).

**Tablo 2. Tip 2 Diyabetli Yaşlı Bireylerin Diyabete İlişkin Özelliklerinin Dağılımı (n=254)**

Özellikler	Min-Maks	Ort±SS
<b>HbA1c value</b>	7.0-12.1	9.31±0.94
	<b>n</b>	<b>%</b>
<b>Diyabet tanı süresi (yıl)</b>		
≤5	34	13.4
6-10	48	18.9
11-15	51	20.1
16 ve üzeri	121	47.6
<b>Diyetine dikkat etme durumu</b>		
Evet	89	35.0
Hayır	129	50.8
Kısmen	36	14.2
<b>Düzenli egzersiz yapma</b>		
Evet	61	24.0
Hayır	139	54.7
Kısmen	54	21.3

Ort.: Ortalama, SS: standart sapma, Min.-Maks.: Minimum-Maksimum

Yaşlı bireylerin Başarılı Yaşlanma Ölçeği Sağlıklı Yaşam Biçimi alt boyutu puanı  $10.27 \pm 1.23$ , Sorunlarla Mücadele Etme alt boyutu puanı  $28.46 \pm 1.81$  ve toplam puan ortalaması ise  $38.73 \pm 2.16$  olarak hesaplanmıştır (Tablo 3).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Tablo 3. Yaşlı Bireylerin Başarılı Yaşlanma Ölçeği Puan Ortalamaları

Ölçekler	Ort.±SS	Min.-Maks.
<b>Başarılı Yaşlanma Ölçeği</b>		
Sağlıklı Yaşam Biçimi	10.27±1.23	6-15
Sorunlarla Mücadele Etme	28.46±1.81	24-33
<b>Toplam Puan</b>	<b>38.73±2.16</b>	<b>33-45</b>

Ort.: Ortalama, SS: standart sapma, Min.-Maks.: Minimum-Maksimum

Tip 2 diyabetli yaşlı bireylerin bazı tanımlayıcı ve diyabete ilişkin özelliklerine göre Başarılı Yaşlanma Ölçeği toplam puanlarının karşılaştırılması Tablo 4’de verilmiştir. Yetmiş beş yaş ve üzeri yaşlıların 65-74 yaş gurubu olanlara göre, kadınların erkeklerden, evlilerin bekarlara göre, gelir durumu iyi olanların kötü olanlara göre, sigara içmeyenlerin içenlere göre, 5 yıl ve daha az diyabet tanısı konan yaşlı bireylerin 16 yıl ve üzeri tanı alan bireylere göre Başarılı Yaşlanma Ölçeği toplam puanı anlamlı olarak daha yüksek bulunmuştur ( $p<0.05$ ).

Eğitim durumu, diyetine dikkat etme ve düzenli egzersiz yapma durumu ile Başarılı Yaşlanma Ölçeği toplam puanı arasında anlamlı ilişki saptanmadı ( $p>0.05$ ) (Tablo 4).

Tablo 4. Tip 2 Diyabetli Yaşlı Bireylerin Bazı Tanımlayıcı ve Diyabete İlişkin Özelliklerine Göre Başarılı Yaşlanma Ölçeği Toplam Puanlarının Karşılaştırılması

Özellikler	Başarılı Yaşlanma Ölçeği	
	Ort.±SS	İstatistiksel analiz
<b>Yaş (yıl)</b>		
65-74	38.49±2.16	t:-3.670
≥75	39.72±1.89	<b>p: 0.000</b>
<b>Cinsiyet</b>		
Kadın	39.56±1.57	t:-7.413
Erkek	37.73±2.35	<b>p:0.000</b>
<b>Medeni durum</b>		
Evli	38.85±2.07	t:1.844
Bekar	38.21±2.47	<b>p:0.046</b>
<b>Eğitim durumu</b>		
Okur-yazar	38.57±2.13	F:0.717
İlkokul	38.83±2.26	p:0.734
Ortaokul	38.71±1.99	
<b>Gelir durumu</b>		
İyi	38.83±1.83	F:1.941
Orta	38.80±2.16	<b>p:0.030</b>
Kötü	37.88±2.21	
<b>Sigara içme</b>		
Evet	38.22±2.02	F:10.183
Hayır	41.58±2.41	<b>p:0.000</b>
Bırakmış	39.31±0.99	
<b>Diyabet tanı süresi (yıl)</b>		
≤5	39.32±1.22	F:3.360
6-10	38.75±2.03	<b>p:0.000</b>
11-15	38.79±2.21	
16 ve üzeri	38.19±2.56	
<b>Diyetine dikkat etme durumu</b>		
Evet	38.80±2.44	F:0.921
Hayır	38.73±1.98	p:0.526
Kısmen	38.55±2.09	

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## Düzenli egzersiz yapma

Evet	39.13±1.63	F:0.921
Hayır	38.51±2.04	p:0.526
Kısmen	38.87±2.86	

F: One Way Anova Testi, t: t testi.

## TARTIŞMA VE SONUÇ

Araştırmada sosyodemografik faktörlerden kadın olmanın başarılı yaşlanmada önemli bir faktör olduğu belirlendi. Yaşlı popülasyonda yapılan çalışmalarda benzer şekilde kadınların daha başarılı yaşlandığına yönelik çalışmalar ön plana çıkmaktadır (Bosnes et al., 2017, 2019; Ng et al., 2009). Eloranta ve arkadaşları çalışmalarında, kadınların hayata karşı daha pozitif bir tutum içerisinde olduğunu ve Ng ve arkadaşları başarılı yaşlanmanın kadınlarda daha yüksek olduğunu göstermiştir (Eloranta et al., 2012; Ng et al., 2009).

Araştırma bulgularına göre yaşı yetmiş beş yaş ve üzeri olanların, kadınların, evli olanların, gelir durumu iyi olanların, sigara içmeyenlerin, diyabet tanısı süresi kısa olan yaşlı diyabetik bireyler daha başarılı yaşlanmaktadır. Çalışmalarda başarılı yaşlanma genellikle, kronik hastalığın ve disabilitenin olmaması, kognitif fonksiyonların iyi olması ve aktif yaşam şeklinde çalışılmıştır (Nakagawa et al., 2021; Ng et al., 2009). Bireylerin sağlık düzeylerini devam ettirebilmek için diyabet kontrolünü kendileri yaptırabilmeleri de başarılı yaşlanma olarak sayılabilir (Nakagawa et al., 2021). Bunun nedeni bu bireylerin bilişsel fonksiyonlarının iyi olması ve kendi fiziksel ihtiyaçlarını karşılayabilmesi ve mevcut sağlık durumlarını koruyabilmeleri açısından kendi kontrollerini yaptıkları ve sağlık hizmetlerine kolay eriştikleri söylenebilir. Başarılı yaşlanmanın iyileştirilebilmesi için koruyucu sağlık uygulamalarının mevcudiyetinin olması ve bireylerin bunları kullanabilmesi önemlidir (Bosnes et al., 2017). Türkiye’de yaşlı bireylere Sağlık Bakanlığı tarafından sunulan sağlık hizmetlerine yaşlı bireylerin daha kolay ve aynı zamanda ücretsiz ulaşmaları, var olan hastalıklarının erken dönemde tanılanarak tedavi edilmesinin sağlanması, oluşabilecek komplikasyonların zamanında gerekli tedbirlerin alınarak önlenmesi, ve bütün bu uygulamaların sonucunda verilecek olan yaşlı bakım hizmetleri ile yaşlıların yaşam kalitelerinin artırılması amacıyla “Sağlıklı yaşlanma eylem planı ve uygulama programı geliştirilmiş” ve uygulanmaktadır. (Türkiye Sağlıklı Yaşlanma Eylem Planı ve Uygulama Programı 2015-2020, 2015).

Tip 2 diyabetli yaşlı bireylerde başarılı yaşlanma düzeyi ve ilişkili faktörlerin belirlenmesi hastalık yönetiminde son derece önemlidir. Diyabet tanısı alan yaşlı bireylere uygulanan hemşirelik bakımının etkin bir şekilde uygulanması ile hasta memnuniyetinin artırılması ve sağlık harcamalarının azaltılabilmesi için başarılı yaşlanma düzeyleri ve ilişkili faktörlerin belirlenmesinin ülkeler için başarılı yaşlanma politikalarının oluşturulmasına önemli ölçüde yarar sağlayacağı düşünülmektedir

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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TIP 2 DİYABETLİ YAŞLI BİREYLERDE SAĞLIK OKUR YAZARLIĞINI ETKİLEYEN  
FAKTÖRLERİN BELİRLENMESİ

DETERMINATION OF FACTORS AFFECTING HEALTH LITERACY IN ELDERLY  
INDIVIDUALS WITH TYPE 2 DIABETES

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**ÖZET**

Dünyada en sık rastlanan ve tüm diyabetlilerin yaklaşık %90'ını oluşturan tip 2 diyabet orta ve ileri yaşlarda sıklıkla görülmektedir. Tip 2 diyabet bireyin kendisi ve ailesinin yaşamında etkisi olan, tedavi hedeflerine ulaşılmadığında ciddi organ hasarına neden olabilen, tüm bu etkileriyle yaşam kalitesinin ciddi oranda azaltabilen, maliyeti yüksek kronik bir metabolizma hastalığıdır. Bu araştırmada tip 2 diyabetli yaşlı bireylerde sağlık okuryazarlığını etkileyen faktörlerin belirlenmesi amaçlanmıştır. Tanımlayıcı tipte olan bu araştırma Ocak-Mayıs 2023 tarihleri arasında diyabet polikliniğine başvuran tip 2 diyabetli 376 yaşlı hasta ile yürütülmüştür. Verilerin toplanmasında; tanıtıcı bilgi formu ve Sağlık Okur Yazarlığı Ölçeğinden yararlanılmıştır. Verilerin analizinde tanımlayıcı istatistikler ve regresyon analizi kullanılmıştır. Araştırmaya katılan bireylerin yaş ortalaması 71.13±3.81 yıl olup, %58'i erkek, %79.5'si evli, %51.1'i ilkökul mezunu, %94.4'ü çalışmamakta, %92'si ailesiyle birlikte yaşamakta, %89.4'ünün algılanan gelir durumu orta düzey olup, %69.9'u sigara içmemektedir. Yaşlı bireylerin Sağlık Okur Yazarlığı Ölçeği toplam puan ortalaması 55.62±6.19 olarak hesaplanmıştır. Sağlık Okur Yazarlığı Ölçeği toplam puanını; cinsiyet, medeni durum, eğitim durumu, çalışma durumu, ekonomik durum, kiminle yaşadığı ve sigara içme alışkanlıklarının etkilediği saptanmıştır (p<0.05). Tip 2 diyabetli bireylerde kendi sağlığı üzerindeki öz etkililiği ve sorumluluğunu artırmak için sağlık okuryazarlığı düzeyi ve etkileyen faktörleri belirleyerek sağlık okuryazarlığı düzeyinin artırılmasına yönelik eğitim, takip gibi erken dönemde planlamaların yapılması son derece önemlidir.

**Anahtar Kelimeler:** Sağlık okuryazarlığı, tip 2 diyabet, yaşlı.

**ABSTRACT**

Type 2 diabetes, which is the most common type in the world and accounts for approximately 90% of all diabetics, is frequently seen in middle and older ages. Type 2 diabetes is a high-cost chronic metabolic disease that has an impact on the life of the individual and his family, can cause serious organ damage if treatment goals are not achieved, and can significantly reduce the quality of life with all these effects. This study aimed to determine the factors affecting health literacy in elderly individuals with type 2 diabetes. This descriptive study was conducted with 376 elderly patients with type 2 diabetes who applied to the diabetes outpatient clinic between January and May 2023. In collecting data; Introductory information form and Health Literacy Scale were used. Descriptive statistics and regression analysis were used to analyze the data. The average age of the individuals participating in the research is 71.13±3.81 years, 58% are male, 79.5% are married, 51.1% are primary school graduates, 94.4% are not working, 92% are unemployed. They live with their family, 89.4% have a medium perceived income level, and 69.9% do not smoke. The total score average of the elderly individuals on the Health Literacy



Scale was calculated as  $55.62 \pm 6.19$ . Health Literacy Scale total score; It was determined that gender, marital status, educational status, working status, economic status, whom one lives with and smoking habits affect it ( $p < 0.05$ ). In order to increase self-efficacy and responsibility for one's own health in individuals with type 2 diabetes, it is extremely important to make early plans such as education and follow-up to increase the level of health literacy by determining the level of health literacy and affecting factors.

**Keywords:** Health literacy, type 2 diabetes, elderly.

## GİRİŞ

Dünyada en sık rastlanan ve tüm diyabetlilerin yaklaşık %90'ını oluşturan tip 2 diyabet orta ve ileri yaşlarda sıklıkla görülmektedir. Tip 2 diyabet bireyin kendisi ve ailesinin yaşamında etkisi olan, tedavi hedeflerine ulaşılmadığında ciddi organ hasarına neden olabilen, tüm bu etkileriyle yaşam kalitesinin ciddi oranda azaltılabilen, maliyeti yüksek kronik bir metabolizma hastalığıdır. (IDF Diabetes Atlas 10th Ed., 2021; World Health Organization, 2019). Uluslararası Diyabet Federasyonu verilerine göre; dünyada 20-79 yaş arasında 2021 yılında 537 milyon yetişkin diyabetli olduğu bildirilmekte olup, 2030 yılına kadar bu sayının 643 milyona, 2045 yılında ise 783 milyona ulaşacağı öngörülmektedir (IDF Diabetes Atlas 10th Ed., 2021). Türkiye'de de dünya verilerine benzer şekilde diyabet prevalansı 1998-2010 yılları arasında %7.7'den %13.7'e yükselerek %90 oranında artış göstermiştir (Satman et al., 2013). Tip 2 diyabet görülme oranının toplam diyabet vakaları içinde %90-95'ini oluşturduğu, yaşlı nüfusta görülme oranının %32 civarında olduğu bildirilmiştir (World Population Ageing, 2013).

Sağlık Okuryazarlığı bir kişinin sağlık ile ilgili uygun kararı alması, sağlık hizmetlerine ilişkin bilgilere ulaşması, bu bilgileri anlaması ve kararları kullanabilmesi için gerekli olan zihinsel ve sosyal becerilerle sahip olma derecesidir. Sağlık okuryazarlığı yaş, cins gibi demografik özelliklerden, psikososyal faktörlerden, kültürden, bireylerin okuryazarlık düzeyinden, kişisel özelliklerden, hastalıkla ilgili daha önceki deneyimlerden ve sağlık hizmeti sistemi ile ilgili faktörlerden etkilenmektedir. Yetersiz ya da düşük düzeyde olan sağlık okuryazarlığı, bireyin sağlık hizmetlerini etkin bir şekilde kullanmasına engel olurken toplumsal boyutta yaşam kalitesinin azalmasına, morbidite ve mortalitenin artmasına neden olmaktadır (Berens et al., 2016). Literatür incelendiğinde diyabet tanısı ile takip edilen bireylerde sağlık okuryazarlığı ve bunları etkileyen faktörleri inceleyen çalışmalar bulunmaktadır (Berens et al., 2016; Bohanny et al., 2013; Toçi et al., 2013; Van Der Heide, 2014). Yetersiz/düşük sağlık okuryazarlığı olan diyabetlilerin acil birimlerine başvurularının daha çok olduğu, hastaneye tekrarlı yatış oranlarının arttığı (Rubin et al., 2014), diyabetin akut ya da kronik komplikasyonlarının gelişme riskinin (Al Sayah et al., 2013), karbonhidrat tüketimlerinin ve ciddi hipoglisemi görülme risklerinin (Berens et al., 2016) daha fazla olduğu belirlenmiştir. Bu verilere ek olarak sunulan sağlık hizmetlerini kullanım oranlarının daha düşük olduğu (Bohanny et al., 2013), besin etiketlerini doğru okumadıkları, porsiyonları tahmin etmede zorlandıkları (Bowen et al., 2013), özbakım aktivitelerinin yetersiz olduğu (hastalığa uyumu da kapsayan) ve glisemik kontrollerinin kötü (Al Sayah et al., 2022; Bowen et al., 2013), HbA1c düzeylerinin çok daha yüksek (Bowen et al., 2013), diyabete konusundaki bilgi düzeylerinin daha düşük olduğu (Al Sayah et al., 2013) belirlenmiştir. Tüm bu veriler dahilinde bu araştırmada tip 2 diyabetli yaşlı bireylerde sağlık okuryazarlığı ve sağlık okuryazarlığını etkileyen faktörlerin belirlenmesi amaçlanmıştır.

## YÖNTEM

### Evren ve Örneklem

Tanımlayıcı tipte olan bu araştırma Ocak-Mayıs 2023 tarihleri arasında tip 2 diyabet tanısı konmuş yaşlı hastalar ile İstanbul'da bulunan bir eğitim araştırma hastanesi diyabet eğitim biriminde yürütülmüştür. Ortalama günlük 3 hasta, aylık 90 hasta diyabet eğitim birimi odasına gelmektedir. Bu nedenle araştırmanın evrenini 750 hasta oluşturmuştur. Örneklem büyüklüğünün belirlenmesinde bilinen bir popülasyon için formül hesaplama kullanılmış; %99'luk güven aralığında örneklem büyüklüğünün 376 hasta olması gerektiği tespit edilmiştir.

Araştırmaya dâhil edilme kriterleri; araştırmaya katılmaya gönüllü 65 yaş ve üzeri olmak, en az altı aydır tip 2 diyabet tanısı ile izlenmek, orta ve ileri evre demansı olmamak ve sözel iletişim kurabilmek olarak belirlenmiştir.

Veriler, araştırmacılar tarafından, uygun tüm önlemler alınarak, çalışmaya katılmayı kabul eden hastalar ile yüz yüze görüşme yöntemi kullanılarak diyabet eğitim birimine ait ayrı bir odada toplanmıştır.

### **Veri Toplama Araçları**

Araştırmanın verilerinin toplanmasında Tanıtıcı Bilgi Formu ve Sağlık Okur Yazarlığı Ölçeği kullanılmıştır.

Araştırmacılar tarafından hazırlanan Tanıtıcı Bilgi Formu yaşlı bireylerin bireysel özellikleri ve hastalık özelliklerini belirlemeye yönelik toplam 8 soru yer almıştır.

Sağlık Okur Yazarlığı Ölçeği; Sorensen tarafından geliştirilen daha sonrasında Toçi, Bruzari ve Sorenson'ın birlikte tekrar çalışarak sadeleştirdikleri ölçeğin Türkiye'de geçerlik ve güvenilirlik çalışması Aras ve Bayık Temel tarafından yapılmıştır (Cronbach's Alpha kat sayısı 0.95) çalışması yapılmıştır (Sorensen et al., 2013; Toçi et al., 2013; Aras & Bayık Temel, 2017). Ölçek, Bilgiye Erişim, Bilgileri Anlama, Değer Bıçme/Değerlendirme, Uygulama/Kullanma olmak üzere dört alt boyuttan ve toplam yirmi beş maddeden oluşmaktadır. Ölçekten alınan puanlar 25-125 arasında değişmekte olup, alınan düşük puan sağlık okuryazarlığı düzeyinin yetersiz, sorunlu ve zayıf olduğunu, yüksek puan ise yeterli ve çok iyi olduğunu göstermektedir. Bu araştırmada Cronbach's Alpha kat sayısı 0.90 bulunmuştur.

### **Veri Toplama Araçlarının Uygulanması**

Araştırma etik kurul onayı alınarak ve Helsinki Bildirgesi'ne uygun olarak yürütülmüştür. Araştırmacılar tarafından, araştırmaya dahil edilen tüm katılımcılara araştırmanın amacı ve prosedürü sözel olarak anlatılmıştır. Her gönüllüden yazılı bilgilendirilmiş onay alındıktan sonra veri toplama işlemi tamamlanmıştır.

Veriler, araştırmacılar tarafından, uygun tüm önlemler alınarak (hastanın mahremiyeti, güvenlik önlemleri gibi) çalışmaya katılmayı kabul eden hastalar ile yüz yüze görüşme yöntemi kullanılarak diyabet eğitim biriminde ait ayrı bir odada toplanmıştır. Ölçme araçlarının doldurulması ortalama 10-15 dakika sürmüştür.

### **Verilerin Analizi**

Araştırmadan elde edilen veriler, SPSS 22.0 (IBM, Armonk, NY, USA) programı kullanılarak değerlendirilmiştir. Verilerin analizinde tanımlayıcı istatistikler ve regresyon analizi kullanılmıştır. Sonuçlar %95 güven aralığında değerlendirilmiş ve anlamlılık  $p < 0.05$  olarak kabul edilmiştir.

### **BULGULAR**

Araştırmaya katılan yaşlı bireylerin yaş ortalaması  $71.13 \pm 3.81$  yıl olup, %80.3'ü 65-74 yaş aralığında, %58'i erkek, %79.5'i evli, %51.1'i ilkokul mezunu, %94.4'ü çalışmamakta, %92.2'si ailesi ile birlikte yaşamakta, %89.4'ünün gelir durumu orta düzey olup, %69.9'u sigara içmemektedir (Tablo 1).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Tablo 1. Tip 2 Diyabetli Yaşlı Bireylerin Tanımlayıcı Özelliklerinin Dağılımı (n=376)

Özellikler	n	%
<b>Yaş (yıl)</b>		
65-74	302	80.3
≥75	74	19.7
<b>Cinsiyet</b>		
Kadın	158	42.0
Erkek	218	58.0
<b>Medeni durum</b>		
Evli	299	79.5
Bekar	77	20.5
<b>Eğitim durumu</b>		
Okur-yazar	126	33.5
İlkokul	192	51.1
Ortaokul	58	15.4
<b>Çalışma durumu</b>		
Çalışan	21	5.6
Çalışmayan	355	94.4
<b>Kiminle birlikte yaşadığı</b>		
Aile	346	92.0
Yalnız	30	8.0
<b>Gelir durumu</b>		
İyi	8	2.1
Orta	336	89.4
Kötü	32	8.5
<b>Sigara içme</b>		
Evet	40	10.6
Hayır	263	69.9
Bırakmış	73	19.4

Tip 2 diyabetli yaşlı bireylerin diyabete ilişkin özelliklerinin dağılımı incelendiğinde; yaşlı bireylerin %46'sının ortalama diyabet tanı süresinin 16 yıl ve üzeri, %50'sinin diyetine dikkat ettiği ve %54.5'inin de düzenli egzersiz yapmadığı belirlenmiştir (Tablo 2).

Tablo 2. Tip 2 Diyabetli Yaşlı Bireylerin Diyabete İlişkin Özelliklerinin Dağılımı (n=376)

Özellikler	n	%
<b>Diyabet tanı süresi (yıl)</b>		
≤5	58	15.4
6-10	75	19.9
11-15	70	18.6
16 ve üzeri	173	46.0
<b>Diyetine dikkat etme durumu</b>		
Evet	134	35.6
Hayır	188	50.0
Kısmen	54	14.4
<b>Düzenli egzersiz yapma</b>		
Evet	98	26.1
Hayır	205	54.5
Kısmen	73	19.4

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Yaşlı bireylerin Sağlık Okuryazarlığı Ölçeği Bilgiye Erişim alt boyutu puanı  $9.73 \pm 2.10$ , Bilgileri Anlama alt boyutu puanı  $15.35 \pm 2.48$ , Değer Biçme / Değerlendirme alt boyutu puanı  $17.74 \pm 2.38$ , Uygulama / Kullanma alt boyutu puanı  $12.79 \pm 1.72$  ve toplam puan ortalaması ise  $55.62 \pm 6.19$  olarak hesaplanmıştır (Tablo 3).

**Tablo 3. Yaşlı Bireylerin Sağlık Okuryazarlığı Ölçeği Puan Ortalamaları**

Ölçekler	Ort.±SS	Min.-Maks.
<b>Sağlık Okur Yazarlığı Ölçeği</b>		
Bilgiye Erişim	$9.73 \pm 2.10$	5-14
Bilgileri Anlama	$15.35 \pm 2.48$	10-23
Değer Biçme / Değerlendirme	$17.74 \pm 2.38$	12-24
Uygulama / Kullanma	$12.79 \pm 1.72$	8-18
<b>Toplam Puan</b>	<b><math>55.62 \pm 6.19</math></b>	<b>41-71</b>

Ort.: Ortalama, SS: standart sapma, Min.-Maks.: Minimum-Maksimum

Araştırmaya katılan yaşlı bireylerin sağlık okuryazarlığını etkileyen faktörleri belirlemek amacıyla tek değişkenli analiz sonucunda anlamlı çıkan değişkenler üzerinde regresyon analizi yapılmıştır. Araştırmaya katılan yaşlı bireylerin cinsiyet, medeni durum, eğitim durumu, çalışma durumu, gelir durumu, kiminle yaşadığı ve sigara içme alışkanlıkları ile sağlık okuryazarlığı toplam puanı arasında ilişkiyi belirlemek için yapılan regresyon analizi anlamlı bulunmuştur ( $F:83.674$ ,  $p<0.05$ ) (Tablo 4).

Araştırmada cinsiyet, medeni durum, eğitim durumu, çalışma durumu, gelir durumu, kiminle yaşadığı ve sigara içme alışkanlıkları değişkenlerinin, Sağlık Okuryazarlığı toplam puanı üzerinde %63 değişim yaptığı belirlenmiştir ( $R^2: 0.63$ ,  $p<0.05$ ).

**Tablo 4. Yaşlı Bireylerin Sağlık Okuryazarlığını Etkileyen Faktörler**

Bağımlı Değişken	Bağımsız Değişken	B	t	p	F	Model (p)	R <sup>2</sup>
Sağlık Okuryazarlığı Ölçeği Toplam Puanı	Yaş	0.473	0.938	0.349	83.674	0.001	0.63
	Cinsiyet	1.669	3.717	<b>0.001</b>			
	Medeni durum	18.166	22.364	<b>0.001</b>			
	Eğitim durumu	0.642	2.212	<b>0.028</b>			
	Çalışma durumu	2.254	2.605	<b>0.010</b>			
	Kiminle birlikte yaşadığı	-18.299	-16.401	<b>0.001</b>			
	Gelir durumu	-7.050	-15.101	<b>0.001</b>			
	Sigara içme	1.364	2.251	<b>0.025</b>			

## TARTIŞMA VE SONUÇ

Diyabeti olan yaşlı bireylerin hastalık yönetimini uygun şekilde yapabilmesi, diyabete ilişkin doğru bilgi, beceriye sahip olması, iyi yönde tutum geliştirmesi için sağlık okuryazarlık düzeyinin iyi olması gerekmektedir. Sağlık okuryazarlığını iyileştirmek bireyin sağlık ile ilgili uygun kararlar almasına, sağlık hizmetlerine ilişkin bilgilere ulaşmasına dolayısıyla sağlıklı yaşam için daha uzun ve kaliteli yaşama kapasitesine sahip olmasına yardımcı olacaktır. Bu da sağlık okuryazarlığının özellikle aktif ve başarılı bir yaşlanmanın önemli bir faktörü olduğunu göstermektedir (Berens et al., 2016; Sørensen et al., 2013).

Bu araştırmada yaşlı bireylerin %46'sının ortalama diyabet tanı süresinin 16 yıl ve üzeri olduğu sonucuna ulaşılmıştır. Genellikle toplumda hastalık süresi ne kadar artarsa bireyin hastalık yönetimini daha iyi sağladığı, sağlık kontrollerini daha düzenli yaptırdığı ve sağlığı, hastalığı ile ilgili daha fazla bilgiye sahip olduğu düşüncesi mevcuttur. Aksine yapılan bir çalışmada diyabet süresi uzun olan

bireylerin ileri yaşta olmaları ve diyabete eşlik eden ek kronik hastalıkların olmasının sağlık okuryazarlık düzeyini etkileyebileceği bildirilmiştir (Rubin et al., 2014). Tüm bu sonuçlar özellikle ileri yaşta olan ve uzun yıllar diyabet tanısı olan tip 2 diyabetli bireylerin sağlık okuryazarlık düzeylerinin belirlenerek, yeni girişimlerin planlanmasının gerekli olduğunu göstermektedir.

Sağlık okuryazarlığı düzeyi diyabetli bireylerin sağlık hizmetleri kullanımını olumlu yönde etkilemekte (Al Sayah et al., 2013; Rubin et al., 2014), kan şekeri regülasyonunu sağlayarak akut ve kronik komplikasyon gelişme riskini azaltmakta ve sonuç olarak diyabet yönetimi üzerinde önemli sonuçlar oluşturmaktadır (Bowen et al., 2013). Bu araştırmada yaşlı bireylerin Sağlık Okur Yazarlığı Ölçeği toplam puan ortalaması  $55.62 \pm 6.19$  olarak bulundu. Avrupa Sağlık Okuryazarlığı (HLS-EU) ölçekleri ile ülkemizde yürütülen çalışmada Türkiye’de Sağlık Okuryazarlığı oranı %27.8 iken Avrupa’da %36 olduğu sonucuna ulaşılmıştır (Centers for Disease Control and Prevention, 2016). Bu sonuçlar Türkiye’de sağlık okuryazarlık düzeyinin düşük olması nedeniyle önemli bir problem olduğunu, toplumun sağlık okuryazarlık düzeyinin artırılmasına için gerekli planlamaların yapılmasına gereksinim olduğunu göstermektedir. Diyabetli bireylerin sağlık okuryazarlık düzeyinin belirlenmesine yönelik yapılan çalışma sonuçlarında da sağlık okuryazarlığının %15-40 arasında düşük seviyelerde olduğu bildirilmektedir (Al Sayah et al., 2013; Bohanny et al., 2013; Rubin et al., 2014). Brezilya’da sağlık okuryazarlık düzeyinin belirlenmesi amacıyla tip 2 diyabetli bireylerle yapılan bir çalışmada %43,4 oranında yetersiz sağlık okuryazarlığı belirlenmiş olup, yeterli sağlık okuryazarlığına sahip olan bireylerin sağlık sonuçlarının daha iyi olduğu belirlenmiştir (Rubin et al., 2014). Kuveyt’te 359 tip 2 diyabetli bireyin sağlık okuryazarlık düzeyinin belirlenmesine yönelik yapılan bir çalışmada da hastaların %44,5’inin yetersiz sağlık okuryazarlığına sahip olduğu belirlenmiştir (Hussein et al., 2018). Benzer şekilde yapılan çalışmalarda da diyabetli bireylerin sağlık okuryazarlık düzeylerinin düşük olduğu bildirilmiştir (İlhan et al., 2021).

Yapılan araştırmalarda cinsiyet, eğitim ve gelir durumu düşük olan bireylerde sağlık okuryazarlığı düzeyinin daha düşük olduğu belirlenmiştir (Al Sayah et al., 2013; Berens et al., 2016; Bohanny et al., 2013). Bu araştırmada da benzer olarak cinsiyet, medeni durum, eğitim durumu, çalışma durumu, gelir durumu, kiminle yaşadığı ve sigara içme alışkanlıkları değişkenlerinin, Sağlık Okuryazarlığı toplam puanı üzerinde değişim yaptığı belirlenmiştir. Diyabet gibi hastanın kendi diyabet yönetimini sağlaması gereken (beslenme uyumu, kan şekeri ölçümü, insülin uygulaması, ayak bakımı vb.) kronik hastalıklarda diyabete ilişkin bilgili olması ve genel sağlık düzeyini koruyucu önlemlerin farkında olması son derece önemlidir. Sağlık okuryazarlığı düzeyi yüksek olan kişiler daha sağlıklı bir yaşam tarzına sahiptir. Dolayısıyla sağlıklı yaşam tarzına sahip olan kişilerde kronik hastalıkların görülme oranı daha azdır, tedaviye uyumları daha yüksektir, sağlıklı olduklarını bildirirler ve daha uzun yaşarlar. Bunların aksine, sağlık okuryazarlığı düzeyi daha düşük olan diyabetli bireyler, koruyucu sağlık hizmetleri daha az kullanırlar, yanlış teşhis için daha yüksek risk altındadır, kronik hastalıklara sahip olurlar, kronik hastalıkların yönetiminde bir çok güçlük yaşarlar, ilaçlar ve tedavi uyumu ile ilgili problemlerle karşılaşır ve daha kötü sağlık sonuçlarına sahiptirler. Bu nedenlerle tip 2 diyabetli bireylerde sağlık okuryazarlığını etkileyen faktörlerin son derece önemlidir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ABILITY TO ASSESS PAIN AMONG CHILDREN WITH INTELLECTUAL DEVELOPMENT DISORDER AND INTELLECTUALLY ABLE CHILDREN

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### ABSTRACT

Intellectual disability (ID), also called intellectual development disorder (IDD) and previously known as Mental Retardation (MR).

Intellectual disability includes disorder with overall mental capability that influence functions of two areas as thinking domain, which enhance learning, problem solving, and reasoning skills and adaptive domain, which essential for daily interaction (social) and motor skills. Aim of the Study: is to evaluate the ability of students with intellectual disability to detect and express pain in comparison with healthy students for proper care. Study design: A descriptive research design was adopted to conduct this research. Methodology: Sample Size; The study population was drawn from the Intellectually Disable Students (IDS) who were in specialty schools and healthy students from general primary and intermediate schools from November to December 2019. The study was conducted on 20 intellectual disabled students and 20 healthy students aged 8-20 years. Result: This study has shown that there were significant differences between intellectually disabled and healthy students in relation to expression of pain and determine site of pain. The form of pain expression is highly diverse between verbalize children, pre-verbal and these ones disable to express pain. Students with intellectual disorder express pain or discomfort very slowly and less precisely than the healthy students. This implies that health teams managing these patients should use pain-control procedures, even in the absence of obvious pain manifestations.

**Keywords:** Developmental disabilities, Healthy students, Intellectually disabled, Pain

### INTRODUCTION

Intellectual disability (ID), also called intellectual development disorder (IDD) and previously known as Mental Retardation (MR). Intellectual disability includes disease with overall mental capability that influences functions of two areas as a thinking domain, which enhances learning, problem-solving, and reasoning skills, and adaptive domain, which essential for daily interaction (social) and motor skills. The term intellectual disability includes all individuals suffering from mental retardation and or liable to diagnose as mental retardation. Intellectual disability occurs in the developmental stages before the age of eighteen years and is recognizably below the average of intellectual functioning. Developmental Disabilities (DD) is a general concept that comprises intellectual disability and other disabilities that occur during life stages of development (early, middle, and late childhood). Developmental disabilities are chronic disabilities that can be cognitive or physical or both. The limitations appear before the age of eighteen and are likely to be life-long. Different kinds of DD are related to physical issues, such as cerebral palsy or epilepsy. Other individuals may have a condition that includes a physical and an intellectual disability, for example, Down syndrome or fetal alcohol syndrome.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Intellectual disability cannot be determined by performing an IQ test only, but the evaluation and classification of it are more complex. There are three essential characteristics to diagnose intellectual disability as marked limitations in both intellectual functioning and adaptive manner, and they should start before the end of the puberty stage of development. For example, any mental retardation can be confirmed when intelligence quotient decreases than seventy and associated with disturbance in coping patterns of usual living skills like communication and interpersonal behaviors. ID affects approximately three percent of the individuals and caused by the unique differential environment, chromosomal disturbances. In addition, mental retardation demonstrates one of the more complicated challenges found by health members and geneticists. There are interrelated causes of ID depending on the types of risk factors, biomedical, social, behavioral, and educational, and the timing of exposure to those factors, whether prenatal, perinatal and postnatal. Intellectual disability is the most common developmental disorder. It is estimated to 6.5 million Americans being affected by the disability. More than 545,000 children between the ages of 6 and 21 have some group of intellectual disabilities and need specific learning services in inclusive school; identified children have a very low level of mental retardation, while some have a very high level. There are different types of retardation, namely, mild, moderate, to severe one. Based on the level of impairment, the health team may realize a child has an intellectual disability. Children with very low, poorly defined intellectual disability may get along in an ordinary educational, but others will likely need special education and services to adopt a learning adaptation of basic life skills.

In the Kingdom of Saudi Arabia, more than half a million Saudi individuals (1 out of every 30 individuals) reported the presence of disability during the year 2016. Also, 20,000 children under 17 affected with down syndrome.

Individuals with intellectual and developmental disabilities experiencing pain moreover than their developing peers. Their responses to pain can be difficult to manage and assess because of their limited ability to communicate. Pain monitoring and management are the most important concern in several scientific fields.

## **METHODS**

### Study design

A descriptive research design was used to conduct this research. Aimed to evaluate the ability of students with intellectual disabilities to detect and express the pain in comparison with healthy students. Inclusion criteria for IDS. The study included intellectual disable students with mild or moderate mental retardation, IQ from 65-40, From 8 to 20 years old, and able to use verbal communication. Exclusion criteria for IDS. The study should not include students with severe mental retardation, IQ below 40, and in pain of fewer than eight years or more than 20 and unable to use verbal communication.

Inclusion criteria for the control group:

The study included healthy students. Aged from 8 to 20 years and free from mental illness.

Exclusion criteria for the control group:

The study should not include students aged below eight or more than 20 years, in pain and mentally ill students.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## RESULTS

Table 1

Socio-demographic characteristics of intellectual development disorder children and the intellectually able children.

		Student (n=40)			
		IDS (n=20)		Healthy students (n=20)	
		No	%	No	%
1- Age - year:	8-less than15	6	30	12	60
	15-less than 18	10	50	8	40
	18-20	4	20	-	-
Mean $\pm$ SD =12.50 $\pm$ 6.3					
2- Education:	Primary	6	30	6	30
	Preparatory	14	70	14	70
3- Having sibling	Yes	20	100	20	100
	No	-	-	-	-

Table 1 (labelled) deals with socio-demographic characteristics of intellectually disabled and healthy students. The mean age of both was  $12.50 \pm 6.3$  years. As regards the level of education, most (70%) of both groups were at an introductory level. One hundred percent of both intellectually disabled and healthy students have siblings.

**Table 2**

Socio-demographic characteristics of parents of intellectual development disorder children and the intellectually able children.

		Student (n=40)			
		IDS (n=20)		Healthy Students (n=20)	
		No	%	No	%
1- Father education	Educated	20	100	20	100
	Not Educated	-	--	-	--
2- Father occupation	Work	20	100	20	100
	Not worked	-	--	-	--
3- Mother education	Educated	18	90	16	80
	Not Educated	2	10	4	20
4- Mother occupation	Work	8	40	10	50

Table 2 (labelled) shows all (100%) of fathers of both intellectually disabled and healthy students were educated and had jobs. Furthermore, majority (90%) of mothers of intellectually disabled students and 80 % of mothers of healthy students were educated, while less than quarter (10%) of fathers of intellectually disabled students and 20% of the mothers of healthy students were not educated and two-third (60%) of mothers of intellectually disabled students and fifty percent of mother of healthy students were housewife.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Table 3**

The difference between intellectual development disorder children and the intellectually able children. During pain latency. period.

Pain latency (by seconds)	N= 40				(T-Test) p-value
	IDS (n=20)		Health Students (n=20)		
	No	%	No	%	
At write wrist:					(14.419) * p-v< 0.001
3-↓20s	0	0.00	19	95	
20- ↓50s	3	15	1	5	
50- ↓100	14	70	0	0.00	
100-↓120s	3	15	0	0.00	
At left wrist:					
3-↓20s	0	0.00	18	90	
20- ↓50s	2	15	2	10	
50- ↓100	14	70	0	0.00	
100-↓120s	4	15	0	0.00	
Median (range)	40·2	(11·5–120·0)	15·5	(6·0–110·0)	
At write temple:					(15.158) * p-v< 0.001
3 -↓20s	0	0.00	20	100	
20 - ↓50s	2	10	0	0.0	
50- ↓100	13	65	0	0.0	
100-↓120s	5	25	0	0.0	
At left temple:					
3 -↓20s	0	0.00	19	95	
20 - ↓50s	1	5	1	5	
50- ↓100	14	70	0	0.0	
100-↓120s	5	25	0	0.0	
Median (range)	20·6	(5·5–120·0)	10·7	(3·7–68·0)	

IDS=Intellectually Disabled Students

\* statistically difference

Table no 3 (labelled) Revealed that at wrists the most (70%) of intellectually disable students took long time to express pain (from 50 to less than 100 seconds) median 40·2 (11·5–120·0) seconds, while the majority (95%) of healthy students took a short time, (from 3 to less than 20 seconds), median 15·5 (6·0–110·0). There was a statistical difference between IDS and healthy students related to pain latency t-test= 14.419, p-v<0.001. Also, at temples, the most (65%) of intellectually disabled students took a long time to express pain (from 50 to less than 100 seconds), median 20·6 (5·5–120·0). While the entire healthy students took a short time, (from 6 to less than 20 seconds), median 10·7 (3·7–68·0). There was a statistical difference between IDS and healthy students related to time spent until the expression of pain t-test= 15.158, p-v<0.001.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Table 4**

The difference between intellectual development disorder children and the intellectually able children towards pain localization.

Pain localization	N= 40				(T-Test) p-value
	IDS (n=20)		Healthy Students (n=20)		
	No	%	No	%	
Hand: Close (at pain point) Near (within 2 cm) Far (more than 2 cm)	6	30	19	95	(5.339) * p-v< 0.001
	14	70	1	5	
	0	0.00	0	0.00	
Face: Close (at pain point) Near (within 2 cm) Far (more than 2 cm)	8	40	20	100	(5.339) * p-v< 0.001
	12	60	0	0.00	
	0	0.0	0	0.00	

IDS=Intellectually Disable Students

\* statistically difference.

Table no 4 and Figure no 1(labelled): demonstrate that according to pain localization, most (70% at hand) and two-third (60% at face) of IDS did not touch the exact point of pain stimulation but able to touch within 2 cm of it, while the majority (95% at hand, 100% at face) of control group touch the exact point of pain stimulation. There were statistical differences between the two groups t-test = (5.339), p-v< 0.001.

## DISCUSSION

Considering the result of the passive concepts and offensive reflexes of the term "mental retardation," the "intellectual or developmental disability" term is gradually substituted nationwide. The current study revealed that most intellectually disable students took a long time to express pain (from 50 to less than 100 seconds). These results might be resulting from the fact that in the intellectually disabled individuals, there are delaying in transmission and integration of the pain process; also, there is slowing in the motor response of these individuals.

Furthermore, the results reflected that children with the intellectual disorder are slow and lack of accuracy to determine the pain site. This was due to cognitive factors and delays at the neuro-motor level. These difficulties are likely to be responsible for the delayed sensory threshold reported in this study and may result in an apparent insensitivity. In the localization test, significant differences found between students with mental disorders and controls in their ability to locate sensations on the hand and face.

## CONCLUSION

The current study has significant differences between intellectually disabled and healthy students in relation to the expression of pain and determining the site of pain. The type of pain expression is highly diverse between verbalizing by children, pre-verbal, and the ones disable to express pain. This study intends the necessity to consider the characteristic of a child with an intellectual disability. Students with mental disorders express pain or discomfort very slowly and less precisely than healthy students. The

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

implication that health teams managing these patients should use pain-control procedures, even in the absence of visible pain manifestations.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## A CRITICAL EXPLORATION OF THE FORMS OF VIOLENT PROTESTS IN LAGOS, NIGERIA

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### ABSTRACT

As a recurring phenomenon, mass violent protests exert substantial influence on the construction industry and its ability to deliver projects effectively. Such protests, characterized by rioting, looting, and civil unrest, not only disrupt construction activities but also pose significant safety risks to workers and project assets. Project delays escalated costs, and heightened security measures can profoundly impact the industry's project delivery timelines and overall performance. This quantitative study delves into the landscape of violent protests in Lagos, Nigeria, explicitly identifying the various forms of these protests and understanding their frequency of occurrence and significance. Through a five-Likert scale questionnaire, participants ranked the intensity of different protests, revealing that Lagos experiences a wide array of protests. While some protests are more severe than others, the study findings highlight that strikes (mean = 4.42; Sig = 0.000\*; K-W = 0.182) and resistance (mean = 4.48; Sig = 0.000\*; K-W = 0.094) are relatively common and significant, though less frequent than riots (mean = 4.55; Sig = 0.000\*; K-W = 0.185) and rebellions (mean = 4.51; Sig = 0.000\*; 0.634). Furthermore, the respondents have closely related opinions on the form of protests ravaging Lagos. The outcomes of this study closely align with existing literature, underscoring the high frequency of violent and non-violent protests in Lagos. These findings bear significant practical implications, particularly for the construction industry, where these protests can lead to project delays, increased costs, and safety concerns. Recognizing the diversity of protest forms and their significance is crucial for stakeholders to develop effective strategies to manage and mitigate their impact on regional construction projects.

**Keywords:** Construction industry, Lagos, Nigeria, Protest, Violence

### Introduction

A protest also referred to as a demonstration, remonstrance, or remonstrance, represents a form of expressing objection, opposition, disapproval, or dissent against a specific idea or action, often when one lacks the power to prevent or avoid it (Tegally et al., 2020). Protests can be seen as collaborative acts wherein many individuals participate, sharing the costs and risks (Lazarus et al., 2021). Ranging from individual speeches to large-scale marches, protests manifest in various forms. Protesters may either orchestrate a protest to publicly voice their opinions to influence public sentiment or governmental policies or opt for direct actions to bring about desired changes (Street & Hill, 2007). The available literature underscores that the megacity witnesses numerous activities daily (Kaklauskas & Gudauskas, 2016).

Among these activities lie the construction of buildings and public infrastructure (McClure et al., 2007). Demonstrators seize opportunities to inflict damage on streets, bridges, parks, shopping complexes, and freeways (Cao et al., 2022). Demonstrators may orchestrate protests to publicly express their views, to influence public sentiment or government policies, or they may opt for direct actions to bring about desired changes themselves (Street & Hill, 2007). Consequently, protests are integral to organized campaigns, whether violent or non-violent, driven by specific objectives (Adam & de Savigny, 2012). Several studies have explored the impact of violence on the performance of construction workers (Truesdale & Brown, 2017), with many of these studies centring on violence originating within construction sites. Likewise, specific authors have investigated the underlying causes of protests in various settings, focusing on megacities like Lagos (Shoemaker et al., 2020).

At times, protests manifest on a small scale as peaceful sit-ins (Betts et al., 2017), while on other occasions, they escalate into massive marches that can persist over an extended period, potentially resulting in damage to public infrastructure and disruptions to activities within a given environment (Akinwumiju et al., 2021). Nigeria has a history of experiencing various forms of protests and agitations (Akinwumiju et al., 2021), which have, in some instances, catalyzed substantial changes within the nation's system, caused delays in environmental initiatives, or tarnished the country's reputation due to the depletion of scarce resources (Akinwumiju et al., 2021). Consequently, this study examines the diverse manifestations of violent protests in Lagos, Nigeria.

### **Review of related literature**

A protest constitutes a revolutionary social movement characterized by the expression or declaration of objection, disapproval, or dissent, typically directed against circumstances or actions that individuals cannot prevent or evade (Akintola, 2010). It signifies the articulation of grievances with the implicit opposition to specific causes, serving as a typical means through which citizens engage in political processes. This phenomenon poses an enduring challenge for political leaders. It can potentially be a source of countervailing power, particularly for the most vulnerable members of society.

Protests in Nigeria have a centuries-old history, often serving as a deliberate and non-violent method to pursue specific objectives, employing pressure and persuasion. These actions are more accurately characterized as civil or non-violent resistance instances (Currie et al., 2009). Various factors, such as government policies (e.g., protest permit requirements), economic conditions, religious conventions, societal institutions, or media monopolies, can constrain diverse self-expression and dissent. An act of protest encompasses the following elements:

- i. The action expresses a grievance, a conviction of wrongdoing or an injustice;
- ii. The protestors are unable to correct the condition directly by their efforts;
- iii. The action is intended to draw attention to the grievances;
- iv. The action is further meant to provoke ameliorative steps by some target groups;
- v. The protestors depend upon sympathy and fear to motivate the target group on their behalf (Akintola, 2010).

The available literature highlights that protests, particularly in developing nations like Nigeria, can be categorized into two distinct types: violent and non-violent protests (Betts et al., 2017). Violent protests, further subcategorized as violent and non-violent, encompass actions involving violence, destruction, or intimidation to instigate change, which may include flag burning, riots, looting, and vandalism (Malik et al., 2018). It is worth noting that violent protests can originate as non-violent demonstrations but may escalate into violent events fueled by mounting frustration. Betts (2017) provides additional classification within violent protests, including Flag Burning Violent Protests, Riots, Looting, Vandalism Protests, and Bombing Protests. In contrast, non-violent protests constitute a practice wherein objectives, such as effecting social change, are pursued through civil disobedience, refraining from using violence or the threat thereof (Nicholasen, 2019).

In peaceful protests, individuals or groups collaborate to effect change through non-violent means, encompassing actions like sit-in demonstrations, where protesters sit in a designated area to express their objection to a specific action; marches and rallies, where a collective of people assemble, often bearing signs, posters, and informational materials about their cause; the creation of posters and banners by protesters to voice their opposition to a particular action or advocate for a specific cause; and hunger strikes, in which protesters fast for a defined period to exert pressure for change on a particular issue or cause (Irschara et al., 2009). Ratliff and Hall (2014) have categorized protest activities into six overarching domains, including literal, symbolic, aesthetic, and sensory expressions; movement within physical space; ceremonies and sacred rituals; acts of civil disobedience; institutional and conventional forms of protest; and collective acts of violence or threats.

### **Recent Trends of Protests Experienced in Nigeria**

#### *Occupy Nigeria Protest of 2012*

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

The Occupy Nigeria protest emerged due to the sudden escalation of Nigeria's premium motor spirit (PMS) price, surging from N65 to 140. This development occurred concurrently with the Arab Spring and the subsequent global Occupy movements. The pervasive influence of social media played a pivotal role in drawing international media attention to Nigeria. Consequently, it was unsurprising that this protest was initially perceived as an extension of the global wave of demonstrations against governmental overreach, initially sparked during the Arab Spring.



Plate 1: A Crowd holding a banner that reads "Nigeria rally against corruption" during a protest in Lagos (Willems *et al.*, 2012)

## *The End SARS Protests of 2020*

The ENDSARS protest initially emerged as an appeal for the dissolution of Nigeria's Special Anti-Robbery Squad (SARS), a division of the Nigerian Police Force notorious for its harsh treatment of civilians and disregard for human rights. The movement commenced as a demand for the complete disbandment of this particular unit within the Nigerian police, widely recognized for its history of brutality and human rights violations. The #EndSars campaign originated in approximately 2018, gaining traction due to allegations of violence and exploitation targeting young people by SARS officers. It was not until around October 2020 that the situation escalated, prompted by reports of an unjustified shooting involving a youth and SARS operatives in Delta State, Nigeria. Social media platforms, particularly Twitter, played a significant role in disseminating this information. Consequently, these events triggered widespread protests across various country regions, resulting in substantial property damage valued in billions and tragic loss of lives (Uwazuruike, 2020).



Plate 2: The famous 2020 End SARS protest across Nigeria (Smith *et al.*, 2020)



### **Methodology**

This study employed a quantitative research design to comprehensively investigate the intricate forms of violent protests and their repercussions on the construction industry in Lagos, Nigeria, following the completion of data collection and analysis. The research utilized a cross-sectional survey approach, enabling valuable data collection from a diverse group of construction professionals in Lagos, allowing for a multifaceted examination of their experiences and perceptions (Johnson & Christensen, 2000).

A purposive sampling method was chosen for the sampling technique, aligning with the research's focus on participants with specific knowledge and experience relevant to the research topic. Construction professionals in Lagos were the primary targets of the study, given their direct involvement and probable encounters with violent protests within the construction industry. The sample size comprised 154 participants, thoughtfully selected to ensure diversity and representation across various roles within the construction sector (Guest et al., 2013).

Data collection was facilitated using a 5-Likert scale questionnaire as the primary instrument. This instrument, comprising a series of statements related to violent protests and their influence on the construction industry in Lagos, enabled participants to rate their level of agreement or disagreement on a five-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree". This approach allowed for the systematic collection of quantitative data, which could be statistically analyzed to derive meaningful conclusions and insights (De Vaus, 2013).

The unit of analysis for this study was construction professionals in Lagos, Nigeria, encompassing various roles within the construction industry, including Civil engineers, Builders, Architects, Quantity Surveyors, and Structural engineers. This focus was selected to delve into their collective experiences, perceptions, and opinions regarding violent protests and their implications for the construction sector in Lagos, Nigeria (Bryman, 2016).

During the study, relevant literature was consulted for guidance on employing the purposive sampling technique and Likert scale questionnaires (Creswell & Creswell, 2017). These sources provided invaluable insights into the design and implementation of the research methodology, contributing to the robustness and credibility of the study's findings.

### **Discussion of Results**

#### **Demographics of the respondents**

A questionnaire of five sections, each employing Likert scales, was administered to 197 respondents. During the data collection phase, 154 completed questionnaires were collected, reflecting a response rate of 78.17%, which is considered adequate for our research. Notably, the respondents exhibited diverse academic and professional qualifications, as outlined in Table 1, indicating their suitability to provide informed responses to the questionnaire. Analyzing their academic qualifications, we find that 23.4% held a Higher National Diploma (HND), 34.0% possessed a National Diploma, 26.9% held a Bachelor's degree, and 15.7% held a Master's degree. Regarding their professional backgrounds, 23.4% identified as architects, 24.4% as builders, 24.9% as civil engineers, 4.57% as structural engineers, and 22.8% as quantity surveyors. Furthermore, examining their years of experience, 7.61% reported having 10-15 years of construction experience, 14.2% had 15-20 years, 50.2% boasted 20-25 years, and the remaining 27.9% possessed 25 years or more of experience in the field.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Table 1: Demographic Information of the Participant**

Participants characteristics	Frequency	Percentage (%)	Respondents	No of questionnaires distributed	No of questionnaires returned and analyzed
<b>Educational background</b>					
MSc	31	15.7	Civil engineers	49	39
BSc	53	26.9			
HND	46	23.4			
ND	67	34.0			
<b>Participants occupation</b>					
Civil engineers	49	24.9	Architects	46	31
Builders	48	24.4			
Architects	46	23.4			
Quantity Surveyors	45	22.8			
Structural engineers	9	4.57			
<b>Working experience (years)</b>					
10-15	15	7.61	Structural engineers	9	9
15-20	28	14.2			
20-25	99	50.2			
25 and above	55	27.9			
			TOTAL	197	154

## Forms of Violence Protests in Lagos, Nigeria

Table 2 comprehensively examines various types of violent protests in the context of the construction industry in Lagos, Nigeria. Riot, Rebellion, Resistant, and Strike are assessed based on their frequency of occurrence, mean importance scores (MIS), ranks, significance levels, and Kruskal Wallis test

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

statistics. Riot, with a SD value of 0.913, is reported as occurring frequently, and it holds the highest mean importance score (MIS) at 4.55, signifying that respondents consider Riot to be paramount. It is ranked first, indicating that it is perceived as the most significant type of violent protest among construction professionals in Lagos. Rebellion follows closely with a SD of 0.813 and an MIS of 4.51, making it the second most crucial protest type. Resistant, with a SD of 1.267 and an MIS of 4.48, is ranked third, and Strike, with a SD of 0.911 and an MIS of 4.42, is ranked fourth. All these important variations are statistically significant, with p-values below 0.001, highlighting significant differences in participants' perceptions of these protests. These findings underscore the varying degrees of concern and attention allocated to different forms of violent protests within the construction industry in Lagos, offering valuable insights into the dynamics and potential challenges associated with each protest type. The Kruskal-Wallis (K-W) test results indicated that the p-values for all the types of violent protests, namely Riot, Rebellion, Resistant, and Strike, were higher than the threshold of 0.005. This suggests that there is no statistically significant difference in the mean importance scores (MIS) of these protest types among the construction professionals in Lagos, Nigeria, who participated in the study.

Table 2: Forms of Violence Protests

Frequency of occurrence of each violent protest	SD	MIS	RANK	Significant	Kruskal Wallis
Riot	0.913	4.55	1 <sup>th</sup>	0.000*	0.185
Rebellion	0.813	4.51	2 <sup>th</sup>	0.000*	0.634
Resistant	1.267	4.48	3 <sup>th</sup>	0.000*	0.094
Strike	0.911	4.42	4 <sup>th</sup>	0.000*	0.182

This finding implies that the participants perceive these different types of protests as equally important in the context of the construction industry in Lagos or that the sample size and data collected may not have been sufficient to detect meaningful distinctions in their perceived importance. These results have several important implications for understanding the dynamics of violent protests within the Lagos construction industry. Firstly, the high frequency of Riot and its top-ranking mean importance score highlight its prominent role in the concerns of construction professionals. This could suggest that the sudden and chaotic nature of riots, often involving large crowds and potential property damage, significantly disrupts construction activities and safety, making it a top priority for professionals in this industry. Secondly, Rebellion, despite having a slightly lower frequency than Riot, also garners substantial importance. This indicates that participants recognize the potential for organized and more sustained acts of protest, such as rebellions, to impact construction projects and overall industry stability significantly. Thirdly, the lower frequency of Resistant protests might reflect a different nature of challenges faced by construction professionals, such as resistance from local communities or labour disputes, which, although less frequent, can still be disruptive. Lastly, Strike, though ranked fourth, is still considered necessary, suggesting that labour strikes in the construction sector are not to be underestimated in their potential to halt or delay projects. In summary, these findings offer valuable insights into construction professionals' nuanced perceptions and concerns regarding different types of violent protests, which can inform strategies for risk management and conflict resolution within the industry.

## Conclusion

This study serves as a stepping stone for understanding the perceptions of violent protests within the Lagos construction industry. It underscores the significance of Riot, Rebellion, Resistant, and Strike protests while pointing to the need for multifaceted approaches to address their implications. The findings shed valuable light on the perspectives of construction professionals operating in a challenging and dynamic environment. Riot emerged as the most frequently occurring and highly regarded type of



protest, indicating its prominence as a concern among industry stakeholders. Rebellion, resistance, and Strike protests followed, each with unique characteristics and implications for the construction sector. The Kruskal-Wallis test, while not revealing statistically significant differences in the significance level between the protest types, highlights the nuanced nature of these perceptions. Several avenues for future research and action emerge from this study.

Firstly, a deeper exploration of the underlying factors contributing to the perceived importance of these protest types is warranted. Qualitative research methods, such as interviews and focus groups, could unveil the intricacies of these perceptions and provide a more nuanced understanding—moreover, the impact of violent protests on project timelines, costs, and safety merits further investigation. A quantitative analysis of different protest types' economic and safety implications would provide valuable insights for risk management and project planning within the construction industry. Consequently, examining the effectiveness of conflict resolution strategies and preventative measures in mitigating the disruptions caused by violent protests is essential. Identifying best practices and areas for improvement in conflict resolution and stakeholder engagement can enhance the resilience of the construction industry in the face of such challenges.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DETERMINATION OF OPTIMAL PERFORMANCE FOR THE QUEUING SYSTEM AT INDEPENDENT NATIONAL ELECTORAL COMMISSION (INEC) OFFICE MAIKUNKELE, MINNA

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### ABSTRACT

The formation of waiting lines is a prevalence scenario that happens whenever the immediate demand for a service surpass the current capacity to provide that service. This discrepancy may be temporal, but a queue accumulates during the period. Formation of a line causes an increase of citizens waiting time in collection of their Permanent voter's card, over-utilization of the available servers and loss of customer goodwill. Application of Queuing theory determines the measures of performance of the service facility; this can be used to design the appropriate service facility. Data for this study was collected at Independent National Electoral Commission (INEC) Office Maikunkele, Minna for five consecutive days between the hours of 9am-3pm daily for a period of four weeks through observations, interviews, and records of Citizens collecting their voters card only. The multi-server model was adopted for the study of the existing structure has three servers. The data was analyzed using descriptive analysis; evaluation of the queuing system shows that, the queuing system has busy time of 5.40 hours while the idle time is 36 minutes, the result also showed that a citizens spent an average of 35.808 minutes in the queue. The Queuing system has 0.666 utilization factor; this implies that the server is always busy.

**Keyword:** Optimal, Performance, Independent National Electoral Commission and Queuing System

### INTRODUCTION

A common situation that occurs in everyday life is that of queuing or waiting in line. Queues (waiting lines) are usually seen at bus stops, ticket booths, doctor's clinics, bank counters, traffic lights, Gas filling stations, post office and Voters Card collection center (Sharma, 2009). A queuing system consists of one or more servers that provide service of some sort to arriving customers. Customers who arrive to find all servers busy generally join one or more queues (waiting lines) in front of the servers, hence the name queuing systems. Waiting phenomenon is not an experience limited to human beings only:

jobs wait to be processed in a machine, planes circles in a stack before given permission to land at an airport, trucks at central market wait for loading and offloading, in warehouse, items wait to be used, incoming calls wait to mature in the telephone exchange. Queuing theory was first analysed in the early 20<sup>th</sup> century by a Danish mathematician and engineer Agner Krarup Erlang 1913 in the context of telephone facilities. It is extensively practiced or utilized in industrial setting or retail sector operations management and falls under the preview decision sciences. Queue is simply an ordered collection of persons or things in which one is served after another, it can also be seen as the buildup of people who are delayed while waiting for service. The demand for service makes it difficult to judge the level of service to provide for customers, in situations where numerous service channel is provided, customers will express few delays even when many customers arrive simultaneously for service. However, providing numerous services channels involves large labor cost as in the case of commercial banks.

Statistical technics such as queuing model can be used to analyze queues and as well balance the cost of resources used to provide services against the cost of the time lost by customers while waiting for service.

Queuing theory is a mathematical study of waiting lines where a model is constructed so that queue lengths and waiting times can be predicted. Queuing theory is generally considered a branch of operations research as the results are often used when making decisions about the resources needed to provide service. The mathematical models often assume infinite queue capacity, infinite numbers of customers, or no bounds on inter-arrival or service times, when it is quite apparent that these bounds must exist in reality, although the bounds do exist, they can be safely ignored because the differences between the real-world and theory is not statistically significant, as the probability that such boundary situations might occur is remote compared to the expected normal situation. Furthermore, several studies show the robustness of queuing models outside their assumptions.

### **MATERIALS AND METHODS**

The type of queuing system adopted by an organization is solely dependent on the type of service being provided. The research method used is a quantitative research approach. The data collected were the daily record of queuing system for five working days (Monday - Friday). The method used were the analysis of queuing systems and techniques, which is used to establish a method that will solve the problem of customer arrival rate, time it takes to serve the customers and also to predict the actual number of servers and time it takes to solve the problem of queues before customers are served. Finally, the model developed was used to test the queuing system against the number of servers and customer arrival rate of the voters card collection center. The data used in this research were collected from INEC office, Maikunkele, Minna which Direct observation and a personal interview were used to collect the data. In the personal interview, three people were asked questions, and direct observation also included counting each citizen who arrived at the PVC collection center and observing the amount of time they spent waiting to be served. This study's data came from the INEC office in Maikunkele, Minna, Niger State's, There are three points at the PVC collection point where citizens are served. From Monday through Friday, the PVC collection point collected data for Four weeks and Data's were gathered from 9AM to 3PM daily in which a line been forms and number were given to each Citizens to maintain orderly, citizens queue up one at a time, with some being served in a "first come, first served" (FCFS) fashion. Some people were asked to come back the following week probably because their cards weren't ready, while others had to wait a long time before being served because their cards weren't found on time. According to the primary data that was gathered, both the patterns of service and arrival were completely random.

#### **Model Assumptions:**

1. The arrival process follows a poisson distribution with an expected arrival rate ( $\lambda$ ) (independent of the number of customers waiting in the system).
2. Infinite calling populations (independent between arrivals).
3. The queue configuration is a simple queue with possibly infinite length (No renegeing or balking).
4. The queue discipline is based on FCFS (First Come First Serve).
5. The service mechanism consists of a single server with exponentially distributed service time ( $\mu$ ) i.e. expected service rate, when the server is busy.

$\lambda$ ; The average citizen arrival rate

$\mu$ ; The average service rate

$\rho = \frac{\lambda}{s\mu}$ : Utilization factor;

where  $s$ =number of distribution point.

To investigate the performance measure, the following queuing formulas will used,given in Equation 1.1 to Equation 1.11

Probability that there is no citizens in the collection centre

$$\rho_0 = \frac{1}{\left[ \sum_{n=0}^{n=s-1} \frac{1}{n!} \left( \frac{\lambda}{\mu} \right)^n \right] + \frac{1}{s!} \left( \frac{\lambda}{\mu} \right)^s \frac{s\mu}{(s\mu - \lambda)}} \quad (1.1)$$

The average number of Citizens in the system

$$l_s = \frac{\left( \frac{\lambda}{\mu} \right)^s \lambda \mu}{(s-1)!(s\mu - \lambda)} \rho_0 + \frac{\lambda}{\mu} \quad (1.2)$$

The average number of citizens in the queue

$$l_q = L - \frac{\lambda}{\mu} \quad (1.3)$$

The average waiting time of citizens in the queue

$$W_q = \frac{l_q}{\lambda} \quad (1.4)$$

The average waiting time citizens spend in the system

$$W_s = \frac{l_s}{\lambda} \quad (1.5)$$

Equations for the finite population model using  $\lambda$  as the mean arrivals rate  $\mu$  as the mean service rate, and  $N$  as the size of the population model with a single channel or server on duty are as follows:

Probability that the system is empty

$$\rho_0 = \frac{1}{\sum_{n=0}^N \frac{N!}{(N-n)! \left( \frac{\lambda}{\mu} \right)^n}} \quad (1.6)$$

Average length of the queue

$$L_q = N - \left( \frac{\lambda + \mu}{\lambda} \right) (1 - \rho_0) \quad (1.7)$$

Average number of citizens (units) in the system

$$L_s = L_q + (1 - \rho_0) \quad (1.8)$$

Average waiting time in the queue

$$W_q = \frac{L_q}{(N - L_s)\lambda} \quad (1.9)$$

Average time in the system

$$W_s = W_q + \frac{1}{\mu} \quad (1.10)$$

Probability of  $n$  units in the system

$$\rho_n = \frac{N!}{(N-n)!} \left( \frac{\lambda}{\mu} \right)^n \rho_0 \text{ for } n = 0, 1, 2, \dots, N \quad (1.11)$$

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## RESULTS AND DISCUSSION

### Data Analysis

The main purpose of this research work is to determine the optimal performance for the queuing system at INEC office Maikunkele, Minna.

We present the statistical analysis of survey data and analysis of queuing system using M/M/S system.

#### Table 4.1 Data Collated.

Table 4.1 is the computed data analysis for unique days of citizen's arrival at INEC office, Maikaunkele, Minna

TIME/DAYS	Week 1	Week 2	Week 3	Week 4	Total
Monday	72	69	198	69	408
Tuesday	72	109	85	70	336
Wednesday	67	97	88	78	330
Thursday	74	Public Holiday	69	62	205
Friday	75	84	73	Public Holiday	232
<b>Total</b>	360	359	513	279	1511

12<sup>nd</sup> December 2022 to 22<sup>nd</sup> January 2023.

#### Table 4.2 Analysis for Data Collated

Days	Arrivals per month	Service time per month	Mean service time per minute
Monday	408	2014.17	4.9367
Tuesday	336	1861.47	5.5401
Wednesday	330	1849.44	5.6043
Thursday	205	1216.81	5.9357
Friday	232	1218.95	5.541
<b>Total</b>	1511	8160.84	27.2709
	<b>Mean arrival rate per Day</b>	453.38	5.4012
	83.94 Citizen's per Day		
	<b>Mean Arrival rate per Min.</b>		<b>Mean service rate</b>
	0.3499 Citizen's per Min		0.1851 per min



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

From Table 4.2, we have the arrival rate per day for citizen's as 83.94 and the staff works for 6 hours per day and the mean service time is 5.4012 Min, hence our arrival rate ( $\lambda$ ) is given by 83.94/6, which is 14 citizen's per hour and our mean service rate ( $\mu$ ) per hour is given by 60/5.4012, which is 11 citizen's per hour. We now proceed to compute the performance

Measure using the following queuing formulas, Equation 4.1 to 4.6

$$\rho_0 = \frac{1}{\left[ \sum_{n=0}^{s-1} \frac{1}{n!} \left( \frac{\lambda}{\mu} \right)^n \right] + \frac{1}{s!} \left( \frac{\lambda}{\mu} \right)^s \frac{s\mu}{(s\mu - \lambda)}} \quad (4.1)$$

$$l_q = \frac{\left( \frac{\lambda}{\mu} \right)^s \lambda \mu}{(s-1)!(s\mu - \lambda)} \rho_0 \quad (4.2)$$

$$l_s = \frac{\left( \frac{\lambda}{\mu} \right)^s \lambda \mu}{(s-1)!(s\mu - \lambda)} \rho_0 + \frac{\lambda}{\mu} \quad (4.3)$$

$$W_q = \frac{l_q}{\lambda} \quad (4.4)$$

$$W_s = \frac{l_s}{\lambda} \quad (4.5)$$

$$\rho = \frac{\lambda}{s\mu} \quad (4.6)$$

Hence from the above equation (4.1) to (4.6), we can calculate  $\rho_0, l_q, l_s, W_q$  and  $W_s$  for 2 servers, that is S=2

Where our arrival rate ( $\lambda$ ) is given as 14 citizen's per hour and service rate ( $\mu$ ) is given as 11 citizens per hour.

From Equation 4.1,

The probability that there are no citizens in the queue or the system is idle is given by Equation 4.7

$$\begin{aligned} \rho_0 &= \frac{1}{\left[ \sum_{n=0}^{s-1} \frac{1}{n!} \left( \frac{\lambda}{\mu} \right)^n \right] + \frac{1}{s!} \left( \frac{\lambda}{\mu} \right)^s \frac{s\mu}{(s\mu - \lambda)}} \\ &= \frac{1}{\left[ \frac{1}{0!} \left( \frac{14}{11} \right)^0 \right] + \frac{1}{2!} \left( \frac{14}{11} \right)^2 \frac{2 \times 2 \times 11}{(2 \times 11 - 14)}} + \frac{1}{\left[ \frac{1}{1!} \left( \frac{14}{11} \right)^1 \right] + \frac{1}{2!} \left( \frac{14}{11} \right)^2 \frac{2 \times 2 \times 11}{(2 \times 11 - 14)}} = 0.7347 \end{aligned} \quad (4.7)$$

From Equation 4.2,

The mean length of citizen on the queue is given as Equation 4.8

$$\begin{aligned} l_q &= \frac{\left( \frac{\lambda}{\mu} \right)^s \lambda \mu}{(s-1)!(s\mu - \lambda)} \rho_0 \\ &= \frac{\left( \frac{14}{11} \right)^2 14 \times 11}{(2-1)!(2 \times 11 - 14)} (0.7347) = 4.2972 \end{aligned} \quad (4.8)$$

From Equation 4.3,

The mean length of citizen in the system is given as Equation 4.9

$$l_s = \frac{\left( \frac{14}{11} \right)^2 14 \times 11}{(2-1)!(2 \times 11 - 14)} (0.7347) + \frac{14}{11} = 5.5699 \quad (4.9)$$

From Equation 4.4,

The waiting time of citizen on the queue is given as Equation 4.10

$$\begin{aligned} W_q &= \frac{L_q}{\lambda} \\ &= \frac{4.2972}{14} = 0.3069 \text{ hours} \end{aligned} \quad (4.10)$$

The citizens spends 18.414 minutes on the queue

From Equation 4.5,

The waiting time of citizen in the system is given as Equation 4.11

$$\begin{aligned} W_s &= \frac{L_s}{\lambda} \\ &= \frac{5.5699}{14} = 0.3979 \end{aligned} \quad (4.11)$$

The citizens spends 23.871 minutes in the system

From Equation 4.6,

The utilization factor is given as Equation 4.12

$$\begin{aligned} \rho &= \frac{\lambda}{s\mu} \\ \rho &= \frac{14}{2 \times 11} \times 100 = 66.66\% \end{aligned} \quad (4.12)$$

for 3 servers, that is  $S = 3$

Where our arrival rate ( $\lambda$ ) is given as 14 citizen's per hour and service rate ( $\mu$ ) is given as 11 citizens per hour.

From Equation 4.1,

The probability that there are no citizens in the queue or the system is idle is given by Equation 4.13

$$\begin{aligned} \rho_0 &= \frac{1}{\left[ \sum_{n=0}^{s-1} \frac{1}{n!} \left( \frac{\lambda}{\mu} \right)^n \right] + \frac{1}{s!} \left( \frac{\lambda}{\mu} \right)^s \frac{s\mu}{(s\mu - \lambda)}} \\ &= \frac{1}{\left[ \frac{1}{0!} \left( \frac{14}{11} \right)^0 \right] + \frac{1}{3!} \left( \frac{14}{11} \right)^3 \frac{3 \times 11}{(3 \times 11 - 14)}} + \frac{1}{\left[ \frac{1}{1!} \left( \frac{14}{11} \right)^1 \right] + \frac{1}{3!} \left( \frac{14}{11} \right)^3 \frac{3 \times 11}{(3 \times 11 - 14)}} + \frac{1}{\left[ \frac{1}{2!} \left( \frac{14}{11} \right)^2 \right] + \frac{1}{3!} \left( \frac{14}{11} \right)^3 \frac{3 \times 11}{(3 \times 11 - 14)}} = 2.921 \end{aligned} \quad (4.13)$$

From Equation 4.2,

The mean length of citizen on the queue is given as Equation 4.14

$$\begin{aligned} l_q &= \frac{\left( \frac{\lambda}{\mu} \right)^s \lambda \mu}{(s-1)!(s\mu - \lambda)} \rho_0 \\ &= \frac{\left( \frac{14}{11} \right)^3 14 \times 11}{(3-1)!(3 \times 11 - 14)} (2.921) = 8.3549 \end{aligned} \quad (4.14)$$

From Equation 4.3,

The mean length of citizen in the system is given as Equation 4.15

$$l_s = \frac{\left( \frac{14}{11} \right)^3 14 \times 11}{(3-1)!(3 \times 11 - 14)} (2.921) + \frac{14}{11} = 9.6276 \quad (4.15)$$

From Equation 4.4,

The waiting time of citizen on the queue is given as Equation 4.16

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

$$W_q = \frac{L_q}{\lambda}$$

$$= \frac{8.3549}{14} = 0.5968 \text{ hours} \quad (4.16)$$

The citizens spend 35.808 minutes on the queue

From Equation 4.5,

The waiting time of citizen in the system is given as Equation 4.17

$$W_s = \frac{L_s}{\lambda}$$

$$= \frac{9.6276}{14} = 0.6877 \quad (4.17)$$

The citizens spends 41.262 minutes in the system

From Equation 4.6,

The utilization factor is given as Equation 4.18

$$\rho = \frac{\lambda}{s\mu}$$

$$\rho = \frac{14}{3 \times 11} \times 100 = 42.42\% \quad (4.18)$$

**Discussion of Results.**

The summary of the computed performance measure of the multi-server queuing model at INEC office Maikunkele, Minna is given in the table 4.3 and table 4.4

**Table 4.3 : Performance Measure of Multi-server Queuing Model at INEC office Maikunkele, Minna.**

S(Server)	$\lambda$ (lamda)	$\mu$ (mu)	Po	Ls	Lq	Ws	Wq
2	14	11	0.7347	5.5699	4.2972	0.39785	0.3069
3	14	11	2.9210	9.6276	8.3549	0.6877	0.5968

Table 4.3 is the computed value for Po, Ls, Lq, Ws and Wq obtained from analyzing 2 and 3 servers.

**Table 4.4 : Analysis of Multi-Server Queuing Model at INEC office Maikunkele, Minna.**

No of Server	2 Staff	3 Staff
Arrival rate ( $\lambda$ )	14	11
Service rate ( $\mu$ )	14	11
System utilization ( $\rho$ )	66.66%	42.42%
Ls	5.5699	9.6276
Lq	4.2972	8.3549
Ws in hours	0.39785	0.6877
Wq in hours	0.3069	0.5968
Po	0.7347	2.9210

Table 4.4 is the computed value for  $\rho$ ,  $L_s$ ,  $L_q$ ,  $W_s$ ,  $W_q$  and  $P_0$  obtained from Equation 4.7 to 4.18 , for 2 and 3 servers.

### **Conclusion**

The analysis and evaluation of queuing system in an organization is necessary for the betterment of the organization. As it concerns the case study (Determination of Optimal Performance for The Queuing System at Independent National Electoral Commission (INEC) Office Maikunkele, Minna), the evaluation of the queuing system shows that, the queuing system has busy time of 5.40 hours while the idle time is 36 minutes, the result also showed that a citizens spent an average of 35.808 minutes in the queue. The Queuing system has 0.666 utilization factor; this implies that the server is always busy. Based on these parameters obtained from the results, there is need for additional server point and staffs for efficient and optimal service delivery.

### **Recommendations**

Based on the conclusion of this study, the following recommendation are suggested for efficiency and quality of service to Citizen at INEC office, Maikunkele Bosso Local Government.

- i. It is recommended to increase the number of servers in order to increase service satisfaction.
- ii. In terms of operator service, the comfort and hospitality of the service should be improved so that the citizen who are queuing feel comfortable.
- iii. The server should increase the speed when providing services to citizen, so that during rush hour queues can be minimized.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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**MODELLING OF UNSTEADY HYDROMAGNETIC COUETTE FLOW THROUGH A  
POUROUS CHANNEL WITH TRANSVERSE MAGNETIC FIELD**

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**ABSTRACT**

This work presents mathematical modelling of transient hydromagnetic couette flow through a porous channel. The partial differential equation governing the phenomenon were non-dimensionalized using some dimensionless quantities. The dimensionless non-linear partial differential equation is solved using separation of variables. The results obtained were presented graphically and discussed. From the results obtained, it was observed that increase in Peclet number and Hartmann number decreases the velocity profiles against distance and increase in Hartmann number decreases the velocity profiles against time. Increase in the Prandtl number and Reynold number enhance the velocity profile against distance.

**Keyword:** convection, Couette flow, modelling, Hydromagnetic, magnetic field

**1. Introduction**

In fluid dynamics, Couette flow refers to the laminar flow of a viscous incompressible fluid in the space between two parallel plates, one of which is moving and the other remains fixed. Couette flow occurs in fluid machinery involving moving parts and is especially important for hydrodynamic lubrication. Couette flow has been used as the fundamental method for the measurement of viscosity and as a means of estimating the drag force in many wall driven applications (Muzychka and Yovanovich [1]).

Magnetohydrodynamics (MHD; also magneto-fluid dynamics or hydromagnetics) is the study of the magnetic properties and behaviour of electrically conducting fluids. Examples of such magnetofluids include plasmas, liquid metals, salt water, and electrolytes. The fluids being investigated must be electrically conducting, which limits the fluids to liquid metals, hot ionized gases (plasmas) and strong electrolytes.

Khan *et al.*, [2] investigated MHD flow of a generalized Oldroyd-B fluid in a porous space taking Hall current into account whereas Khan *et al.*, [3] also considered MHD transient flows of an Oldroyd-B fluid in a channel of rectangular crosssection in a porous medium. Hayat *et al.* [4] studied the influence of Hall current and heat transfer on the steady MHD flows of a generalized Burgers' fluid between two eccentric rotating infinite disks of different temperatures. In this case the fluid flow is induced due to a pull with constant velocities of the disks. Khan *et al.*, [5] considered the effects of variable suction and heat transfer on the oscillatory magnetohydrodynamic flow of a non-Newtonian fluid through a porous medium with slip at the wall.

Elbashbeshy [6] examined the effect of surface mass flux on mixed convection along a vertical plate embedded in porous medium. He found out that the velocity and temperature profiles increase as the mixed convection parameter increases, and that injection increases the heat transfer for all parameters studied. Similarly, Kafoussias [7] studied heat transfer inflow through a porous medium bounded by a semi-infinite horizontal plate. He concluded that there is a rise in the rate of heat transfer at the plate with increasing  $\gamma$  (permeability parameter). Makinde and Sibanda [8] researched on the suction driven flow and heat transfer in a pipe filled with porous medium. Besides, many researchers studied Couette flow through porous media.

Gbolagade and Makinde [9] investigated the effect of Biot number on thermal criticality in a Couette flow. They concluded that the magnitude of thermal explosion criticality at very large activation energy



is lower than that of moderate value of activation energy and thus thermal explosion will occur faster in the former than the latter. Ismail *et al.* [10] investigates effects of thermal radiation and magnetic field on hydromagnetic Couette flow of a highly viscous fluid with temperature-dependent viscosity and thermal conductivity at constant pressure through a porous channel. They highlight the effects of Nahme numbers, magnetic field, radiation and permeability parameters on both profiles. The results obtained are used to give graphical illustrations of the distribution of the flow variables and are discussed.

## 2. Mathematical Analysis

Consider the unsteady flow of a viscous incompressible electrically conducting fluid between two parallel porous plates  $y = 0$  and  $y = h$  of infinite length, in  $x$  and  $z$  directions, in the presence of a uniform transverse magnetic field  $H_0$  applied parallel to  $y$ - axis. Initially (i.e. when time  $t = 0$ ), fluid and the plates of the channel are assumed to be at rest. When time  $t > 0$  the lower plate ( $y = 0$ ) starts moving with time dependent velocity  $U_0$  ( $U_0$  being a constant) in  $x$  direction while the upper plate ( $y = h$ ) is kept fixed. The fluid suction/injection takes place through the porous walls of the channel with uniform velocity  $V_0$  which is greater than zero for suction and is less than zero for injection. It is assumed that no applied or polarization voltages exist (i.e.  $E = 0$ ,  $E$  being electric field).

Under the above assumptions, the equations of motion for viscous incompressible electrically conducting fluid reduce to

$$\frac{\partial u'}{\partial t'} + \nu_0 \frac{\partial u'}{\partial y'} = \nu \frac{\partial^2 u'}{\partial y'^2} - \frac{\sigma \mu_e^2 H_0^2}{\rho} u' \quad (2.1)$$

Where,  $\rho$  is the fluid density,  $\sigma$  is the electrical conductivity,  $\mu_e$  magnetic Permeability,  $\nu$  kinematic coefficient of viscosity,  $H_0^2$  is the transverse magnetic field,  $u'$  is the velocity of the fluid,  $t'$  is the time.

With the boundary condition given as,

$$u'(y, 0) = 0, \quad u'(0, t) = U_0, \quad u'(h, t) = 0 \quad (2.2)$$

Introducing the following dimensionless quantities,

$$y = \frac{y'}{h}, \quad u = \frac{u'h}{\nu}, \quad t = \frac{t'\nu}{h}, \quad R_e = \frac{U_0 h}{\nu}, \quad P_e = \frac{\nu_0 h}{\alpha}, \quad (2.3)$$

$$P_r = \frac{\nu_0}{\alpha}, \quad H_a^2 = \frac{\sigma \mu_e^2 H_0^2 h}{\nu \rho}$$

Into equation (2.1) we have,

$$\frac{\partial u}{\partial t} + \frac{R_e P_r}{P_e} \frac{\partial u}{\partial y} = \frac{P_r}{P_e} \frac{\partial^2 u}{\partial y^2} - H_a^2 u \quad (2.4)$$

Where,  $u$  is the dimensionless velocity along  $x$ - axis,  $t$  is the dimensionless time,  $y$  is the dimensionless coordinate axis normal to the plate,  $R_e = \frac{U_0 h}{\nu}$  is the Reynold number,  $P_e = \frac{\nu_0 h}{\alpha}$  is the Peclet number,  $P_r = \frac{\nu_0}{\alpha}$  is the Prandtl number,  $H_a^2 = \frac{\sigma \mu_e^2 H_0^2 h}{\nu \rho}$  is the Hartmann number.

The boundary condition is reduced to

$$u(y, 0) = 0, \quad u(0, t) = R_e, \quad u(1, t) = 0, \quad (2.5)$$

### 3. Method of Solution

By separation of variables, we let

$$u(y,t) = Y(y)T(t) \quad (3.1)$$

Substituting (3.1) into (2.4) we get,

$$\frac{P_r}{P_e} \frac{Y''(y)}{Y(y)} - \frac{R_e P_r}{P_e} \frac{Y'(y)}{Y(y)} = \frac{T'(t)}{T(t)} + H_a^2 \quad (3.2)$$

Since the Left hand side and Right hand side are of different variable, it implies that both are equal to a constant, so we let the constant be  $\lambda^2$  that is,

$$\frac{P_r}{P_e} \frac{Y''(y)}{Y(y)} - \frac{R_e P_r}{P_e} \frac{Y'(y)}{Y(y)} = \frac{T'(t)}{T(t)} + H_a^2 = \lambda^2 \quad (3.3)$$

So that,

$$\frac{P_r}{P_e} \frac{Y''(y)}{Y(y)} - \frac{R_e P_r}{P_e} \frac{Y'(y)}{Y(y)} = \lambda^2 \quad (3.4)$$

And

$$H_a^2 + \frac{T'(t)}{T(t)} = \lambda^2 \quad (3.5)$$

Solving equation (3.4) and (3.5) with straight forward calculation  $Y(y)$  and  $T(t)$  are known. The final expression of  $u(y,t)$  is given as,

$$u(y,t) = \left[ \left( \frac{R_e e^{m_2}}{e^{m_2} - e^{m_1}} \right) e^{m_1 y} - \left( \frac{R_e e^{m_1}}{e^{m_2} - e^{m_1}} \right) e^{m_2 y} \right] e^{(\lambda^2 - H_a^2)t} \quad (3.6)$$

Where,  $m_1 = \frac{A_2 + \sqrt{A_2^2 + 4A_1A_3}}{2A_1}$ ,  $m_2 = \frac{A_2 - \sqrt{A_2^2 + 4A_1A_3}}{2A_1}$ ,  $A_1 = P_r$ ,  $A_2 = R_e P_r$ ,  $A_3 = P_e \lambda^2$

### 4. Result and Discussion

In this analysis we examine the effect of Hartman number ( $H_a$ ), Prandtl number ( $P_r$ ), Reynold number ( $R_e$ ), Peclet number ( $P_e$ ), distance ( $y$ ), time ( $t$ ), on the velocity  $u(y,t)$  of the fluid.

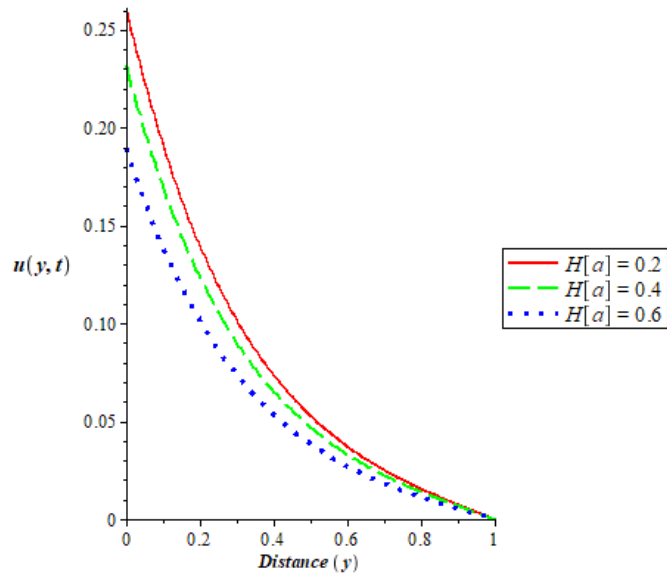


Figure 4.1: Graph of velocity of the fluid  $u(y,t)$  against Distance  $(y)$

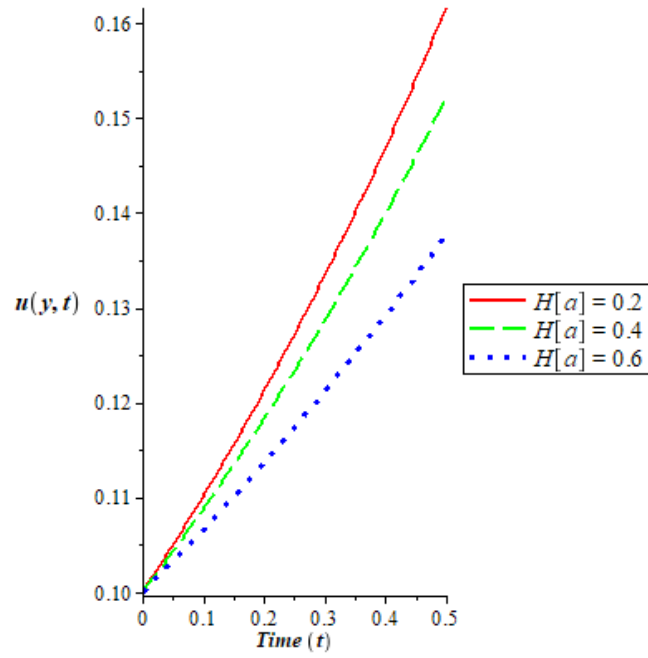


Figure 4.2: Graph of velocity of the fluid  $u(y,t)$  against Time  $(t)$

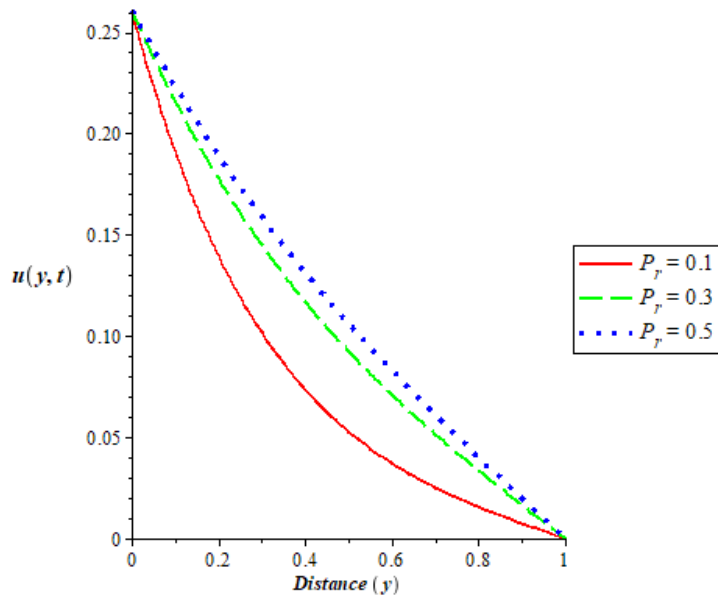


Figure 4.3: Graph of velocity of the fluid  $u(y,t)$  against Distance  $(y)$

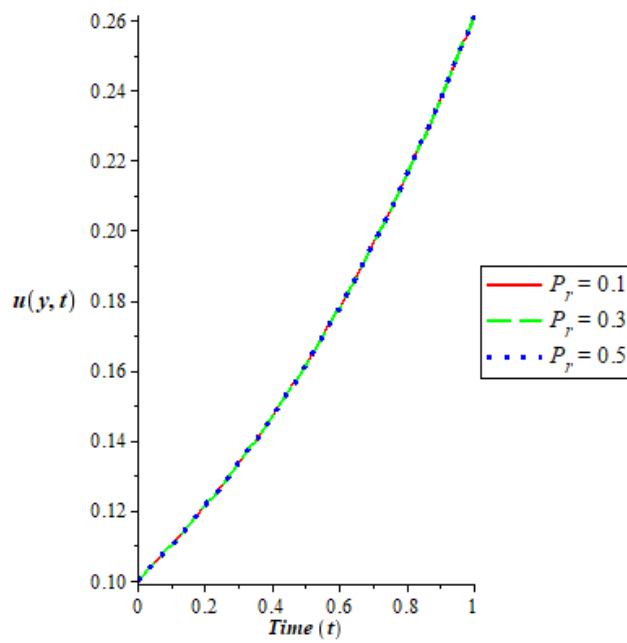


Figure 4.4: Graph of velocity of the fluid  $u(y,t)$  against Time  $(t)$

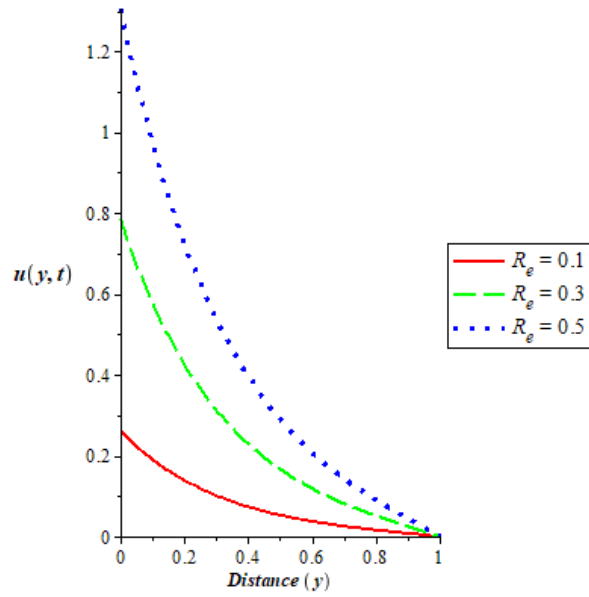


Figure 4.5: Graph of velocity of the fluid  $u(y,t)$  against Distance  $(y)$

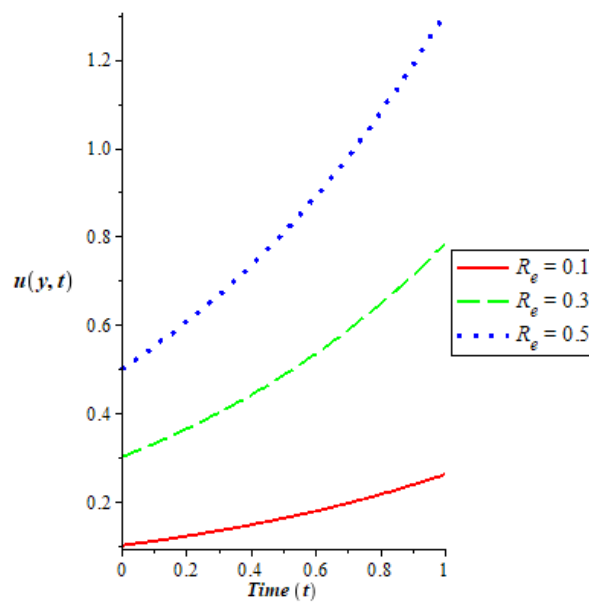


Figure 4.6: Graph of velocity of the fluid  $u(y,t)$  against Time  $(t)$

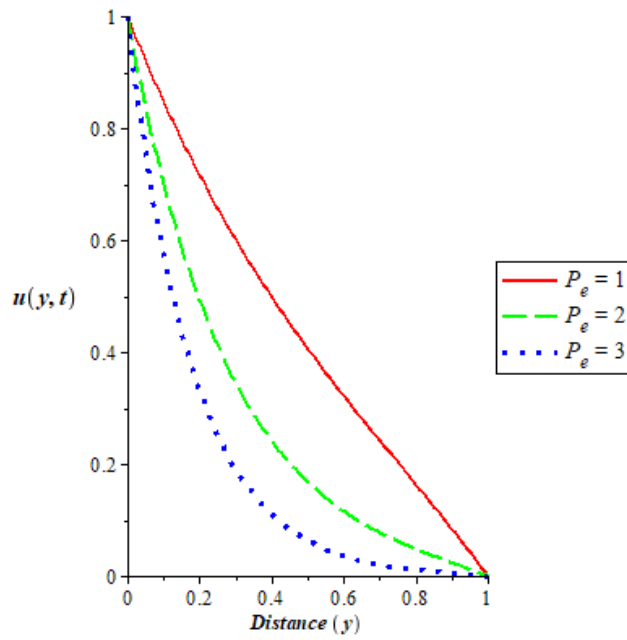


Figure 4.7: Graph of velocity of the fluid  $u(y,t)$  against Distance ( $y$ )

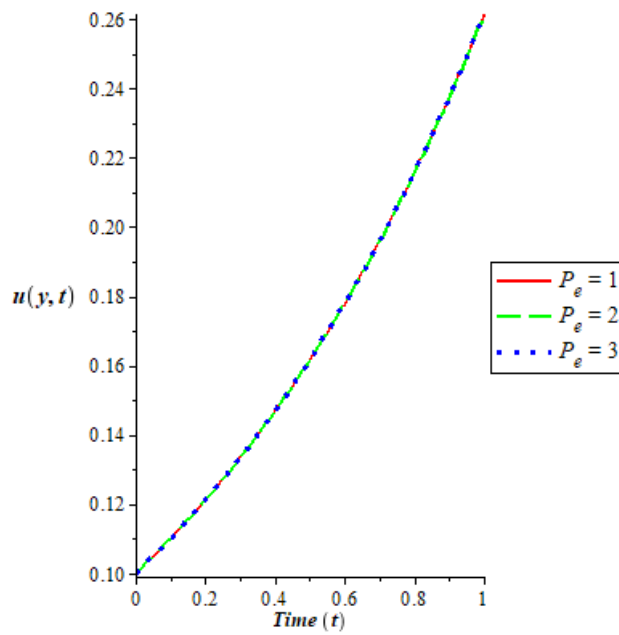
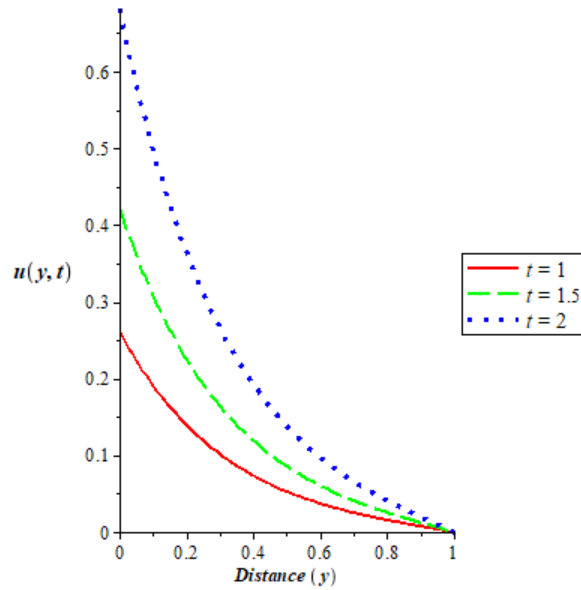
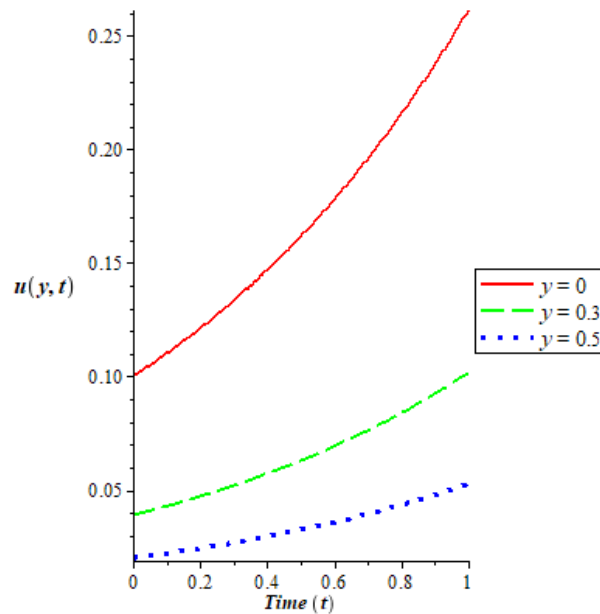


Figure 4.8: Graph of velocity of the fluid  $u(y,t)$  against Distance ( $y$ )





**Figure 4.9: Graph of velocity of the fluid  $u(y,t)$  against Distance ( $y$ )**



**Figure 4.10: Graph of velocity of the fluid  $u(y,t)$  against Time ( $t$ )**

### 5. Conclusion

A mathematical analysis has been carried out to study the transient hydromagnetic couette flow through a porous channel. The dimensionless governing non-linear partial differential equations for this investigation were solved analytically using method of separation of variables. The effects of the dimensionless parameters as shown on the graph were analyzed. We conclude that:

- (i) Hartman number ( $H_a$ ) and Peclet number ( $P_e$ ) reduces the transient velocity of the fluid against distance.
- (ii) Hartman number ( $H_a$ ) reduces the transient velocity of the fluid against time.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- (iii) Prandtl number ( $P_r$ ), Reynold number ( $R_e$ ) enhances the velocity of the fluid against distance.
- (iv) Reynold number ( $R_e$ ) enhances the velocity of the fluid against time.

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**MATHEMATICAL MODELLING OF TRANSIENT MIXED CONVECTION FLOW UNDER  
THE THERMAL BOUNDARY CONDITION**

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**ABSTRACT**

This paper presents mathematical modelling of transient hydromagnetic couette flow through a porous channel. The partial differential equation governing the phenomenon were non-dimensionalized using some dimensionless quantities. The dimensionless non-linear partial differential equation is solved using separation of variables. The results obtained were presented graphically and discussed. From the results obtained, it was observed that increase in Reynold number and the Annulus decreases the velocity profiles against radius and increase in Magnetic field parameter and Radius increases the velocity profiles against time. Increase in the Magnetic field parameter enhances the velocity profile against radius.

**Keywords:** convection, heat transfer, modelling, magnetohydrodynamic, magnetic field

**1. Introduction**

Convection heat and mass transfer in porous medium has been intensively studied over the decades. This is completely attributed to its wide applications in various fields. These applications are found in geothermal energy engineering, ground water pollution transport, nuclear waste disposal, chemical reactors engineering and insulation of buildings and pipes. The majority of studies on convection heat transfer in porous media are based on Darcy's law (Darcy [1])

Adesanya and Makinde [2] investigated the effect of radiative heat transfer on the pulsatile couple stress fluid flow with time dependent boundary condition on the heated plate. It is well known that the no-slip condition is not realistic in some flows involving Nanochannel, micro-channel and flows over coated plates with hydrophobic substances. In view of this, Adesanya and Gbadeyan [3] studied the flow and heat transfer of steady non Newtonian fluid flow noting the fluid slip in the porous channel.

Kaurangini and Jha [4] presented result of the studies on combined effects of free and forced convection flow in a vertical annulus filled with porous material having variable porosity when the outer cylinder is isothermally heated and the inner cylinder is isoflux.

Kaurangini and Jha [5] presented the study of mixed convection flow in a vertical annulus filled with constant porous material when the outer surface of the inner cylinder is isothermally heated. In the present work, the study of combined effects of free and forced convection flow in a vertical annulus filled with porous material having constant porosity is presented by heating the inner surface of the outer cylinder isothermally or constant heat flux.

Hamza *et al.*, [6] investigated unsteady heat transfer to MHD oscillatory flow through a porous medium under slip condition. They investigate the effects of slip condition, transverse magnetic field and radiative heat transfer to unsteady flow of a conducting optically thin fluid through a channel filled with porous medium. Exact solution of the governing equations for fully developed flow is obtained in closed form.

Chikh *et al.* [7] obtained an analytical solution for a fully developed, forced convection in a gap between two concentric cylinders. They exposed the inner cylinder to a constant heat flux while the outer is thermally insulated. Also a porous layer is attached to the inner cylinder. Their investigations were focused on the effects of permeability, thermal conductivity and the thickness of the porous materials

by using a Brinkman extended Darcy model. The study revealed that there exists a critical thickness of the porous layer at which heat transfer is minimum in the case of low thermal conductivity materials.

The aim of this paper is to analyze the behavior of mixed convection flow of an incompressible viscous fluid filled with porous material.

## 2. Mathematical Analysis

A transient Laminar fully developed mixed convection flow of an incompressible viscous fluid between a vertical concentric annulus of infinite length is considered. A pressure gradient is neglected.

In formulating the model, the following assumptions were made: The fluid obeys Boussinesq approximation, The velocity of the fluid varies in the axial direction only, The pressure gradient is neglected, The initial velocity is assumed to increase lengthwise (depend on the radius)

Under these assumptions, we consider the flow of fluid through a vertical annulus filled with porous material.

The governing equations of the problem and its boundary conditions are stated below,

$$\frac{\partial u}{\partial t} = -\frac{1}{\rho} \frac{\partial P}{\partial z} + \nu \left( \frac{\partial^2 u}{\partial r^2} + \frac{1}{r} \frac{\partial u}{\partial r} \right) - \frac{\nu}{k} u \quad (2.1)$$

Where  $u$  is the velocity of the fluid,  $\nu$  is the kinematic viscosity,  $r$  is the radius,  $a$  is the annulus,  $P$  denotes the fluid pressure,  $t$  is the time.

With the corresponding initial and boundary condition as,

$$u(r, 0) = \frac{Ur}{R} \left( 1 - \frac{r}{R} \right), \quad u(a, t) = 0, \quad u(R, t) = U \quad (2.2)$$

Introducing the following dimensionless quantities,

$$u' = \frac{u}{U}, \quad r' = \frac{r}{R}, \quad t' = \frac{Ut}{R}, \quad R_e = \frac{UR}{\nu}, \quad \left. \frac{M}{R_e} = \frac{R\nu}{Uk} \right\} \quad (2.3)$$

We have,

$$\frac{\partial u}{\partial t} = \frac{1}{R_e} \left( \frac{\partial^2 u}{\partial r^2} + \frac{1}{r} \frac{\partial u}{\partial r} \right) - \frac{M}{R_e} u \quad (2.4)$$

Where,  $u$  is the dimensionless velocity of the fluid,  $R_e$  is the Reynold number,  $r$  is the dimensionless radius,  $a$  is the annulus,  $M$  Magnetic field parameter,  $t$  is the dimensionless time

The boundary condition is reduced to

$$u(y, 0) = r(1-r), \quad u(a, t) = 0, \quad u(1, t) = 1, \quad (2.4)$$

## 3. Method of Solution

By separation of variables, we let

$$u(r, t) = R(r)T(t) \quad (3.1)$$

Substituting (3.1) into (2.4) we get,

$$\frac{R''(r)}{R_e R(r)} + \frac{R'(r)}{R_e r R(r)} = \frac{M}{R_e} - \frac{T'(t)}{T(t)} \quad (3.2)$$

Since the Left hand side and Right hand side are of different variable, it implies that both are equal to a constant, so we let the constant be  $\sigma^2$  that is,

$$\frac{R''(r)}{R_e R(r)} + \frac{R'(r)}{R_e r R(r)} = \frac{M}{R_e} - \frac{T'(t)}{T(t)} = \sigma^2 \quad (3.3)$$

And we have,

$$\frac{R''(r)}{R_e R(r)} + \frac{R'(r)}{R_e r R(r)} = \sigma^2 \quad (3.4)$$

And,

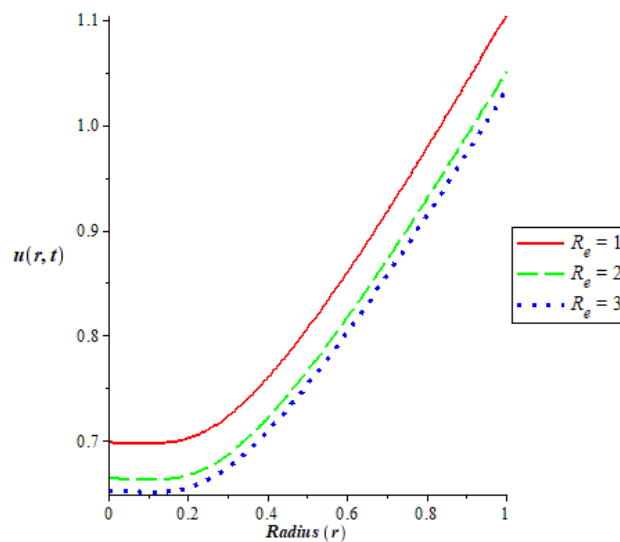
$$\frac{M}{R_e} - \frac{T'(t)}{T(t)} = \sigma^2 \quad (3.5)$$

Solving equation (3.4) and (3.5) with straight forward calculation  $R(r)$  and  $T(t)$  are known. The final expression of  $u(r, t)$  is given as,

$$u(r, t) = \left[ \left( -\frac{e^{(m_2-m_1)a}}{e^{m_2} - e^{(m_2-m_1)a} e^{m_1}} \right) e^{m_1 r} + \left( \frac{1}{e^{m_2} - e^{(m_2-m_1)a} e^{m_1}} \right) e^{m_2 r} \right] e^{\left( \frac{M-R_e \sigma^2}{R_e} \right) t} \quad (3.6)$$

#### 4. Result and Discussion

In this analysis, we examine the effect of Reynold number ( $R_e$ ), Magnetic field parameter ( $M$ ), Annulus ( $a$ ), Radius ( $r$ ), time ( $t$ ), on the velocity  $u(y, t)$  of the fluid.



**Figure 4.1: Graph of velocity of the fluid  $u(y, t)$  against Radius ( $r$ )**

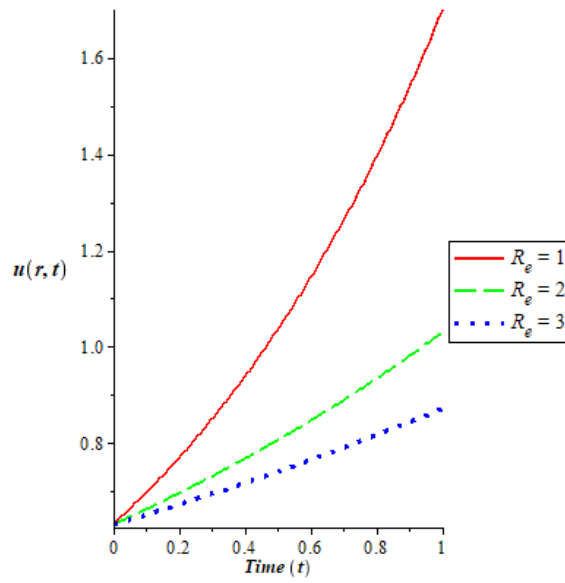


Figure 4.2: Graph of velocity of the fluid  $u(y,t)$  against Time  $(t)$

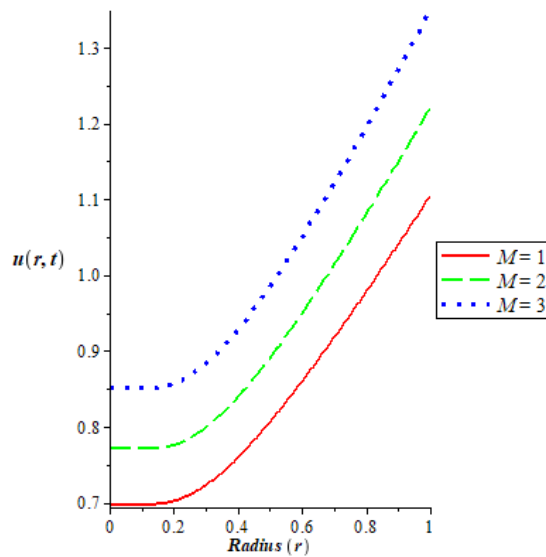


Figure 4.3: Graph of velocity of the fluid  $u(y,t)$  against Radius  $(r)$



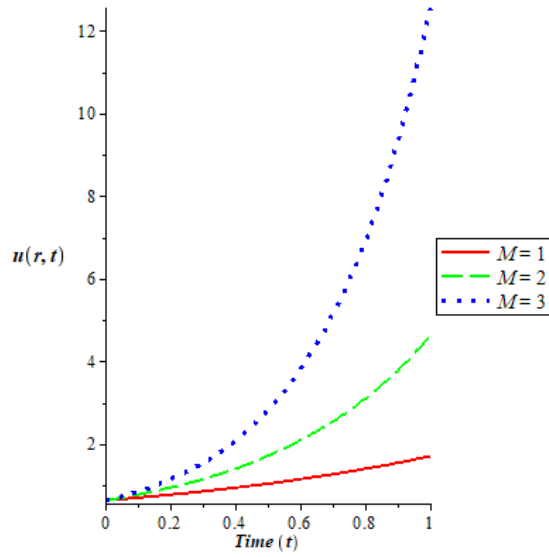


Figure 4.4: Graph of velocity of the fluid  $u(y,t)$  against Time  $(t)$

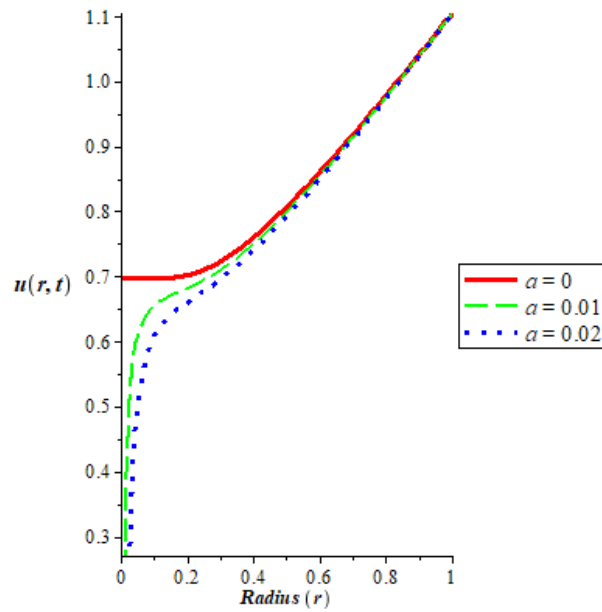


Figure 4.5: Graph of velocity of the fluid  $u(y,t)$  against Radius  $(r)$

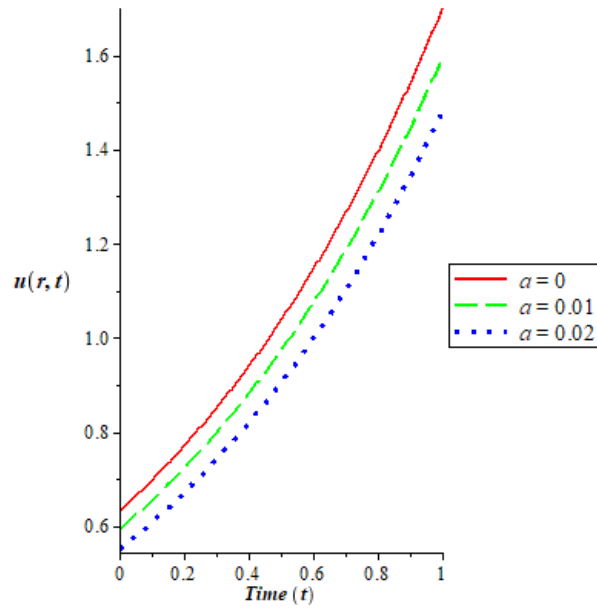


Figure 4.6: Graph of velocity of the fluid  $u(y,t)$  against Time  $(t)$

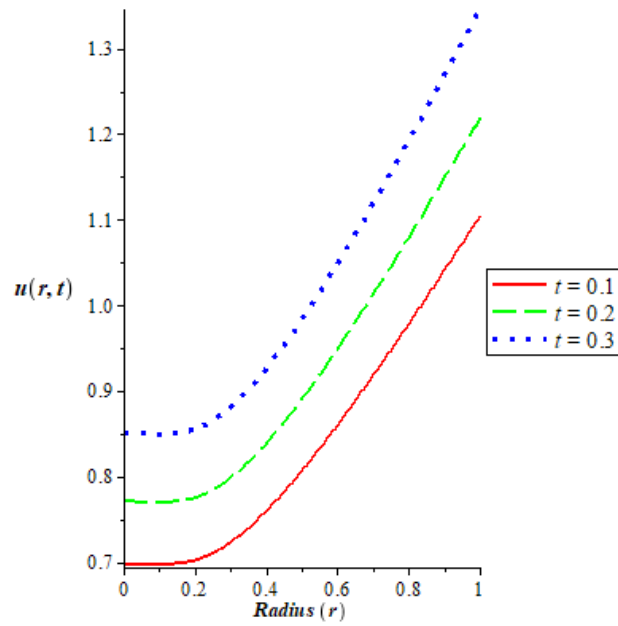
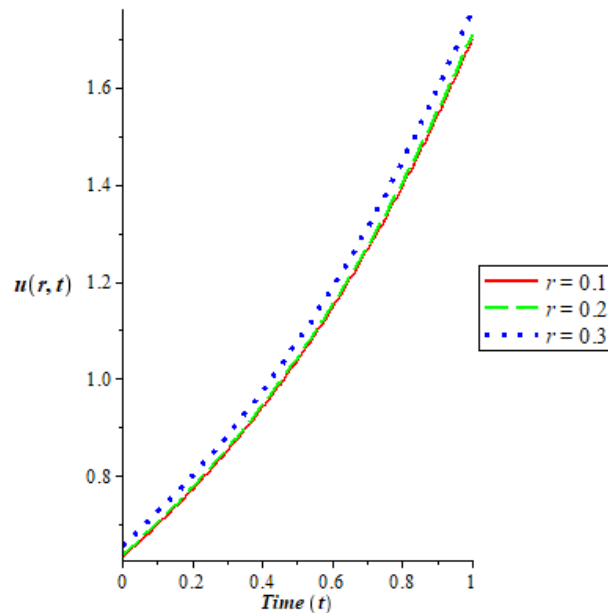


Figure 4.7: Graph of velocity of the fluid  $u(y,t)$  against Radius  $(t)$



**Figure 4.8: Graph of velocity of the fluid  $u(y, t)$  against Time ( $t$ )**

## 5. Conclusion

A mathematical analysis has been carried out to study a transient mixed convection flow of an incompressible viscous fluid between a vertical concentric annulus under thermal boundary condition. The dimensionless governing non-linear partial differential equations for this investigation were solved analytically using method of separation of variables. The effects of the dimensionless parameters as shown on the graph were analyzed. We conclude that:

- (i) Reynold number ( $R_e$ ) and Annulus ( $a$ ) reduces the transient velocity of the fluid against radius.
- (ii) Reynold number ( $R_e$ ) and Annulus ( $a$ ) reduces the transient velocity of the fluid against time.
- (iii) Magnetic field parameter ( $M$ ) and Radius ( $r$ ) enhances the velocity of the fluid against time.
- (iv) Magnetic field parameter ( $M$ ) and Time ( $t$ ) enhances the velocity of the fluid against radius.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## ATTITUDE OF UNDERGRADUATE STUDENTS OF SCHOOL OF AGRICULTURE TOWARDS AGRICULTURAL ACTIVITIES IN FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE, NIGERIA

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### ABSTRACT

Agriculture is the backbone of the Nigerian economy. The Agricultural sector is yearning for the replacement of aged farmers with youth that will be more ventures and adapt better farm practice. This study therefore examined the attitude of undergraduate student of Federal of Technology, Minna Niger state, Nigeria. A multi-stage sampling technique was used to select 133 students. Primary data were used for this study and data were collected using a questionnaire (google form) and analyzed using descriptive and inferential statistics. Results revealed that majority (57.14%) of the students were within the age range of 20-25 years, 55.63% were female while 81.04% were single. Distribution by parent occupation shows that 22.56% had farming as their primary occupation, 73.68% had their childhood in the city while 51.87% of the students had farming experience of between 1 – 5 years. The level of involvement of students shows that Poultry farming had the highest mean score of 2.51 and ranked 1<sup>st</sup>. The reason for student's participation in agricultural activities indicates that majority (96.24%) of students were involved farming because it ensures food security. More so, result of Probit model shows that age, parent occupation, marital status and years of farming experience affect students' attitude towards agriculture. Risk associated with agriculture was one of the major constraint's student faces. The study recommends that female gender should be encouraged and given full support to practice agriculture also, students on campus should be sensitization on the opportunities in agricultural sector.

**Keywords:** Attitude, Students, Agricultural activities and Federal University of Technology

### Introduction

Agriculture is one of the most viable sectors particularly in terms of its employment potentials (*World Bank, 2020*). Majority of African farmers are old and still use crude implement in carrying out their farming activities thus young generation perceives farming as an occupation for the aged, illiterate and poor rural people (Njeru *et al.*, 2015). It is the foundation for the development of stable human communities, both in rural and urban communities. According to the census held in 2006 it was estimated that youth population is almost a hundred million. This means that they constitute more than two-third of the country's population of 140 million. Career choice in practical farming has a lot to do with the kind of skill and entrepreneurial knowledge acquired. If Nigeria youth policy definition of all young persons of ages 18 to 35 years is used as benchmark, it implies that correct diagnosis that will bring about right motivation that will ensure aggressive and efficient involvement of youth in agricultural production will be a solution to food security in Nigeria. It is often argued that lecture based knowledge alone does not often make the expected impact on practical output and confidence of students that will ensure exploration of careers in agriculture. That is one of the reason the University body has instituted and incorporated the SIWES (Student Industrial Work Experience Scheme) programme in order for students to get acquainted to what has been taught into practical and be able to be dependent. Today, most youths that are unemployed put at 20.3 million with Nigeria generating about 4.5million new entrants into the labour market annually with 2.2 million primary school leavers not proceeding to secondary school, one million secondary school leavers not proceeding to the tertiary level and 300,000 graduates finding no placement anywhere for productivity, and yearly graduate turnover at over 600,000 (National Bureau of Statistic Abuja, 2012). Agriculture which is said to be the way out of our economic woes can contribute immensely to youth

development and act as a means of future livelihood. Furthermore, farming serves as a tool for providing employment opportunities for graduates thereby alleviating poverty and youth delinquencies. It is therefore important to encourage agricultural graduate involvement in agricultural activities. More so, youth involvement and willingness in agricultural activities will not only create career opportunities for the youth but also increase food production and to a large extent reduce the gap between. The general objective of the study were to describe the socio-economic characteristics of the respondent; describe the reasons for students' participation in agricultural activities in the study area; examine the student's attitude towards agriculture during the five year of agricultural training in the study area and identify constraints to students' participation in agricultural activities in the study area;

## **MATERIALS AND METHODS**

### **The Study Area**

The study will be carried out in Federal University of Technology, Minna, Niger State, Nigeria. The school was established in 1983 and has ten (10) faculties. Namely: School of Agriculture and Agricultural technology (SAAT), School of Infrastructure, Process and Engineering Technology(SIPET), School of Entrepreneurship and Management Technology (SEMT), School of Environmental Technology (SET), School of Life Sciences (SLS), School of Physical Sciences (SPS), School of Information and Communication Technology (SICT), School of Technology Education (STE), School of Post Graduate Studies (SPGS).

### **Sampling size and Sampling Techniques**

The population for this study consist of all agricultural students (500 level) of the School of agriculture and agricultural technology (SAAT) from various Departments namely; Department of Agricultural Economics and Farm management, Agricultural Extension and Rural development, Animal Production, Crop Production, Horticulture, Soil Science and Land Management, Food Science and Technology, Water Aquaculture and Fishery Technology. The population of students as a result of the large size, a stratified random sampling technique was used to stratify the population into sub-group (departments and student level of study) that is 500 level only. Thereafter, random sampling technique was employed in sampling 4% students from each of the seven departments amounting to a total of one hundred and thirty-three (133) respondents.

### **Method of Data Analysis**

Objective I, II and IV were analyzed using descriptive statistics. A probit model was used to estimate the factors influencing students' attitude in the study area which is objective III  $Y = \text{Favourable attitude} = 1; \text{Unfavorable attitude} = 0$

$X_1 = \text{Age (years)}$   $X_2 = \text{Sex (Male=1; Female=0)}$   $X_3 = \text{Parent annual income (₦)}$

$X_4 = \text{Marital status (Married=1, otherwise=0)}$   $X_5 = \text{Place of birth (Urban=1, Otherwise=0)}$

$X_6 = \text{Farming experience (Yes=1, otherwise=0)}$   $X_7 = \text{Years of farming experience}$

$b_1 - b_7 = \text{regression coefficient}$   $e = \text{error term}$

## **RESULTS AND DISCUSSION**

### **Socio-economic characteristics of the students**

Table 1 shows that majority (57.14%) of the respondents were within the age range of 20 – 25 Years, 55.63% were female while 81.04% were single. Distribution by parent occupation shows that 22.56% had farming as their primary occupation, 73.68% had their childhood in the city while 51.87% of the students had farming experience of between 1 – 5 years. Result of the study is in line with the findings of Agumagu, *et al.* (2017) who reported that majority (59%) of the students had farming experience before gaining admission into the university.



**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**Table 1: Socio-economic characteristics of the students (n = 133)**

Variables	Frequency	Percentages
Age (Years)		
< 20	9	6.76
20 – 25	76	57.14
26 – 30	45	33.83
31 – 35	1	0.75
>35	2	1.51
Gender		
Male	59	44.36
Female	74	55.63
Marital status		
Single	108	81.20
Engaged	8	6.02
Married	18	13.53
Parent occupation		
Law	9	6.76
Teaching	7	5.26
Engineering	21	15.79
Farming	30	22.56
Medicine	18	13.53
Military	15	11.28
Accountant	7	5.26
Craftsman	2	1.50
Undecided	24	18.05
Place of Residence		
Rural	35	26.31
Urban	98	73.68
Farming experience		
1 – 5	69	51.87
6 – 10	20	15.04
11 – 15	7	5.26

**Source: Field Survey, 2021**

**Distribution of students according to their level of involvement**

This implies that certain profession such as livestock enjoyed a lot of involvement by the respondents which could be due to the short gestation and or level of financial outlay

**Table 2: Distribution of respondents according to their level of involvement**

Variable	Mean ( $\bar{x}$ )	Rank
Poultry farming	2.51	1 <sup>st</sup>
Cash crop farming	2.44	2 <sup>nd</sup>
Fish farming	2.30	3 <sup>rd</sup>
Snail farming	2.26	4 <sup>th</sup>
Arable crop production	2.17	5 <sup>th</sup>

**Source: Field Survey, 2021**

Table 3 Results indicates that majority (96.24%) of students were involved into farming because it ensures food security, provision of self-employment (94.74%) while some were involved for its ability to reduce poverty (89.47%).

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**Table 3: Reasons for student’s involvement in Agricultural activities**

Research items	Frequency	Percentage
<b>Food security</b>		
Yes	128	96.24
<b>Self – employment</b>		
Yes	126	94.74
<b>Credit acquisition opportunity</b>		
Yes	92	69.17
<b>Poverty reduction</b>		
Yes	119	89.47
<b>Absence of desirable job opportunity</b>		
Yes	99	74.43
<b>To create employment for other individuals</b>		
Yes	115	86.47
<b>Industrial training</b>		
Yes	94	70.68
<b>Family business</b>		
Yes	72	54.14

**Source:** Field survey, 2021

**Student’s attitude during the five years of Agricultural training**

I actually did not apply to study any agricultural course, i just found myself here was the statement that ranked 1<sup>st</sup> ( $\bar{x}=2.39$ ) while “My attitude towards farming was negative when I resumed 100 level” ranked 2<sup>nd</sup> ( $\bar{x}=2.29$ ). This implies that more students strongly agreed that their attitude towards agriculture was negative before their admission into 100 level. This implies that many respondents were not pleasantly disposed to agriculture before their admission to the university. The result is line with the findings of Okiror and Otabong (2015) who reported that students of agriculture in Universities are admitted by the Ministry of Education rather than by choice. Research item on “Student Industrial Work Experience Scheme (SIWES) programme made me to have positive attitude towards agriculture” had a mean score of 2.09 which is above the average mean score. This implies that student’s industrial work scheme (SIWES) positively influenced the attitude of students towards farming as a profession. This finding corroborates with the work of Abayomi (2008) who stated that practical training in agriculture will increase agricultural graduate employability on graduation.

**Table 4. Student’s attitude during the five years of Agricultural training**

Research item	Mean ( $\bar{x}$ )	Rank	Decision
I actually did not apply to study any agricultural course i just found myself here	2.39	1 <sup>st</sup>	High
My attitude towards agriculture was negative when i resumed my 100 level	2.29	2 <sup>nd</sup>	High
SIWES programme changed my orientation and opened my eyes towards agriculture and grew my interest to practice it as a career	2.09	3 <sup>rd</sup>	High
I lost interest in agriculture because it is time consuming and requires so much attention	2.07	4 <sup>th</sup>	High
Inadequate knowledge turned me off from agriculture	2.03	5 <sup>th</sup>	High
I do not have a positive attitude towards agriculture	1.28	6 <sup>th</sup>	Low
If agriculture can be profitable and adequate entrepreneurial education is provided, it will interest me to practice	1.21	7 <sup>th</sup>	Low
My attitude towards agriculture still remains the same even after my years of study	1.19	8 <sup>th</sup>	Low

**Source:** Field survey, 2021

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## Factors influencing students' attitudes towards agricultural activities

Table 5 shows a probit model revealing the age, parent occupation, marital status and years of farming experience where the factors influencing students' attitude towards agricultural activities in the study area. Age was negatively significant at 1%; implying that the increase in age does not guarantee a positive attitude of the student, that is to say that the more the age the poorer their attitudes. Parent occupation was positively significant at 1%; implying that parent occupation influences the attitude of the student positively due to their elite professions and level of education. Marital status is positively significant at 10% implies that the more married the students are, the more proficient their attitude. Years of farming experience was significant positively at 5%, this implies that increase in years of farming experience brings about increase in their attitudinal level. The result concurs with the findings of Fizer (2013) who reported that family, passion, salary, role model, gender and past experiences are some of the factors that affect the decision for career choice.

**Table 5: Probit model estimating the factors influencing students' attitude of respondents**

Variables	Coefficient	Standard error	t – value	P - value
Age	-0.054	0.0164918	-3.30	0.001***
Gender	-0.571	0.398	-1.43	0.151
Parent occupation	1.141	0.364	3.13	0.002***
Marital status	0.485	0.256	1.89	0.058*
Place of childhood resident	-0.055	0.049	-1.11	0.267
Farming experience	-0.012	0.210	-0.60	0.551
Years of farming experience	0.435	0.1969	2.21	0.027**
Constant	1.612	0.924	1.74	0.081*

**Source:** Field survey, 2021\* significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%

n = 133 LR  $\chi^2(7) = 50.42$  Prob >  $\chi^2 = 0.0000$  Pseudo  $R^2 = 0.4015$  Log likelihood = -37.575

## Constraints to student's participation in Agricultural activities

Some of the constraints faced by the respondents in the study area are risk associated with farming and low access to credit. The result is in consonance with the findings of Agumagu, *et al.* (2017) who reported that continuous poor harvest, Perception that farmers are failures Feelings that farmers are not respected and Poor returns on investment.

**Table 6: Constraints to student's participation in Agricultural activities**

Research items	Mean ( $\bar{x}$ )	Rank	Decision
Risk associated with farming	2.61	1 <sup>st</sup>	Severe
Low access to credit	2.59	2 <sup>nd</sup>	Severe
Drudgery associated with agricultural production	2.57	3 <sup>rd</sup>	Severe
Temptation towards more lucrative white-collar jobs	2.53	4 <sup>th</sup>	Severe
Low status ascribed to farmers	2.52	5 <sup>th</sup>	Severe
Inadequate infrastructures in farm areas	2.52	5 <sup>th</sup>	Severe
inadequate incentives from the government	2.47	7 <sup>th</sup>	Severe
Inadequate of awareness of the scope of opportunities in the agricultural sector	2.38	8 <sup>th</sup>	Severe
Low wages	2.31	9 <sup>th</sup>	Severe
Low access to land	2.25	10 <sup>th</sup>	Severe
Lack of management skills and ability	2.13	11 <sup>th</sup>	Severe
Boredom and social isolation	1.74	12 <sup>th</sup>	Not severe

**Source:** Field survey, 2021

## Conclusion

The study also discovered that most agricultural students in the study area who had negative

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

attitude to farming until their admission into the university, now have positive attitude through training received from the University.

## Recommendation

- ❖ Government should provide incentives such as input supply, good market outlet and attractive price of agricultural produce should be put in place to encourage youth.
- ❖ Awareness of the scope of opportunities in agricultural sectors should be made to student while on campus in order to be aligned into various agricultural enterprises;
- ❖ Student who are currently into agriculture should be encouraged and honoured so that others will take interest and get involved in agriculture.

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ROLE OF PROBIOTICS IN HEALTHCARE

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ABSTRACT

Extensive research has been conducted in recent decades to investigate the health benefits provided by probiotics. These functional foods have been shown to modify and restore the existing intestinal flora. Probiotics are live microorganisms that, when consumed in controlled and adequate amounts as a single strain or combination of strains, confer health benefits to the host. Their therapeutic potential in preventing and managing gastrointestinal infections, allergic diseases, and even cancer has been globally recognized, particularly in developed countries. Probiotics are commonly found in foods such as yoghurts, cheese, and dairy drinks, and this practice has flourished in Europe, Asia, and the Americas. The bacteria species used as probiotics are primarily lactic acid-producing strains, including *Lactobacillus*, *Bifidobacterium*, *Streptococcus thermophilus*, certain *Lactococcus*, *Leuconostoc*, and *Pediococcus* species. Non-lactic acid probiotics include specific beneficial strains of *Escherichia coli* (Nissle 1917), *Bacillus lacterosporus*, *Bacillus subtilis*, *Bacillus coagulans*, *Propionibacterium* species, and the non-pathogenic yeast *Saccharomyces boulardii*. Probiotics have shown remarkable potential in preventing and managing various infectious and non-infectious disorders, such as *Helicobacter pylori* infections, inflammatory bowel diseases, irritable bowel syndrome, bacterial gastroenteritis, bladder infection, microbial vaginosis, allergies, colon cancer, and breast cancer. They also help reduce recurrent childhood infections, such as diarrhea and upper respiratory tract infections, especially in infants aged 4-11 months. Probiotics can be introduced into the human body as food products through the mouth or as yogurt-soaked tampons, douches, or encapsulated probiotic suppositories into the vagina. The utmost significance of probiotics lies in their established safety, cost-effectiveness, and potential to impede microbial infections. In 1994, the World Health Organization recognized probiotics as the second most crucial immune defense mechanism, particularly in situations where commonly prescribed antibiotics have become ineffective due to antibiotic resistance.

**Key words:** Probiotics, functional foods, intestinal microflora, *Lactobacillus*, *Bifidobacterium*, gastrointestinal disease, healthcare

Introduction

Hippocrates asserted that the principle of "Let food be the medicine and medicine be the food" is undoubtedly applicable in today's context. The predominant issue in the realm of medicine is the emergence of resistance among crucial pathogens against a variety of antibiotics. The indiscriminate and excessive utilization of antibiotics has resulted in the emergence of bacteria strains that are resistant to multiple drugs. This regrettable occurrence has compelled scientists to alter the treatment approach, shifting from the elimination of specific bacteria to the modification of bacterial ecology through the utilization of probiotics (Webb, 2011).

It has been scientifically established that certain species of microorganisms can cause illness and even death. Throughout history, some of the deadliest microorganisms have been *Yersinia pestis*, influenza virus, AIDS/HIV virus, *Clostridium tetani*, *Mycobacterium tuberculosis*, and *Vibrio cholerae*, among others. Recently, many multi-drug resistant bacteria have been causing significant healthcare-associated infections, and dangerous serotypes have been causing serious emerging food poisonings due to the production of enterotoxins. Some of these medically important bacteria include methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), extended-spectrum beta-lactamase (ESBL) producing Enterobacteriaceae, multi-drug resistant *Pseudomonas aeruginosa*, multi-drug resistant *Mycobacterium tuberculosis*, and Enterohemorrhagic *Escherichia coli* (EHEC) (Gruber

*et al.*, 2013). Henceforth, in the course of microbiology's history, the majority of human investigations have concentrated on the pathogenic microorganisms present on or within individuals, with fewer inquiries delving into the advantages offered by the indigenous bacteria (Peterson *et al.*, 2009). As highlighted in various critiques (Relman, 2002; Relman and Falkow, 2001), our comprehension of the endogenous flora inhabiting the human body remains inadequate. Nevertheless, we are encompassed by a vital biological consortium of microorganisms that reside within or on the human body and confer benefits. This biological consortium is known as the human microbiome.

The human gut microbiota is composed of approximately 500 to 1,000 bacterial species, with about 90% of them being obligate anaerobes (Sommer and Bäckhed, 2013). Probiotics have been proposed to provide protection against infectious diseases through various strain-dependent mechanisms, including the secretion of antipathogenic substances, competitive exclusion of pathogens, maintenance of mucosal integrity, and stimulation of systemic or mucosal immune responses (Howarth and Wang, 2013). Probiotics are not a recent invention, but have been present in traditional foods such as fermented beverages, salted fish, yogurt, and various types of cheese for centuries (Amara, 2012). These food products contain different types of beneficial bacteria. It is believed that the first use of food containing probiotics was fermented milk (Hosono, 1992), which humans discovered had a pleasant taste. Later, they learned how to transform it into cheese, yogurt, and other products (Metchnikoff and Mitchell, 1910; Metchnikoff, 2004; Amara, 2012).

Despite the accumulation of several pieces of evidence supporting the use of probiotics (Agathou & Beales, 2013), the availability and utilization of probiotics in this community remain low. This may be attributed to the inadequate awareness and knowledge among health practitioners and consumers regarding the sources and benefits of probiotics. Additionally, various factors such as the increasing levels of drug resistance among pathogenic organisms, particularly in hospitals, and the growing demand from consumers for natural alternatives to pharmaceutical drugs, have prompted physicians to explore alternative remedies. The emergence of scientific and clinical evidence demonstrating the efficacy and effectiveness of certain probiotic strains has made them an appealing adjunct to antibiotics. Despite the flourishing use of probiotics and prebiotics in Europe, Asia, and America, there is still significant hesitation in Nigeria regarding the use of these products (Anukam *et al.*, 2006).

### **History of Probiotics**

During the early 20th century, the discovery of probiotics occurred when Elie Metchnikoff, a Nobel prize-winning scientist and director of the Pasteur Institute, observed that rural inhabitants in Bulgaria lived to advanced ages despite facing extreme poverty and harsh climate conditions. While conducting research in Bulgaria in 1907, Metchnikoff became intrigued by the fact that certain individuals in the Bulgarian population lived significantly longer than wealthy city-dwellers in Europe. He specifically focused his study on centenarians, individuals who had surpassed the age of 100, in an attempt to systematically identify potential connections between their remarkable longevity and their lifestyle choices. Metchnikoff's investigations revealed that the inhabitants of the Caucasus Mountains consumed a fermented yoghurt drink on a daily basis. Further analysis of this drink led to the discovery of a probiotic called *Lactobacillus bulgaricus*, which appeared to improve the health and extend the lifespan of those who consumed it. Metchnikoff theorized that by manipulating the intestinal microbiome with beneficial bacteria found in sour milk, overall health could be enhanced and the onset of senility delayed (Samuel, 2021). Another scientist named Tissier also made significant contributions to the understanding of probiotics. Tissier discovered Bifidobacteria in breast-fed infants, highlighting the functional role of specific bacteria in maintaining good health. In 1906, Tissier reported the clinical benefits of modulating the flora in infants with intestinal infections (Soccol *et al.*, 2010). At the time, many others were skeptical about the concept of bacterial therapy and specifically questioned whether the bacteria found in yoghurt, such as *L. bulgaricus*, could survive the journey through the intestines, colonize the gut, and provide benefits. However, in the early 1920s, *L. acidophilus* milk was documented to have therapeutic effects, particularly in aiding digestion. It was believed that the colonization and growth of these microorganisms in the gut were essential for their effectiveness, leading to the recommendation of using intestinal isolates (Soccol *et al.*, 2010).



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

In the early 1930s, a Japanese microbiologist by the name of Minoru Shirota dedicated his research to the selection of strains of intestinal bacteria that could withstand the journey through the digestive system. He also focused on utilizing these strains to develop fermented milk for distribution in his clinic. Shirota hypothesized that the production of lactic acid in the gut could eliminate harmful bacteria in the intestines, thereby improving the health and longevity of consumers (Samuel, 2021). The initial product he created, which contained *L. acidophilus* Shirota (later renamed *L. casei* Shirota), served as the foundation for the establishment of the Yakult Honsha Company (Soccol *et al.*, 2010). It was not until the end of the century that the various functions of intestinal microflora became evident. These functions include protective, metabolic, and trophic roles (Guarner and Malagelada, 2003). Protective functions involve the creation of barriers and defense against pathogens. Metabolic functions primarily consist of vitamin K production, ion absorption, energy conservation in the form of short-chain fatty acids, and the fermentation of indigestible dietary residue and endogenous mucus. Lastly, trophic functions are responsible for the development and maintenance of the immune system, as well as the regulation of epithelial cell growth and differentiation (Soccol *et al.*, 2010). The health benefits associated with the consumption of foods containing *Lactobacillus acidophilus*, *Bifidobacterium*, and *L. casei* have been extensively documented. While yoghurt starter cultures, such as *Lactobacillus delbrueckii* and *Streptococcus thermophilus*, offer some health benefits, they are not naturally present in the intestine. Therefore, *L. acidophilus*, *Bifidobacterium*, and *L. casei* are added as dietary supplements to yoghurt in order for it to be considered a probiotic product. As a result, it is common practice to include both starter organisms, such as *L. delbrueckii* and *S. thermophilus*, along with one or more species of probiotic bacteria when producing such products (Soccol *et al.*, 2010).

## Definitions of Probiotics

The term "probiotics" is derived from the combination of two Greek words, "pro" meaning "for" and "bios" meaning "life". Literally, this term signifies its importance for sustaining life. Over the past decade, probiotics have emerged as a significant area of research interest (Guarner *et al.*, 2008). In 1965, scientists Lilly and Stillwell introduced the term "probiotics" to refer to "microbially derived factors that stimulate the growth of other organisms" (Guarner *et al.*, 2008). The term gained popularity through R. Fuller, who defined it as "a live microbial feed supplement which beneficially affects the host by improving its intestinal microbial balance" (Fuller, 1989). In October 2001, the World Health Organization (WHO) defined probiotics as "live micro-organisms which, when administered in adequate amounts, confer a health benefit on the host" (Schlundt and Jordan, 2012). Subsequently, the Guidelines for the Evaluation of probiotics in Food were issued by a working group convened by the Food and Agriculture Organization (FAO) and WHO in May 2002 (FAO/WHO, 2002). A consensus definition of probiotics was adopted based on available information and scientific evidence following the joint expert consultation between the FAO of the United Nations and the WHO. This effort was followed by the requirement of local governmental and supragovernmental regulatory bodies to provide better substantiation for health claims. In 2010, the first global effort was made to develop recommendations for the evaluation and validation of probiotic health claims by representatives of two expert groups consisting of academic scientists and industry professionals (Shane *et al.*, 2010). However, the European Food Safety Authority does not accept this definition as it includes a health claim that cannot be measured (Rijkers *et al.*, 2011).

A gathering of scientific experts convened in London, Canada, on October 23, 2013 to deliberate on the extent and suitable application of the term "probiotic". The impetus for this meeting stemmed from advancements in the field that prompted the formulation of a definition in 2001, and the findings of the panel were subsequently published in June 2014 (Hill *et al.*, 2014). The panel proposed a more grammatically precise definition, stating that probiotics are "live microorganisms that, when administered in sufficient quantities, bestow a health advantage upon the host".

## Probiotics Microorganisms

Probiotic products typically contain one or more carefully selected microbial strains. The predominant probiotic microorganisms for human use are typically found within the geni *Lactobacillus*, *Bifidobacterium*, *Lactococcus*, *Streptococcus*, and *Enterococcus*. Additionally, certain Gram-positive strains of bacteria from the *Bacillus* genus and some strains of yeast from the *Saccharomyces* genus are

commonly utilized in probiotic products (Simon, 2005). It is crucial for probiotics to be safe for both human and animal consumption, as they are subject to regulations outlined in general food laws. In the United States, microbial strains used for consumption must have the GRAS (Generally Regarded As Safe) status, which is regulated by the FDA (Food and Drug Administration). In Europe, the term QPS (Quality Presumption of Safety) was introduced by EFSA. The QPS concept includes additional safety assessment criteria for bacterial supplements, such as the absence of antibiotic resistance risk and a history of safe usage (Gaggia *et al.*, 2010). Dairy and dairy-based products are rich sources of probiotics (Liong, 2011). Throughout history, the fermentation of milk and the consumption of these fermented products have been common practices, providing a source of lactic acid bacteria (LAB), *Bifidobacteria*, and other microbes for human use. Another method employed is the isolation of probiotics from human fecal samples, as these bacteria naturally exist within the human gut. Table 1 below displays various probiotic bacteria strains for human use. The most popular probiotic microorganisms are typically found within the *Lactobacillus*, *Bifidobacterium*, and *Streptococcus* genera, although other organisms such as enterococci and yeast have also been utilized as probiotics. The selection of these strains is often based on criteria believed to be essential for their effectiveness, including strain origin, in vitro adherence to intestinal cells, and survival during passage through the gastrointestinal tract (Soccol *et al.*, 2010).

**Table 1:** Microorganisms applied in probiotic products.

<i>Lactobacillus</i> species	<i>Bifidobacterium</i> species	Others
<i>L. acidophilus</i>	<i>B. adolescentis</i>	<i>Enterococcus faecium</i>
<i>L. rhamnosus</i>	<i>B. animalis</i>	<i>Lactococcus lactis</i>
<i>L. gasseri</i>	<i>B. bifidum</i>	<i>Streptococcus thermophilus</i>
<i>L. Casei</i>	<i>B. breve</i>	<i>Leuconostoc mesenteroides</i>
<i>L. crispatus</i>	<i>B. infantis</i>	<i>Enterococcus faecalis</i>
<i>L. reuteri</i>	<i>B. longum</i>	<i>Pediococcus acidilactici</i>
<i>L. fermentum</i>	<i>B. lactis</i>	<i>Bacillus clausii</i>
<i>L. helveticus</i>		<i>Escherichia coli</i> Nissle 1917
<i>L. plantarum</i>		<i>Saccharomyces cerevisiae</i> (boulardi)
<i>L. gallinarum</i>		
<i>L. johnsonii</i>		
<i>L. salivarius</i>		
<i>L. pentosus</i>		

### Characteristics of Probiotics

The survival of a probiotic strain in its intended location is of great significance. In order to achieve prolonged and potentially heightened activity, it is imperative that the strain is able to proliferate and colonize the specific location. It is likely that only host-specific microbial strains possess the ability to compete with the indigenous microflora and colonize the niches (Eric and Byong, 2015). Numerous authors (FAO/WHO, 2002; Anwar *et al.*, 2014) have compiled a list of properties that are expected from potential probiotic strains of lactic acid bacteria and other probiotic bacteria. These properties include:

- a) Accurate taxonomic identification;
- b) Normal inhabitant of the species targeted human origin for human probiotics;
- c) Nontoxic and non-pathogenic;
- d) Genetically stable;
- e) Capable of survival, proliferation, and metabolic activity at the target area;

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

- f) Adherence and colonization potential preferred;
- g) Stability of desired characteristics during culture preparation, storage, and delocalization;
- h) Viability at high populations;
- i) Production of antimicrobial substances, such as bacteriocins, hydrogen peroxide, and organic acids;
- j) Antagonistic towards pathogenic/cariogenic bacteria;
- k) Ability to compete with the normal microflora, as well as the same or closely related species; potentially resistant to acid, bacteriocins, and other antimicrobials produced by residing microflora;
- l) Resistant to bile;
- m) Resistant to acid;
- n) Immunostimulatory;
- o) Ability to exert one or more clinically documented health benefits;
- p) Amenable to production processing adequate growth, concentration, recovery, freezing, dehydration, storage, and distribution;
- q) Provision of suitable organoleptic qualities when included in fermented products.

### **IMPORTANCE OF PROBIOTICS**

Numerous health benefits have been associated with the consumption of probiotics by both humans and animals. Various studies have provided clinical evidence of the advantages derived from probiotics, such as their effectiveness in treating diarrhea, lactose intolerance, and irritable bowel syndrome (Boaventura *et al.*, 2012). Probiotics are utilized in a wide range of applications, including as feed supplements, pharmaceuticals, dairy products, fruit juices, chocolates, and even meat products (Martins *et al.*, 2011). The traditional use of probiotics to regulate gastrointestinal health, such as improving lactose intolerance, enhancing natural resistance to infectious diseases in the gastrointestinal tract, preventing traveler's diarrhea, and reducing bloating, has been extensively researched and documented (Musa *et al.*, 2009). Clinical trials have examined their use in preventing and treating gastrointestinal diseases caused by pathogenic microorganisms or disruptions in the normal microflora (Sullivan and Nord, 2005).

#### **Nutritional Importance**

It is important to note that over 2000 years ago, the ancient Greek physician Hippocrates, who is considered the father of Western medicine, stated, "Let food be thy medicine and medicine be thy food." The utilization of food for its medicinal value, as well as its nutritional benefits, is an ancient tradition in China, India, Egypt, and Japan (Boris, 2015). In addition to their desired health and clinical properties, probiotics must meet several fundamental requirements for the development of marketable probiotic products. The most crucial requirements include the ability of probiotic bacteria to survive in sufficient numbers in the product, the guarantee of their physical and genetic stability during storage, and the maintenance of all essential properties necessary for expressing their health benefits after consumption during the manufacturing and storage process (Knut, 2001). The preparation of viable microorganisms that are consumed by humans or other animals with the intention of inducing beneficial effects by qualitatively or quantitatively influencing their gut microflora and/or modifying their immune status is known as probiotics (Fuller, 2004). Fermentation is a process in which a microorganism transforms food into other products, typically through the production of lactic acid, ethanol, and other metabolic end-products (Guarner *et al.*, 2008). Probiotic bacteria are primarily sold in fermented foods, with dairy products playing a prominent role as carriers of probiotics. These foods are well-suited for promoting the positive health image of probiotics for several reasons: fermented foods, particularly dairy products, already have a positive health image; consumers are aware that fermented foods contain living microorganisms (bacteria); and probiotics used as starter organisms combine the positive images of fermentation and probiotic culture (Knut, 2001).

For centuries, it has been widely acknowledged that a diet centered around fermented milk products has a positive impact on health. This is due to its ability to regulate the growth of harmful bacteria in the small intestine, leading to overall improved well-being and an extended lifespan (Danut *et al.*, 2009). Metchnikoff proposed that the consumption of fermented milk would introduce harmless lactic-acid bacteria into the intestine, thereby reducing the pH levels and inhibiting the growth of pathogenic bacteria (Amiya *et al.*, 2011). Lactic acid fermentation is the most commonly used and easily experimented method. It involves the conversion of sugar into lactic acid by LAB, primarily the *Lactobacillus* species. This lactic acid acts as a natural preservative, allowing food to be stored and preserved without spoilage, especially in the absence of refrigeration and pasteurization. This preservation method relies on the natural defense mechanisms of lactic acid producing bacteria (Aattour *et al.*, 2002). LAB, or lactic acid producing bacteria, are a functional classification of nonpathogenic, non-toxicogenic, Gram-positive, fermentative bacteria that play a crucial role in food fermentation. This group includes species such as *Lactobacillus*, *Lactococcus*, *Streptococcus*, and *Thermophilus* (Guarner *et al.*, 2008).

### **Public Health Importance**

In the past two decades, there has been a growing interest in the role of probiotic bacteria in promoting human health. Probiotics have been found to offer several significant benefits, including the reduction or elimination of ailments such as colon irritation, constipation, and traveler's diarrhea, the inhibition of pathogenic bacteria, the synthesis of B vitamins, the lowering of blood ammonia levels, the improvement of calcium absorption, and the enhancement of lactose utilization through the production of b-galactosidase, provided that there are sufficient probiotics in the colon (Ozyurt and Otles, 2014).

### **ROLE OF PROBIOTICS AND PREBIOTICS IN HEALTHCARE**

The utilization of probiotics for clinical health advantages is an intriguing field of study that remains largely unexplored in the current era. Numerous studies have been conducted thus far to investigate the impact of probiotics on health (Cakir, 2003). While some effects have been partially established, a greater number of them now possess robust clinical verification. The most significant and well-documented beneficial effects of probiotics encompass (Schrezenmeir and de Vrese, 2001):

- ✓ Prevention of diarrhea
- ✓ Digestion of lactose in lactose intolerance
- ✓ Betterment of immune system
- ✓ Reduction of risk of colon cancer
- ✓ Lowering the level of cholesterol and triacylglycerol in blood plasma
- ✓ Management of blood pressure
- ✓ Bringing down inflammation
- ✓ Diminishing allergic symptoms
- ✓ Advantageous impacts on metabolism of minerals, preferably bone volume and stability.
- ✓ Diminishing effects on infection of *Helicoacter pylori*
- ✓ Exclusion of pathogens (antimicrobial effect)
- ✓ Osteoporosis avoidance
- ✓ Urogenital health care
- ✓ Anti-diabetic activities
- ✓ Anti-cancer activity
- ✓ Anti-obesity activity
- ✓ Angiogenic activity

### **Prevention of Diarrhea**

As per the World Health Organization, diarrhea is characterized by the occurrence of three or more loose or watery stools within a 24-hour timeframe. Over the past two decades, numerous inquiries have been conducted on probiotic microorganisms through in vitro studies, animal experiments, and well-designed clinical studies. These investigations have confirmed the beneficial impact of probiotic consumption in preventing various types of diarrhea (Narayan *et al.*, 2010).

#### **(a) Acute infantile diarrhea:-**

Acute infantile diarrhea is a condition caused by rotaviruses and is one of the leading causes of death in children worldwide (Scheinbach, 1998). This gastrointestinal condition has been extensively studied and the primary treatment is rapid oral rehydration. Probiotics have been found to be useful as an adjunct to rehydration therapy (Szymanski *et al.*, 2006). *Lactobacillus* GG has been shown to effectively reduce the infection caused by rotavirus and is considered the most effective probiotic against rotavirus diarrhea, as demonstrated by numerous studies conducted by researchers. Other probiotic bacteria, such as *Lactobacillus acidophilus* LBI, *Bifidobacterium lactis*, and *Lactobacillus reuteri*, have also been found to have a profound effect on diarrhea (Salminen *et al.*, 2004).

#### **(b) Antibiotic associated diarrhoea**

Antibiotic Associated Diarrhea (AAD) is a form of diarrhea that occurs as a result of intensive antibiotic therapy, leading to an imbalance in the homeostasis of the gut microbiota. The disruption of the gut microbial flora and subsequent changes in the metabolism of carbohydrates, short chain fatty acids, and bile acids impair the body's resistance to pathogens, thus causing diarrhea (Bartlett, 2002). Probiotics, such as various bacterial species including *Lactobacillus acidophilus*, *Lactobacillus rhamnosus* GG, *Lactobacillus fermentum*, and the yeast *Saccharomyces boulardi*, have been found to be effective in reducing the occurrence of diarrhea induced by antibiotics (McFarland, 2006). Numerous studies have shown that the use of *Saccharomyces boulardi* during antibiotic associated diarrhea is particularly effective in eliminating the presence of *Clostridium difficile* in the gut microflora (Gismondo *et al.*, 1999).

#### **(c) Traveller's diarrhea:-**

It is estimated that between 20 and 60 percent of global travelers experience the condition known as traveler's diarrhea. This particular form of diarrhea primarily affects individuals who travel to developing countries, particularly those in tropical and semi-tropical regions, originating from industrialized areas. Bacterial pathogens are responsible for approximately 60 to 85 percent of cases, with *Escherichia coli* being the most common culprit, followed by *Campylobacter jejuni*, *Shigella* spp., and *Salmonella* spp. Parasites account for about 10 percent of cases, while viruses are responsible for 5 percent of infections (Hill & Ryan, 2008). Several studies have demonstrated the effectiveness of *S. boulardi* in treating bacterial diarrhea, while *Lactobacillus* GG has shown efficacy against idiopathic and viral diarrhea. Prophylactically, *Lactobacilli*, *Bifidobacteria*, *Enterococci*, and *Streptococci* have been utilized to prevent traveler's diarrhea (McFarland, 2007).

### **Lactose intolerance**

Lactose intolerance has emerged as a gastrointestinal issue in various populations. Individuals afflicted with this condition are unable to properly digest lactose found in food products due to the absence of the enzyme  $\beta$ -galactosidase, which is responsible for breaking down lactose into glucose and galactose. Symptoms experienced by lactose intolerant individuals include abdominal pain, flatulence, bloating, and cramping after consuming milk or other lactose-containing foods. As lactose passes through the small intestine, the colonic microflora produces gas, which is then converted to acid in the large intestine. The incomplete digestion of lactose can also be detected through the presence of hydrogen in the breath. However, when lactose intolerant individuals consume milk and other food products that contain specific probiotic starters, they generally do not exhibit any symptoms of lactose intolerance and there is no increase in breath hydrogen levels (Fooks *et al.*, 1999). Furthermore, it has been observed that the consumption of milk containing probiotic organisms such as *Bifidobacterium longum* and *Lactobacillus acidophilus* leads to significantly reduced flatulence and hydrogen production (Vonk *et al.*, 2012).



The use of probiotics to address lactose intolerance presents two possible explanations for its beneficial effect. Firstly, the concentration of lactose in fermented foods is found to be very low due to the activity of lactose of probiotic bacteria present in that food or used for its production. Secondly, the active lactose enzyme and probiotic bacteria with increased lactose activity enter the human gut when fermented foods are consumed (Salminen and Von Wright, 2004). For individuals with lactose intolerance, yogurt is preferred over milk because the lactose in yogurt has been converted into lactic acid and it contains bacterial species that produce  $\beta$ -galactosidase (Salminen and Von Wright, 2004). The predominant bacterial strains used for yogurt production, *Streptococcus thermophilus* and *Lactobacillus bulgaricus*, have been found to have no resistance to gastric acidity. Therefore, probiotic food products should be preferred and acceptable to lactose intolerant individuals (Salminen and Von Wright, 2004). It is important to note that lactose digestion is not solely dependent on bacterial  $\beta$ -galactosidase, but the slow gastric emptying of semi-solid milk products such as yogurt in the stomach is also a contributing factor (Salminen and Von Wright, 2004).

### **Inflammatory Bowel Disorder (IBD)**

Inflammatory Bowel Disorder (IBD) is a chronic and relapsing disorder that is characterized by inflammation of the gastrointestinal tract. This condition causes severe watery and bloody diarrhea accompanied by abdominal pain (Moeinia *et al.*, 2013). IBD affects both the colon and small intestine and includes ulcerative colitis (UC), Crohn's Disease (CD), and Pouchitis. The etiology of IBD is multifactorial and includes genetic, immune dysregulation, environmental factors, oxidative stress, and intestinal microbe (Moeinian *et al.*, 2013). Both CD and UC are chronic inflammatory autoimmune conditions of the gastrointestinal tract and are likely due to the lack of innate immune system adaptation to the environment. Additionally, other organs such as the eyes, skin, and joints may also be affected (Matsumoto *et al.*, 2005).

#### **(a) Ulcerative Colitis (UC)**

Ulcerative colitis (UC), similar to inflammatory bowel disease (IBD), primarily affects the mucosal lining of the large intestine and rectum. One of the identified risk factors for colon cancer is the presence of long-standing ulcerative colitis. Promising outcomes have been observed through the utilization of various probiotic species, such as *Lactobacillus casei*, *Bifidobacterium bifidum*, and *S. boulardi* (Kelesidis and Pothoulakis, 2012). In a preliminary investigation, the consumption of fermented milk containing *L. acidophilus*, *B. bifidum*, and *B. breve* demonstrated beneficial effects in inducing a mild degree of remission in patients (Sheil *et al.*, 2007).

#### **(b) Crohn's disease (CD)**

Crohn's disease is a type of inflammatory bowel disease (IBD) that primarily affects the intestine, but can occur anywhere from the mouth to the rectum. It causes ulceration and inflammation, which impairs the body's ability to properly digest food, absorb nutrients, and eliminate waste. The microorganisms commonly identified as causative agents of Crohn's disease include *Clostridium difficile*, *Salmonella*, *Campylobacter jejuni*, Mycoplasma, and Adenovirus. In addressing the challenges posed by Crohn's disease in humans, there have been numerous reports suggesting the effectiveness of probiotics. Some examples of probiotics used in this condition are *S. boulardii*, *E. coli*, Nissel 1917, *Lactobacillus rhamnosus* strain GG, VSL#3, and L.GG (Jonkers *et al.*, 2012). Regarding the issue of Crohn's disease, the therapeutic effects of consuming probiotics are reported to be attributed to their competitive action against commensal and pathogenic flora, as well as their influence on the immune response system (Van Immerseel *et al.*, 2010).

#### **(a) Pouchitis**

Pouchitis, an additional form of inflammatory bowel disease (IBD), entails inflammation of the ileal pouch, typically arising subsequent to colectomy and ileal pouch canal anastomosis. Various studies have demonstrated the remarkable efficacy of VSL#3 probiotic mixture in sustaining remission of chronic pouchitis (Veerappan *et al.*, 2012).



### **Irritable Bowel Syndrome (IBS)**

Irritable bowel syndrome (IBS) is a prevalent functional gastrointestinal disorder. It is a chronic ailment characterized by recurring episodes of abdominal discomfort and pain, bloating, and variable bowel habits, without any evident mucosal abnormalities or flatulence. The pathophysiological factors that contribute to the development of Irritable Bowel Syndrome (IBS) are multifaceted and include psychological factors such as stress and emotional state, social factors such as upbringing and support systems, and biological factors such as gut motility and visceral sensitivity. These factors interact in a complex manner to exacerbate and worsen the symptoms (Tanaka *et al.*, 2011). A combination of 8 probiotic strains, known as VSL#3, and *Lactobacillus plantarum*, has been found to alleviate abdominal bloating and reduce flatulence (Chapman *et al.*, 2011). *L. rhamnosus* GG has been observed to decrease abdominal pain (Kim *et al.*, 2005). Consumption of *Bifidobacterium bifidum* MIMBb75 for duration of 4 weeks has been shown to effectively alleviate global IBS symptoms and related issues (Guglielmetti *et al.*, 2011). Additionally, the use of probiotic *Escherichia coli* Nissle 1917 has proven to be effective in the treatment of IBS, particularly in patients with altered enteric microflora, such as those who have experienced gastroenterocolitis or have been administered antibiotics (Kruis *et al.*, 2012).

### **Immune system**

Probiotics have demonstrated promising effects on the immune system. When tested on human subjects, they have shown positive results in promoting the health of the host (Mombelli and Gismondo, 2000). Numerous studies have been conducted on the human system, both in vitro and in vivo conditions in mice and humans, to investigate the effects of probiotics. These studies have revealed that probiotics have promising effects on the immune system when administered through oral bacteriotherapy, and they also exhibit antagonistic activity against certain pathogens (Dugas *et al.*, 1999). Probiotic bacteria enhance the phagocytosis of pathogens, stimulate antibody production, modify cytokine production, and are capable of increasing the concentration of secretory IgA (Gill *et al.*, 2000). The adhesion of these microorganisms is the main cause of some of these effects. In a study involving children aged 15-31 months who were fed a formula diet containing viable *Bifidobacterium lactis* Bb12 for 20 days, a significant increase in the levels of IgA and anti-poliovirus IgA was observed in their feces (Fukushima *et al.*, 1998). The immunomodulatory effect of probiotics was demonstrated in the study conducted by Link-Amster *et al.* (1994). In this study, the researchers investigated whether the consumption of fermented milk with *L. acidophilus* La1 and *Bifidobacteria* had any effect on humans. The volunteers were provided with fermented milk for three weeks, and attenuated *Salmonella typhi* Ty21a was administered to mimic a pathogenic infection. After three weeks, it was found that the specific serum IgA level had increased fourfold compared to the control group that only received the attenuated Salmonella infection. This study concluded that LAB strains capable of surviving in the acidic conditions of the gastrointestinal tract can act as adjuvants to the humoral immune response (Link-Amster *et al.*, 1994; Quwehand *et al.*, 1999).

### **Anti-obesity activity**

Abnormal or excessive accumulation of fat (obesity) that directly impairs health is associated with an increase in energy availability, sedentary lifestyle, and greater control of ambient temperature, resulting in an imbalance between energy intake and expenditure (Kobyliak *et al.*, 2016). It has been observed that transferring the intestinal microflora from obese mice to germ-free mice can replicate the obese phenotype and potentially enhance the extraction of energy from food and stimulate lipogenesis. Probiotics possess physiological functions that contribute to the regulation of microbial health in the host environment. In many cases, thermogenic and lipolytic responses aid in weight loss by stimulating the sympathetic nervous system (Kerry *et al.*, 2018). Probiotic strains, such as *Lactobacillus gasseri* BNR17, have demonstrated the ability to inhibit the increase in adipocyte tissue, which is a major source of adiponectin and leptin, thereby reducing leptin secretion (Kerry *et al.*, 2018). Other probiotic microbes, including *Lactobacillus acidophilus*, *Bifidobacterium longum*, and *L. casei*, have also been reported to have hypocholesterolemic effects (Kerry *et al.*, 2018).

### **Effects against cancer**

According to the World Health Organization's cancer fact sheet (Awaisheh *et al.*, 2016), cancer is a devastating disease that affects people worldwide, with approximately 14 million new cases and 8.2

million cancer-related deaths reported by 2012. More than 70% of global cancer deaths occur in Asia, Africa, and the Americas (Vidya and Thiruneelakandan, 2015). In recent years, intensive research on cancer involving genomics, proteomics, and molecular pathology has increased knowledge about cancer and public awareness. At the same time, many new drugs using nanotechnology and biotechnology (nanocapsules) with fascinating luminescent properties have been discovered, but their burden and side effects have been a major limitation. Natural sources that confer anti-carcinogenic effects, such as probiotics, have received prime focus in recent years (Gayathri and Rashmi, 2016). These have attracted intense interest from clinical nutritionists, scientists, and industrialists to work collaboratively to reduce the disease and develop an effective drug with minimal or no side effects (Vafaeie, 2016).

Fermented milk products and yogurt have been promoted as cancer-preventing, especially for colon cancer (Challa *et al.*, 1997). Several epidemiological studies suggest that colon cancer is associated with a high-fat diet. This is because the high-fat diet potentially stimulates bile acid turnover, resulting in an increase of bile acids in the colon that affects the metabolism of the bacterial flora (Brady *et al.*, 2000). The bile acids sodium cholate and sodium chenodeoxycholate were studied as promoters of colon carcinomas by comparing conventional rats to germ-free rats, and these researchers concluded that indigenous microflora in the intestine could produce enzymes such as glucuronidase, nitroreductase, and azoreductase, which can convert pro-carcinogens into carcinogens. This has prompted research on the use of probiotic bacteria to reduce the risk of colon cancer (Brady *et al.*, 2000).

### **Angiogenic activity of probiotics**

Angiogenesis is a crucial phenomenon that is essential for the wound healing process through specific cellular responses that regenerate damaged tissues (Kerry *et al.*, 2018). The angiogenic program is a carefully orchestrated series of cellular events that promote the recruitment of inflammatory cells and the production of cytokines, matrix-degrading enzymes, and chemokines, resulting in the formation of new vessels from preexisting ones. The deregulation of angiogenesis has a significant impact on major human diseases, such as cancer, diabetic retinopathy, and inflammatory bowel disease, including Crohn's disease and ulcerative colitis (Kerry *et al.*, 2018). Studies have reported that the nonpathogenic probiotic yeast, *S. boulardii*, can protect against intestinal injury and inflammation. However, the molecular mechanisms by which probiotics mediate these beneficial effects remain unclear. The potential mechanisms of probiotics in the angiogenesis process may include the alteration of inflammatory cytokine profiles, down-regulation of pro-inflammatory cascades, or induction of regulatory mechanisms in a strain-specific manner. Additionally, probiotics may enhance epithelial barrier function, reduce visceral hypersensitivity, modulate spinal afferent traffic, and regulate stress responses (Kerry *et al.*, 2018).

### **Anti-allergic activity of probiotics**

The increasing prevalence of allergic diseases caused by immune disorders poses a significant social and economic burden on a global scale. It is crucial to understand the underlying molecular mechanisms that contribute to the development of allergic diseases and explore new treatment approaches in order to effectively manage and prevent these conditions (Kerry *et al.*, 2018). Recent research has shed light on the beneficial role of probiotics in the management and prevention of allergic diseases. In vitro studies have demonstrated the potential of certain probiotics, such as *Lactobacillus plantarum* L67, to prevent allergy-related disorders by promoting the production of interleukin-12 and interferon-g in their host (Kerry *et al.*, 2018). Another study found that *L. plantarum* 06CC2 significantly alleviated allergic symptoms and reduced the levels of total immunoglobulin E, ovalbumin-specific immunoglobulin E, and histamine in ovalbumin-sensitized mice. Furthermore, *L. plantarum* 06CC2 was found to enhance the secretion of interleukin-4 and interferon-g in spleen cells, which are responsible for alleviating allergic symptoms (Kerry *et al.*, 2018).

### **Bacterial Vaginosis**

Bacterial vaginosis (BV) is a prevalent vaginal infection that primarily affects young females. Its main symptom is a continuous off-white irregular vaginal discharge. BV occurs due to an imbalance in the vaginal microecology, characterized by a decrease in the growth of *Lactobacillus* species and an increase in the overgrowth of vaginal anaerobic Gram-negative bacteria, specifically *Gardnerella vaginalis* (Masoudi *et al.*, 2016). BV is associated with an increased risk of preterm delivery, spontaneous

abortion, pelvic inflammation, and endometritis. The main pathogen responsible for the production of polymicrobial biofilm is *G. vaginalis*, which acts as a binding agent against vaginal epithelial cells (Sabbatini *et al.*, 2018). *Lactobacillus*, *Bifidobacterium*, and *Saccharomyces* spp. have the potential to interfere with the pathological progression of BV. Sabbatini *et al.* (2018) demonstrated the inhibitory response of the probiotic *S. cerevisiae* in in-vivo trials. These preventive effects were achieved through various mechanisms, including a reduction in *G. vaginalis*' binding capacity to vaginal epithelial cells, inhibition of the sialidase enzyme, and improvement of inflammatory cytokines. Furthermore, in a recent study on mice, the probiotic strain *Clostridium butyricum* WZ001 not only suppressed the growth of *G. vaginalis* and reduced inflammatory cytokines but also enhanced the growth of lactobacilli to restore the balance of the vaginal microecology (Zhou *et al.*, 2019).

### Urogenital Health care

According to the Centers for Disease Control and Prevention (CDCP), over one billion women worldwide suffer from non-sexually transmitted urogenital infections, including urinary tract infections (UTIs), bacterial vaginosis (BV), and various yeast infections (Waigankar and Patel, 2011). The bacteria typically associated with BV include *Mycoplasma hominis*, *Ureaplasma urealyticum*, and *Gardnerella vaginalis* (Hanson *et al.*, 2016). Sexually transmitted diseases (STDs) are a significant cause of morbidity worldwide. In some developed countries, the two most commonly documented bacterial STDs are gonorrhoea and Chlamydia, caused by *Neisseria gonorrhoeae* and *Chlamydia trachomatis*, respectively (Chan *et al.*, 2016). The major issue facing the current decade is the increasing resistance of pathogenic microbes to existing medicines, despite the availability of sophisticated treatments for various medical conditions. Therefore, instead of developing new medicines, our focus should be on developing new live supplements, such as non-pathogenic microbes that act against pathogens. It is well-known that there is an association between abnormal vaginal microbial flora and an increased incidence of UTIs. The vagina is inhabited by approximately 50 different species, including *Lactobacillus* species, *Lactobacillus brevis*, *Lactobacillus casei*, *Lactobacillus vaginalis*, *Lactobacillus delbrueckii*, *Lactobacillus salivarius*, *Lactobacillus reuteri*, and *Lactobacillus rhamnosus*, which are regarded as the main regulators of the vaginal micro-environment (Kerry *et al.*, 2018). Imbalance in the microbial composition greatly influences the health of the vaginal micro-environment, potentially leading to compromised states of BV and UTI. These compromised states can be reassured by balancing the number of *Lactobacillus* sp. through the supplementation of probiotics (Kerry *et al.*, 2018).

In females, the majority of urinary tract pathogens originate in the intestinal tract (Reid *et al.*, 1999). The close proximity of the urethra to the vagina allows for the transfer of probiotics following vaginal application. However, in cases of urinary tract infections, it is crucial to use highly adherent strains of probiotic microorganisms. The efficacy of vaginal suppositories containing *Lactobacillus* in preventing the recurrence of urinary tract infections after antimicrobial treatment has been investigated by Reid *et al.* (1992). The study found that the recurrence rate in patients receiving probiotic suppositories was 21%, whereas it was 47% in patients receiving a placebo.

### *Helicobacter pylori* infection

*Helicobacter pylori* is a Gram-negative and spiral-shaped pathogen that is widely distributed. It is the primary causative agent of chronic gastritis and peptic ulcer, and it poses a risk factor for gastric malignancies (Patel *et al.*, 2014). The incidence of *H. pylori* can be reduced to 5-10% by probiotic strains, which have been found to be effective in alleviating associated side effects (Alvi *et al.*, 2016). According to the findings of a double-blind placebo-controlled study, *S. boulardii* and *Lactobacillus johnsonii* La1 can reduce *H. pylori* loads, but they are unable to completely eradicate the pathogen (Homan and Orel, 2015). Pretreatment with bifidobacterial-containing yogurt may enhance the eradication of *H. pylori* (Sheu *et al.*, 2006). There is substantial evidence supporting the use of probiotics in conjunction with antibiotics for the treatment of *H. pylori* infection. However, the optimal probiotic strain, dosage, and duration of treatment have yet to be determined (Boltin, 2016).

### Conclusion

There is ample scientific evidence to suggest the beneficial role of probiotics in maintaining good health and preventing infectious and metabolic diseases. The health status of the mother and the environment in which the child is born determine the initial colonization of the child's body by microorganisms,

which subsequently impact their health throughout their life. The establishment of a healthy microbial community in the form of microflora is crucial for maintaining good health and providing various benefits. However, numerous factors in our lives disrupt this beneficial microflora, necessitating the use of external sources, such as probiotics. These probiotics, which contain beneficial microbes, can be found in various types of foods, including fermented foods, milk, and milk products. Additionally, advancements in science, conducted by researchers and modern companies, have resulted in the development of different forms of probiotics for various illnesses. The early observations made by humans, along with the research and diverse applications of probiotics, highlight the significant contributions these remarkable microbes can make in promoting our health, protecting us, and facilitating the treatment or management of diseases. Importantly, probiotics are available in natural forms and carry out their activities safely and naturally.

The documentation regarding the health-promoting effects of probiotics products is experiencing rapid growth. The food industry, which develops probiotic products, should intensify their efforts to conduct high-quality research and well-designed clinical trials on regular food products. The most crucial aspect of probiotics is their proven safety, cost-effectiveness, and potential to interfere with microbial infections. In 1994, the World Health Organization recognized probiotics as the second most important immune defense system when commonly prescribed antibiotics become ineffective due to antibiotic resistance (Kailasapathy and Chin, 2000; Levy, 2000).

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## HAND GESTURE-CONTROLLED ELECTRONIC CAR

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### ABSTRACT

The hand gesture-controlled electronic car signifies a remarkable leap in the realm of automotive innovation, ushering in a new era of intuitive and futuristic driving. At its core lies a highly sophisticated sensor system, meticulously engineered to discern and decipher intricate hand motions with remarkable precision. These subtle gestures are then seamlessly translated into specific commands, seamlessly dictating the electronic car's movements in diverse directions—forward, backward, left, and right. Of paramount significance is the wireless connectivity that underpins this cutting-edge system. Through the implementation of an RF (radio frequency) link, a seamless and instantaneous communication channel is established between the hand gesture device and the electronic car. This system not only pushes the boundaries of vehicular control but also hints at a future where technology harmoniously integrates with human interactions. In essence, the hand gesture-controlled electronic car encapsulates the marriage of technological advancement and user-centered design. It embodies the spirit of progress, heralding a transformative wave of automotive technology that not only amplifies convenience but also sets a precedent for a harmonious relationship between humans and machines on the road.

**Keywords:** Hand Gesture-Controlled Electronic Car, Automotive Innovation

### Introduction

An electronic car consists of an electro-mechanical system that can be executed by an Arduino program. Electronic cars can be autonomous or semi-autonomous. In industries, an autonomous electronic car is mostly used because of its high speed and great accuracy. But in some applications, a semi-autonomous electronic car is needed which can be controlled by a human. Some other control systems, i.e., voice control, touch, and motion control, are widely used. One of the most implemented motion control systems is a hand gesture-controlled electronic device. In this project, a hand gesture-controlled electronic car is made by using the MPU6050 (3-axis accelerometer and 3-axis gyroscope sensor) and is controlled by an Arduino Nano. In this project, the action of the hand is used to control the speed of the electronic car in a particular direction and also the speed instead of using remote control. The project is fully based on wireless communication. Using an RF link, the gesture of the hand is passed on to the electronic car. The project has two parts: receiver and transmitter. [1]



Figure 1

### **Goals**

- The goal of this project is to capture simple hand gestures from the Glove and use that input to wirelessly control the car.
- Controlled variables include speed, steering, forward/reverse and stop

### **System Components**

- Glove
- Circuit
- Programming
- Car

### **Glove components**

- Arduino uno
- MPU 6050
- Transmitter
- DP
- IC

### **Components Of Transmission Section**

1. Arduino nano
2. 434mhz rf transmitter
3. Ht-12e encoder ic
4. Mpu6050
5. accelerometer/gyroscope sensor 750k $\omega$  resistor

### **Components for receiver section**

- L293d motor driver ic
- Ht-12d decoder ic
- 434 mhz rf receiver
- 33k $\omega$  resistor

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- 330 $\omega$  resistor
- Led
- 4 geared motors with wheels
- Robot chassis
- Car Components
- BATTERY
- WIRE
- DC motor
- uln2003a and l293d
- resistors

## Block Diagram

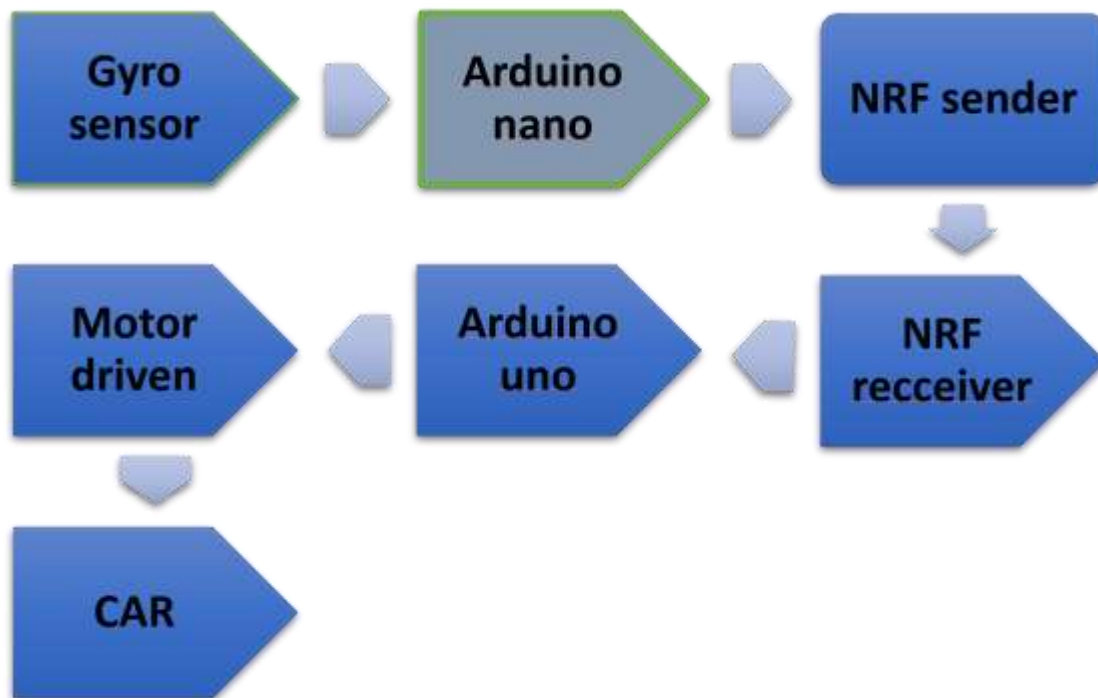


Figure 2: Block diagram

## Circuit Diagram

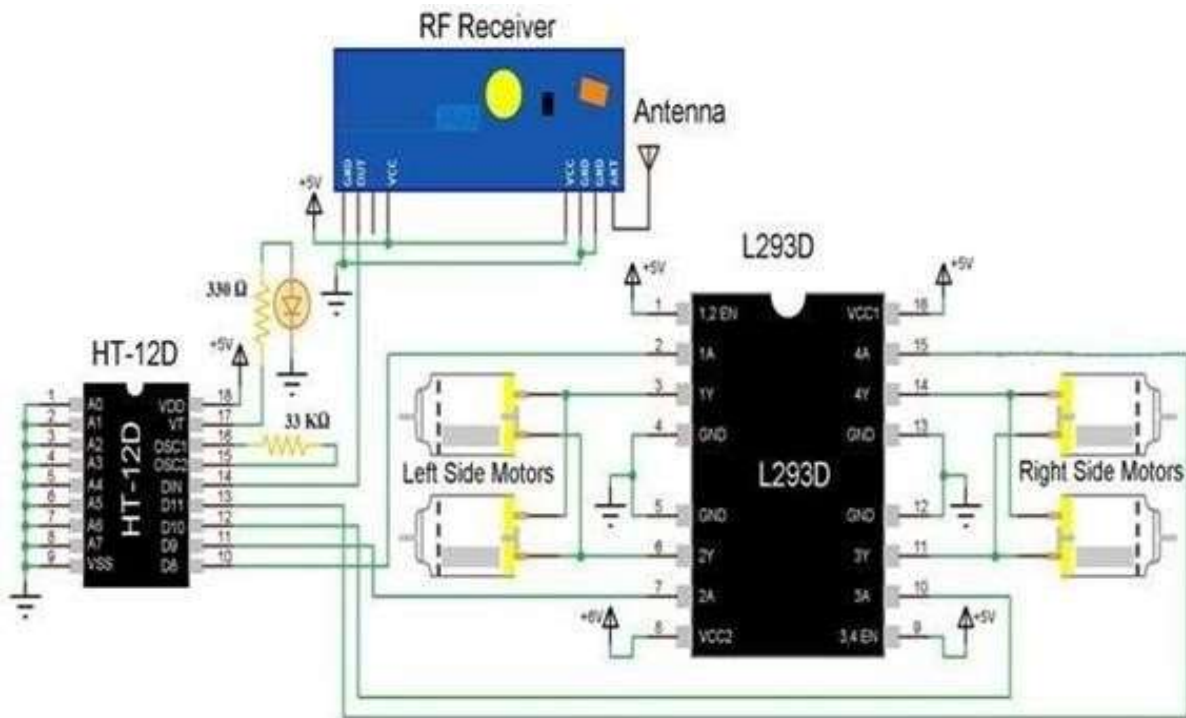


Figure 3: Circuit diagram

### Applications

The applications of the accelerometer based gesture controlled robot include:

- Military applications to operate robots
- Medical applications for the purpose of surgery
- Construction field
- In industries to control trolley and lift
- Gesture controlling is very helpful for handicapped and physically disabled people to achieve certain tasks, such as driving a vehicle.
- Gestures can be used to control interactions for entertainment purposes such as gaming to make the game player's experience more interactive or immersive

### Literature review

The emergence of service electronic cars in early 90's (helpmate electronic cars and electronic car-caddy) followed by the development of natural language interface through keyboard has been given by Torrance in 1994.

In 1994 Torrance developed a natural language interface through keyboard which can control the robot. Gesture recognition concept is used to control the robot in more friendly way without any remote control. The main technologies used for human machine interaction are accelerometer and gyroscope that offer very reasonable motion sensitivity, hence, are used in large array of different application. [2]

Bonny Varghese invent a wireless humanoid robotic arm .it contains four movable fingers, each with three linkages, an opposing thumb with a rotating wrist and an elbow.

K. Brahmani et al, used the technique of mems technology for controlling a robotic arm . It comprised of controlling of robotic arm powered with arm7 based lpc1768 core .two flex sensors are also used to control the gripper movement using 2.4 ghz rh module. [3]

### Major outcomes

The wireless hand controlled electronic car will function by the movements of the hand as the input for the evolution of the electronic car. Our basic idea for this project is to accomplish an electronic car which is futuristic and human interactive. In this project, wearable hand glove is designed which accommodate the sensors implemented on it and it will record the hand movement that converts the data from mechanical to electrical form.

[4]

### Methodology

The hand controller device is a 3 directional device that can be rotated in 3 axes.

The rotation takes place at x-axis is called pitch, the next rotation at y-axis is known as roll and the rotation in z-axis is called yaw. Any direction can be obtained by comprising those three-elemental rotation.

In our project, specific direction can be obtained by hand gesture in respective direction.

Each gesture contain a specific direction at which electronic car does its movement. Methodology for communication signal module.

This project controls a remote robot through rf. The ordinary 433 mhz rf modules are used in this project. At89c51 microcontroller is used in this project. This robot can perform their operations without direct human guidance. [5]

### Transmitter block diagram

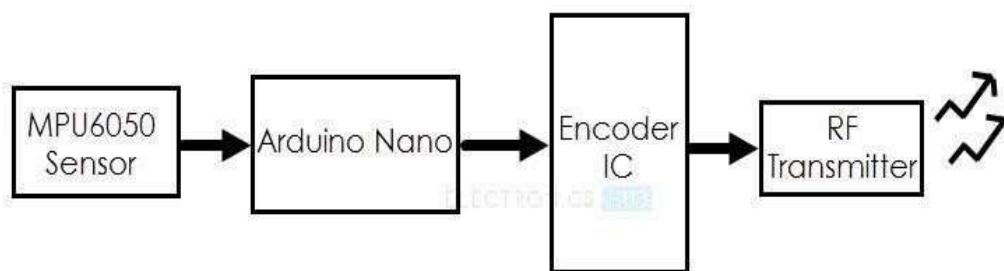


Figure 4: Transmitter block diagram

An rf transmitter module is a small printed circuit board that helps to transfer a radio wave and modify that wave to carry data. Transmitter circuit consist mpu6050 sensor, arduino nano, encoder ic and rf transmitter. The connection of these components is shown in fig 1. This transmitter section implemented on the hand gloves which gives the input signal to the module that is transferred. The power is provided to the module by battery. Install the gesture control program in arduino nano. [6]

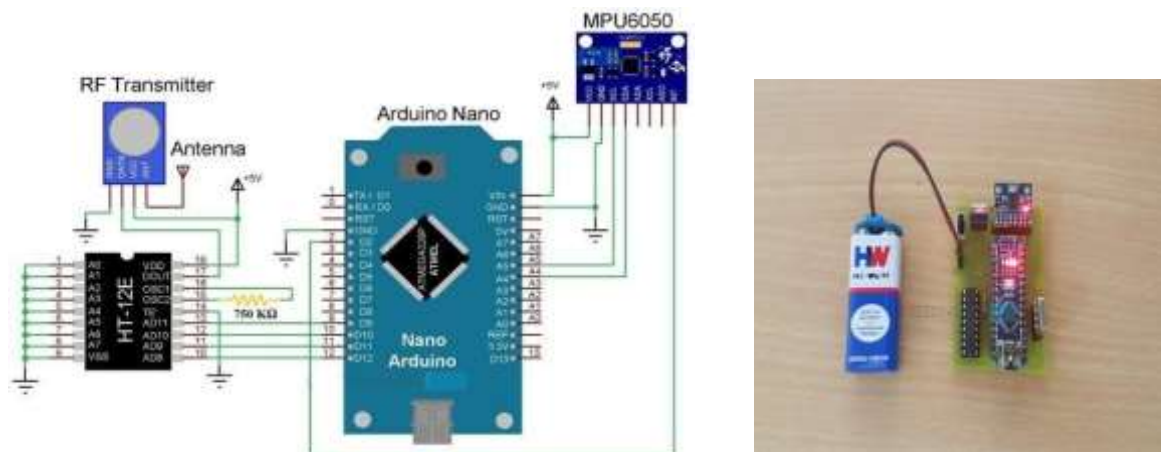


Figure 5: Transmitter section

The scl and sda pins of the mpu6050 sensor are connected to a5 and a4 pins of the arduino nano. Pins 10 to 13 (ad8, ad9, ad10 and ad11) are the data pins of ht-12e. They collect the

4 word parallel data from external source like a microcontroller (arduino nano in this case).

They are connected to the pins d12, d11, d10 and d9 of arduino nano respectively. Dout (pin 17) is the serial data out pin. The encoder ic contain internal oscillator ckt. Between the pins 16(osc1) and 15 osc2). To enable the oscillator a 750k $\Omega$  resistor is connected between these pins. Hence, all the vcc pins are connected to a regulated 5v supply.

The input signal given to the sensor mpu6050 is transferred to the arduino and arduino control the signal that pass on to the encoder ic which convert the parallel data into serial data and pass on to the rf transmitter. Finally, the signal is ready to transmit into receiver section. [7]

### Components for transmitter section

- Arduino nano
- 434mhz rf transmitter
- Ht-12e encoder ic
- Mpu6050

accelerometer/gyroscope sensor 750k $\omega$  resistor

### Receiver block diagram

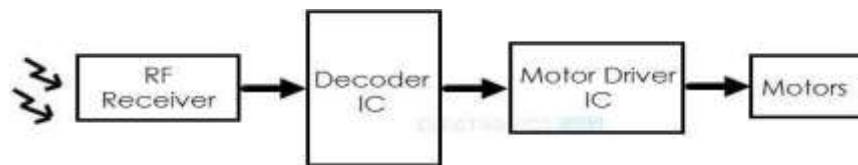


Figure 6: Reciever block diagram

An rf receiver is a small printed circuit board that is used to collect radio frequency wave and modify that wave to collect data. Receiver circuit consist rf receiver, decoder ic (ht12d), motor driver ic (l293d) and motors. The connection of these components is shown in fig 3. This receiver section implemented on electronic car which takes the input signal from the transmitter module which is collected by receiver module. The power is provided to the receiver module by battery. [8]

Based on the action of hands, input codes are read and control by arduino which will give command to microcontroller and electronic car will behave as follows

Movement in forward direction

Movement in backward direction

Movement in left direction

Movement in right direction

We have also added head light, back light and turning lights to leave a right.



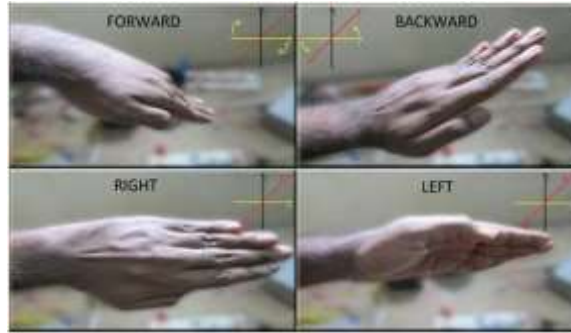


Figure 7: Hand signs

### Components for receiver section

- L293d motor driver ic
- Ht-12d decoder ic
- 434 mhz rf receiver
- 33k $\omega$  resistor
- 330 $\omega$  resistor
- Led
- 4 geared motors with wheels
- Robot chassis

### Working

As mentioned earlier, the gesture controlled robot is a wireless operated robot and has two parts: transmitter and receiver .in this project, the transmitter section consists a sensor (mpu6050) that senses the action of the hand. Mpu6050 consists accelerometer adxl335 outputs voltage in range from 0 to vcc (applied voltage usually 3.3v) and is read by arduino's analog pins. The input data signal of hand gesture (movement) is collected by the arduino nano. The data collected by arduino nano is parallel data. This parallel data can be used to drive the motors. This data is captured by the arduino, which then transmits a corresponding data to the encoder, based on the orientation of the mpu6050 sensor. The encoder ic (ht12e) connected to the arduino converts the parallel data into serial data. That serial data is send to the receiver section by the radio frequency transmitter wirelessly. In the receiver section, rf receiver collects the serial data and the decoder ic (ht12d) convert the serial data into parallel data. That parallel data collected by the motor driver ic (l293d) controls the motor of the car. Hence, electronic car will run and control on the basis of hand movements.

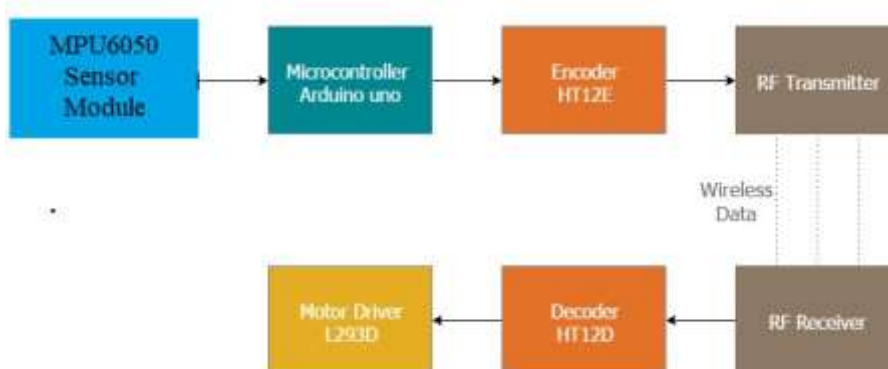


Figure 8: Working

### **Conclusion**

The purpose of this project is to control a car using mpu6050 which is a 3-axis accelerometer and 3-axis gyroscope sensor attached to a controller part arduino nano implemented on a hand glove. In this project no remote control is used instead of that sensor is used to control the movement of car. Based on the hand movements that sensor will allow us to control the forward and backward, left and right movements, while using the same accelerometer sensor to control the driver of the car . By using the above mentioned components hardware is setup to control a car thus resulting in formation of an electronic car.

### **Matlab code**

```
% gesture control car - matlab code

                                % initialize webcam
                                Cam = webcam;

% create a video player object to display the live video feed
                                Videoplayer = vision.videoplayer;
                                % initialize car control variables

Forwardspeed = 0; % speed for moving forward
Turnangle = 0;   % angle for turning the car
                                % gesture recognition loop
                                While true
% capture a frame from the webcam frame = snapshot(cam);
% display the frame step(videoplayer, frame);
% perform gesture recognition here
                                % use computer vision techniques or machine learning algorithms
% to detect and recognize hand gestures
                                % example: simple gesture control based on hand position handposition = detecthandposition(frame);

% adjust car control variables based on hand position if handposition == "up" forwardspeed = 1; %
move the car forward elseif handposition == "down"
forwardspeed = -1; % move the car backward elseif handposition == "left"
turnangle = -30; % turn the car left elseif handposition == "right" turnangle = 30; % turn the car
right
                                else
forwardspeed = 0; % stop the car turnangle = 0; end
% apply the control signals to the car's motors carcontrol(forwardspeed, turnangle);
                                End
                                % release resources
                                Release(videoplayer);
                                Clear cam;

                                % function to detect hand position
Function position = detecthandposition(frame)
```

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

```
% perform hand detection and recognition here
% return the detected hand position as a string
% examples: "up", "down", "left", "right", "none"
% you can use image processing techniques or machine learning models
           % to detect and classify hand gestures
           End
% function to control the car based on speed and turn angle
           Function carcontrol(speed, angle)
           % implement the code to control the car based on the provided speed and angle
% this can involve sending commands to the car's motors or actuators
% based on the desired speed and turning angle
           End
```

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## MYSTERY WITH SOME HISTIDINE KINASES OF *AMBORELLA TRICHOPODA* IN THE PUBLIC DATABASES AND AVAILABLE RESOURCES

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### ABSTRACT

The relict and enigmatic flowering plant *Amborella trichopoda* Baill. is unique among the extant Angiosperms since it is considered from phylogenetic point of view to be sister to all of them i.e. the most basal lineage of this clade. Despite its evolutionary value and uniqueness it is relatively poorly studied genomically although its genome was sequenced and assembled several years ago and many popular public omics databases acquired and stored copy of it. Besides that its transcriptome was also sequenced and assembled or derived and annotated from some versions of the assembled genome copies with the help of various algorithms and tools. Therefore nowadays are available several versions of genomic and transcriptomic data for this unique species. In this study with the tools and algorithms of the bioinformatics were identified and analyzed in depth the histidine kinases orthologues as deduced from the available data from better studied Angiosperms. The results revealed that there are some problems and discrepancies with some of the histidine kinase orthologues for this relict species available from the various sources especially among the group of cytokinin receptors. As result an attempt to fix some of these issues was proposed.

**Key words:** *Amborella trichopoda*, basal Angiosperms, histidine kinase, cytokinin receptor

### INTRODUCTION

*Amborella trichopoda* Baill. was discovered about 150 years ago as endemic species on the south Pacific island New Caledonia that served as refuge hotspot preserving large number of plant lineages from the Mesozoic era which could not survive and became extinct elsewhere during the dynamic geological history (Bailey, & Swamy, 1948; Poncet, et al., 2013; Garrouste, et al., 2021). Initially *A. trichopoda* was placed in the primitive magnoliid family Monimiaceae from order Laurales and stayed in the shade from the interest of the researchers. Later in 1950s it was analyzed more extensively and it was separated in its own family Amborellaceae, but remained in the same order regardless some anomalous traits as absence of ethereal oil cells (Poncet, et al., 2019; Bailey, & Swamy, 1948; Philipson, 1993). This situation was changed at the end of the XXth century with the advance of the molecular biology methods in phylogenetic studies when evidences started to be accumulated that *A. trichopoda* is sister to all extant Angiosperms and as such can no longer remain as part from order Laurales (Renner, 1998). Thus Amborellaceae along with other primitive Angiosperm families as Nymphaeaceae, Illiciaceae, Trimeniaceae, Austrobaileyaceae etc. formed the group of the basalmost Angiosperms named also as ANITA (from the first letters of the mentioned families) where Amborellaceae was considered as the most basal (Endress, 2004). This unique position of Amborellaceae drew great interest among the researchers hoping to shed more light on the centuries long discussion of the flowering plants origin and soon *A. trichopoda* became one of the first plants whose genome got sequenced and assembled (Chamala, et al., 2013; Poncet, et al., 2019; Heyfetz 2021). For the last decade after the genome became available there is steady rise of studies with this unique plant however many of its genes and their products are yet to be analyzed (Poncet, et al., 2019).

The present study focused on the search and identification the histidine kinases in the available omics resources for *A. trichopoda* and more specifically the ones involved in cytokinin signaling.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Table 1: Histidine kinases and related proteins in *A. thaliana* (Hoang, et al., 2021; Hwang, et al., 2002).

Name	ID in Arabidopsis genome	Length [aa.]	Function
CKI1	At2g47430	1122	Cytokinin-related
CKI2 (AHK5)	At5g10720	950	Cytokinin-related
AHK1	At2g17820	1190	Osmosensor
AHK2	At5g35750	1173	Cytokinin signaling
AHK3	At1g27320	1176	Cytokinin signaling
CRE1 (AHK4 & WOL1)	At2g01830	1057	Cytokinin signaling
ETR1	At1g66340	738	Ethylene signaling
ERS1	At2g40940	613	Ethylene signaling
ETR2	At3g23150	773	Ethylene signaling
EIN4	At3g04580	766	Ethylene signaling
ERS2	At1g04310	645	Ethylene signaling
PHYA	At1g09570	1122	Photoreceptor
PHYB	At2g18790	1172	Photoreceptor
PHYC	At5g35840	1111	Photoreceptor
PHYD	At4g16250	1164	Photoreceptor
PHYE	At4g18130	1112	Photoreceptor

In the most popular model plant organism *A. thaliana* often used as reference so far were found 16 genes for proteins identified as histidine kinases or related to them (Hwang, et al., 2002). They can be divided in 3 main groups based on their similarity (see Fig. 1 and Table 1): 1/. cytokinin receptors and similar proteins; 2/. photoreceptor phytochromes; 3/. ethylene receptors. The first group comprises of 6 proteins, which can be divided to 3 subgroups: 1.1/. Cytokinin receptors – AHK2, AHK3, AHK4; 1.2/. Cytokinin Independent – CKI1, CKI2; 1.3/. AHK1. The second group has 5 members with higher level of similarity than the previous group: PHY A-E. The third group comprises of 5 members which can be divided in two subfamilies: A/. Subfamily 1, which has a functional histidine kinase: ETR1 (ETHYLENE RESISTANT/ ETHYLENE RESPONSE 1) and ERS1 (ETHYLENE RESPONSE SENSOR 1); and B/. Subfamily 2, which has a modified form, including Ser/Thr kinases: ETR2, ERS2, and EIN4 (ETHYLENE INSENSITIVE 4) (Hoang, et al., 2021; Hwang, et al., 2002).

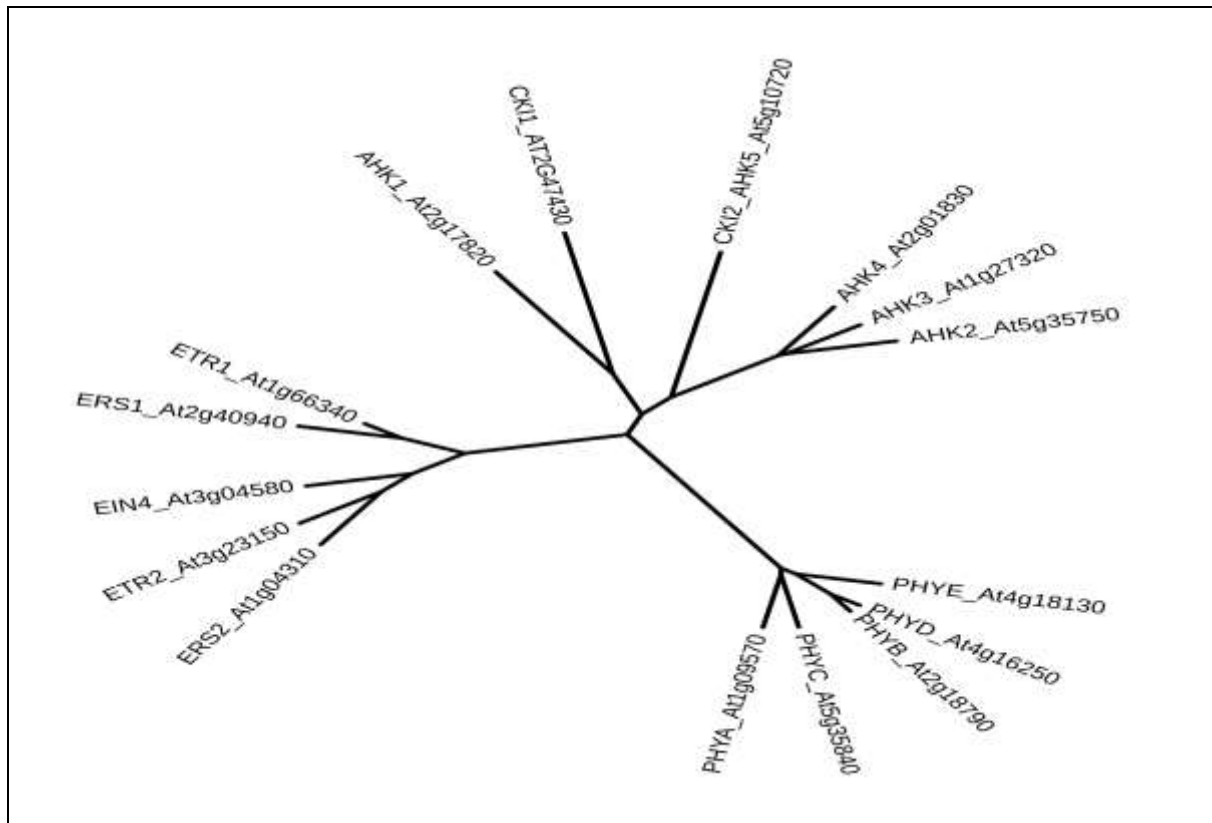


Figure 1: Relationship tree (unrooted) of the histidine kinases and related proteins in *A. thaliana*. The proteins were aligned with ClustalO and the tree was built with TreeView X (Sievers, & Higgins, 2021; Bianchini, & Sánchez-Baracaldo, 2023).

### RESEARCH AND FINDINGS

The genome of *A. trichopoda* was studied by many research groups and many of its genes, transcripts and their protein products were derived using different bioinformatics tools, models and algorithms and copies of them were stored in popular databases with free or limited public access as NCBI (<https://www.ncbi.nlm.nih.gov/>), Ensembl (<https://www.ensembl.org/index.html>), JGI Genome Portal (<https://genome.jgi.doe.gov/portal/>) etc.

For the current study first it was attempted to be located the available already annotated histidine kinases and related proteins orthologues to the ones of *A. thaliana* mentioned in the previous section. Since the annotated genes in Ensembl on their respective webpage also refer to the ID code of their orthologues in *A. thaliana*, for the search were used these codes. The results are presented in Table2.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Table 2: The orthologues of *A. thaliana* histidine kinases and related proteins found in the database of *A. trichopoda* in Ensembl.org

Name	Gene ID (A.thaliana)	Gene ID (A.trichopoda)	Transcript ID (A.trichopoda)	Protein ID in UniProt (A.trichopoda)
CKI1	At2g47430	N/A		
CKI2 (AHK5)	At5g10720	AMTR_s00019p00177820	ERN07211	W1PHX9
AHK1	At2g17820	AMTR_s00055p00041510	ERN18222	U5D9X2
AHK2	At5g35750	AMTR_s00028p00193460	ERN10636	W1PSE7
AHK3	At1g27320	AMTR_s00013p00077930	ERN09856	W1PQ59
AHK4	At2g01830	N/A		
ETR1	At1g66340	AMTR_s00032p00053220	ERN14786	U5CNQ3
ERS1	At2g40940	N/A		
ETR2	At3g23150	N/A		
EIN4	At3g04580	N/A		
ERS2	At1g04310	N/A		
PHYA	At1g09570	AMTR_s00045p00153850	ERN02086	Q9M6J8; W1P3C8
PHYB	At2g18790	N/A		
PHYC	At5g35840	N/A		
PHYD	At4g16250	N/A		
PHYE	At4g18130	N/A		

Since only 6 (out of 16) histidine kinases and related proteins were found in the database of *A. trichopoda* in Ensembl.org the search continued in the NCBI databases for annotated orthologues genes, transcripts and proteins. As result of the key words search for annotated histidine kinases and related proteins were found histidine kinase 1, 2, 3, 5, also phytochromes A, B, C and ethylene receptor 1, 2. Histidine kinase 1 and 5 have 4 and 6 transcript variants respectively, and phytochrome A has 3 variants. The results showed that the number of orthologues is 50% higher compared to the ones from Ensembl.org. However from both repositories were found only 4 orthologues of histidine kinases annotated and named as such and in both of them was missing histidine kinase 4, which is the most widely expressed in *A. thaliana* and so far is found in all Angiosperms with annotated genomes and identified histidine kinases, plus its orthologue is found also in the only Gymnosperm species with identified and experimentally verified cytokinin receptors (Lomin, et al., 2021; Hoang, et al., 2021). This anomaly necessitated to be performed detailed BLAST search for identification of the missing orthologue. The results from the BLAST analysis with the transcript of At2g01830 in the Nucleotide collection of NCBI for *A. trichopoda* showed that the hits with highest rank were all annotated and were named as histidine kinase 3 and 5 and had parameters with relatively close values (Table 3).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Table 3: The top candidate orthologues of *A. thaliana* histidine kinase 4 (AHK4) found with blastn in the database of *A. trichopoda* in NCBI

Description	Max Score	Total Score	Query Cover	E value	Per. Ident	Acc. Len	Accession
probable histidine kinase 5 (LOC18438816), transcript variant X6	429	621	53%	2.00E-118	67.19%	4416	XM_020670144.1
histidine kinase 3 (LOC18438004)	398	598	57%	4.00E-109	66.22%	4901	XM_020669906.1
probable histidine kinase 5 (LOC18438816), transcript variant X5	318	630	53%	3.00E-85	65.99%	4022	XM_020670143.1
probable histidine kinase 5 (LOC18438816), transcript variant X4	318	630	53%	3.00E-85	65.99%	4174	XM_020670142.1
probable histidine kinase 5 (LOC18438816), transcript variant X3	318	630	53%	3.00E-85	65.99%	4232	XM_020670141.1
probable histidine kinase 5 (LOC18438816), transcript variant X2	318	630	53%	3.00E-85	65.99%	4289	XM_020670140.1
probable histidine kinase 5 (LOC18438816), transcript variant X1	318	630	53%	3.00E-85	65.99%	4480	XM_020670139.1

Table 4: The top candidate orthologues of *A. thaliana* histidine kinase 4 found with blastp in the database of *A. trichopoda* in NCBI

Description	Max Score	Total Score	Query Cover	E value	Per. Ident	Acc. Len	Accession
histidine kinase 3	1073	1073	87%	0	58.16%	1047	XP_020525565.1
probable histidine kinase 5 isoform X2	1067	1067	89%	0	57.01%	1028	XP_020525803.1

These results did not solve the anomaly, therefore was performed BLAST analysis with the corresponding protein sequence of At2g01830. The results again placed as top hits histidine kinase 3 and 5 (Table 4). Such results were unexpected and puzzling since histidine kinase 4 has long highly conservative sensory domain that is absent in histidine kinase 5, which belongs to another subfamily histidine kinases.

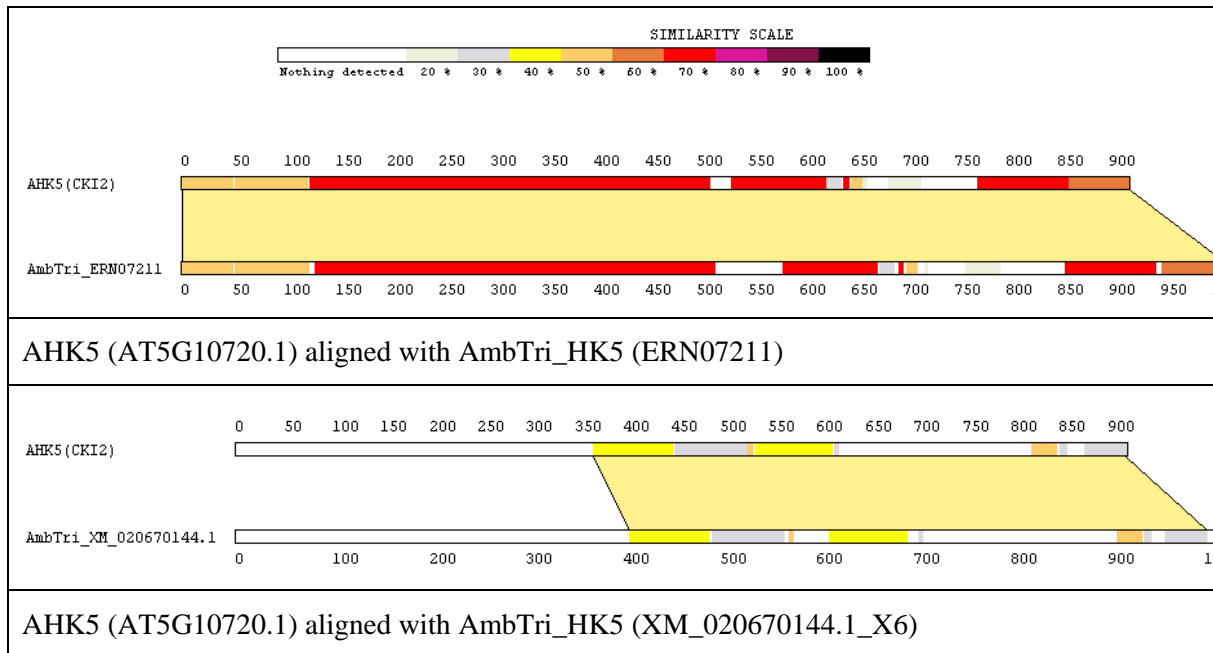
To solve this puzzle the protein sequences of histidine kinase 5 from Ensembl.org and NCBI were aligned with AHK5 (with ClustalO) and the distance matrix was calculated with UGENE (Okonechnikov, et al., 2012). The results showed much higher similarity between histidine kinase 5 from Ensembl.org and AHK5, than from NCBI (Table 5).

Table 5: Distance matrix of candidate orthologues of *A. thaliana* histidine kinase 5 found in both databases of *A. trichopoda*

ClustalO (no gaps)	AHK5 AT5G10720.1	AmbTri_HK5 (Ensembl) ERN07211	AmbTri_HK5 (NCBI) XM_020670144.1_X6
AHK5 AT5G10720.1	922	547	208
AmbTri_HK5 (Ensembl) ERN07211	547	1013	218
AmbTri_HK5 (NCBI) XM_020670144.1_X6	208	218	1028

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

Table 6: Pairwise alignment of candidate orthologues of *A. thaliana* histidine kinase 5 found in both databases of *A. trichopoda*



Additionally to check in detail their similarity and differences both histidine kinases 5 were pairwise aligned with AHK5 with SIM (<https://web.expasy.org/sim/>) and the results were visualized with LALNVIEW (Duret, et al., 1996; Huang, & Miller 1991) (Table 6).

The candidate- orthologue from Ensembl.org had higher percentage of identity and the regions of high similarity resembled the expected domain structure of this protein. On the other side the candidate orthologue from NCBI had negligible similarity between the first 40% of the length from the N-terminus, while for the rest of the sequence's length the similarity increased only to 50% or less.

Based on these results as orthologue of AHK5 was accepted ERN07211 from Ensembl.org, while the candidate from NCBI was rejected.

Further to check how identical are histidine kinase 3 orthologues from both databases their protein sequences were aligned with ClustalW, the results show 100% identity between first 1022 amino acid residues from the N-terminus and differing in the last portion near the C-terminus (Fig. 2). So probably both proteins are variants of histidine kinase 3 orthologue in *A. trichopoda*.

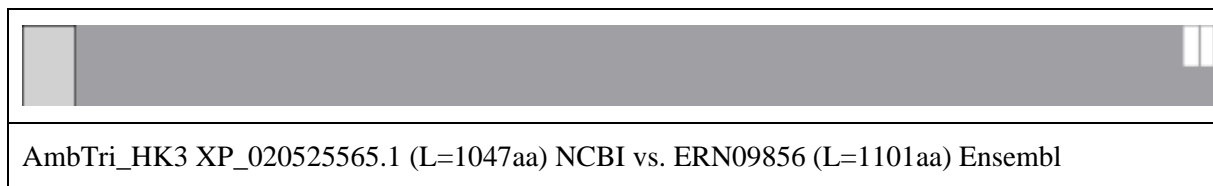


Figure 2: Alignment with ClustalW of the candidate histidine kinases 3 from NCBI and Ensembl.org

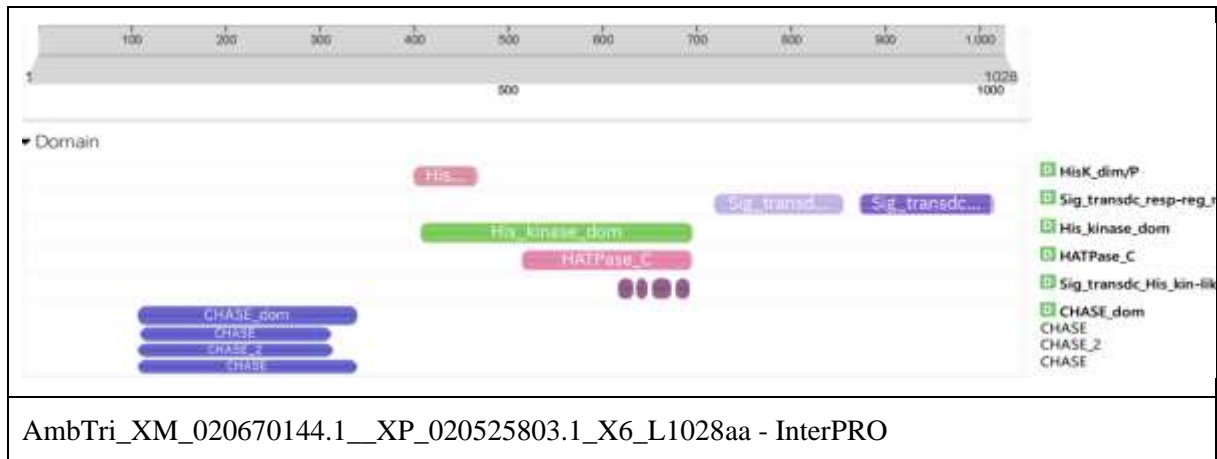
Since histidine kinase 5 from NCBI is not orthologue of AHK5, then to what Arabidopsis gene it may be orthologous?

Histidine kinase 5 was one of the top hits from the BLAST search when as test sequence was used AHK4. However there were 6 variants with similar or identical scores, therefore all of them were aligned and compared with ClustalW. The results showed that 5 of the transcript variants (X1, X2, X3, X4, X5) although had different length they have fully identical protein products with length 1047aa., so actually there are only 2 differing candidate proteins - X5 and X6. Consequently both of them were aligned and compared with ClustalW and they were fully identical apart of insertion of 21aa at position 125.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

Afterwards the candidate protein X6 was explored for conservative domains and motifs with the online tool InterPro (Paysan-Lafosse, et al., 2023). The results showed that the CHASE domain starts approximately 100aa from the N-terminus (Table 7). Based on these results the longer candidate proteins although highly similar to the shorter variant were rejected since currently it is not known if this relatively large insertion in highly conservative region impacts the expected cytokinin binding functionality and the shorter variant was accepted as orthologue of AHK4.

Table 7. The probable domain structure of XP\_020525803.1\_X6 found with InterPro tool



## CONCLUSION

Currently there are 6 (Ensembl.org) and 9 (NCBI) annotated orthologues of *A. thaliana* histidine kinases and related proteins in the genome of *A. trichopoda*. In this study 3 of them – the cytokine receptors were analyzed bioinformatically and confirmed to be orthologues. However in order to keep the nomenclature of the model organism *A. thaliana* the histidine kinase 5 annotated automatically by the NCBI's gene prediction tool Gnomon is better to be renamed to number 4 (Souvorov, et al., 2010).

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## ASSESSING THE LEGAL FRAMEWORK FOR ENVIRONMENTAL PROTECTION IN ALBANIA: A CRITICAL ANALYSIS

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### ABSTRACT

Albania, since 1990, has embarked on a remarkable journey of legal transformation, indicating its strong commitment to international agreements and the enhancement of domestic legislation to align with Western best practices and the goal of harmonizing with European Union (EU) legislation. This commitment also extends to the field of environmental protection, where Albania has ratified numerous international agreements, including the Aarhus Convention, often hailed as "democracy in the field of the environment." These international agreements hold a prominent position within Albania's legal hierarchy, second only to the Constitution. A ratified international agreement, endowed with the force of law, supersedes any domestic laws conflicting with it.

The legal framework for environmental protection in Albania encompasses four main areas:

**Legal-Constitutional Protection:** The Albanian Constitution recognizes citizens' right to information about the environment and the state's duty to ensure a healthy and ecologically suitable environment for present and future generations. Nevertheless, as the trend among European countries is to introduce a specific right to a clean environment in their constitutions, the need for such a constitutional right in Albania has garnered attention.

**Framework and Sectoral Legislation:** Albania's environmental legislation, covering both framework and sectoral aspects, is complex and ever-evolving. The primary goal is to ensure alignment with EU requirements and to facilitate the process of EU accession. Key laws, such as the Law on Environmental Protection and other sector-specific laws, delineate principles and terms related to environmental protection.

**Legal-Civil Liability for Environmental Damage:** The Albanian Civil Code contains provisions for civil liability concerning environmental damage, incorporating a principle akin to the "Polluter Pays" principle. However, the Code's lack of specific provisions for environmental damage poses challenges in assessing potential harm to the environment. Filing lawsuits to prevent environmental harm is hindered by lengthy legal processes.

**Legal-Criminal Protection of the Environment:** The Albanian Penal Code comprises a dedicated chapter on environmental offenses, providing for various environmental crimes and corresponding criminal penalties. However, these criminal provisions often refer to specific legislation to determine the severity of the violation, contributing to jurisdictional challenges.

### 1. INTRODUCTION

Environment law, as is the case for the majority of European countries, is a relatively recent legal field in Albania (Petrela, 2011).

In Albania, the beginnings of fundamental environmental rights date back to the period after 1990, following the overthrow of the communist regime and the establishment of a democratic system. The first official Albanian document on environmental policies is the Environmental Action Plan of 1993.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

This document outlined the government's commitment to establish an institutional, legal, and economic framework for environmental issues. After the adoption of the Constitution in 1998, another phase of development of Albanian environmental law began, characterized by the signing of international agreements in the field and the alignment of legislation with that of the European Union. For the first time, the Constitution included specific provisions related to the environment, and legal protection of the environment was incorporated into criminal, civil, and other sectoral legislation.

The Stabilization and Association Agreement, which entered into force on April 1, 2009, paved the way for Albania's application for candidate status in the European Union, a status that was granted in 2014. According to Article 70 of the SAA, Albania commits to gradually align its legislation with the *acquis communautaire* during the transitional period specified in the agreement "with special attention to safety and environmental standards as well as social aspects...".<sup>1</sup>

Despite the transformation and the progress in the direction of aligning environmental legislation and strengthening institutional monitoring structures, as evident in the progress reports of the EU and studies from various national and international institutions, Albania is still far from achieving contemporary standards for environmental conservation and protection.

According to the Progress Report of the European Commission for Albania for the year 2022, while it is stated that "*The EU promotes strong climate action, sustainable development and protection of the environment. EU law contains provisions addressing climate change, water and air quality, waste management, nature protection, industrial pollution, chemicals, noise and civil protection,*" it is underlined that Albania shows some level of preparation in this area. Limited progress was made in further aligning the policies and legislation with the EU *acquis*, in areas such as water management, chemicals and environmental crime. The Progress Report thoroughly analyzes Albania's obligations in aligning specific legislation in the field, thus highlighting that despite progress and the initiation of accession negotiations with the EU, Albania must fulfill all obligations of Chapter 27 on the environment.

## 2. THE ALBANIAN ENVIRONMENTAL LAW

Albania, since 1990, has engaged in an ongoing process of profound transformation of its legal system, actively signing and ratifying international agreements and improving domestic legislation in alignment with European Union legislation. In the field of the environment, Albania has ratified significant international agreements such as the Basel Convention, the Stockholm Convention, the Rotterdam Convention, CITES, the Bern Convention, the Bonn Convention, and more. Of particular importance in the field is the ratification of the Aarhus Convention<sup>3</sup>, also known as "democracy in the field of the environment," representing one of the most significant acts for environmental rights in Albania. The international agreements ratified in the hierarchy of legal sources stand immediately after the Constitution, based on its Article 116 and form part of the domestic legal system, are directly applicable, except in cases where they are non-self-executing, requiring the enactment of a law for their implementation. A ratified international agreement with the force of law prevails over domestic laws that are inconsistent with it.

The domestic legislation aimed at providing legal protection for the environment in Albania is realized within a broad framework, which can be categorized as follows:

1. Legal-constitutional protection;
2. Framework and sectoral legislation;
3. Legal-civil liability for environmental damage;

<sup>1</sup> The Stabilization and Association Agreement between the European Communities and their Member States and the Republic of Albania, <https://integrimi-ne-be.puneteshqiptare.gov.al/wp-content/uploads/2020/04/MSA-BE-Shqiperi-sq.pdf>

<sup>2</sup> Albania 2022 Report European Commission, Brussels, 12.10.2022 SWD(2022) 332 final, [https://neighbourhood-enlargement.ec.europa.eu/albania-report-2022\\_en](https://neighbourhood-enlargement.ec.europa.eu/albania-report-2022_en)

<sup>3</sup> Law No. 8672, dated October 26, 2000, on the ratification of the 'Aarhus Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters'.

4. Legal-criminal protection of the environment.

2.1. *Legal-constitutional protection*

The Constitution of the Republic of Albania<sup>4</sup> includes two specific provisions related to the environment, outlined in its Part II 'Fundamental Rights and Freedoms,' Chapter IV 'Economic, Social, and Cultural Rights,' and Chapter V 'Social Objectives.' Specifically, Article 56 states: "Everyone has the right to be informed about the state of the environment and its protection." Article 59, in its point 1, stipulates: "The state, within its constitutional competencies and means at its disposal, as well as in complementarity with private initiatives and responsibility, aims for: d) a healthy and ecologically suitable environment for present and future generations; dh) the rational use of forests, waters, pastures, and other natural resources based on the principle of sustainable development." Furthermore, in point 2 of this article, the Constitution specifies that the fulfillment of social objectives cannot be directly sought in court, and it will be the law that determines the conditions and extent to which the realization of these objectives can be pursued.

At the time of its adoption, this constitutional regulation was considered to be in line with many other European constitutions, recognizing the right of citizens to be informed about environmental issues and establishing the state's responsibility for a clean environment for current and future generations as part of sustainable development.<sup>5</sup>

The inclusion of a specific fundamental right to "a healthy and clean environment" in the Constitution was considered unnecessary by the drafters of the Constitution. Enshrining it as a fundamental right would not only provide a legal basis for legitimate legal actions but also open the door to direct appeals to the Constitutional Court (Manushaqe, 2017).

The trend towards recognizing an inherent right to a clean and healthy environment to guarantee health and quality of life, a right enjoying special constitutional protection, is a recent development. We can mention the case of Italy, which, with recent constitutional changes in 2022<sup>6</sup>, guarantees constitutional protection for the environment, biodiversity, and ecosystems (Article 9) and stipulates that economic freedom cannot be exercised to the detriment of health and the environment (Article 41).

The Albanian Constitution recognizes the general right to information as a fundamental human right and places special importance on this right in Article 56, guaranteeing everyone's right to be informed about the state of the environment and its protection. This constitutional right is further elaborated and detailed by Albanian legislation on the right to information, treating it as a specific right regulated in environmental legislation (Baraku, 2013).

2.2. *Framework and sectoral legislation*

In Albania, environmental legislation, both at the framework and sectoral levels, is constructed through a number of laws, decisions of the Council of Ministers, and other acts of central and local authorities. This legislation is complex, constantly evolving, and often the concerns of field experts express a lack of cohesion and conflicts among various legal and sub-legal acts. A characteristic of this legislation remains the aim of the Parliament and the Government to fulfill the obligations for aligning the legislation as a commitment towards EU accession.

The Law on Environmental Protection of 2011, amended several times, is a framework law aimed at regulating the relationship between humans and the environment, protecting environmental components and processes, and ensuring the material conditions for sustainable development while meeting the necessary framework for implementing constitutional requirements for a ecologically clean environment.

Other important laws include the Law on Environmental Impact Assessment, the Law on Integrated Water Resource Management, the Law on Environmental Permits, the Law on Integrated Waste

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<sup>4</sup>Law No. 8417, dated October 21, 1998, 'The Constitution of the Republic of Albania,' as amended.

<sup>5</sup> The Constitutional Debate - Discussions in the Parliamentary Commission for Drafting the Constitution (March-September 1998), Volume 1, Tirana 2006, published by the OSCE Presence in Albania.

<sup>6</sup> Legge costituzionale 11 febbraio 2022, Costituzione della Repubblica Italiana, cortecostituzionale.it

Management, the Law on Forests, the Law on Air Pollution Control, and other similar laws that address principles and key terms related to environmental protection, environmental damage, monitoring structures, administrative penalties, and more.

The right to seek redress in court against actions of public authorities that are in violation of national environmental legislation, guaranteed by the right to live in an environment suitable for health and well-being as sanctioned by Article 1 of the Aarhus Convention, is also recognized in Albania through a number of principles and legal procedures outlined in these laws. However, the few legal cases in Albania confirm that, due to clashes between legal provisions in the Administrative Procedures Code, the Administrative Courts Law, and various laws in the field of the environment, the courts have shown a tendency not to recognize the active standing of associations, interest groups, or the interested public.

### *2.3. Legal-civil liability for environmental damage*

The legal-civil liability in the Albanian Civil Code<sup>7</sup> is outlined in its Title IV, "Obligations Arising from Damages." The Code specifically addresses environmental liability in Article 624:

*"A person who, with fault, damages the environment by deteriorating, altering, or harming it, wholly or partially, is obliged to compensate for the damage caused."*

There are no court cases in Albanian jurisprudence that deal with environmental legal-civil liability. Article 624 contains the principle of "Polluter Pays," a principle also found in sectoral laws. In terms of the objective aspect of causing damage in civil law (Nuni, 2008), liability is determined based on the amount and value of the damage caused by the person. In situations where the Civil Code does not define environmental damage as a specific category in the future (e.g., the hidden costs of production, from which legal-civil liability for environmental harm arises), or when doctrine encounters problems in these definitions, both in procedural and substantive aspects related to environmental damage and determining legal-civil liability and its effectiveness, the Civil Code can be improved by anticipating even potential damage in the environment, which is the most challenging issue in determining legal-civil liability for environmental damage. What is not clearly defined in the context of future damage to the environment is related to the threats that may come to the environment.

Precisely because of the difficulty in assessing future harm to the environment, filing a lawsuit, as a means to prevent the possibility of harm to the environment by suspending administrative acts or work, becomes an inefficient tool to protect the legitimate interests of the public, given the considerable length of a judicial process.

In a context where the field of civil liability is considered a jurisprudential field, it is now time for a more advanced, interpretative, and unifying decision of the Supreme Court. The category of environmental harm should be interpreted in the light of the most advanced developments in the field.

### *2.4. Legal-criminal protection of the environment*

The Penal Code provides a separate chapter for environmental offenses. Penal legislation guarantees legal-penal protection of the environment by directly safeguarding legal relationships established in the Constitution or other laws in the environmental field. In addition to personal criminal liability, Law No. 9754, dated June 14, 2007, "On the Criminal Liability of Legal Entities," also provides for the criminal liability of legal entities.

Environmental offenses, along with the amendments that came into force on October 8, 2019, are provided for in Chapter IV of the current Penal Code, as follows:

Article 201 - Pollution of air, water, and soil

Article 201/a - Waste management

Article 201/b - Waste transportation

Article 201/c - Hazardous activities

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<sup>7</sup> Law No. 7850, dated July 29, 1994, "On the Civil Code of the Republic of Albania," as amended.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

Article 201/ç - Hazardous nuclear materials and radioactive substances

Article 202 - Damaging protected species of flora and fauna

Article 202/a - Trafficking in protected species of flora and fauna

Article 202/b - Damaging habitats in environmental protection areas

Article 203 - Ozone-depleting substances

Article 204 - Unauthorized fishing

Article 205 - Unauthorized logging of forests

Article 206 - Unauthorized felling of decorative and fruit trees

Article 206/a - Forest arson

Article 206/b - Destruction by negligence with fire of forests and forested areas

Article 207 - Violation of plant and animal quarantine

For all the above-mentioned environmental offenses, the Penal Code provides criminal penalties, but the provisions outlining these criminal acts refer to specific legislation to determine the severity of the violation. In these criminal provisions, the expression "beyond the limits allowed by law" refers to the specifications of the special law regarding the specific environmental issue. Each special law lists environmental violations that serve as guidance and reference for identifying environmental crimes.

General criteria for determining whether an environmental violation constitutes an administrative or criminal offense hinge primarily on the extent of environmental harm caused. However, the legal and sub-legal framework that defines these differentiating criteria is often deficient, incomplete, frequently ambiguous, and therefore not effective in achieving its intended purpose. This deficiency also gives rise to conflicts of jurisdiction between various administrative bodies, law enforcement agencies, and the prosecution.

### 3. ALIGNMENT OF LEGISLATION WITH EU LAW

Albania has generally shown dynamism and activity in harmonizing environmental legislation with European law. In addition to the adoption of laws and sub-legal acts within specific sectors, harmonization has also been carried out in criminal law. Thus, the legal changes made in 2019 in Chapter IV of the Penal Code have been brought into line with European Parliament and Council Directive 2008/99/EC of November 19, 2008, 'On the protection of the environment through criminal law,'<sup>8</sup> completing the legal framework for environmental offenses.

Similarly, Albania has aligned with the EU Water Framework Directive through Law No. 111/2012, 'On the integrated management of water resources,' followed by a series of sub-legal acts/decisions of the Council of Ministers in this regard.<sup>9</sup>

In this context, a series of laws have been enacted, including: Law no. 57/2020, 'On forests'; Law no. 9693/2007, 'On pastureland'; Law no. 10006/2008, 'On the protection of wildlife'; Law no. 10120/2009, 'On the protection of medicinal, aromatic, and other natural plant resources'; Law no. 10253/2010, 'On hunting'; Law no. 81/2017, 'On protected areas'; and Law no. 9587/ 2006, 'On the protection of biodiversity,' as amended, followed by the relevant sub-legal acts."

<sup>8</sup> EU Directive on Revised Environmental Crime (europa.eu):

[https://ec.europa.eu/commission/presscorner/detail/en/qanda\\_21\\_6745](https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_6745)"

<sup>9</sup> CMD No. 177, dated 31.5.2005, 'On the permissible discharge standards and criteria for zoning receiving water environments,' CMD No. 1189, dated 18.11.2009, 'On the rules and procedures for the preparation and implementation of the national environmental monitoring program,' CMD No. 797, dated 29.9.2010, 'On the approval of hygiene-sanitary regulations for water quality management,' CMD No. 246, dated 30.4.2014, 'On the determination of environmental quality standards for surface waters,' and CMD No. 321, dated 28.5.2014, 'On safety at sea, beaches, inland waters at territorial depth, and during water sports activities.'

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

For hazardous waste, Law no. 10463/2011, 'On integrated waste management,' was approved, aiming to align with the European Parliament and Council's Framework Directive on Waste. Regarding waste management in landfills, CM Decision No. 452, dated 11.7.2012, 'On waste landfills,' was approved, aligning with the Council Directive 1999/31/EC, dated 26.4.1999, "On the landfill of waste."

As part of the process of aligning legislation with that of the EU, the cross-sectoral document addressing environmental policies is the National European Integration Plan 2022-2024.<sup>10</sup> In Chapter 27 of this document, the existing situation and the policies and measures that the Albanian government plans to take to address environmental and climate change issues are presented. These measures include strengthening the legal framework, adopting other legislative and sub-legislative acts for specific areas such as air, inland waters, waste, noise and chemicals, biodiversity, forests, and climate change.

The partial transposition of some directives related to environmental crime, such as the Environmental Crime Directive (transposed 65%), the Environmental Liability Directive (transposed 28%), and the Regulation on Minimum Inspection Criteria (transposed 62%), has shown relatively good progress in terms of policy adaptation in this field. This is also evident in the preliminary report prepared by the joint cross-sectoral working group supported by the program 'Support to Albanian Negotiations in the Environmental Field - Chapter 27' SANE 2711. It is emphasized that the implementation of the 'polluter pays' principle in the application of legislation remains a challenge, and efforts are needed to achieve full harmonization with the Environmental Liability Directive.

According to the Albania Report 2022, of European Commission, for the Chapter 27 "Environment and climate change" Albania needs to step up efforts to achieve full alignment and implementation in most areas. As evident from this report, despite continuous improvements, Albania still has a lot of work to do in aligning its legislation with European legislation in the field of the environment. Albania has adopted a number of specific sectoral policies in the field of the environment.<sup>12</sup> However, the development of a comprehensive national strategy dedicated to the environmental sector is now seen as a necessity to comprehensively supplement the legal framework on the environment, clarify responsibilities among institutions, and enhance coordination among enforcement agencies.

#### 4. CONCLUSIONS

In a resolution of 8 October 2021, the UN Human Rights Council (UNHRC) recognised the human right to a safe, clean, healthy and sustainable environment, endorsing the broad recognition of the link between human rights and the environment. On 29 September 2021, the Parliamentary Assembly of the Council of Europe recommended the drafting of an additional protocol in this respect. Article 37 of the Charter of Fundamental Rights of the European Union provides that a high level of environmental protection must be integrated in EU policies, but does not recognise an individual right to a healthy environment. On September 2022, in a Recommendation on human rights and the protection of the environment, the Council of Europe calls on its 46 member states to actively consider recognising, at national level, the right to a clean, healthy and sustainable environment, as a human right. There are 110 States where this right enjoys constitutional protection and 101 States where this right has been incorporated into national legislation. Moreover, 19 out of 27 EU countries have enshrined this right in their constitutions (some only implicitly) and 17 in their national law.

The Constitution of the Republic of Albania includes two special provisions related to the environment, guaranteeing a specific right to information on the state of the environment, as well as an obligation of the State, within its competencies and resources, to fulfill the social objective of a healthy and ecologically appropriate environment. At the time of drafting the Constitution in 1998, sanctioning a specific fundamental right 'to a healthy and clean environment' was considered premature. Now that the sanctioning of this right is a trend for European countries, the time has come for a constitutional

<sup>10</sup> <https://integrimi-ne-be.punetegashtme.gov.al/anetaresimi-ne-be/plani-kombetar-i-integrim-it-pkie/>

<sup>11</sup> <https://sane27.com/sq/about-us/>

<sup>12</sup> National Strategy for Air Quality (2014), Strategic Policy Document for Biodiversity Protection (2015), Strategic Policy Document for Integrated Waste Management (2020-2035), Policy Document for Forests (2019-2030), Climate Change Strategy (2019), Integrated Water Resources Management Strategy (2017-2027), etc.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

regulation of this right to be considered for the Albanian Constitution. Such a constitutional regulation would pave the way for the revision of all codes and laws in the environmental field, which would constitute a fundamental transformation not only from a legal perspective but also in the engagement of the state and private parties, raising society's awareness of the environment.

Albania does not have an umbrella national strategy for the environment, even though it has adopted several specific sectoral policies in the field of the environment. A comprehensive national strategy dedicated to the environmental sector is now seen as a necessity to comprehensively supplement the legal framework on the environment, clarify responsibilities among institutions, and enhance coordination among enforcement agencies. The absence of such a policy document has resulted in a fragmented legal framework, often leading to clashes between laws in the field of the environment as a whole.

Albania still has a lot of work to do in aligning its legislation with European legislation in the field of the environment, as periodically highlighted by the Progress Reports of the European Commission and reports from international organizations.

Changes in the Civil Code would constitute a significant step in clearly defining environmental harm and responsibility towards the environment, would further define, and align concepts and terminology related to environmental damage in the future.

An Environmental Code, following the Italian and French models, would be a good solution in the Albanian context. It would serve to unify the regulatory framework, in line with international agreements ratified by Albania. Such a unified normative text would benefit law enforcement agencies, police authorities, and the judiciary, enabling them to handle environmental issues more professionally in their work.

Despite significant improvements in the Penal Code regarding environmental crimes, the Albanian Penal Code still needs clarification, precision, and alignment with specific environmental laws. The Penal Code, when seeking to determine environmental pollution through the expression 'beyond permissible limits,' refers to primary or secondary specialized legislation. There is a lack of direct and clear legal regulation concerning the demarcation line between administrative misconduct and criminal offenses. This demarcation is constituted by the damage caused and the measure of this damage, but in sectoral laws, this demarcation line is not clearly defined, and sub-legal acts in this regard are incomplete. A clear distinction between administrative misconduct and criminal offenses would leave no room for different applications in similar situations.

It can be concluded that since the first government document on the environment in 1993 until today, Albania has made significant progress in adopting and approving environmental legislation as part of the alignment process with European legislation. However, despite the trend towards faster alignment, many legislative and sub-legislative acts are still missing, and, more concerningly, many existing legislative acts are not applied in practice.

Environmental legislation is considered highly advanced for the administrative, financial, and institutional capacities of Albania. The large number of sectoral laws and administrative acts in the Albanian environmental legal framework, along with the shortage of professionals in the field, makes it challenging and difficult for police, investigative bodies, and courts to determine which specific law or act should be applied in specific cases. On the other hand, the lack of public awareness and the absence of a comprehensive curriculum for environmental law in universities and schools highlight the need for not only continuous improvement of environmental legislation and the establishment of a strong administration in this regard but also the necessity for numerous measures to enhance overall environmental protection.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## AN EXPERIMENTAL INVESTIGATION OF EFFECT OF MAXIMUM AGGREGATE SIZE ON MODE-I FRACTURE PARAMETERS OF STEEL FIBRE REINFORCED NORMAL STRENGTH CONCRETE

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### ABSTRACT

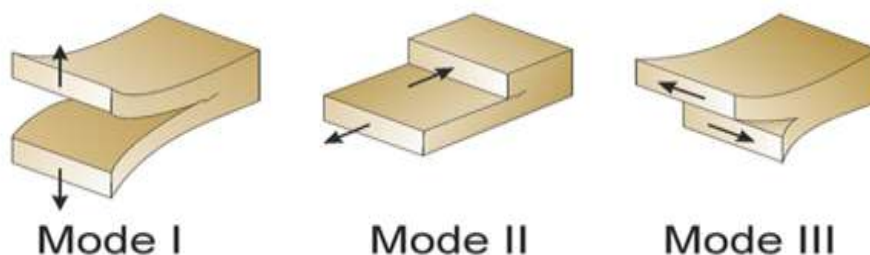
The Fracture Mechanics theories promise better predictions about the life and durability of a structure in presence of cracks. Mode I crack propagation in Steel fiber-reinforced concrete (SFRC) is simulated by a fracture mechanics approach by using Size Effect Law. The present experimental investigation consisting of tests on geometrically similar notched prismatic specimens made from plain concrete and fiber concrete with 0.5%, 1% & 1.5% of steel fibers. The MAS taken in this study are 20mm, 16mm, 10mm. The notched specimens are tested with three point bending test. Theories of fracture mechanics tend to incorporate the fracture energy (**Gf**) of concrete as an important property in addition to other properties of concrete like Young's modulus (E), Cohesive Fracture Zone (Cf), Failure stress( $\sigma_n$ ) and Brittleness number ( $\beta$ ). From the curves of P- $\delta$ , P-CMOD,  $\beta$ -d,  $\sigma_n$ -d the Fracture Energy parameters are determined. Different relations are established by varying percentage of steel fibres and Maximum Aggregate Size against load which are used to determine the Fracture toughness. The post peak behavior of concrete is determined by using the area under p- $\delta$  curves.

### INTRODUCTION

Concrete crack formation poses a serious risk of damage due to corrosion, necessitating accurate prediction for mitigation. The fictitious crack model (FCM), pioneered by Hillerborg in 1976,

emerges as a potent tool for anticipating cracks in composite materials like concrete. Realistic predictions hinge on understanding fracture energy and material strain softening. Strength, alongside parameters like ductility, self-compacting ability, and wear resistance, plays a crucial role. This discussion centers on crack formation in normal concrete, where fracture energy and strain softening dynamics are intricately tied to the composite structure, governed by the mechanical interplay between aggregates and the cement-based matrix. Failures stem from diverse factors, including loading uncertainties, material defects, design inadequacies, and construction shortcomings. Designing against fractures constitutes a dynamic research area crucial for structural engineers. Emphasizing the vulnerability of increasingly brittle materials, especially when life is at stake, underscores the need for meticulous consideration of numerous failure-contributing factors. Engineers must be well-versed in available procedures to safeguard against catastrophic, brittle fractures, a significant contributor to engineering disasters.

The literature distinguishes between the three different fracture modes shown in figure.



**Fig: different fracture modes**

**Mode I: OPENING MODE OR TENSILE MODE**

**Mode II: SLIDING MODE OR IN-PLANE SHEAR MODE**

**Mode III: TEARING MODE OR ANTI PLANE SHEAR MODE**

**EXPERIMENTAL PROGRAMME:**

**Outline of Experimental Program:**

The experimental program was designed to study the stress intensity factor and fracture energy of Steel Fibre Reinforced Concrete (SFRC) beams of size 100mm x 75mm x 350mm (Span is 300mm), 100mm x 150mm x 650mm (Span is 600mm) and 100mm x 300mm x 1250mm (Span is 1200mm) with centrally placed notch at mid span of the beam under a three point bending test i.e., with a central point load. The influence of centrally placed notch of specimens on stress intensity and fracture energy was studied on beams of varying size effects with two different mix proportions (M20 and M30) with varying percentage of steel fibres (0.5%,1%,1.5%) and Maximum Aggregate Size(MSA) taken as (20mm,16mm,10mm).

This experimental program consists of three series of beams for each grade, namely small, medium, and large and having equal notch depth ratio (0.15).

The beams were designated in order of grade and were given alphabets for naming of grade. (M20-A, M30-B).The aggregate size is given in numbers followed by size of aggregate. (20mm-1,16mm-2,10mm-3). The beam size is given as (small-S, medium-M, large-L). The percentage of steel fibres were written at the end as (0%,0.5%,1%,1.5%).

The beams were named as

$$(A, B) x / (S, M, L) / y\%$$

Here A, B are grade of concrete viz. A-M20 & B-M30

X is 1,2,3. i.e., 1-20mm,2-16mm,3-10mm.

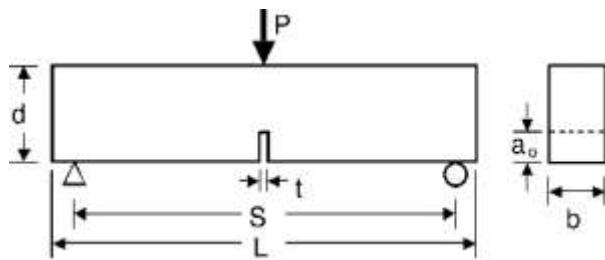
Size of beams were given as S-small, M-medium, L-large.

Y represents percentage of steel fibers viz. 0%,0.5%,1%,1.5%.

Finally beams were designated as

M20(A),20mm (1), large beam(L),0%--[ A1/L/0%]

M30(B).20mm (1). large beam(L).0%--[ B1/L/0%]



**The Three point bending beam specimen for mode –1 fracture**

Where

P = LOAD APPLIED ON BEAM

d = DEPTH OF THE BEAM

S = SPAN OF BEAM

L = TOTAL LENGTH OF BEAM

a<sub>0</sub> = CRACK WIDTH

**Materials:-**

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Moulds:** Standard cast iron cubes and cylinders moulds were used for casting of cubes and cylinders. Three casted iron moulds were prepared for casting of beams of sizes as follows (**l\*h\*b**)

1. 350\*75\*100 mm
2. 650\*150\*100 mm
3. 1250\*300\*100 mm

**Marble Cutter:** The beams were cut with a marble cutter in to the hardened concrete

**Table 1: Quantities of Materials**

The above mix proportions were used to cast 6 beams (2S,2M,2L), 3 cubes and 3 cylinders per mix. Steel fibres are taken by volume fraction viz. 0%,0.5%,1%,1.5%.

GRADE	SIZE OF AGGREGATE	PROPORTIONS	CEMENT (Kg/m <sup>3</sup> )	WATER (Kg/m <sup>3</sup> )	FINE AGGREGATE (Kg/m <sup>3</sup> )	COARSE AGGREGATE (Kg/m <sup>3</sup> )	STEEL FIBERS (Kg)
M20	10	0.5:1:1.46:2.54	277.96	138.98	405.821	706.01	28.376
	16	0.5:1:1.38:2.98	266.28	133.141	367.48	785.00	28.376
	20	0.5:1:1.425:3.1	258.40	129.20	368.22	801.04	28.376
M30	10	0.46:1:1.29:2.55	302.12	138.98	389.74	770.41	28.376
	16	0.46:1:1.28:2.88	289.44	133.20	370.50	833.60	28.376
	20	0.46:1:1.26:3.12	281.00	129.28	354.10	876.72	28.376

**Table 2: Dimensions of beam specimens in Size Effect Method**

GRADE OF CONCRETE	SPECIMEN	AGGREGATE SIZE(mm)	Length(L) mm	Width(b) mm	Depth(d) mm	Span(S) mm	Notch Depth(ao)	ao/d	S/d
M20	SMALL	10	350	100	75	300	11.25	0.15	4
		16	650	100	150	600	22.5	0.15	4
		20	1250	100	300	1200	45	0.15	4
M20	MEDIUM	10	350	100	75	300	11.25	0.15	4
		16	650	100	150	600	22.5	0.15	4
		20	1250	100	300	1200	45	0.15	4
M20	LARGE	10	350	100	75	300	11.25	0.15	4
		16	650	100	150	600	22.5	0.15	4
		20	1250	100	300	1200	45	0.15	4
M30	SMALL	10	350	100	75	300	11.25	0.15	4
		16	650	100	150	600	22.5	0.15	4
		20	1250	100	300	1200	45	0.15	4
M30	MEDUM	10	350	100	75	300	11.25	0.15	4
		16	650	100	150	600	22.5	0.15	4
		20	1250	100	300	1200	45	0.15	4
M30	LARGE	10	350	100	75	300	11.25	0.15	4
		16	650	100	150	600	22.5	0.15	4
		20	1250	100	300	1200	45	0.15	4

### Results and Discussions:

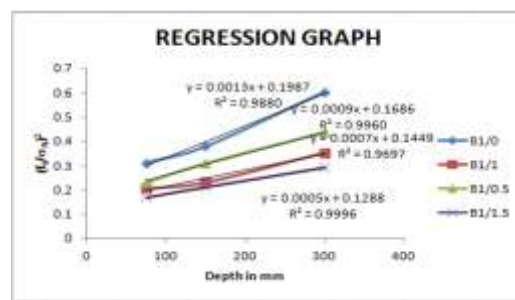
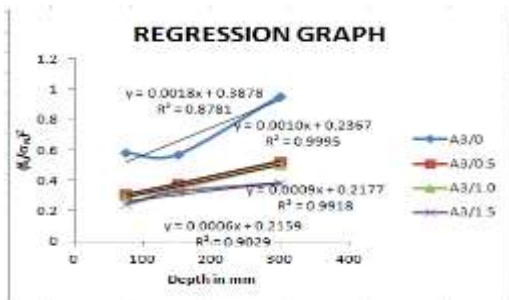
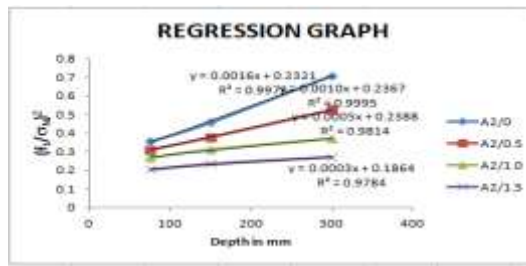
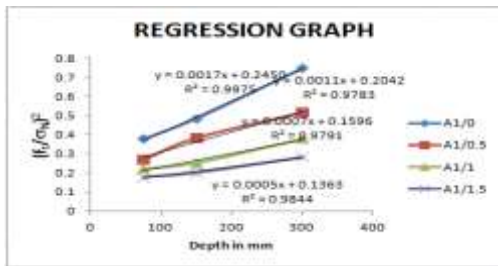
#### Test Setup and Testing Procedure:

All the specimens were tested on the LOADING FRAME of 100 TONS capacity under displacement control at a rate of 0.02mm/min. After 28days of curing the samples were taken out from the curing tank and kept for dry. Then notch is provided at the centre of the beam with notch to depth ratio of 0.15. After this the sample was coated with white wash. One day later the sample was kept for testing. The notched beam specimen was kept on the supports of testing machine as shown in below figure . When performing a test, a gradually increased load is applied to the notched beam until a stress level is reached which results in crack propagation.

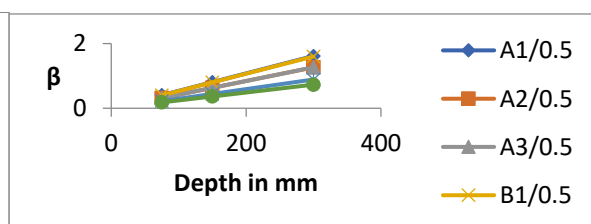
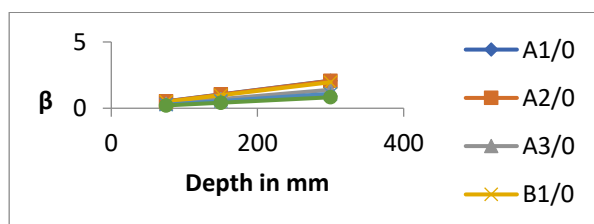


**Loading Frame Test setup Used for Testing of Beams**

**Regression Graphs for M20&M30:** Regression graphs were plotted between Y (y-axis) and depth (x-axis) of beam from which the constants A and C are determined. These constants are used to determine Fracture Energy (Gf).



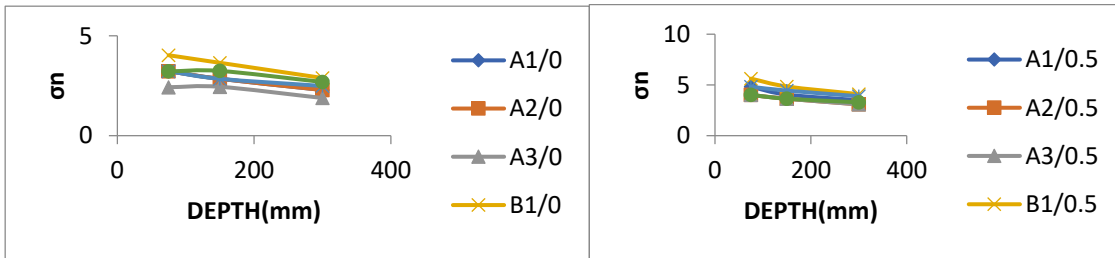
**Brittleness number Vs Depth:** Graphs were plotted between Brittleness number  $\beta$  (d/d<sub>0</sub>) and depth (mm) from which the brittleness natures of specimens are determined. The graphs were plotted considering the percentage of steel fibres.



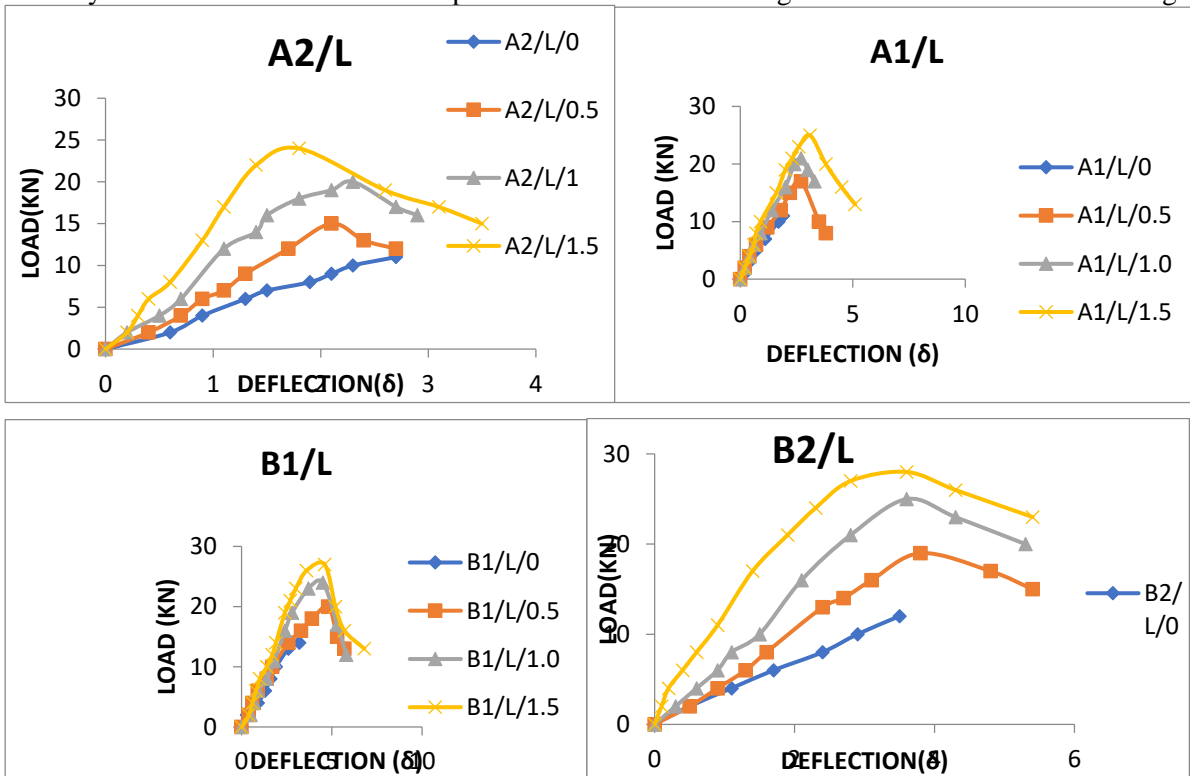
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October 13-14, 2023

**Failure Stress Vs Depth:** Failure stress ( $\sigma_n$ ) is determined and graphs are plotted between failure stress and depth(mm). With increase in MAS from 10mm to 20mm, failure stress increases.



**Load Vs Deflection:** In this graphs between Load Vs Deflection we can observe that as the percentage of steel fibres increases the load bearing capacity of specimens increases which clearly shows the ductility nature of specimens in large beams is higher

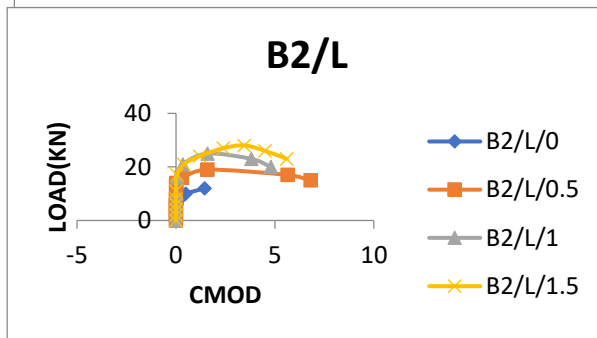
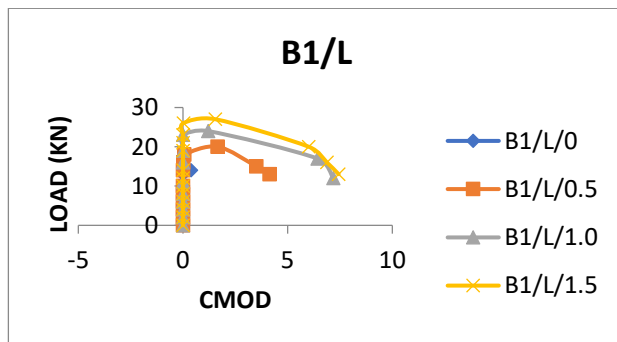
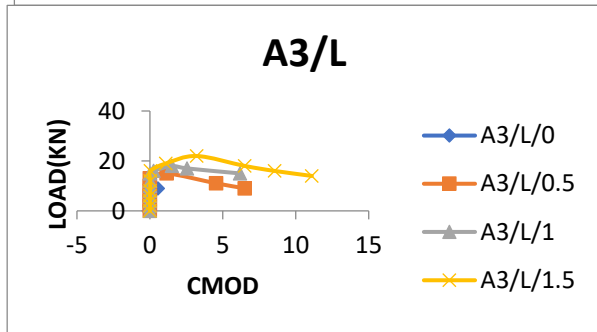
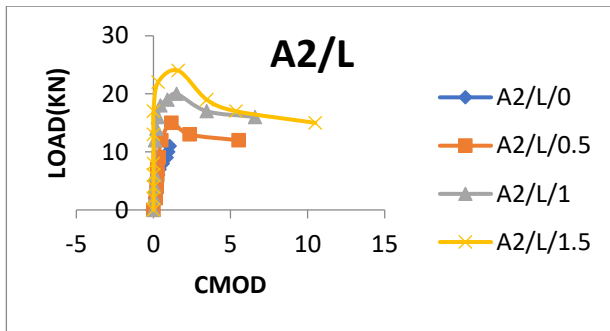


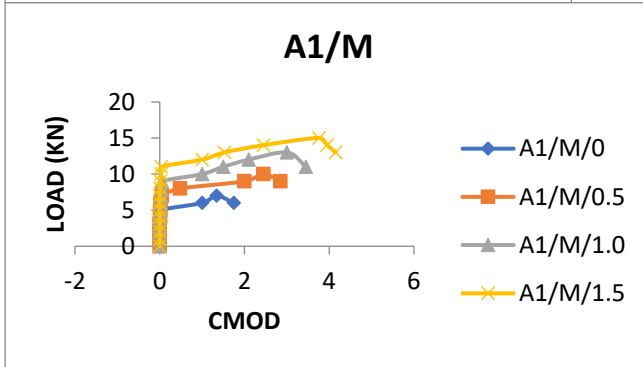
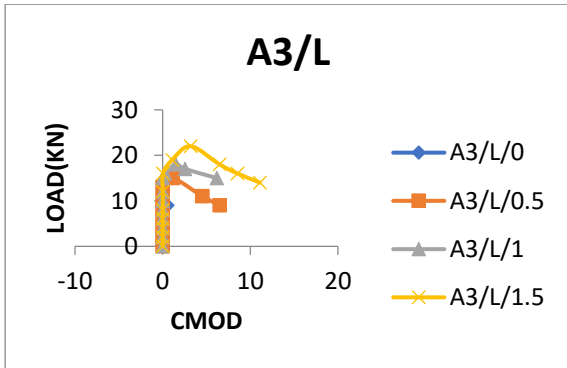
**Load Vs CMOD**



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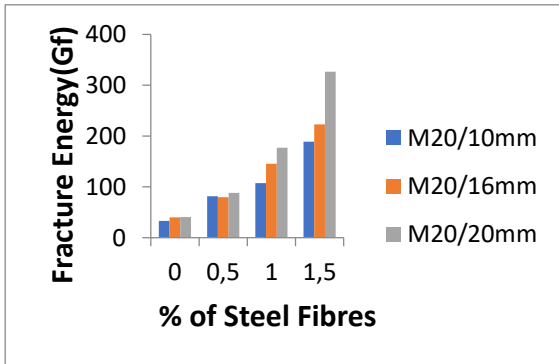
October 13-14, 2023



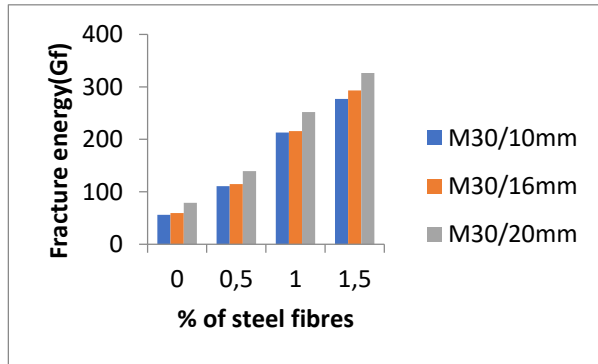


Fracture Energy (Gf) if calculated and graphs are plotted between Fracture energy and percentage of steel fibres. Behavior of Fracture energy with increase of steel fibres can be studied from graphs.

### Fracture Energy Vs Percentage of steel fibers: M20 Grade

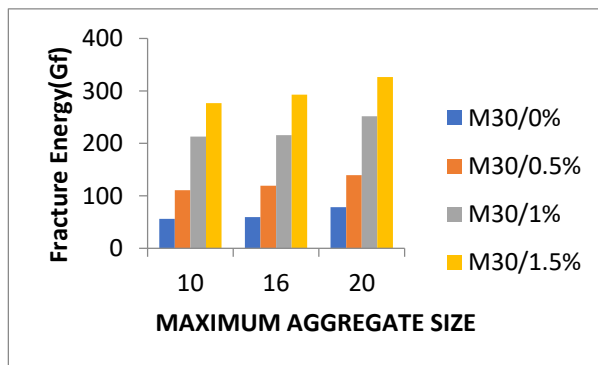
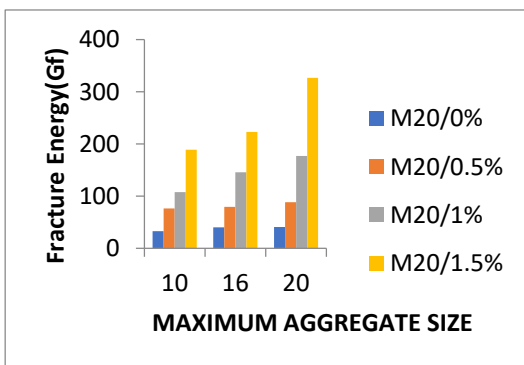


M20 Grade



M30 Grade

Fracture Energy Vs MAS: Graphs are plotted between Fracture energy and MAS and the behavior of Gf is studied when there is increase in aggregate size.



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October 13-14, 2023

Specimen	Regression A	Regression C	Failure Stress( $\sigma_N$ )	Brittleness Number( $\beta$ )	Fracture Energy Gf(N/mm)	Cf	Ki
A1/S/0	0.0017	0.245	3.2252	0.520408163	40.57721	16.57329	18.92274
A1/M/0	0.0017	0.245	2.8468	1.040816327	40.57721	16.57329	23.62106
A1/L/0	0.0017	0.245	2.29	2.081632653	40.57721	16.57329	26.87156
A1/S/0.5	0.0011	0.2042	4.82625	0.404015671	88.32024	21.34787	28.31635
A1/M/0.5	0.0011	0.2042	4.04875	0.808031342	88.32024	21.34787	33.59413
A1/L/0.5	0.0011	0.2042	3.49375	1.616062684	88.32024	21.34787	40.99673
A1/S/1	0.0007	0.159	5.6021	0.330188679	145.4878	26.12105	32.86838
A1/M/1	0.0007	0.159	5.24875	0.660377358	145.4878	26.12105	43.55101
A1/L/1	0.0007	0.159	4.29375	1.320754717	145.4878	26.12105	50.38417
A1/S/1.5	0.0005	0.1363	6.42625	0.275128393	222.8431	31.34855	37.70379
A1/M/1.5	0.0005	0.1363	6.04875	0.550256787	222.8431	31.34855	50.18894
A1/L/1.5	0.0005	0.1363	5.09375	1.100513573	222.8431	31.34855	59.77162
A2/S/0	0.0016	0.2321	3.2252	0.517018526	40.12807	16.68195	18.92274
A2/M/0	0.0016	0.2321	2.8468	1.034037053	40.12807	16.68195	23.62106
A2/L/0	0.0016	0.2321	2.29	2.068074106	40.12807	16.68195	26.87156
A2/S/0.5	0.001	0.2367	4.02625	0.316856781	79.51799	27.22011	23.62262
A2/M/0.5	0.001	0.2367	3.64875	0.633713561	79.51799	27.22011	30.27516
A2/L/0.5	0.001	0.2367	3.09375	1.267427123	79.51799	27.22011	36.30301

Specimen	Regression A	Regression C	Failure Stress( $\sigma_N$ )	Brittleness Number( $\beta$ )	Fracture Energy Gf(N/mm)	Cf	Ki
B1/S/0	0.0013	0.1987	4.0252	0.49068948	58.17797	17.57705	23.61646
B1/M/0	0.0013	0.1987	3.6468	0.98137896	58.17797	17.57705	30.25898
B1/L/0	0.0013	0.1987	2.89	1.96275793	58.17797	17.57705	33.91214
B1/S/0.5	0.0009	0.1686	5.62625	0.40035587	114.4855	21.54302	33.01007
B1/M/0.5	0.0009	0.1686	4.84875	0.80071174	114.4855	21.54302	40.23205
B1/L/0.5	0.0009	0.1686	4.09375	1.60142349	114.4855	21.54302	48.03731
B1/S/1	0.0007	0.1449	6.4021	0.36231884	151.8167	23.80466	37.5621
B1/M/1	0.0007	0.1449	6.04875	0.72463768	151.8167	23.80466	50.18894
B1/L/1	0.0007	0.1449	4.89375	1.44927536	151.8167	23.80466	57.42476
B1/S/1.5	0.0005	0.1288	7.22625	0.29114907	226.4293	29.62357	42.39751
B1/M/1.5	0.0005	0.1288	6.44875	0.58229814	226.4293	29.62357	53.5079
B1/L/1.5	0.0005	0.1288	5.49375	1.16459627	226.4293	29.62357	64.46534
B2/S/0	0.0015	0.4119	3.2252	0.27312455	56.05185	31.57854	18.92274
B2/M/0	0.0015	0.4119	2.8468	0.54624909	56.05185	31.57854	23.62106
B2/L/0	0.0015	0.4119	2.49	1.09249818	56.05185	31.57854	29.21842
B2/S/0.5	0.0008	0.2706	4.82625	0.22172949	139.7492	38.89819	28.31635
B2/M/0.5	0.0008	0.2706	4.44875	0.44345898	139.7492	38.89819	36.91309
B2/L/0.5	0.0008	0.2706	3.89375	0.88691796	139.7492	38.89819	45.69045

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Specimen	Regression A	Regression C	Failure Stress( $\sigma_N$ )	Brittleness Number( $\beta$ )	Fracture Energy $G_f(N/mm)$	Cf	Ki
B1/S/0	0.0013	0.1987	4.0252	0.49068948	58.17797	17.57705	23.61646
B1/M/0	0.0013	0.1987	3.6468	0.98137896	58.17797	17.57705	30.25898
B1/L/0	0.0013	0.1987	2.89	1.96275793	58.17797	17.57705	33.91214
B1/S/0.5	0.0009	0.1686	5.62625	0.40035587	114.4855	21.54302	33.01007
B1/M/0.5	0.0009	0.1686	4.84875	0.80071174	114.4855	21.54302	40.23205
B1/L/0.5	0.0009	0.1686	4.09375	1.60142349	114.4855	21.54302	48.03731
B1/S/1	0.0007	0.1449	6.4021	0.36231884	151.8167	23.80466	37.5621
B1/M/1	0.0007	0.1449	6.04875	0.72463768	151.8167	23.80466	50.18894
B1/L/1	0.0007	0.1449	4.89375	1.44927536	151.8167	23.80466	57.42476
B1/S/1.5	0.0005	0.1288	7.22625	0.29114907	226.4293	29.62357	42.39751
B1/M/1.5	0.0005	0.1288	6.44875	0.58229814	226.4293	29.62357	53.5079
B1/L/1.5	0.0005	0.1288	5.49375	1.16459627	226.4293	29.62357	64.46534
B2/S/0	0.0015	0.4119	3.2252	0.27312455	56.05185	31.57854	18.92274
B2/M/0	0.0015	0.4119	2.8468	0.54624909	56.05185	31.57854	23.62106
B2/L/0	0.0015	0.4119	2.49	1.09249818	56.05185	31.57854	29.21842
B2/S/0.5	0.0008	0.2706	4.82625	0.22172949	139.7492	38.89819	28.31635
B2/M/0.5	0.0008	0.2706	4.44875	0.44345898	139.7492	38.89819	36.91309
B2/L/0.5	0.0008	0.2706	3.89375	0.88691796	139.7492	38.89819	45.69045

**BEAMS BEFORE TEST (A)**

**BEAMS AFTER TEST(A)**



## CONCLUSIONS

Based on the tests carried out on 144 geometrically identical specimens the results obtained were analyzed as below.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- With increase in Maximum aggregate size (MAS) and percentage of steel fibres the fracture energy( $G_f$ ) is increases.
- With increase in MAS from **10mm to 20mm**, failure stress increases by **80%** for A series and **86%** for B series. With increase in percentage of steel fibres from **0% to 1.5%** Failure Stress( $\sigma_n$ ) increases by **47.5%** in A series and **55.08%** in B series.
- With increase in MAS from **10mm to 20mm** ,Brittleness number increases by **66.9%** in A series and **33.4%** in B series. with increase in percentage of steel fibres from **0% to 1.5%** Brittleness number decreases by **52.76%** in A series and **59.5** in B series.
- With increase in MAS from **10mm to 20mm**, Fracture Process Zone(FPZ)i.e.  $C_f$  decreases by **64.89%** in A series and **42.31%** in B series. with increase in percentage of steel fibers from **0% to 1.5%** FPZ( $C_f$ ) increases by **52.85%** in A series and **59.32%** in B series.
- With increase in MAS and percentage of steel fibers the post peak behavior ( $p-\delta$ ) of concrete improves.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## GREEN LOGISTICS ACTIVITIES' INFLUENCE ON CONSUMER BUYING DECISIONS: EVIDENCE FROM CROATIA

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### ABSTRACT

Logistics incorporates several business activities relevant for modern enterprises that are concerned with the processes from handling raw materials to making and selling new products, namely transport, handling, storage etc. Due to its importance in modern business enterprises, logistics has significantly affected both the economy as well as the environment. The impact of logistics on the environment has become an important topic of academic and professional research due to global warming becoming an ever increasing and more immediate problem. One of the possible solutions to this problem was adopting practices and activities in logistics commonly named green logistics.

Since the emergence and widespread application of green logistics practices in modern business, logistic issues have changed significantly. From traditional logistic orientation to organize forward distribution such as transport, warehousing, packaging and inventory management, modern logistic trends include reverse distribution activities such as waste transport and used materials' movement. Today logistic activities that allow for recycling and disposal of waste materials have become a significant market.

Green logistics practices have been adopted by many companies and have become a desirable way to conduct business and attract consumers. But although companies in developed countries and increasingly those in developing countries tend to adopt and exercise those practices, their effects have not been appropriately researched. Although positive effects on the environment cannot yet be measured, the effect on the companies' success in attracting and holding onto consumers can more easily be researched. Therefore, the aim of this study was to test whether green logistics practices of companies have a positive effect on consumer choices. In order to achieve this aim, a survey was conducted among Croatian consumers that consisted of questions regarding consumer choice of products based on the green logistics activities the producers are performing. Collected data was analyzed using factor and cluster analysis and results were presented in the paper. Limitations of this research, as well as recommendations for future research were also given in the conclusion.

**Keywords:** business logistics, green purchase decisions, factor analysis, cluster analysis.

### INTRODUCTION

Modern environmental, social and economic conditions have ushered a need to build companies' practices on a more ethical, sustainable and ecological basis. In this era of the shift towards ecology and sustainability, businesses are embracing environmentally-friendly practices to optimize their supply chain operations and other logistic activities. From utilizing renewable energy sources to reducing carbon emissions, green logistics is reshaping the future of transportation and revolutionizing the way goods are delivered across the globe. Green logistics practices have been adopted by many companies and have become a desirable way to conduct business and attract consumers, which are also becoming

increasingly inclined towards making green purchase decisions and buying logistically sustainable and ethical products.

Although green logistics has received lots of interest by scholars, the influence of aforementioned practices on the Croatian market and Croatian consumers has not been adequately researched. There is a need to study consumer purchase intentions based on green logistics activities and how they influence consumption and purchase decisions of Croatian consumers.

Based on the aforementioned, the main aim of the study presented in this paper was to understand how the consumer purchase decision was impacted by green logistics activities among Croatian consumers. In order to achieve this goal, an empirical study was conducted and the results and implications of the research are also presented in this paper.

### **LITERATURE REVIEW**

Logistics can be described as a set of activities in incorporating, ensuring and improving the availability of all persons and assets, which represent assistance or insurance for flows within a system (Segetlija, 2006, p. 177). Traditional logistics was concerned with forward distribution, i.e., activities such as transport, warehousing, packaging and inventory management that are directed from the producer to the consumer. Modern logistics consists of elements of environmentally friendly business philosophy and concerns itself with reverse logistics, i.e., sustainable transport of waste and the movement of used materials (Rodrigue et al., 2017). The aforementioned activities of companies are often referred to in the relevant literature as green logistics.

Sbihi and Eglese (2007) define green logistics as a set of activities that allow companies to produce and distribute goods in a sustainable way, taking account of environmental and social aspects. Additionally, green logistics refers to environmentally friendly and efficient transport and distribution system (Rodrigue et al. 2017). Some of the goals of green logistics are reducing the pollution caused by traffic, limiting the emissions, and minimalizing waste materials. Green logistics consists of five basic elements: green procurement, green manufacturing, green distribution, green packaging and reverse logistics.

One reason to implementing green logistics are many reported benefits to green logistics, not only referring to environment but also businesses. Among the environmental benefits Jaggernath and Khan (2015) include waste and pollution reduction, increased energy efficiency, decrease in gas emissions, reduced toxic chemical released into waterways, water conservation etc. Considering the advantages of green logistic activities implementation, promoting their adoption proves to be vital for preservation of our natural environment.

However, as noted by Rodrigue et al. (2017), green logistics is still a long way from being achieved due to the fact that several paradoxes in the application and functioning of green logistics in companies exist. Those paradoxes refer to the costs, which are being reduced by improvements in packaging and reduction of wastes, but are often externalized and paid for by the consumer. Another issue is the increase in transportation by modes that are not environmentally friendly, such as trucking and air transportation.

For achieving the goals of making green logistics activities more widespread in companies, there are other factors worth noting; such as the behavior of governments, but also consumers (Sun and Li, 2021). Consequently, many governments have recognized the need for incentives towards green logistic activities in companies and therefore introduced different schemes aimed at introducing a more sustainable and green logistics practices in their economies, such as India (Alagarsamy et al., 2021) and China (Zhu et al., 2013). Additionally, consumers choosing green products and products produced by companies adopting green logistics activities and practices might prove an important element in turning to a more sustainable and eco-friendly business activities.

Fortunately, consumers are nowadays indeed becoming more mindful of ecological aspects of products. Most consumers do not evaluate products solely based on their price and quality, but take other criteria in account, such as sustainability. Moreover, environmental impact of the product is becoming one of the most often used criterion since green brand awareness has greatly increased in consumers during this century (Kavas, 2020), leading to changes in consumer behavior and a shift towards green purchase decisions. Green consumption and green purchase intention refer to choosing purchase behavior and

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

purchase patterns that will not harm the environment, and their desire to consume products that meet environmental protection expectations (Alagarsamy et al., 2021).

The companies are now well aware of consumers evaluation of products based on ecological criteria, and consequently decided to adapt their strategies in order to make their products more environmentally friendly, thus improving their brand image and their market position. Taking everything above into consideration, it can be speculated that adopting green logistics activities might result in a more favorable purchasing decisions from consumers.

Research has found that consumers interested and invested in environmental issues are more likely to have a positive attitude towards companies and products that incorporate sustainable and green logistics practices (Alagarsamy et al., 2021). Furthermore, Kavas (2020) proved that green logistics practices affect the purchasing behavior of consumers in the example of e-commerce.

All things considered, the connection between consumer green purchase decisions and green logistics can be presumed. Nevertheless, this connection was not confirmed in the case of the Croatian consumers. Therefore, our research question of whether Croatian consumers would base their purchase decisions on green logistics activities of companies was tested by empirical research.

## RESEARCH AND FINDINGS

A well-structured questionnaire was developed based on the relevant literature and the research framework. The questionnaire consists of two parts. The first part consists of 13 questions in the form of affirmative claims for measuring green consumer purchase intention towards green logistics activities that were adopted from those used in the research conducted by Zhu et al. (2013) and modified to the current research context. The respondents expressed their agreement for all measurement items on a five-point Likert scale that allowed respondents to rate how much a given claim describes them (1 – not at all, 2 – up to a lesser extent, 3 – neither yes nor no, 4 – up to some extent, 5 – to a greater extent). The second part of the questionnaire consists of five questions that refer to demographic data on the respondents (age, gender, etc.).

The survey was conducted during the summer of 2023 via a web form, and 84 respondents from all over Croatia participated in the survey. Among the respondents, 32% were male and 68% female, while 9% were under 26 years old, 19% between 26 and 36 years old, 34% between 36 and 45 years old, 18% between 46 and 55 years old, and 20% over 56 years. Table 1 shows the descriptive indicators of the answers to the 13 statements about green logistics.

**Table 1. Descriptive indicators of the obtained data.**

	N	Minimum	Maximum	Mean	Std. Deviation
Variable 1	84	1,00	5,00	2,5833	1,22433
Variable 2	84	1,00	5,00	2,7381	1,16287
Variable 3	84	1,00	5,00	3,1310	1,19012
Variable 4	84	1,00	5,00	2,7024	1,22995
Variable 5	84	1,00	5,00	2,5952	1,14196
Variable 6	84	1,00	5,00	2,8452	1,33979
Variable 7	83	1,00	5,00	3,5181	1,24314
Variable 8	84	1,00	5,00	3,5238	1,21711
Variable 9	84	1,00	5,00	3,3333	1,21569
Variable 10	83	1,00	5,00	2,5181	1,14083
Variable 11	84	1,00	5,00	2,7500	1,24063
Variable 12	84	1,00	5,00	3,2024	1,33335
Variable 13	83	1,00	5,00	3,6400	1,08900

Source: authors' calculations.

From table 1, based on the average values, it can be concluded that the majority of answers are low with average values no higher than 3.7. One reason behind this might be the lack of interest among Croatian consumers in participating in green purchase behaviors or considering ecological criteria when making

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

purchase decisions. In addition, they may not be familiar with green logistics activities enough to be able to take them into account when choosing a product.

The collected data were analyzed by factor and cluster analysis. In the initial phase of the research, the reliability of the collected data was tested. The analysis showed satisfactory reliability (Cronbach Alpha coefficient is 0.933). The adequacy of the sample was tested with the Kaiser-Meyer-Olkin coefficient and the value obtained was 0.891. Bartlett's test of sphericity gives a value of 699.453 ( $p=0.000$ ). All the conducted tests indicate a well-constructed questionnaire and the continuation of the analysis.

In the next phase, an explanatory factor analysis was performed. Based on the collected data, two factors were extracted. Using the two factors obtained, 65.972% of the variance was explained. The first factor is more strongly related to 11 variables that mostly relate to attitudes about the use and management of packaging in the production process, and this factor is called "Packaging" in the rest of the paper. Respondents who express a higher degree of inclination towards this factor are more likely to make purchase decisions based on the degradability of the packaging, the amount of packaging, the amount of materials and packaging used in the production process etc. The second factor is more strongly related to the remaining 5 variables, which mainly relate to attitudes about the methods and costs of transport, and this factor is called "Transport". Respondents more inclined to this factor are more likely to base their purchase decisions on the characteristics of transport channels a manufacturer uses, minimization of transport routes or uses of vehicles that are less polluting the environment. The results indicate two most important issues considered by Croatian consumers when making purchase decisions to be packaging and transportation. Companies in the Croatian market should improve green logistic activities related to the aforementioned two sets of activities.

**Table 3.** The results of the factor analysis.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7,263	55,868	55,868	7,263	55,868	55,868	4,310	33,153	33,153
2	1,314	10,105	65,972	1,314	10,105	65,972	4,266	32,819	65,972
3	0,797	6,131	72,103						
4	0,629	4,839	76,942						
5	0,582	4,476	81,418						
6	0,524	4,028	85,446						
7	0,398	3,061	88,507						
8	0,352	2,705	91,212						
9	0,320	2,459	93,671						
10	0,274	2,106	95,777						
11	0,246	1,891	97,668						
12	0,174	1,336	99,003						
13	0,130	0,997	100,000						

Source: authors' calculations.

Using the values of the obtained factors, a cluster analysis was performed and two clusters were obtained. In the first cluster, which is called "environmentally conscious", there are above-average values of one and the other factor, which means that this cluster belongs to the respondents who base their purchase decisions on information about the product's packaging, but also on the resources that were needed to deliver that product to the shelves of the markets. 48 respondents are included in the first cluster. On the other hand, the respondents whose values in both factors are below average are included in the second cluster, and they do not base their purchase decisions on information about packaging or transport, but place higher value to some other criteria. 36 respondents belong to the second cluster.

In the final phase, an ANOVA analysis was performed, the results of which are shown in Table 3.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Table 3. Results of ANOVA analysis.**

Factors	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Factor 1: Packaging	24,178	1	0,717	82	33,705	<b>0,000</b>
Factor 2: Transport	36,246	1	0,570	82	63,569	<b>0,000</b>

The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus can not be interpreted as tests of the hypothesis that the cluster means are equal.

Source: authors' calculations.

## CONCLUSION

As the world focuses more on sustainability, the demand for green logistics will continue to grow. Innovations such as electric vehicles, renewable energy sources, and optimized supply chains will play a crucial role in reducing carbon emissions and improving efficiency. Embracing green logistics is not only a necessity but also an opportunity for businesses to thrive in the future.

Unfortunately, despite the fact that consumers tend to make green purchase decisions more often nowadays, Croatian consumers seem to base their purchase decisions based on green logistics activities of manufacturers to a lesser degree. One reason behind this could be the lack of understanding and importance given to the issue of pollution. In other words, Croatian consumer might not be highly influenced by environmental issues. Since green purchase behaviors are crucial in achieving sustainability, government and other interested stakeholders are advised to undertake steps to ensure further education and increase awareness of this problem among the consumers. Another possible reason might be the lack of information provided by the manufacturer about their green logistic activities. More effective communication and marketing methods and strategies should be implemented by Croatian companies in order to familiarize Croatian consumers with green logistic activities they undertake and the consequences of their implementation.

Our findings provide an additional insight to academia on green consumer behavior and particularly on how purchase decisions have been influenced by green logistics activities by companies. The findings will also enforce Croatian companies to recognize possible opportunities, developments and other benefits from adapting sustainable green logistics activities.

Future research might take into account different products, i.e., whether consumers make their purchase decisions based on green logistics activities of food manufacturers, clothing manufacturers, tourist service providers etc.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DESIGN AND FABRICATION OF DIE FOR INJECTION MOLDING MACHINE

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### ABSTRACT

PVC pipe clips are essential components used in various industries to securely fasten and organize PVC pipes. This project aimed to develop a cost-effective and efficient manufacturing process to produce highquality PVC pipe clips with consistent dimensions and superior performance. This research initially focused on understanding the requirements and specifications of the PVC pipe clips and analyzing existing molds used for similar purposes. design and fabrication of injection molding molds play a crucial role in modern manufacturing processes, enabling the mass production of intricate plastic components used in various industries. My research study presents a comprehensive investigation into the design and fabrication of an injection molding mold, focusing on optimizing its performance, efficiency, and quality. So, the initial phase of the study involved an in-depth analysis of the requirements and specifications of the target plastic component. Through computer-aided design (CAD) software, a precise and innovative mold design was developed, considering factors like material compatibility, part geometry, and mold complexity. Special attention was given to the selection of appropriate materials for the mold to ensure durability and longevity under the demanding conditions of the injection molding process. The fabrication process employed advanced machining techniques, such as computer numerical control (CNC) machining, to manufacture the mold components with high precision and accuracy. The use of modern manufacturing technologies allowed for the rapid production of complex mold geometries, reducing lead times and enhancing overall production efficiency. Investigated various aspects of mold design and fabrication, including cooling system optimization, venting solutions, and surface treatments, to minimize defects and improve the quality of molded parts. The researchers also explored the integration of conformal cooling channels to enhance heat dissipation outcomes of this research contribute to the advancement of injection molding technology by providing insights into the best practices for mold design and fabrication. The developed methodologies and findings can serve as valuable guidelines for manufacturers seeking to optimize their production processes, improve product quality, and reduce production costs and reduce cycle times.

### Introduction

Injection molding is a widely used manufacturing process for plastic components, and the mold for the injection molding machine is its core element. This introduction highlights the mold's significance and key factors in design and operation. The mold shapes molten plastic into the desired form, consisting of cavity and core halves precisely machined to create the product's negative impression. Proper mold design considers geometry, materials, cooling systems, and gate placement to ensure smooth filling and minimal defects. Material selection involves using steel or aluminum to withstand high pressures and temperatures. Different mold types accommodate varying production needs, from single-cavity molds for low volume to multi-cavity and family molds for higher output. Regular maintenance and innovative technologies, such as CAD/CAM, contribute to enhancing mold performance and prolonging its lifespan, enabling the production of highquality plastic products efficiently. Aims and objectives To design and manufacture the PVC drainage cover die.

For making of PVC pipe holding clip die will be designed by first we have to know the peak pressure and temperature of the injection molding machine on the basis of temperature and pressure the material

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

selection will be done by testing all calculation in Ansys software so that in result all the percentages and composition of materials will be clarified with precautions.      Historical Background

Die is believed to have had its humble birth sometime during the middle of the 19th century. According to records, the first die equipment was invented in 1838 with the sole purpose of manufacturing parts for the moveable type machines responsible for the printing industry. Now a day the die is installed in the injection molding machine so that that speeds up the process and no man power is used during this process.

## Design Components

The design components of an injection molding machine mold can vary depending on the specific requirements of the product being manufactured. However, here are some essential design components commonly found in injection molding machine molds:

### Cavity and Core:

These are the main components that form the shape of the final product. The cavity is the female part of the mold, and the core is the male part. When the mold is closed, the cavity and core come together to create the desired shape of the product.

### Runner System:

The runner system is responsible for guiding the molten plastic from the injection nozzle into the cavities. It consists of channels and gates that distribute the plastic evenly to each cavity.

### Gating System:

The gating system includes the sprue, runners, and gates that direct the flow of molten plastic from the injection machine nozzle to the cavity. The design of the gating system affects the flow, cooling, and quality of the molded part.

### Ejector System:

The ejector system is used to push the finished part out of the mold after it has cooled and solidified. It typically consists of ejector pins or plates that move the part away from the core.

### Cooling System:

Efficient cooling is crucial in the injection molding process to ensure proper solidification and minimize cycle time. Cooling channels are incorporated into the mold to remove heat from the molten plastic and the mold itself.      Venting System:

To prevent air traps and ensure complete filling of the mold, vents are included in the design. These vents allow air and gases to escape during the injection process.

### Guiding and Alignment Mechanisms:

These components ensure precise alignment and proper closure of the mold during the injection process. They help maintain the correct position of the cavity and core.

### Ejector Pin Retainers:

These components hold the ejector pins in place during the molding process and allow for easy replacement if needed.      Sprue Puller System:

The sprue puller is a mechanical device that helps to separate the sprue (the excess material connected to the runners) from the molded part.

### Heating System:

Some molds, especially for certain types of materials, may include a heating system to aid in maintaining proper mold temperature and optimize the molding process.

### Mold Base:

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

The mold base is the main structural support for all the components and provides the interface to the injection molding machine.

## Ventilation System:

The ventilation system allows for proper air circulation during cooling and can also aid in exhaust management.

## Overflows and Parting Lines:

These are essential features in the mold design that account for material shrinkage during cooling and enable easy removal of the finished part from the mold.

## Methodology

### Theoretical Studies

Acquiring dimensions-The dimensions of the existing die were acquired by manually by measuring with a scale and Vernier scale. Also, more accurate dimensions were acquired by scanning with a CMM at Accurate.

### Experimental Setup

Creating a CAD model of existing die - By using the dimensions we obtained we could create a CAD model using software like CATIA, Creo, Solid Works, etc.

If the product is scanned by a CMM we would obtain a CMM data sheet which contains the coordinate points plotted in a 3D plane with the help of a computer integrated software like Arco software or other assistant software. By using laser scanner, we could directly generate a 3D CAD model of the product as it is scanned.

### Material Selection for die

A suitable material is selected under the guidance of guide, research papers and support from a local injection company. The below comparison helps us to select the material for die based upon our requirements. As per our requirement.

### Design of CAD model for new product

A design of product is modeled using a modelling software such as CATIA using the constraints obtained after measuring the dimensions of existing die and molding machine.

RESEARCH PAPERS Practical applications of taguchi method for optimization of processing parameters for plastic injection molding: a retrospective review NgChina Fei,Nik Mizamzul Mehat, Shahrul (2013)

This paper presents a review of research in the optimization of processing parameters for injection moulding. A number of research works based on standalone Taguchi method and the integration of Taguchi method with various approaches, including numerical simulation, grey relational analysis (GRA), principal component analysis (PCA), artificial neural network (ANN), and genetic algorithm (GA), have been discussed. In a volatile and fiercely competitive global market, the practice of the trial-and-error approach which relies heavily on the experience of the moulding personnel is no longer sufficient to meet the challenges of globalization especially at the point where the disadvantages outweigh its advantages. (1)

Productivity enhancement in dies and molds manufacturing by the use of C1 tool path M Boujelbene, A Moisan, N Tounsi, B Brenier (2004)

The challenge of die and mold milling is to achieve the specified dimensional and geometrical accuracy, and improve the surface roughness, in order to minimize polishing operations, still necessary to meet the tight tolerances required by the automotive industry and the plastic injection sector. Surface finish analysis given by 3D measurements and data processing techniques shows that microgeometrical defects generated by C1 continuous tool path are definitely less serious than those obtained by classical tool

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

paths driven via linear interpolation. Also, polishing time saving is more than 30%. Thus, a substantial productivity enhancement is achieved in dies and molds manufacturing. (3)

Modern machining of die and mold tools. J mater process technol

Krajanik P, Kopac J (2004)

Modern production of die and mold tools is quite different in comparison with conventional machining. The basic theory of cutting process and cutting geometry is similar, but the techniques and technology is quite different. High-speed cutting (HSC) principles are not applicable with conventional machinetools. Difference between conventional and high-speed cutting velocity is analyzed on chip formation. The comparison between EDM and HSM has been made and shows great HSC benefits. Usage of modern software (CAM) optimizes tool production and helps us to save unnecessary additional machining time and costs. (4)

Investigating the cutting phenomena in free-form milling using a ball-end cutting tool for die and mold manufacturing

Adriano Fagali de Souza, Anselmo Eduardo Diniz, Alessandro Roger Rodrigues & Reginaldo Teixeira Coelho

(2014)

This paper presents an investigation of no planar tool-work piece interactions in free-form milling using a ballend cutting tool, a technique that is widely applied in the manufacturing of dies and molds. The influence of the cutting speed on the cutting forces, surface quality of the work piece, and chip formation was evaluated by considering the specific alterations of the contact between tool-surface along the cutting time. The experimental results demonstrated the negative effect of the engagement of the tool tip into the cut on machining performance. The length of this engagement depends on the tool and work piece curvature radii and stock material. When the tool tip center is in the cut region, the material is removed by shearing together with plastic deformation. Such conditions increase the cutting force and surface roughness and lead to an unstable machining process, what was also confirmed by the chips collected. (5)

Application of Taguchi method in the optimization of injection molding parameters for manufacturing products from plastic blend S. Kamaruddin, Zahid A. Khan and S. H. Foong (2010)

This paper presents a study in which an attempt has been made to improve the quality characteristic (shrinkage) of an injection molding product (plastic tray) made from blends plastic (75% polypropylene (PP) and 25% low density polyethylene (LDPE)) by optimizing the injection molding parameters using the Taguchi method. The analysis of the results shows that the optimal combination for low shrinkage are low melting temperature, high injection pressure, low holding pressure, long holding time and long cooling time. Using Taguchi method for design of experiment (DOE), other significant effects such as interaction among injection molding parameters are also investigated. (6)

A CAD/CAE-integrated injection mold design system for plastic products

Ivan Matin, Miodrag Hadzistevic, Janko Hodolic, Djordje Vukelic & Dejan Lukic (2012)

Mold design is a knowledge-intensive process. This paper describes a knowledge-based oriented, parametric, modular and feature-based integrated computer-aided design/computer-aided engineering (CAD/CAE) system for mold design. Development of CAx systems for numerical simulation of plastic injection molding and mold design has opened new possibilities of product analysis during the mold design. The proposed system integrates Pro/ENGINEER system with the specially developed module for the calculation of injection molding parameters, mold design, and selection of mold elements. The system interface uses parametric and CAD/CAE feature-based database to streamline the process of design, editing, and reviewing. Also presented are general structure and part of output results from the proposed CAD/CAEintegrated injection mold designs. (7)

Shear viscosity measurements of polymer melts using injection molding machine with adjustable slit die Johanna Aho Seppo Syrjala (2011)

Rheological properties of polymer melts were studied using a slit die attached to an injection molding machine. The die has three exchangeable inserts to set the slit height to 0.75, 1.0, or 1.5 mm. The modular design eases the die cleaning, and measurements with variable slit heights enable the detection of possible wall slip. This suggests that a simple slit die construction can be used as an inexpensive rheometer to measure rheological properties of polymer melts for processing purposes. The thermomechanical history of the investigated melt in the in-line slit die experiments resembles that in actual melt processing and, therefore, determination of rheological properties under true processing conditions is possible. (8)

Quality monitoring of micro-shrinkage defects in thick-walled injection molded components

Jian-Yu Chena Jia-Xiang Zhuangb Ming-Shyan Huangb (2019)

Sink mark defects are commonly observed in thick-walled injection molded components as a result of underpacking in the hot-spot areas and an insufficient compensation of the polymer melt as the plastic begins to cool. These defects degrade the surface quality of the molded parts and are a reliable indicator of excessive volume shrinkage during the molding process. The experimental results obtained under various values of the holding pressure show that the five injection molding process quality indexes are all highly correlated with the microshrinkage. The correlation is particularly strong for the pressure-based quality indexes and hence, it is suggested that these indexes provide a viable means of predicting the formation of sink mark defects and excessive microshrinkage in thick-walled injection molded component. (9)

A framework for analyzing energy efficient injection-molding die design

J. Mattis; P. Sheng; W. DiScipio; K. Leong (1996)

Significant part of the development of electronics products is the design of injection molded thermoplastic parts ranging from chassis panels and enclosures (to connectors). While much effort has been spent on analyzing the end-of-life issues associated with thermoplastic parts, such as disassembly, separation, and recycling, a primary driver for design-for-environment of plastic parts is the energy expended in the forming process. As well as process parameters selection on the process energy efficiency through a framework that integrates a 3-d solid modeling environment, numerical analysis of the filling and poatfilling behavior, and an energy-based process model. The process model that is presented describes the modes of energy utilization in injection molding processes as they relate to design-for-environment concerns. Case studies are performed on a center-gated plastic disk, and a small plastic enclosure to illustrate the use of this framework (10)

Determination of process parameters based on cavity pressure characteristics to enhance quality uniformity in injection molding

Jian-Yu Chena Ping-Han Hung b Ming-Shyan Huangb (2021)

An appropriate choice of the process parameters is essential to ensure the precision and uniformity of the molded parts. The flow length-to-wall thickness ( $l/t$ ) ratio for most molded components lies in the range of 100-200. For higher values of the  $l/t$  ratio, the flow resistance increases dramatically at the end of the molded part and the injection pressure propagates less easily through the mold cavity. Consequently, the geometric dimensions of the molded parts in the near-gate region are frequently different from those in the far-from-gate region as well as resulting in lower uniformity molded components with a large  $l/t$  ratio, the  $v/p$  switchover point should be determined based on the quality requirement for the part in the far-from-gate region in order to avoid insufficient (11)

### DESIGN AND FABRICATION

List of Components

- Ejector pin
- Ejector retaining plate

- Ejector plate
- Mold core
- Ejector box
- Support plate
- Guiding pins
- Locating ring
- Springs
- Clamping plates (fixed plate)
- Cooling channels

#### **Components Detail Ejector Pin**

Ejector pins are vital in creating parts. They are an integral component of the ejection system in mold, which determines the final outcome of products in an injection molding process. Injection molding is a manufacturing process that involves injecting molten plastic in a metal mold to assume the shape of the mold.

#### **Ejector Pin 3D Model**



*Figure 3: Ejector Pin 3D Model*

#### **Ejector Retaining Plate**

An ejector retainer plate holds the heads of ejector pins in place. The main function of this plate is to lock the heads of the pins so they don't come out during the injection molding process. The ejector bar plate has almost the same role as an ejector retainer plate **Ejector Retaining Plate 3D Model**



*Figure 5: Ejector Retaining Plate 3D Model*

#### **Ejector Plate**

In an ejection system in mold, ejector plates function alongside the ejector pins. It holds the head of the pins to prevent them from coming out during the ejector pins injection molding process.



### Ejector Plate 3D Model



Figure 7:

*Ejector Plate 3D Model*

### Mold Core

The Mold Core & Cavity are the shaped sections in either half of the mold tool which give the plastic product its final shape. The hot molten material is injected into the core & cavity and then sets hard into shape. The design of the core & cavity is essential in the correct formation of the product.

### Mold Core 3D Model



Figure 9: Mold core 3D Model

### Support Plate

The backup plate or support plate is used to support the cavity plate, attach the hole for the return pin's spring, and cooling channel when in cavity plate cannot make it.

### Support Plate 3D Model



Figure10: Support Plate 3D Model

### Guiding pins

Guide pins are cylindrical rods used in an assembly to align components. The mechanical fastener may help ensure stability, limit contact damage, and maintain precise positioning

### Guiding Pin 3D Model

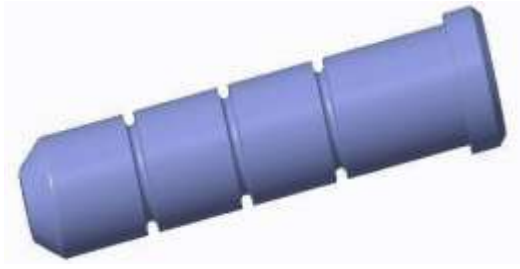


Figure 13: Guiding Pin 3D Model

### Locating Ring

A locating ring is a circular member fitted on to the front face of the mold over the sprue bush. Its purpose is to register (or locate) the mold in the correct position on the injection machine, to ensure proper alignment between the nozzle and the sprue bush, thereby eliminating leakage



Figure 15: Locating Ring 3D Model

### Spacer Block

Spacer Block is mounted between the movable clamping plate and the movable cavity plate to give space and allow the ejector plate to move when ejecting the part.

### Spacer Block 3D Model



Figure 17: Spacer Block 3D Model

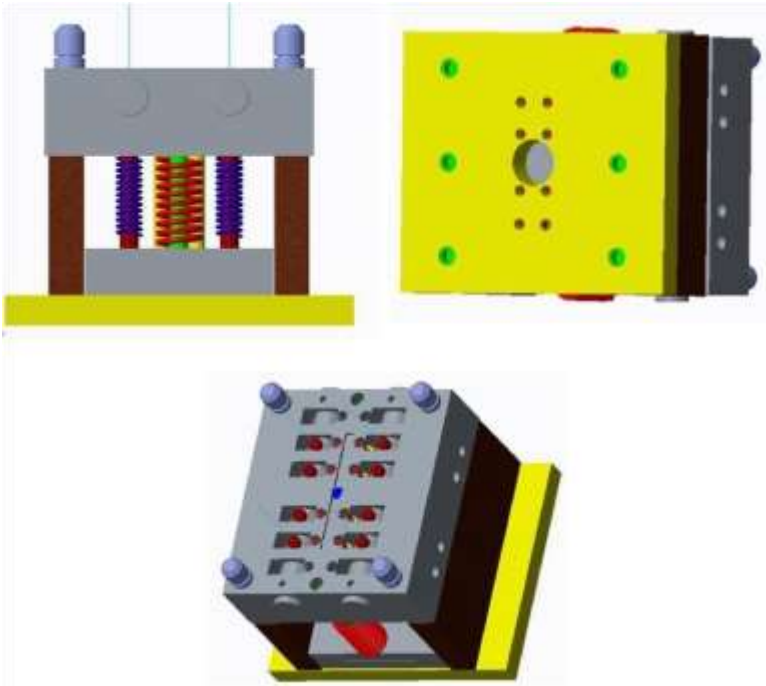
### Springs

A spring is a device consisting of an elastic but largely rigid material (typically metal) bent or molded into a form (especially a coil) that can return into shape after being compressed or extended. The most common use of springs in an injection mold is to retract the ejector plates. **Springs 3D Model**



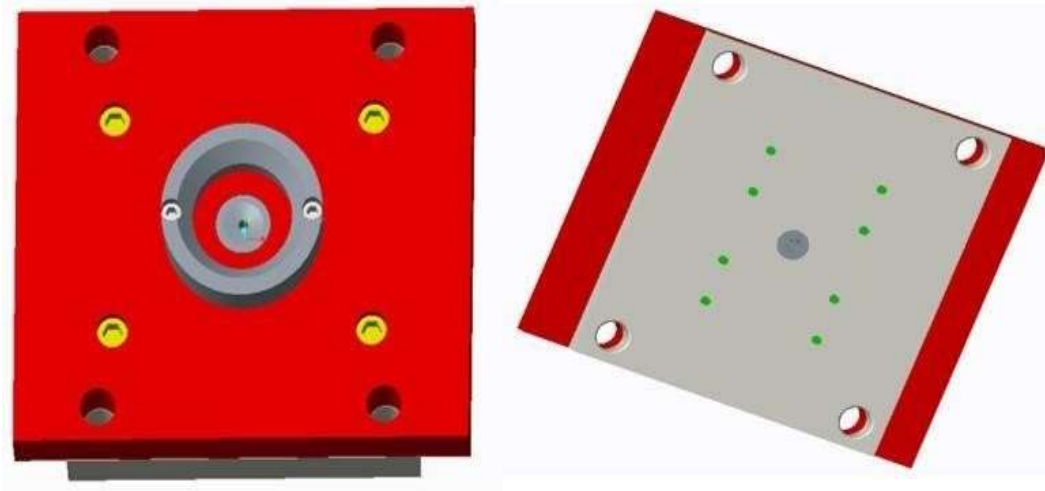
*Figure 18: Springs 3D Model*

**Cavity Unit Assembly CAD Model**



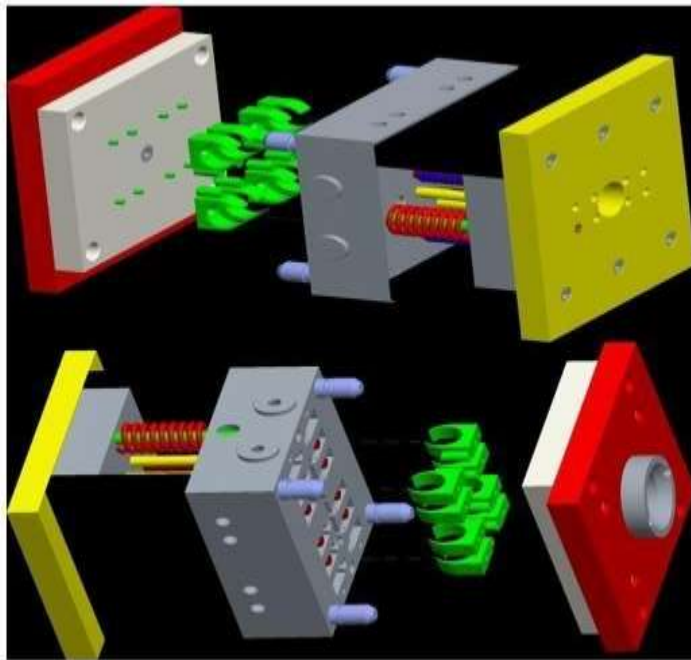
*Figure 20: Moving Unit Assembly CAD Model*

**Fixed Plate Unit Assembly**



*Figure 21: Fixed Plate Unit*

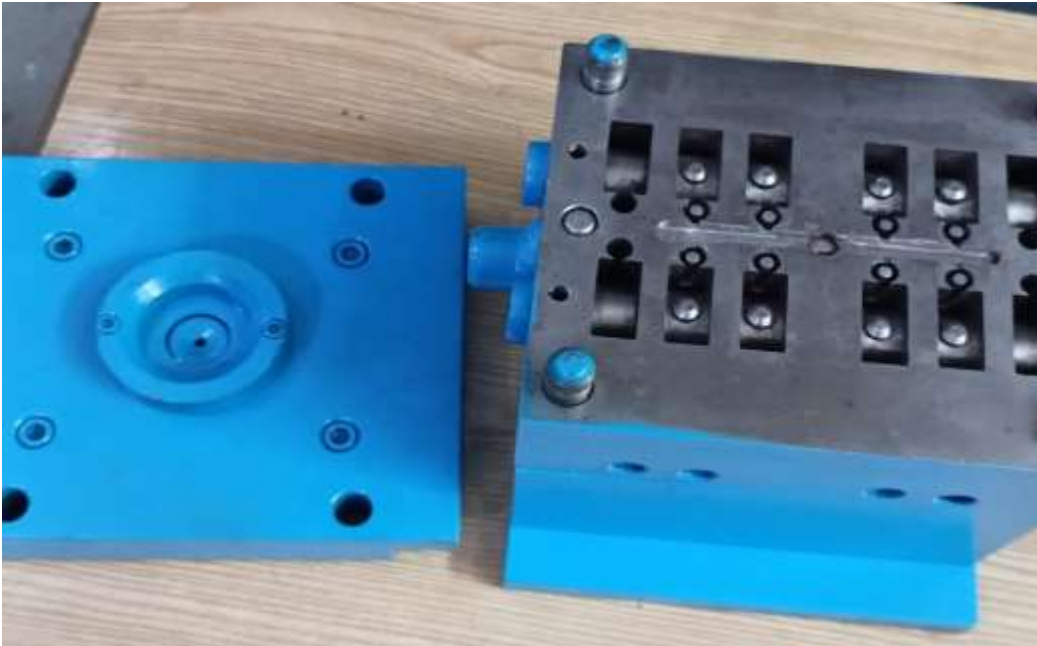
**Final Die Assembly CAD Model**



*Figure 22: Final Assembly CAD Model*

**RESULTS**

**MANUFACTURED DIE**



**EXPERIMENTATION OF MANUFACTURED DIE WHEN INSTALLED IN  
INJECTION MOLDING MACHINE**



product 1





PRODUCT AFTER EXPERIMENTATION OF DIE PVC PIPE CLIPS



## Conclusion & Future Recommendation

### Future Recommendations

#### Industry 4.0 Integration:

Injection molding machines and molds may become more interconnected with Industry 4.0 technologies, enabling real-time data collection, process optimization, and predictive maintenance to enhance productivity and reduce downtime.

#### Sustainable Molding Solutions:

As sustainability becomes a more prominent concern, there might be a push towards eco-friendly molding processes and biodegradable or recycled plastics, leading to greener plastic products.

#### Precision and Micro-Molding:

The demand for smaller and more intricate plastic parts may drive the development of precision and micro molding technologies, requiring highly specialized molds and machines.

#### Multi-Material and Hybrid Molding:

Advancements in multi-material injection molding and hybrid molding techniques may lead to the production of more complex and functional plastic products, requiring molds capable of handling multiple materials.



### **Additive Manufacturing for Molds:**

The adoption of additive manufacturing for mold-making could enable more design flexibility, faster prototyping, and cost-effective production of custom molds.

### **Smart and Functional Plastic Products:**

Future plastic products may incorporate smart functionalities, such as sensors, actuators, and communication capabilities, opening up new applications and markets.

### **Improved Part Quality and Consistency:**

Continuous advancements in mold design, process control, and material technology could result in higher part quality, tighter tolerances, and greater consistency across production runs.

### **Reduced Waste and Energy Consumption:**

Innovations in injection molding processes and mold designs may help reduce material waste and energy consumption, contributing to a more sustainable and efficient manufacturing industry.

### **Advanced Mold Materials:**

Advancements in materials science may lead to the development of new mold materials with improved durability, thermal conductivity, and wear resistance. These materials could result in longer mold lifetimes and better part quality.

### **Innovative Cooling Solutions:**

Further research into conformal cooling, advanced cooling channel designs, and the integration of cooling technologies like micro-fluidics could significantly reduce cycle times and improve part quality.

### **Conclusion**

#### **Quality Assurance:**

A well-designed and precisely engineered injection machine mold is essential for ensuring high-quality plastic parts. Proper mold design, material selection, and fabrication techniques contribute to achieving consistent and accurate part dimensions and surface finishes.

#### **Productivity and Efficiency:**

Optimal mold design and efficient cooling systems can significantly reduce cycle times, resulting in increased productivity and cost savings. Mold designs with advanced cooling solutions, such as conformal cooling, can enhance heat dissipation and shorten the overall production time.

#### **Versatility and Complexity:**

Modern injection machine molds are increasingly capable of handling complex geometries, multi materials, and over-molding processes. This adaptability opens up opportunities for producing diverse and innovative plastic products.

#### **Sustainability:**

Emphasis on sustainable manufacturing practices has led to the development of eco-friendly mold materials and processes. Sustainable molds contribute to reduced waste generation and energy consumption, aligning with environmental goals.

#### **Integration and Automation:**

Injection machine molds are becoming more integrated with Industry 4.0 technologies, enabling real time monitoring, data analytics, and predictive maintenance. Increased automation in mold handling and setup enhances operational efficiency and reduces human errors.

### **Precision and Miniaturization:**

Advancements in mold-making technologies support precision molding and micro-molding, catering to the demand for smaller, intricate plastic components used in various industries, including medical and electronics.

### **Customization and Rapid Prototyping:**

Additive manufacturing (3D printing) is increasingly utilized for mold prototyping, offering faster iterations and customization options. This capability accelerates the product development cycle and facilitates the testing of various design iterations.

### **Continuous Innovation:**

The injection machine mold industry continues to evolve, driven by ongoing research, material advancements, and customer requirements. Mold designers and manufacturers must remain open to innovation and adopt new techniques to stay competitive in the market.

### **Low Production Cost**

Scrap material is used for the production of plastic parts that reduces production cost.

In conclusion, the injection machine mold serves as the backbone of the injection molding process, impacting the quality, productivity, and versatility of plastic product manufacturing. By embracing technological advancements, sustainable practices, and innovative designs, the injection machine mold industry will continue to shape the future of manufacturing, contributing to the development of efficient, high-quality, and environmentally conscious plastic products.

### **Safety Precautions**

- **Personal Protective Equipment (PPE):** Wear appropriate PPE, such as safety glasses or goggles, face shields, gloves, and protective clothing, to protect against potential hazards like molten plastic, flying debris, or chemical exposure.
- **Machine Safety:** Familiarize yourself with the specific safety features and procedures of the injection machine. Ensure that emergency stop buttons, safety interlocks, and guards are in place and functioning correctly. Follow lockout/tagout procedures when performing maintenance or servicing the machine. **Training and Knowledge:** Receive proper training on the operation, maintenance, and safety procedures of injection machine molds. Understand the potential risks and hazards associated with the process, as well as the safe handling of materials, tools, and equipment.
- **Material Handling:** Handle plastic resins and additives safely. Follow proper storage and handling guidelines to prevent exposure to hazardous chemicals or substances. Be aware of the potential for fires or explosions in case of mishandling or overheating of materials.
- **Mold Inspection:** Regularly inspect the injection machine mold for any signs of damage, wear, or defects. Replace or repair any damaged parts promptly to avoid potential hazards during operation. **Tool and Equipment Safety:** Use tools and equipment properly and safely. Ensure that they are in good working condition and appropriate for the task at hand. Avoid using damaged or malfunctioning tools and equipment.
- **Heating and Cooling Systems:** Take precautions when dealing with the heating and cooling systems of the injection machine mold. Follow the manufacturer's guidelines for proper temperature control, and be cautious of hot surfaces or fluids to avoid burns or scalds.
- **Housekeeping:** Maintain a clean and organized work area to minimize tripping hazards and prevent clutter around the injection machine. Clean up any spills or debris promptly to maintain a safe working environment.
- **Ventilation:** Ensure adequate ventilation in the work area to prevent the accumulation of fumes or gases that may be released during the injection molding process.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- Emergency Preparedness: Know the location and proper use of emergency equipment, such as fire extinguishers and first aid kits. Be familiar with emergency procedures and evacuation routes.

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October 13-14, 2023

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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October 13-14, 2023

## DESIGN AND FABRICATION OF ELECTROMAGNETIC BRAKING SYSTEM

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### ABSTRACT

With the Continues increment in road accident due to inefficient brakes the advantages of conventional brake appear. Faster response and robust braking system in a safer mode are important factor of concentration of automobile this paper describe the electromagnetic braking system as a replacement for the conventional brakes that provides vigorous response in an emergency situation. Energy resources are diminishing and thus, the use of electric system and hybrid system are increasing. Hydraulic also use fuel and oil for their proper functioning and require fuel change from time to time. Drum brakes and the other hand cause wear and tear and increasing friction losses etc. Electromagnetic braking system completely relies of electric and magnetic power to stops wheels' rotation or to move part s of the braking system. this paper provides electromagnetic braking system analysis in comparison with other conventional system using experimentation model and also the parametric analysis for electromagnetic braking system. The focus of the system is to increase the safety of the vehicle drive , reduce wear and tear , reduce braking time , and braking distance to lowest possible value

### Background:

In Pakistan, vehicles produced locally are not certified to meet the same standards as those made by international companies, or the vehicles imported from the parent countries like Europe, America, South-East Asia, and South America. The main cause of these safety hazards is the local productivity of vehicles due to the least availability of resources and vehicles. Though Advanced Braking Models are now used in most cars still accident rate is increasing day by day due to Braking Failure. For instance, Suzuki produces 5-star models for Europe and South Africa, but it is still producing 0-model cars locally having failed braking system [1].

Every year 9% of accidents are caused due to brake failure in Pakistan. This is also because of the road conditions and the conventional Braking System used in vehicles. Braking Failure means the leakage occurs due to the damaged seals to the cylinder which is a common failure in Hydraulic Brakes. Brake Pedals worn out and breaking down of Fluid is the serious cause of accidents. Due to extreme weather conditions, brakes could overheat due to friction which results in low brake efficiency. To overcome this fatality rate Electromagnetic Braking System, hope to reduce this death rate and improve the efficiency of the vehicles [2].



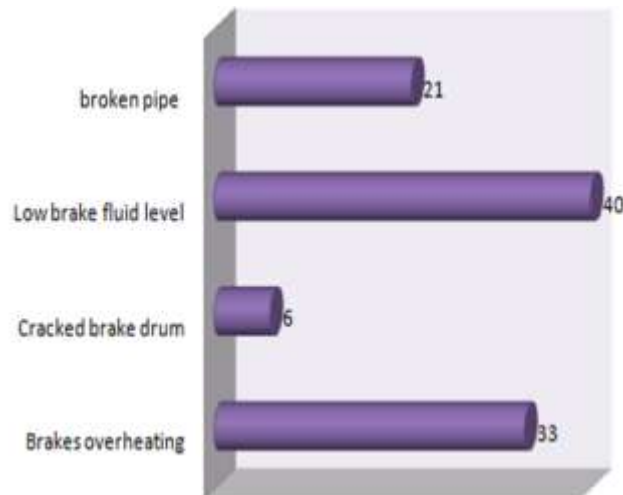


Figure 1.1: Common Brake Failure Statistics [3]

#### Electromagnetic Braking System:

##### History:

The electromagnetic Braking System was first invented by Granville Tailer Woods in 1887. They were specifically designed to be used for Trains but later used in other systems in conjunction with conventional brakes i.e., Hydraulic Brakes, Disc Brakes, and Drum Brakes. They were first termed electro-mechanical brakes which later changed to electromagnetic brakes because of their working principle [3].

##### Working Mechanism:

The electromagnetic Braking System works on the principle of change in energy(kinetic) into thermal. As the brake is applied, they exert a magnetic force on the disc and stops the vehicle in a record short time regardless of the vehicle's speed [3].

Although it has electric actuation, the torque is mechanically transmitted by an electromagnetic brake system. As the coil is ignited when the brake receives voltage or current, this process creates a magnetic field. As a magnetic field is produced, the coil becomes an electro-magnet which produces magnetic flux. The armature is drawn to the magnetic flux. The hub and armature are normally attached where the rotating shaft is. The shaft stops as the coil interacts with the hub and armature [3].

The armature can then turn with the shaft once the brake no longer receives current. When power is released from these types of brakes, armature gets in distance from the braking surface by the spring generating a small air gap [3].

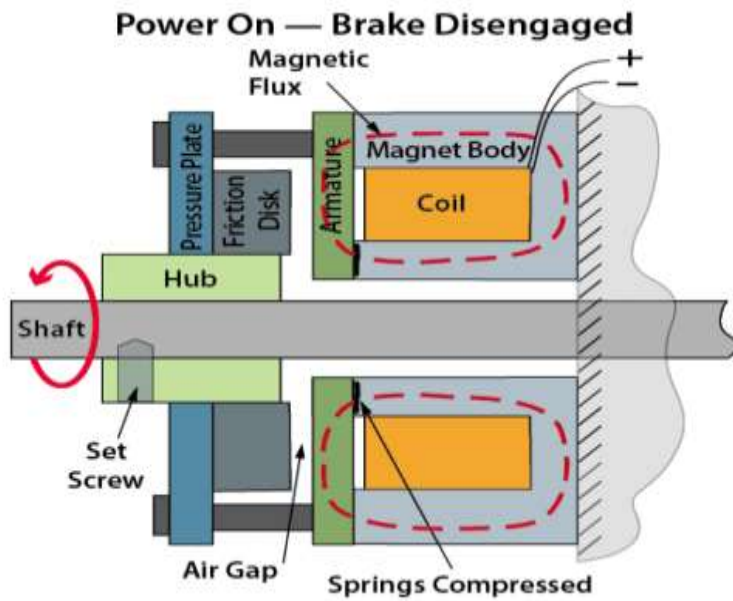


Figure 1.2: Electromagnetic Braking System (Brake Disengaged) [4]

Eddy current brakes to stop a vehicle, depend upon the strength of opposing fields, whereas electromagnetic brakes employ magnetic fields which cause the lever to get against the rotating shaft which finally stops the vehicle. These types of brakes depend upon eddy currents which are made when a conductor goes through the field, as the name infers. The conductor at that point creates its field, which response with the first field to stop the conductor. Electromagnets are used instead of permanent magnets in eddy current brakes because the magnetic field's power can be better regulated by electricity [3].

The system has fewer moving components than an electromagnetic brake since it depends on an attractive field to work as a brake. As a result, this lasts longer. Eddy current brakes are commonly employed to provide varying resistance levels in crisis shutoffs, high-velocity trains, and event congregation attractions, as well as in workout equipment [3].

Types of Electromagnetic Braking System:

With the increasing use of the electromagnetic brakes, it has now evolved into many shapes and got transformations. The major types of electromagnetic braking systems are:

*Single Face Brake:*

This brake uses a single plate surface's contact to retain the clutch's input and an output member. Electromagnetic brakes with a single face account for roughly 80% of all power applied braking applications [5].

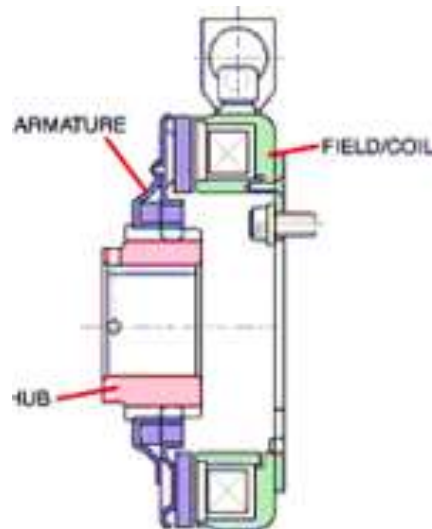


Figure 1.3: Single Face Brake [6]

*Power Off Brake:*

When electrical power is mistakenly or purposely withdrawn, power-off brakes halt or hold a load. They're usually found near or on an electric motor. To boost torque without expanding the brake's diameter, they may use numerous discs. Power-off brakes are divided into two categories [5].

There are spring-applied brakes, for starters. A spring pulls on a pressure plate in the absence of electricity, retaining the disc(friction) between the internal tension plate and the external cover plate. The made friction is passed on to the center point, which is appended to a shaft. Since this style of brake has a ton of blowbacks, it's best for less exact applications where reaction time isn't basic [5].

The super durable magnet brake is the second kind of force-off brake. Magnets(permanent) are used to attract the armature via springs of this type. The super durable magnets produce lines of attractive motion when the brake is applied, which may draw in the armature to the brake lodging. To disconnect the brake and create an air gap, power is provided to the coil, which creates an opposing field that counteracts the super durable magnets' attractive motion. As this form of electro-magnetic brake has no drawback it is more suited to applications requiring exact halting, for example, security highlights. At the point when there is no backfire, the brake will stop promptly when it is applied [5].

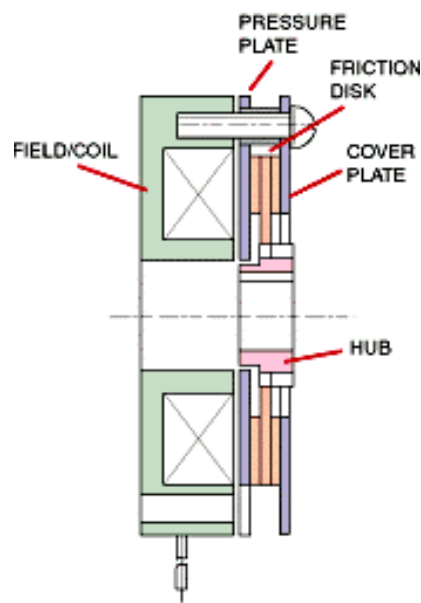


Figure 1.4: Power off Brake [7]

*Particle Brake:*

The operating torque range of magnetic particle brakes is quite broad. Torque can be adjusted extremely precisely with a magnetic particle brake. These machines are appropriate for pressure control applications such as wire winding, foil, film, and tape tensioning. They can likewise be utilized in high-cycle applications like magnetic cards, arranging machines, and naming hardware because of their quick response. A powder chamber with magnetic particles is used in this electromagnetic brake. The following transition attempts to tie the particles together when power is applied to the curl, bringing about an attractive molecule slush. As the electrical level ascents, the particles' holding develops further. The brake rotor goes through these ensnared particles, making a resistive power that eases back and, in the end, stops the result shaft [5].

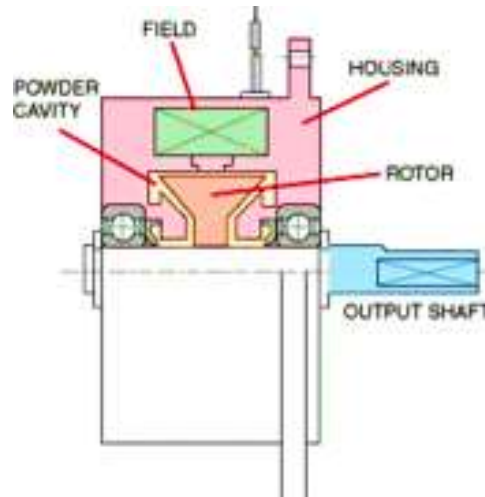


Figure 1.5: Particle Brake [7]

*Hysteresis Power Brake:*

The torque range of electrical hysteresis units is quite large. They are valuable for test stand applications requiring changing force since they can be controlled remotely. Since the drag force is low, these brakes have a wide force range. At the point when power is applied to a field, an inward attractive transition is made, which is along these lines moved to a hysteresis disc. A diligent drag or ultimate stopping of the output shaft is caused by an attractive drag on the hysteresis disc. Once the power is removed, the hysteresis plate is allowed to turn, and no general power is passed on between the two individuals. The main force that exists between the info and result is bearing drag [5]

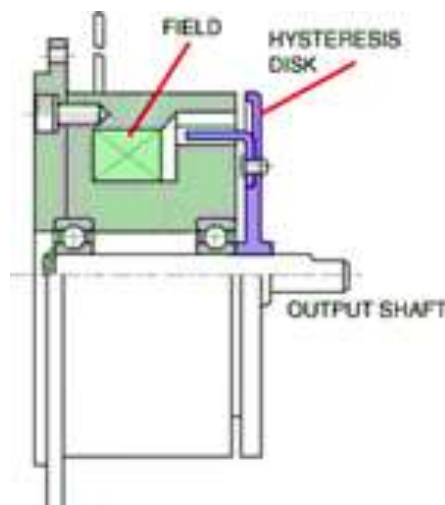


Figure 1.6: Hysteresis Brake [7]

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October 13-14, 2023**

Problem Statement:

Heat Dissipation and Wear and Tear are the main causes every year most conventional braking system fails. This causes a lot of maintenance. To overcome the pre-mentioned problems and induce longevity to the brakes, electromagnetic brakes are a reasonable option.

Aim:

Selection and Usage of suitable Electromagnetic Braking System in an automobile to reduce wear and tear, braking time & braking distance.

Objectives:

Following are the main objectives of the designed project:

1. To Develop Prototype of Electromagnetic Braking System for Automobile applications for experimental analysis of braking time and braking distance.
2. To analyze and compare the performance parameters of Electromagnetic Braking System with conventional system.

Components

The following are the main components of the Electromagnetic Braking System

Driving Unit

The purpose of the Driving Unit is to provide the power source for the complete system of the Electromagnetic Braking Unit. It comprises the following parts and components:

1. Electric Motor
2. Power Control
3. Wheel System
4. Battery
5. Springs
6. Bearings

Braking Unit

It is the main part of the system. It decided the functioning of the braking mechanism.

1. Electromagnet
2. Braking Coil

Adopted Brake System

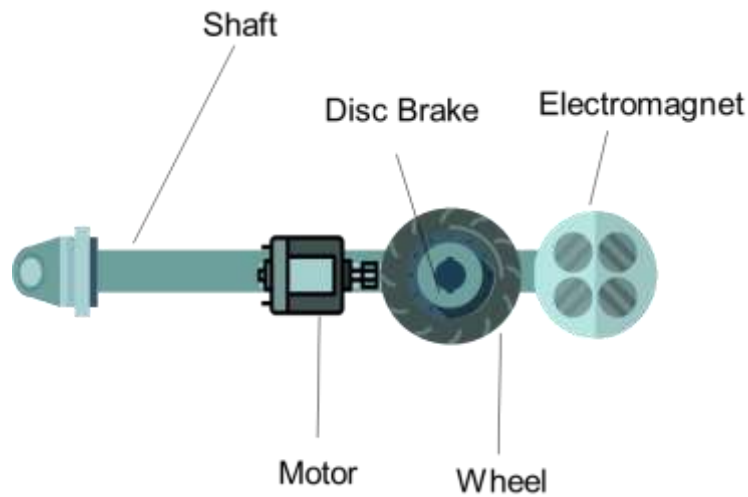


Figure 3.7: Proposed Design

This design is modified, based on following considerations:

- Magnetic Intensity increases the eddy currents which helps to shorten the stop time.
- On the RPM side, the plate is installed to reduce power consumption so that comparatively smaller magnets will be used.
- The wheel is on the Torque side to divide the power transmission and to minimize magnetization.



Figure 3.8: Assembly Drawing of EMB system [18]

- This design is selected and then modified to meet the requirements of the Final Fabricated Electromagnetic Braking System Model. The proposed design is presented as the following

Mathematical Modelling Equations

$$B = \frac{\mu_0 n i^2}{l_g}$$

(3.1)

The Braking Torque as the function of Dissipated Power and angular speed of the wheel is given as [19]:



$$T_b = \frac{P_d}{\dot{\theta}}$$

(3.2)

The dissipated power is given as the function of the following parameters of [19]:

$$P_d = \sigma R^2 S d \dot{\theta}^2 B^2$$

(3.3)

Combining (3.1), (3.2) and (3.3) The resultant is the Braking Torque as the function of the required parameters of [19]:

$$T_b = \frac{\sigma R^2 S d \dot{\theta} \mu_0 n i^2}{l_g}$$

(3.4)

To determine Braking Torque independently, it is evident that it can be found by using Braking Force applied and the effective disc radius of the braking system.

$$T_b = F_b \cdot r_e$$

(3.5)

To extract the Braking Force, to get the alternative formula for Braking Torque the following mathematical equation is used:

$$KE = \frac{1}{2} m v^2$$

$$\text{Braking energy} = F_b \cdot \text{Braking Distance}$$

$$\text{Braking Distance} = \frac{\frac{1}{2} m v^2}{\text{Braking Force}}$$

(3.6)

The Braking Torque in terms of Braking Distance can thus be found by the following equation. This can further help us to determine the relationship between the Braking Torque and Braking Distance.

$$T_b = \frac{\frac{1}{2} m v^2}{\text{Braking Force}} \cdot r_e$$

(3.7)

By comparing (3.7) and (3.4):

$$\text{Braking Distance} = \frac{\frac{1}{2} m v^2}{\frac{\sigma R^2 S d \dot{\theta} \mu_0 n i^2}{l_g}} \cdot r_e$$

(3.8)

Also braking torque is given by

$$T_b = \frac{F \cdot D}{2 \cdot R_e} [6]$$

(3.9)

By Newton's second law

$$F = \frac{mv}{t}$$

(3.10)

Putting value of from (3.10) in (3.9)

$$T_b = \frac{m.v.D}{2.Re.t}$$

(3.11)

By comparing (3.4) & (3.11)

$$\frac{\sigma R^2 S d \hat{\theta} \mu_o n i^2}{l_g} = \frac{m.v.D}{2.Re.t}$$

(3.12)

By rearranging

$$t = \frac{\frac{m.v.D}{2.Re}}{\frac{\sigma R^2 S d \hat{\theta} \mu_o n i^2}{l_g}}$$

(3.13)

$$\text{Braking Time} = \frac{\frac{m.v.D}{2.Re}}{\frac{\sigma R^2 S d \hat{\theta} \mu_o n i^2}{l_g}}$$

Final Experimental Model



**Experimentation**

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**October 13-14, 2023**

Experimentation is carried out manually on the fabricated model. A stopwatch is used to record the brake time and then the Braking Distance is calculated through the Respective RPM of the wheel along with the stopping time. Conventional and Electromagnetic Braking are both recorded. Meanwhile, the RPMs of the wheel are recorded with the help of a Tachometer. The following data is obtained under the following experimentation:

Braking Time

Table 5.1: Experimental Braking Time of Electromagnet and Conventional Braking System

Serial Number	RPM	Electromagnet Braking Time (s)	Conventional Braking Time (s)	Advantage
1	550	0.11	0.13	15%
2	650	0.13	0.26	50%
3	750	0.15	0.33	55%
4	850	0.18	0.47	62%
5	1000	0.33	0.68	51%

Braking Distance

Braking Distance is calculated through the formula:

$$\text{Braking Distance} = d = \frac{\omega t}{r}$$

(5.1)

Where;

$\omega$  = angular velocity of wheel

r = radius of wheel

t = Braking Time

d = Braking Distance

Table 5.2: Experimental Data of Electromagnetic and Conventional Braking Distance

Serial Number	RPM	Electromagnet Braking Distance (m)	Conventional Braking Distance (m)	Advantage
1	550	0.23	0.27	15%
2	650	0.33	0.6	50%
3	750	0.43	0.96	55%
4	850	0.59	1.56	62%
5	1000	1.28	2.6	51%

**Results and Discussion**

**MATLAB Results**

Following are the results obtained from the MATLAB modeling of the Contactless Electromagnetic Braking System. The MATLAB modelling was done on the parameters of Air Gap, Current, Radius of Electromagnet, and Disc thickness for the Braking Time and Air Gap, Current, Number of Turns and Disc Thickness for the Braking Distance. The following behavior is recorded for these parameters as shown in Table 6.1 and then with graphs in section **Hata! Başvuru kaynağı bulunamadı..**

Table 6.1: Parametric Relations of Contactless Electromagnetic Braking Model (Braking Time and Braking Distance) using MATLAB

	<b>Parameter</b>	<b>Behavior</b>
<b>Braking Time</b>	Air Gap	Direct or increasing
	Radius of Electromagnet	Inverse or decreasing
	Current	Inverse or decreasing
	Disc Thickness	Inverse or decreasing
<b>Braking Distance</b>	Air Gap	Direct or increasing
	Number of Turns	Logarithmic Decrease
	Current	Inverse or decreasing
	Disc Thickness	Inverse or decreasing

**CONCLUSION**

This report presented the performance of an electromagnetic braking system which includes various components with efficient methodologies to utilize the supplied energy. The electromagnetic braking system depends upon the various parameters that affect the braking torque and braking distance of the system which results depicted the efficiency of the EMB. With the application of the effective and strong electromagnet, we can have a greater efficient braking system. In this report, mathematical modeling was used for the parametric analysis and development of the prototype model. Air Gap, induced current, number of electromagnetic turns, and disc thickness were the major parameters that majorly affected the braking torque and RPM reduction of an automobile. The electromagnetic braking system was found to be reliable with the advantage of about **46.6%** over the conventional system and proved to be efficient. However, the percentage difference observed of about 51% in braking time and 52.1% in braking distance. The braking time and braking distance were calculated at various RPMs of the vehicle and compared with the hydraulic wire type conventional braking system. It was shown in Table 6.2 that the electromagnetic braking system was efficient and had less wear and tear and maintenance requirements. Also, the braking time and braking system parameters proved to be best performing in the case of the electromagnetic braking system.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## DIABETES MELLITUS-CHRONIC DISEASE

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### ABSTRACT

Diabetes mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels, affecting millions of individuals worldwide. Its multifaceted pathophysiology and propensity for complications make its management a critical priority in healthcare. This abstract provides an overview of comprehensive risk factor management in diabetes, highlighting the key strategies to reduce complications and improve the quality of life for individuals living with the condition. Effective diabetes management begins with strict blood glucose control, as hyperglycemia is the hallmark of the disease. Regular blood glucose monitoring, medication adherence, and insulin therapy, when necessary, are fundamental aspects of this control. However, managing diabetes goes beyond glucose levels; addressing associated risk factors is equally pivotal. Hypertension is prevalent in diabetes, contributing to cardiovascular complications. Blood pressure control through lifestyle modifications, including a low-sodium diet and exercise, is essential. Dyslipidemia, often accompanying diabetes, requires attention to maintain heart health. Dietary choices, exercise, and medication help control cholesterol levels. Obesity and physical inactivity are risk factors for type 2 diabetes and can exacerbate its complications. Weight management and regular physical activity play a crucial role in diabetes management. Smoking cessation is imperative, as smoking further elevates the risk of heart disease and stroke, conditions already heightened in diabetes. Optimal nutrition, focusing on whole grains, lean proteins, and fruits and vegetables, supports blood glucose control and reduces the risk of obesity and cardiovascular disease. Medication adherence is key, as prescribed medications, including insulin, contribute significantly to controlling blood glucose.

### INTRODUCTION

The complicated and persistent metabolic illness known as diabetes mellitus, or simply diabetes, is characterized by increased blood glucose levels. It results from the body's inability to make or use insulin, a hormone essential for controlling blood sugar, effectively. Type 1, type 2, and gestational diabetes are the three main kinds of the disease. While diabetes of the type 2 variety, the most prevalent kind, normally develops in maturity and is closely connected to lifestyle variables including obesity and a lack of movement, the first type of diabetes is autoimmune and frequently diagnosed in infancy. During pregnancy, gestational diabetes can develop [1]. Numerous consequences, such as heart disease, renal failure, nerve damage, and eye issues, can result from diabetes. Effective treatment includes medication, dietary adjustments, and, occasionally, treatment with insulin. This review article examines the epidemiology, etiology, diagnostics standards, and current therapeutic approaches for diabetes mellitus, while highlighting the condition's rising worldwide impact and the value of early intervention and prevention. Diabetic incidence has significantly increased in the past few years, becoming a significant worldwide health problem. It affects people's quality of life as well as their chance of developing coronary artery disease, cerebrovascular accident, renal disease, eyesight loss, and damaged nerves [2].

### EPIDEMIOLOGY

The past several decades has seen a sharp rise in the prevalence of diabetes, which is now a major worldwide health issue. The World Health Organization (WHO) estimates that 422 million individuals worldwide had diabetes in 2014, and that figure will likely rise. A great deal of instances of diabetes are type 2, which is closely associated with lifestyle factors such as inadequate nutrition and a lack of activity resulting in a significant public health issue [3]. Geographically, the frequency of diabetes varies, with greater rates in cities and wealthy nations. In addition, diabetes is becoming a bigger problem as the



population ages. Additionally, diabetes during pregnancy affects many pregnant women and puts both mother and child at danger. The epidemiological picture of diabetes emphasizes the significance of early detection and prevention in order to reduce its impact on individual and health systems worldwide [4].

### **ETHIOLOGY:**

Diabetes mellitus is a chronic metabolic disorder characterized by elevated levels of blood glucose (hyperglycemia) resulting from a combination of genetic and environmental factors. Its etiology is multifaceted and involves two primary forms: type 1 diabetes and type 2 diabetes. Type 1 diabetes is primarily an autoimmune disease, where the body's immune system mistakenly attacks and destroys the insulin-producing beta cells in the pancreas [5]. Genetic predisposition plays a significant role, and environmental triggers, such as viral infections, may also contribute to its development. Type 2 diabetes, the more prevalent form, typically develops in adulthood, though it can occur in children and adolescents as well. It results from a complex interplay of genetic factors and lifestyle choices, notably obesity, physical inactivity, and an unhealthy diet. In this form, the body becomes insulin resistant, meaning the cells do not respond effectively to insulin, and the pancreas struggles to produce enough insulin to maintain normal blood glucose levels. While genetics predispose some individuals to diabetes, lifestyle modifications, such as maintaining a healthy weight, engaging in regular physical activity, and adopting a balanced diet, are crucial in preventing and managing this chronic disease. Early diagnosis and appropriate medical care are essential to mitigate its complications and improve the quality of life for those affected [6,7].

### **PATHOPHYSIOLOGY:**

Diabetes mellitus, a chronic metabolic disorder, encompasses a range of pathophysiological processes that ultimately lead to elevated blood glucose levels. The two primary forms, type 1 and type 2 diabetes, have distinct pathophysiological mechanisms.

#### **Type 1 Diabetes:**

Type 1 diabetes is characterized by the autoimmune destruction of insulin-producing beta cells in the pancreas. This process begins when a genetic predisposition is triggered by environmental factors, such as viral infections. Immune cells mistakenly recognize beta cells as foreign invaders, launching an autoimmune attack that leads to their destruction. As a result, insulin production decreases or ceases entirely. Without sufficient insulin, glucose cannot enter cells for energy, leading to hyperglycemia.

The lack of insulin in type 1 diabetes causes several pathophysiological effects:

**Hyperglycemia:** Elevated blood glucose levels result from the inability to transport glucose into cells.

**Ketosis:** In the absence of insulin, the body breaks down fat for energy, producing ketones, which can lead to diabetic ketoacidosis.

**Gluconeogenesis:** The liver produces excess glucose, further contributing to hyperglycemia [8].

#### **Type 2 Diabetes:**

Type 2 diabetes primarily involves insulin resistance and impaired insulin secretion. Genetic factors play a significant role, but environmental factors like obesity and sedentary lifestyles are crucial contributors. Insulin resistance means that body cells do not effectively respond to insulin, requiring the pancreas to produce more insulin to maintain glucose control.

Pathophysiological processes in type 2 diabetes include:

**Insulin Resistance:** Cells, especially in muscle, liver, and adipose tissue, become resistant to insulin's signaling, making it challenging for glucose to enter cells.

**Beta Cell Dysfunction:** Over time, the pancreas may not produce enough insulin, or the insulin it produces is less effective.

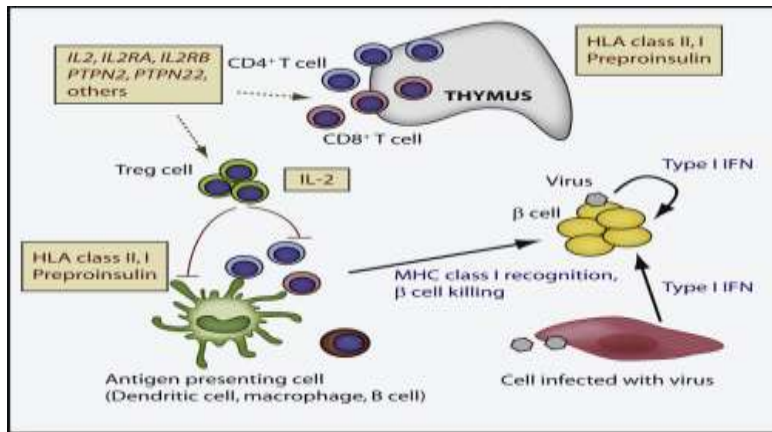
**Excess Gluconeogenesis:** The liver continues to produce glucose, contributing to hyperglycemia.

**Incretin Hormone Dysregulation:** Disruption in hormones like glucagon-like peptide-1 (GLP-1) and glucose-dependent insulinotropic polypeptide (GIP) affects insulin secretion and glucose control.

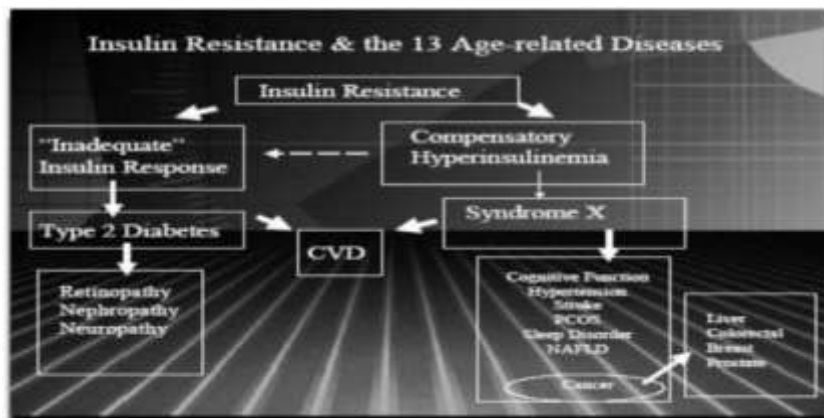
**Lipotoxicity:** Increased fat deposits in muscle and liver cells lead to impaired insulin action.

**Chronic Inflammation:** Inflammation, often linked to obesity, further exacerbates insulin resistance [9].

Both types of diabetes can lead to a range of complications, including cardiovascular issues, kidney disease, neuropathy, and retinopathy, all stemming from prolonged hyperglycemia and its effects on blood vessels and various tissues. Understanding the complex pathophysiological processes involved in diabetes is critical for developing effective treatment strategies and preventive measures.



**Fig 1 Pathophysiology of type 1 diabetes**



**Fig 2 pathophysiology of type 2 diabetes**

### COMPLICATION OF DIABETES:

Microvascular complications such as retinal degeneration, nephropathy, and neuropathy fall under the category of diabetes-related complications, while macrovascular problems such as coronary artery disease (CAD), peripheral vascular disease (PVD), and cerebrovascular events (CVA) fall under the category of diabetes-related complications.

- **Retinopathy:** A well-known consequence of both type 1 and type 2 diabetes mellitus is diabetic retinal damage (DR), which has been reported to appear in almost all cases of type 1 and 75% of cases of type 2 diabetes after fifteen years of insulin. DR is divided into proliferative diabetes-related retinopathy (PDR) and non-proliferative diabetic retinopathy (NPDR), also known as background retinopathy. Microaneurysms and retinal hemorrhages are the initial obvious symptoms of NPDR, which is characterized by vascular closure. The development of cotton-wool patches, vein beading, and intraretinal endothelial anomalies are all symptoms of increasing capillaries nonperfusion. PDR is characterized by the creation of fresh arteries on the inner retina and posterior surface of the vitreous, this happens with continued retinal ischemic [10].

- **Nephropathy:** Nephritis is the main cause of protracted renal failure. The first symptom is microalbuminuria, which may be identified by calculating the ratio of albumin to creatinine in a random spot sample. Microalbuminuria is more prevalent in type 2 DM patients than to type 1 DM patients. A

24-hour urine collection approach indicates that the unexpected outcome for microalbuminuria is 150–300 mg/day, but the abnormal value for macroalbuminuria is higher than 300 mg/day. Despite the fact that diabetic nephropathy can be divided into stages: both microscopic and macro levels of albumin based on information about albumin from the urine excretion, the risk for developing diabetic nephropathy and cardiovascular disease starts even when the elimination of albumin from values are below the normoalbuminuric assortment.

- **Cardiovascular Diseases:** Cardiovascular illness is to blame for as much as 65 percent of diabetics' mortality.<sup>31</sup> Ischemic heart disease and stroke are the main causes of diabetes-related morbidity. As was already noted, patients with diabetes have mortality rates from cardiac disease that are 2 to 4 times higher than those without diabetes [11]. Additionally, diabetics have a two to four times higher chance of getting a stroke than non-diabetics. Over 70% of people with diabetes have hypertension or use medication to control it. How diabetes patients' hyperglycemia influences cardiovascular issues is unclear. The same factors that put non-diabetics at risk for coronary artery disease apply to diabetics as well, including cigarette smoking, high blood pressure, and raised cholesterol levels.

### REDUCTION OF COMPLICATIONS BY RISK FACTOR MANAGEMENT:

Reducing complications in diabetes mellitus involves managing various risk factors to maintain optimal blood glucose control and prevent secondary complications. Effective management of these factors can significantly improve the quality of life for individuals with diabetes. Here are some key strategies:

- **Blood Glucose Control:** The cornerstone of diabetes management is maintaining blood glucose levels within the target range. Regular monitoring, medication adherence, and insulin management (if applicable) are essential for preventing complications.
- **Blood Pressure Control:** Hypertension is common in diabetes and can lead to cardiovascular complications. Managing blood pressure through medication, lifestyle modifications (such as a low-sodium diet and regular exercise), and stress reduction is vital.
- **Lipid Management:** Elevated cholesterol levels are a risk factor for cardiovascular disease. A heart-healthy diet, exercise, and medication, if needed, can help control cholesterol levels.
- **Smoking Cessation:** Smoking increases the risk of heart disease and stroke, which are already elevated in diabetes. Quitting smoking is crucial for reducing these risks.
- **Weight Management:** Obesity is a risk factor for type 2 diabetes and can exacerbate complications. Achieving and maintaining a healthy weight through diet and exercise is beneficial [11,12].
- **Physical Activity:** Regular exercise can help improve insulin sensitivity, lower blood glucose levels, and reduce the risk of heart disease. It also aids in weight management and overall well-being.
- **Dietary Choices:** A balanced diet with a focus on whole grains, lean proteins, fruits, and vegetables can help control blood glucose levels and reduce the risk of obesity and cardiovascular disease.
- **Medication Adherence:** Consistently taking prescribed medications, including insulin or oral antidiabetic drugs, is crucial for maintaining proper blood glucose control.
- **Foot Care:** Diabetes can lead to neuropathy and poor circulation, increasing the risk of foot complications. Regular foot inspections, appropriate footwear, and professional foot care are essential.
- **Eye Care:** Regular eye exams are vital to detect and treat diabetic retinopathy, a common complication that can lead to vision loss if left untreated.
- **Kidney Health:** Monitoring kidney function through regular tests and managing blood pressure and blood glucose levels can help prevent diabetic nephropathy.
- **Stress Management:** Chronic stress can affect blood glucose control. Relaxation techniques, mindfulness, and seeking support are essential for emotional well-being.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- **Immunizations:** Infections can affect blood glucose control. Staying up to date with vaccinations, such as the annual flu shot and pneumonia vaccine, is crucial.

Managing these risk factors through a combination of lifestyle modifications, medication, and regular medical check-ups can significantly reduce the risk of complications in diabetes [12]. It is important for individuals with diabetes to work closely with healthcare professionals to create a personalized management plan tailored to their specific needs and circumstances

## TREATMENT AND MANAGEMENT OF DIABETES:

The following methods are frequently used to treat and control diabetes mellitus:

### ❖ **Lifestyle Modifications:**

- **Diet:** It's important to keep a balanced diet with a low consumption of carbs. Put a focus on lean meats, fruits, vegetables, whole grains, and healthy fats.
- **Exercise:** Blood sugar management is aided by regular physical activity. Aim for 150 hours or more of moderately demanding exercise every week.

### ❖ **Medication:**

- **Oral drugs:** Many oral medications for diabetes that is type 2 can help lower blood sugar levels.
- **Insulin:** Type 1 diabetics and certain type 2 diabetics may require insulin injections to manage blood sugar levels.

❖ **Blood Sugar Monitoring:** Monitoring on a regular with a glucose meter helps to keep blood sugar levels within acceptable ranges.

❖ **Weight Management:** If required, losing weight can enhance insulin sensitivity and blood sugar regulation.

❖ **Controlling blood pressure and cholesterol:** Diabetes can be made more difficult by high blood pressure and cholesterol levels. There may be a need for medication or lifestyle modifications.

❖ **Regular Medical Checkups:** It's important to regularly see a doctor to review and modify your treatment strategy.

❖ **Self-Care:** Take good care of your feet to avoid issues.

- Eye examinations to diagnose and manage retinopathy caused by diabetes.
- Preventing gum disease via dental care.
- Regular vaccines to stave against illnesses.

❖ **Education:** Diabetic learning about self-management can enable people to make knowledgeable health decisions [13].

## CONCLUSION

Diabetes, often known as diabetes mellitus, is a long-term medical disease that affects millions of individuals all over the world. We will summaries important aspects concerning diabetes, its effects on people and society, the value of prevention and management, and ongoing research initiatives in this conclusion. High blood sugar levels are the primary sign of diabetes, which can be caused by either inadequate insulin production (Type 1 diabetes) or inefficient insulin usage (Type 2 diabetes). If not treated appropriately, both kinds of diabetes can result in significant consequences. Diabetes is a primary cause of disability and mortality due to these consequences, which can include heart disease, stroke, kidney issues, neuropathy, and visual loss. The effects of diabetes on society are significant. Due to the high expenses of diabetes treatment, medicine, and care, it has a huge financial impact on healthcare systems. Additionally, the illness impairs people's quality of life by frequently requiring food restrictions, lifestyle adjustments, and routine blood sugar testing. The fight against diabetes must focus on controlling and preventing it. Efforts in the public sector to promote healthy eating and lifestyles can lower the risk of diabetes, especially type 2 diabetes. For those with diabetes, early detection and

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

efficient care are crucial. This includes the use of prescription drugs, insulin treatment, consistent exercise, and a nutritious diet. For people to attain glycemic control and enhance their general well-being, self-managing diabetes education and assistance programmers are essential [14].

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## REDUCTION OF HOTSPOT OF IN SANDCASTING

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### ABSTRACT

This project introduces / propose experimental study on the reduction of Hotspots in sand casting. Sand casting is used in industries to manufacture parts that are made of metals or non-metals like iron, aluminum, brass, bronze. The material can be chose according to need. It is melted in furnace and then poured in mould cavity formed of sand. Sand casting is relatively simple. Sand casting is inexpensive. Some defects are also present in sand casting.

Metal casting is one the most important manufacturing process in which a liquid material is usually poured into a mold, which contains a hollow cavity of the desired shape, and then allowed to solidify. The solidified part is also known as a casting, which is ejected or broken out of the mold to complete the process. Casting materials are usually metals or various times setting materials that cure after mixing two or more components together, examples are epoxy concrete, plaster and clay. Casting is most often used for making complex shapes that would be otherwise difficult or uneconomical to make by other methods. Heavy equipment like machine tool beds, ships' propellers, etc. can be cast easily in the required size, rather than fabricating by joining several small pieces.

There are a number of defects related to the castings. These defects are the unwanted Irregularities that appear in the casting during metal casting process. There is various reason or Sources which is responsible for the defects in the cast metal. Some of the defects produced may Be neglected or tolerated and some are not acceptable, it must be eliminated for better Functioning of the parts. Following are the major types of sand casing defects.

Designing is one of the essential steps before casting. Designing defines the dimension of the Casting pat. Designing a gating system requires careful consideration according to the Technology materials, and castings It gives a clear image of how casting will take place. In this project, we use empirical formulas

To find the dimension of L shape casting and T shape casting and design and calculate the Dimension of in-gate, sprue, runner, and riser as these parameters are required for casting, which Can be achieved by designing and calculation. As from the discussion The shape and size of the Gating system in casting are coectly arranged when making the mold If the gating system is not Appropriately designed, it can cause severe casting defects. We finalize that casting depends on Design. Once designing is caried out correctly, we can get the desired shape we want to cast.

Following are some of the terms defined which are used in designing:

By taking, Length (with common region)= 160mm Width=40mm, Thickness =20mm, Length (without common region)= 120mm ,To find out volume of casting, Volune of casting =(40x20x160) - +(40x20x120), 224000mm<sup>3</sup>, Length (common region) =260mm, Width =50mm, Thickness = 20mm, Length=110mm, Volume of casting = L x W x T=(50x20x260)+(50x20x110),= 370000mm<sup>3</sup>



In sand aluminum casting, place a pattern in sand to create a mold. Incorporate the pattern and sand in a gating system. Remove the pattern. Fill the mold cavity with molten metal. Allow the metal to cool. Break away the sand mold and remove the casting. The use of sand casting is widespread throughout the foundry industry. A majority of metal castings are manufactured using a sand casting process because it is a cost effective and extremely reliable method for complicated parts and components requiring internal cavities

## **1 INTRODUCTION**

Metal casting is one the most important manufacturing process in which a liquid material is usually poured into a mold, which contains a hollow cavity of the desired shape, and then allowed to solidify. The solidified part is also known as a casting, which is ejected or broken out of the mold to complete the process. Casting materials are usually metals or various time setting materials that cure after mixing two or more components together; examples are epoxy, concrete, plaster and clay. Casting is most often used for making complex shapes that would be otherwise difficult or uneconomical to make by other methods. Heavy equipment like machine tool beds, ships' propellers, etc. can be cast easily in the required size, rather than fabricating by joining several small pieces.

## **2 Components specifications**

### **Sprue**

Sprue is a vertical passage way from the pouring basin down runner and gates. Liquid metal going down the vertical sprue loses pressure but increases speed due to the effect of gravity.

The sprue cross-section can be circular, square, or rectangular (preferably circular). Sprue is designed to taper down to avoid air aspiration. Bigger end above for metal pick-up, while smaller end connects to the runner.

### **Runner**

Runner in casting is a horizontal channel connecting the sprue well to the gates. Liquid metal will flow from the sprue to the runner and fill the mold cavity appropriately. A runner has the effect of slowing down the speed of liquid metal when it is free-falling in a high-speed sprue.

### **Ingate (or gate)**

Ingate is the end of the path and where the mold cavity begins. It leads the liquid metal that flows from the runner into the mold cavity.

### **Gating ratio**

Gating ratio is the ratio between the cross-sectional area of the sprue to the total cross-sectional area of the runners to the total cross-sectional area of the ingates.

The formula for the gating ratio is  $A_s : A_r : A_g$ .

### **Reynolds number**

This is the number that helps to predict flow types with different liquid flows. The nature of the flow in the gating system can be established by calculating the Reynolds number:

### **Pouring time**

Pouring time is the time when metal fills the mold cavity. The longer the Pouring time, the higher the pouring temperature, and the filling of the mold is not guaranteed. The shorter the pouring time, the more chaotic metal flow in the mold leads to dying erosion and excessive shrinkage.

### **Choke**

The choke is a control area placed in the sprue well to control the flow of liquid metal flowing into the mold cavity so that the mold is filled in calculated pouring time.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

The choke area plays an essential role in gating systems because the area allows the metal to pass through at a consistent and constant flow.

## Riser

The Riser is a molten metal cavity in a mold, ready to supply metal to the mold cavity to compensate for shrinkage as the metal cools. It is placed in the final solidification position of the casting, and it is in the liquid state for the longest time. The Riser is also where the gases generated inside the mold are released during the casting process.

## Pattern Making:

After designing the complete L and T-shapes along with all the necessary requirements, the patterns for both the shapes were required to be made. It was done so in the pattern shop where the wood was brought and the process of making patterns was performed using all of the necessary techniques. After some hard labor and consistency, we got the required result.



Figure 3.3a pattern for T & L shape casting

As shown in the pictures 3.2a, the sprue, runner and ingate for both the L and T-shapes are designed separately with compatibility to the sizes of the respective shapes in order to ensure the best possible result of casting.

## Designing and Calculation for L shape:

By taking

Length (with common region) = 160mm Width = 40mm

Thickness = 20mm

Length (without common region) = 120mm To find out volume of casting

$$\begin{aligned} \text{Volume of casting} &= (40 \times 20 \times 160) + (40 \times 20 \times 120) \\ &= 224000 \text{mm}^3 \end{aligned}$$

Step 1: Calculate the total weight of castings using equation 3.0

$$W = \rho \times V \quad (3.0)$$

where:  $W$  = total weight of casting,  $\rho$  = density,  $V$  = total volume of casting.  $V = 224 \text{cm}^3$

$$\rho = 2.713 \text{cm}^3$$

By putting values of  $V$ ,  $\rho$  in the above equation we get

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MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

$$W = 224 \times 2.713$$

$$= 0.607\text{Kg}$$

Step 2: Calculate the pouring rate and pouring time  $T = \frac{W}{Ra}$  (3.1)

where: T = pouring time

$$Ra = \frac{R}{K.C} \quad (3.2)$$

$$R = b\sqrt{W} \quad (3.3)$$

where: R = pouring rate, b = constant, depends on wall thickness; typical values of b are shown on Table 3.1

Table 3.1

Wall thickness (mm)	Below 6 mm	6-12 mm	Above 12 mm
b - constant	0.99	0.87	0.47

As thickness we take is 12mm so  $b = 0.47$  and putting the value of weight of casting and constant b in equation 3.3

$$R = 0.47\sqrt{0.607}$$

$$R = .366 \text{ kg/sec}$$

Putting values in equation 3.2 of  $k = 1$ ,  $C = 0.85$  we get 0.366

$$Ra = \frac{.366}{1(0.85)} = 0.43 \text{ kg/sec}$$

Putting values in equation 3.1  $T = 0.607/0.43 = 1.40 \text{ sec}$

Step 3: Calculate the effective sprue height

Sprue height  $H_{\text{sprue}} = 100 \text{ mm}$

Height of casting in the cope  $H_1 = 10 \text{ mm}$

Total height of casting  $H_2 = 20 \text{ mm}$

$$H_p = H - 0.5 \frac{h_1^2}{h_2} \quad (3.4)$$

where:  $H_p$  = effective sprue height. Putting values in 3.4

$$H_p = 100 - 0.5$$

$$100$$

$$\frac{20}{20}$$

$$H_p = 97.5 \text{ mm}$$

Step 4: Calculate the choke cross sectional area

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

The flow rate equation:

$$A_c = \frac{W}{\rho t C \sqrt{2gH_p}} \quad (3.5)$$

where:  $A_c$  = choke area ( $\text{mm}^2$ ),  $W$  = casting weight (Kg),  $\rho$  = density of molten metal ( $\text{kg/m}^3$ ),  $H_p$  = effective sprue height (mm),  $C$  = discharge coefficient (0.8),  $g$  = acceleration due to gravity ( $9.81\text{m/s}^2$ ),  $R_a$  = adjusted pouring rate (Kg/s) and  $t$  = pouring time (s) putting values in equation 3.5

$$A = \frac{0.607}{(2713)(1.4)(0.8) \sqrt{2(9.80)(97.5)(0.001)}}$$

$$A_c = 144.5075\text{mm}^2$$

Step 5: calculation of the sprue inlet area, since sprue exit area  $A_{\text{sprue\_exit}}$  = choke area  $A_c$

$$A_{\text{sprue\_exit}} \sqrt{H_{\text{sprue\_exit}}}$$

$$A_{\text{sprue\_inlet}} = \frac{A_{\text{sprue\_exit}} \sqrt{H_{\text{sprue\_exit}}}}{\sqrt{H_{\text{sprue\_inlet}}}} \quad (3.6)$$

where  $A_{\text{sprue\_inlet}}$  = sprue inlet cross-sectional area,  $A_{\text{sprue\_exit}}$  = sprue exit cross-sectional area,  $H_{\text{sprue\_inlet}}$  = distance between the ladle and sprue top and  $H_{\text{sprue\_exit}}$  = distance between ladle and sprue exit. By putting value in equation 3.6

$$A_{\text{sprue\_exit}} = 144.5075\text{mm}^2 \quad H_{\text{sprue\_inlet}} = 50\text{mm}$$

$$H_{\text{sprue\_exit}} = 150\text{mm}$$

$$A = \frac{144.5075 \sqrt{150}}{\sqrt{50}}$$

$$A = \frac{144.5075 \sqrt{150}}{\sqrt{50}}$$

$$A_{\text{sprue\_inlet}} = 250.294\text{mm}^2 \quad \text{Radius of the sprue inlet:}$$

$$R_{\text{inlet}} = \sqrt{\frac{A_1}{\pi}} = 8.92\text{mm} \quad (3.7)$$

$\pi$

$$R_{\text{exit}} = \sqrt{\frac{A_2}{\pi}} = 6.7821\text{mm} \quad (3.8)$$

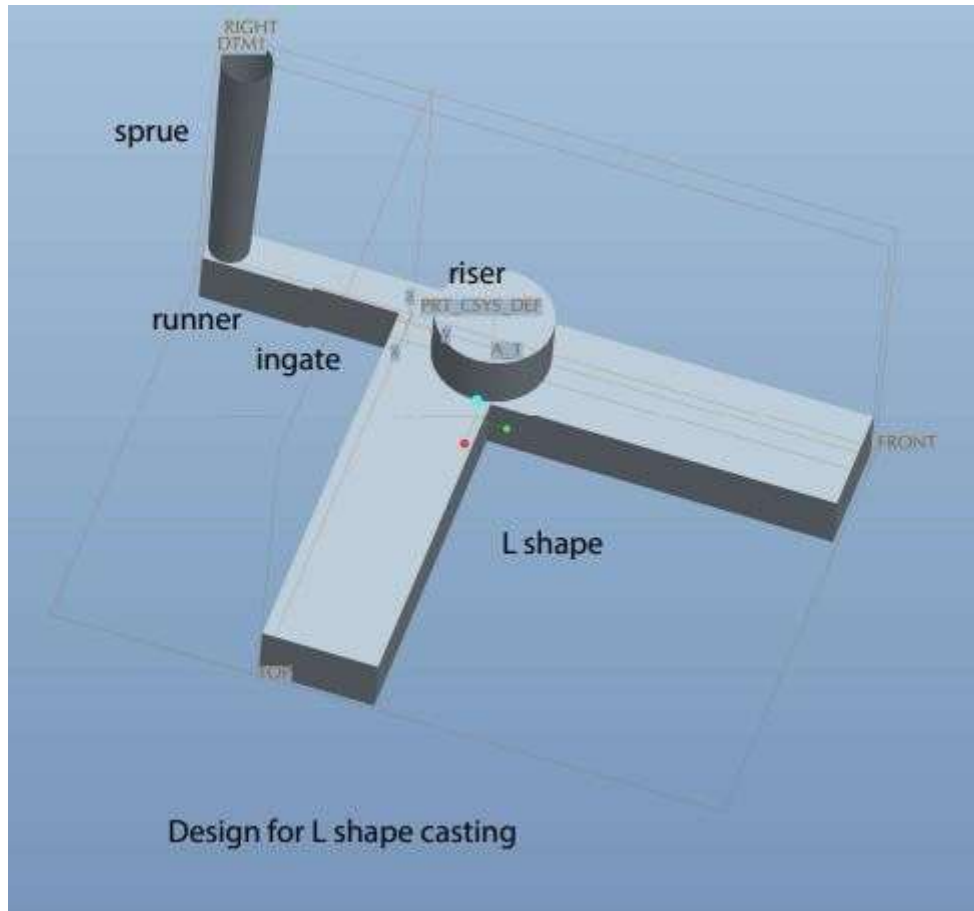
$\pi$

Step 6: Calculation of the Ingates and Runner cross-sectional areas using a gating ratio of 1: 4: 4

Runner cross-sectional area =  $4 \times 144.5075\text{mm}^2$

= 578.03

Ingate cross sectional area =  $578.03\text{mm}^2$



design for L shape casting

Feed path analysis using modulus criteria

**For Runner:**

Surface area of Runner interchanging heat flux =  $24 \times 8 \times 4 = 768 \text{ mm}^2$  Volume of Runner =  $24 \times 24 \times 8 = 4608 \text{ mm}^3$

$$\text{Modulus} = V/A \quad (3.9)$$

$$= 4608/768 = 6 \text{ mm}$$

**For Ingate:**

Surface area of ingate interchanging heat flux =  $24 \times 4 \times 4 = 384 \text{ mm}^2$  Volume of ingate =  $24 \times 24 \times 4 = 2304 \text{ mm}^3$

$$\text{Modulus} = 2304/384 = 6 \text{ mm (using equation 3.9)}$$

**For cast:**

Surface area of cast interchanging heat flux =  $34400 \text{ mm}^2$  Volume of the cast =  $224000 \text{ mm}^3$

$$\text{Modulus} = 42000/8840 = 6.5 \text{ mm}$$

**Reynold's Number for sprue exit**

It is given by:)

$$Re = VD/\mu \quad (3.10)$$

Where D is the characteristic dimension, in this case it is the diameter of the sprue exit. V is the velocity at sprue exit and  $\mu$  is the Kinematic viscosity.

$$A_1V_1=A_2V_2 \quad (3.11)$$

$$V_1 = \sqrt{2gh} \quad (3.12) \quad V_1 = \sqrt{2(9.8)(0.02)}$$

$$= 0.6260 \text{ m/s}$$

Putting values in equation 3.11 to find  $V_2$   $V_2 = 1.084 \text{ m/s}$  for Re using equation 3.10

$$Re = 1.084 * 13.5642 * 0.001 / 1.2(10)^{-6}$$

$$= 12255 < 20000$$

**For Riser:**

After research, riser's diameter shall be 2 times as its height, i.e.,  $d = 2h$

We take  $H = 20 \text{ mm}$  Which implies,  $D = 40 \text{ mm}$  Hence, Volume =  $\pi r^2 h$

$$= 25132.72 \text{ mm}^3$$

Now, surface area is given as,  $\pi dh + \pi d^2/4$

$$= 2513.27 + 1256.673 \text{ mm}^2$$

$$= 3769.907 \text{ mm}^2$$

Now, Riser's Modulus is given as, using equation 3.9  $M = V/A$

$$M = 25132.72 / 3764.95 \quad M = 6.667 \text{ mm}$$



As the riser's purpose is to get rid of hotspots and the presence and detection of those is the exact basis of our project so we decided not to use the riser for project's sake. But to check the intended purpose, we casted just of the shapes using riser which will have no hotspots hence proving the intended point.

Designing for T type casting:

Length (common region) = 260mm

width = 50mm thickness = 20mm length = 110 mm

Volume of casting =  $L \times W \times T = (50 \times 20 \times 260) + (50 \times 20 \times 110)$   
= 370000mm<sup>3</sup>

Step 1: Calculate the total weight of castings using equation 3.0

$$W = \rho \times V$$

where: W = total weight of casting,  $\rho$  = density, V = total volume of casting.  $V = 370\text{cm}^3$

$$\rho = 2.713\text{cm}^3$$

$$W = 370 \times 2.713$$

$$= 1.002 \text{ Kg}$$

Step 2: Calculate the pouring rate and pouring time using equation 3.1

$$t = \frac{W}{R_a}$$

where: t = pouring time

$$R_a = \frac{R}{K.C}$$

$$R = b\sqrt{W}$$

where: R = pouring rate, b = constant, depends on wall thickness; typical values of b are shown on Table 3.2 using equation 3.3

Table 3. 2

Wall thickness (mm)	Below 6 mm	6-12 mm	Above 12 mm
b -constant	0.99	0.87	0.47

$$R = 0.47\sqrt{1.002}$$

$$R = 0.42 \text{ kg/sec}$$

Using equation 3.2 we get

$$0.42$$

$$R_a = \frac{0.42}{1(0.85)} = 0.49 \text{ kg/sec}$$

And using 3.1 we get  $T = 1.002 / 0.49 = 2.04$

Step 3: Calculate the effective sprue height

$$\text{Sprue height } H_{\text{sprue}} = 100\text{mm}$$

Height of casting in the cope  $H_1 = 10$  mm Total height of casting  $H_2 = 20$  mm

$$H_p = H - 0.5 \frac{h_1^2}{h_2}$$

where:  $H_p$  = effective sprue height. Putting values in equation 3.4

$$H = 100 - 0.5$$

$$100$$

---


$$20$$

$$H_p = 97.5 \text{ mm}$$

Step 4: Calculate the choke cross sectional area using equation 3.5

The flow rate equation:

$$A_c = \frac{W}{\rho t C \sqrt{2gH_p}}$$

where:  $A_c$  = choke area ( $\text{mm}^2$ ),  $W$  = casting weight (Kg),  $\rho$  = density of molten metal ( $\text{kg/m}^3$ ),  $H_p$  = effective sprue height (mm),  $C$  = discharge coefficient (0.8),  $g$  = acceleration due to gravity ( $9.81 \text{ m/s}^2$ ),  $R_a$  = adjusted pouring rate (Kg/s) and  $t$  = pouring time (s) using equation

3.5 we get

$$1.002$$

$$A = \frac{(2713)(2.04)(0.8) \sqrt{2(9.80)(97.5)(0.001)}}{1.002}$$

$$A_c = 187.6075 \text{ mm}^2$$

Step 5: calculation of the sprue inlet area, since sprue exit area  $A_{\text{sprue\_exit}} = \text{choke area } A_c$  using equation 3.6

$$A_{\text{sprue-inlet}} = \frac{A_{\text{sprue-exit}} \sqrt{H_{\text{sprue-exit}}}}{\sqrt{H_{\text{sprue-inlet}}}}$$

Continuity equation:

where  $A_{\text{sprue\_inlet}}$  = sprue inlet cross-sectional area,  $A_{\text{sprue\_exit}}$  = sprue exit cross-sectional area,  $H_{\text{sprue\_inlet}}$  = distance between the ladle and sprue top and  $H_{\text{sprue\_exit}}$  = distance between ladle and sprue exit.

$$A_{\text{sprue-exit}} = 187.6 \text{ mm}^2$$

$$H_{\text{sprue-inlet}} = 50 \text{ mm} \quad H_{\text{sprue-exit}} = 150 \text{ mm}$$

Putting values in equation 3.6 we get

$$A = \frac{187.6 \sqrt{150}}{\sqrt{50}}$$

$$A = \frac{\quad}{\quad}$$

$$\sqrt{50}$$

$$A_{sprue\_inlet} = 324.915 \text{ mm}^2$$

$$r_{inlet} = \sqrt{\frac{A_1}{\pi}} = 10.1697 \text{ mm} \text{ by using equation 3.7}$$

$$r_{exit} = \sqrt{\frac{A_2}{\pi}} = 7.727 \text{ mm} \text{ by using equation 3.8}$$

Step 6: Calculation of the Ingates and Runner cross-sectional areas using a gating ratio of 1: 4: 4

$$\begin{aligned} \text{Runner cross-sectional area} &= 4 \times 187.59 \text{ mm}^2 \\ &= 750.36 \text{ mm}^2 \end{aligned}$$

$$\text{Ingate cross sectional area} = 750.36 \text{ mm}^2$$

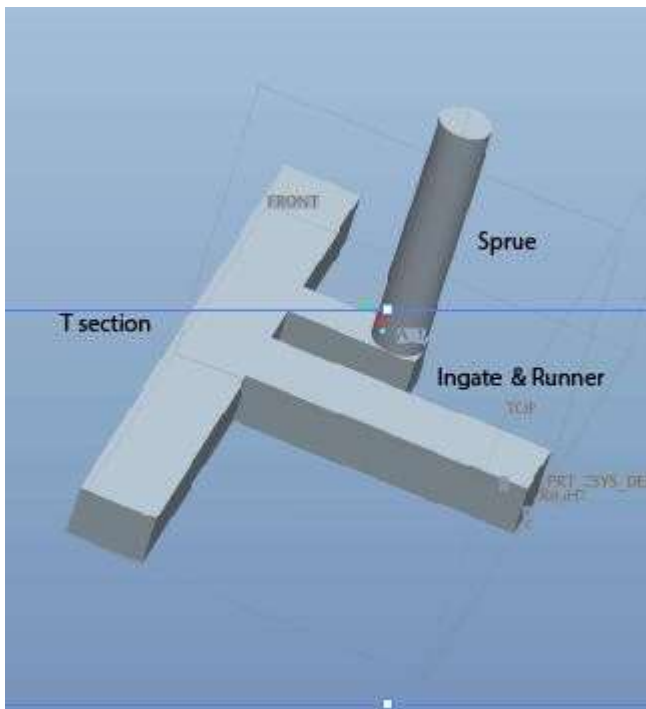


Figure 3. 2 design for T shape casting

Feed path analysis using modulus criteria for T type casting For Runner:

$$\text{Surface area of Runner} = 1120 \text{ mm}^2 \quad \text{Volume of Runner} = 7840 \text{ mm}^3$$

$$\text{Modulus} = V/A$$

$$= 7 \text{ mm}$$

For Ingate:

$$\text{Surface area of Ingate} = 1120 \text{ mm}^2 \quad \text{Volume of Ingate} = 7840 \text{ mm}^3$$

$$\text{Modulus} = V/A$$

= 7mm

For cast:

Surface area of cast interchanging heat flux =  $40400\text{mm}^2$  Volume of the cast =  $296000\text{mm}^3$

Modulus =  $V/A$

= 7.3

As the riser's purpose is to get rid of hotspots and the presence and detection of those is the exact basis of our project so we decided not to use the riser for project's sake.

### Conclusion

The main objective of our project was the detection of hotspots in l-shaped and t-shaped castings through the examination of mechanical properties. For this purpose, a couple of tests were performed including sem analysis and tensile tests on the specimen taken from both l and t sections. It was discovered that the specimen taken from or near sharp edges resulted in failure without taking enough stress, exhibiting weak mechanical properties. While the ones taken from the regions away from sharp corner and junctions took much more stress before failure and were able to exhibit better mechanical properties. The results from the tests show the prime location for hotspot genesis and the figure below shows the regions susceptible to hotspots in both l-shape and t-shape.

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**DESIGN AND FABRICATION OF SHELL AND TUBE HEAT EXCHANGER**

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**ABSTRACT**

This project centers on the design and optimization of a Shell and Tube Heat Exchanger featuring helical tubes, where HFC cold gas traverses the interior of the tubes while hot water circulates within the shell. The primary objective is to facilitate efficient heat exchange between these two fluids, with one passing through the tube exteriors and the other flowing within the tubes. The enhancement of heat transfer is achieved through the manipulation of specific design parameters.

Three key design parameters have been identified as critical to the heat exchanger's performance, utilizing the Taguchi method. These parameters are the shell-side flow rate, coil diameter, tube-side flow rate, and coil pitch. Modifying these factors has a substantial impact on the heat exchanger's effectiveness in transferring thermal energy between the hot water and HFC cold gas.

By increasing the coil diameter, coil pitch, and mass flow rate within the heat exchanger, the overall heat transfer efficiency is improved. This optimization process ensures that the heat exchanger operates at its maximum potential, effectively meeting the desired heat exchange requirements. **Keywords :** Shell , Tube , 2D Assembly , 3D Assembly, Compressor, Temperature sensors, Fans, Frame, Valves, Temperature difference analysis.

**1 INTRODUCTION**

A heat exchanger is a device used to transfer heat between two or more fluids. There are different categories of tubular heat exchangers; one of the most common is the shell and tube exchanger. A shell and tube exchanger consists of a number of tubes mounted inside a cylindrical shell. Two fluids can exchange heat: one fluid flows over the outside of the tubes while the second fluid flows through the tubes. The fluids can be single or two phases and can flow in a parallel or a cross/counter flow arrange.

**2 RESEARCH GAP**

In the context of shell and tube heat exchangers in the world, a notable research gap exists in the transition from traditional segmented tube designs to coiled shapes with the aim of making them more efficient. While the majority of existing research papers predominantly focus on segmented tube configurations, our study delves into the unexplored realm of coiled tube heat exchangers. This research aims to conduct a comparative analysis, optimize coiled tube design parameters, understand fluid flow patterns, and assess their suitability for various industrial applications, thereby filling a significant knowledge gap in the pursuit of more efficient heat exchange.

**3 Methodology**

The effect of baffle spacing on a shell and tube heat exchanger have been studied and the effect of heat transfer rate when the baffle space is varied have been analyzed using Fluent in Ansys work bench. The

shell and tube heat exchanger model are created using Creo Parametric and the analysis have been performed using Fluent in Ansys work bench. During this analysis it is assumed that ant fluid leak between tube and baffle is not considered, and shell side fluid is assumed to possess constant thermal properties and the heat exchanger is considered well insulated (heat loss to the environment is totally neglected).

#### 4 Components

##### Shell:

A shell and tube heat exchanger consists of a series of tubes housed within a cylindrical container known as a 'shell'. All tubes within the shell are collectively termed a tube bundle. The provided reference dimensions for the shell and tube heat exchanger serve as a reliable starting point in my project's design process. These dimensions, including the length of the shell, outer diameter, and shell thickness, are industry-standard and well-established parameters. By adopting these reference values, I ensure an efficient and safe foundation for my heat exchanger design, while still allowing for customization to meet the specific needs of my project, such as fluid types, flow rates, and operating conditions. This approach saves time and resources, as it combines a proven framework with tailored adjustments for optimal results mention in.

##### Tubes:

The product flows through the inner tube while the service does it through the space between the two tubes .Tube in shell and tube heat exchangers, are specially designed for heating or cooling products with low-medium viscosity. Basically tubes are design in coil shape for this project Because the coil shape tubes produce more efficiency. The coil is made up of copper as copper is a good conductor of heat. We are selecting this reference model for our project because it aligns with our requirements for fluid properties, heat transfer efficiency, and industry standards. This choice a ensures optimal performance and compliance with design criteria.

##### Sensors:

A temperature sensor for measuring temperature of a surface of a heat exchanger of a motor vehicle air conditioning system, comprising: a sensor housing configured for assembly in an opening of a heat exchanger housing; and a sensor head configured to thermally contact the surface of the heat exchanger. Basically the sensor in heat exchanger is sense the inlet temperature and outlet temperature and show the difference between these temperature (initial and final).

##### Compressor:

The compressor is the electro-mechanical heart of the cooling system. It is a pump that moves refrigerant under pressure from the outside condensing unit to the indoor evaporator coil to extract heat from inside the home and expel that heat outside the home, thereby cooling the house.

#### 5 Simulation Detail

The material selected for simulation parts is given below in the table:

Shell	Stainless Steel
Tube	Copper
Stand	Stainless Steel
Valves	Stainless Steel
Compressor	¼ R134
Motor	DC

Table 1.1 Simulation Detail



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October 13-14, 2023**

3D Model of Shell:

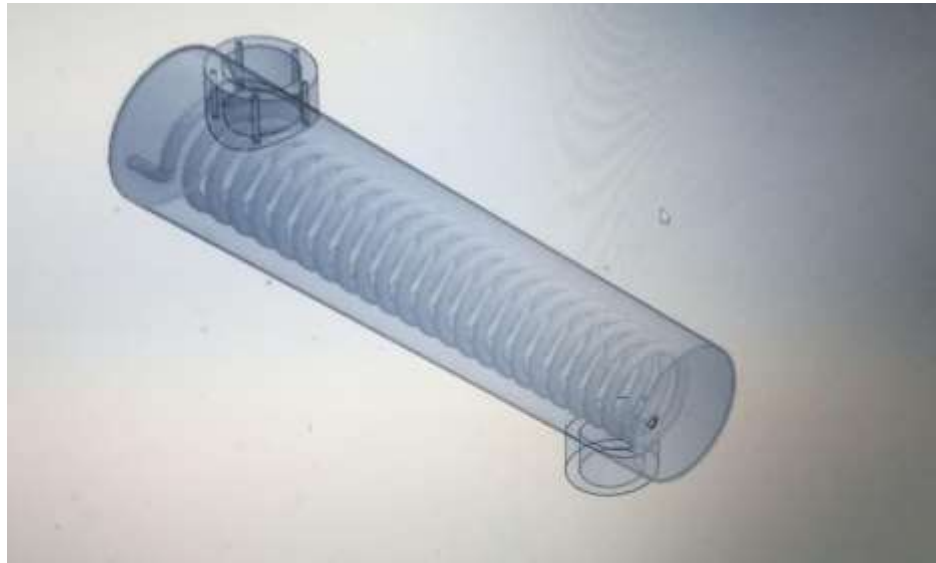


Figure 1.1 Shell 3D Model

3D Model of Tube:

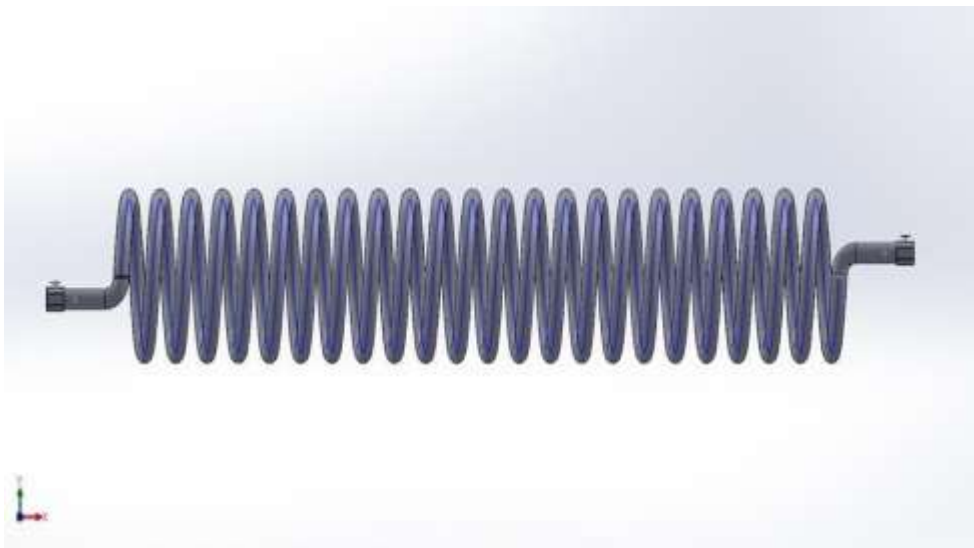


Figure 1.2 3D Model of tube

**3D Model of Sensors:**

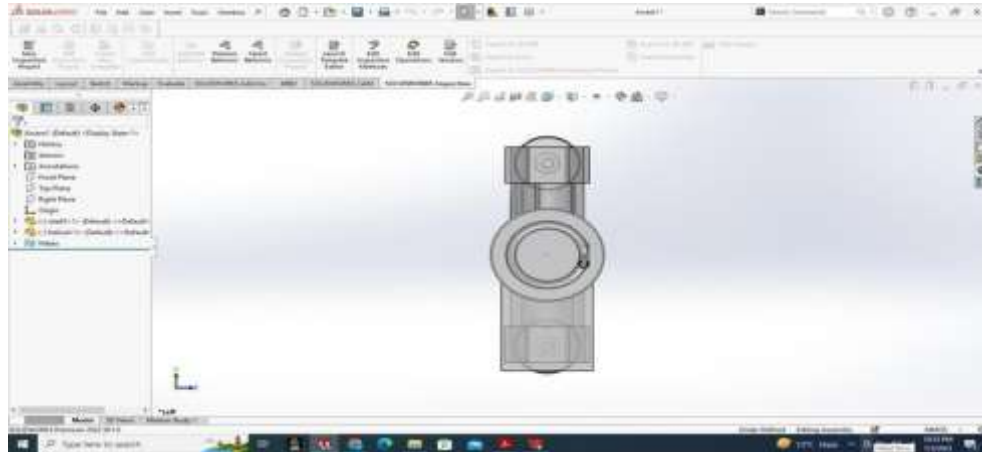


Figure 1.3 3D Model of sensors

**3D Model of Stand:**

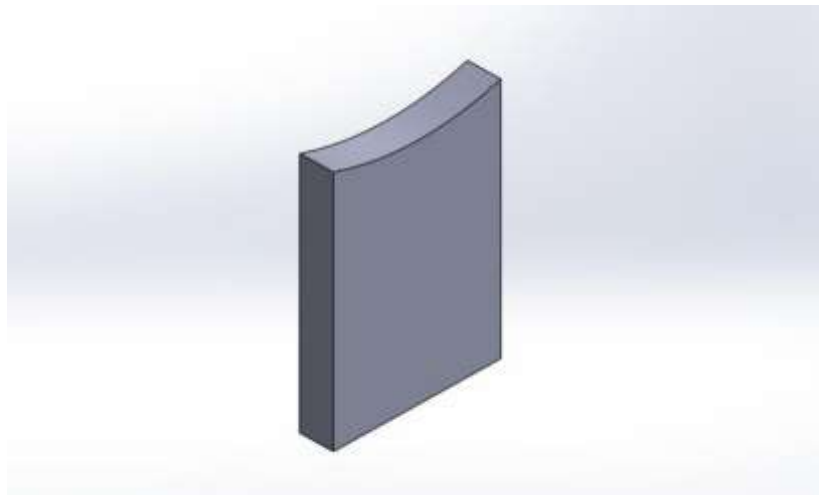


Figure 1.4 3D Model of stand

**Experimental Parameters**

- Water flow rate
- Turns of helical coil
- Shell thickness
- Compressor
- Inlet outlet temperature of shell - Fluid used water
- Inlet and outlet temperature of tubes - Measuring devices

**Table of experimental results**

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October 13-14, 2023**

Table 1.2: Table of experimental result

S no	Shell Inlet Temp T1	Tube inlet Temp t1	Shell Outlet Temp T2	Tube Outlet Temp t2	Water FlowRate
1	70	-5	51	24	7
2	70	-5	53	23	7
3	70	-5	52	23	7
4	70	-5	40	27	5
5	70	-5	43	24	5
6	70	-5	41	25	5
7	70	-5	33	16	3
8	70	-5	32	17	3
9	70	-5	33	15	3

**Shell and tube side Temperature Difference**

Table 1.3: Shell and tube side temperature difference

Sr no	Gas (HFC) temp difference t2-t1	Water temp difference T1-T2	Water flow rate LPM
1	29	19	7
2	28	17	7
3	28	18	7
4	32	30	5
5	28	33	5
6	30	31	5
7	21	37	3
8	22	38	3
9	20	37	3

**Result Analysis**

Table 1.4: Table of total mean values at 7 lpm flow rate

S NO	Water Inlet temp T1 °C	Water outlet temp T2 °C	Gas (HFC) inlet temp t2 °C	Gas (HFC) outlet tempt2°C	Water temp difference T1-T2°C	Gas (HFC) temp difference t2-t1°C	Water flowrate LPM
1	70	51	-5	24	19	29	7
2	70	53	-5	23	17	28	7
3	70	52	-5	23	18	28	7
<b>Total Mean Value</b>	70	52	-5	23	18	28	7

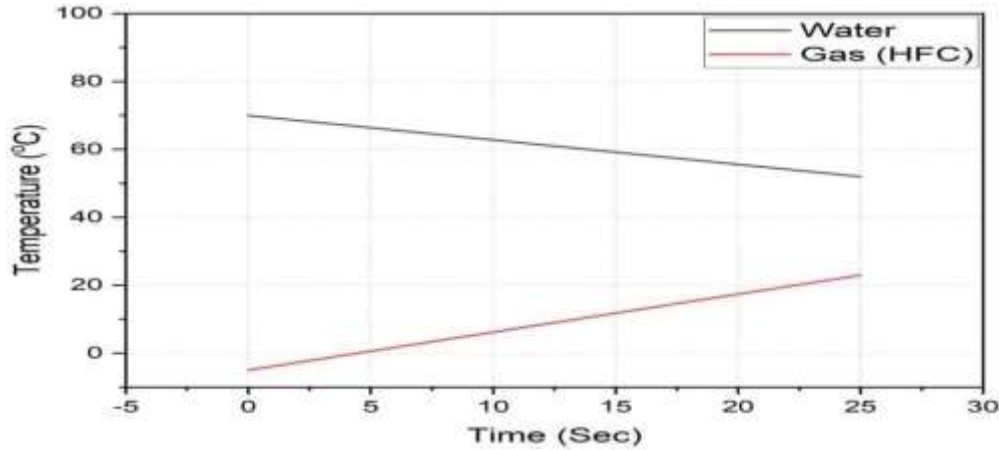


Figure 1.5: Graph between temp difference and time taken at 7 lpm

The mean value in first three experiments is given in graph, the water inlet temperature T1 in all first three experiments is 70°C and the mean value is also 70°C, and after process in first three experiments the water outlet temperature T2 is (51,52,53°C) it means the temperature is down from 70°C to approximately 53°C and the mean value is 52°C. The gas inlet temperature is -5 in all first three experiments and the mean value is also -5°C and after process the temperature is rise up to (24,23,23°C) and the mean value of gas outlet is 23°C. The temperature difference in water side is (19,17,18) and the mean values of temperature difference in water side is 18°C. After the temperature difference in water side in graph so the next is temperature difference in gas side is (29,28,28) and the mean value of temperature difference in gas side is 28°C. The time duration in all these experiments is approximately 25 min and the water flow rate all these experiments is 7LPM. Our project temperature difference is better than relevant project at this flow rate. [2]

Table 1.5: Table of total mean values at 5 lpm flow rate

S NO	Water Inlet temp T1 °C	Water outlet temp T2 °C	Gas (HFC) inlet temp t2 °C	Gas (HFC) outlet temp t2 °C	Water temp difference T1-T2 °C	Gas (HFC) temp difference t2-t1 °C	Water flow rate LPM
1	70	40	-5	27	30	32	5
2	70	43	-5	24	33	28	5
3	70	41	-5	25	31	30	5
<b>Total Mean Value</b>	70	41	-5	25	31	30	5

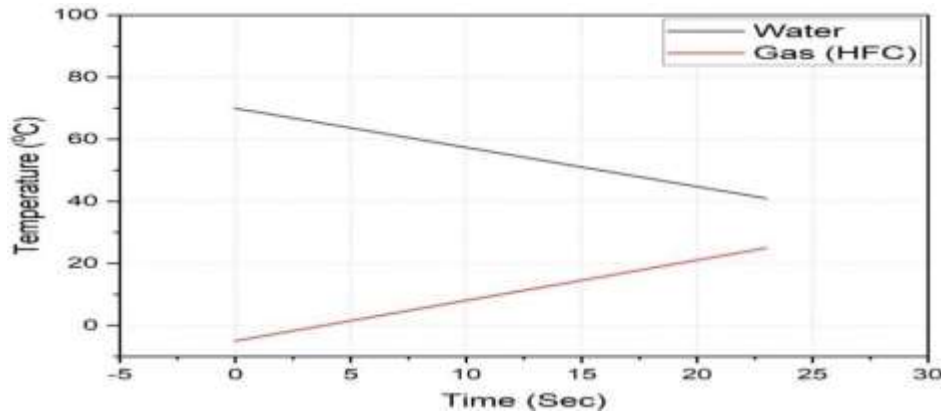


Figure 1.6: Graph between temp difference and time taken at 5 lpm

The mean value in first three experiments is given in graph, the water inlet temperature T1 in all first three experiments is 70°C and the mean value is also 70°C, and after process in first three experiments the water outlet temperature T2 is (40,43,41°C) it means the temperature is down from 70°C to approximately 43°C and the mean value is 41°C. The gas inlet temperature is -5 in all first three experiments and the mean value is also -5°C and after process the temperature is rise up to (27,24,25°C) and the mean value of gas outlet is 25°C. The temperature difference in water side is (30,33,31) and the mean values of temperature difference in water side is 31°C. after the temperature difference in water side in graph so the next is temperature difference in gas side is (32,28,30°C) and the mean value of temperature difference in gas side is 30°C. the time duration in all these experiments is approximately 23 min and the water flow rate these experiments is 5LPM. Our project temperature difference is better than relevant project at this flow rate. Relevant project temperature difference shell side at 5LPM is 21°C and our is 31°C. [2]

Table 1.6: Table of total mean values at 3 lpm flow rate

S NO	Water Inlet temp T1 °C	Water outlet Temp T2 °C	Gas (HFC) Inlet Temp t1 °C	Gas (HFC) Outlet Temp t2 °C	Water Temp Diff T1-T2 °C	Gas (HFC) Temp Diff t2-t1 °C	Water Flow rate LPM
1	70	33	-5	16	37	21	3
2	70	32	-5	17	38	22	3
3	70	33	-5	15	37	20	3
<b>Total mean values</b>	70	32	-5	16	37	21	3

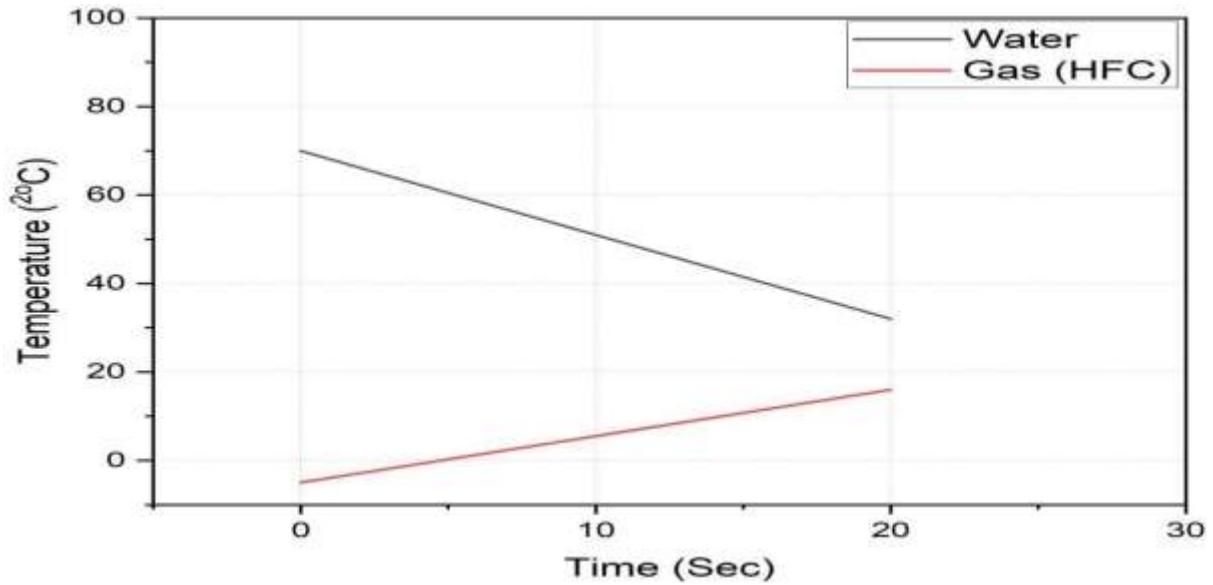


Figure 1.7: Graph between temp and time taken at 3lpm

The mean value in first three experiments is given in graph, the water inlet temperature T1 in all first three experiments is 70°C and the mean value is also 70°C, and after process in first three experiments the water outlet temperature T2 is (33,32,33°C) it means the temperature is down from 70°C to approximately 33°C and the mean value is 32°C. The gas inlet temperature is -5 in all first three experiment and the mean value is also -5°C and after process the temperature is rise up to (16,17,15°C) and the mean value of gas outlet is 16°C. the temperature difference in water side is (37,38,37°C) and the mean values of temperature difference in water side is 37°C. after the temperature difference in water side in graph so the next is temperature difference in gas side is (21,22,20°C) and the mean value of temperature difference in gas side is 21°C. the time duration in all these experiments is approximately 20 min and the water flow rate all these experiments is 3LPM. Our project temperature difference is better than relevant project at this flowrate. Relevant project temperature difference of shell side at 5LPM is 26°C and our is 37°C. [2]

**Experimentation and results of reference model:**

Table 1.7: Reference model mean values

Results of reference model at 7LPM					
Srno	Shell inlettemp T1	Tube inletTemp t1	Shell outlet Temp T2	Tube outlet Temp t2	Water flowrate LPM
1	70	-5	56	24	7
Results of our model at 7LPM					
2	70	-5	52	23	7



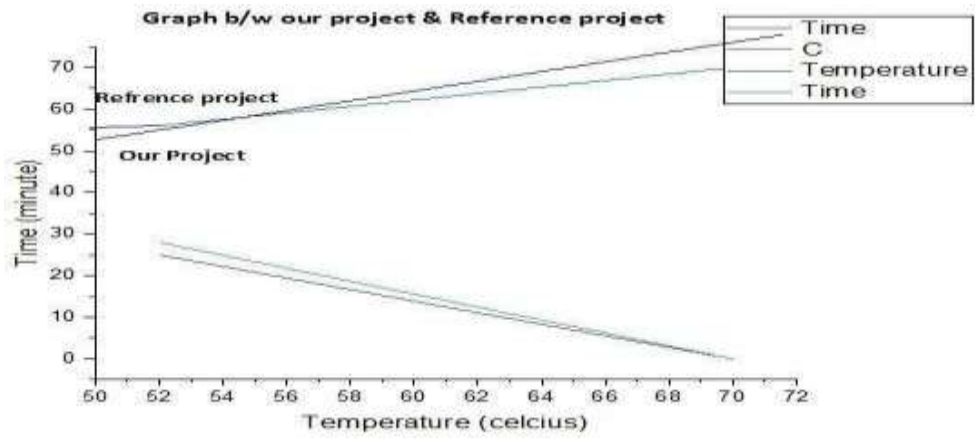


Figure 1.8: Graph of result

Model:



Figure 1.9 Model

### Safety precaution

- Beware of tube leaking caused by corrosion.
- If fluid in hot and cold sides mix, a reaction may occur.
- A corrosion monitoring, inspection and leak detection are very important.
- If a slurry flow or contaminated liquid flow enters the heat exchanger.
- Erosion may happen and can cause leaking too.

### Conclusion

A shell and tube heat exchanger is a widely used device for efficiently transferring heat between two fluid streams. Shell and tube heat exchangers are designed to provide efficient heat transfer between fluids due to their large surface area, making them suitable for a wide range of applications. These heat exchangers can handle a variety of fluid types, including liquids and gases, as well as fluids with different temperature ranges and viscosities. Shell and tube heat exchangers can be easily scaled up or down to accommodate different heat transfer requirements, making them suitable for both small and large-scale applications. Shell and tube heat exchangers can be easily scaled up or down to accommodate different heat transfer requirements, making them suitable for both small and large-scale applications. The design of shell and tube heat exchangers allows for easier cleaning and maintenance, as the tubes can be easily accessed and cleaned or replaced if needed. In conclusion, shell and tube heat exchangers are versatile and efficient devices for transferring heat between fluid streams, making them a preferred choice in various industrial and commercial applications. Their advantages in terms of heat transfer efficiency, durability, and ease of maintenance are balanced by considerations such as complexity, cost, and potential fouling issues. Proper design, operation, and maintenance are essential to ensure optimal performance and longevity of shell and tube heat exchangers. Segway has been designed using principles of machine design, utilizing SolidWorks software for modeling and Ansys15.0 for analysis. The segway was then fabricated according to the plan. Test results have shown that when the segway is built with efficient motors and battery packs, it can serve as an excellent personal transporter. Although there may be some issues with motion due to the third wheel, incorporating a strong suspension system can increase stability and reliability. Based on factors such as stability and cost, the three-wheel segway has proven to be a viable alternative to the two-wheeled version. Additionally, its fail-safe feature makes it more dependable than the two-wheel segway. This project's results demonstrate that when the three-wheel segway is manufactured with efficient components, a good control system, and a reliable suspension system, it becomes the most stable, dependable, economical, and fail-safe personal transporter.

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**INTERNATIONAL ANKARA CONGRESS ON  
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October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## PRECISION MEDICINE IN DRUG DELIVERY

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### ABSTRACT

Precision medicine is transforming the landscape of drug development and healthcare, ushering in an era of personalized therapies tailored to an individual's unique genetic makeup, environment, and lifestyle. This paradigm shift holds immense promise for improving treatment efficacy, minimizing adverse effects, and addressing unmet medical needs across various diseases. This abstract provides an overview of the key concepts and implications of precision medicine in drug development. Precision medicine's core principle involves identifying biomarkers and genetic variations that underlie diseases, allowing for the development of targeted therapies. Advances in genomics and high-throughput sequencing technologies have enabled the comprehensive profiling of patients, leading to the discovery of novel drug targets and the identification of predictive biomarkers. In clinical trials, precision medicine has revolutionized patient recruitment and trial design, enabling the selection of individuals who are most likely to benefit from specific treatments. This approach has accelerated drug development timelines and increased the likelihood of successful outcomes. Cancer treatment exemplifies the success of precision medicine, with targeted therapies and immunotherapies showing remarkable results. Moreover, precision medicine is expanding its reach beyond cancer, offering hope for patients with rare genetic disorders and chronic diseases. However, the integration of precision medicine into mainstream healthcare presents regulatory, ethical, and economic challenges. Ensuring data privacy, equitable access to personalized therapies, and addressing potential genetic discrimination are pressing concerns. Nevertheless, the continuous evolution of technologies like CRISPR gene editing and gene therapies promises to drive further innovations in precision medicine.

### INTRODUCTION

Precision medicine, often hailed as the future of healthcare, represents a paradigm shift in medical practice. It stands in stark contrast to the traditional "one-size-fits-all" approach to treatment, where a single therapy is applied universally to a broad patient population. Instead, precision medicine recognizes that each individual is unique, with their own genetic, environmental, and lifestyle factors influencing their health and response to treatment. This emerging field is underpinned by the belief that tailoring medical interventions to the specific characteristics of each patient can lead to more effective, safer, and personalized healthcare. At the heart of precision medicine is the recognition that genetic and genomic variations play a critical role in an individual's susceptibility to diseases and their response to medications. Advances in genomics have unlocked the ability to decode the human genome, allowing us to identify specific genetic markers, mutations, and variations that are linked to various diseases and drug responses[1]. As a result, healthcare practitioners can now develop treatments that are precisely matched to a patient's genetic makeup, significantly enhancing the chances of therapeutic success while minimizing potential adverse effects. This approach is revolutionizing various aspects of healthcare, from early disease detection and diagnosis to drug development and delivery. In this review, we delve into the principles, practices, and applications of precision medicine in drug delivery. By examining the key components of precision medicine, the advanced drug delivery systems that enable it, and the clinical applications that demonstrate its transformative potential, we aim to shed light on the promising future where healthcare is no longer "one-size-fits-all" but is customized to meet the unique needs of each patient, ushering in a new era of medical care[2].

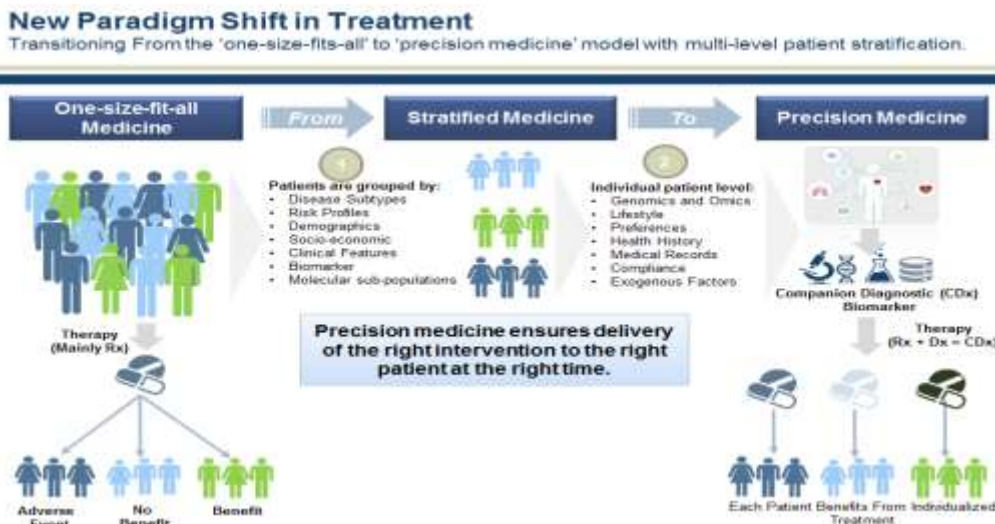


FIG (1) Precision Medicine

## PRINCIPLES OF PRECISION MEDICINE

Precision medicine is a revolutionary approach to healthcare that relies on several fundamental principles to tailor medical treatments and interventions to the unique characteristics of individual patients. These principles are at the core of the precision medicine paradigm, enabling a shift from traditional, population-based medicine to a highly personalized and targeted approach. Below, we explore the key principles that underpin precision medicine:

- **Individual Variability:** Precision medicine recognizes that every patient is unique, with their genetic makeup, lifestyle, environment, and health history influencing their health outcomes. It seeks to account for this individual variability by customizing healthcare strategies.
- **Genetic and Genomic Understanding:** A cornerstone of precision medicine is the profound understanding of genetics and genomics. By analyzing an individual's genetic code, healthcare providers can identify genetic variations and mutations that may predispose them to certain diseases or affect their response to treatments.
- **Biomarkers:** Biomarkers are specific biological markers or indicators that can be measured to provide information about a patient's health or disease. Precision medicine relies on the identification and utilization of biomarkers to diagnose diseases earlier and guide treatment decisions[3].
- **Targeted Therapies:** In precision medicine, treatments are specifically targeted to the underlying molecular and genetic mechanisms of a disease. This allows for therapies that are more effective, with fewer side effects.
- **Patient-Centric Care:** Precision medicine prioritizes patient-centric care, with a focus on shared decision-making. Patients become active participants in their healthcare, with treatment plans tailored to their preferences and needs.
- **Preventive Approach:** Precision medicine extends beyond treatment; it emphasizes preventive measures based on a patient's risk profile and genetic predisposition to diseases, enabling early interventions to mitigate risks.

By adhering to these fundamental principles, precision medicine is poised to revolutionize healthcare, offering the potential for more effective, safer, and patient-tailored treatments. This approach is transforming the landscape of medicine, with the promise of better outcomes and improved quality of life for individuals across the globe.

## DRUG DELIVERY SYSTEMS

In the realm of precision medicine, drug delivery systems play a pivotal role by ensuring that therapeutic agents reach their intended target in a controlled and efficient manner. These systems have undergone



significant advancements to enhance the safety, efficacy, and personalization of drug administration[4]. Here, we explore the diverse landscape of drug delivery systems and their crucial role in realizing the promise of precision medicine.

- **Nanoparticles and Nanomedicine:** Nanoparticles, often on the scale of a billionth of a meter, have emerged as versatile drug delivery vehicles. They can encapsulate drugs, protect them from degradation, and release them at the desired site. Lipid-based nanoparticles, polymeric micelles, and dendrimers are just a few examples of nanomedicine platforms that allow for controlled drug release, reducing systemic toxicity, and improving bioavailability.
- **Liposomes and Micelles:** Liposomes are lipid-based vesicles that can encapsulate both hydrophilic and hydrophobic drugs. They mimic the structure of cell membranes and have shown significant promise in delivering a wide range of therapeutics. Micelles, composed of amphiphilic molecules, are similarly effective for drug solubilization and targeted delivery.
- **Targeted Drug Delivery Systems:** Targeted drug delivery involves designing drug carriers that can specifically home in on diseased cells or tissues. Antibody-drug conjugates (ADCs), aptamer-conjugates, and ligand-functionalized nanoparticles are examples of targeted delivery systems. They can bind to specific receptors or antigens overexpressed on the surface of target cells, improving the therapeutic index and reducing off-target effects.
- **Controlled Drug Release:** Controlled-release systems regulate the rate at which a drug is released, ensuring sustained therapeutic levels over time. These systems include drug-eluting stents, transdermal patches, and implantable devices. They are particularly beneficial for conditions requiring long-term treatment.
- **Prodrug and Nano-Prodrug Strategies:** Prodrugs are inactive drug forms that become active upon undergoing chemical transformation within the body. Nano-prodrug approaches combine prodrug strategies with nanotechnology to enable site-specific drug activation, reducing systemic toxicity and improving treatment outcomes.
- **Personalized Drug Delivery Systems:** Advancements in 3D printing and digital health have paved the way for the creation of personalized drug delivery systems. Dosage forms can be customized to meet an individual's specific needs, such as altering drug release rates or combining multiple drugs in a single dose.

These drug delivery systems are pivotal in realizing the principles of precision medicine. They enhance the targeting of therapies to specific patient populations, account for individual variability, and minimize adverse effects[4,5]. As the field of precision medicine continues to evolve, drug delivery systems will remain a critical component, ensuring that patients receive the right treatment, at the right time, and in the right way, ultimately improving the efficacy and safety of healthcare interventions.

### PHARMACOGENOMICS AND PHARMACOGENETICS

Pharmacogenomics and pharmacogenetics are two closely related fields within the realm of precision medicine that focus on understanding the genetic factors influencing an individual's response to drugs. These disciplines have the potential to revolutionize drug therapy by tailoring treatment plans to a patient's unique genetic makeup, enhancing efficacy, minimizing adverse effects, and optimizing medication selection and dosing. Below, we delve into these fields and their significance in personalized medicine.

- **Pharmacogenomic**

Pharmacogenomics is the study of how an individual's entire genome, encompassing all of their genes and their interactions, impacts their response to drugs. It involves the use of large-scale genetic data, such as whole-genome sequencing, to identify genetic variations that affect drug metabolism, pharmacokinetics, and pharmacodynamics. Pharmacogenomic research explores how genes influence drug efficacy, toxicity, and overall treatment outcomes.



- **Pharmacogenetics:**

Pharmacogenetics is a subset of pharmacogenomics that focuses on the influence of specific genes or genetic variations on an individual's response to drugs. It typically involves the study of individual genetic variations, such as single nucleotide polymorphisms (SNPs) in drug-metabolizing enzymes, transporters, or drug targets. Pharmacogenetics is more targeted and can often be implemented more easily in clinical practice compared to the broader scope of pharmacogenomics[5].

### KEY CONCEPTS AND APPLICATIONS

**Genetic Variants:** Both fields investigate genetic variants that can lead to altered drug responses. For instance, some individuals may have variations in genes responsible for drug metabolism, affecting how quickly or slowly a drug is broken down in the body.

- **Drug Metabolism:** Genetic variations can significantly influence the activity of drug-metabolizing enzymes, such as the cytochrome P450 (CYP) family. Altered enzyme activity can lead to variations in drug clearance and, consequently, drug efficacy and toxicity.
- **Individualized Drug Selection:** By identifying a patient's genetic profile, healthcare providers can choose the most suitable drug and dosage for that individual. This minimizes the risk of adverse reactions and enhances therapeutic outcomes.
- **Warfarin Dosing:** An illustrative example of pharmacogenetics is the dosing of the anticoagulant drug warfarin. Genetic testing for variations in the CYP2C9 and VKORC1 genes can help determine the optimal initial dose for patients, minimizing the risk of bleeding or clotting complications.
- **Cancer Treatment:** In oncology, understanding the genetic mutations in a patient's tumour cells can guide the selection of targeted therapies. EGFR mutations, for instance, are critical in determining the choice of treatments for lung cancer patients.
- **Adverse Drug Reactions:** Genetic testing can help identify patients at higher risk of adverse drug reactions, allowing for proactive measures or alternative therapies[6].

### PERSONALIZED DRUG FORMULATION

Personalized drug formulation represents a cutting-edge approach in precision medicine, aiming to optimize drug delivery by tailoring pharmaceutical products to the unique needs of individual patients. This innovative strategy acknowledges that patients vary in their genetics, physiology, and disease conditions, and a one-size-fits-all approach may not be the most effective or safe method for administering medications. Here, we explore the principles and applications of personalized drug formulation and its role in the future of healthcare.

- **3D Printing in Drug Formulation:** 3D printing technology has emerged as a powerful tool in personalized drug formulation. It offers the capability to manufacture patient-specific drug doses with precise control over drug release rates. This technology is especially valuable in cases where conventional dosage forms are inadequate, such as for patients with swallowing difficulties or for paediatrics who may require very low doses.
- **Tailored Drug Combinations:** Combining multiple drugs into a single formulation tailored to an individual's needs is another aspect of personalized drug formulation. This approach can be particularly valuable in complex diseases or conditions where multi-drug therapy is required, allowing for improved patient adherence and reduced potential for drug interactions.
- As precision medicine continues to evolve, personalized drug formulation promises to be a game-changer in healthcare. By crafting medications specifically tailored to an individual's genetic, physiological, and clinical characteristics, this approach optimizes treatment outcomes, minimizes adverse effects, and enhances patient compliance[7]. With advancements in technology and a growing understanding of personalized medicine, the future of drug delivery holds the promise of truly patient-centric care.

### DIAGNOSTICS AND BIOMARKERS IN PRECISION MEDICINE

Diagnostics and biomarkers are fundamental components of precision medicine, playing a crucial role in the individualization of healthcare. These tools enable healthcare providers to accurately assess a patient's health, diagnose diseases, and predict treatment responses. In the context of precision medicine, diagnostics and biomarkers are at the forefront of tailoring medical interventions to the specific needs of each patient.

#### **Biomarkers in Precision Medicine:**

Biomarkers are measurable biological indicators that reflect normal or pathological processes or responses to therapeutic interventions. They can include molecules like proteins, nucleic acids, metabolites, and even specific cells. In precision medicine, biomarkers provide essential information for patient stratification and treatment decisions.

- **Guiding Treatment Decisions:** Biomarkers help identify the most appropriate treatment for a patient. In oncology, for instance, tumour biomarkers can determine whether targeted therapy or immunotherapy is more suitable, potentially leading to more effective and less toxic treatments.
- **Predicting Treatment Responses:** Biomarkers can predict how an individual will respond to a particular treatment. In cardiology, the measurement of cardiac biomarkers, like troponins, can help predict the likelihood of adverse cardiovascular events and guide treatment decisions.
- **Personalized Medicine in Infectious Diseases:** The field of infectious diseases leverages biomarkers to customize treatment plans. For instance, in HIV treatment, viral load measurements and genotypic assays are used to determine the most effective antiretroviral therapies for each patient.
- **Liquid Biopsies:** Liquid biopsies involve the analysis of biomarkers in bodily fluids, such as blood or urine, to diagnose and monitor diseases. They are especially promising in oncology, offering non-invasive alternatives to traditional tissue biopsies[8].
- **Challenges and Future Directions:** While the potential of biomarkers in precision medicine is immense, challenges include standardization, data interpretation, and the need for large, diverse datasets. Additionally, ethical and privacy concerns related to the collection and use of genetic and health data must be addressed. The future of diagnostics and biomarkers in precision medicine will likely see the development of more sophisticated, multiplexed biomarker panels, further improving our ability to predict, diagnose, and treat a wide range of diseases with unprecedented precision.

### KEY ASPECTS OF PATIENT PROFILING AND DATA ANALYTICS

- **Data Sources:** Patient profiling leverages diverse sources of data, including electronic health records (EHRs), genetic information, imaging data, wearable device data, and patient-reported outcomes. Integrating these data types offers a comprehensive view of a patient's health.
- **Genomic Profiling:** Genetic data, such as DNA sequencing, plays a central role in patient profiling. It enables the identification of genetic variants that may influence disease susceptibility and drug responses.
- **Clinical and Medical Data:** Electronic health records provide valuable clinical and medical data, including patient history, diagnostic tests, and treatment outcomes. This information is essential for understanding a patient's healthcare journey[9].
- **Data Integration:** Effective patient profiling involves integrating data from multiple sources to build a holistic patient profile. This approach is often facilitated by electronic health record systems and data analytics platforms.

### APPLICATIONS OF DATA ANALYTICS IN PRECISION MEDICINES

- **Risk Assessment:** Data analytics can be employed to assess a patient's risk of developing specific diseases, such as cardiovascular conditions or diabetes, based on genetic, lifestyle, and clinical data.

- **Treatment Selection:** Data analytics can aid in selecting the most appropriate treatment options by analyzing a patient's genetic profile and historical response to therapies. This is particularly relevant in oncology and pharmacogenomics.
- **Personalized Medicine Plans:** Data analytics are used to create personalized treatment plans that consider a patient's unique characteristics, such as age, genetics, comorbidities, and lifestyle. These plans optimize therapeutic efficacy and safety.
- **Early Disease Detection:** Advanced analytics can identify subtle deviations from normal health parameters, enabling early disease detection and intervention, particularly in conditions like sepsis, cancer, or neurodegenerative diseases.
- **Predictive Modelling:** Predictive modelling and machine learning techniques can forecast patient outcomes, adverse events, or disease progression. This information informs treatment decisions and care plans.

### CHALLENGES AND FUTURE DIRECTIONS

Challenges in patient profiling and data analytics include data privacy concerns, interoperability of health systems, and the need for standardized data formats. Future directions in the field involve the development of more sophisticated data analytics tools, artificial intelligence applications, and the integration of emerging data sources such as microbiome data. As precision medicine continues to evolve, the integration of patient profiling and data analytics holds the promise of delivering patient-centred care by harnessing the full potential of data to inform healthcare decisions[10].

### CLINICAL APPLICATIONS OF PRECISION MEDICINE

Precision medicine is transforming the landscape of healthcare by applying the principles of individualized care to various clinical fields. The integration of genetic, genomic, and personalized approaches in clinical practice holds immense promise for optimizing treatment outcomes, enhancing patient care, and minimizing adverse effects. Here, we explore some of the prominent clinical applications of precision medicine.

- **Oncology: Tumour Profiling:** In oncology, precision medicine is perhaps most advanced. Tumour profiling involves genetic analysis of a patient's cancer cells to identify specific mutations or alterations. This information guides the selection of targeted therapies, immunotherapies, and clinical trial enrolment. **Liquid Biopsies:** Non-invasive liquid biopsies that analyse circulating tumour DNA and other biomarkers in blood are increasingly used for early cancer detection and monitoring treatment responses.
- **Cardiology: Pharmacogenomics in Antiplatelet Therapy:** Genetic testing is utilized to determine the most effective antiplatelet drugs, such as clopidogrel, for patients undergoing percutaneous coronary intervention. **Risk Stratification:** Genetic and lifestyle factors are combined to assess an individual's risk of cardiovascular diseases, enabling early preventive interventions.
- **Infectious Diseases: HIV Treatment:** Precision medicine in HIV involves genotypic and phenotypic resistance testing to guide the selection of antiretroviral therapies tailored to an individual's viral variants. **Antimicrobial Stewardship:** Genomic sequencing is used to identify drug resistance mutations in pathogens, informing antibiotic selection and treatment duration[11].
- **Neurology: Pharmacogenomics in Psychiatry:** Genetic profiling helps determine the most effective psychiatric medications for individual patients, minimizing side effects and optimizing mental health treatment. **Rare Neurological Diseases:** Precision medicine approaches are critical for diagnosing and treating rare genetic neurological disorders, such as Huntington's disease.

### REGULATORY AND ETHICAL CONSIDERATIONS IN PRECISION MEDICINE

The rapid advancement of precision medicine brings with it a host of regulatory and ethical considerations that must be carefully navigated to ensure the responsible and effective implementation of these innovative approaches to healthcare.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## Regulatory Considerations:

- **FDA and Regulatory Agencies:** In the United States, the Food and Drug Administration (FDA) plays a central role in regulating drugs, medical devices, and diagnostics. As precision medicine technologies and therapies evolve, regulatory agencies must adapt to ensure safety and efficacy.
- **Data Security and Privacy:** The collection and utilization of extensive genetic and health data raise concerns about data privacy and security. Compliance with data protection regulations, such as the Health Insurance Portability and Accountability Act (HIPAA) in the U.S., is essential.
- **Diagnostic and Therapeutic Validity:** Ensuring the accuracy and reliability of diagnostic tests and therapeutic interventions is paramount. Regulatory bodies must establish rigorous standards for validation and clinical utility, especially in the case of genetic testing and targeted therapies[12].
- **Lack of Established Guidelines:** Precision medicine often challenges traditional treatment paradigms, as some therapies may not have a broad evidence base. This complicates the development of regulatory guidelines and coverage decisions by insurance providers.

## Ethical Considerations:

- **Informed Consent:** Patients must have a clear understanding of the implications of genetic testing and personalized treatments. Informed consent is essential to ensure that individuals are aware of potential findings and risks.
- **Privacy and Confidentiality:** Maintaining the privacy of genetic and health data is crucial. Patients should have control over who has access to their data and how it is used.
- **Genetic Discrimination:** Concerns about genetic discrimination in employment, insurance, and other areas need to be addressed. Laws like the Genetic Information Non-discrimination Act (GINA) in the U.S. aim to protect individuals from such discrimination.
- **Resource Allocation:** Precision medicine can be resource-intensive, raising questions about equitable access. Ensuring that these innovations are accessible to all patients, regardless of socioeconomic status, is an ethical imperative.
- **Return of Results:** Deciding when and how to return genetic or diagnostic results to patients is an ethical challenge[13]. There is a balance to be struck between empowering patients with information and avoiding undue anxiety or confusion.

## CHALLENGES AND FUTURE DIRECTIONS IN PRECISION MEDICINE

While precision medicine holds immense promise, several challenges must be overcome to realize its full potential. Looking ahead, there are key areas of focus and innovation that will shape the future of precision medicine.

### Challenges:

- **Data Integration and Standardization:** The integration of diverse data sources, including genomics, clinical data, and environmental factors, is challenging due to variations in data formats and standards. Developing interoperable systems and standards is crucial for effective data sharing and analysis.
- **Cost and Access:** Many precision medicine technologies and therapies can be expensive, limiting access for some patients. Ensuring affordability and equitable access is a significant challenge, particularly in healthcare systems with disparities.
- **Clinical Implementation:** Integrating precision medicine into routine clinical practice remains a challenge[14]. Healthcare professionals need education and training to understand and apply precision medicine principles effectively.
- **Genetic Diversity:** Precision medicine is primarily based on genomic data, but many underrepresented populations are not adequately represented in genetic studies. This can lead to disparities in diagnosis and treatment.

### Future Directions:

- **AI and Machine Learning:** The application of artificial intelligence (AI) and machine learning is expected to play a significant role in analyzing complex, multidimensional patient data. AI can help identify patterns, predict patient outcomes, and personalize treatment decisions more effectively.
- **Big Data Analytics:** The use of big data analytics will continue to grow, facilitating the integration of diverse datasets for patient profiling and treatment selection. Data analytics tools will become more sophisticated, aiding in predictive modelling and decision support.
- **Multi-Omics Integration:** Beyond genomics, the integration of multiple omics data sources, such as proteomics, metabolomics, and epigenomics, will enhance the depth of patient profiling, allowing for more precise diagnosis and treatment.
- **Digital Health and Wearables:** The use of digital health tools and wearables will expand, providing continuous real-time data on patient health and lifestyle. This data will inform precision medicine strategies and improve monitoring and early detection.
- **Personalized Preventive Medicine:** Precision medicine will increasingly focus on preventive strategies by identifying individuals at risk and tailoring interventions to reduce disease development or progression[15].

### CASE STUDIES AND SUCCESS STORIES IN PRECISION MEDICINE

Case studies and success stories provide real-world evidence of the transformative potential of precision medicine. These examples illustrate how tailoring healthcare strategies to individual patients can lead to better outcomes, improved patient care, and even life-changing interventions. Here are a few notable case studies and success stories:

- **Cancer Immunotherapy:** One of the most celebrated success stories in precision medicine is the development of cancer immunotherapy. In cases like that of former U.S. President Jimmy Carter, who was diagnosed with metastatic melanoma, immunotherapy drugs like pembrolizumab and nivolumab, which target specific immune system checkpoints, have led to remarkable tumour regression and long-term remission in many patients.
- **Cystic Fibrosis (CF):** The CFTR gene mutation is associated with cystic fibrosis, a genetic disorder. The development of the drug ivacaftor exemplifies precision medicine. It targets specific CFTR mutations and has led to improved lung function and quality of life for individuals with those mutations.
- **Breast Cancer:** HER2-positive breast cancer is an aggressive form of the disease. The success story here is Herceptin (trastuzumab), a drug that specifically targets HER2-positive tumours. It has transformed the prognosis of this subtype of breast cancer, offering better survival rates and quality of life.
- **Pharmacogenomics in Psychiatry:** Genetic testing to guide psychiatric medication selection is gaining traction. Success stories abound as patients with depression or bipolar disorder achieve better symptom management with fewer side effects, thanks to personalized treatment[16].

### ECONOMIC AND MARKET CONSIDERATIONS IN PRECISION MEDICINE

The adoption and growth of precision medicine have significant economic and market implications, affecting various stakeholders within the healthcare industry and beyond. Understanding these considerations is crucial for realizing the full potential of precision medicine.

#### Economic Considerations:

- **Cost Savings:** While precision medicine may involve initial costs for genetic testing and personalized treatments, it can lead to cost savings in the long run. By reducing trial-and-error approaches to treatment, avoiding adverse effects, and preventing the progression of diseases, precision medicine can lower overall healthcare costs.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- **Resource Allocation:** The allocation of resources in healthcare will evolve as precision medicine becomes more prevalent[17]. Investment in diagnostic and therapeutic tools, genetic testing infrastructure, and data analytics will be necessary.
- **Pharmaceutical Industry:** Precision medicine challenges the traditional blockbuster drug model. Pharmaceutical companies will need to adapt by developing targeted therapies and companion diagnostics. This may lead to increased costs and risks, but also potentially higher rewards for successful products.
- **Health Insurance and Payer Models:** Health insurance providers and government payers are adapting to include coverage for genetic testing and targeted therapies. Ensuring equitable access to precision medicine and determining reimbursement policies are ongoing challenges.

## Market Considerations:

- **Emerging Biotech and Diagnostics:** The growth of precision medicine has led to the emergence of biotechnology companies focused on developing targeted therapies and diagnostics. This creates opportunities for investment and innovation in these sectors.
- **Personalized Healthcare Services:** With the increasing availability of genetic testing and personalized medicine options, there is potential for new healthcare service models, including telemedicine consultations with genetics experts, direct-to-consumer genetic testing, and personalized health planning services[18].
- **Laboratory and Diagnostic Equipment:** The market for genetic sequencers, diagnostic tools, and related laboratory equipment is expanding as precision medicine requires advanced technologies for genetic testing, biomarker identification, and diagnostic profiling.
- **Health IT and EHR Systems:** The adoption of precision medicine relies on robust health information technology infrastructure. Companies providing electronic health record (EHR) systems and interoperability solutions are crucial for data sharing and integration.
- The economic and market considerations surrounding precision medicine are complex, reflecting the transformative nature of this approach to healthcare. As the field continues to evolve, stakeholders will need to adapt to changing dynamics, invest in relevant technologies, and navigate regulatory and reimbursement challenges to fully harness the potential of precision medicine[19].

## CONCLUSION

Precision medicine represents a paradigm shift in healthcare, promising to revolutionize the diagnosis, treatment, and prevention of diseases by tailoring medical interventions to the unique characteristics of individual patients. This personalized approach, informed by genetics, genomics, data analytics, and innovative technologies, has the potential to improve patient outcomes, reduce adverse effects, and enhance the quality of healthcare. As we conclude our exploration of precision medicine, it's essential to reflect on the profound impact and potential it holds for the future of healthcare. The journey of precision medicine begins with patient profiling, where an individual's genetic, genomic, clinical, and lifestyle data is integrated to create a comprehensive healthcare plan. This patient-centric approach allows healthcare providers to make informed decisions, choose the most appropriate therapies, and predict treatment responses, ultimately improving healthcare delivery. While precision medicine has made remarkable strides in fields like oncology, cardiology, and infectious diseases, it faces several challenges. These include data standardization, cost considerations, ethical dilemmas, and equitable access to advanced treatments. Navigating regulatory complexities, ensuring data privacy, and addressing issues like genetic discrimination are key areas of concern. However, the future of precision medicine is promising, with cutting-edge technologies like AI and machine learning, data analytics, and wearables poised to propel the field forward. Precision medicine has already generated numerous success stories, from cancer immunotherapy breakthroughs to the effective management of chronic diseases and rare disorders. These case studies underscore the tangible benefits of tailoring treatments to individuals' unique characteristics. As precision medicine continues to evolve, the economic landscape and market dynamics will transform, offering opportunities for biotech, diagnostics, data



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

analytics, and digital health sectors[20]. The emphasis on cost savings, resource allocation, and personalized healthcare services will shape the healthcare industry of tomorrow.

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**INTERNATIONAL ANKARA CONGRESS ON  
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October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ANALYSIS AND DESIGN OF PRESTRESSED CONCRETE SLEEPERS WITH PARTIAL REPLACEMENT OF FLYASH IN CONCRETE

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### ABSTRACT

The analysis and design of prestressed concrete sleepers with partial replacement of fly ash in concrete is a significant research endeavour aimed at enhancing the sustainability and performance of railway infrastructure. Prestressed concrete sleepers are critical components in railway track systems, providing stability and support to rails. This study focuses on the incorporation of fly ash, a byproduct of coal combustion, as a partial replacement for conventional cement in the concrete mix. The primary objective of this research is to investigate the mechanical properties, durability, and environmental benefits of using fly ash in concrete sleepers. Fly ash is known for its pozzolanic properties, which can improve the strength and durability of concrete while reducing the carbon footprint of the construction industry. By optimizing the proportion of fly ash in the mix, the study aims to achieve a balance between sustainability and structural performance. The analysis phase involves extensive material testing and finite element simulations to assess the structural integrity of the prestressed concrete sleepers with varying fly ash content. Additionally, durability tests will assess the resistance of these sleepers to environmental factors such as moisture and temperature variations. The results of this analysis and design study are expected to provide valuable insights into the feasibility of using fly ash as a sustainable alternative in the construction of prestressed concrete sleepers. This research contributes to the ongoing efforts to make railway infrastructure more environmentally friendly and economically viable while maintaining high safety and performance standards.

### INTRODUCTION

Sleepers, also known as railroad ties or concrete ties, are essential components in railway track systems. They provide support to the rails and distribute the weight of trains, ensuring safe and stable rail operations. Prestressed sleepers are a crucial innovation in modern rail infrastructure, offering improved durability and longevity. The primary function of prestressed sleepers is to resist the various forces and stresses exerted by passing trains. These forces include vertical loads, lateral forces during cornering, and dynamic forces from train acceleration and braking. Prestressed sleepers are designed to maintain their shape and structural integrity under these demanding conditions.

Types of sleepers :



**Fig-1 Wooden sleepers.  
sleepers.**



**Fig-2 Cast iron sleepers.**



**Fig -3 Steel**

There are two main types of prestressed sleepers: pre-tensioned and post-tensioned.

**Pre-Tensioned Sleepers:** In pre-tensioned sleepers, high-strength steel wires or strands are pre-stressed by applying tension to them before pouring the concrete. The concrete is then cast around the stressed wires, resulting in a sleeper that is already under compression when installed. This compression helps counteract the tensile forces the sleeper experiences in service, enhancing its strength and resilience.

**Fig -4 Pre-stressed sleepers**



**Post-Tensioned Sleepers:** Post-tensioned sleepers have similar steel wires or strands placed within the concrete, but tension is applied after the concrete has set. This process allows for adjustments and fine-tuning of the sleeper's prestress level. Post-tensioning offers flexibility and control in optimizing sleeper performance for specific track requirements.



**Fig-5 Post-tensioned sleepers**

Both types of prestressed sleepers offer improved durability, reduced maintenance, and extended service life, making them crucial components of modern railway infrastructure. Their ability to withstand heavy loads and environmental factors ensures the safety and efficiency of rail transportation systems worldwide.

### EXPERIMENTAL PROCEDURE

The process of analysing and designing prestressed concrete with partial fly ash replacement in concrete involves a series of systematic steps. It begins with material selection, encompassing Ordinary Portland Cement (OPC), fly ash, aggregates, water, and prestressing strands. Mix proportioning is crucial, aiming to balance compressive strength, workability, and environmental benefits by incorporating varying levels of fly ash (20%, 30%, 40%, and 50%) while maintaining control specimens with 100% OPC.

Fresh concrete properties are rigorously tested, including slump, workability, and air content. Afterward, curing is carried out in controlled conditions to ensure proper hydration and strength development. Mechanical tests, such as compressive, tensile, and flexural strength assessments, are conducted to gauge the impact of fly ash replacement on concrete strength. Durability is examined through water absorption, chloride ion penetration, and sulphate resistance tests to assess long-term performance.

Structural analysis software is employed to model and analyse prestressed concrete members, considering the influence of fly ash. Design optimization is then performed based on experimental data and structural analysis results. Environmental benefits of fly ash usage are evaluated through life cycle analysis, focusing on reduced emissions and waste reduction.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Finally, thorough documentation of all data, results, and design specifications ensures future reference and validation, fostering sustainability and resource efficiency in construction practices.

Tests conducted on aggregates are shown below:



**Fig:6-Penetration test Test**



**Fig:7-Sieve analysis**



**Fig:8-Crushing**



**Fig:9-Elongation index test**



**Fig:10-Flakiness test**

FOLLOWING TABLES CONSISTS OF DETAILS OF MIX DESIGN OF M55 GRADE AND SOURCE OF RAW MATERIALS:

S. No	Mix Design	%FlyAsh	Cement(kg)	Fly Ash (gm)	Coarse Aggregate (kg)		Fine Aggregate (kg)	Water(lt)
					20mm	10mm		
1	M55	0	10.92	0	18.83	8.05	12.929	4.2
2	M55	5	10.37	546	18.83	8.05	12.929	4.2
3	M55	10	9.883	1037	18.83	8.05	12.929	4.2
4	M55	15	9.282	1638	18.83	8.05	12.929	4.2

Table: 1- Details of Mix Design

S. No	Source of Raw Materials	Area
2.1	Cement(brand name) Location of cement plant	Nagarjuna cement ,pendurthi
2.2	CA1 (20mm)	CEV, JNTUGV
2.3	CA2(10mm)	CEV , JNTUGV
2.4	Fine aggregate	CEV, JNTUGV
2.5	Water source	CEV, JNTUGV
2.6	pH value of water	5.5

Table: 2- Source of Raw Materials



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## QUALITY PLAN:

S.NO	Description	Characteristic Check	Specification Reference	Acceptance Norms	Frequency	Format of Record
1	Raw materials					
1.1	Cement					
		Fineness	IS:4031 (Pt-2)-1999	3700 cm <sup>2</sup> /gm.	-do-	Format-1
		Normal consistency	IS:4031 (Pt-III&IV)- 1996	Needle reading 5 to 7mm below from bottom	-do-	Format-2
		IST	IS:4031 (Pt-V)-1996	60 mins	-do-	Format-3
		FST	IS:4031 (Pt-III)-1988	600 mins	-do-	-do-
		7 days mortar cube strength	IS:4031 (Pt-VI)-1988	Not < 37.5mpa	-do-	Format-4
		soundness	IS:12269-1987	Not > 5mm	-do-	-
1.2	AGGEREGATES					
	20mm(CA1) 10mm(CA2)	Individualgrading	As per appendix 'A' of IS:383	Table-2 of IS:383-1970	Weekly	Format-6
	20mm(CA1) 10mm(CA2)	Combinedgrading	-do-	Fit in approved envelopes. plotting on semi log graph	weekly	-do-
	20mm(CA1)	Impact value				



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

	10mm(CA2)					
	20mm(CA1)	Abrasionvalue				
	10mm(CA2)					
	20mm(CA1)	Crushingvalue	IS:2386 (Pt-1)	< 30%	Yearly foreach source	
	10mm(CA2)					
	20mm(CA1)	Flakinessindex	IS:2386 (Pt-1)	< 30%	weekly	Format-7
	10mm(CA2)					
	20mm(CA1)	Elongationindex	IS:2386 (Pt-1)	< 30%	weekly	Format-8
	10mm(CA2)					
	SAND(FA)	Finenessmodulus	IS:383-1970			
		Silt content	-do-	< 3%		-do-
	All aggregate	Absorbedmoisture content	IRS:T-39IRS:T-45	Calculate moisture adjustmentin mix design	Daily, before each shift	Format-5
1.4	WATER					
	Treatedwater	pH value	IS:456-2000	Not < 6 &not > 9	Yearly	
		SO4	-do-	< 500mg/l		-do-
		Chloride	-do-	< 500mg/l		-do-
		Quantity	IRS:T-39IRS:T-45	Sufficient for concrete,steam and water curing	Daily	
1.5	SGCI INSERTS					
	Dimension	Jig to Drg no.RT 454 Alt9	IRS-T-46-1996& Rly. Bd's letter dt.	As per RSDO'S Latest		Suitable format canbe made

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

			11/08/03	specifications		by plant
	Weight	Weight	-do-	1.55kg (-3%)		
	Soundness	2 kg hammertest	-do-	1% insert randomly by SE/Works		

## RESULTS AND DISCUSSIONS

The analysis and design of prestressed concrete sleepers with partial replacement of fly ash in concrete revealed promising results and noteworthy discussions. Incorporating fly ash, a waste byproduct of coal combustion, into the concrete mix yielded several positive outcomes. Firstly, the inclusion of fly ash led to an enhancement in the workability of the concrete mixture. The finer particles of fly ash acted as a filler material, reducing water demand and improving the overall cohesion of the mix. This resulted in easier handling and placement during sleeper production. Furthermore, the compressive strength of the prestressed concrete sleepers was not significantly compromised with the partial substitution of fly ash. The combination of fly ash and cementitious materials maintained the required structural integrity and durability standards, making it a sustainable choice. The discussion also centered on environmental benefits. The utilization of fly ash as a supplementary cementitious material reduced greenhouse gas emissions associated with traditional concrete production. This eco-friendly approach aligns with sustainable construction practices, promoting a greener infrastructure. However, careful consideration of the quality and source of fly ash is crucial to ensure consistent performance. Additionally, long-term monitoring and research are essential to assess the sleeper's performance under various conditions.

S.No	Grade of Concrete	Days for Testing	Sample for Cubes (KN)			Avg. of 3 cubes (KN)	Area of Cube (mm <sup>2</sup> )	Compressive Strength = Load/Area (N/mm <sup>2</sup> ).
			1	2	3			
1	M55	3	350.12	650.81	958.18	653.036	22500	29.02
2	M55	14	765.83	770.53	852.19	796.183	22500	35.38
3	M55	21	1350.58	1460.69	1600.89	1470.72	22500	65.36
4	M55	28	1450.05	1480.86	1630.08	1520.33	22500	67.57

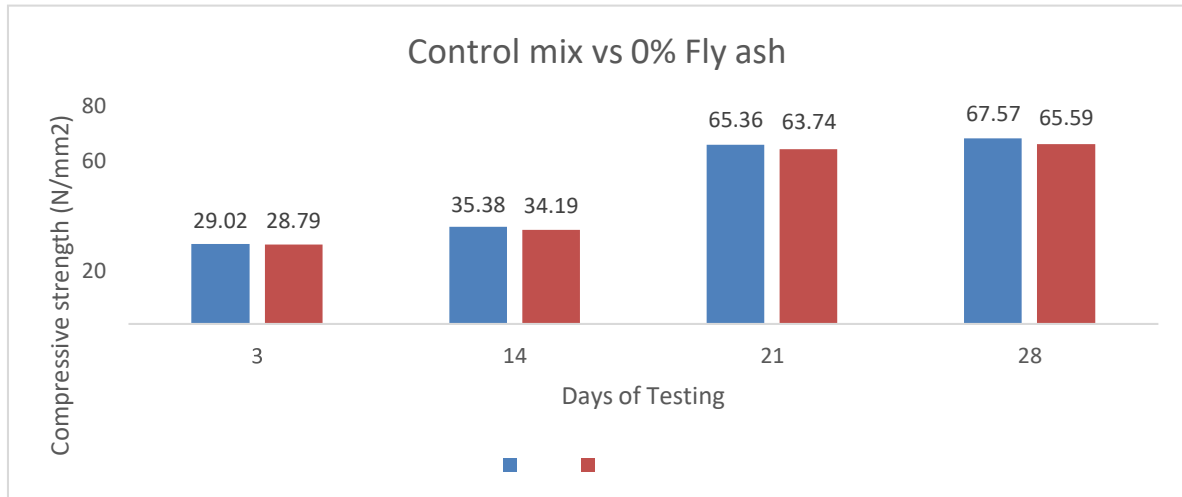
Table:1-Compressive strength of M55 cube samples of Control mix.

S.No	Grade of Concrete	Days for Testing	Sample for Cubes (KN)			Avg. of 3 cubes (KN)	Area of Cube (mm <sup>2</sup> )	Compressive Strength = Load/Area (N/mm <sup>2</sup> ).
			1	2	3			
1	M55	3	339.84	646.81	956.73	647.790	22500	28.79
2	M55	14	765.83	719.15	823.06	769.346	22500	34.19
3	M55	21	1301.25	1412.15	1589.06	1434.15	22500	63.74
4	M55	28	1400.25	1425.26	1601.98	1475.83	22500	65.59

Table:2-Compressive strength of M55 cube samples with 0% Fly ash.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

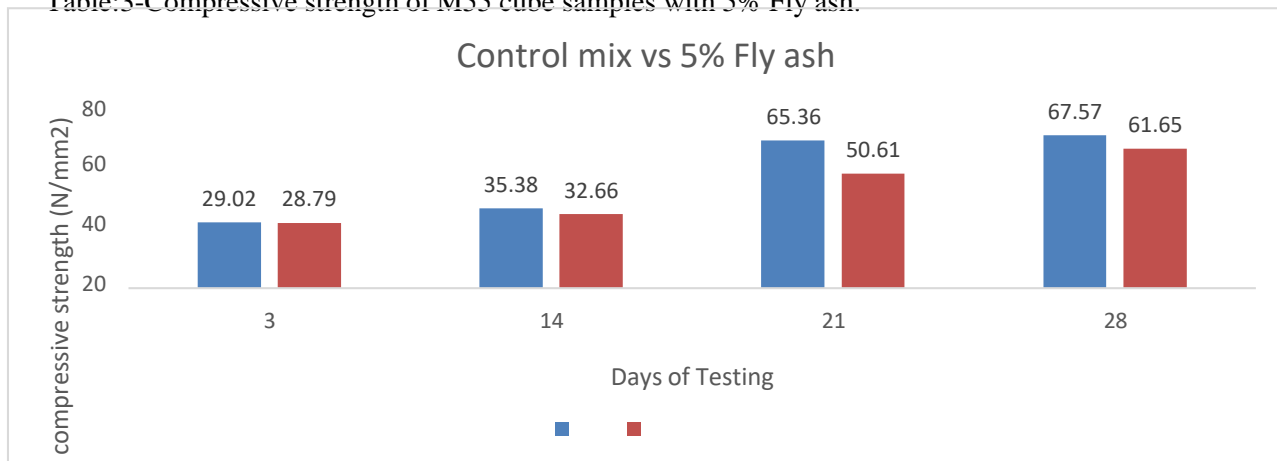
October 13-14, 2023



Tests are carried out for the following samples of M55 grade with 0 % fly ash i.e., nominal mix of M55 grade. Different samples are tested by using CTM for 3,14,21,28 days respectively. Results show that the compressive strength of concrete cube samples tested for 3 days are giving results closer to the control mix. There are fluctuations in the compressive strength for 14 and 21 days. But finally for 28 days the compressive strength of nominal mix is satisfying the results of control mix Design.

S.No	Grade of Concrete	Days for Testing	Sample for Cubes (KN)			Avg. of 3 cubes (KN)	Area of Cube (mm <sup>2</sup> )	Compressive Strength = Load/Area (N/mm <sup>2</sup> ).
			1	2	3			
1	M55	3	339.84	646.81	956.73	647.790	22500	28.79
2	M55	14	639.21	713.09	852.28	734.86	22500	32.66
3	M55	21	1046.58	1070.12	1300.06	1138.92	22500	50.61
4	M55	28	1425.12	1536.16	1200.21	1387.16	22500	61.65

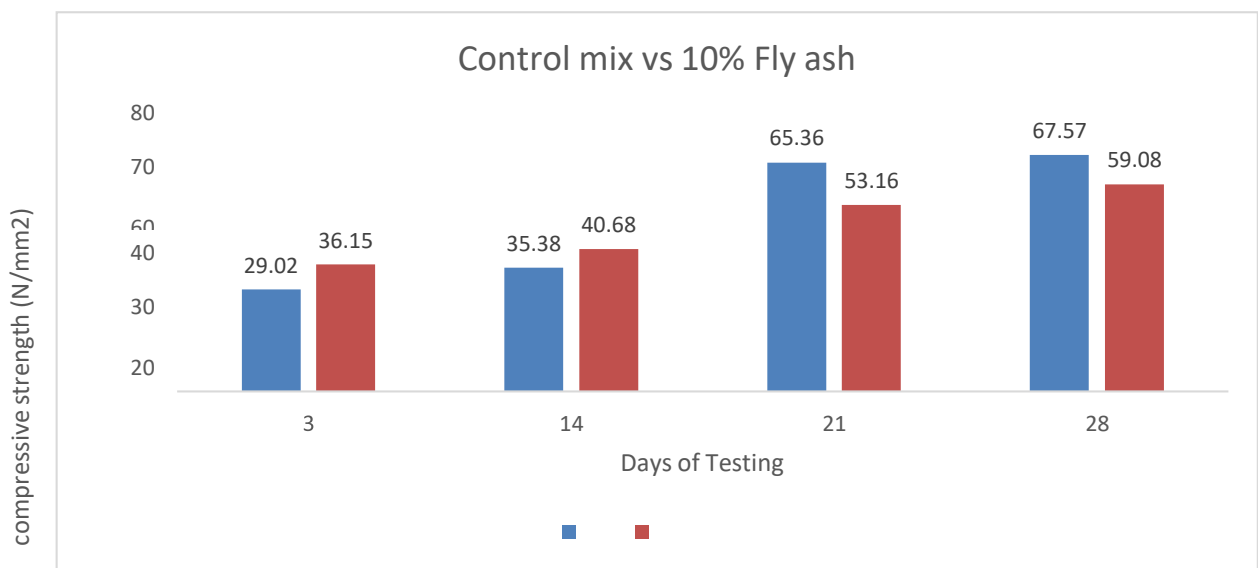
Table:3-Compressive strength of M55 cube samples with 5% Fly ash.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

S.No	Grade of Concrete	Days for Testing	Sample for Cubes (KN)			Avg. of 3 cubes (KN)	Area of Cube (mm <sup>2</sup> )	Compressive Strength = Load/Area (N/mm <sup>2</sup> ).
			1	2	3			
1	M55	3	801.73	806.73	832.18	813.546	22500	36.15
2	M55	14	925.13	980.12	840.79	915.346	22500	40.68
3	M55	21	998.35	1376.50	1213.45	1196.1	22500	53.16
4	M55	28	1248.13	1215.26	1524.56	1329.32	22500	59.08

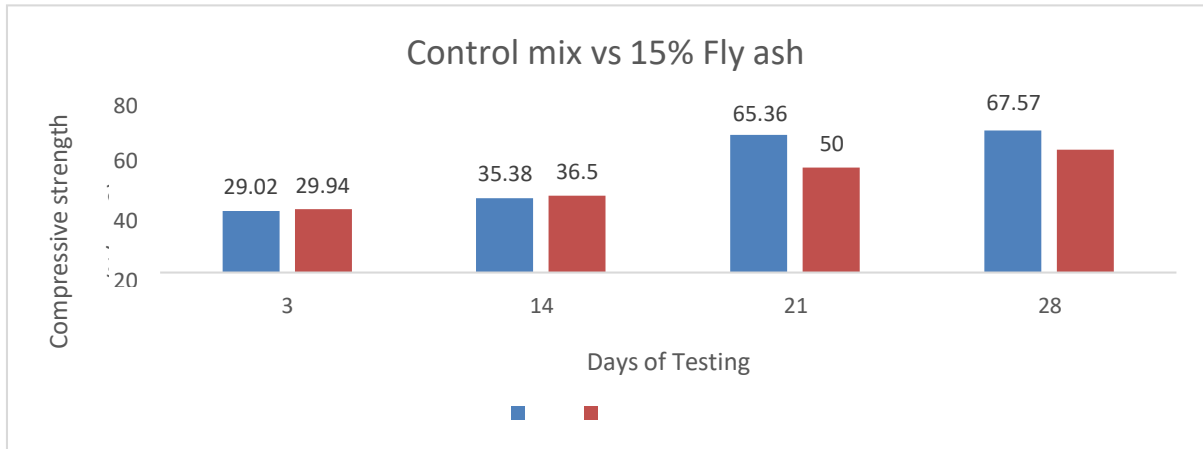
Table:4-Compressive strength of M55 cube samples with 10% Fly ash



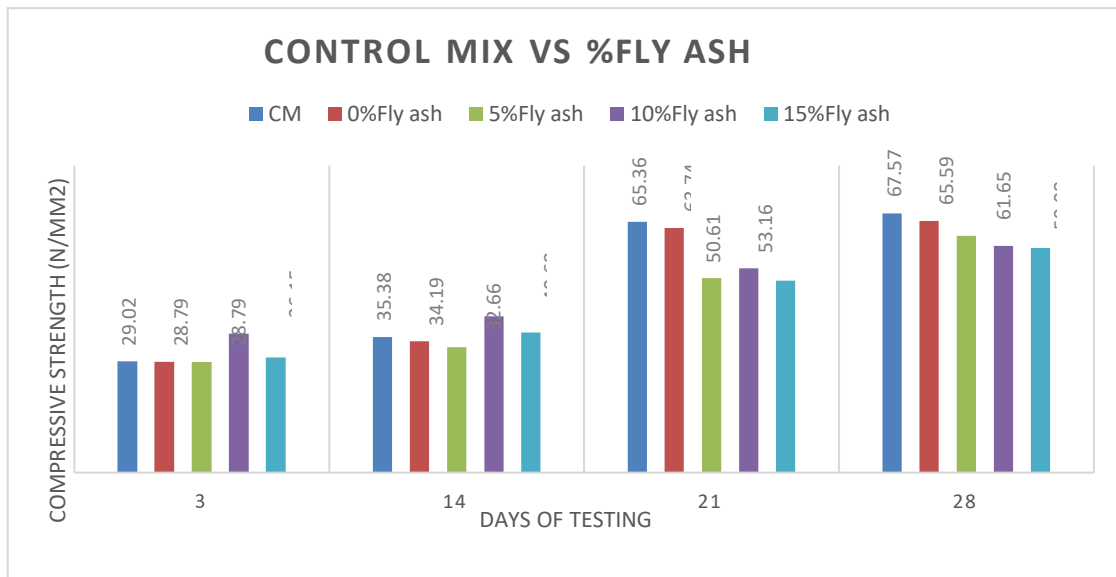
S.No	Grade of Concrete	Days for Testing	Sample for Cubes (KN)			Avg. of 3 cubes (KN)	Area of Cube (mm <sup>2</sup> )	Compressive Strength = Load/Area (N/mm <sup>2</sup> ).
			1	2	3			
1	M55	3	841.85	557.04	622.12	673.670	22500	29.94
2	M55	14	583.18	980.95	899.45	821.193	22500	36.50
3	M55	21	973.31	870.86	1531.20	1125.12	22500	50.00
4	M55	28	1200.31	1424.89	1326.16	1317.12	22500	58.54

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

Table:5-Compressive strength of M55 cube samples with 15% Fly ash.



## CONTROL MIX VS %FLY ASH



## CONCLUSION

The analysis and design of prestressed concrete sleepers with partial replacement of fly ash in concrete have shown promising results. This study aimed to evaluate the feasibility of using fly ash as a supplementary cementitious material in prestressed concrete sleepers.

The investigation encompassed various aspects, including material properties, mix design, structural performance, and environmental impact. The results revealed that incorporating fly ash up to a certain percentage, typically 20-30% of the cement content, significantly improved the workability of the concrete mixture without compromising its compressive strength. This substitution also exhibited potential benefits in terms of reducing greenhouse gas emissions and the demand for natural resources, making it a sustainable choice.

Structurally, the prestressed concrete sleepers met the required standards for load-bearing capacity and durability. Moreover, the reduced heat of hydration due to fly ash led to decreased cracking, enhancing the long-term performance of sleepers.

In conclusion, the incorporation of fly ash in the design of prestressed concrete sleepers is a viable and sustainable alternative that merits consideration in railway infrastructure projects. Further research and

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

field testing may be needed to fine-tune the optimal fly ash content for specific applications and environmental conditions, but overall, this approach holds promise for improving the efficiency and sustainability of railway systems.

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**INTERNATIONAL ANKARA CONGRESS ON  
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October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## SOIL STABILIZATION WITH AERATED CEMENTED CLAY- FA SUPPLANT

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### ABSTRACT

Soil stabilization enhances soil properties like shear strength and bearing capacity through controlled compaction or additives like cement, sand, fly ash, and air foaming agents. It's vital in modern civil engineering, especially for road construction, improving soil strength and reducing costs. Aerated cemented material is widely used in infrastructure and facility construction. This project analyzes the impact of water, cement, air content, and fly ash replacement on properties of ACC clay-FA materials. The composite mix reduces costs, settlements, and enhances soil strength. The V/C ratio (void/cement) is crucial for ACC-FA material strength. The 30% fly ash replacement assumption is economically beneficial.

**Keywords:** Fly Ash, Soil Stabilisation, Cemented clay.

### INTRODUCTION

Soil is a fundamental element crucial to sustaining life, providing the necessities like food, housing, and clothing. It is a foundational requirement for a country's development, supporting essential infrastructure such as buildings, roads, bridges, and more. Derived from the Latin word 'solium,' soil is the upper layer of the Earth, a loose material where plants grow. In engineering terms, it's an unconsolidated material composed of solid particles resulting from rock disintegration, with void spaces potentially containing air, water, or organic matter. Understanding and modifying soil properties are critical, especially the subgrade, which is natural soil supporting various layers in roads. Poor subgrade properties necessitate modification or stabilization to enhance its strength. Soil stabilization involves treating soil to maintain, alter, or improve its performance as a construction material.

India has diverse soil types, including red soils found predominantly in the Deccan Plateau and states like Madhya Pradesh, Andhra Pradesh, Bihar, Maharashtra, and more. Red soils are formed through a process involving clay, limestone, and igneous rock elements, resulting in their distinctive reddish tint. They vary in texture from sandy to clayey and are deficient in certain nutrients like lime, magnesia, phosphates, and humus.

In this project, a thorough analysis of red soils in India is undertaken, including their distribution, characteristics, and benefits. The study aims to explore soil stabilization methods, incorporating air foam agents and ACC-FA supplementary materials with different fly ash percentages. The methodology involves experimental procedures and laboratory tests to evaluate the impact of these additives on red clayey soil properties, offering insights to enhance soil stabilization techniques. The report is organized into chapters covering introduction, soil stabilization, literature review, methodology and experimental study, results and discussions, and conclusions. Soil stabilization involves altering soil properties, either chemically or mechanically, to create an improved material with desired engineering characteristics. This process aims to enhance soil strength, durability, prevent erosion, and minimize dust formation. The goal is to produce a soil material or system that can withstand design use conditions throughout its intended lifespan. The success of soil stabilization depends on thorough soil testing and verification of chosen methods in the laboratory before field application.

Methods of soil improvement can be broadly categorized into ground reinforcement, ground improvement, and ground treatment. Techniques include stone columns, soil nails, micropiles, jet grouting, ground anchors, geosynthetics, fibers, lime columns, and more. The selection of the appropriate method depends on the specific soil properties and the desired engineering outcome.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Soil stabilization provides numerous advantages, such as enhanced soil strength and bearing capacity, making it more economical and sustainable compared to alternatives like deep foundations. It's also vital in stabilizing slopes, preventing erosion, and reducing soil volume change due to temperature or moisture variations. Different materials, including cement, lime, fly ash, and bitumen, play crucial roles in stabilizing soil through mechanical or chemical processes. For instance, cement stabilizes soil through chemical reactions during hydration, with the required amounts varying based on soil type.

The use of lightweight materials like ACC-FA (Aerated Cement Clay - Fly Ash) Supplnat is an attractive alternative for stabilizing soft soil deposits. By replacing cement with fly ash and incorporating air foam agents, the resultant composite mix not only enhances stability and strength but also reduces costs and lateral settlements. This approach significantly contributes to efficient construction and soil stabilization, especially in regions with challenging soil conditions.

## 1.8 ANALYSIS OF RED SOILS AVAILABLE IN INDIA:

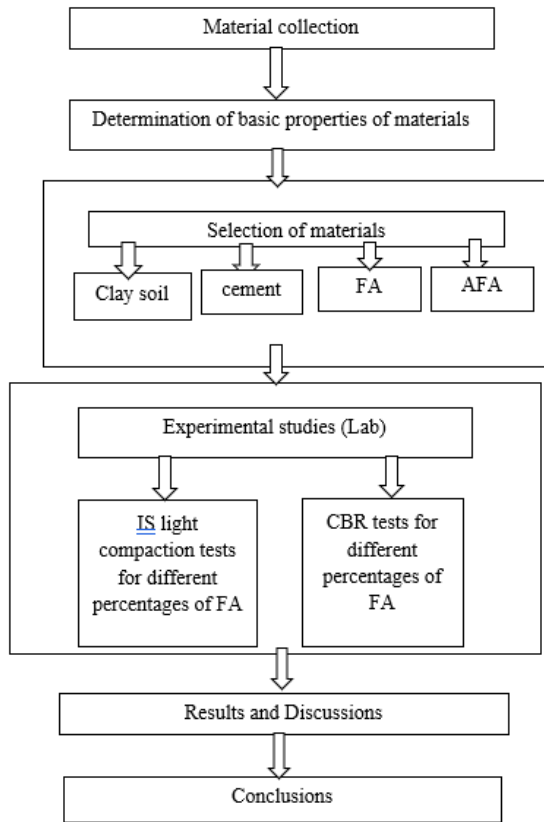
Fig.1 Mapping of Red soils availability



## METHODOLOGY AND EXPERIMENTAL STUDY

### FLOWCHART FOR METHODOLOGY

Fig 2 -Flowchart representing Methodology



Given the detailed information provided about the project objectives, scope of work, materials used, and experimental studies, it seems like a comprehensive and well-structured study to improve the properties of red soil for construction purposes. The objectives are clear, focusing on reducing density and increasing California bearing ratio (CBR) using specific admixtures, providing an alternative solution for industrial waste disposal, and aiming for an economical stabilization solution.

The experimental studies, such as specific gravity, Atterberg limits, compaction tests, CBR tests, and UCS tests, are well-planned and aligned with the project objectives. The materials used, including red soil, fly ash, cement, and air foam agent, are described in detail along with their properties, functions, and sources.

The inclusion of graphs, tables, and diagrams in the experimental study section will provide a visual representation of the data, making it easier to understand the results and conclusions. It's also good to see the consideration of various proportions of red soil, fly ash, cement, and AFA in the experimental trials.

#### Effect of AFA ON SOIL:

In general, synthetic foaming agents are preferred for the following advantages on soil.

Allows a greater control over density of material than protein based foams.

Possess permanent (since they are produced in accordance with technical requirements).

Longer working life. Proper selection of foaming agent is essential as the type of foaming agent used influences the final strength of foamed materials .

The excessive foam volume results in a drop in flow. However, the flow is significantly affected by mixing time.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

In the most foamed soil mixes, at the total volume of the final mix the air voids ranges between 6% and 35%



Fig-3 Air Foam agent

Air foam agent used in this study:

The foaming agent referred for this study have motto light in weight, build in faster and good in strength. The foaming agent is branded as ELITE CLC light weight concrete foaming agent from AAC blocks, DEV DATTA industries, Ayyannapalem, Sabbavaram, Visakhapatnam. Here, AFA is considered to be constant as 1% of weight of cement + FA. Due to this additive strength of mix increases even on the reduction of weight.

Overall, it appears to be a thorough and systematic approach to address the project objectives and evaluate the potential benefits of using specific admixtures to enhance the properties of red soil for construction.

In this experiment, a totally 18 number of trials are conducted.

## RESULTS AND DISCUSSIONS

In this study, various tests were conducted to analyze the properties and behavior of untreated soil and soil treated with different proportions of cement, fly ash (FA), and air foam agent (AFA). The aim was to understand how these additives affect the soil's properties and performance, particularly in terms of liquid limit, grain size distribution, specific gravity, maximum dry density (MDD), optimum moisture content (OMC), California Bearing Ratio (CBR), and unconfined compressive strength (UCS).

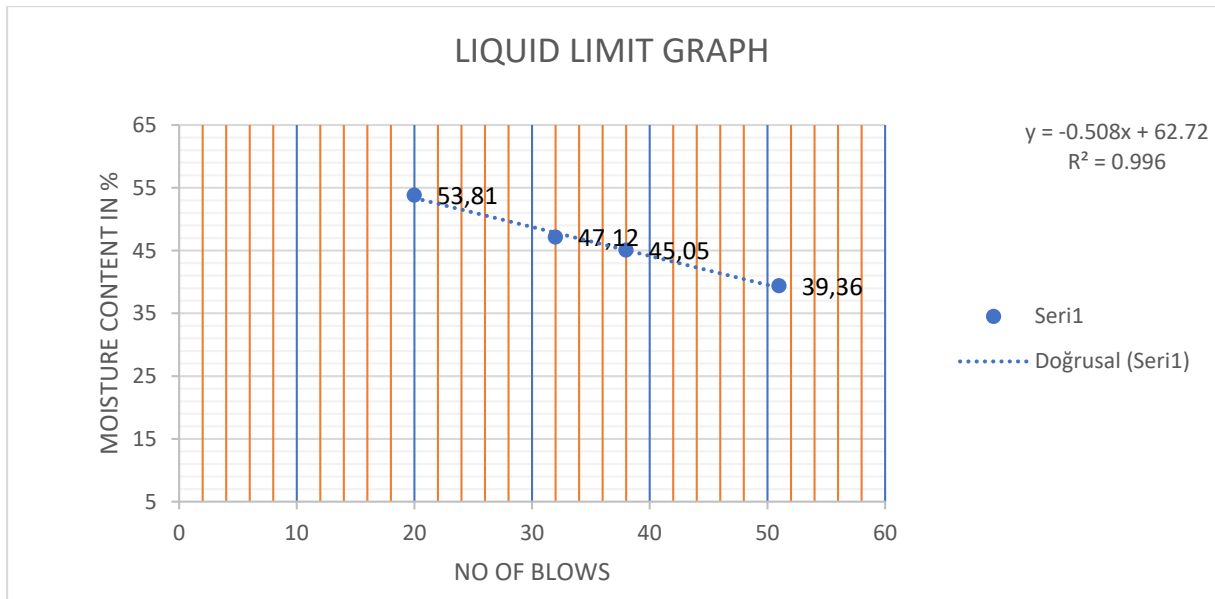
Liquid limit graph and table for untreated soil:

S NO	OBSERVATIONS	TRAIL 1	TRAIL 2	TRAIL 3	TRAIL 4
1	No of blows	20	32	38	51
2	Mass of wet soil (m)	38.26	33.560	29.58	37.58
3	Mass of dry soil (m)	24.870	22.811	20.394	26.966
4	Water content (%w)	53.81	47.12	45.05	39.36

Table -1 liquid limit tabular form

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023



Graph – 1 plotted between No of blows & Moisture content values shown in table 4.1

Grain size distribution of untreated soil:

IS sieve no	Weight retained on each sieve (gm)	% retained on each sieve	Cumulative % retained on each sieve(y)	% finer 100-y
4.75	10	1	1	99
2.36	18	1.8	2.8	97.2
1.18	206	20.6	23.4	76.6
0.6	126	12.6	36	64
0.3	484	48.4	84.4	15.6
0.15	78	7.8	92.2	7.8
0.075	58	5.8	98	2
Pan	20	2	100	0

Table- 2: Tabular form for grain size distribution of soil sample

Grain size distribution curve for soil:

The graph is plotted between size of particles and % fines.

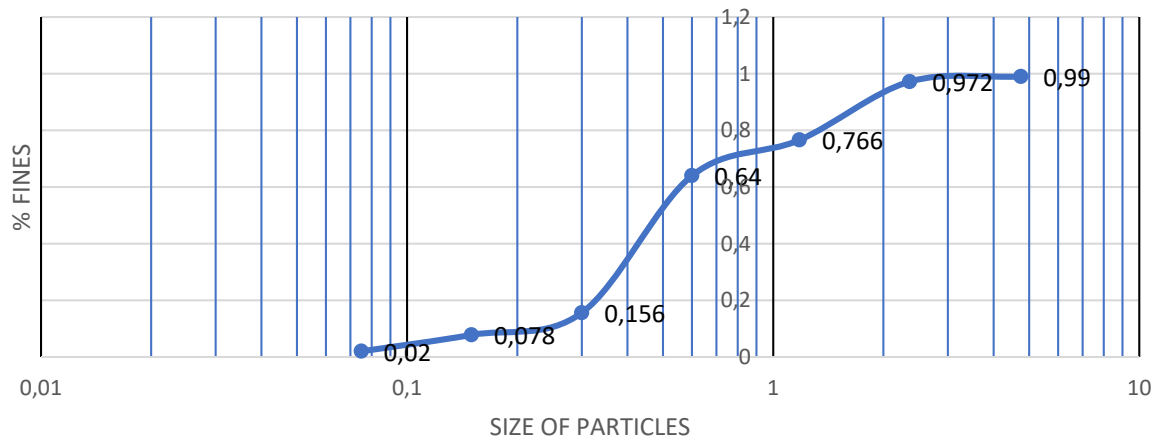
This graph is plotted based on the values from the table- 5.2



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October 13-14, 2023

GRAIN SIZE DISTRIBUTION CURVE



Graph- 2 Grain size distribution curve

Tabular form for specific gravity values:

S.NO	OBSERVATIONS	TRAIL 1	TRAIL 2	TRAIL 3
1	Mass of the empty Pycnometer ( $m_1$ ) in g	28.58	28.72	28.61
2	Mass of the Pycnometer + soil ( $m_2$ ) in g	49.58	49.50	49.38
3	Mass of the Pycnometer + soil + water ( $m_3$ ) in g	89.97	89.94	90.48
4	Mass of Pycnometer + water ( $m_4$ ) in g	77.85	77.42	77.98
5	Specific gravity (G)	2.36	2.48	2.51
	Average specific gravity	2.45		

Specific gravity of the soil = 
$$\frac{(m_2 - m_1) \cdot 1000}{(m_4 - m_1) - (m_3 - m_2)} \quad G_1 = 2.09 \quad G_2 = 2.25 \quad G_3 = 2.05$$

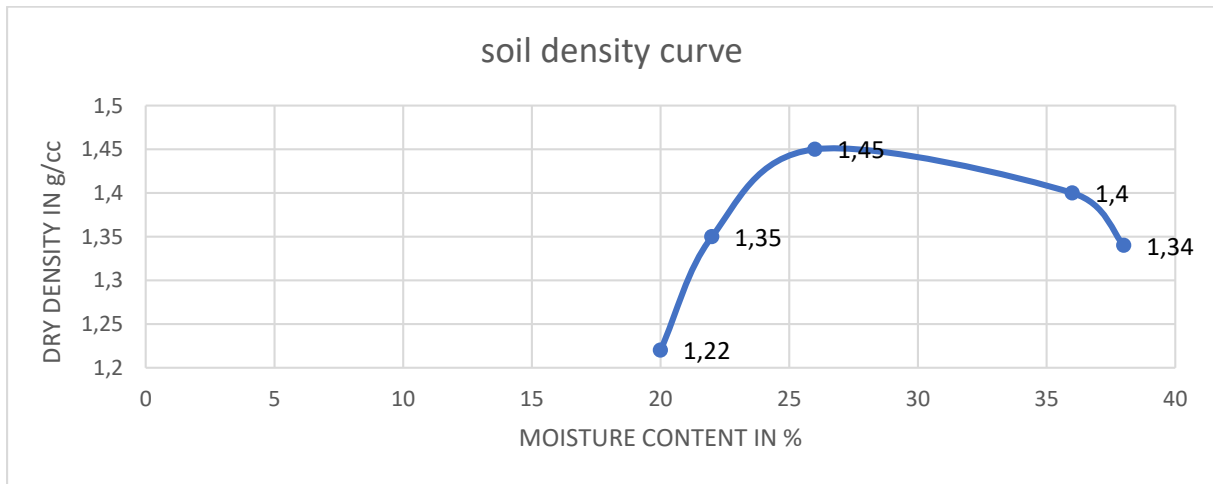
Average value of specific gravity of soil =  $(G_1 + G_2 + G_3) / 3 = 2.45$

The specific gravity of the soil sample = 2.45

Graph shows maximum dry density and optimum moisture content:

S. No	Added water content in (%)	Weight in kg	Volume in cc	Unit weight in g/cc	Water content in (%)	Dry density in g/cc
1	12	1.459	996.9	1.464	20	1.220
2	14	1.641	996.9	1.647	22	1.350
3	18	1.821	996.9	1.827	26	1.450
4	22	1.898	996.9	1.904	36	1.400
5	24	1.843	996.9	1.849	38	1.340

Table 4 - standard proctor values for untreated soil



Graph -4 Soil density curve

From the above graph the peak of curve reported as a maximum dry density and corresponding Y - axis value is

taken as maximum dry density .

And the corresponding X-axis value is taken as maximum dry density, and corresponding X-axis value is taken as

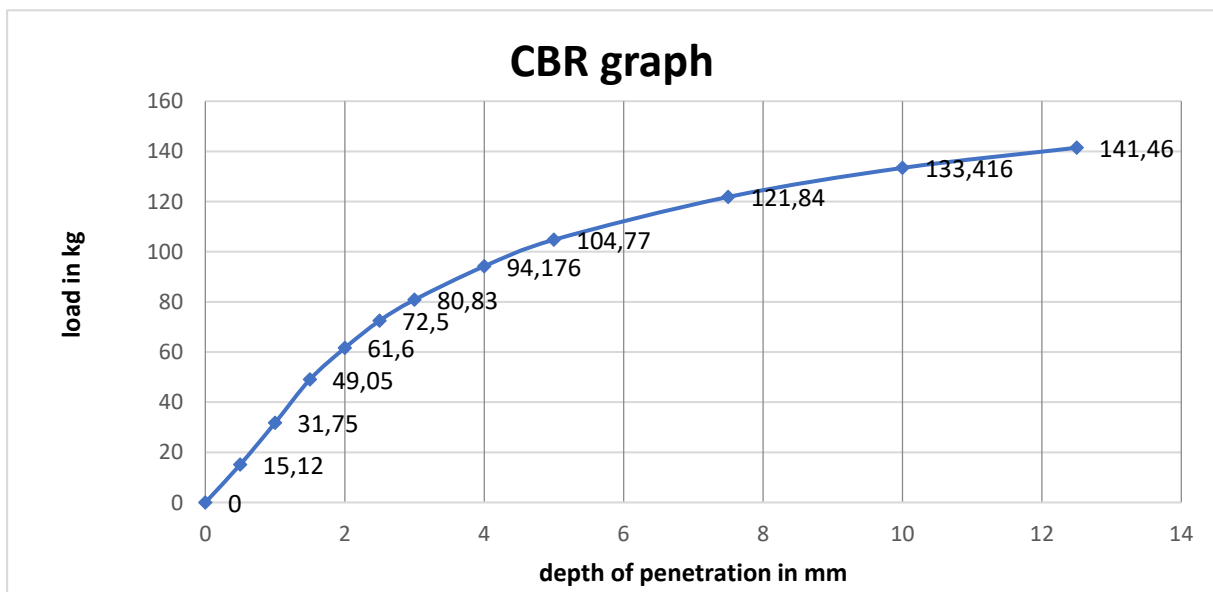
optimum moisture content.

Maximum dry density = 1.45g/cc

Optimum moisture content = 26%

CBR graph for untreated soil:

The graph shows load penetration response of red soil. The loads for 0,0.5,1,1.5,2,2.5,3,4,5,7.5,10,12.5. are taken from test values.



Graph- 5 CBR graph

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

CBR value for 2.5mm penetration is =5.29%

Optimum moisture content = 26.66%

## UCS TEST RESULTS:

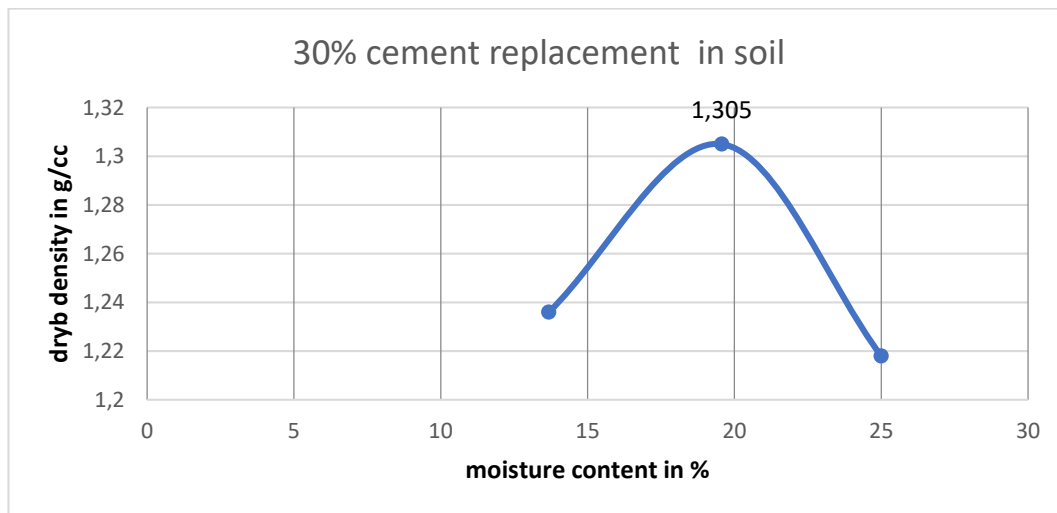
Unconfined compressive strength test is conducted for soil sample for determination of shear strength.

The unconfined compressive strength of the soil =0.543N/mm<sup>2</sup>

And the cohesion value =0.272N/mm<sup>2</sup>

Graph shows maximum dry density and optimum moisture content:

The graph shows dry density response with water content obtained from IS light weight compaction test on 70% soil and 30% of cement .optimum moisture content is obtained at maximum dry density from the graph.



Graph-6 UCS GRAPH

From the above graph the X&Y axes values corresponding to the peak of the curve represents the optimum moisture content and dry density.

Maximum dry density = 1.305g/cc

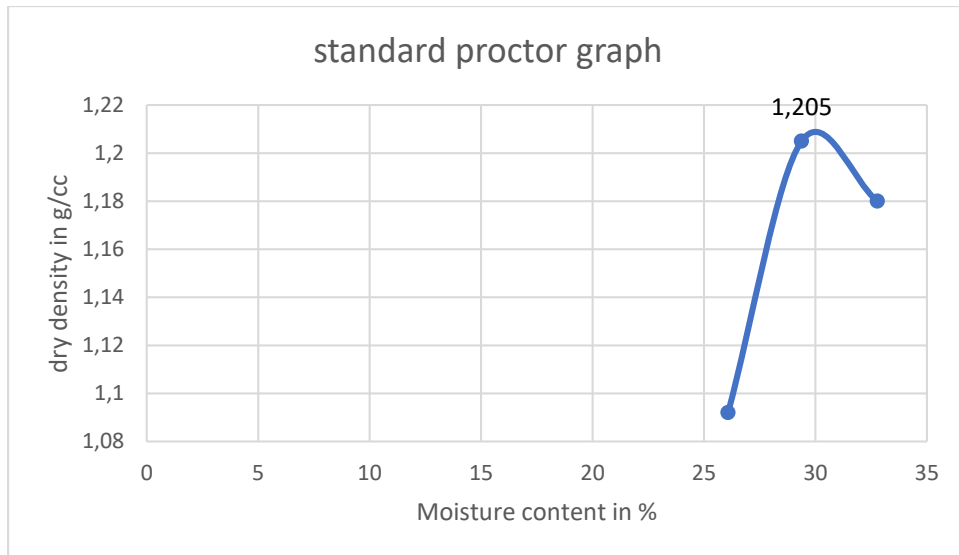
Optimum moisture content = 19.56%

Variation of dry density with water content of 70% of soil+ 30%of cement +1%AFA of weight of cement:

The graph shows response of dry density with water content obtained from IS light weight compaction test on 70% of lime, 30% of cement, and 1%of AFA of weight of cement. Optimum moisture content is obtained at the maximum dry density from the graph.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023



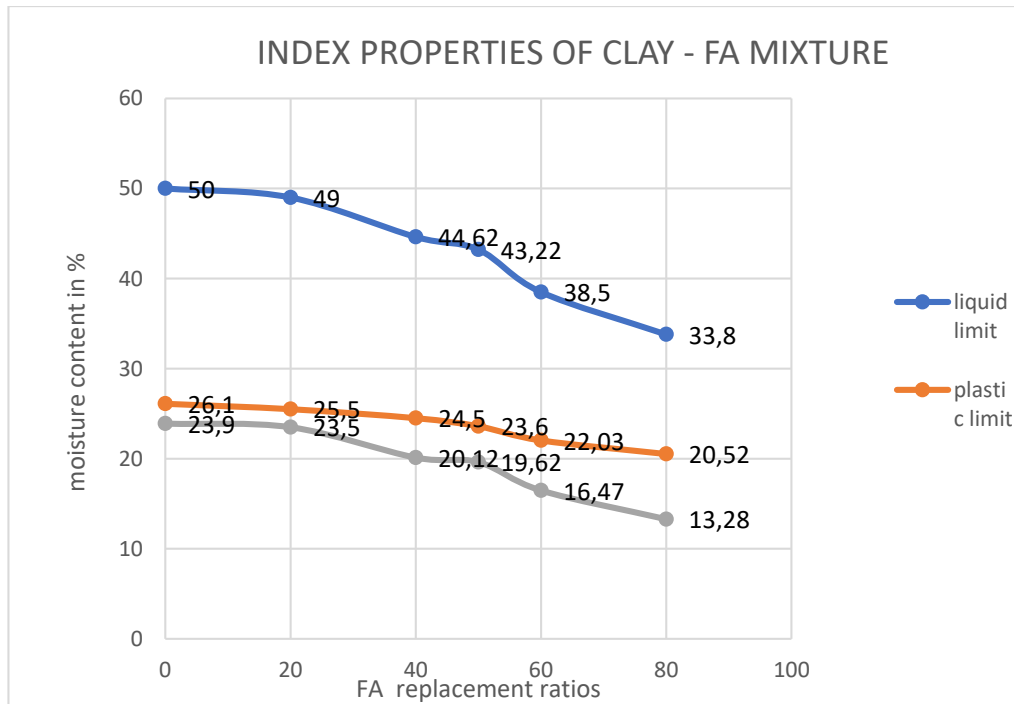
Graph-7 Standard proctor test

From the above graph, Maximum dry density = 1.205 g/cc

Determination of FA fixation point:

S. NO	FA replacement ratio in (%)	Liquid limit in (%)	Plastic limit in (%)	Plasticity index in (%)
1	0	50	26.10	23.9
2	20	40	25.50	23.5
3	40	44.62	24.50	20.12
4	50	43.22	23.60	19.62
5	60	38.5	22.03	16.47
6	80	33.8	20.82	13.28

Table –8 Variation of moisture content with FA replacement ratios:



Graph- 8 Index properties of clay-FA mix

From the above graph, at the 60% of FA replacement its clearly observed that decrements in liquid limit plastic limit and plasticity index are clearly observed.

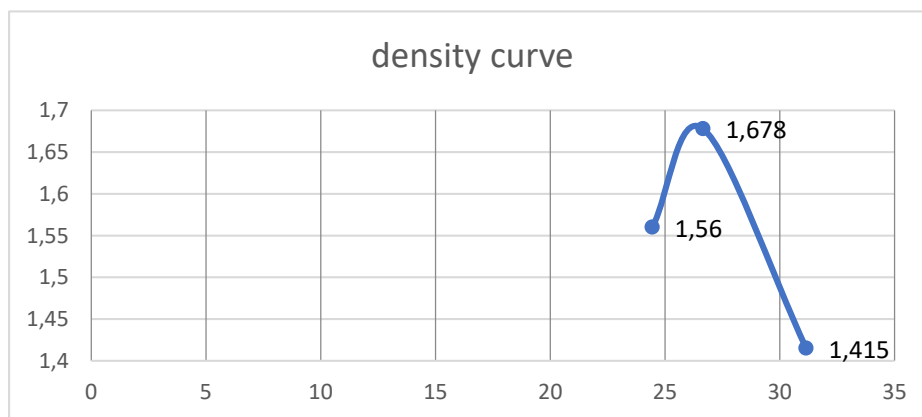
Graph shows the variation of water content and dry density:

The graph is drawn for 70% of soil and in the remaining 30% cement is replaced with 40% of fly ash and 1% of air foam agent of dry weight of cement.

Optimum moisture content and dry density are obtained from the graph

Optimum moisture content = 26.66%

Maximum dry density = 1.678 gm/cc



Graph- 9 Density curve

Variation of dry density and water content 70 % of soil +15% of cement + 15% of FA with 1% of AFA

The graph is drawn for 70% of soil and in the remaining 30% cement is replaced with 50% of fly ash and 1% of air foam agent of dry weight of cement.

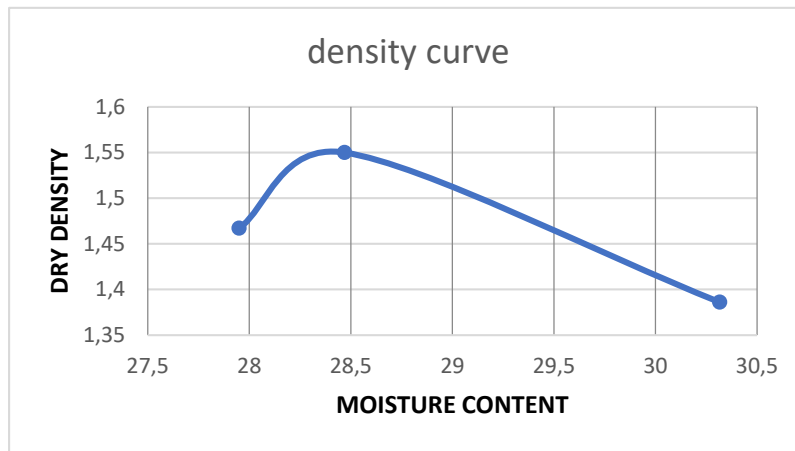
Optimum moisture content and dry density are obtained from the graph

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Optimum moisture content =28.47%

Maximum dry density =1.55gm/cc



Graph-10 density curve

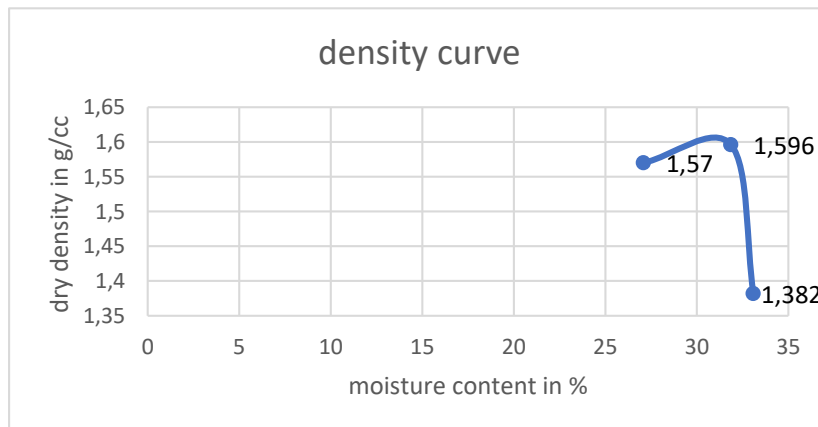
Variation of dry density and water content 70 % of soil +12% of cement + 18% of FA with 1% of AFA.

The graph is drawn for 70%of soil and in the remaining 30% cement is replaced with 60% of fly ash and 1%of air foam agent of dry weight of cement.

Optimum moisture content and dry density are obtained from the graph

Optimum moisture content =31.86%

Maximum dry density =1.596gm/cc



Graph- 12 density curve

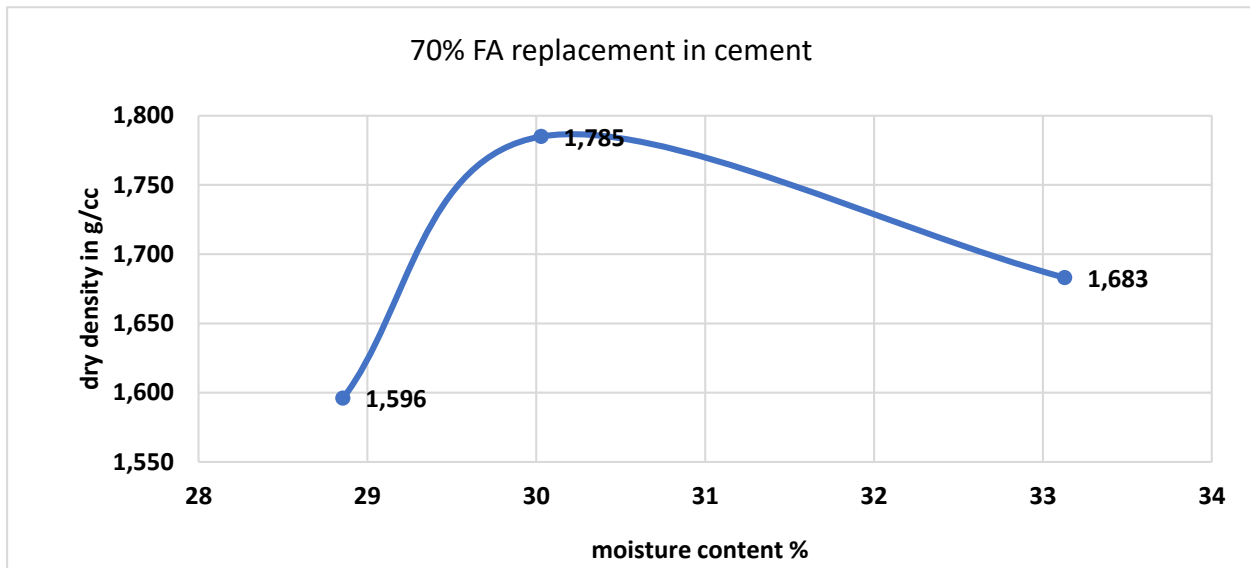
Variation of dry density and water content 70 % of soil +09% of cement + 21% of FA with 1% of AFA:

The graph is drawn for 70%of soil and in the remaining 30% cement is replaced with 70% of fly ash and 1%of air foam agent of dry weight of cement. Optimum moisture content and dry density are obtained from the graph



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023



Graph-13 for 70 % replacement

Optimum moisture content = 30.03% ,

Maximum dry density = 1.785 gm/cc

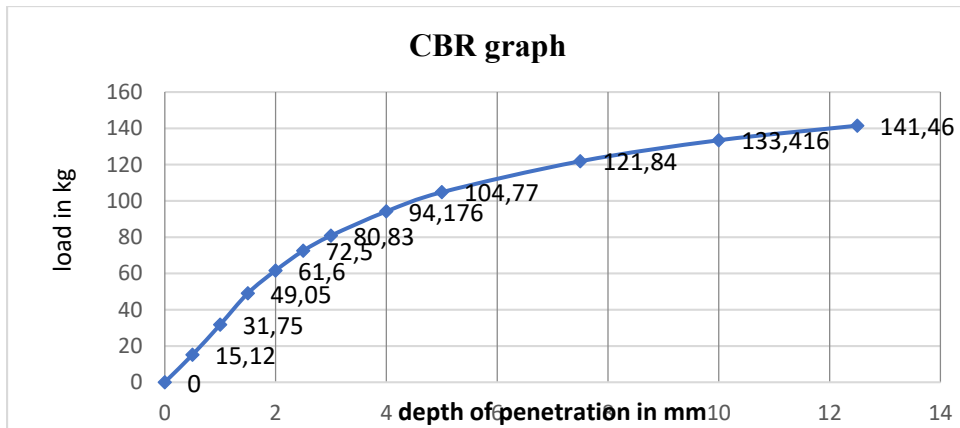
Effect of cement (%) + FA(%) + AFA(%) on OMC & MDD	OMC(%)	MDD g/cc
0	26	1.45
40	26.66	1.678
50	30.32	1.55
60	33.084	1.596
70	33.13	1.785

Table -14 Effect of fly ash cement and AFA on soil

On increase of FA replacement ratios, OMC increases and MDD varies with different percentages

CBR Graph of 70% of soil + 30% of cement with 1% of AFA:

The fig shows load penetration response of 70% of soil + 30% of cement with 1% of AFA dry weight of cement. The loads for 0, 0.5, 1, 1.5, 2, 2.5, 3, 4, 5, 7.5, 10, 12.5 are taken from test values



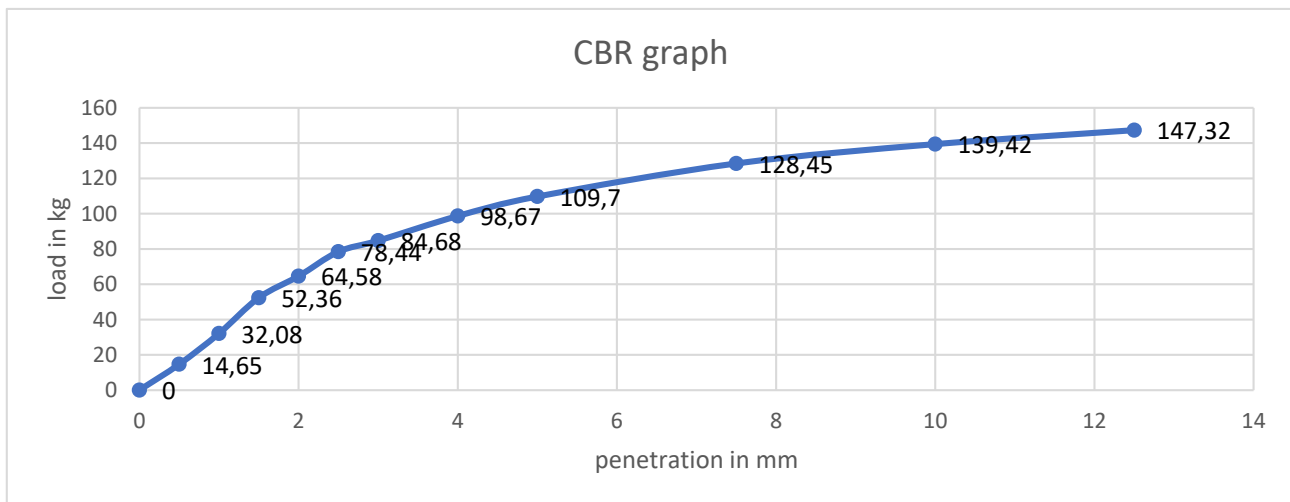
Graph- 14 CBR for 30 % of cement

From the above graph,

The CBR value for 2.5mm penetration= 6.54%

The CBR graph for the mix of 70%Of soil +18%of cement +12%of FA with 1%of AFA:

Fig 4.m shows load penetration response of 70% of soil+18% of cement + 12% of FA with 1% of AFA dry weight of cement. The loads for 0,0.5,1,1.5,2,2.5,3,4,5,7.5,10,12.5.mm penetrations are taken from test values.



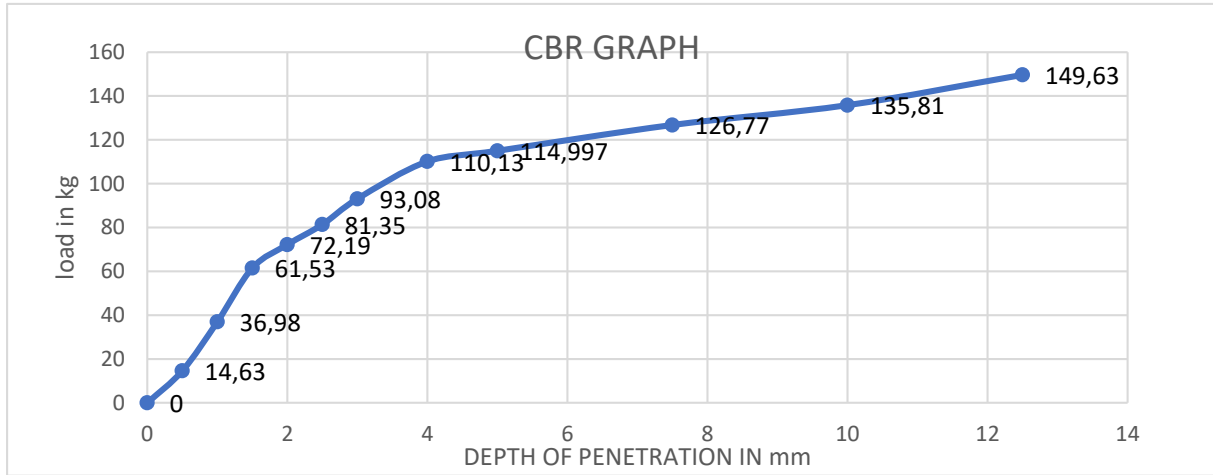
Graph 15 CBR for 30 % FA + Cement + AFA

From the above graph,

The CBR value for 2.5mm penetration= 6.72%

The CBR graph for the mix of 70%Of soil +15%of cement +15%of FA with 1%of AFA:

Fig 4.o shows load penetration response of 70% of soil+15% of cement + 15% of FA with 1% of AFA dry weight of cement. The loads for 0,0.5,1,1.5,2,2.5,3,4,5,7.5,10,12.5.mm penetrations are taken from test values.



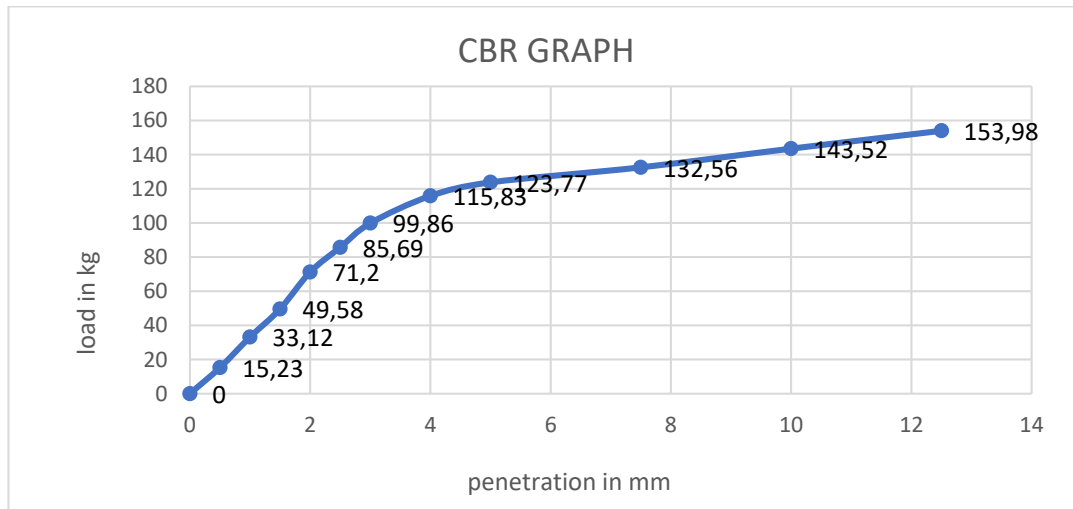
Graph 16 CBR for 30 % FA + Cement + AFA

From the above graph,

The CBR value for 2.5mm penetration=5.93%

The CBR graph for the mix of 70%Of soil +12%of cement +18%of FA with 1%of AFA:

The graph shows load penetration response of 70% of soil+12% of cement + 18% of FA with 1% of AFA dry weight of cement. The loads for 0,0.5,1,1.5,2,2.5,3,4,5,7.5,10,12.5.mm penetrations are taken from test values.



Graph -17 CBR for 30 % FA+Cement+AFA

From the above graph,

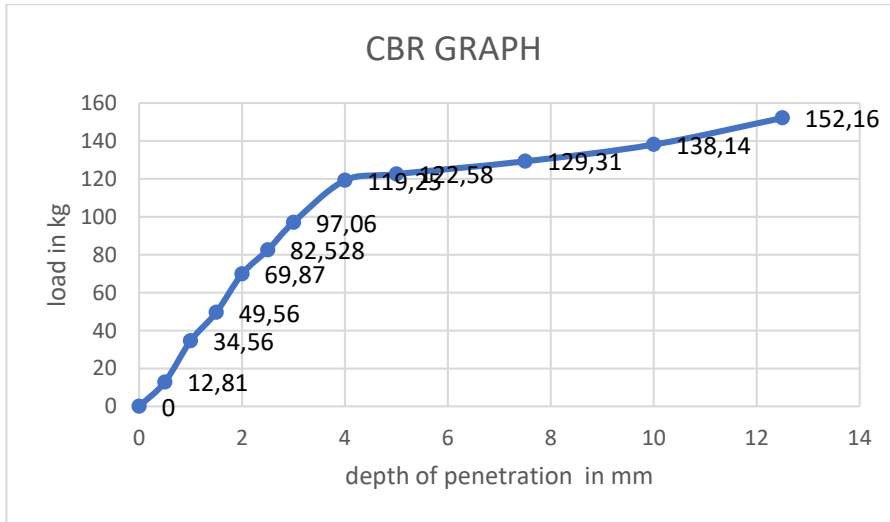
The CBR value for 2.5mm penetration=6.25%

The CBR graph for the mix of 70%Of soil +09%of cement +21%of FA with 1%of AFA:

The graph shows load penetration response of 70% of soil+09% of cement + 21% of FA with 1% of AFA dry weight of cement. The loads for 0,0.5,1,1.5,2,2.5,3,4,5,7.5,10,12.5.mm penetrations are taken from test values.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023



Graph- 18 CBR for 30 % FA+Cement+AFA

From the above graph,

The CBR value for 2.5mm penetration=6.02%

Effect of cement (%)+FA(%)+ AFA(%) on CBR CBR in % at 2.5mm penetration                      CBR in % at 5mm penetration

Effect of cement (%)+FA(%)+ AFA(%) on CBR	CBR in % at 2.5mm penetration	CBR in % at 5mm penetration
0	5.29	5.09
40	5.725	5.33
50	5.938	5.596
60	6.25	6.022
70	6.02	5.965

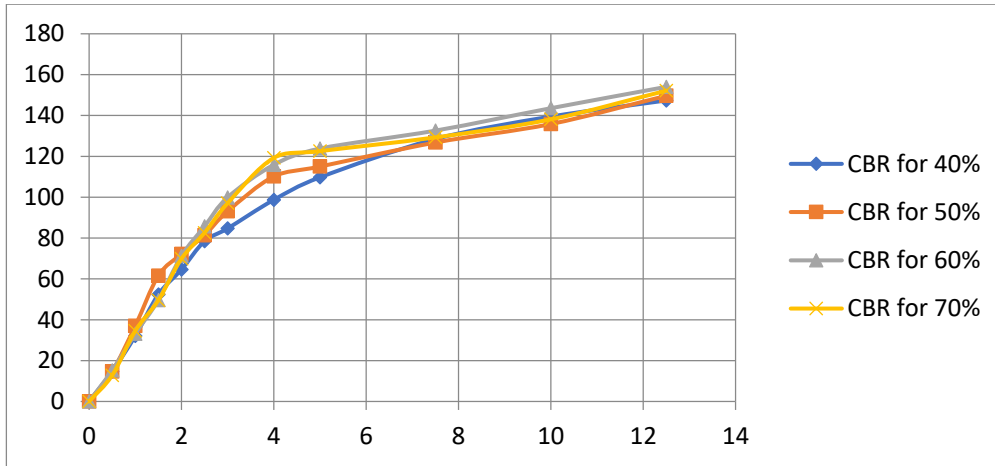
Table -19 Effect of cement, FA and AFA on CBR

Load penetration response of red soil with different proportions of cement, FA,AFA:

The graph represents the CBR curves for different proportions of cement, fly ash, air foam agent in the soil.

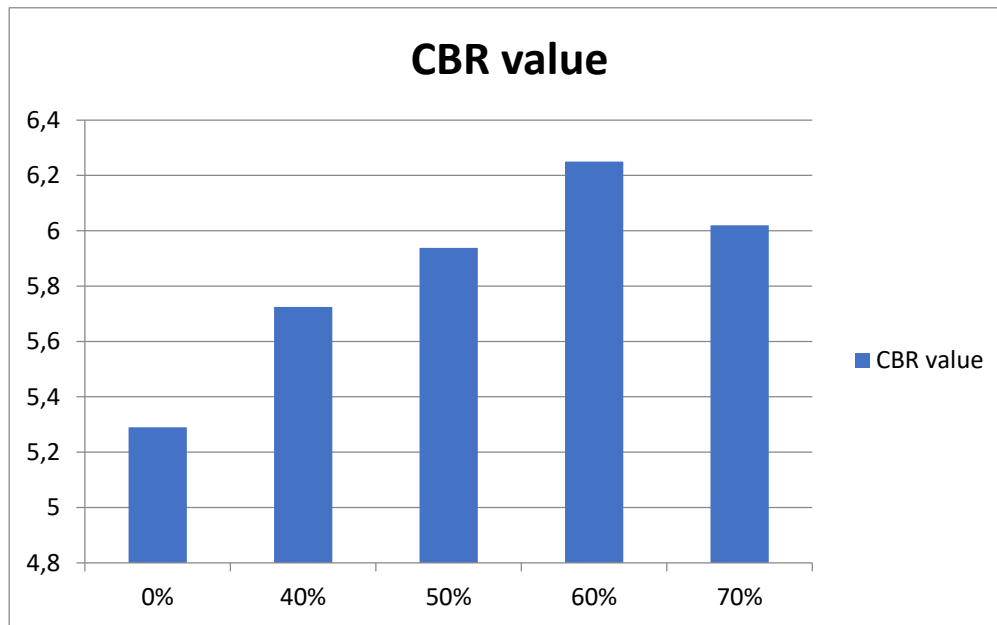
# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023



Graph- 19 CBR curves for Proportions of FA & AFA

Comparison bar graph of CBR value for different FA replacement:



Graph- 20 CBR for Samples of FA replacement

Unconfined compressive strength of soil with different FA replacement ratios:

S . No	Soil mix	UCS N/mm <sup>2</sup>	Cohesion in N/mm <sup>2</sup>
1	100% soil	0.543	0.272
2	70% soil+18% cement+12% FA with 1% AFA	0.621	0.311
3	70% soil+15% cement+15% FA with 1% AFA	1.086	0.543
4	70% soil+12% cement+18% FA+1% with AFA	1.313	0.657
5	70% soil+9% cement+21% FA with 1% AFA	1.177	0.589

Table-21 Unconfined compressive strength of soil with different FA replacement ratios

Subsequently, the study focused on the compaction characteristics of the soil. The maximum dry density (MDD) and optimum moisture content (OMC) were determined through the Standard Proctor compaction test. For different combinations of soil, cement, fly ash, and air foam agent, the dry density and moisture content were plotted to establish the optimum conditions for compaction. Furthermore, the

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

California Bearing Ratio (CBR) tests were conducted to assess the strength characteristics of the soil. The CBR values were calculated for various mixtures of soil, cement, fly ash, and air foam agent. It was observed that CBR values varied with the different proportions of additives, indicating changes in the soil's strength and load-bearing capacity. Lastly, the unconfined compressive strength (UCS) of the soil was determined for different combinations of soil and additives. The results showed an increase in compressive strength with the addition of fly ash and cement. Overall, the study demonstrated how the inclusion of cement, fly ash, and air foam agent influenced the soil's properties, compaction characteristics, and strength. The findings provide valuable insights for utilizing these additives to enhance the engineering properties and performance of soil for construction and infrastructure projects.

## CONCLUSIONS

There are many natural wastes being sent out to environment, fly ash is one such waste. Being produced in large quantities, the cost towards the application is very less. After experimental study made, it was found that the fly ash can be used as stabilizer in improving the properties of red soil.

As FA is a non-plastic material, the plasticity index of the clay – FA mixture decreases with increase in the FA replacement ratio.

With the FA replacement ratio of 60% the decrease in liquid limit, plastic limit and plasticity index is clearly observed. Therefore 60% FA replacement is fixed as a FA replacement ratio.

At the same FA replacement ratios, there is sudden change in liquid limit plastic limit and plasticity index, which is taken as FA fixation point.

Proposed design mix: 70% of soil + 12% of cement + 18% of FA with 1% of AFA of dry weight of cement. i.e. in the final mix of ACC-FA supplant 70% of soil and in the remaining 30% the cement is replaced with fly ash by 60% with 1% of air foam agent. Hence strength attained is same as a target strength.

Due to addition of air foam agent, the weight of soil gets reduced by 8.25%.

By the use of ACC-FA supplant the soil strength is increased by 18.5%.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ASSESSMENT OF ANTIMICROBIAL ACTIVITY OF THREE COMMERCIAL HAND SANITIZERS AGAINST MICROORGANISMS ISOLATED FROM THE HUMAN HAND

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### ABSTRACT

Hand sanitizer was developed as a convenient way to disinfect an individual's hands from all forms of pathogens in situations where soap and water were not available. Therefore, this study evaluated the antibacterial activity of hand sanitizer. The present study is an in vitro study aimed at evaluating the antibacterial efficacy of Smartans, Sanigel and MacJames hand sanitizers against organisms isolated from the hands of volunteers (students, laboratory staff of grocers, cleaners and food vendors) as test organisms including *Staphylococcus aureus*, *Escherichia coli* and *Micrococcus* sp. A good variation of the agar disk diffusion test using Mueller-Hinton agar was used to evaluate the antibacterial effectiveness of hand sanitizers. The McFarland turbidity standard of 0.5 was taken as a reference to adjust the turbidity of bacterial suspensions. Fifty microliters of hand sanitizer was introduced into each of the three wells while the fourth well combined with sterile water served as a control. This was done for all organisms tested and the plates were incubated in an incubator for 24 h at 37°C. After incubation, the antibacterial effect was determined with a caliper (mm) by measuring the inhibition zone. The maximum inhibition (in mm) observed and recorded in Sanigel hand sanitizer against *Micrococcus* was  $27 \pm 1.414$  and the minimum inhibition (in mm) was observed and recorded in the MacJames hand sanitizer against *Staphylococcus Aureus* was  $3.5 \pm 4.95$ . Despite claims of effectiveness and 99.9% reduction from hand sanitizer manufacturers, there is still a need to verify these claims by regulators and higher authorities to enforce measures good quality.

**Key Words:** Sanitizers, Microorganisms, Human Hand, Diffusion Test

### INTRODUCTION

Hands are considered the main route of transmission of germs and infections to individuals. Personal hygiene and hand hygiene are important to prevent many infectious diseases. The word "hygiene" is derived from the ancient Greek goddess "Hygeia" which means "goddess of healing". The importance of hygiene is widely recognized and evidence-based. It is well known that hand hygiene is important to prevent and reduce nosocomial infections (Rosenthal et al., 2017). The Centers for Disease Control and Prevention, the World Health Organization and many other health experts recommend hand hygiene as the most important measure in preventing hospital-acquired infections. Several studies have demonstrated the importance of good hand hygiene in reducing the incidence of nosocomial infections. It is estimated that at any given time, more than 1.4 million people worldwide have a hospital-acquired infection. In most cases, these hospital-acquired infections are also the result of poor hand hygiene. It is acknowledged that hand hygiene is essential to reduce bacterial load, transmission and infection (Kampf

and Kramer, 2015). The density and species of bacteria that colonize each person's hands vary widely and can be influenced by a number of factors, including age, gender, ethnicity and occupation. Fortunately, regular hand washing with soap, water, and scrub is an effective method to reduce bacterial load, when combined with other infection control measures (i.e., use of gloves, compliance with and education), significantly reduces the transmission of bacteria, nosocomial infections, gastrointestinal and respiratory diseases and improves overall health. Scientific studies have shown that after washing hands, up to 80% of individuals retain pathogenic bacteria on their hands (Chan et al., 2020). Hand washing removes fatty acids from the body, which can lead to cracked skin, allowing pathogens to enter. To overcome the limitations of simple hand washing, hand sanitizers have been introduced, which are believed to be effective against these pathogenic microorganisms and improve skin condition through the addition of humectants. Soft skin (Kampf et al., 2020). Hand sanitizers have also been shown to be effective in reducing gastrointestinal illnesses, respiratory infections and skin infections in the home, reducing absenteeism in primary schools and reducing illness. In academic dormitories. Additionally, to reduce infections in healthcare facilities, alcohol-based hand sanitizer should be used as part of hand hygiene.

### **METHODOLOGY**

#### **Sample collection:**

A total of five (5) unwashed hand samples were collected from different volunteers (students, food vendor laboratory staff, cleaners, and food vendors) using sterile cotton swabs. Wetted by dipping into normal saline solution. The swab sample was then transported to the Kwara State University Microbiology Laboratory for further analysis.

Three different commercial disinfectants were purchased from stores to test their activity in inhibiting bacterial growth. The disinfectants used in this study were Smartans Instant Hand Sanitizer (75% alcohol), Sanigel Instant Hand Sanitizer (70% alcohol), and MacJames Premium Hand Sanitizer and Moisturizer (70% alcohol).

#### **Isolation of bacteria:**

The collected swab samples were cultured on sterile nutrient agar and then cultured on MacConkey agar to diagnose different types of bacteria. Plates were incubated for 24 h at 37°C. Bacterial colonies were identified by colony morphology, microscopy of isolated bacteria, and various biochemical tests (Al-Zahrani et al., 2017).

#### **Sterility test:**

A total of 1 ml of undiluted hand sanitizer was inoculated directly into nutrient agar medium via the pour plate method. Incubation of the plates was performed at 37°C for 14 days. Then, growth testing or observation is performed (Kaiser and Newman, 2015). Agar diffusion test (well variant) to determine the sensitivity of the test organism to hand sanitizers:

Bacterial suspensions vary in turbidity and can cause potential bias in results, aiming to overcome this problem and standardize microbiological testing; McFarland standards were taken as reference to adjust the turbidity of bacterial suspensions. McFarland 0.5 turbidity standard was prepared by adding 0.5 mL of 1.175% w/v barium chloride dihydrate (BaCl<sub>2</sub>·2H<sub>2</sub>O) solution to 99.5 mL of 15 w/v sulfuric acid (H<sub>2</sub>SO<sub>4</sub>). Sterile Mueller-Hinton agar plates were inoculated with standardized test organisms. Sterile cotton is dipped into the test tube containing the inoculum and rotated properly to allow maximum contact. Excess inoculum was removed by firmly pressing and rotating the swab against the inner wall of the tube above the liquid level. The swab was then applied three times to the surface of the medium while rotating the plate at a 60° angle after each use. The swab was also inserted around the edge of the agar surface. The inoculum was left to dry for a few minutes at room temperature and the lid was closed (Valgas et al., 2017).

Using a sterile 6 mm corn borer, drill 3 evenly spaced holes into the agar plate with the fourth hole in the center of the plate. Jelly plugs are removed with a sterile needle. Fifty microliters of hand sanitizer was then introduced into three wells using a sterile pipette while the central well was filled with an equal volume of sterile water as a control. This is done for all isolated organisms and hand sanitizers. Plates

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

were incubated for 24 h at 37°C in an upright position. Growth on the plates is then examined for zones of inhibition that indicate the sensitivity or resistance of the test organism to the antimicrobial agent. The point of sudden growth reduction corresponding to complete growth inhibition was taken as the limit of the region. Then, the inhibition zone was measured using a caliper (mm).

### Statistical analysis:

Statistical analysis was performed using STATA 13 computer software for mean and standard deviation analysis, while Microsoft Excel 2016 for graphical presentation of results.

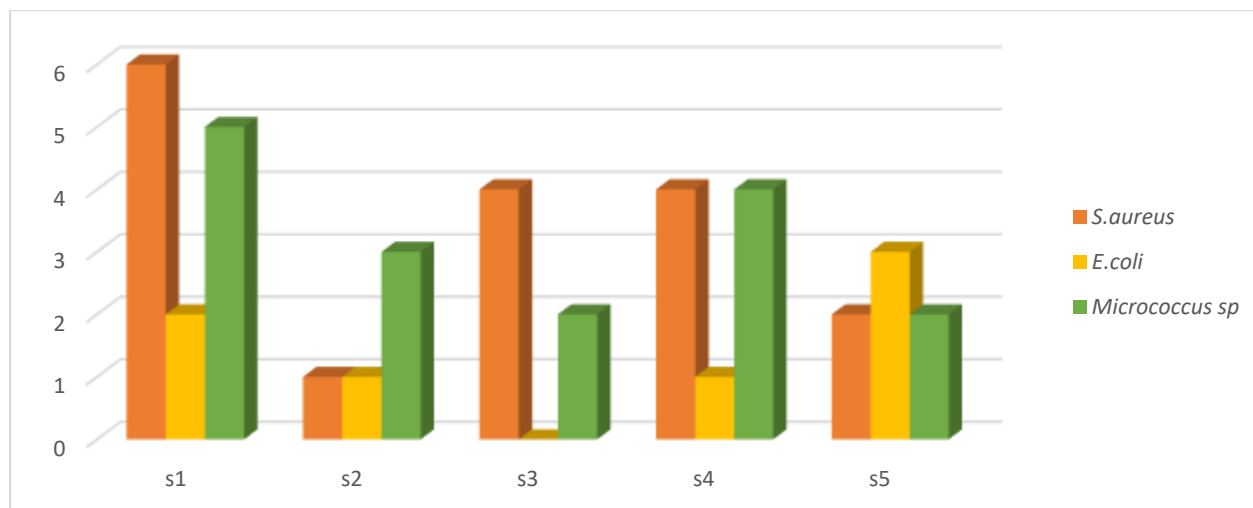
### FINDINGS AND DISCUSSION

Isolation of Microorganisms: Table 1 showed the frequency of organisms isolated from hand of different volunteers including (student, food vendor laboratory staff, sweepers, and food vendor). Isolate 1 occurs to have the highest recorded frequency of occurrence of 42.5%, isolate 3 having 40% while isolate 2 had the least frequency of occurrence of 17.5%.

**Table 1: Frequency of Occurrence of Bacterial Isolated from Hands of Volunteers**

S/N	Bacteria isolates	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Total	Total %
1	<i>Staphylococcus aureus</i>	6	1	4	4	2	17	42.5
2	<i>Escherichia coli</i>	2	1	-	1	3	7	17.5
3	<i>Micrococcus sp</i>	5	3	2	4	2	16	40
Total		13	5	6	9	7	40	100

**Keys:** Sample 1-5 represent the hands of the volunteers which are (students, food vendor laboratory staff, sweepers, and food vendor), Isolate 1-3 is the representation of organism or bacterial isolates prior identification.



**Figure 1: The frequency of occurrence of the bacterial isolates**

**Sterility Test:** All the hand sanitizer was sterile as none had growth of microbial colonies after 14 days with incubation at 37°C.

**Morphological and Biochemical Characterization of the Isolates:** Table 2 below shows the morphological and biochemical characterization of the isolates which accumulate to the identification means of the organisms.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

**Table 2: Morphological and Biochemical identification of bacterial isolates**

Keys: +ve-Positive, -ve-Negative, CAT-Catalase, COA-Coagulase, OXI-Oxidase, UR-Urease, IN-

Isol-ates	Cultural characteristics	CAT	COA	OXI	UR	IN	MR	VG	MOT	CIT	LF	GF	Tentative organism
1	Gram Positive, cocci in clusters (whitish and smooth on Nutrient agar)	+ve	+ve	-ve	+ve	-ve	+ve	+ve	-ve	+ve	+ve	+ve	<i>Staphylococcus aureus</i>
2	Gram Negative, small rods (round convex colonies)	+ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	+ve	+ve	<i>Escherichia coli</i>
3	Gram positive, spherical in tetrads(whitish and smooth on Nutrient agar)	+ve	+ve	+ve	+ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve	<i>Micrococcus</i> sp

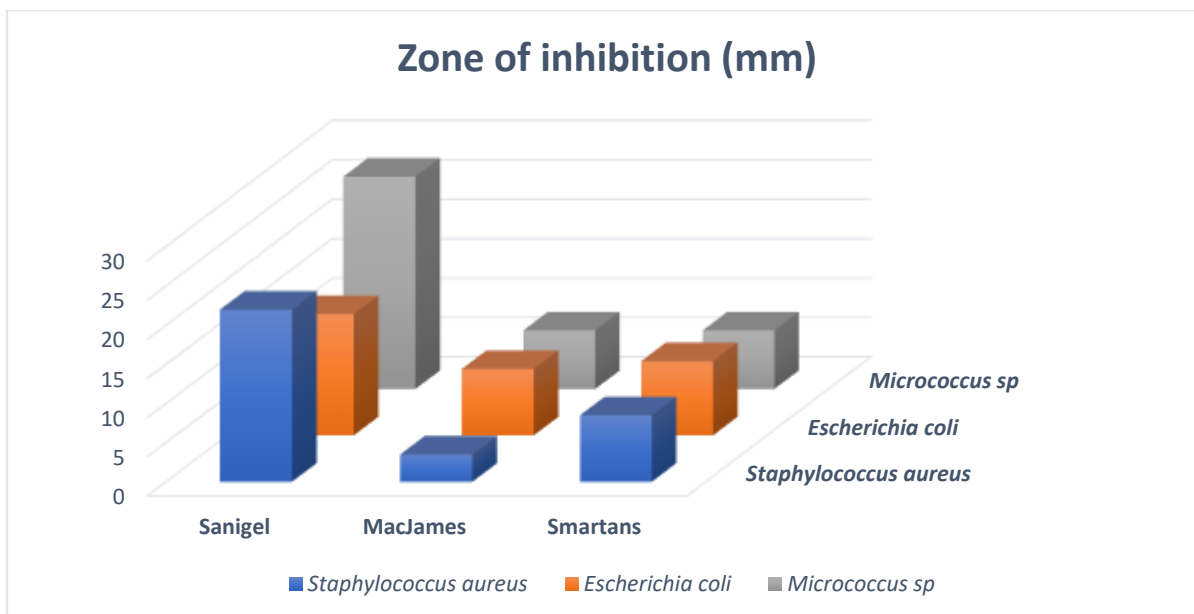
Indole, MR-Methyl Red, VG-Voges Proskauer, MOT-Motility, CIT-Citrate, LF-Lactose fermentation, GF-Galactose Fermentation.

Susceptibility of Test Organisms to Hand Sanitizers: The antimicrobial effectiveness was assessed by measuring the zone of inhibition against the test organisms. Maximum inhibition (in mm) was observed and recorded in Sanigel sanitizer against *Micrococcus* which was  $27 \pm 1.414$  and minimum inhibition (in mm) was observed and recorded in MacJames hand sanitizer against *Staphylococcus aureus*  $3.5 \pm 4.95$ .

**Table 3: Zone of inhibition (in mm) measured at the end of 24 h of different hand sanitizers against test organisms**

Test Organism	Hand sanitizers diameter of Inhibition Zone (mm) in (Mean $\pm$ SD)		
	Sanigel	MacJames	Smartans
<i>Staphylococcus aureus</i>	22 $\pm$ 1.414	3.5 $\pm$ 4.95	8.5 $\pm$ 0.707
<i>Escherichia coli</i>	15.5 $\pm$ 0.707	8.5 $\pm$ 0.707	9.5 $\pm$ 0.707
<i>Micrococcus</i> sp	27 $\pm$ 1.414	7.5 $\pm$ 0.707	7.5 $\pm$ 0.707





**Figure 2: Zone of inhibition (in mm) measured at the end of 24 h of different hand sanitizers against all the test organisms.**

#### Discussion

Infection with environmental microbes is increasing alarmingly. Normal human skin always harbors bacteria (10<sup>2</sup> and 10<sup>6</sup> CFU/cm<sup>2</sup>). The transfer of bacteria from the hands to food, objects, or people plays an important role in the spread of many communicable diseases (Kantor and Silverberg, 2017). The critical density of micro-organisms on the hands needed for the spread of pathogens remains unknown, and it may depend on the type and duration of contact, the type of micro-organism, the patient's resident flora, and their colonization resistance.

To overcome the negative impact of microbial contamination, hand sanitizers are recommended as an adjunct to plain hand washing. Most commonly and easily available hand sanitizers in Nigerian market were selected for this study. Among the Three hand sanitizers used in this study were Smartans Instant hand sanitizer (75% alcohol), Sanigel instant Hand sanitizer (70% alcohol) and MacJames Hand safe advanced hand sanitise and moisturizer (70% alcohol). Alcohol was the main active ingredient in alcohol-based hand sanitizer which exerts antimicrobial activity by causing protein denaturation disruption of tissue membranes, and dissolution of several lipids.

Table 1 above revealed the frequency of organisms isolated from hand of different volunteers including (student, food vendor laboratory staff, sweepers, and food vendor). *Staphylococcus aureus* occurs to have the highest recorded frequency of occurrence of 42.5% and *Micrococcus sp* having 40% while *Escherichia coli* had the least frequency of occurrence of 17.5%.

To determine the microbiological quality, the antibacterial property and dilution effects on activity of three types of hand sanitizers (Smartans, Sanigel and MacJames), the sanitizers were evaluated using susceptibility test by agar well diffusion. In this study, isolates which include *E. coli*, *S. aureus* and *Micrococcus sp* were isolated from the hands of student, food vendor laboratory staff, sweeper, and food vendor and were used to test the efficacy of hand sanitizers. Sanigel was the most effective disinfectant among all the hand sanitizers against all the bacteria used in this study. This might be attributed to the presence of alcohol (75%) in liquid form that soaks and penetrates the skin creases and nail folds unlike the gel form sanitizers that glide over and coat the skin (Oranusi *et al.*, 2013). These result resemble the result obtain by previous studies that isolated *S. aureus*, *P. aeruginosa* and *E. coli* from hands swabs of students and food vendors and similar the result obtain from another study where they isolated *S. aureus*, *E. coli*, *P. aeruginosa*, *Enterobacter spp*, *B. subtilis*, *S. dysenteriae*, *Sta. epidermidis* from unwashed hand (Thomas *et al.*, 2017).

Similar to the present study, several studies reported significantly better antimicrobial efficacy of hand sanitizers, as well as a decrease in nosocomial infection rates as compared to hand washing.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Furthermore, a study conducted among school children showed significantly high efficacy of hand sanitizers in reducing microflora on hand (Valgas *et al.*, 2017). However, further studies are required to find the exact cause of least effectiveness of some hand sanitizer against the tested organisms.

## CONCLUSION

The goal of hand hygiene is to reduce the number of bacteria on the skin enough to prevent cross-transmission of pathogens between individuals. It's easier to keep your hands clean than it is to get them clean. The critical density of microorganisms on hands required for pathogen spread is unknown and may depend on the length of time the bacteria are present. Sanigel Instant Hand Sanitizer has maximum antibacterial activity against all organisms tested isolated from unwashed hands in this study, including gram-negative bacteria used in the study, continued are Smartans Instant Hand Sanitizer and MacJames Disinfectant. Despite claims of effectiveness and 99.9% reduction from hand sanitizer manufacturers, there is still a need to verify these claims by regulators and higher authorities to enforce measures good quality.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ADÖLESAN DÖNEM ÖĞRENCİLERİ İÇİN; KİMYASAL, BİYOLOJİK, RADYOLOJİK VE NÜKLEER TEHDİTLERİN HAZIRLIĞINA YÖNELİK EĞİTİM MÜFREDATI GELİŞTİRİLMESİ

### FOR ADOLESCENT STUDENTS; DEVELOPMENT OF TRAINING CURRICULUM FOR PREPAREDNESS FOR CHEMICAL, BIOLOGICAL, RADIOLOGICAL AND NUCLEAR THREATS

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## ÖZET

Afetler; yerleşim alanını olumsuz etkileyen doğal, teknolojik veya beşerî sebeplerle oluşan olayın ancak ulusal veya uluslararası yardım ile olağan yaşama dönülebilecek düzeydeki yıkımı ifade eder. Medeniyetin başlangıcından itibaren Kimyasal, Biyolojik, Radyolojik ve Nükleer maddelerinin teknolojinin gelişimi ve yayılımı ile, yerleşim alanında bulunan canlı ekosistemi üzerinde oluşabilecek tehlikeli durumları ifade etmekte ve baş harflerinin bir arada kullanımıyla KBRN, CBRN veya NBC olarak kısaltılmaktadır.

Günümüzde KBRN tehditlerine yönelik savunma prensipleri ulusal ve uluslararası düzeyde; KBRN ajanları ile çalışan kurumların planlı hazırlanması, uluslararası KBRN ajanlarına karşı silahsızlanma yarışı, savaş alanında KBRN maddelerinin kullanılmamasına yönelik çalışmalar, terörizmi engelleme, afet/acil durum personelinin KBRN' ye yönelik eğitim, tatbikat ve planlamaların geliştirilmesi toplumun bilinçlendirilmesi vb. çalışmalar yapılmaktadır. Ülkemizde toplumu KBRN alanında bilinçlendirmeye çalışan kurumların başında AFAD, STK'ler, üniversiteler, okullar, halk eğitim merkezleri gelmektedir. KBRN tehditlerine yönelik eğitimler ancak AFAD resmi gönüllüsü olunduktan sonra alınabilmektedir. AFAD resmi gönüllüsü olabilmek için ise birey 18 yaşını doldurmuş olmalı ve yeterli eğitim almış olmalıdır. Yapılan araştırmalara göre 18 yaşını doldurmamış olmasına karşın yaşamının adölesan döneminde bulunan birey kendini korumaya yönelik bireysel hazırlık ve sorumluluk alabilecek yeterliliğe sahip olduğu bilinmektedir.

Geleceğimizin teminatı olan Adölesan dönem lise öğrencileri için psikolojik, mental ve bilişsel açıdan yaş gruplandırmasına uygun olarak, KBRN tehditlerine yönelik hazırlık yapması/hazırlık yapmasının öğretilmesi, bilgi düzeyinin yükseltilmesi ve bu konuda gelecek dönemlerde de uygulanabilir ve sürdürülebilir eğitim planlamaları ve müfredatının oluşturulmasıdır. Müfredat içeriği olarak adölesan dönem öğrencilerinin psikolojik gelişimi, emosyonel durumları, fikir ve düşüncelerine uygun görsel, işitsel, fiziksel ve video materyalleri kullanılarak öğretim sunum tekniklerine uygun bir anlatım ve gösterim ile geçmişte yaşanmış KBRN olayları incelenerek günümüzde yaşanabilme ihtimali ile yaşanırsa bireysel savunmamız hakkında doğru yöntem, teknik ve uygulaması öğretilmesi amacıyla

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

soru-cevap, yöntemiyle sebep-sonuç ilişkisi ile bağdaştırılabileceği dinamik bir müfredatın hazırlanması amaçlanmıştır. Bu amaçla, Türkiye Cumhuriyeti Millî Eğitim Bakanlığı Talim Terbiye Kurulu Başkanlığı'nın ortaöğretim düzeyinde eğitim veren kurumların mevcut müfredatına uygun; yeni zorunlu, seçmeli veya mevcutta bulunan afetle ilgili konuları içeren dersin müfredatına eklenebilir şekilde hazırlanması planlanmaktadır.

**Anahtar kelimeler:** KBRN, KBRN tehditleri, Adölesan Dönem, T.C. Millî Eğitim Bakanlığı, Öğretim Müfredatı, Bireysel Savunma.

## ABSTRACT

Disasters; adversely affects the residential area. Occurs due to natural, technological or human causes. It refers to an event at a level that can only be returned to normal life with national or international aid. Since the beginning of civilization there has been the development of technology of Chemical, Biological, Radiological and Nuclear materials. With the spread of these substances, it refers to the dangerous situations that can be experienced on the living ecosystem located in the settlement area. It is abbreviated as national in Turkish: KBRN and international: CBRN or NBC with the combination of initials.

Nowadays, the defense principles against CBRN threats are at national and international level. Planned preparation of institutions working with CBRN agents is carried out. There is a disarmament race against international CBRN agents. Efforts are being made to prevent the use of CBRN substances on the battlefield. Terrorism prevention activities are carried out. Training of disaster/emergency personnel for CBRN is being carried out. Studies are carried out to develop exercises and planning for disaster/emergency situations. Efforts are being made to raise public awareness for individual defense against disasters/emergencies. In Turkey, awareness raising activities for CBRN threats are carried out by the Disaster and Emergency Management Presidency (AFAD), non-governmental organizations, universities, schools and public education centers. Trainings on CBRN threats can be received by AFAD after being an official volunteer. To become an official volunteer of AFAD, the individual must be over 18 years of age. According to the researches, it is known that the individual who has not completed the age of 18 but is in the adolescent period of life has the ability to take individual preparation and responsibility for self-protection.

Adolescent high school students are the guarantee of our future. For them, age grouping was made psychologically, mentally and cognitively. In accordance with this grouping, it is to teach preparation/preparation for CBRN threats, to increase the level of knowledge and to create practical and sustainable training plans and curricula in this regard in the future periods. The curriculum content is based on the psychological development, emotional status, ideas and thoughts of adolescent students. Accordingly, visual, audio, physical and video materials were used. It is aimed to examine the CBRN events that have occurred in the past and to teach the correct method, technique and application about our individual defense according to the possibility of today. In this direction, it is aimed to prepare a dynamic curriculum that can be reconciled with the cause-effect relationship with the question-answer method. It is aimed to prepare lectures and demonstrations in accordance with the teaching presentation techniques in accordance with the planning. For this purpose, it is aimed to prepare the Ministry of National Education of the Republic of Turkey Board of Education in accordance with the current curriculum of the institutions providing education at the secondary education level. In this direction, it is planned to prepare the course that includes compulsory, elective or existing disaster-related topics in a way that can be added to the curriculum.

**Keywords:** CBRN, CBRN threats, Adolescent Period, Republic of Turkey Ministry of National Education, Curriculum, Individual Defense.

## GİRİŞ

Afetler, yerleşim alanında bulunan insan, hayvan, bitki ve insanlar tarafından kullanılmakta olan her türlü yapı ve eşyaya zarar vererek, kullanılamaz hale getirerek ve olağan yaşamı durduracak düzeydeki

doğal, teknolojik veya beşerî sebeplerle oluşan bütün olaylara; yerel kaynaklar yetersiz kalmakla birlikte ancak ulusal ve uluslararası düzeyde bölgeye yapılacak yardım ve müdahale ile olağan yaşama dönmesi sağlanabilmektedir (HUDOTO, 2023).

Kimyevi özelliğinden dolayı ekosisteme zarar verebilen kimyasal maddelerin oluşturduğu tehditlere Kimyasal Tehdit denir (AFAD, 2019). Ekosisteme zarar veren biyolojik organizma ve/veya ürettiği toksinlerin oluşturduğu tehditlere Biyolojik Tehdit denir (Kılıç, 2006). İyonlaştırıcı radyasyonun veya radyoaktif maddelerin; ekosisteme zarar oluşturabilecek olaylara Radyolojik Tehditler denir (Gündüz Y. 2015) Nükleer materyalin fisyon veya füzyon (*atomun parçalanması veya iki atomun birleşmesi*) ile ekosisteme ciddi zararlar verebilecek tehditlere Nükleer Tehdit denir (Dinçer İ. 2019). Kimyasal, Biyolojik, Radyolojik ve Nükleer Tehditlerinin baş harflerinin bir arada ve sıralı biçimde kullanımıyla; ulusal düzeyde KBRN Tehditleri, uluslararası düzeyde CBRN veya CBN şeklinde afet sözlüğünde yer almakta ve afete sebep olan olayın türüne göre doğal, beşerî ve teknolojik kaynaklı olduğuna karar verilmektedir (AFADEM).

Medeniyetin başlangıcından günümüze KBRN ajanlarını; insanlık tarihinin ilk dönemlerinde ilkel bir şekilde (*Bizanslıların kale surlarından yaklaşan düşman gemilerine Grek Ateşi diye adlandırılan karpiti (kalsiyum karbür) fırlatması*) kullanılmaktayken (Beşaltı K. 2016); kimya, biyoloji ve nükleer enerji ve KBRN ile ilgili diğer bilimsel konularda yapılan bilimsel araştırma faaliyetlerinin artması, teknolojinin gelişmesi, artan toplumlararası gerginlikler ile I. Dünya Savaşında (*Almanlar Rusların o dönemde savaş tankı olarak görülen atlarına şarbon ruam bulaştırmıştır*) (AFAD) ve özellikle II. Dünya Savaşı olmak üzere (*ABD'nin Japonya'nın Hiroşima ve Nagazaki şehirlerine atom bombası atması*) dünya savaşlarında (HASUDER, 2022) KBRN ajanlarından elde edilen silahların kullanımıyla kazanılan büyük güç sonucu savaşın kaderine hızlı yön vermek isteyen taraf devletler; konvansiyonel silahlarla savaşmanın hızlı ve yeterli olmayacağını düşünmektedir. Ayrıca KBRN ajanlarının elde edilmesinin, üretilmesinin kolay olması, maliyetinin az olması, günümüzde kullanılmakta olan basit konvansiyonel silahlara entegre edilebilir olması, uzaktan kontrol ile patlayıcı olarak kullanılabilmesi toplu intihar yöntemi olarak kullanılması (*11 Eylül saldırılarını takip eden haftalarda değişik kurumlara gönderilen şarbonlu postalar gönderilmiştir*) terör örgütlerinin tercih etmesine ve kullanmasına sebep olmaktadır. (AFADEM ve Özdemir, 2002)

Sanayide kullanılan kimyasalların üretim, depolama, transfer aşamasında yapılan iş güvenliği hataları sonucu (*2020 Beyrut Limanı Patlamasına neden olan Lübnan'ın Beyrut Limanında depolanan 2 bin 750 ton amonyum nitratın patlaması*) (AFAD, 2019 ve Selcan A. 2020) büyük kazalar yaşanabilmektedir. Biyolojik laboratuvarların iş güvenliği kurallarına uymaması sonucu (*1979'da Sverdlovsk Askeri Üssü Kazası hava filtresinde yaşanan teknik problem sonucu 1 gram şarbon sporları etrafa yayıldı ve 68 kişinin öldüğü ve günümüzde hala yaklaşık 100 hektarlık bir alanın yerleşime kapanmıştır*) (AFAD, Meselon M. ve ark.) büyük kazalar yaşanabilmektedir. Teknolojik gelişmeler sonucu açığa çıkan enerji ihtiyacını karşılamak amacıyla geliştirilen Nükleer Güç Santralinde yaşanabilecek bir kazada (*Çernobil Nükleer Güç Santrali Kazası*), santral yakınında yaşayan halkın sağlığını ve güvenliğini tehdit edebilecek boyutlarda radyoaktif maddenin yayılmasına sebep olabilir ve etkilenen alanda ne kadar süre etkisi devam edebileceği sadece bilimsel tahminlerden öteye gidememektedir (Kılıç N. 2017) En tehlikeli silah olarak üretilen atom bombasının Japonya Hiroşima ve Nagazaki şehirlerine atılmasının ardından ülkeler birbirini nükleer teknolojisinin gelişmişliği ile (*Soğuk Savaş Dönemi yaşanan 1962'deki Küba Füze Krizi bütün dünyayı 13 gün boyunca nükleer açıdan tehdit olmuştur*) tehdit etmektedir (Ekmen B. 2021).

### **KBRN TEHDİTLERİNE YÖNELİK SAVUNMA PRENSİPLERİ**

KBRN tehditlerinin etki alanının geniş, öldürücülüğünün yüksek, KBRN ile ilgili yürütülen teknolojik faaliyetlerin yerleşim alanlarına yakın, savaşlarda kullanıma uygun olması ve terör örgütlerinin kullanımı gibi sebepler; devlet ve toplumların savunma amacıyla ve ortak çıkar doğrultusunda uluslararası, ulusal ve sivil savunma prensipleri hazırlamaya mecbur bırakmıştır (AFADEM) Ülkemizin jeopolitik konumu (kırk yılı aşkın süredir terörle mücadelesi (Topçu M.C. 2023), Güney komşu Suriye iç savaşı (Canyurt D. 2018), batı komşu Yunanistan Türkiye'ye yönelik saldırgan politikaları (Can R.R., 2021), kuzeyde Ukrayna Rusya Savaşı (Sönmez A.S. ve ark., 2015), doğuda Türkiye sınırına 17 km



mesafede 1960'lı yıllarda yapılmış olan Metsamor nükleer enerji santrali (Baghirova A., 2018), mülteci göçleri (Erdil B., 2020) ve benzeri nedenler KBRN tehditleri ne maruz kalma ihtimalini arttırmaktadır.

Ulusal ve uluslararası düzeyde KBRN Tehditlerine yönelik savunma prensipleri; Toplum faydasına uygun hareketler KBRN ajanları ile çalışan tıp, bilim, sanayi ve teknoloji kurum, kuruluş, güç santralleri ve laboratuvarların yerleşim alanlarına uzaklığı, yapı güvenliği, çalışan veya çalışacak personelin teknik-teorik bilgi ve becerilerinin sahada çalışmaya uygun olmasını sağlamak amacıyla planlar hazırlanmalıdır (AFADEM; Palacı H. ve ark. 2018; Yusuf G. Ve ark. 2013). KBRN ajanlarının savaş alanlarında ve terör faaliyetleri içinde kullanımını önleyici tedbirler kapsamında Uluslararası KBRN tehditlerini önleyici kuruluşlar kurulmalı KBRN tehditlerini önleyici Uluslararası Antlaşmalar (Yağmuroğlu O., 2020) ve KBRN risklerine karşı Uluslararası Risk Azaltma Çerçeve Eylem Planları hazırlanmalı (Sendai, 2015); devletler bu kuruluşlara taraf olarak antlaşmalara ve planlara katılım göstermelidir. Bu doğrultuda devletler ülke iç politikalarını KBRN tehditlerini önleyici kanun, yönetmelik, yöntemler (Mevzuat, 2020) geliştirmeli ilgili kurumlar oluşturmalı saha personelinin mesleki anlamda yetişmesi ve gelişmesi için üniversite programları açmalı ve ilgili bütün denetimleri düzenli yapmalıdır (AFADEM; İçişleri B. 2020).

Yaşanabilecek KBRN olaylarında afet anı ve sonrasında devlet gerekli her türlü tedbiri almasına karşın, kamu kaynaklarını ilk 72 saat boyunca afetten etkilenen halka ulaştıramayabilir (Kadioğlu M., 2009) Bu nedenle devlet KBRN tehditleri konusunda halkı; bireyden topluma olacak şekilde bilinçlendirmeli, olay anı ve sonrasında doğru hareket tarzını öğretmeli, bireyi psikolojik ve emosyonel açıdan hazırlıklı olması amacıyla bireye KBRN tehditlerinin yaşanabilir bir afet olduğunu kabullendirici ve sivil savunmayı özendirici faaliyetler yürütmelidir Demiralp N ve ark.). Afet ve Acil Durum Yönetimi Başkanlığı AFAD ülkemizde toplumu KBRN eğitimleri çerçevesinde; bilinçlendirici eğitim faaliyetlerini, tatbikat planlarını yürütülmesini, eğitim materyalinin oluşturulmasını, yazılı, görsel ve işitsel basın-yayın organlarında sivil savunma faaliyetlerini özendirici çalışmalar ve konu ile ilgili diğer bütün yöntem ve teknikleri uygulamakta ana çözüm ortağıdır (AFADEM). AFAD dışında KBRN tehditlerine yönelik eğitimleri T.C. Millî Eğitim Bakanlığına bağlı Mesleki ve Teknik Liselerinin ders içeriğinde KBRN tehditleri ile ilgili konular bulunan mesleki programlarına ve ayrıca Halk Eğitim Merkezleri yaygın eğitim ile mesleki gelişmeyi sağlayan sertifika programlarında KBRN tehditleri ile ilgili konular bulunan programlarda verilmektedir. Yüksek Öğretim Kurumlarına bağlı Üniversitelerin mesleki alan içeriğinde KBRN tehditleri ile ilgili konular bulunan yükseköğretim programlarında verilmektedir. Afet yönetimi ile ilgili çalışmalar yürüten bazı Sivil Toplum Örgütleri/Kuruluşları STK üyelerine KBRN Tehditlerine yönelik bilinçlendirici eğitimler vermektedir (İtfaiyecilik, 2017; MEGEP, 2011; YÖK, 2021; Kızılay, 2023).

Birey KBRN tehditlerine yönelik bilinçlendirici, hazırlık vb. eğitimleri en erken meslek liselerinin KBRN tehditleri ile ilgili konular bulunan meslek derslerinde alabilir, ancak bu eğitimleri alamaması halinde AFAD Gönüllüsü veya diğer eğitim veren STK'lara üye olduktan sonra alabilmektedir. En erken destek AFAD üyeliği ise 18 yaşını doldurduktan sonra olunabilir (Gönüllülük sistemi 2023).

### **ADÖLESAN DÖNEMDE KBRN EĞİTİMİN AMACI VE ÖNEMİ**

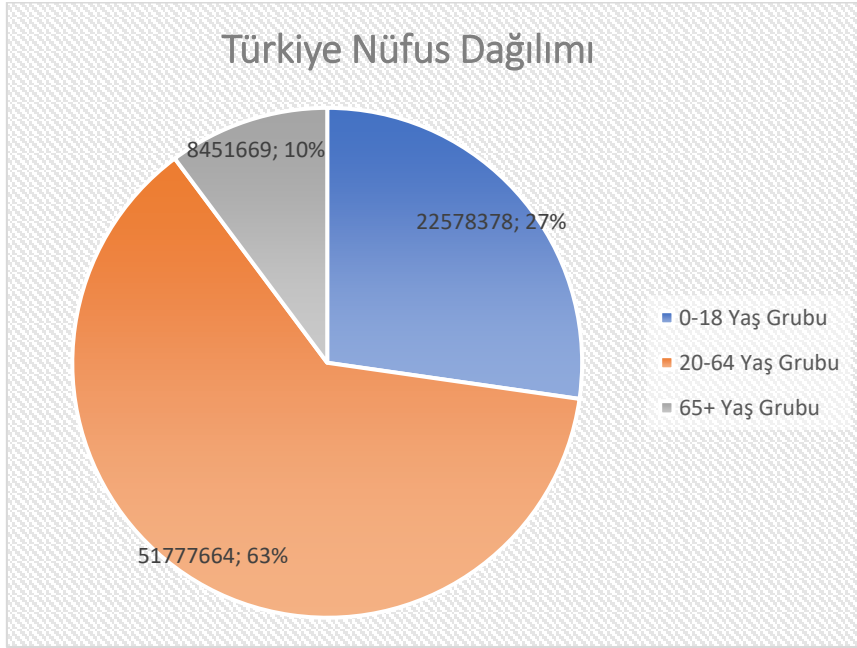
Adölesan Dönem; Çocukluk çağını bitirip yetişkin bir birey olmayı sağlayan sürecin tamamına ergenlik dönemi kapsamaktadır (Köseoğlu S.Z. ve Çelebi Tayfur A. 2017). Bu dönem de birey biyolojik, psikolojik ve sosyal açıdan yoğun bir gelişim ve değişim evresidir. Bu değişim ve gelişimler bireyseldir (Santrock JW., 2014). Dünya Sağlık Örgütü (DSÖ) adölesan dönemi 10-19 yaş aralığındaki bireyleri kapsamakta ve erken, orta ve ergenlik dönemleri olmak üzere üç gruba ayrılmaktadır (Özcebe H. 2002). Erken ergenlik döneminde (10-13 yaş aralığı) çocukluktan ergenliğe geçişin ilk dönemlerinde vücudunda yaşamış olduğu değişimleri kabullenmekte şaşkınlık ve endişe için de olmakta olaylara aşırı tepki vermektedir. Çok fazla sorumluluk yüklenmemekle birlikte olağandışı durumlarda psikolojik destek ve korunmaya ihtiyaç duyabilmektedirler. Orta ergenlik döneminde (14-16 yaş aralığı) vücudundaki değişimleri kabullenmeye başlar, ebeveynleri ile çatışmaları artmakta, arkadaş gruplarına önem verme artmakta ve sosyal ve kişisel açıdan sorumluluk bilinci artar. Geç ergenlik dönemi (16-19 yaş aralığı) bireyin toplum içinde erişkin olması ile sonuçlanır (Özcebe H. 2002; WHO, 2019; Tüzün Z. ve Ataman E. 2017). Ergenlik döneminde geliştirilen duygusal, beceri ve sosyal ilişkiler doğrultusunda



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

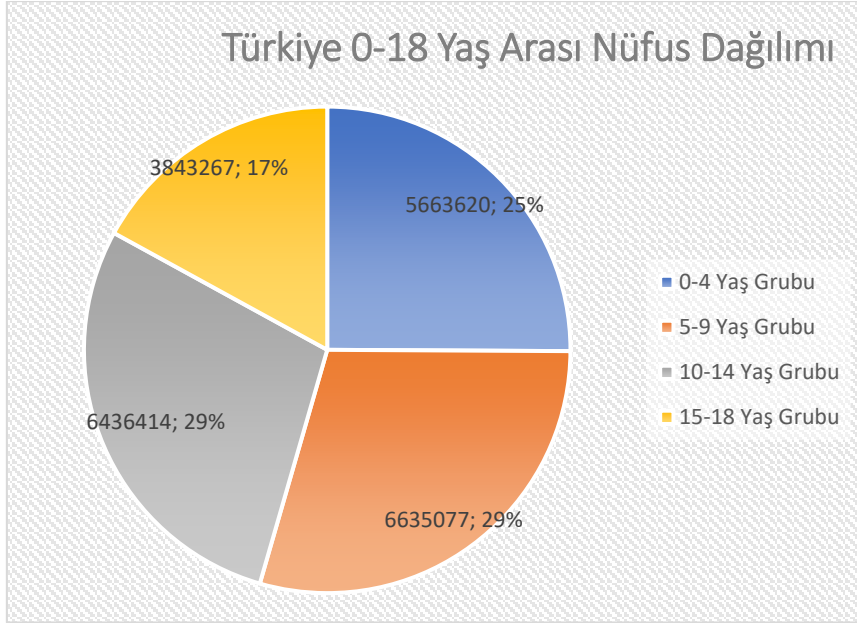
October 13-14, 2023

karakteristik kimliğin oluřtuđu d6nemdir. Fikir alma, uzlařı ve karar alma yeteneđi kazanır (řahin ř. ve 6zcelik .. 2016)



Grafik 1: 31 Aralık 2022 tarihli Adrese Dayalı Nüfus Sayımında (TÜİK) nüfus-yař gruplandırılmasındaki deđiřkenlerin dađılım

Toplumda ekonomik aıdan herhangi bir üretim faaliyetinde bulunmayan nüfusa bađımlı nüfus denmektedir. Bađımlı nüfus grubunu; 18 yař altı, 65 yař üstü ve 19-64 yař arası engelli bireyler oluřturmaktadır (řahin S. ve ark. 2019). Ayrıca afetlerde bađımlı nüfusu oluřturan 18 yař altı, 65 yař üstü ve engelli bireylerin kendi imkân ve kabiliyetleri ile yařanan olay ve afetle bařa ıkamaz veya bařa ıkmakta güçlük eker (akır . ve Atalay G. 2020; Bilik M.B. ve Akdađ M. 2023).. Grafik-1'e göre toplam nüfus 85 milyon 279 bin 553'tür. Toplam nüfusun sadece yař verileri baz alındıđında toplumun %37'sini (19-64 yař grubu engelli bireyler hari) oluřturan bađımlı nüfus grubunda 65 yař üstü ve 18 yař altı eriřkin olmayan bireyler vardır.



Grafik 2: 31 Aralık 2022 tarihli Adrese Dayalı Nüfus Sayımında (TÜİK) 0-19 yaş arası nüfusun dağılımı

Grafik-2’de bağımlı grupta kabul edilen 18 yaş ve altı birey olarak 22 milyon 578 bin 378 kişi vardır. Bağımlı nüfusta bulunan adölesan birey; erken ergenlik dönemi hariç, 14 yaşında ortaöğretim hayatına başlamış olan öğrenci sorumluluk almaya ve kendini korumaya yönelik yeterliliğinin arttığı bilinmektedir. Bu yaş grubunda nüfus sayımının yapıldığı dönemi baz alındığında MEB 2022 kaynaklarında toplam 6 milyon 543 bin 599 ortaöğretim düzeyinde eğitim gören öğrenci vardır. 0-18 yaş grubunun %29’unu oluşturan ortaöğretim öğrencileri “KBRN Tehditlerine Yönelik Hazırlık Eğitimi” alabilecek ve bununla birlikte KBRN tehditlerine karşı bilinçli ve hazırlıklı olabileceklerdir.

Bu doğrultuda MEB Talim ve Terbiye Kurulunun Ortaöğretim Yönetmeliğine (Ortaöğretim Yönetmeliği; Ders Yönetmeliği 2021) uygun hareketle ortaöğretim düzeyinde eğitim gören öğrencinin sınıfı ve yaş grubuna uygun olacak biçimde; doğru eğitim-öğretim metot ve materyali kullanılarak öncelikle yaşadığı bölgede KBRN Afet, Acil Durum ve Olaylarının yaşanabilir olduğunu ve süreci yaşayabileceğini kabullendirici faaliyetler yürütülmelidir. Bu konuda afetlere hazırlık ve sivil savunma prensiplerinin önemi ve hazırlığa özendirme yöntemleri doğru şekilde planlanarak hazırlıkları yapılmalıdır. Ancak doğru davranış sergileyebilmesi için doğru bilinçlendirici eğitim alması gerekmektedir. Olağanüstü durumlarda kendi ve çevresini korumak amacıyla doğru davranış sergileyebilir.

**EĞİTİM ÇALIŞMASININ İÇERDİĞİ KONU BALIKLARI İLGİLİ SORULARI**

1. Afet nedir? Afetlerin sınıflandırılması nasıl olur?
2. KBRN tehditleri nelerdir? KBRN tehditleri hangi afet sınıfında yer alır?
3. A. KBRN tehditlerinden korunma yöntemleri nelerdir?  
B. KBRN Tehditlerinden bireysel olarak korunma yöntemleri nelerdir?
4. Afet ve Acil Durum Çantası afetlerde kullanımı bize ne tür fayda sağlar?
  - a) Afet ve Acil Durum Çantasında afet sonrasında hayatımızı kolaylaştıracak ne vardır?
  - b) Afet ve Acil Durum Çantasında bulunan malzemeler afet anı ve sonrasında hangi malzeme hangi amaçla kullanılır?
5. Aile Afet ve Acil Durum Planı, afet öncesinde hazırlamak bize ne tür fayda sağlar?
  - a) Aile Afet ve Acil Durum Planı, afet öncesinde hazırlarken plana uygun aşamalar nelerdir?
  - b) Aile Afet ve Acil Durum Planı, afet öncesinde hazırlarken bireysel sorumluluklarımız nelerdir?
  - c) Aile Afet ve Acil Durum Planı, güvenli gıda ve su temininde nelere dikkat etmeliyiz?
  - d) Ülkemiz Barış içerisinde yaşamakta ancak yaşam alanımıza herhangi bir saldırı olursa nasıl hazırlıklı olunmalıdır?
6. Afet ve Acil Durum Yönetimi Başkanlığı AFAD Sivil Savunma Birimleri, İkaz ve Alarm Sistemleri ile uyarılarda bulunacaktır?
  - ❖ Sarı Alarm
  - ❖ Kırmızı Alarm
  - ❖ Siyah Alarm
7. İkaz ve alarm işaretlerini duyunca hareket tarzı nasıl olmalıdır?
  - a) Sığınakların planlaması nasıl olmalıdır? Nerededir?
  - b) Yerinde Sığınak yapılabilecek yerin planlaması nasıl yapılmalıdır?
  - c) Yerinde Sığınak yapılabilecek yer seçilirken nelere dikkat edilmelidir?
  - d) Yerinde Sığınak yapılacak odanın afet sonrasında gerekli olabilecek malzemelerinin stoklanması nasıl olmalıdır?
    - ❖ KBRN tehdidi oluştuğunda uygun olan ilk anda hangi Acil durum çağrı numarasını aramalıyız?
  - e) Sığınağa giderken nelere dikkat edilmelidir?
  - f) Sığınakta nelere dikkat edilmelidir?
  - g) Sığınaktan çıkarken nelere dikkat etmeliyiz?

*Tablo-1: KBRN Tehditlerine Yönelik Hazırlık Aşaması Konu Başlıkları*

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

1. Kimyasal Tehditler nelerdir?
    - a. Kimyasal Tehditlerin tarihçesi nedir?
      - Antik Çağ Döneminde kullanımı,
      - Dünya Savaşlarında kullanımı,
      - Terör gruplarının kullanımı,
      - Savaşlarda kullanımı,
      - Kıyasalların üretim, depolama sırasında yaşanmış kazalar
  2. Kimyasal tehditlerin sınıflandırılması?
    - I. Toksik Endüstriyel Kıyasalların oluşturduğu tehditler nelerdir?
      - a) Toksik Kıyasal Endüstride çalışırken kullanılan kişisel koruyucu ekipmanın kullanımı nasıl olmalıdır?
      - b) Toksik Kıyasal Endüstride yaşanabilecek kazalarda hareket tarzı nasıl olmalıdır?
      - c) Toksik Kıyasal Endüstride Kişisel Korunma ile ilgili video izletilmiştir.
    - II. Evsel Kıyasalların oluşturduğu tehditler nelerdir?
      - a) Evlerde kullanılan kıyasallar nelerdir?
      - b) Evsel Kıyasala maruziyet sonucu ortaya çıkan belirtiler nelerdir?
      - c) Evsel Kıyasala maruziyet sonrası hareket tarzı nasıl olmalıdır?
    - III. Kıyasal Savaş Ajanları nedir?
      - a) Kıyasal Savaş Ajanları hangi amaçlarla kullanılır?
      - b) Kıyasal Savaş Ajanlarının çevreye yayılım yolları nelerdir?
      - c) Kıyasal Savaş Ajanlarının sınıflandırılması nasıl yapılır? Fiziksel durumu, Uçuculukları, Toksikolojik özelliklerine göre; *Sinir Ajanları, Yakıcı Ajanlar, Kan Zehirleyici Gazlar, Boğucu Ajanlar, Kapasite Bozucu Ajanlar, Kargaşa Kontrol Ajanları, Toksinler*; nedir, nasıl etki eder, üretimi nasıldır ve belirtileri nelerdir?
  3. Kıyasal saldırılardan korunma nasıl yapılmalıdır?
    - a) Kıyasal silah kullanımı nasıl anlaşılır?
    - b) Kıyasal bir tehditten önce neler yapmalıyız?
    - c) Kıyasal bir tehdit oluştuğunda, bulunduğumuz konuma göre hareket tarzı nasıl olmalıdır?
    - d) Kıyasal bir tehdit oluştuğunda, radyo, televizyon veya telefon aracılığıyla bilgi almak ne işimize yarar?
    - e) Kıyasal bir tehdit oluştuğunda, sığınak ve yerinde sığınak kurallarına uymak ne işimize yarar? Güvenli gıda ve su kullanımı nasıl yapılmalıdır?
    - f) Kıyasal bir tehdit oluştuğunda, araç içindeyseniz ne yapmalıyız?
    - g) Kıyasal tehditten etkilendiysek profesyonel tıbbi yardımı nasıl ve nereden almalıyız?
    - h) Sığınakta veya yerinde sığınak yaptığımız alanda arınma işlemlerini nasıl yürütmeliyiz?
- AFAD tarafından hazırlanan Ülkemizde yaşanma ihtimali olabilen Kıyasal Ajan kullanarak yapılabilecek terör eylemi ve buna yönelik hareket tarzı ile ilgili video izletilmiştir.

Tablo-2: Kıyasal Tehditler ile İlgili Konu Başlıkları

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

1. Biyolojik Tehditler nelerdir? hangi gruplara ayrılarak incelenmektedir?
    - a. Biyolojik Tehditlerin tarihçesi nedir?
      - Antik Çağ Döneminde kullanımı,
      - Çeşitli savaşlarda kullanımı
      - Dünya Savaşlarında kullanımı,
      - Bağımsız Devletlerin laboratuvarlarda üretimi
      - Biyolojik ajanların üretim, depolama sırasında yaşanmış kazalar
      - Terör gruplarının kullanımı,
      - Posta yoluyla kişi, kurum ve/veya topluma empoze edilmeye çalışılan fikrin dayatılması,
    - b. Tarihteki yaşanmış büyük çaplı biyolojik tehditler; Pandemiler, Bölgesel Salgınlar
  2. Biyolojik Ajanların yayılma yolları nelerdir?
    - a) Aerosollerin solunması ile,
    - b) Hayvan ısırıkları, vektörlerle bulaş, enfekte besin yeme,
    - c) Kontamine gıda ve suyun tüketimi,
    - d) İnsandan insana bulaş olur.
  3. Biyolojik Ajanların Sınıflandırılması nasıl olur?
    - a) *Bakteriler, Toksinler ve Virüsler*; Yapıları nedir, Türleri nelerdir, Canlılık durumu nedir, Bulaş yolu nasıldır, Üretim yöntemi nasıldır?
    - b) Biyolojik ajanların genel özellikleri nedir?
  4. Biyolojik Saldırılarından korunma nasıl yapılmalıdır?
    - a) Biyolojik Ajan kullanımı nasıl anlaşılır?
    - b) Biyolojik bir tehditten önce neler yapmalıyız?
    - c) Biyolojik tehditlere karşı yapılan aşılama çalışmalarının önemi nedir? Türkiye Cumhuriyeti Sağlık Bakanlığı Aşı Takvimi nasıl yürütülmektedir?
    - d) Biyolojik bir tehdit oluştuğunda, bulunduğumuz konuma göre hareket tarzı nasıl olmalıdır?
    - e) Biyolojik bir tehdit oluştuğunda, radyo, televizyon veya telefon aracılığıyla bilgi almak ne işimize yarar?
    - f) Biyolojik bir tehdit oluştuğunda, sığınak ve yerinde sığınak kurallarına uymak ne işimize yarar? Güvenli gıda ve su kullanımı nasıl yapılmalıdır?
    - g) Biyolojik bir tehdit oluştuğunda, eğer hastalanırsak sağlık durumumuzu nasıl yetkililere bildirilmelidir?
    - h) Biyolojik tehditten etkilendiysek profesyonel tıbbi yardımı nasıl ve nereden almalıyız?
    - i) Sığınakta veya yerinde sığınak yaptığımız alanda arınma işlemlerini nasıl yürütmeliyiz?
    - j) Biyolojik tehditlere karşı her zaman uymamız gereken kurallar nelerdir?
- AFAD tarafından hazırlanan Ülkemizde yaşanma ihtimali olabilen Biyolojik Ajan kullanarak yapılabilecek terör eylemi ve buna yönelik hareket tarzı ile ilgili video izletilmiştir.

Tablo-3: Biyolojik Tehditler ile İlgili Konu Başlıkları

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

1. Radyasyon nedir?
    - a) Radyolojik tehditler nelerdir? Radyolojik tehdit oluşturan radyasyon türleri nelerdir?
    - b) Nükleer santrallerin çalışma prensibi nedir?
    - c) Dünyada ve coğrafyamızdaki nükleer güç santralleri hangi bölgelerde yoğunlaşmıştır?
    - d) Nükleer santral kazaları nasıl oluşur ve ne tür sonuçlar ortaya çıkarır?
    - e) Kirli bomba (RSS) nedir? Kimler tarafından kullanılır? Radyolojik silahların etkileri nelerdir?
    - f) Radyoaktif kaynaklar nelerdir? Radyoaktif kaynakta kaza nasıl oluşur? Bu kazaların sonuçları nelerdir?
    - g) Radyolojik Tehditlerin tarihçesi nedir?
      - NGS kazaları,
      - Radyoaktif madde depolama kazaları,
      - Radyoaktif kaynak Kazaları,
      - Doğal afetlerin radyasyon kazalarına etkileri
    - h) Daha önce yaşanmış Nükleer Güç Santral (Çernobil NGS) kazaları esas alınarak ülkemiz için tehdit oluşturabilecek Nükleer Güç Santralleri nelerdir?
  2. Radyasyon çeşitleri nelerdir?
    - a) Çevremizde bulunan kaynakların etrafa yaydığı radyasyonların frekans düzeyleri nelerdir? Bu radyasyon çeşitlerinin tehlike düzeyleri nelerdir?
    - b) *Alfa, Beta, Gama ve Nötron Radyasyonları*; yayılma hızı, yayılmasını engelleyici faktörler ve insan vücuduna etkileri nelerdir?
  3. Radyasyonun insan sağlığına etkileri nelerdir?
    - a) Akut Radyasyon Sendromu belirtileri nelerdir?
    - b) Radyasyonun gecikmeli etkileri nelerdir?
    - c) Radyasyonun kansere sebep olan etkileri nelerdir?
  4. Radyasyondan korunmada temel kavramlar nelerdir? -Zaman, -Mesafe, -Zırhlama kavramlarının önemi nedir?
    - a) Radyolojik bir tehditten önce ne tür hazırlıklar yapmalıyız?
    - b) Radyolojik bir tehdit oluştuğunu nasıl anlarız?
    - c) Radyolojik bir tehdit oluştuğunda, radyo, televizyon veya telefon aracılığıyla bilgi almak ne işimize yarar?
    - d) Radyolojik bir tehdit oluştuğunda, bulunduğumuz konuma göre hareket tarzı nasıl olmalıdır?
    - e) Bulduğumuz yerin boşaltılması istendiyse hareket tarzımız nasıl olmalıdır?
    - f) Bulduğumuz yerde kalmamız istendiyse hareket tarzımız nasıl olmalıdır?
    - g) Güvenli sığınağı bulmanın önemi nedir?
    - h) Radyolojik bir tehdit oluştuğunda, sığınak ve yerinde sığınak kurallarına uymak ne işimize yarar? Güvenli gıda ve su kullanımı nasıl yapılmalıdır?
    - i) Sığınakta veya yerinde sığınak yaptığımız alanda arınma işlemlerini nasıl yürütmeliyiz? Profesyonel tıbbi yardım almak veya basit yaralanmalarımıza ilk yardımı nasıl yapmalıyız? Nelere dikkat etmeliyiz?
- AFAD tarafından hazırlanan Ülkemizde yaşanma ihtimali olabilen Radyolojik Ajanların depolama ve imha aşamalarında yaşanabilecek tehditle ilgili ve buna yönelik hareket tarzı ile ilgili video izletilmiştir.

Tablo-4: Radyolojik Tehditler ile İlgili Konu Başlıkları



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

1. Nükleer Tehditler nelerdir? Nükleer bomba türleri nelerdir?
  - a) Atom Bombası ve Hidrojen Bombası arasındaki farklar nelerdir?
  - b) Nükleer tehditlerin tarihçesi nedir?
    - Nükleer bombanın üretiminden kullanımına kadar geçen sürede yaşanmış olayların kronolojisi,
    - Nükleer bomba denemesi yapan ülkelerin, bomba deneme tarihi ve adedi,
    - Uluslararası Nükleer bomba edinme yarışında yaşanmış krizler,
    - Dünyada nükleer bomba üretmiş ve nükleer bomba denemesi yapmış ülkeler,
  - c) Nükleer Tehditlerin
  - d) Nükleer Silahların çalışma prensibi nedir?
2. Nükleer Silahların etkileri nelerdir?
  - a) Nükleer patlama sonucu, oluşan etkilerin sonuçları nelerdir?
  - b) Nükleer patlama sonucu, oluşan etkilerin orantısız dağılımı nedir?
  - c) Nükleer patlama sonucu, oluşan etkilerin insan sağlığına verebileceği zararlar nelerdir?
3. Nükleer saldırılardan korunma nasıl yapılmalıdır?
  - a) Nükleer bir tehditten önce ne tür hazırlıklar yapmalıyız?
  - b) Radyoaktif serpinti durumları için potansiyel sığınma yerlerinin tespiti nasıl ve ne için yapılmalıdır?
  - c) Nükleer bir tehdit oluştuğunu nasıl anlarız?
  - d) Nükleer bir tehdit oluştuğunda, radyo, televizyon veya telefon aracılığıyla bilgi almak ne işimize yarar?
  - e) Nükleer bir tehdit oluştuğunda, bulunduğumuz konuma göre hareket tarzı nasıl olmalıdır?
  - f) Patlama anında hareket tarzımız nasıl olmalıdır?
  - g) Güvenli sığınağı bulmanın önemi nedir?
  - h) Güvenli sığınakta kalma süremizin tespiti nasıl olmalıdır?
  - i) Nükleer bir tehdit oluştuğunda, sığınak ve yerinde sığınak kurallarına uymak ne işimize yarar? Güvenli gıda ve su kullanımı nasıl yapılmalıdır?
  - j) Sığınak tahliyesi ve eve dönüşlerde nelere dikkat etmeliyiz?

Sığınakta veya yerinde sığınak yaptığımız alanda arınma işlemlerini nasıl yürütmeliyiz? Profesyonel tıbbi yardım almak veya basit yaralanmalarımıza ilk yardımı nasıl yapmalıyız? Nelere dikkat etmeliyiz?

*Tablo-5: Nükleer Tehditler ile İlgili Konu Başlıkları*

KBRN Tehditlerinin hazırlığına yönelik geliştirilmesi planlanan Eğitim Müfredatının “Tablo-1: KBRN Tehditlerine Yönelik Hazırlık Aşamaları Konu Başlıkları, Tablo-2: Kimyasal Tehditler İle İlgili Konu Başlıkları, Tablo-3: Biyolojik Tehditler İle İlgili Konu Başlıkları, Tablo-4: Radyolojik Tehditler İle İlgili Konu Başlıkları, Tablo-5: Nükleer Tehditler İle İlgili Konu Başlıkları” tablolarında belirtilen konu başlıkları ve soruları KBRN Tehditlerine hazırlığına yönelik eğitim ile ilgili konu ve soru başlıklarının tamamını kapsamaktadır; bu başlıklar baz alınarak eğitim içeriği; bu konuda ilgili diğer kurum ve kuruluşlardan destek alınarak hazırlanmalıdır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## EĞİTİMİN METOT, MATERYAL VE KAZANIM YÖNÜNDE ÖRNEKLENDİRİLMESİ

Konu	Materyal	Metot	Kazanımlar
Afet ve Acil Durum Çantası	Ders kitabı, Görsel olarak slayt sunusu Fiziki olarak çantanın hazırlanması	<p>Ortaöğretim öğrencisi afet ve acil durum çantasını çoğunlukla önceden bilmesine karşın ne için ve nasıl kullanacağını bilmemektedir.</p> <p><b><i>Afet ve Acil Durum Çantasının kullanım amacı;</i></b></p> <p>Yardım ekipleri olası büyük afet ve acil durumlarda afet bölgesinde yaşayan herkese anında yetişememektedir. Altın saat olarak kabul edilen ilk 72 saatte yardım ekipleri gelene kadar her birey kendisini hazırlamayı zorunlu kılmaktadır.</p> <p>Bireyin Afet ve Acil Durum Çantasının olması yardım ekipleri ulaşana kadar kendisinin ve çevresindekilerinin hayatta kalmasında ihtiyaç duyabileceği malzemelerin hazır ve ulaşılabilir olması çok önemlidir.</p> <p><i>“Örneğin KBRN olaylarının yaşanmasıyla aksi ispat edilene kadar paketi açık, nereden, nasıl ve ne amaçla temin edildiği bilinmeyen her türlü su ve gıda ürünü tehlikelidir; Afet ve Acil Durum Çantasında bulunan paketli su ve gıdanın kullanımı bu doğrultuda önemlidir”</i> şeklinde Afet ve Acil Durum Çantasında bulunan bütün malzeme ve ekipman görsel ve fiziki olarak kullanım şekli ve amacı anlatılabilir.</p>	<p>Öğrenci Afet ve Acil Durum Çantasının kullanım amacı, kullanım şekli, hazırlama yöntemlerini, gerekli malzemelerin neler olduğunu öğrenir.</p> <p>Afet ve Acil Durum Çantasının gerekliliğini bilir ve pozitif yönlü davranış göstererek Afet ve Acil Durum Çantasını hazırlaması beklenir.</p>

Tablo-6: KBRN Tehditlerine Yönelik Hazırlık ve Koruyucu Yöntemlerin İncelenmesi Örneği

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Konu	Materyal	Metot	Kazanımlar
2020 Beyrut Limanı Patlaması	Ders kitabı, Görsel Sunu, Türkiye Limanları Haritası	<p>Ortaöğretim öğrencisi 2020 yılında yaşanmış olayı biliyor olabilmekle birlikte nasıl olduğunu ve ne amaçla değerlendireceğini bilemeyebilir.</p> <p>Olay anlatımı; 4 Ağustos 2020 yılında Beyrut Limanında çıkan yangın sonrası limanda devlet tarafından depolanan 2 bin 750 ton amonyum nitratın patlaması ile birlikte 218 kişi vefat etmiş ve 7500+ kişi yaralanmıştır. Lübnan ekonomisine maliyeti 10-15 milyar doları geçmiş ve olay sonrası hükümet istifa etmiştir.</p> <p>Ülkemizin jeopolitik yapısına göre Avrupa, Asya ve Afrika için kesişim noktasında olması; denize kıyısının olması ve ayrıca deniz limanlarının kullanımı milli güvenlik politikaları gizli tutulmaktadır. Bu nedenle deniz limanlarımızda ne depolandığı bilinmemektedir.</p> <p>Eğer ülkemizde böyle bir afet yaşanırsa ne yapmalıyız? Ne yöne hareket etmeliyiz? Olay sonrası rüzgârın estiği yönü bilmemiz bize nasıl fayda sağlar? İkaz alarm işaretlerini duyduğumuz zaman hareket tarzımız nasıl olmalıdır? Sorularını; soru-cevap ve beyin fırtınası yöntemleri kullanılarak anlatım sağlanarak doğru hareket tarzı öğretilir.</p>	<p>Öğrenci geçmişte yaşanmış kimyasal olayları öğrenir.</p> <p>Geçmişte yaşanan kimyasal olayların günümüzde de yaşanabileceğini fark eder.</p> <p>Kimyasal olayın yaşanması durumunda stresle başa çıkma yöntemlerini, doğru hareket tarzını, nereye durabileceği ve sığınmak olarak kullanabileceğini ve kendini nasıl koruması gerektiğini bilir.</p> <p>Kimyasal olayın yaşanması durumunda yardım ekiplerine nasıl ulaşabileceğini öğrenir.</p>

Tablo-7: KBRN Tehditlerinde Uygun Olay İncelemesi Örneği

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Konu	Materyal	Metot	Kazanımlar
Vektörlerin Hastalık Taşıma Yöntemleri	Ders kitabı, Video sunusu	<p>Video içeriği; Kolera hastalığının yayıldığı bir köyde bireysel hijyen kurallarına uymayan hastalık etkeni (<i>vibrio cholera</i>) bireyler tuvalet ihtiyaçlarını uygun olmayan noktalara yapıyor, vektör olan sivrisinekler dışkıdan aldığı mikrobu köydeki bireylerin ellerine, kullandığı materyallere, yediği yemeklere, içtikleri sulara bulaştırıyor. Hijyen kurallarına uymayan bu bireyler sindirim sistemini etkisi altına alan kolera hastalığı bulaştırıyor.</p> <p>Hijyen kurallarının neler olduğu, sadece bulaşıcı hastalıkların çoğaldığı dönemlerde değil her zaman uyulması gerektiğini öğrenmenin gereklilikleri anlatılır.</p> <p>Ellerin su ve sabunla sürekli yıkanması, gıdaların açıkta tutulmaması gerektiği, çatal, kaşık, bıçak, bardak gibi beslenme materyallerinin bireysel olduğu ve kimseyle paylaşılmaması gerektiğini, öksürme veya hapşırma sırasında ağız ve burnun kapalı tutulması, hasta kişinin hastalığı yaymaması için maske kullanması veya ayrı bir odada karantinada kalması Covid-19 dönemi de örnek gösterilerek anlatılabilir.</p>	<p>Öğrenci; küçük olmasına karşın masum olmayan sivrisineklerin vektör olarak hastalık taşıyabileceğini öğrenir.</p> <p>Hijyen kurallarını eskiden öğrendikleri ile pekiştirerek yeniden öğrenir.</p> <p>Hastalıklardan korunmak amacıyla hijyen kurallarına uyması yönünde pozitif davranış sergiler.</p>

Tablo-8: Biyolojik Ajanların Yayılma Yollarının Anlatıldığı Video Sunusu İncelemesi Örneği

KBRN Tehditlerinin hazırlığına yönelik geliştirilmesi planlanan Eğitim Müfredatının “**Tablo-1: KBRN Tehditlerine Yönelik Hazırlık Aşamaları Konu Başlıkları, Tablo-2: Kimyasal Tehditler İle İlgili Konu Başlıkları, Tablo-3: Biyolojik Tehditler İle İlgili Konu Başlıkları, Tablo-4: Radyolojik Tehditler İle İlgili Konu Başlıkları, Tablo-5: Nükleer Tehditler İle İlgili Konu Başlıkları**” tablolarında belirtilen konu başlıkları baz alınarak “**Tablo-6: KBRN Tehditlerine Yönelik Hazırlık ve Koruyucu Yöntemlerin İncelenmesi Örneği, Tablo-7: KBRN Tehditlerinde Uygun Olay İncelemesi Örneği, Tablo-8: Biyolojik Ajanların Yayılma Yollarının Anlatıldığı Video Sunusu İncelemesi Örneği**” örneklerine uygun eğitim ders kitapları, görsel, işitsel, fiziki ve video sunu vb. materyaller hazırlanabilir.

## SONUÇ

Ülkemiz de KBRN Tehditlerine karşı ulusal düzeyde hazırlanıldığı gibi bireysel düzeyde de hazırlanmalıdır. Geleceğimizin teminatı olan gençlerin KBRN tehditlerine yönelik hazırlık yapması/hazırlık yapmasının öğretilmesi, bilgi düzeyinin yükseltilmesi ve bu konuda gelecek dönemlerde de uygulanabilir ve sürdürülebilir eğitim planlarının oluşturulması amacıyla öneri niteliğinde yürütülen araştırma çalışması adolesan bireyin, KBRN tehditlerine maruz kalması halinde yardım ekipleri gelene kadar ne yapması gerektiğini bilmesi ve olağanüstü durumlarda kendi ve çevresini korumak amacıyla doğru davranış sergileyebilmesi için KBRN tehditlerinin hazırlığına yönelik bilinçlendirici ve tamamlayıcı eğitimleri alması gerekmektedir. Bu amaçla Türkiye Cumhuriyeti Milli Eğitim Bakanlığı talim terbiye kurulunun Başkanlığının ortaöğretim düzeyinde eğitim veren

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

kurumlarının mevcut müfredatına uygun yeni zorunlu seçmeli veya mevcutta bulunan afetle ilgili konuları içerisinde dersin müfredatına eklenebilir şekilde hazırlanması; eğitimin uygun görülmesiyle ortaöğretim eğitim müfredatına eklenmesi durumunda öncelikle lisede eğitim gören öğrenciler ve kademeli olarak liseye geçen öğrenciler eğitime katılabilecek ve bu şekilde bilinçli bir toplumun temelleri atılmış olacaktır.

## KAYNAKÇA

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NESNE ALGILAMA İLE EMNİYET KEMERİ TESPİTİ: YOLOv3 VE YOLOv4  
KARŞILAŞTIRMASI

OBJECT DETECTION FOR SEATBELT DETECTION: A COMPARISON OF YOLOv3 AND  
YOLOv4

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**ÖZET**

Emniyet kemeri, trafik kazaları sırasında yaşamsal önem taşıyan basit ve etkili bir güvenlik önlemidir. Bu nedenle, emniyet kemeri kullanımının denetlenmesi ve bu kullanımın artırılmasının sağlanması güvenlik üzerinde kritik bir etkiye sahiptir. Emniyet kemeri kullanımının izlenmesi, kazalar sırasında yaralanmaları azaltabilir ve yaşamları kurtarabilir. Bu önemli güvenlik önlemi, nesne algılama teknolojisi kullanılarak daha etkili bir şekilde izlenebilir ve uygulanabilir. Nesne algılama, bilgisayarlı görünümün önemli bir alanıdır ve güvenlik alanında emniyet kemeri tespiti gibi uygulamalarda oldukça etkili bir yöntem sunar. Özellikle, son zamanlarda en çok araştırılan YOLO (You Only Look Once) algoritmaları, bu tür görevlerde oldukça başarılıdır. Bu çalışmada YOLOv3 ve YOLOv4 gibi iki önde gelen derin öğrenme modeli kullanılarak emniyet kemeri tespiti yapılması amaçlanmıştır. Bu amaç doğrultusunda, YOLOv3 ve YOLOv4 modelleri karşılaştırılarak, emniyet kemeri tespitindeki performanslarının değerlendirilmesi hedeflenmiştir. Bu araştırma sonucunda, YOLOv4'ün emniyet kemeri tespiti için daha yüksek doğruluk sağladığını göstermektedir.

**Anahtar kelimeler:** Emniyet kemeri, Nesne algılama, YOLO

**ABSTRACT**

The seat belt is a simple and effective safety measure that is vital during traffic accidents. Therefore, monitoring and ensuring increased use of seat belts has a critical impact on safety. Monitoring the use of seat belts can reduce injuries during accidents and save lives. This important security measure can be monitored and implemented more effectively using object detection technology. Object detection is an important area of computer vision and provides a very effective method in applications such as seat belt detection in the field of security. In particular, the most recently researched YOLO (You Only Look Once) algorithms are very successful in such tasks. The study aims to detect seat belts using two leading deep learning models, YOLOv3 and YOLOv4. To this end, the objective is to evaluate their performance in seat belt detection by comparing the YOLOv3 and YOLOv4 models. This research shows that YOLOv4 provides higher accuracy for seat belt detection.

**Keywords:** Seat belt, Object detection, YOLO

**GİRİŞ**

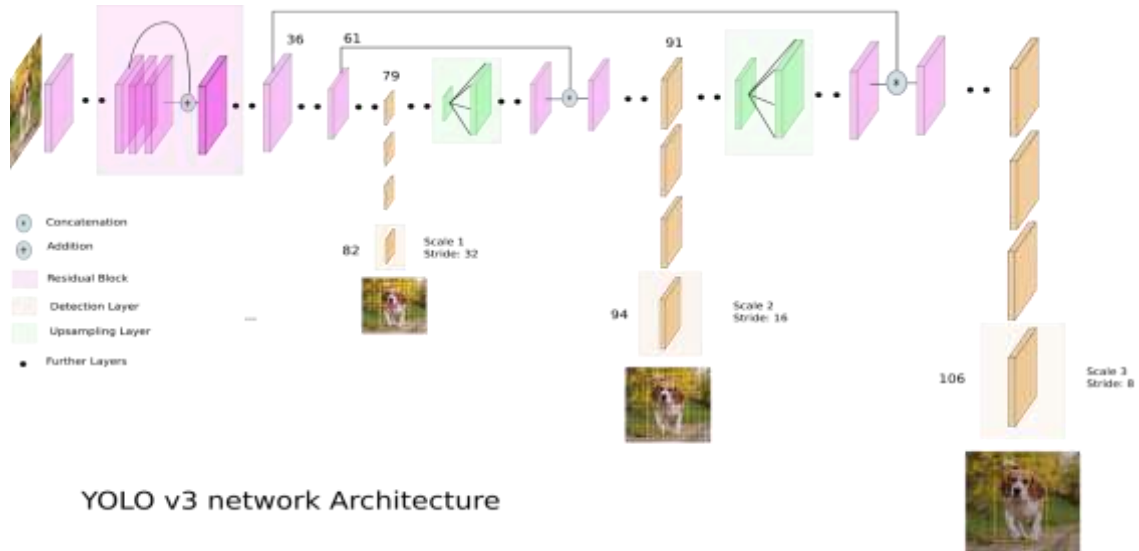
Kentlerin büyümesi ve nüfus hareketliliğinin artması, yollardaki araç sayısını önemli ölçüde artırarak karayolu trafiği için ciddi zorluklar doğurmuştur (Wang & Ma, 2022). Bu artışın bir sonucu olarak, dünya genelinde karayolu trafik kazaları sadece büyük ekonomik kayıplara yol açmakla kalmamış, aynı zamanda uzun süreli psikolojik sorunları da beraberinde getirmiştir. (Febres vd., 2020). Emniyet kemeri

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Bu çalışmada YOLOv3 ve YOLOv4 algoritmalarının emniyet kemeri tespitindeki etkinliği araştırılmıştır. Bu doğrultuda iki algoritmada da aynı veri seti ile modellenerek emniyet kemeri algılamadaki performanslar değerlendirilmiştir.

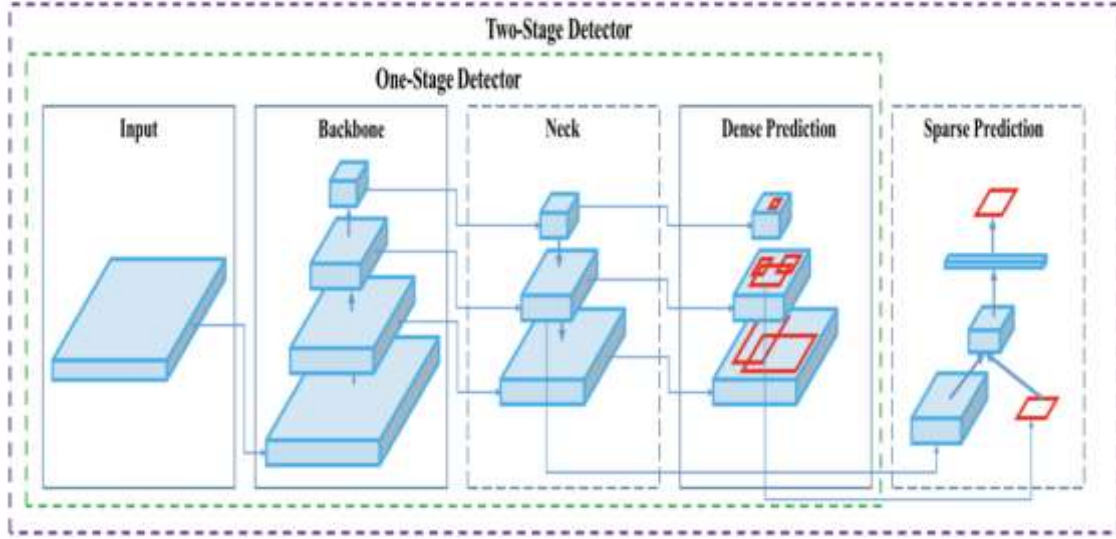
### YÖNTEM

YOLO (You Only Look Once), gerçek zamanlı olarak nesne algılama algoritmasıdır. Bu algoritma Evrişimli Sinir Ağı (CNN) yöntemini kullanır. Bu yöntem ile görüntüyü bölgelere ayırır ve her bölge için olasılıkları tahmin eder, bu sayede doğruluk oranı oldukça yüksektir. YOLO, sınırlayıcı kutular çizme ve sınıf etiketlerini tanımlama problemini tek bir uçtan uca türevlenebilir ağda birleştiren nesne ağıdır. YOLOv3, her sınırlayıcı kutu için bir nesne varlık puanı tahmin eder ve bunu lojistik regresyon kullanarak yapar (Redmon & Farhadi, 2018). YOLOv3, sınırlayıcı kutu tahminine bir nesnelilik puanı ekleyerek önceki YOLO modelleri üzerine inşa edilmiştir. Omurga ağ katmanlarına bağlantılar eklenmiş ve daha küçük nesnelere performansı artırmak için üç ayrı ayrıntı düzeyinde tahminler yapması sağlanmıştır. (Zhao & Li, 2020). YOLOv4 ise Omurga olarak CSPDarknet53, "Boyun" olarak SPP (Mekansal piramit havuzu) ve PAN (Yol Toplama Ağı) ve "Baş" için YOLOv3 kullanılarak son araştırma bulgularına dayalı olarak tasarlanmıştır. Şekil 1 ve Şekil 2 de sırasıyla YOLOv3 ve YOLOv4 mimarileri verilmiştir.



Şekil 1. YOLOv3 Mimarisi

Şekil 1’de görüldüğü gibi YOLOv3 mimarisinde önemli yenilik, bu algoritmanın algılamalarını üç farklı ölçekte yapmasıdır. YOLO algoritması tam bağlantılı bir katmandır ve algılama, yukarıdaki diyagramda görüldüğü gibi üç farklı yerde üç farklı ölçek kullanılarak yapılır. Şekil 2’de gösterildiği gibi YOLOv4 algoritması ise 4 farklı bölgeye sahiptir: Omurga, boyun, yoğun tahmin ve seyrek tahmin. YOLOv4, ortalama ortalama hassasiyette (mAP) %10'a kadar ve saniyedeki kare sayısında %12'ye kadar bir iyileşme sağlayarak YOLOv3 algoritmasında bir gelişmedir.



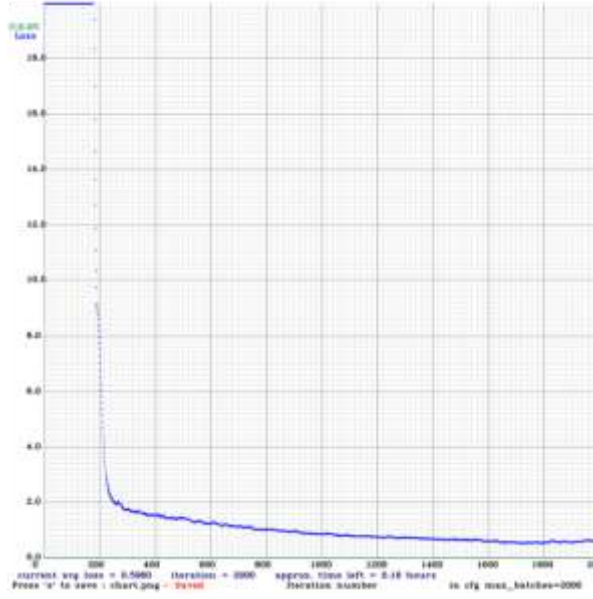
Şekil 2. YOLOv4 Mimarisi

### Veri Seti

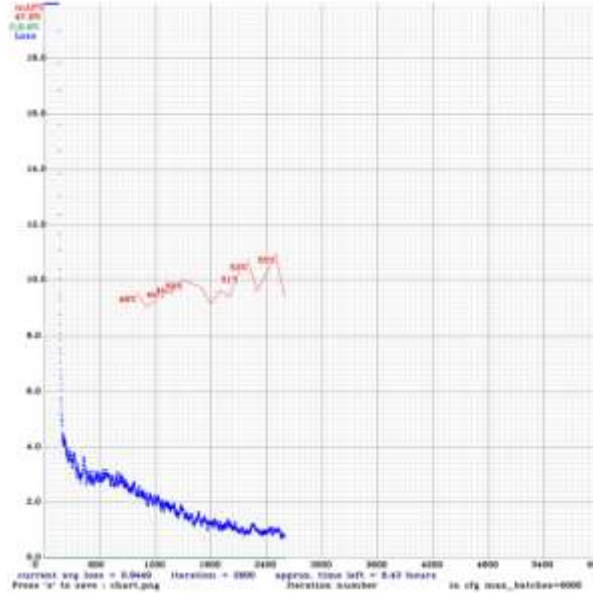
Nesne tanıma işlemi için en önemli unsurlardan biri veri setinin hazırlanmasıdır. Üzerinde tanıma yapılacak nesne için birçok fotoğrafa ihtiyaç duyulmaktadır. Ne kadar fazla ve ne kadar farklı tip fotoğrafımız olursa o kadar doğru bir modelimiz elde edilmiş olur. Araştırmada kullanılan veri seti Google'ın sunmuş olduğu Open Images Dataset V6 sitesi, images cv sitesi ve Google arama motorundan indirilen resimlerden oluşturulmuştur. Görüntülerde emniyet kemerinin nerede olduğunu belirlemek için etiketlemeler yapılmalıdır. İndirilen resimler LabelImg programı kullanılarak etiketlenmiştir. LabelImg, nesne tespiti projeleri için kullanılan popüler bir açık kaynaklı etiketleme aracıdır. Modelimizin eğitimi için 2022 resim, testler için ise 53 resim seçilmiştir.

### Modelin Geliştirilmesi

Görüntüleri etiketledikten sonra DarkNet aracılığı ile Google Colab üzerinden YOLO modelimiz oluşturulmuştur. Hem YOLOv3 için hem de YOLOv4 için aynı veri seti kullanılarak model eğitimi sağlanmıştır. Model eğitiminin başarısı eğitim sonrası oluşan loss grafiğinden anlaşılabilir. Şekil 4 ve Şekil 5 sırası ile YOLOv3 ve YOLOv4 loss grafikleridir. Modelin eğitimi sırasında hesaplanan toplam kaybın (loss) zaman içindeki değişimini gösterir. Eğitim başladığında, loss yüksek olmalıdır çünkü model hiçbir nesneyi doğru bir şekilde tespit etmeyi öğrenmemiştir. Modelin eğitildikçe loss değeri azalmalıdır. Model, nesnelere daha iyi tespit etmeyi öğrendikçe, loss değeri düşmelidir. Loss grafiği zaman içinde dalgalanmamalı veya aniden yükselmemelidir. Stabil bir loss grafiği, modelin güvenilir bir şekilde çalıştığını gösterir. Eğitim sonunda, loss değeri düşük olmalıdır. Bu, modelin nesnelere başarılı bir şekilde tespit etmeyi öğrendiği ve eğitim verilerine uygun bir şekilde genelleme yaptığı anlamına gelir. Bu loss grafiği, modelin ne kadar iyi veya kötü performans gösterdiğini ve eğitimin hangi aşamalarında iyileşme veya kötüleşme olduğunu değerlendirmek için kullanılır. Grafiklerde yatay eksen eğitim iterasyonlarını veya epoklarını temsil eder. Her iterasyon veya epok, modelin eğitildiği veri setinin bir tam geçişini ifade eder. Diğer bir deyişle, eğitim sürecinin zaman içinde nasıl ilerlediğini gösterir. Düşey eksen ise loss değerlerini temsil eder. Loss, modelin tahminlerinin gerçek değerlerden ne kadar sapma gösterdiğini ölçen bir metriktir. Loss değeri düşük olduğunda, model daha iyi performans gösterir. Genellikle loss grafiği, eğitim başladığında yüksek bir loss değeri ile başlar çünkü model başlangıçta rastgele ağırlıklarla başlar. Ardından, modelin eğitildikçe loss değeri düşmeye başlar çünkü model daha iyi tahminler yapmayı öğrenir. İdeal olarak, loss grafiği istikrarlı bir şekilde azalır ve eğitim sonunda bir minimum değere ulaşır.



Şekil 3. YOLOv3 Loss değeri

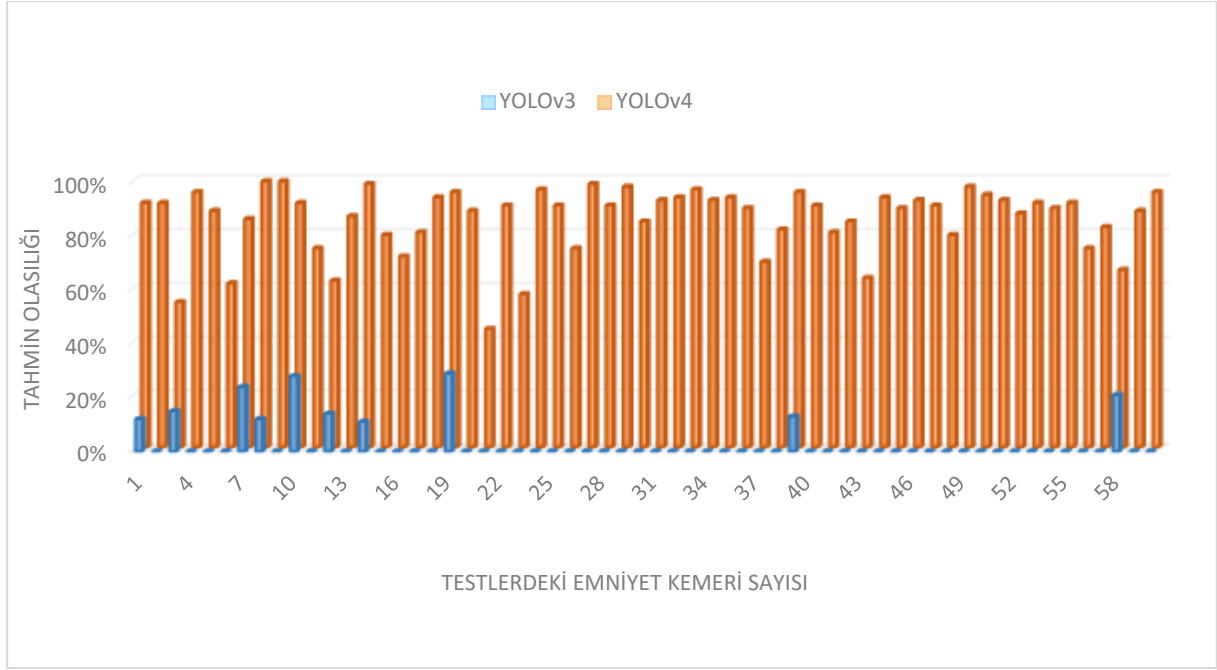


Şekil 4. YOLOv4 Loss Değeri

Eğitim aşamasını tamamlayıp weights uzantılı dosyalar oluşturulmuş ve test aşamasına geçilmiştir. Weight dosyası, YOLO modelinin öğrenilmiş ağırlıklarını içeren bir dosyadır. Bu ağırlıklar, modelin eğitim verileri üzerinde öğrendiği nesne tespiti ve sınıflandırma yeteneklerini temsil eder. Model eğitildikten sonra, modelin eğitiminde kullanılan görüntülerden farklı görüntüler kullanılarak modelin emniyet kemeri algılama yeteneği test edilmiştir.

#### ARAŞTIRMA VE BULGULAR

Emniyet kemeri tespiti amacıyla YOLOv3 ve YOLOv4 algoritmalarının performansını değerlendirmek için, 53 farklı görüntü seçilmiştir. Her iki algoritma için de aynı resimler test aşaması için kullanılmıştır ve resim çıktıları karşılaştırılmıştır (Şekil 5). Bu 53 görüntüde yolcularda dahil olmak üzere toplamda 60 adet emniyet kemeri bulunmaktadır. Her bir resimde bulunan emniyet kemeri için YOLOv3 ve YOLOv4 algoritmalarından elde edilen sonuç olasılıkları Şekil 5'te verilmiştir. Model %10 tahmin olasılığının altındaki tahmin değerlerini algılamayacak şekilde ayarlanmıştır.



Şekil 5. YOLOv3-YOLOv4 Algoritmalarının Performans Karşılaştırması

Bu çalışmada eğitim aşaması tamamlandıktan sonra elde edilen sonuçlar, YOLOv4 algoritmasının kemer algılamada daha etkili olduğunu göstermektedir. Test sonucundaki bulgulara göre YOLOv4 her resimdeki kemerleri yüksek bir olasılıkla tahmin ederken, YOLOv3 bu konuda yetersiz kalmıştır. Şekil 5'teki grafikte görüldüğü gibi YOLOv3 algoritması çok az resimde ve düşük olasılıkla emniyet kemeri tahmini yaparken (1,3,7,8,10,12,14,19,39,58) YOLOv4 yüksek bir oranda resimlerdeki tüm emniyet kemerlerini algılamıştır. Şekil 6, aynı resmin hem YOLOv3 hem de YOLOv4 modeli için çıktı test çıktılarından örnekler göstermektedir.

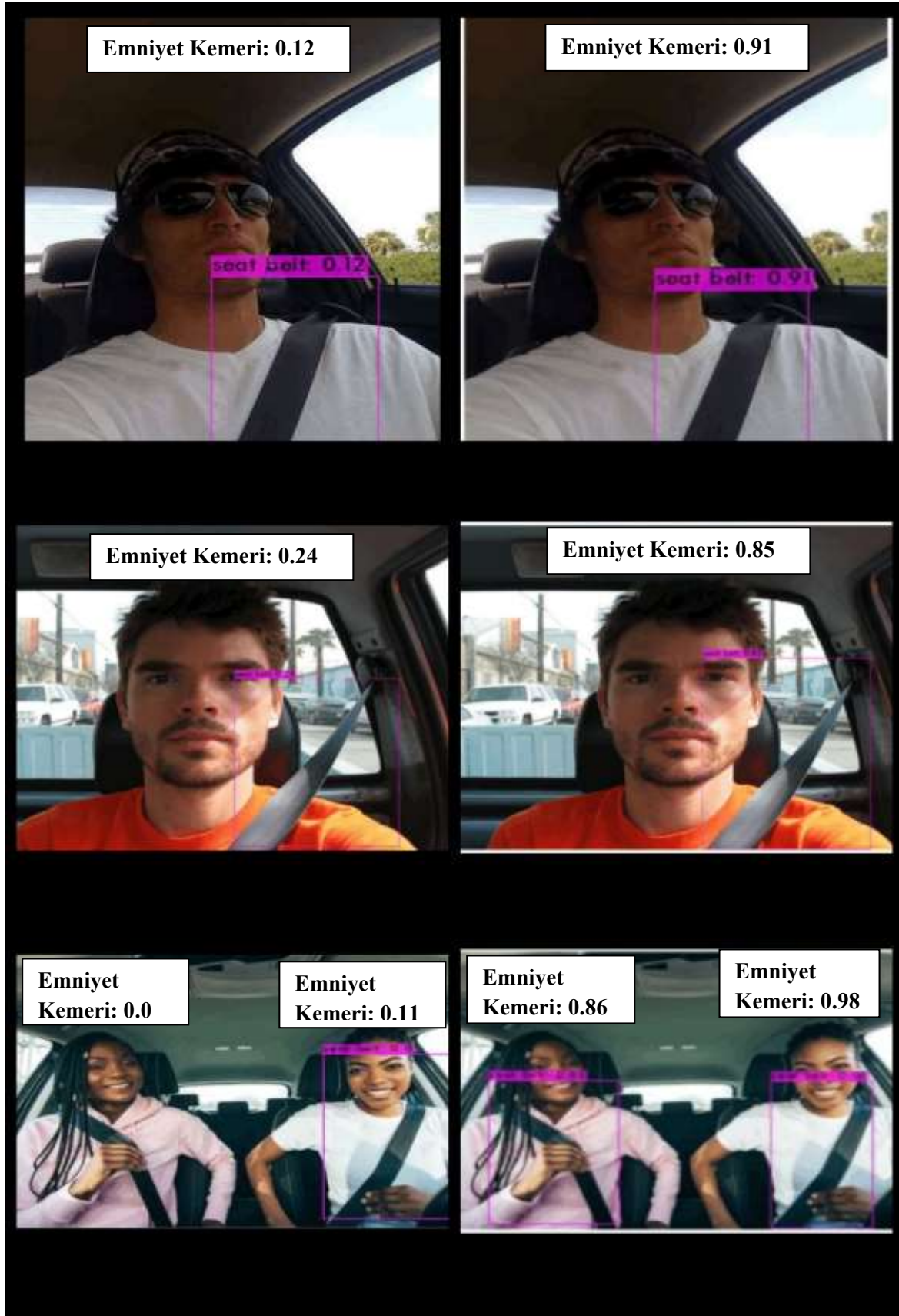


# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

YOLOv3

YOLOv4



Şekil 6. Test Verilerinden Örnekler

## **TARTIŞMA VE SONUÇ**

YOLOv3 ve YOLOv4, nesne algılama için oldukça etkili ve hızlı derin öğrenme algoritmalarıdır. Yapılan çalışmada bu algoritmalar kullanarak emniyet kemeri algılama uygulaması geliştirmek istenmiştir. İlk adımda eğitimde kullanılan verilerdeki emniyet kemerleri etiketlenmiştir. Ardından, YOLOv3 ve YOLOv4 nesne algılama modelleri kullanılarak eğitildi. Eğitim sonucunda elde edilen modellerin performansı test için ayrılan farklı görüntüler üzerinde değerlendirilerek emniyet kemeri algılama performansları karşılaştırıldı. Bu çalışma sonucunda YOLOv4 algoritması tüm resimlerde yüksek tahmin oranı ile emniyet kemeri tespiti yaparken, YOLOv3 oldukça düşük tahmin oranlarıyla çok az sayıda emniyet kemerini algılaması yapabilmektedir.

Bu araştırma, derin uygulama yöntemlerini kullanarak emniyet kemeri tespiti yapacak gelecekteki çalışmalara rehberlik sağlaması açısından önem taşımaktadır.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DAVRANIŞSAL HALKLA İLİŞKİLER MODELİNİN KAMUDA FARKINDALIK OLUŞTURMAK AMACIYLA KULLANIMI: TÜTÜN KONTROLÜ KAPSAMINDA YÜRÜTÜLEN FAALİYETLER

### USAGE OF BEHAVIORAL PUBLIC RELATIONS MODEL TO RAISE PUBLIC AWARENESS: ACTIVITIES CONDUCTED WITHIN THE SCOPE OF TOBACCO CONTROL

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#### ÖZET

Küresel iklim değişikliğinin oluşturduğu risklerin en aza indirilmesi ve kamuların bilgilendirilmesi, su/enerji vb. kaynakların korunması ve sürdürülebilirliklerinin sağlanması, eğitimin geliştirilmesi, sağlığın geliştirilmesi ve korunması gibi pek çok konunun ve bu konulardaki bilgi eksikliklerinden kaynaklı sorunların çözümü kapsamında yürütülen faaliyetlerde davranış bilimlerinden yararlanmak daha etkili sonuçlara ulaşmak anlamına gelmektedir. Devletler açısından bakıldığında, kamu politikalarının oluşturulması çerçevesinde ele alınan konuların ve sorunların çözümü için yasal düzenlemeler gerekliken; bireyler ve tüm kamu açısından bakıldığında, oluşturulan politikaların ve gerçekleştirilen yasal düzenlemelerin kabulü için kamulara yönelik olarak yürütülen çeşitli faaliyetlerden yararlanmak gerekmektedir. Oluşturulan politikaların ve gerçekleştirilen yasal düzenlemelerin kamularda kabul görebilmesi açısından farkındalık oluşturmak, karar verme aşamasında etkili olan temel motivasyonları yönlendiren etmenleri ortaya koymak, davranış değişikliğinin sürdürülebilirliğini sağlamak amacıyla çeşitli faaliyetlerden yararlanmak, doğru tasarlanmış bilgilendirme süreciyle bilinç oluşturmak, ikna edici iletişim faaliyetlerini tasarlayıp uygulamak önem taşımaktadır. Tüm bunlar çerçevesinde kamu kurumları; kamusal sorunlara dikkat çekmek, bireylerin ve tüm kamunun konuyla ilgili farkındalıklarını oluşturup davranış değişikliğini sağlamak amacıyla halkla ilişkiler uygulamalarından yararlanmaktadırlar. Yürütülen faaliyetler, kamularda tutum değişikliğinin gelişmesine ve olumlu davranışın benimsenmesine katkı sağlamaktadır. Aynı zamanda da kamusal bilincin oluşumuna yardımcı olarak davranışların sürdürülebilirliği açısından etkili olmaktadır. Kamu kurumlarının kamuları bilgilendirmek ve bilinç oluşturmak amacıyla yürüttükleri halkla ilişkiler uygulamalarında, amaç doğrultusunda alanda kullanılan model ve kuramlardan yararlanmaları bu uygulamaların kabul görmesini, etkinliğini ve sürdürülebilirliğini artıracaktır. Halkla ilişkilerin kamusal sorunlara veya konulara odaklanarak çözüm üretip ilgili konu çerçevesinde davranış değişikliği yaratma konusundaki çabalarını kapsayan *Davranışsal Halkla İlişkiler Modeli*, bu çerçevede kullanılan modellerden biridir. Patrick Jackson davranış değişikliğine odaklanan *Davranışsal Halkla İlişkiler Modelinin*; farkındalık oluşması, bireylerin edindikleri bilgiler üzerinde düşünmeye başladıkları örtük ilgi süreci, bu ilginin halkla ilişkiler faaliyetleriyle tetiklenmesi, davranış değişikliği öncesinde tutum ve davranışlarda yaşanan değişiklikler ve nihai davranış değişikliğinin gerçekleşmesi olarak beş temel adımın olduğunu aktarmıştır (Balta Peltekoğlu & Akbayır, 2019, s.832). Ulusal ve uluslararası alanda tüm bireyler ve kamular için en önemli sorunlardan biri, tütün ve tütün mamullerinin kullanımının yol açtığı sağlık sonuçlarıyla mücadele etmektir. Bu çerçevede oluşturulan politikalar ve gerçekleştirilen yasal düzenlemelerle birlikte kamularda farkındalık oluşturulması açısından yürütülecek halkla ilişkiler uygulamalarının, doğru model ve bilimsel çerçevede tasarlanmış stratejilere oturtulması ve sürdürülmesi gerekmektedir. Tüm dünyada olduğu gibi Türkiye’de de tütün ve tütün mamullerinin

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

kullanılmaya başlanmasının önlenmesi, kullananların bırakmasının sağlanması, pasif içici durumunda bulunanların etkilenimlerinin engellenmesi amacıyla oluşturulan politikalar ve gerçekleştirilen yasal düzenlemelerle halk sağlığının korunması amaçlanmıştır. Sigara içmeye bağlı olarak gerçekleşen sağlık riskleri bilinmesine rağmen, hedef kitlelerde kalıcı davranış değişikliğinin oluşmadığı gözlemlenmektedir. Bireysel düzeydeki davranışları değiştirmeye yönelik gerçekleştirilecek uygulamalarla birlikte, sosyal ve kültürel çevreyi de değiştirmeyi hedefleyen bütüncül politikaların oluşturulması ve yasal düzenlemelerin gerçekleştirilmesi bir gereklilik olarak karşımıza çıkmaktadır. Türkiye’de tütünle mücadele kapsamındaki çalışmaların başlangıcını, 7 Kasım 1996 tarihli ve 4207 sayılı *Tütün Mamullerinin Zararlarının Önlenmesine Dair Kanun* oluşturmaktadır. Sonraki süreçlerde konuyla ilgili birçok politika oluşturulmuş, yasal düzenlemeler gerçekleştirilmiş, sahada kampanyalar uygulanmış, medya araçlarında kamu spotları yayınlanmıştır.

2018 tarihinde T.C. Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü Tütün ve Madde Bağımlılığı ile Mücadele Dairesi Başkanlığı koordinatörlüğünde ilgili kurumlar, üniversiteler, sivil toplum örgütleri, medya temsilcilerinin de iş birliğiyle 2018-2023 dönemini kapsayacak *Tütün Kontrolü Strateji Belgesi ve Eylem Planı* hazırlanmıştır. Bu planla amaç; tütünle mücadele etmek, tüm kamuyu özellikle çocukları ve gençleri tütün kullanımından korumaktır. Bu çalışmada; tüm Dünya’da olduğu gibi Türkiye’de de tüm bireyler ve kamular için en büyük sağlık tehditlerinden biri olan tütün ve tütün mamullerinin kontrolüne yönelik hazırlanan ve ulusal olarak kamularda bilinç oluşturulup davranış değişikliğinin sürekliliğinin sağlanması, oluşturulan politikaların güçlendirilmesi kapsamında hazırlanan *Tütün Kontrolü Strateji Belgesi ve Eylem Planı (2018-2023)* çerçevesinde gerçekleştirilen iletişim faaliyetlerinin *Davranışsal Halkla İlişkiler Modeli* açısından irdelenmesi amaçlanmıştır. Örneklem olarak belirlenen *Tütün Kontrolü Strateji Belgesi ve Eylem Planı* kapsamında gerçekleştirilen iletişim çalışmaları, davranışsal halkla ilişkilerin kullanımı açısından irdelenip değerlendirilmiştir. Bu çalışma kapsamında gerçekleştirilecek olan çözümleme ve değerlendirmeler, konuyla ilgili oluşturulacak sonraki süreçteki eylem planlarının iletişim stratejilerinin oluşturulmasında rehberlik edeceği bakımından da önem taşımaktadır.

**Anahtar Kelimeler:** Davranışsal Halkla İlişkiler Modeli, Tütünle Mücadele, Kamu Kurumları, Tütün Kontrolü Eylem Planı.

## ABSTRACT

About minimizing the risks posed by global climate change and informing the public, water/energy etc., using behavioral sciences in activities carried out within the scope of solving many issues such as protecting resources and ensuring their sustainability, improving education, improving and protecting health, and problems arising from lack of knowledge on these issues means achieving more effective results. From the perspective of states, while legal regulations are necessary to solve the issues and problems addressed within the framework of creating public policies; from the perspective of individuals and the entire public, it is necessary to benefit from various activities carried out for the public in order to accept the policies created and the legal regulations made. It is important to raise awareness, to reveal the factors that direct the basic motivations that are effective in the decision-making stage, to benefit from various activities to ensure the sustainability of behavioral change, to raise awareness through a properly designed information process, and to design and implement persuasive communication activities in order for the policies and legal regulations to be accepted by the public. Public institutions use public relations practices to draw attention to public problems, to raise awareness of individuals and the entire public on the issue and to ensure behavioral change within the framework of all these. The activities carried out contribute to the development of attitude change in publics and the adoption of positive behavior. At the same time, it is effective in terms of sustainability of behavior help to create public conscience about these policies. In the public relations practices carried out by public institutions to inform the public and raise conscience, the use of models and theories used in the field in line with the purpose will increase the acceptance of effectiveness and sustainability of these practices. *Behavioral Public Relations Model*, which covers the efforts of public relations to produce solutions by focusing on public problems or issues and to create behavioral change within the framework of the relevant issue, is one of the models used in this framework. Patrick Jackson stated



that in *Behavioral Public Relations Model* which focused on behavioral change; there are five basic steps: raising awareness, the implicit interest process in which individuals begin to think about the information they have acquired, triggering this interest with public relations activities, changes in attitudes and behaviors before behavioral change, and the realization of the final behavioral change (Balta Peltekoğlu & Akbayır, 2019, s.832). One of the most important problems for all individuals and publics, nationally and internationally, is to struggle against the health consequences caused by the use of tobacco and tobacco products. Public relations practices to be carried out in order to raise awareness in the public should be based on strategies designed in the correct model and scientific framework together with the policies and legal regulations made should be continued within this context. In Turkey, as in the rest of the world, it is aimed to protect public health through policies and legal regulations designed to prevent the use of tobacco and tobacco products, to ensure that users quit, and to prevent exposure to passive smokers. It is observed that there is no permanent behavioral change in the target groups although the health risks associated with smoking are known. It is a necessity to create holistic policies and implement legal regulations that aim to change the social and cultural environment Along with the practices to be carried out to change behaviors at the individual level. The beginning of the efforts within the scope of the struggle against tobacco in Turkey is the *Law on the Prevention of Harmful Effects of Tobacco Products* dated 7 November 1996 and numbered 4207. In the following processes, many policies on the subject were created, legal regulations were implemented, campaigns were implemented in the field, and public service announcements were broadcast in media.

In 2018, T.R. *Tobacco Control Strategy Document and Action Plan* covering the period 2018-2023 has been prepared under the coordination of the Department of Struggle Tobacco and Substance Abuse Addiction of the Ministry of Health, General Directorate of Public Health, in cooperation with relevant institutions, universities, non-governmental organizations and media representatives. The aim with this plan is; struggle against tobacco for protecting the entire public, especially children and young people, from the usage of tobacco. In this study, *Tobacco Control Strategy Document and Action Plan*, prepared for the control of tobacco and tobacco products, which are one of the biggest health threats for all individuals and publics in Turkey, as well as all over the world, and within the scope of raising public consciousness nationally for ensuring the continuity of behavioral change and strengthening the policies created. It is aimed to examine the communication activities carried out within the framework of the *Plan (2018-2023)* in terms of the *Behavioral Public Relations Model*. The communication studies carried out within the scope of the *Tobacco Control Strategy Document and Action Plan*, which were determined as a sample, were examined and evaluated in terms of the use of behavioral public relations. The analyzes and evaluations to be carried out within the scope of this study are also important in that they will guide the creation of communication strategies and action plans in the next process.

**Keywords:** Behavioral Public Relations Model, Struggle Againsts Tobacco, Public Institutions, Tobacco Control Action Plan.

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ILLEGAL ITEM DETECTION IN X-RAY SCANS USING CORNER DETECTION - A  
THEORETICAL MODEL

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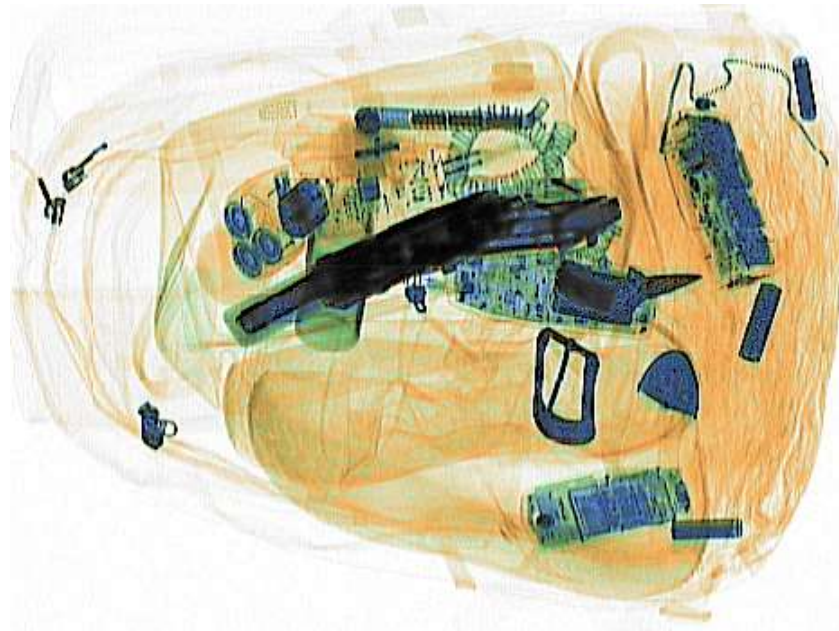
**ABSTRACT**

In today's world, airports host huge numbers of passengers. Because of the increase in flights and the passenger count, passengers with malicious intent also increased in number. Obtaining weapons does not pose a challenge, so everyone must be controlled without a mistake in order to ensure the safety of the passengers during flights or in airports. Determining if the passenger carries illegal items can be troublesome and requires constant concentration. As humans, security personnel are open to making mistakes which can be brutal. AI specialized in this area is of much use to prevent security breaches where the human eye lacks to catch a well-hidden illegal item. Rather than being the sole decider, the AI in question is intended as an assistant to human personnel because AI does not have the capability to identify objects with 100% accuracy. However, in collaboration with human personnel, AI will increase the efficiency of inspections. With the usage of corner detection technique combined with a CNN structure, the objects are inspected separately and illegal items are detected. If there is an illegal item detected, security will be warned and thus the inspection will have higher accuracy overall.

**Keywords:** Illegal Item Detection, Passenger Baggage Inspection, X-Ray Scan, Convolutional Neural Network, Corner Detection

**1. INTRODUCTION**

Luggage inspection is a core precaution in airport safety. It prevents crime, acts of terrorism, propagation of pests and diseases [1]. X-ray scanning has become significant in airports, border checkpoints, and train stations. The inspection of x-ray images is a demanding task which requires concentration for long periods of time. Manual inspection is difficult for some reasons. The list of illegal items which security officers must identify is pretty long, including firearms, sharp objects, some liquids, aerosols, etc. Most of the luggages do not pose a threat, yet the personnel must remain alert for any potential security breach. X-ray scans are transmission images, thus the objects in a bag appear to be stacked on top of each other, making the identification process more challenging. Time is valuable for each passenger, so security personnel must act with haste. Especially in rush hours, the time to inspect each luggage becomes even more limited, which can cause distraction in employees and decrease the detection performance [2]. The objects can also appear differently in x-ray images than in reality [3].



**Figure 1:** Example image containing an illegal item (Akçay, Breckon, Devereux, & Kundegorski, 2016).

For these reasons, an AI inspection assistant will help reduce the workload of security screeners and reduce the time of each inspection. Although there is progress in automated luggage inspection, the technology is wide-open to improvements. Various approaches to the limitations exist, such as using single view of mono-energy or dual-energy x-ray images, metal artifact reduction and denoising techniques, 3D inspection of images [1], multi-view (multi-camera) detection [4], contour proposal learning [5], superimposition by foreground-background separation [6]. All of the techniques have their weaknesses alongside their various advantages. Single view inspection techniques may suffer from occlusion and thus lower accuracy. Metal artifact reduction and denoising techniques have great importance for fixing the images that are in poor quality or have missing pieces, but they can alter the image in an unintended way, becoming an obstacle before inspections. These techniques must be carefully implemented in order to achieve decent results. 3D or multi-view inspection techniques overcome the occlusion problem mostly, however; they need more advanced x-ray scanners to properly function and thus have lower applicability. Contour proposal learning relies on edges, which are suitable to be hindered by another object[7]. Superimposition may be time consuming due to the number of comparisons made during inspections, and occlusion will also be a problem for this technique.

Except for multi-view techniques, which have low applicability, occlusion is a common problem and a significant obstacle before inspection. In occluded parts of the objects are ignored and the identification process is made by inspecting the non-occluded parts[1]. Even though this work has achieved more accuracy than the other models, with higher occlusion, the accuracy will drop drastically. Instead of ignoring the occluded parts, designing the AI model to deduce the items will increase the accuracy. Interference of the objects create different colors, which makes up the foundation for “corners”. A combination of FAST (Features from Accelerated Segment Test) and Harris corner detection algorithms is a suitable approach to the occlusion problem and is the key concept of this model.

## 2. PROPOSED METHOD

As mentioned in the introduction, the model consists of two main parts: corner detection and classification with a convolutional neural network. As in the work [8], corner detection is formed by a combination of improved FAST and Harris algorithms. The FAST algorithm has high corner detection speed, but it detects more redundant corners than the Harris algorithm. The Harris algorithm has high detection accuracy, but has a large amount of computation, thus the efficiency is low. Improved FAST algorithm will be used to capture corners within a short time, and Harris algorithm will be used to increase corner detection accuracy by screening the corners. For CNN, computer vision is used. As a largely deployed field of AI, computer vision is the optimum field to apply to this model.

### 2.1 CORNER DETECTION

In x-ray images, objects are colored according to the material used. In interferences of the objects, color changes are observed. The picks of color changes are corners of the objects and will be used to determine the objects' shapes. The corners are then inspected by CNN and determined Corner detection in this AI mode is a 2 step process: rough capture with the improved FAST algorithm and accurate capture with the Harris algorithm. The FAST algorithm offers a high detection speed but has low accuracy as a setback. A major amount of the corners detected by the FAST algorithm are error or redundant corners.

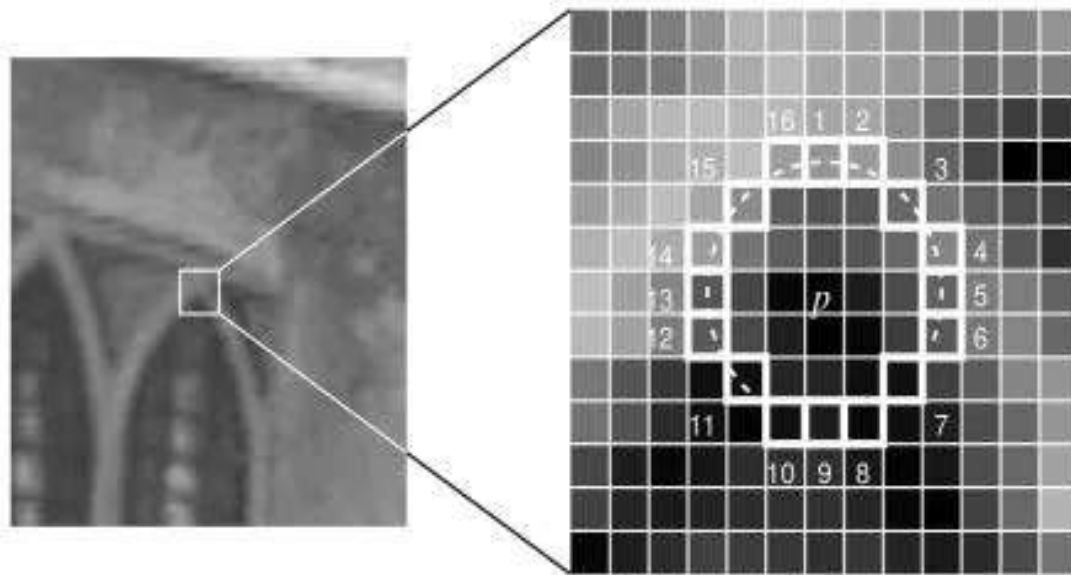
#### 2.1.1 Improved FAST Algorithm

For the FAST algorithm,  $p$  is the center of Bresenham a circle and three pixels is its radius. The corners are determined by judging the difference between the pixel value  $I_p(x_p, y_p)$  of the  $p$  point and the pixel value  $I_i(x_i, y_i)$  of the discrete points  $P_1 \sim P_{16}$  on the Bresenham circle [8]. The mathematical model for the FAST is given:

$$|I_i(x_i, y_i) - I_p(x_p, y_p)| \geq T \quad (1)$$

$$N = \sum_{x \in \text{circle}(p)} ||I_i(x_i, y_i) - I_p(x_p, y_p)| > T | \geq 12 \quad (2)$$

where  $N$  is the number of pixels satisfying (1),  $T$  is the threshold, and the empirical value is generally 50 pixels, where  $N > 12$ . 12 is the best experimental result value obtained through experimental comparison in literature [9]. When the pixel value of point  $p$  satisfies (2), then  $p$  is judged to be a corner point [8].



**Figure 2:** Bresenham circle shown on an edge (Rosten & Drummond, 2006).

As seen in Figure 2, the difference between  $P_1, P_5, P_9,$  and  $P_{13}$  on the circle and  $p$  should be considered. It is equal to a  $7 * 7$  matrix window with  $p$  being the center. Equation (3) is the FAST corner response function.

$$N = \sum_{x \in \text{circle}(p)} ||I_i(x_i, y_i) - I_p(x_p, y_p)| > T | \geq 3 \quad (3)$$

where,  $I_i(i = 1, 5, 9, 13)$  represents the pixels which lie on the circumference and  $I_p$  represents the center,  $p$ . The threshold  $T = 50$ . By reducing the contrast points from the original FAST algorithm, this improved

algorithm has higher speed, but even lower accuracy. The Harris algorithm will be adopted to cover the low accuracy rate of the improved FAST algorithm.

In the corner capturing process, padding technique will be used in order to view each point with clear focus. Padding size of the image is expressed by:

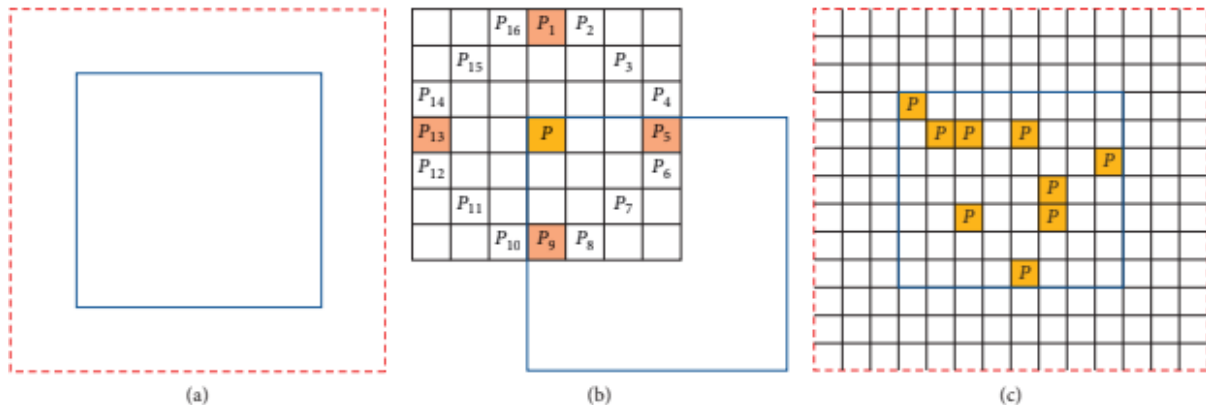
$$n = \lfloor \frac{n + 2q - f}{s} \rfloor + 1 \quad (4)$$

where,  $n * n$  is the size of input matrix,  $q$  is the padding size,  $f$  is the matrix window size,  $s$  is the step length, and  $\lfloor \rfloor$  is rounding down to integer [8].

Input image size is equal to  $rows * cols$ . The detection area is  $7 * 7$  matrix window.  $n=rows$ ,  $f=7$ , and  $s=1$ . By placing the parameters into their places, this equation is formed:

$$rows = rows + 2q - 7 + 1 \rightarrow q = 3 \quad (5)$$

The same situation is also valid in  $cols$ . Hence, to detect each pixel, the image is padded by 3 rows and columns. Padding is constant because of its runtime advantage [8].



**Figure 3:** Improved FAST corner detection flow: (a) image padding, (b) corner point judgment, (c) corner point position.

Normally, if the image was too close or too far, corner detection would be affected. In x-ray images, the distance of the image is always the same and it is an optimal distance, so there is no need to zoom in/out the input image.

The steps of the FAST algorithm is as follows:

*Step 1:* Image padding, as in Figure 3.

*Step 2:* Moving the image from right to left and top to bottom.

*Step 3:* Getting the corner position.

### 2.1.2 Improved Harris Algorithm

After the rough capture stage by the FAST algorithm, the corners detected need to be checked by a more accurate algorithm. The Harris algorithm is the chosen algorithm here because of its performance in detecting the corners accurately

The Harris algorithm is based on catching points with regards to the variation of intensity between the candidate point and neighbor points. If a small area around the point shows a substantial amount of change in intensity, the point is a corner [10]. The equation is given:

$$E(u, v) = \sum_{x,y} w(x, y) [I(x + u, y + v) - I(x, y)]^2 \quad (6)$$

$u$  and  $v$  are shifts from the candidate point,  $w(x, y)$  is the Gaussian filtering function, and  $I$  is the gray value [8, 10]. By using Taylor expansion and taking the gradient of the input image through the autocorrelation matrix, this equation is obtained:

$$M = \sum_{x,y} w(x, y) \begin{bmatrix} I_x^2 & I_x I_y \\ I_x I_y & I_y^2 \end{bmatrix} \rightarrow A^{-1} \begin{bmatrix} \lambda_1 & 0 \\ 0 & \lambda_2 \end{bmatrix} A \quad (7)$$

$M$  corresponds to the maxima of the equation (6) with the analysis of the first matrix.  $A$  is the rotation factor, and  $\lambda_1$  and  $\lambda_2$  are eigenvalues in two orthogonal directions.

As mentioned before,  $w(x, y)$  is the Gaussian filtering function [7]:

$$w(x, y) = \frac{1}{2\pi\sigma^2} e^{-\frac{(x^2+y^2)}{2\sigma^2}} \quad (8)$$

The  $M$  function can be simplified because of  $E(u, v)$  is related to  $I_x$  and  $I_y$ :

$$M = \begin{bmatrix} I_x^2 & I_x I_y \\ I_x I_y & I_y^2 \end{bmatrix} \quad (9)$$

3 \* 3 Scharr gradient operator  $\begin{bmatrix} -3, 0, 3 \\ -10, 0, 10 \\ -3, 0, 3 \end{bmatrix}$  is used for  $I_x$  to calculate horizontal gradient and the operator  $\begin{bmatrix} -3, -10, -3 \\ 0, 0, 0 \\ 3, 10, 3 \end{bmatrix}$  for  $I_y$  to calculate vertical gradient [8].

Let the new  $M$  after the Gaussian filtering be named  $M_0$ . The corner response function will be:

$$R = \det(M_0) - \alpha(\text{trace}(M_0))^2 \quad (10)$$

where  $\alpha$  is 0.05,  $\det(M_0)$  is  $\lambda_1 \lambda_2$ , and  $\text{trace}(M_0)$  is  $\lambda_1 + \lambda_2$  in the response function. If the point  $p$  is a corner is determined regarding the response function. If  $R \gg 0$ , corner;  $R \ll 0$ , edge;  $R \approx 0$ , plane [7, 10].

The steps for the Harris algorithm is given[8]:

*Step 1:* Get one of the corners given from the improved FAST algorithm.

*Step 2:* Find the  $x$  and  $y$ -axis gradient values of  $p$  using  $3 * 3$  Scharr operator.

*Step 3:* Get  $M_0$  with Gaussian filtering.

*Step 4:* Determine if the point  $p$  is a corner according to the  $R$  function.

*Step 5:* Repeat until all the candidate points are checked.

### 2.1.3 FAST - Harris Fusion Algorithm

The FAST - Harris fusion algorithm consists of getting the candidate corners (11), and then the values which satisfy (11) will be passed to (12). This way, the real corners will be obtained.

$$N = \sum_{x \in \text{circle}(p)} ||I_i(x_i, y_i) - I_p(x_p + q, y_p + q)| > T| \geq 3 \rightarrow P(x_p + q, y_p + q) \quad (11)$$

$$R_{P(x_p+q, y_p+q)} = \det(M_{P(x_p+q, y_p+q)}) - \alpha(\text{trace}(M_{P(x_p+q, y_p+q)}))^2 > 0 \rightarrow P_c(x_p + q, y_p + q) \quad (12)$$

$$M_{P(x_p+q, y_p+q)} = \begin{bmatrix} I_{x_p+q}^2 & I_{x_p+q}I_{y_p+q} \\ I_{x_p+q}I_{y_p+q} & I_{y_p+q}^2 \end{bmatrix} \quad (13)$$

where  $I_i$  (1, 5, 9, 13) is the pixel value of the points lying on the circumference of the  $p$ -centered circle with a radius of 3 pixels;  $T$ , as previously mentioned, is the threshold value;  $I_p$  is the pixel value of the center and the candidate corner  $P(x_p + q, y_p + q)$ , or  $p$ , with  $q$  being the padding size. The corner after Gaussian filtering is  $P_c(x_p + q, y_p + q)$ . The horizontal and vertical pixel values of  $P(x_p + q, y_p + q)$  are expressed as  $I_{x_p+q}$  and  $I_{y_p+q}$  [8].

Even though the Harris algorithm is used in order to decrease the number of redundant corners, they can be further decreased with the usage of nonmaximum suppression. For nonmaximum suppression, SAD is used in this project. For calculating the SAD values of each  $P_c(x_p + q, y_p + q)$  and the 16 pixels on the aforementioned circle, which is in (18), the below equation is used:

$$S(P, A)_{SAD} = \sum_{i=1}^{16} |I_p(x_p + q, y_p + q) - I_i(x_i, y_i)| \quad (14)$$

where each single point on the circle is represented by  $I_i$ , and the candidate corner is represented by  $I_p$  [8].

Adjacent corners also cause a reason behind the redundancy. Elimination of the corner with a lower local maximum score is needed. If the Euler distance - given in (15) - of two candidate corners is less than 4, the two corners are adjacent [8].

$$e = \sqrt{(x_i - x_j)^2 + (y_i - y_j)^2} < 4 \quad (15)$$

The steps for the fusion algorithm is as follows[8]:



*Step 1:* Detect the target pixel in the image.

*Step 2:* Check if the  $N$  value is valid.

*Step 3:* Use  $3 * 3$  Scharr operator to calculate row and column gradient values.

*Step 4:* Find the values of  $M_{P(x_p+q,y_p+q)}$  matrix.

*Step 5:* Get the new  $M_0$  matrix by Gaussian filtering the values of the  $M_{P(x_p+q,y_p+q)}$ .

*Step 6:* Check if  $R_{P(x_p+q,y_p+q)} > 0$ ; if false, discard the point, if true, continue with Step 7.

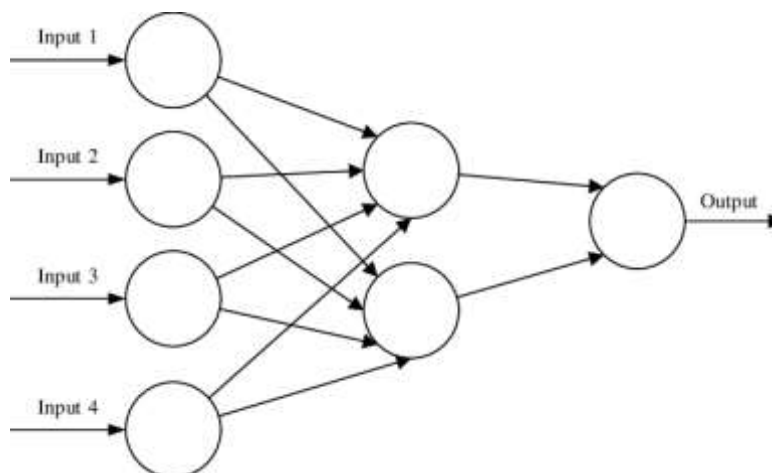
*Step 7:* Get all the values, and calculate the pixel points with (13).

*Step 8:* Determine if two corners are adjacent. If adjacent, apply nonmaximum suppression and delete the one with the lower score.

The real corners are found after the deletion of redundant corners in *Step 8*.

## 2.2 CLASSIFICATION WITH CONVOLUTIONAL NEURAL NETWORK

Artificial neural network (ANN) is an AI model which is inspired from how biological nervous systems work. ANNs consist of high numbers of computational nodes, referred to as neurons. Inputs are taken from the first layer, then hidden layers make operations based on the input, and outputs are given from the last layer. In supervised learning with ANNs, if the output isn't close to the expected value, weights of the parameters will be readjusted by the neural network and a new trial will begin. Until the output reaches a desirable value, this process continues. This readjustment process is called "Backpropagation" and is significant in ANNs. Convolutional neural network (CNN) is a type of ANN. CNNs also cover the aforementioned basics of ANN. CNNs are primarily used for pattern recognition for images, allowing to encode image-specific features into the structure. This makes the model more suitable for tasks with images, thus reducing the parameters required [11].



**Figure 3:** A model 3-layered ANN (Nash & O'Shea, 2015).

In this model, the input is the x-ray image, separated to its pixels. The first step that will be done is to check and find the corners of the objects. The color change picks are the corners in x-ray images. The given FAST - Harris fusion algorithm will be used for this step. After the first step, all the corners would be determined, as shown highlighted in Figure 4:



**Figure 4:** An example x-ray image with the object corners highlighted as purple circles (Akçay, Breckon, Devereux, & Kundegorski, 2016).

After the corners are determined, by the help of the color used in material, objects are determined. The determined objects are separated from the input image and after an object is separated individually, its corners are erased from the determined set of corners to avoid inaccuracies in the process of object separation.



**Figure 5:** A firearm separated from the whole image.

The separated objects are then compared with the images of illegal items in order to determine if there are contrabands among the objects in the luggage inspected. The similarity of an item is determined as a percentage.



**Figure 6:** The result of the comparison with an illegal item, with what type of contraband it is with the similarity percentage.

If an item in the inspected luggage is identified as a contraband, the security personnel will be alerted for the situation with the figure like in Figure 5.

### 3. CONCLUSION

In this paper, a new approach in single-view x-ray image inspection is introduced. Determining the objects in luggages by corner detection is presented to the field for the purpose of overcoming the challenge posed by occlusion. The method used for corner detection is a fusion of improved FAST and Harris algorithms for increased detection speed and accuracy. The CNN is designed to capture the corners, get the shapes which are formed by the corners, compare the shapes with the shapes of illegal

items to determine if there is any contraband in the luggage. If there is any contraband in the luggage inspected, the security personnel will be alerted to search the luggage. This model helps the personnel with the inspections and increases the efficiency and accuracy of finding illegal items.

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PANDEMİ DÖNEMİNDE COVID-19 VE LEİSHMANİASİS KOENFEKSİYONU  
COVID-19 COINFECTION WITH LEISHMANIASIS SPECIES DURING PANDEMIC

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**ÖZET**

Leishmaniasis, tropik, subtropik ve güney Avrupa'nın bazı bölgelerinde bulunan vektör kaynaklı paraziter bir hastalıktır ve ihmal edilen bir tropikal hastalık (NTD) olarak sınıflandırılmaktadır. Leishmaniasis, enfekte dişi flebotomin tatarcıklarının ısırığıyla bulaşarak cilt, mukozalar veya iç organlarda enfeksiyona neden olmaktadır. Günümüzde en sık rastlanılan klinik formları visceral leishmaniasis, (VL), kutanöz leishmaniasis (KL) ve mukokutanöz leishmaniasis,(ML) olarak sıralanmaktadır. Bu enfeksiyon özellikle gelişmekte olan ve az gelişmiş ülkelerde yetersiz beslenme, barınma sorunu, zayıf immün sistem ve ekonomik sorunlar nedeniyle hala yaygın olan ve önemli bir hastalıktır. COVID-19 pandemi döneminde sağlık hizmetlerinin daha çok SARS-CoV-2 enfeksiyonun kontrolü ve tedavisine yönelmesi leishmaniasis gibi nadir görülen enfeksiyonların tanı tedavisinde gecikmelere neden olmuştur. Bu çalışmada pandemi döneminde bildirilen Leishmania ve SARS-Cov-2 ko-enfeksiyon vakaları ve salgınlar retrospektif olarak incelenmiştir. Çalışma sonucunda 2020-2023 arasında pandemi döneminde Leishmania spp. ve SARS-CoV-2 ko-enfeksiyonu olan dünya genelinde 11 vaka olduğu saptanmıştır. Bu vakalardan üçü kutanöz leishmaniasis (KL) ve sekizi visceral leishmaniasis (VL) olarak belirlenmiştir. Çalışma sonucunda Leishmania spp. ve SARS-CoV-2 ko-enfeksiyonunun göz ardı edilmemesi gerektiği ve özellikle ağır COVID-19 vakalarında kapsamlı tıbbi değerlendirme yapılması gerektiği sonucuna varılmıştır.

**Anahtar kelimeler:** Ko-enfeksiyon, Leishmania, SARS-CoV-2.

**ABSTRACT**

Leishmaniasis is a vector-borne parasitic disease reported in tropical, subtropical and parts of southern Europe and is classified as a neglected tropical disease (NTD). Leishmaniasis is transmitted through the bite of infected female phlebotomine sandflies, causing infection in the skin, mucous membranes or internal organs. Nowadays, the most common clinical forms are listed as visceral leishmaniasis (VL), cutaneous leishmaniasis (KL) and mucocutaneous leishmaniasis (ML). This infection is still a common and important disease, especially in developing and underdeveloped countries, due to malnutrition, housing problems, deficient immune system and economic problems. During the COVID-19 pandemic period, healthcare services focused more on the control and treatment of SARS-CoV-2 infection, which caused delays in the diagnosis and treatment of rare infections such as leishmaniasis. In this study, Leishmania and SARS-Cov-2 co-infection cases and outbreaks reported during the pandemic period were retrospectively evaluated. As a result of the study, it was determined that there were 11 cases of Leishmania spp. and SARS-CoV-2 co-infection worldwide during the pandemic period between 2020 and 2023. Three of these cases were identified as cutaneous leishmaniasis (CL) and eight as visceral leishmaniasis (VL). As a result of the study, it was concluded that Leishmania spp and SARS-CoV-2 co-infection should not be ignored and a comprehensive medical evaluation should be made, especially in severe COVID-19 cases.

**Keywords:** Co-infection, Leishmania, SARS-CoV-2.

### GİRİŞ

Leishmaniasis, ihmal edilen tropical bir hastalık olup dünya genelinde yılda yaklaşık olarak 700.000 ila 1 milyon arasında kişiyi etkilediği tahmin edilmektedir (1). Leishmaniasis, dünya genelinde çeşitli ülkelerde görülen bir parazit kaynaklı bir enfeksiyon hastalığıdır. Leishmaniasise neden olan Leishmania türleri (spp.) özellikle tropikal ve subtropikal bölgelerde daha yaygın olarak görülmekle birlikte son yıllarda dünyanın farklı yerlerinde de seyahat ya da göç kaynaklı olarak Leishmania spp. ile enfekte vakalar rapor edilmiştir (2). Leishmaniasis hastalığının klinik belirtileri Leishmania spp. ve bireyin bağışıklık sisteminin durumuna bağlı olarak değişebilmektedir. Leishmaniasis, 20'den fazla Leishmania türünün neden olduğu bir protozoa parazitit kaynaklı bir enfeksiyondur. Günümüzde 90'dan fazla tatarcık türünün Leishmania parazitlerini taşıdığı saptanmıştır (3). Leishmaniasise yol açan klinik formlar viseral leishmaniasis (VL), kutanöz leishmaniasis (KL) ve mukokutanöz leishmaniasis (ML) olarak belirlenmiştir (3). İç organ leishmaniasisine neden olan Kala-azar olarak da bilinen visseral leishmaniasis (VL), vakaların %95'inden fazlasında tedavi edilmezse ölümcül olan bir klinik formdur. Düzensiz ateş nöbetleri, kilo kaybı, dalak ve karaciğerde büyüme ve anemi ile karakterizedir. Vakaların çoğu Brezilya, Doğu Afrika ve Hindistan'da saptanmıştır. Dünya çapında her yıl tahminen 50.000 ila 90.000 yeni VL vakası ortaya çıkmakta ve bunların yalnızca %25-45'i DSÖ'ye bildirilmektedir. Salgın ve ölüm potansiyeli olan bir klinik formdur. Bir diğer klinik form olan Kutanöz leishmaniasis (CL) en sık görülen formdur ve özellikle vücudun açıkta kalan kısımlarında başta ülser olmak üzere cilt lezyonlarına neden olduğu bildirilmiştir. CL vakalarının yaklaşık %95'i Amerika, Akdeniz havzası, Orta Doğu ve Orta Asya'da meydana gelmektedir. Dünya çapında her yıl 600.000 ila 1 milyon yeni vakanın ortaya çıktığı tahmin edilmektedir ancak bunların yalnızca 200.000'i DSÖ'ye bildirilmektedir. Mukokutanöz leishmaniasis burun, ağız ve boğazdaki mukoza zarlarının kısmen veya tamamen tahrip olmasına yol açmaktadır. Mukokutanöz leishmaniasis vakalarının %90'ından fazlası Bolivya (Çokuluslu Devlet), Brezilya, Etiyopya ve Peru'da görülmektedir (4). CL'ye neden olan Leishmania türleri doğu yarım kürede *L. tropica* ve *L. major*, batı yarım kürede *L. mexicana*, *L. vienna*, *L. guyanensis* ve *L. panamensis* olarak bildirilmiştir (4). Kutanöz Leishmania sıklıkla Akdeniz, Orta Asya, Amerika ve Ortadoğu ülkelerinde saptanmıştır. Viseral leishmaniasis etkeni *L. infantum* olmakla birlikte genellikle Batı ve Doğu Avrupa, Balkan ülkeleri, Orta Asya, Kıbrıs ve Türkiye'de bildirilmiştir (3). Leishmaniasis ağırlıklı olarak kalabalık, kırsal ve yoksul yaşamın daha yaygın görüldüğü Güney Amerika, Orta Doğu, Afrika ve Hindistan gibi coğrafi bölgelerde daha sıklıkla bildirilmektedir. Tüm dünyayı etkileyen SARS-CoV-2 enfeksiyonu kaynaklı COVID-19 pandemisinde özellikle Leishmaniasis gibi hastalıkların tanı, tedavi ve takibinde aksamlar yaşanmıştır. Dünya sağlık örgütü raporlarına göre COVID-19 pandemisinde SARS-CoV-2 enfeksiyonu nedeniyle dünya çapında farklı yaş gruplarında 769 milyondan fazla vaka ve yedi milyona yakın ölüm meydana gelmiştir (4). Özellikle pandeminin ilerleyen dönemlerinde artan COVID-19 vakaları nedeniyle SARS-CoV-2 enfeksiyonunun tanı ve tedavisi ağırlık kazanmıştır. Buda Leishmaniasis'in tanısında gecikme yada gözden kaçırılmaya neden olmuştur. Bu çalışmada pandemi döneminde bildirilen Leishmania ve SARS-Cov-2 ko-enfeksiyon vakaları ve salgınlar retrospektif olarak incelenmiştir.

### YÖNTEM

PubMed, Google Scholar ve Scopus arama motorları kullanılarak bilgisayar tabanlı literatür taraması gerçekleştirildi. Tarama yıl aralığı aralığı pandemi dönemi 2020-2023 arası dahil edildi. Leishmania COVID-19 konenfeksiyonu olan vakaları veya salgınları saptamak için tarama terimleri olarak Leishmania ve COVID-19 veya SARS-CoV-2 ve Leishmania konenfeksiyonu kullanıldı. Sonuçlara herhangi bir filtre veya dil kısıtlaması uygulanmadı. Ayrıca, listelenen tüm referanslar diğer ilgili makaleler tek tek incelendi. Leishmania COVID-19 konenfeksiyonunun olmadığı sadece Leishmania vakalarını yada sadece COVID-19 vakalarını içeren çalışmalar çıkartıldı. Leishmania COVID-19 konenfeksiyonu ile ilgili tüm klinik verileri ve vakaları bildiren makaleler çalışmaya dahil edildi.

### BULGULAR

Yapılan çalışmada 2020 ila 2023 yılları arasında yapılan literatür taramasında aranan terimler ile ilgili 43 makale bulunmuştur. Bu çalışmalar içerisinde sadece sekizinde Leishmania ve COVID-19 konenfeksiyonunu bildiren vakalar olduğu belirlenmiştir (5-12). Pandemi döneminde bildirilen COVID-19 ile enfekte Leishmaniasis vakaların üçünde CL geri kalan beşinde VL enfeksiyonu saptanmıştır.



### TARTIŞMA VE SONUÇ

COVID-19 pandemisinde salgının dünya genelinde yayıldığı dönemde COVID-19 ve Leishmaniasis birlikteliği ortaya çıkmaya başlamıştır. Bugüne kadar sekiz adet COVID-19-VL, COVID-19-CL koenfeksiyon vakası rapor edilmiştir (5-12). Amogne ve ark. 18 yaşındaki erkek bir hastada COVID-19- Leishmania donovani koenfeksiyonu, Miotti ve ark. 79 yaşında bir erkek hastada COVID-19-VL koenfeksiyonu, Martin ve ark. 41 yaşında immünsüprese bir kadın hastada COVID-19-L. infantum chagasi koenfeksiyonunu, Eshaghi ve ark. 29 yaşındaki erkek hastada COVID-19- Leishmania donovani koenfeksiyonu, Iuliano ve ark. 28 yaşında erkek hastada COVID-19-VL koenfeksiyonunu, Pikaulas ve ark. 22 yaşında kadın hastada COVID-19-L. infantum ve Çil ve ark. 12 yaşındaki bir erkek hastada COVID-19-VL koenfeksiyonunu bildirmişlerdir (5-11). Bu çalışmalardaki vakaların hepsi visceral leishmaniasis vakalarıdır. Bu çalışmalardan farklı olarak Bamorovat ve ark. İranda yaptıkları çalışmada SARS-CoV-2 enfeksiyonu ile CL arasındaki potansiyel ilişkiyi CL geçmişi olan ve tedavi almış 1010 hastada değerlendirmişlerdir (12). Hastaların sadece %0.3'ünde COVID-19-CL koenfeksiyonunu saptamışlardır. Yaptıkları çalışma sonucunda CL gibi bazı bulaşıcı hastalıkların ürettiği immünolojik hafıza hücrelerinin, COVID-19 hastalığının görülme sıklığını ve şiddetini azaltabileceğini öne sürmüşlerdir.

Yapılan bu çalışmalarda araştırmacılar pandemi döneminde Leishmaniasisin endemik olduğu bölgelerde COVID-19 şüphesi olan ya da tanısı olan hastalarda Leishmania spp. koenfeksiyonunun gözardı edilmemesi gerektiğini vurgulamışlardır. Bu koenfeksiyon COVID-19 hastalığının fatal hale gelmesine neden olabilmektedir.

Pandemi nedeniyle dünyanın farklı yerlerinde uygulanan karantinaların yanı sıra, Dünya Sağlık Örgütü'nün (WHO) Leishmaniasis gibi çeşitli enfeksiyonlar için aktif vaka bulma, toplu ilaç uygulaması ve araştırmalarının ertelenmesi çağrısında bulunması nedeniyle bu enfeksiyonları ortadan kaldırma programları da durdurulmuştur (13).

Özellikle pandemi döneminde leishmaniasis kontrol programlarına ayrılan finansman azalması bu hastağının kontrolünü olumsuz yönde etkilemiştir. Hastalıkla ilgili sürveyans verileri pandemi döneminde azaldığı gibi etkin bir tedavinin uygulanmasını önlemiştir. Ayrıca özellikle leishmaniasis neden olan kum sinekleri ile mücadele programlarının aksamasına neden olmuştur. Pandemi döneminde Leishmaniasis enfeksiyonunun tanı, takip ve tedavisinde yaşanan aksamalar ilerleyen yıllarda bu hastalığın kontrol ve elimasyonu için hedeflenen sürenin uzamasına neden olacaktır.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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TÜRKİYE'DE BAKTERİYOFAJLARIN ANTİBAKTERİYEL AJAN OLARAK KULLANIMI  
USE OF BACTERIOPHAGES AS ANTIBACTERIAL AGENTS IN TURKIYE

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ÖZET

Bakteriyofajlar gezegenimizde doğal ekosistemlerin önemli bir parçasıdır ve bakterilerin kontrol edilmesinde ve dengeyi sağlamada kritik bir rol oynarlar. Bu nedenle, bakteriyofajların sayısı ve etkisi, ekosistemlerin sağlıklı bir şekilde işlemesine katkı sağlar. Bakteriyofajlar, bakterileri enfekte ederek onların içinde çoğalabilen bakteri virüsleridir. Bu virüsler, özellikle bakteriyel enfeksiyonların tedavisinde ve bakterilerin kontrol altına alınmasında potansiyel bir kullanım alanına sahiptir. Dünya Sağlık Örgütü (WHO) antibiyotik direncini önemli bir halk sağlığı sorunu olarak bildirmekte olup ilaç direnci kaynaklı ölümlerin yaklaşık olarak 10 milyona ulaşacağını tahmin etmektedir. Bakteriyofajların, özellikle antibiyotik direncine karşı mücadelede ve bakteriyel enfeksiyonların tedavisinde potansiyel bir araç olarak kullanılması yönünde çok sayıda araştırma yürütülmektedir. Faj terapisi, antibiyotik direncinin olduğu durumlarda veya tedavi seçenekleri sınırlı olduğunda uygulanabilecek bir tedavi seçeneğidir. Özellikle faj terapisi deri enfeksiyonları, yara enfeksiyonları, cerrahi enfeksiyonlar ve gıdalarda patojen bakterilerin saptanması amacıyla günümüzde kullanılmaktadır. Bu çalışmada ülkemizde bakteriyofajların antibakteriyel etkinliğini saptayan çalışmaların sonuçları retrospektif olarak incelenmiştir. Çalışma sonucunda methicillin-resistant *Staphylococcus aureus* (MRSA) MRSA türü, *Pseudomonas aeruginosa*, *Mycobacterium tuberculosis* and *Acinetobacter baumannii* türlerine karşı hazırlanan faj kokteyllerinin etkili olduğu saptanmıştır.

**Anahtar Kelimeler:** Bakteriyofaj, ilaç direnci, antibakteriyeli, faj kokteyli.

ABSTRACT

Bacteriophages are an important part of natural ecosystems on our planet and play a critical role in controlling bacteria and maintaining balance. Therefore, the number and effect of bacteriophages contribute to the healthy functioning of ecosystems. Bacteriophages are bacterial viruses that can infect bacteria and multiply within them. These viruses have potential use, especially in the treatment of bacterial infections and control of bacteria. The World Health Organization (WHO) reports antibiotic resistance as an important public health problem and estimates that deaths due to drug resistance will reach approximately 10 million. A lot of research is being carried out on the use of bacteriophages as a potential tool, especially in the fight against antibiotic resistance and in the treatment of bacterial infections. Phage therapy is a treatment option that can be applied in cases of antibiotic resistance or when treatment options are limited. In particular, phage therapy is used today to detect pathogenic bacteria in skin infections, wound infections, surgical infections and foods. In this study, the results of studies determining the antibacterial activity of bacteriophages in our country were retrospectively examined. As a result of the study, it was determined that phage cocktails prepared against methicillin-resistant *Staphylococcus aureus* (MRSA) MRSA species, *Pseudomonas aeruginosa*, *Mycobacterium tuberculosis* and *Acinetobacter baumannii* species were effective.

**Key words:** Bacteriophage, drug resistance, antibacterial, phage cocktail.

## **GİRİŞ**

Bakteriyofajlar bakterileri enfekte eden virüslerdir. Bu nedenle yaşamlarını sürdürmek için mutlaka canlı bir konağa gereksinim duyarlar (1). Fajlar doğası gereği parazittir ve bu nedenle bir konakçıya (bakteri) ihtiyaç duyarlar. Bakteriyo(bakteri), faj (yiyen), anlamına gelen eski Yunanca kökenli bir terimdir (2). Fajlar doğada serbest halde yüksek miktarda bulunan mikroorganizmalardır. Özellikle kanalizasyon sularında bol miktarda bulunmaları sebebiyle bu kaynaklardan izolasyon oranları yüksektir. Bakteriyofajlar bakterilerin evriminde önemli rol oynamaktadırlar. Çünkü bakteriyofaj ve bakteri arasında gerçekleşen gen transferi rekombinasyon olayları bakterilerin genetik yapısını değiştirmektedir. Bakteriyofajlar sadece su kaynaklarından değil toprak ve insan vücudundaki floradan da izole edilebilirler. İnsan vücudunda ağırlıklı olarak üriner sistem, alt solunum sistemi, gastrointestinal sistem ve deriden izole edilmişlerdir. Özellikle örnek alınması daha pratik olan ağız ve barsak gibi bölgelerden elde edilen fajlar en çok karakterize edilenler olup ayrıca yüksek konsantrasyonda da elde edilmişlerdir (2,3). Bakteriyofajlar mobil genetik yapılardır. Yapısal olarak çoğu faj, kapsid içine paketlenmiş bir nükleik asit genomundan oluşmaktadır. Fajların kapsidleri morfoloji (yani pleomorfik, filamentli veya çokyüzlü) ve boyut açısından oldukça değişkendir Protein kapsidinin yanı sıra, bazı fajların dış katmanı bir lipit membrandan oluşur. Fajlar, sahip oldukları nükleik asit türüne, kapsidlerinin morfolojisine, kuyruğun varlığına veya yokluğuna ve bir zarfın varlığına veya yokluğuna göre sınıflandırılmaktadır. Fajların genetik materyali ya tek sarmallı (ss) ya da çift sarmallı (ds) RNA veya DNA'dan oluşur; genom boyutları ~3.5kb (Escherichia coli fajı MS2 ssRNA genomu gibi) ile ~540kb arasında değişir. (Genomu dsDNA'dan oluşan Prevotella'nın LAK fajları gibi). Genel olarak bakteriyofajlar konak yapısında yaptıkları enfeksiyona göre litik ve lizojenik olarak sınıflandırılırlar (4).

Günümüzde yapılan araştırmalarda bakteriyofajlar gıda ve insan sağlığı için patojen olan bakterilerin ortadan kaldırılmasında kullanılmaktadır. Bu çalışmada ülkemizde bakteriyofajların antibakteriyel etkinliğini saptayan çalışmaların sonuçları retrospektif olarak incelenmiştir.

## **YÖNTEM**

PubMed ve Tr dizin arama motorları kullanılarak bilgisayar tabanlı literatür taraması gerçekleştirildi. Herhangi bir tarama yıl aralığı uygulanmadı. Sonuçlara herhangi bir filtre veya dil kısıtlaması uygulanmadı. Ayrıca, listelenen tüm referanslar diğer ilgili makaleler tek tek incelendi.

## **BULGULAR**

Ülkemizde yapılan bakteriyofaj araştırmaları ile ilgili Pubmed veri tabanında 23 makale, Ulusal veri tabanında ise Tr dizinde 29 makale bulunmuştur. Bunlardan sadece altı araştırma makalesi bakteriyofaj tedavisi ile ilgili olarak belirlenmiştir.

## **TARTIŞMA VE SONUÇ**

Günümüzde artan antibiyotik direnci nedeniyle dünya genelinde bakteriyofajlar ile tedavi yöntemleri dikkat çekici hale gelmektedir. Yapılan çeşitli araştırmalarda hem toplum kaynaklı hemde nozokomiyal enfeksiyon etkeni olan bakterileri etkisiz hale getirmek için çeşitli bakteriyofajlar kullanılmaktadır. Bakteriyofajların üretilmeleri antibiyotik üretimine kıyasla daha kolay, pratik ve ucuzdur. Günümüzde artan antibiyotik direnci nedeniyle bakteriyofajlar dirençli bakteri popülasyonlarını kontrol etmede bir alternatif olarak ortaya çıkmaktadır. Toplum ve hastane kaynaklı enfeksiyonların yanı sıra insan sağlığı için zararlı olan çeşitli gıda patojenlerinde ortadan kaldırılmasında ya da inaktif hale getirilmesinde bakteriyofajlar kullanılmaktadır (5).

Ülkemizde bakteriyofaj tedavisi ile ilgili ilk yapılan araştırma 2013 yılındadır. Çalışmada hastanede yatan hastalardan izole edilen 20 MRSA suşu kullanılmış ve bunlara karşı 13 lizojenik fajın enfekte etme özellikleri araştırılmıştır. Yapılan çalışma sonucunda LizAnk fajının fibroblast hücreler üzerinde sitotoksik etkisinin olmadığı ve MRSA'lar tarafından oluşturulan yüzeysel deri enfeksiyonlarının tedavisinde, tek başına veya faj kokteyli içerisinde sorunsuz olarak kullanılabilceği saptanmıştır (6). Gündoğdu ve ark. (2016) komplike deri ve yumuşak doku enfeksiyonları olan hastalardan izole edilen çok ilaca dirençli (ÇİD) patojenlerin, standart bakteriyofaj (faj) kokteyllerine karşı in vitro duyarlılıklarının araştırmışlardır (7). Agar spot test ile yapılan çalışma sonucunda 33 ÇİD patojenin 29'u (%87.9), kullanılan faj/faj preparatlarından en az birine karşı duyarlı bulunmuştur. Aynı

araştırmacılar aynı yıl yaptıkları bir başka araştırmada Gürcistan bakteriyofaj kokteyllerinin, hastaların kan ve idrar kültürlerinden izole edilen çoklu ilaca dirençli (MDR) geniş spektrumlu betalaktamaz üreten *Escherichia coli* (ESBL-EC) üzerine etkili olduğunu saptamışlardır (8).

Erol ve ark. 2021 yılında aile ve göç sağlık merkezlerine başvuran, enfeksiyon bulgusu olmayan ayakta tedavi gören hastalardan burun sürüntüsü örnekleri almışlar ve bu örneklerden elde edilen MRSA suşlarının ENKO, INTESTI, PYO, SES ve stafilkokal bakteriyofajlara karşı genel duyarlılığını sırasıyla %67,7, %55,5, %53,5, %61,6 ve %44,4 olarak bildirmişlerdir. Monofaj tedavisinin etkinliğinin faj kokteyllerine göre çoklu ilaç direnci olan izolatlarda daha az etkili olduğunu rapor etmişlerdir (9). Erol ve ark 2023 yılında yaptıkları bir başka çalışmada iki bakteriyofaj C2 faj, K3 faj ve faj kokteyllinin (C2 + K3 faj), çoklu ilaca dirençli *A. baumannii* suşlarının biyofilmine karşı antibiyotik (kolistin) ile kombinasyon halinde terapötik bir ajan olarak etkinliğini değerlendirmişlerdir. Çalışma sonucunda faj ve antibiyotik kombinasyonunun biyofilmin yok edilmesini artırabileceğini ve antibiyotiğe dirençli bakterilerin neden olduğu biyofilme ilişkili enfeksiyonların tedavisinde bakteriyofajların ve antibiyotiklerin birlikte kullanılabilirliğini belirlemişlerdir (10). Son olarak ülkemizde ve dünyanın birçok ülkesinde önemli bir hayvan ve halk sağlığı sorunu olan sığır brusellozise karşı faj etkinliğinin araştırıldığı çalışmada elde edilen yedi adet yerel bakteriyofaj *Brucella* spp.'ye karşı etkili olarak saptanmıştır. Faj kokteyllerinin brusellosis ile mücadelede uygulanmasının hastalığın kontrolüne önemli bir alternatif olduğu bildirilmiştir (11).

Sonuç olarak farklı araştırmacılar tarafından yapılan çalışmalarda bakteriyofajların özellikle çoklu ilaç direnci olan izolatlarda etkili oldukları belirlenmiştir. Faj terapisinin en önemli avantajlarından birisi belirli bakteri türlerine özgüdür, bu nedenle vücutta faydalı bakterilere zarar verme olasılığı daha düşüktür. Ancak bakteriyofajların etkinliği, hastanın sağlık durumu, enfekte olan bakteri türü ve diğer faktörlere bağlıdır. Her bakteriyofaj her bakteriyi enfekte edemez, bu nedenle doğru bakteriyofajların seçilmesi kritiktir. Bakteriyofaj tedavisi ile ilgili daha geniş hasta popülasyonlarında daha fazla araştırma yapılması gereklidir. Bu nedenle şu an faj terapisinin kullanımı standart tedavi seçeneklerine göre daha sınırlıdır.

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**INTERNATIONAL ANKARA CONGRESS ON  
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GAZAL BOYNUZU “*LOTUS CORNICULATUS L.*” ÇİÇEĞİNİN BİYOAKTİVİTESİ  
BIOACTIVITY OF *LOTUS CORNICULATUS L.* FLOWER

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**ÖZET**

Gazal Boynuzu (*Lotus corniculatus L.*) Baklagiller (*Fabaceae*) familyasının bir üyesi olarak dünya çapında dağılmış düzinelere türü içeren Lotus (*Leguminosae*) cinsine ait bir bitkidir. Bu çok yıllık bitki, geniş bir yayılım alanına sahip olması nedeniyle genellikle yem bitkisi olarak kullanılmakla birlikte insan beslenmesinde de kullanılmaktadır. *L. corniculatus*'un biyoaktif bileşenleri arasında  $\alpha$ - tokoferol,  $\beta$ -karoten, lutein ve oleanolik asit gibi lipid antioksidanlar bulunmaktadır. Geleneksel tıpta bu bitki, dermatik, gaz giderici, hipoglisemik, anti-inflamatuar, anti-mikrobiyal, anti-frebril, anti-proliferatif, anti-helminth ve antioksidatif ajan olarak kullanılmaktadır.

Bu çalışma Malatya ilinden toplanan Gazal Boynuzu çiçeklerinin toplam fenolik, toplam flavonoid ve antioksidan aktivitelerini belirlemeyi amaçlanmıştır. Gazal Boynuzu çiçekleri, toplandıktan sonra yaprakları ve saplarından ayrılarak kurutulmuş ve ardından metanol:su (7:3, v/v) karışımı ile ekstrakte edilmiştir. Elde edilen ekstraktların antioksidan aktivitesi ABTS (2,2-Azino-bis-3-ethylbenzothiazoline-6-sulfonic Acid) ve DPPH (2,2-difenil-1-pikrilhidrazil) yöntemleri kullanılarak belirlenmiştir. Gazal Boynuzu çiçeklerinin toplam fenolik madde içeriğinin 72.53 mg GAE/g, toplam flavonoid madde içeriğinin ise 69.76 mg quercetin/g olduğu bulunmuştur. Ayrıca, ABTS ve DPPH yöntemleri ile belirlenen antioksidan aktivitelerinin sırasıyla %97.84 ve %81.07 olduğunu tespit edilmiştir.

Çalışmamız sonucunda, Gazal Boynuzu çiçeklerinin önemli düzeyde fenolik madde, özellikle flavonoid içerdiği ve yüksek antioksidan aktiviteye sahip olduğu belirlenmiştir. Gazal Boynuzu çiçeklerinin yüksek fenolik madde içeriğinin, bu bitkinin tıbbi kullanımını teşvik edilebileceği düşünülmektedir.



Ayrıca bu çalışma sonuçlarının gelecekte bu bitkiyle yapılacak daha ayrıntılı çalışmalar için bir kaynak oluşturabileceği öngörülmektedir.

**Anahtar Kelimeler:** Gazal Boynuzu, Antioksidan, Fenolik, Flavanoid

### ABSTRACT

Bird's foot trefoil (*Lotus corniculatus* L.) is a plant belonging to the *Lotus* (*Leguminosae*) genus, which is a member of the *Fabaceae* family and has dozens of species distributed worldwide. This perennial plant is commonly used as a forage crop due to its wide distribution range, but it is also used in human nutrition. Among the bioactive compounds of *L. corniculatus* are lipid antioxidants such as  $\alpha$ -tocopherol,  $\beta$ -carotene, lutein, and oleanolic acid. In traditional medicine, this plant is used as a dermatological, gas-relieving, hypoglycemic, anti-inflammatory, antimicrobial, antipyretic, anti-proliferative, anthelmintic, and antioxidant agent.

This study aimed to determine the total phenolic content, total flavonoid content, and antioxidant activities of Bird's foot trefoil flowers collected from Malatya province. After harvesting, Bird's foot trefoil flowers were separated from their leaves and stems, dried, and then extracted with a mixture of methanol and water (7:3, v/v). The antioxidant activity of the obtained extracts was determined using the ABTS (2,2-Azino-bis-3-ethylbenzothiazoline-6-sulfonic Acid) and DPPH (2,2-diphenyl-1-picrylhydrazyl) methods. The results showed that Bird's foot trefoil flowers had a total phenolic content of 72.53 mg GAE/g and a total flavonoid content of 69.76 mg quercetin/g. Additionally, their antioxidant activities, as determined by the ABTS and DPPH methods, were found to be 97.84% and 81.07%, respectively.

In conclusion, our study revealed that Bird's foot trefoil flowers contain a significant amount of phenolic compounds, particularly flavonoids, and have high antioxidant activity. The high phenolic content of Bird's foot trefoil flowers suggests that this plant could be encouraged for medicinal use. Furthermore, it is anticipated that the results of this study may serve as a resource for future more detailed investigations with this plant.

**Keywords:** Bird's Foot Trefoil, Antioxidant, Phenolic, Flavonoid

### GİRİŞ

Gazal Boynuzu (*Lotus corniculatus* L.) *Fabaceae* familyasının çoğunlukla Akdeniz, Avrasya, Kuzey ve Güney Amerika'da dağılım gösteren 100'e yakın türden oluşan *Lotus* (*Leguminosae*) cinsine aittir (Şekil 1). Gazal boynuzu çalımı, çok gövdeli bir bitki olup genellikle yerden yarım metre uzunluğundadır. Meyvesi silindirik şekilli, kahverengi baklagildir. Çiçeklenmesi oldukça çok gösterişli olan bu bitki yetiştiği coğrafyaya bağlı olarak nisan ayından itibaren çiçek vermektedir. Çiçekler gölge ve hava alan bir yerde, sık sık yer değiştirmeye özen gösterilerek kurutulmalıdır. Kuruduktan sonra ışıktan korunarak cam veya seramik kaplarda saklanmalıdır (Gazal boynuzu / *Lotus corniculatus*, 2021).



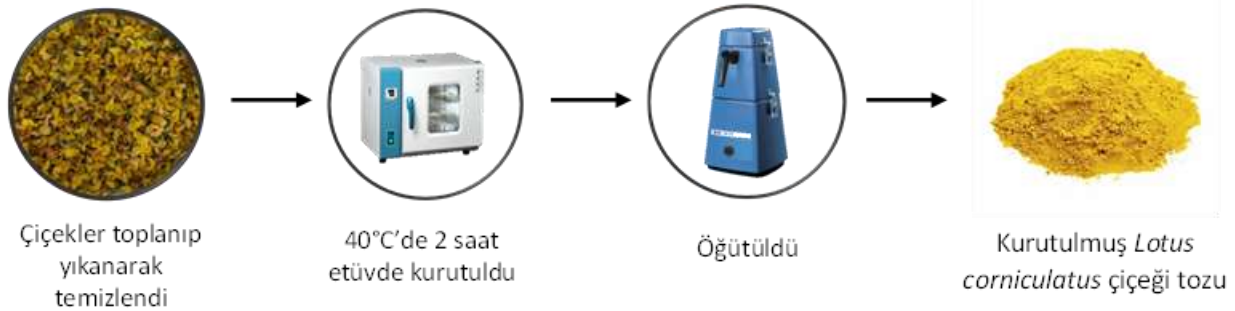
Şekil 1: Gazal Boynuzu (*Lotus corniculatus* L.)

*Lotus* cinsine ait bitkiler üzerinde yapılan daha önceki çalışmalar çeşitli flavonoidler (kaempferol ve kuersetin), fenolik asitler, proantosiyanidinler, tanenler,  $\alpha$ -tokoferol,  $\beta$ -karoten, lutein, oleanolik asit, steroller ve saponinler dahil olmak üzere birçok bileşeni içerdiklerini göstermektedir (Baali vd., 2019; Fumić vd., 2019; Koelzer vd., 2009; Li vd., 2019). *L. Corniculatus* üzerine yapılan birçok çalışma bu bitkinin; dermatik, gaz giderici, sakinleştirici, migren giderici, sırt ve diş ağrısı gibi çeşitli ağrıları giderici, hipoglisemik, anti-inflamatuar, anti-mikrobiyal, anti-frebril, anti-proliferatif, anti-helmin, antioksidatif özelliklere sahip olduğunu göstermiştir (Baali vd., 2019; Fumić vd., 2019; Jabbari vd., 2023; Koelzer vd., 2009). *L. Corniculatus* ayrıca siyanür bileşikleri içerdiği için bitkinin kullanımında dikkatli ve özenli olunmasını gerekmektedir. Ayrıca *L. corniculatus*'un ekstraktlarının Gram-pozitif ve Gram-negatif bakterilere karşı önemli antibakteriyel aktiviteye sahip olduğu bildirilmiştir (Abdallah vd., 2022).

Bu çalışma ile Malatya Bölgesi'nde yetişen Gazal Otu çiçeklerinin fenolik madde içeriği ve antioksidan kapasitesi belirlenerek potansiyel sağlık faydalarının ortaya konulması amaçlanmıştır.

### MATERYAL METOD

Çalışmamızda Malatya ili, İnönü Üniversitesi kampüsünde yetişen ve Eylül ayında toplanan Gazal Otu çiçekleri kullanılmıştır.



### Şekil 2: *L. Corniculatus* çiçeklerinin analiz için hazırlanması

Ekstraktların hazırlanması için kurutulmuş Gazal boynuzu çiçeği tozundan 2 gr alınarak 20 ml metanol (%70) ile homojenize edildi ve karışım bir vorteks cihazı ile 12 saat oda sıcaklığında inkübasyona bırakıldı. İnkübasyon sonrası karışım 15 dk 10000 rpm'de santrifüje tabi tutuldu.

Santrifüj sonrası üstteki süpernatant kısım 0.45  $\mu$ m'lik naylon filtreden süzülerek Gazal boynuzu çiçeği ekstraktları elde edildi.

### Toplam Fenolik Madde Analizi

*L. Corniculatus* çiçek ekstraktlarından 200  $\mu$ l alınarak üzerine 1ml %10'luk Folin&Ciocalteu reaktifi eklenmiş ve daha sonra 800  $\mu$ l %7.5'lik  $\text{Na}_2\text{CO}_3$  eklenerek elde edilen karışım oda sıcaklığında 2 saat inkübasyona bırakılmıştır. Süre sonunda spektrofotometre ile 750 nm'de absorbans değerleri ölçülmüştür. Örneklerin toplam fenolik madde miktarı gallik asit eşdeğeri (GAE) olarak ifade edilmiştir (Spanos & Wrolstad, 1992)

### Toplam Flavanoid Madde Analizi

1 ml *L. Corniculatus* çiçek ekstraktı alınarak üzerine 1ml %2'lik  $\text{AlCl}_3$  eklenerek elde edilen karışımlar oda sıcaklığında, ışık almayan bir ortamda 1 saat inkübe edilmiştir. İnkübasyon sonunda 415 nm dalga boyunda spektrofotometre ile (Shimadzu UV-1800, Japonya) absorbans değerleri ölçülmüştür. Örneklerin toplam flavanoid madde içeriği quersetin standart grafiği kullanılarak mg KE (quersetin eşdeğeri) /g olarak ifade edilmiştir (Quettier-Deleu vd., 2000).

### Antioksidan Kapasite Analizleri

#### ABTS radikali süpürücü aktivite

*L. Corniculatus* çiçek ekstraktlarının ABTS radikali süpürücü aktivitesini belirlemek için Re ve ark. (1999) yöntemi kullanılmıştır. ABTS (7 mM) ve potasyum persülfat (2.45 mM) ile hazırlanan stok stok

çözelti uygun derişime seyreltilerek kullanılmıştır. 150 µl *L. Corniculatus* çiçek ekstraktı ve 2.85 ml seyreltilmiş ABTS çözeltisinden elde edilen karışım 6 dk inkübe edilmiş ve 734 nm’de absorbans değerleri ölçülmüştür. %ABTS=(A<sub>kontrol</sub>-A<sub>örnek</sub>)/A<sub>kontrol</sub> x 100 formülü kullanılarak ABTS radikali süpürücü aktivite % olarak belirlenmiştir (Re vd., 1999).

DPPH radikali süpürücü aktivite

0.1 M DPPH solüsyonundan 4 ml alınarak 1 ml *L. Corniculatus* çiçek ekstraktı ile birleştirilmiş ve 30 dakika ışık almayan bir ortamda inkübe edilmiştir. 515 nm dalga boyunda spektrofotometrede absorbans ölçümleri yapılmıştır. DPPH radikali süpürücü aktivite %DPPH=(A<sub>kontrol</sub>-A<sub>örnek</sub>)/A<sub>kontrol</sub> x 100 formülüyle belirlenmiştir (Rezaeirad D vd., 2013).

### BULGULAR VE TARTIŞMA

Çalışma sonucunda elde edilen verilere göre *L. Corniculatus* çiçeklerinin toplam flavanoid madde miktarı 69.76±0.34 mg Quersetin/g; toplam fenolik madde miktarı 72.53±0.58 mg GAE/g olarak belirlenmiştir (Tablo 1).

**Tablo 1.** Gazal Boynuzu çiçeğinin toplam flavonoid, toplam fenolik madde içeriği

	Toplam Flavonoid (mg KE/g)	Toplam Fenolik (mg GAE/g)
<i>Gazal Boynuzu çiçeği</i>	69.76±0,34	72.53±0.58

*L. Corniculatus* çiçeklerinin DPPH radikal süpürücü aktivitesi %81.07; ABTS radikali süpürücü aktivitesi %97.84 olarak belirlenmiştir (Tablo 2).

**Tablo 2.** Gazal Boynuzu çiçeğinin antioksidan aktivite değerleri (ABTS, DPPH)

	ABTS (%)	DPPH (%)
<i>Gazal Boynuzu çiçeği</i>	97.84	81.07

Literatür incelendiğinde farklı ekolojik koşullarda yetişen *L. Corniculatus* örneklerinin çiçeklerinde biyoaktif bileşen ve antioksidan aktivite analizlerinin sonuçları görülmektedir. Fumic vd. (2019) yapmış olduğu bir çalışmada *L. Corniculatus*'un toplam fenolik madde içeriği 3.80-9.41 mg/mL arasında bulunmuştur. Yerlikaya vd. (2019) yapmış olduğu bir çalışmada *L. Corniculatus* metanolik ekstraktlarının toplam flavanoid madde içeriğini 21.13 mg RE/g, toplam fenolik madde içeriği 19.94 mg GAE/g, DPPH radikal süpürücü aktivitesinin 31.94 mg TE/g ve ABTS radikal süpürücü aktivitesinin ise 140.30 mg TE/g olduğunu bildirmişlerdir. Başka bir çalışmada *L. Corniculatus*'un toplam fenolik ve flavonoid içeriği sırasıyla 87.1 ± 14.5 mg GAE/g ekstrakt ve 36.5 ± 2.1 mg QE/g ekstrakt olarak bulunmuştur (Baali vd., 2019). *L. Corniculatus*'un in vitro antioksidan aktivite sonucu ise 300 µg/ml’de, *L. Corniculatus* için DPPH radikalinin yüksek süpürme aktivitesi %59.7 olarak bulunmuştur (Baali vd., 2019). Abdel-Alim vd. (2023) *Lotus Corniculatus* antioksidan potansiyeli üzerine yapmış olduğu bi çalışmada ise *Lotus Corniculatus* ekstraktlarının ABTS değerinin 122±7.6 mg VCE/g DW ve DPPH değerinin 156±5.9 mg VCE/g DW olduğu tespit edilmiştir.

Literatür sonuçlarında görüldüğü gibi yapılan araştırmalar ile çalışmamız sonucunda elde edilen verilerin hem benzer hem de oldukça farklı olduğu görülmektedir. Bitkilerin yetiştiği ekolojik ortamların bitkinin biyokimyasal yapısını değiştirdiği bilindiğinden, sonuçlar arasında farklılıklar olması şartıcı

değildir. Ayrıca ekstraksiyonda kullanılan solventin türü, ekstraksiyon koşulları, bitkinin yaş veya kuru formda olması, sonuçların verildiği eşdeğer fenolik bileşik, flavonoid, gibi parametreler ve birimlere bağlı olarak sonuçlarda farklılıklar oluşabilmektedir.

#### **SONUÇ**

Çalışmamız sonucunda, Gazal Boynuzu (*L. Corniculatus*) çiçeklerinin önemli düzeyde fenolik madde, özellikle flavonoid içerdiği ve yüksek antioksidan aktiviteye sahip olduğu belirlendi. Gazal Boynuzu çiçeklerinin yüksek fenolik madde içeriği, bu bitkinin tıbbi kullanımını teşvik edebileceği ve bu bitki üzerine daha ayrıntılı çalışmalar için bir kaynak oluşturabileceği düşünülmektedir.

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REKABETÇİ EKONOMİ İNŞA ETMEDE KÜLTÜREL DEĞERLERİN ROLÜ  
THE ROLE OF CULTURAL VALUES İN BUILDING A COMPETITIVE ECONOMY

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ÖZET

Günümüzde küresel ekonomide gözlemlenen en önemli olgu rekabetin güçlenmesidir. Nitekim ulusal sınırların açılması, malların, hizmetlerin, sermayenin ve işgücünün hareketinin önündeki uluslararası engellerin kalkması, yeni pazarların oluşması, teknolojik ve bilimsel ilerlemenin önemli ölçüde hızlanması, bilgi ve iletişim teknolojileri sayesinde uluslararası ekonomik ilişkilerin kolaylaşması vb. bu gibi faktörler rekabetin artmasına ve küresel ekonomide önem arz etmesine neden olmuştur. Böylelikle, “rekabet gücü” olarak nitelendirilen bir performans göstergesi ön plana çıkmıştır. Modern küreselleşme koşullarında ülkelerin ekonomik gelişmişlik düzeyini belirlemek için artık sadece Gayri Safi Yurtiçi Hasıla (GSYİH), Gayri Safi Milli Hasıla (GSMH) gibi makroekonomik göstergelerin değil, aynı zamanda uluslararası kuruluşların düzenlediği ekonominin rekabet gücü, beşeri sermaye ve ekonomik özgürlük gibi endekslerin de dikkate alınmaya başlanması tesadüf değildir. Bu çalışmanın amacı Küreselleşme ve Dördüncü Sanayi Devrimi'nin yarattığı yeni fırsatlar eşliğinde, rekabet gücünün tanım ve kavramlarının giderek daha kurumsal ve sosyal faktörleri içerecek şekilde değiştiği bir bağlamda, toplumsal sistemlerin altında yatan ve onlara ideolojik temel oluşturan kültürel değerlerin ülkelerin rekabet gücü performansındaki rolünü ortaya koymaktır. Çalışmada karşılaştırma ve sistematik analiz yöntemleri kullanılarak ülkelerin rekabet gücüne katkı sağlayan değerler belirlenmiştir. Nitekim bireye olan inanç, sağlıklı rekabet, dayanışma, işbirliği, eşitlik, yeniliğe açıklık, rasyonellik, dürüstlük, güvenilirlik, sadakat, yardımseverlik, sözünde durma gibi kültürel değerlerin ülkelerin rekabetçi bir ekonomi inşa etmelerinde olumlu etkiye sahip olduğu tespit edilmiştir. Aynı zamanda değerlerin oluşumuna ve değişimine etki eden faktörlerin her toplum için farklı olması nedeniyle ekonomik kalkınma ve rekabet gücü açısından verimli değerlerin belirlenmesine özel bir yaklaşımın uygulanması, verimli değerlere doğru değişim süreci için o topluma uygun stratejiler geliştirilmesi gerektiği sonucuna varılmıştır.

**Anahtar Kelimeler:** küreselleşme, rekabet gücü, kültürel değerler

ABSTRACT

At the present time, increasing of competition is the most important phenomenon observed in the global economy. Actually, the opening of national borders, the removal of international barriers to the movement of goods, services, capital and labor, the formation of new markets, the significant acceleration of technological and scientific progress, the facilitation of international economic relations thanks to information and communication technologies and other factors caused competition to increase and become significant in the global economy. Therefore, a performance indicator described as "competitiveness" came to the fore. It is not a coincidence that in order to determine the economic development level of countries under modern globalization conditions, not only macroeconomic indicators such as Gross Domestic Product (GDP), Gross National Product (GNP), but also indices such as competitiveness, human capital and economic freedom organized by international organizations began to be considered. The aim of this study is to reveal the role of cultural values, which stand behind social systems and form an ideological basis for them, in the competitiveness performance of countries, in a context where the definitions and concepts of competitiveness are gradually changing to include more institutional and social factors and new opportunities created by Globalization and the Fourth Industrial Revolution. In the study the values that contribute to the competitiveness of countries are identified by using comparative and systematic analysis methods. Thus, it has been determined that



cultural values such as faith in the individual, healthy competition, solidarity, cooperation, equality, openness to innovation, rationality, honesty, reliability, loyalty, helpfulness, fulfilling one's word have a positive effect on the building of a competitive economy of the countries. At the same time, it was concluded that since the factors affecting the formation and change of values are different for each society, a special approach to determining productive values for economic development and competitiveness should be applied and strategies for the process of change towards productive values should be developed for that society.

**Keywords:** globalization, competitiveness, cultural values

## GİRİŞ

Devletlerin gelişmiş, gelişmekte olan ve geri kalmış olarak sınıflandırılmasında temel etken ülkelerin sahip olduğu avantajlardır. Ancak bu avantajlar zamana ve döneme göre farklılık göstermektedir. 100 hatta 50 yıl önce ülkelerin zenginlik ve refah kaynakları toprak, madenler veya ucuz işgücü gibi karşılaştırmalı üstünlüklerdi, ancak modern küresel ekonomide karşılaştırmalı üstünlük yerini rekabet avantajına bırakmıştır. Bu nedenle rekabet gücü, bir ülkenin ekonomik gelişimini belirleyen makroekonomik göstergeler kadar önemli hale gelmiştir.

Karşılaştırmalı üstünlük koşullarında devletler, daha fazla toprak işgal etmek, maden kaynaklarını içeren arazileri kendi topraklarına katabilmek ve ucuz işgücü elde etmek için çalışıyorlardı. Günümüzün rekabetçi ortamında ise devletlerin görevi, ucuz işgücü ve doğal kaynaklar üzerindeki mücadelenin ötesine geçerek, hızlı ve sürdürülebilir verimlilik artışıyla sonuçlanan daha karmaşık rekabet biçimlerini mümkün kılacak şekilde kaynaklarını, kurumlarını ve yeteneklerini geliştirmektir. Çünkü şu anda ekonomik olarak gelişmiş ülkeler, bilgi, yatırım, fikir ve yeniliğe dayalı daha karmaşık rekabet avantajı kaynaklarının geliştirilmesi yoluyla firmalarının daha verimli olduğu ülkelerdir. Rekabetin öneminin artmasına paralel olarak "*rekabet gücü*" adı verilen bir performans göstergesi de ön plana çıkmıştır. Çalışmanın amacı rekabetçi ekonomi için kültürel değerlerin hangi öneme ve yere sahip olduğunu belirlemektir. Bu bağlamda ilk olarak rekabet gücü ile ilgili tanımlar ve kavramlar, aynı zamanda Dünya Ekonomik Forumu tarafından düzenlenen Küresel Rekabet Gücü raporları, Küresel Rekabet Gücü endeksleri ve rekabet gücü performansı için önemli olan göstergelere yer verilmiştir. Daha sonra kültürel değerlerin rekabet gücü performansı açısından hangi öneme sahip olduğu incelenmiştir.

## REKABET GÜCÜ TANIM VE KAVRAMLARI. KÜRESEL REKABET GÜCÜ ENDEKSİ

Rekabet gücüne ilişkin tanımlar ve teorik kavramlar çeşitlidir. Aynı zamanda rekabet gücünün firma, sanayi ve ulusal (uluslararası) olmak üzere 3 düzeyde tanımlandığını da belirtmek gerekir. Bu çalışmada ulusal (uluslararası) düzeyde rekabet gücü ele alınıyor. Bu açıdan yaklaşıldığında Altomonte, Aquilante, Ottaviano (2012, 1), uluslararası rekabet gücünü "*bir ülkede bol olan mal ve hizmetleri, o ülkede kıt olan mal ve hizmetlerle değiştirme yeteneği*" olarak nitelendirmektedir. Avrupa Komisyonu (2001), bir ülkenin rekabet gücünü "*ülke ekonomisinin nüfusu için sürdürülebilir nitelikte artan yaşam standartları ve yüksek düzeyde istihdam sağlama yeteneği*" olarak tanımlıyor.

1979'dan bu yana, Dünya Ekonomik Forumu (DEF), politikacıların, iş adamlarının ve kamuoyunun verimliliğin ve sürdürülebilirliğin artırılmasında ekonomik büyümenin temel itici güçleri hakkındaki düşüncelerini genişletmek, ulusal rekabet gücünü belirleyen birçok faktörü incelemek ve karşılaştırmak, rekabet gücünü artırmanın önündeki engelleri bulmak ve bunlarla mücadele etmek için en iyi stratejiler hakkındaki tartışmaları teşvik etmek amacı doğrultusunda Küresel Rekabet Gücü Raporlarını hazırlamaktadır. ( WEF 2020, 4)

21. yüzyılın başlarından itibaren ise Dünya Ekonomik Forumu, rekabet gücünü sosyolojik ve çevresel bağlamda değerlendirmek amacıyla rekabet gücü ve sürdürülebilirlik arasındaki karmaşık ilişkiyi sosyal ve çevresel faktörlere dayalı olarak incelemektedir. DEF temsilcileri, ekonominin rekabet gücünün ekonomik faktörlerin yanı sıra kurumsal faktörlerden de etkilendiğini ve bu faktörlere ilişkin göstergelerin de dikkate alınması gerektiğini vurgulamaktadırlar. Bu da tesadüfi değildir. Çünkü 20. yüzyılın sonlarından itibaren kültürel değerlerin ekonomik kalkınma üzerindeki etkisine ilişkin bilimsel çalışmalara daha geniş yer vermeye başlanmıştır. Fukuyama (2001) bunu iki nedene bağlıyor. Birincisi "yeni kurumsal ekonominin" ortaya çıkışıyla ilişkilidir. Nitekim yeni kurumsalcılar, ekonomik yaşamda



normların önemini kabul ediyor ve kurumların (resmi veya gayri resmi kuralların) işlem maliyetlerini azaltmada ve ekonomik verimliliği artırmadaki önemli rolünü belirtiyorlardı. İkincisi ise 1980'lerin sonu ve 1990'larda yaşanan geçiş ekonomisi deneyimlerinden ve aynı zamanda "Asya mucizesi" olarak da adlandırılan süreçten kaynaklanıyordu. Komünizmin çöküşünden sonra birçok Doğu Avrupa ve Sovyet ardılı devletleri resmi piyasa kurumları tesis ettiler. Polonya, Macaristan ve Çek Cumhuriyeti gibi ülkeler, merkezi planlı ekonomiden piyasa odaklı ekonomiye nispeten kolay geçiş yaptı. Rusya ve Ukrayna gibi diğer ülkeler için ise süreç daha zordu, çünkü kurumlar zayıftı ve yolsuzluk seviyeleri yüksekti.

Kurumsalcılık eğiliminin temsilcileri, ekonomik faktörlerin yanı sıra rekabet gücünün devlet organları, sendikalar, finansal kurumlar, sosyo-politik örgütler, mülkiyet ve organizasyon yapıları, manevi alışkanlıklar, kurallar ve davranış kuralları gibi sosyal kurumlardan da etkilendiğini belirtiyorlardı. (Siudek ve Zawojka, 2014, 95)

2001 yılından bu yana, Dünya Ekonomik Forumu rekabet gücünü ölçmek için Büyüme Rekabet Gücü endeksini kullanmaya başladı. Büyüme Rekabet Gücü endeksinin 3 sütunu vardı: makroekonomik ortamın kalitesi, ülkenin kamu kurumlarının durumu, teknoloji ve yeniliğin önemi dikkate alınarak teknolojik hazırlık düzeyi. 2005 yılında ise Dünya Ekonomik Forumu, uluslararası düzeydeki değişiklikleri dikkate alarak 9 sütundan (Kurumlar, altyapı, makroekonomi, sağlık ve ilköğretim, yüksek öğrenim ve öğretim, piyasa verimliliği, teknolojik hazırlık, iş dünyasının çeşitliliği ve inovasyon) ibaret Küresel Rekabet Gücü Endeksi'ni oluşturdu. 2006 yılında Küresel Rekabet Gücü endeksinin sonuçlarına göre İsviçre, Finlandiya, İsveç ve Danimarka, Singapur, ABD, Japonya, Almanya, Hollanda ve Birleşik Krallık ilk onlukta yer alıyordu. Dünya Ekonomik Forumu'nun o yılki raporuna göre İsviçre ve diğer İskandinav ülkelerinin dünyanın en rekabetçi ekonomisine sahip ülkeleri olarak seçilmesinin nedenleri arasında öncelikle bu ülkelerin dünyanın en iyi kurumlarına sahip olması, eğitim ve öğretimin yüksek seviyesi, teknolojiye ve yeniliğe gerekli ilginin olmasını göstermekte ve sıralanan nüansların rekabet gücünün sürdürülebilirliği açısından başarılı bir strateji olduğunu vurgulamaktaydı. (WEF 2006)

2018 yılında ise Dünya Ekonomik Forumu (WEF 2019), yeni Küresel Rekabet Gücü Endeksi 4.0'ı ortaya koydu. Yeni endeks, Dördüncü Sanayi Devrimi'nde ekonomik başarının belirleyicileri olarak insan sermayesi, yenilikçilik, sürdürülebilirlik, esnekliğin rolünü ve rekabetçi bir ekonominin inşasında bahsedilen yeni bileşenlerin öncekilerle bütünleştirilmesinin önemini vurguluyor. Çünkü bu nitelikler bir takım yeni ve önemli kavramların (örneğin girişimcilik kültürü, çok taraflı işbirliği, rasyonel düşünme, sosyal güven vb.) bir sonucu olarak ortaya çıkıyor ve geleneksel faktörleri (örn. BİT ve fiziksel altyapı, makroekonomik istikrar, mülkiyet hakları, eğitim yılı) tamamlıyor. Ulusal rekabet gücünü, "bir ülkenin verimlilik düzeyini belirleyen bir dizi faktör, politika ve kurumlar" olarak nitelendiren Dünya Ekonomik Forumu, yeni endeksi 12 sütunu içerecek şekilde tesis etmiştir: Kurumlar; altyapı; BİT'in benimsenmesi; makroekonomik istikrar; sağlık; yetenekler; ürün pazarı; işgücü piyasası; finansal sistem; piyasa ölçüsü; iş dinamizmi; inovasyon yeteneği.

2019 Küresel Rekabet Gücü endeksinin sonuçlarına göre (WEF 2019) ilk onlukta sırasıyla Singapur, ABD, Hong Kong ÖİB, İsviçre, Japonya, Almanya, İsveç, Birleşik Krallık, Danimarka, Finlandiya, Tayvan (Çin), Kore Cumhuriyeti, Kanada ve Fransa yer alıyor. Aynı yılın raporunda rekabet gücünü engelleyen temel faktörler olarak zayıf kurumlar ve inovasyon becerileri gösteriliyor. Ayrıca endekste yer alan faktörlerin çoğunun soyut olduğu ve bunların arkasında kültürel faktörlerin olduğu belirtiliyor.

### **KÜLTÜREL DEĞERLERİN REKABET GÜCÜ PERFORMANSINDA YERİ**

20. yüzyılın başlarında modernleşme teorisi Batılı bir model olarak ele alınmış ve devletlerin ancak Batı'nın kültürel ve teknolojik yöntemlerine yöneldikten sonra ekonomik olarak gelişebilecekleri fikri ortaya atılmıştır. 20. yüzyılın ortalarında neo-Marksist ve dünya sistemleri gibi teoriler ise az gelişmiş ülkelere, yoksulluğun iç sorunlarla hiçbir ilgisi olmadığını, zengin ülkelerin yoksul ülkeleri sömürerek onları bağımlı kıldığını öne sürüyordu. (Inglehart ve Baker 2000, 20)

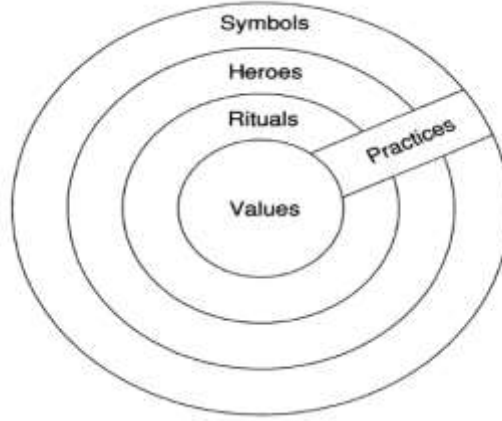
Aslında her iki akım da eksik düşüncelere sahipti. Çünkü ikisinin de görmezden geldiği nüanslar vardı. Modernleşme teorisi sömürgecilik, emperyalizm, siyasi ve ekonomik hakimiyet gibi dış etkenleri göz ardı ediyor ve dinin zayıflayacağını iddia ediyordu. Neo-Marksist ve dünya sistemleri teorileri ise toplumların kültürel değerlerinin ekonomik kalkınma sürecindeki rolünü görmezden geliyordu.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

İster GSYİH ve GSMH gibi klasik makroekonomik göstergeler, isterse de rekabet gücü gibi endekslerin sonuçlarına göre ülkelerin sıralamasına baktığımızda, modernleşme teorisinin aksine, batılı olmayan ülkelerin de ilk sıralarda yer aldığını görmekteyiz. Onlar bu başarıya kendi potensiyelleri, ekonomik ve aynı zamanda kültürel değerleri ile ulaşmışlar. Evet, küreselleşmenin etkisi, ulusötesi şirketlerin, Amerikan ve Batı popüler kültürünün, görünüşçe aynı McDonald's restoranları ve Starbucks kafelerinin tüm dünyada yaygınlaşması, gençlerin batı tarzı kıyafetleri tercih etmesi gibi gerçekler, insanları küreselleşmenin değerleri evrensellediği yanılgısına düşürüyor. Ancak sıralanan gerçekler temel değer farklılıklarının sürekliliğine zarar veremez.

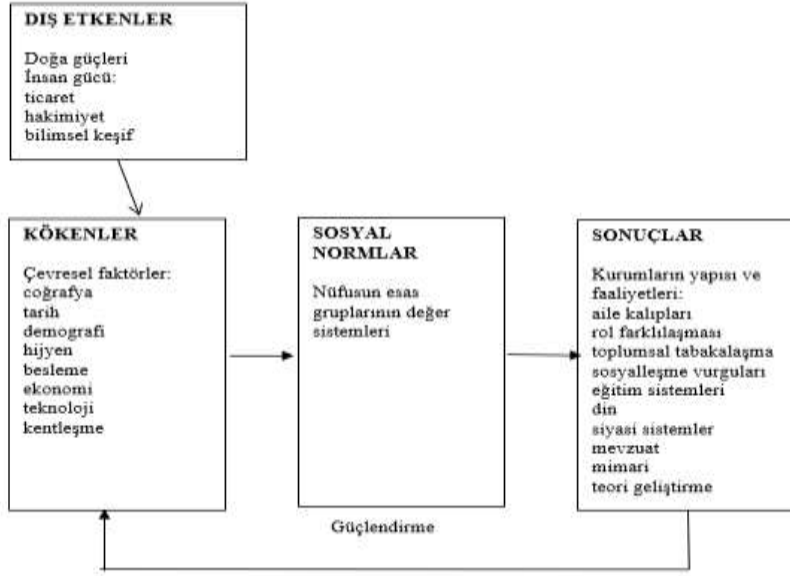
Bunu Hofstede'nin "Kültürün soğan diyagramı: Kültürün farklı derinlik düzeyinde tezahürü" ile açıklamak mümkündür. Hofstede'ye göre değerler kültürün ana unsurudur ve diğer unsurlardan farklı olarak davranışlarda ortaya çıkana kadar görünmezler. Bu nedenle Hofstede'nin diyagramında kültür, çekirdeğini değerlerin oluşturduğu soğanın katmanları olarak tanımlanıyor. Semboller, kahramanlar ve ritüeller deneyimler terimi altında sınıflandırılır ve dışarıdaki gözlemciler tarafından görülebilir. (Hofstede 2001, 11) Yani yukarıda sıralanan dış unsurlardaki yaklaşmayı dünyanın kültürel homojenleşmesi olarak tanımlamak yanlış olur. Kültürün temelini oluşturan değerler de değişir ancak bu değişim bazen bir neslin ömrü boyunca devam ediyor.



Kaynak. G.Hofstede 2001, 11

Nitekim Inglehart ve Baker (2000, 12), kültürel değerlerin değişmesine toplumların modernleşmeye ve küreselleşmeye direnebilen (Protestan, Roma Katolik, Ortodoks, Konfüçyüs, komünizm) kültürel miraslarının engel olduğunu öne sürüyorlardı.

Hofstede'nin (2001, 12) "Uluslararası Değerler, Davranışlar, Kurumlar ve Organizasyonların Karşılaştırılması" adlı kitabında yer alan "Kültürel Örneklerin Stabilizasyonu" adlı şemada kültürel değerler ve kurumlar arasındaki etkileşim açıkça gösterilmiştir.



Kaynak: Hofstede 2001, 12

Rekabet gücü için kurumlar, teşvikleri şekillendiren ve ekonomik aktörlerin etkileşimini belirleyen kurallar sistemi anlamına gelir. Toplumda belirli teşviklerin, beklentilerin ve geleneklerin sıklığı, kültürün temelini oluşturan normatif değer yönelimlerini ifade etmektedir. Aynı zamanda sosyal kurumların örgütsel yöntemleri, kuralları ve günlük uygulamaları, kültürün temel değer mekanizmalarında ifade edilen beklentileri açıkça göstermektedir. Toplumda yaşayan insanlar bu sosyal kurumlar aracılığıyla sürekli olarak altta yatan kültürel değerleri harekete geçiren teşvik ve beklentilerle karşı karşıya kalmaktadır. (Шварц 2008, 37-38 ).

Kültürel değerlerin rekabet gücüne etkisi bakımından Porter (2000), çalışkanlık, inisiyatif alma, eğitim, tasarruf, yatırım yapma isteği gibi kültürel değerlerin ancak verimliliğe katkı sağladığı sürece önemli olduğunu vurguluyor. Tarihe baktığımızda bu gerçeğin doğruluğuna şahit oluyoruz. Eski Sovyet Sosyalist Cumhuriyetleri'ndeki planlı ekonomide çok çalışmanın ödülü yoksa bunun ne önemi vardı? Verimliliğe bir katkısı oldu mu? Hayır.

Ekonomik kalkınmaya, bir ulustaki ekonomik kültürün verimliliğini artıran yönler ile kültürün verimliliğini bozan yönler arasında kararlı bir mücadelenin kısmi oluşumu gibi bir yaklaşım sunan Porter (2000), “neden halklar, uluslar, devletler, toplumlar verimli değerlere sahip olmayan kültürel değerleri seçerler ve bunları sürdürmekte ısrar ederler” diye bir soru sorar.

Grondon'un (2000, 44-45) değerler sınıflandırması bu soruya cevap niteliğindedir. Nitekim o, değerleri içsel ve araçsal olmak üzere iki kısma ayırır. İçsel değerler,  *fayda veya maliyetlerden bağımsız olarak koruduğumuz* değerlerdir.  *Yararlı oldukları için benimsediğimiz* değerler araçsaldır. Grondon, tüm ekonomik değerlerin araçsal olduğunu ve sürdürülebilir ekonomik kalkınma için gerekli değerlerin içsel ve ekonomik olmayan nitelikte olması gerektiğini vurguluyor. Sürdürülebilir ekonomik kalkınma için gerekli olan değerler, insanları zengin olduktan sonra bile çalışmaya, rekabet etmeye, yatırım ve yenilik yapmaya devam etmeye motive eden değerlerdir. Bunlar da refaha ulaştıktan sonra bile kaybolmayan içsel değerler aracılığıyla gerçekleşebilir. Çünkü içsel değerler tükenmezdir. Ayrıca sürdürülebilir kalkınmaya yönelik içsel değerler ekonomik olmasa bile ekonomiye aykırı olmamalıdır. Çünkü ekonomik olmayan değerler ekonomik başarı ile tükenmeyecek; ve ekonomiden yana olmakla tasarrufu sürekli ilerleteceklerdir. Verimli olmayan değerler içsel ve ekonomik olmayan değerlerdir.

Grondon (2000, 47-51) ekonomik kalkınmayı teşvik eden, yani verimli değerler olarak bireye güven, sağlıklı rekabet, yeniliği teşvik eden eğitim, rasyonellik, iyimserlik vb. vurguluyor. Grondon'a göre ekonomik kalkınmanın ana motoru bireylerin yaratıcılığıdır. Yaratıcılıklarını teşvik eden ana faktör ise sorumluluk almalarına ve faaliyetde bulunmalarına olanak tanıyan özgür bir ortamdır. Ayrıca o, ekonomik verimlilik için sağlıklı rekabetin, sporda olduğu gibi her iki tarafın da elinden gelenin en iyisini yaparak fayda sağladığı bir işbirliği biçimi olduğunu savunuyor. Nitekim mal, emek ve finansın

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

en verimli şekilde dağılımının sağlanması açısından piyasanın büyüklüğü ve verimliliği, ekonomide ayrı bir önem taşımaktadır. Üretken ve etkin bir pazara ulaşmanın temel yolu, ekonomik çarpıklıkları azaltarak ürün ve hizmetler için sağlıklı rekabet yaratmak ve sürdürmektir. Kuzey Avrupa ülkelerinin sonuçları yıkıcı rekabete gerek olmadığını gösteriyor. Büyüme için çalışmak ve aynı zamanda “eşitlik”den yana olmak mümkün.

Küresel pazarlarda rekabet edebilmek için yeniliği teşvik eden, yeni bilgi ve teknolojilere hakim olmaya yardımcı olan, değişen çevreye hızla uyum sağlayabilen insanlar yetiştiren bir eğitim sistemine de sahip olmak gerekmektedir. Eğitim ve öğretimde, kabul edilen inanışların aksine fikirler ortaya koyabilen, yani sorgulayan, rasyonel düşünen insanların yetiştirilmesi, yenilik yapma yeteneğini geliştirir. İnovasyon ise ekonomik kalkınmanın ve rekabet gücünün motorudur. Nitekim yeni fikirlere ve stratejilere açık olan ve böylece ürünlerini daha kaliteli biçimde sunan işletmeler ve ya ülkeler rekabet ortamında üstünlük kazanmış oluyor. Bunun dışında, ekonomik aktörler pazarlama ile ilgili yeni strateji ve yöntemler aracılığıyla da rekabet güçlerini geliştirebilmektedirler. (Yorgancılar 2011, 411)

Dünya Ekonomik Forumu tarafından hazırlanan Küresel Rekabet Gücü raporlarına göre güvenlik, mülkiyet hakları, sosyal sermaye, şeffaflık ve ahlak, kamu sektörü performansı ve kurumsal yönetim olarak tanımlanan kurumların zayıf olması birçok ülkede rekabeti engelliyor. Toplumdaki insanlar ahlaki normlara göre hareket ettiğinde devlet, bu normların uygulanması ve yaptırımları için ayrılan kaynaklardan tasarruf ederek yeni yatırımlara odaklanma fırsatı yakalar. Demir (2003, 81-82) ahlakı, *iyilik, dürüstlük, yardımseverlik, sözünde durma ve yalan söylememeyi içeren bir dizi kural ve tutum* olarak nitelendiriyor. Nitekim işlem maliyetlerinin azalmasına yol açtığı için bu ahlaki normların ekonomik bir işlevi vardır diyebiliriz.

## BULGULAR

Böylelikle, bireye inam, sağlam rekabet, dayanışma, işbirliği, beraberlik, yeniliğe açıklık, rasyonellik, dürüstlük, güvenilirlik, yardımseverlik, sözünde durma, sadakat gibi kültürel değerlerin rekabet gücüne olumlu yönde etkide bulunduğu belirlenmiştir.

Küreselleşme değerlerin evrenselleşmesini sağlayamamıştır. Kültürel değerlerin değişimi her toplum için özel bir süreç arz ediyor. Bir toplumun tüm yaşam biçimini tamamen değiştirmeye çalışmak gerekli değildir. Rekabetçi bir ekonomi inşa etmek için kültürün verimli ve verimsiz değerlerinin ve bunların rekabet gücü için nasıl kullanılacağı belirlenmesi gerekmektedir.

## SONUÇ

Ekonomik gelişimin ister GSYH, GSMH gibi klasik isterse de uluslararası kuruluşlar tarafından düzenlenen rekabet gücü gibi yeni göstergeleri için ekonomik ve kültürel faktörler aynı derecede önemlidir. Bu nedenle her hangi bir ülkenin, toplumun ekonomik gelişimini tetikleyen ve engel olan faktörler belirlenirken ekonomik ve kültürel değerler birlikte ele alınmalıdır. Eğer kısa süreli ekonomik performans değişikliğinden bahs ediliyorsa bunun nedenlerini ekonomik faktörlerde aramamız gerekir.

Kültürel değerler yavaş şekilde değişir ve uzun sürede etki yapar. Değerlerin oluşumuna ve değişimine etkide bulunan faktörler de her toplum için farklılık arz ettiğinden ekonomik kalkınma ve rekabet gücü performansı için verimli değerler her topluma özel olarak belirlenmeli ve değişim süreci için stratejiler geliştirilmelidir.

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October 13-14, 2023

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KARBON AYAK İZİNİN İŞLETME DUYARLILIKLARINA ETKİSİ  
THE EFFECT OF CARBON FOOTPRINT ON BUSINESS SENSITIVITY

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**ÖZET**

Karbon ayak izi ile ilgili düzenlemeler, işletmelerin çevre konusundaki duyarlılıklarına önemli katkılar sağlamıştır. Bu düzenlemeler sayesinde işletmeler gerek ürünlerinde gerekse imalat sistemlerinde yenilikler yapma imkânına sahip olmuşlardır. Çevreye karşı olan duyarlılıklar, bir anlamda işletmelerin ve dolayısıyla markalarının itibarını artırma ve bu çerçevede diğer işletmeler ile rekabet edebilme şanslarını yakalamalarına neden olmuştur. Mevcut düzenlemeler başlangıçta işletmeleri bazı yatırımları yapmaya zorlasa da, çevre bilinci ile belli oranda finansal kaynak ayırmalarını gerektiren düzenlemeler; hammadde girdilerinin sınırlı kullanımı nedeniyle kaynak verimliliğini arttıracak, araçların daha verimli kullanılmasını ve böylece daha iyi performans göstermelerine neden olmuştur. Çevreye duyarlı işletmelerin ilk yatırım maliyetlerinin oldukça yüksek olduğu söylenebilir de “Aragón-Correa ve Rubio-López (2007),’in 140 gıda fabrikadan elde etmiş oldukları verilere dayanarak çevresel ilerlemenin finansal performansla ilişkili olmadığı ortaya konmuştur. Bu nedenle bazı işletmelerin yasal standartların ötesine geçmek için gerekli mali teşviklere sahip olma mecburiyetleri yoktur. Kısaca emisyon azaltımı sağlamak isteyen işletmeler, kendi emisyonlarının yanı sıra tedarik zincirlerindeki diğer oyuncuların emisyonlarını ve seçimlerini etkilemek için fırsatlar aramakta durumdadırlar” (Bocken ve Allwood, 2012:118).

Günümüz işletmeleri açısından değerlendirildiğinde; “işletmeler emisyonlarını azaltmayı hedefliyorsa, paydaşlarını dikkate almak zorundadırlar”. Henriques ve Sadosky'ye (1999) göre proaktif işletmeler; müşterileri, hissedarları ve yerel toplulukları önemli paydaşlar olarak görürler. Buysse ve Verbeke (2003)'e göre, proaktif işletmelerin algıları reaktif işletmelerden farklıdır. Bu nedenle en proaktif işletmeler, hedefe ulaşmak için iç ve dış paydaşlarla birlikte çalışırlar (Bocken ve Allwood, 2012:118). Kaldı ki bir işletmenin pazarlama planı her zaman müşterilerinin tutumlarıyla bağlantılı olmalıdır ve müşteriler iklim değişikliği konusunda giderek daha fazla endişe duymaktadır. Bu nedenle müşteriler önemli bir dış paydaştır. Organizasyonel bir perspektiften bakıldığında ise, karbon ayak izi ile ilgili bazı trendler de söz konusudur. Özellikle son dönemlerde sera gazı emisyonları ya da alternatif ve yenilenebilir enerji kaynaklarının kullanımına yönelik olarak kamuoyunun giderek artan bir ilgisi söz konusudur. “Bu nedenle, herhangi bir kurumsal sera gazı emisyonu risk yönetimi stratejisinin, bir işletmenin sera gazı üretiminin ölçümüyle başlaması gerektiğine yaygın olarak inanılmaktadır” (Andrews, 2009:1). Çalışmamız kamuoyunda artan çevre bilincinin; işletmelerin pazarlama ve yönetim stratejilerine olan etkisini incelemeyi amaçlamaktadır.

**Anahtar Kelimeler:** Karbon Ayak İzi, Sera Gazı Emisyonu, Çevresel Sürdürülebilirlik,



**ABSTRACT**

Regulations on carbon footprint have made significant contributions to the environmental sensitivity of businesses. Thanks to these regulations, businesses have had the opportunity to innovate both in their products and manufacturing systems. In a sense, environmental sensitivities cause businesses to increase the reputation of their brands and thus their brands, and in this context, they have the chance to compete with other businesses. Although existing regulations initially force businesses to make some investments, regulations that require them to allocate a certain amount of financial resources with environmental awareness will increase resource efficiency due to the limited use of raw material inputs, will lead to more efficient use of tools and thus better performance. Although the initial investment costs of environmentally conscious businesses are said to be quite high, "Aragón-Correa and Rubio-López (2007), based on data from 140 food factories, found that environmental progress is not related to financial performance. Therefore, some businesses do not necessarily have the financial incentives to go beyond legal standards. Businesses seeking emission reductions should look for opportunities to influence their own emissions as well as the emissions and choices of other players in their supply chains" (Bocken and Allwood, 2012:118).

In terms of today's businesses, "if businesses aim to reduce their emissions, they have to consider their stakeholders". According to Henriques and Sadorsky (1999), proactive businesses see customers, shareholders and local communities as important stakeholders. According to Buysse and Verbeke (2003), the perceptions of proactive businesses differ from those of reactive businesses. The most proactive businesses work with internal and external stakeholders to achieve their goals (Bocken and Allwood, 2012:118). Moreover, a business's marketing plan should always be linked to the attitudes of its customers, and customers are increasingly concerned about climate change. Customers are therefore an important external stakeholder. From an organizational perspective, there are also some trends related to carbon footprint. In particular, there is a growing public interest in greenhouse gas emissions or the use of alternative and renewable energy sources. "It is widely believed, therefore, that any corporate GHG emissions risk management strategy should begin with the measurement of a company's GHG production" (Andrews, 2009:1). Our study aims to examine the impact of increasing environmental awareness in the public on the marketing and management strategies of businesses.

**Keywords:** Carbon Footprint, Greenhouse Gas Emissions, Environmental Sustainability

**1. LİTERATÜR**

Karbon ayak izi kavramı üzerine literatürde birçok araştırma mevcuttur. Ancak karbon ayak izinin yaygın olarak kabul edilen ve somut bir tanımı yoktur (Wiedmann ve Minx, 2008). Buna karşın ayak izinin ne olduğuna yönelik farklı açıklamalar da mevcuttur. Bu kapsamda karbon ayak izi; doğrudan ve dolaylı olarak bir faaliyetin neden olduğu veya bir ürünün yaşam evreleri boyunca biriken özel toplam karbondioksit emisyon miktarının bir ölçüsü (Wiedmann ve Minx, 2008); insan faaliyetlerinin çevre üzerindeki etkisinin bir ölçüsü; (*çamaşır yıkamak, seyahatler, atık depolama alanları, günlük aktiviteler vb. insan faaliyetlerinden kaynaklanan karbondioksit miktarı*) (Patel,200); bir ürünün üretiminde kullanılan hammaddeden tüketimine kadar (*kullanım sırasındaki emisyonlar hariç*) yaşam döngüsü boyunca karbon eşdeğerlerindeki toplam sera gazı miktarı (Carbon Trust, 2006; Peters, 2010) vb. şekillerde ifade edilmektedir. Karbon ayak izinin evrensel olarak kabul edilmiş bir tanımının bulunmaması nedeniyle, benzer kavramları veya süreçleri tanımlamak için çeşitli alternatif terimler geliştirilmiştir. Bu tür terimler arasında; sera gazı muhasebesi (Forsyth vd., 2008), sera gazı hesaplaması ve karbon muhasebesi (Swinburne Teknoloji Üniversitesi 2008) yer almaktadır.



Şekil 1: Karbon Ayak İzi, (<https://yalova.csb.gov.tr/karbon-ayak-izi-nedir-haber-42218>).

İklim krizi, kuraklık, artan hava ısısı, tükenen doğa gibi natural gerçekler küresel ölçekte tehdit oluşturmakta; politika, ekonomi, toplum, teknoloji, çevre ve ekoloji gibi pek çok alana etki etmektedir (Michaels ve Knappenberger, 1996). Uluslararası düzeyde endişelere sebep olabilen bu durum, ülkelerin dahil olduğu önlem çalışmalarını da beraberinde getirmiştir. *Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesi* (1992), *Kyoto Protokolü* (1997), *Bali Yol Haritası* (2007), *Kopenhag Anlaşması* (2009), *Paris Antlaşması* gibi uluslararası sözleşmeler bu durumun önemli örneklerindedir. Genel kabul görmüş duruma göre, ülkelerin emisyon azaltımları ve eylem planı konusunda taahhütleri bu anlaşmaların temelidir. Bu kapsamda düşük karbon ekonomisi, düşük karbonlu şehir, düşük karbonlu yaşam, karbon ticareti, karbon vergisi, karbon emisyonlarını azaltma anlamına gelen kavramlar önemli bir kalkınma stratejisi haline gelebilmektedir.

## 2. KARBON AYAK İZİ İLE MÜCADELE

Çevre ve iklim değişikliği ile ilgili genel kaygılar, küresel nüfus artışı, artan tüketim, kıt kaynaklar vb. gibi durumlar etrafında karbon ayak izine olan ilginin artması muhtemeldir. Dolayısıyla işletmeler karbon ayak izi sonucu oluşan sera gazı emisyonunu azaltmak için girişimlerde bulunabileceklerdir. Bu girişimler ulusal/uluslararası ve sektörel olarak gerçekleşmektedir. Bu kapsamda karbon ayak izi ve gaz emisyonu konusu çeşitli uygulamalarda söz konusudur:

- ✓ ISO; ürünlerin karbon ayak izi üzerine uluslararası bir standart olan ISO-14067'yi geliştirerek kuruluşların karbon ayak izi hakkında bir standart oluşturmayı hedeflemiştir (TSE),
- ✓ Sürdürülebilir kalkınma için *Dünya İş Konseyi* (WBCSD) ve *Dünya Kaynakları Enstitüsü* (WRI), *Sera Gazı Protokolü Ürün/Tedarik Zinciri Girişimi* kapsamında; uygulamalar gerçekleştirmektedir. *Ürün Yaşam Döngüsü Muhasebesi ve Raporlama Standardı ile Kurumsal Muhasebe ve Raporlama Standardı* olmak üzere iki standart geliştirmişlerdir (Ghgprotocol),
- ✓ UNEP/SETAC *Yaşam Döngüsü Girişimi* (Ghgprotocol), karbon ayak izi konusunda bir proje grubu başlatmıştır,
- ✓ İngiliz Standartları Enstitüsü (BSI), mal ve hizmetlerin yaşam döngüsü ve sera gazı emisyonlarının değerlendirilmesine yönelik gereklilikleri belirtmek için kamuya açık bir spesifikasyon yayınlamıştır,
- ✓ Japonya Ekonomi, Ticaret ve Sanayi Bakanlığı (METI) (Meti.org) bir karbon ayak izi deneme projesi başlatarak “*Ürünlerin Karbon Ayak İzinin Değerlendirilmesi Ve Etiketlenmesi İçin Genel İlkeler*” teknik şartnamesi yayınlamıştır. Japonya ayrıca 2050 yılına kadar emisyonların %50 azaltılacağını duyurmuştur,

- ✓ Kore Avrupa Birliği için “*Karbon Ayak İzi Ölçüm Araç Seti*” konulu Avrupa Komisyonu Projesi başlatmıştır,
- ✓ Birleşik Krallık' İklim Değişikliği Komitesi (Theccc.org); karbon emisyonunun nasıl azaltılabileceği konusunda tavsiyelerde bulunmak üzere bağımsız, yasal bir organ olarak ortaya çıkmıştır,
- ✓ İşletmelerin karbon emisyonlarını azaltmalarına yardımcı olmayı amaçlayan ve bağımsız bir kurum olan *The Carbon Trust* (Carbontrust.com), bir karbon etiketleme uygulama planı başlatmıştır. Bu sayede ürünler, tüm yaşam döngüsü boyunca yayılan karbondioksiti belirten etiketlere sahip olmuştur. Program aynı zamanda ürünü üreten firmanın karbon ayak izini azaltma taahhüdünde bulunmasını istemektedir,
- ✓ Tesco (Tesco.com), mağazasındaki tüm ürünlerin karbon derecelendirmesi alarak büyük yatırımlar yapmaya başlamıştır,
- ✓ Marks and Spencer (Marksandspencer.com), karbon ayak izini azaltmak için yatırımlar yapmaya başlamıştır,
- ✓ Carbon Trust, DEFRA ve British Standard Institute, yaşam döngüsü, sera gazı ve ürün/hizmetlerin emisyonlarını değerlendirmek üzere *Kamuya Açık bir Spesifikasyon (PAS) 2050* taslağı geliştirmektedir. Taslak (PAS) şu anda 75 ürün yelpazesinde ve Cadbury Schweppes, Coca-Cola, Dairy UK Ltd ve British Sugar gibi gıda endüstrisi kuruluşlarında denetlenmektedir.

### 3. KARBON AYAK İZİ VE TÜKETİM

Tüketim sürekli artmakta, buna karşın doğa zarar görmekte ve kaynaklar da azalmaktadır. Bu kapsamda yapılacak her girişim, tedarik zincirleri boyunca ve tüketicilere yönelik doğayı koruma kapsamında, artan bir pazar talebine hizmet etmektedir. Dolayısıyla hem üreticiler hem de tüketiciler kendi fayda maksimizasyonlarını düşünürken, bu kaynaklara karşı da sorumlu olduğunun da bilincinde olması gerekir. Karbon ayak izi bu bilinç kapsamında ele alınan bir kavramdır.

Karbon ayak izi özellikle sürdürülebilirlik bakımından ele alınan önemli bir konudur (Jones vd., 2008). Bu çerçevede sürdürülebilirlik kavramı, geçmişi 1970'li yıllara dayanan çevreci yaklaşımın bir sonucu olarak ortaya çıkmış olup (Kumar vd., 2012) farklı boyutları içermesi nedeniyle oldukça kapsamlıdır. Tüketiciler için, uygun fiyatların oluşturulması ve ekonomik hedefleri kapsarken, aynı zamanda üreticiler için de adil bir kâr sağlanması, çevresel kaynakların korunması ve sosyal boyutların dikkate alınmasını gerektirmektedir (Vermeir ve Verbeke, 2006). Tüketici bağlamında sürdürülebilir tüketim, yalnızca bireyin ihtiyaç ve isteklerini değil, aynı zamanda bireyin davranışlarının ekonomik, çevresel ve sosyal sonuçlarının sorumluluğunu da dikkate alan bir karar verme sürecine dayanmaktadır (De Pelsmacker vd., 2003).

Tüketicilerin daha düşük karbon ayak izi etiketli ürünlere yönelik tercihleri literatürde henüz geniş çapta araştırılmamıştır (Vanclay ve ark. 2011). Bununla birlikte literatür, tüketicilerin gıda, konut ve mobilite gibi temel tüketim alanlarındaki karbon ayak izlerini nasıl azaltabileceklerini araştırırken, bu seçeneklerin tüm tüketim alanlarında yapılandırılmasına olanak tanıyan araştırmalar da azdır. Gıda tüketiminde en önemli sera gazı karbondioksit olup bunu metan ve nitröz oksit takip etmektedir. Yakıt yakma faaliyetleri karbondioksit emisyonunun ana kaynaklarıdır. Hayvancılık ve pirinç ekimi ise metan emisyonunun ana kaynaklarıdır. Nitröz oksit emisyonu temel olarak topraktaki nitrojenin dönüşümünden, gübre uygulanmasından ve sanayiden kaynaklanmaktadır (Kramer vd., 1999).

Karbon ayak izi, temelde bir ürünün neden olduğu sera gazı emisyonlarının toplam kümesidir. Genellikle yayılan tüm sera gazlarının karbondioksit eşdeğeri cinsinden ifade edilir. Bir ürünün karbon ayak izi, ancak sera gazı emisyon değerlendirmesi yapılarak ölçülebilir (Wiedman vd., 2008). Karbon ayak izinin boyutu bilindikten sonra teknolojik gelişmeler, daha iyi bir süreç, iyi ürün yönetimi ve alternatif tüketim stratejileriyle karbon ayak izini azaltmaya yönelik bir strateji geliştirilebilir. Sera gazı emisyonu yaşam döngüsünün çeşitli aşamalarında (*örneğin gıda ürünlerinin üretimi, taşınması, işlenmesi ve hazırlanması*) meydana gelir. Bu kapsamda dünya çapındaki gıda zincirlerinin toplam sera gazı emisyonunun büyük bir kısmını oluşturması mümkündür.

Bununla birlikte sorumlu tüketim ve üretim küresel çapta sürdürülebilir kalkınma hedeflerinden biridir (Canavari vd., 2019; Coderoni vd., 2015). Örneğin; Avrupa'da, *AB Sürdürülebilir Kalkınma Stratejisi*, sürdürülebilir tüketim ve üretim modellerini teşvik etme amacını ortaya koymaktadır. Ana hedefleri ekonomik büyümeyi çevresel bozulmadan ayırmak, sosyal ve ekonomik kalkınmayı ekosistemlerin taşıma kapasitesi dahilinde ele almaktır (Ledoux Mertens ve Wolff, 2005). Bu sürecin anahtarı, üretici ve tüketicilerin davranışları arasındaki uyumdur. Bu uyum için; üreticiler her zaman daha sürdürülebilir iş modelleri sunarak iş performanslarını iyileştirmeyi hedeflemeli, tüketiciler ise üretim süreçlerinin çevresel sürdürülebilirliği konusunda bilgiye ulaşabilmesi ve davranışlarında bu durumun sonuçlarının bilincinde olması gerekmektedir.

Nitekim iklim değişikliği, hem dünya üzerindeki ekosistemler hem de insanlığın gelecekteki refahı için ciddi bir tehdit olarak algılanmaktadır. Sera gazı emisyonlarında gerekli olan önemli azalmaları karşılamak amacıyla, tüketim kalıplarındaki değişiklikler, küresel iklim değişikliğini hafifletme sorununu çözümlenmenin önemli bir ayağı olarak kabul edilmekte ve daha fazla önem kazanmaktadır (Schanes vd., 2016). Karbon ayak izi bu gaz emisyonlarında azalmanın önemli bir göstergesi olarak ifade edilebilir. Ayrıca tüketicilerin iklim değişikliğiyle ilgili konulara ilişkin endişelerini özetlemek ve koruyucu faaliyetlere teşvik etmek için kullanılan bir kavram olarak karşımıza çıkmaktadır. Sonuç olarak günümüz tüketicilerinin iklim değişikliğine yönelik çözümlere dahil olması bir gerekliliktir diyebiliriz.

Araştırmalar tüketicilerin, özellikle düşük fiyatlı ürünlerle ilişkilendirildiklerinde, düşük karbon emisyonlu gıdalara olumlu yanıt verdiklerini göstermektedir (Canavari ve Coderoni, 2020). Ayrıca hem fiyat teşviklerinin hem de bilgilendirici müdahalelerin tüketicilerin satın aldığı gıda ürünlerinin karbon ayak izlerini azaltma potansiyeline sahip olduğu görülmektedir (Soregaroli vd., 2021). Bu farklı politika müdahaleleri; tüketici davranışlarını anlamak, karbon emisyonlarını azaltabilecek etkili kurumsal müdahaleleri geliştirilmek ve çevre dostu uygulamalara yönelik ekonomik faaliyetleri veya yatırımları desteklemek açısından önemli görülmektedir.

Hoek vd.(2017) belirli ürünler ile bunların sağlıklı ve sürdürülebilir alternatifleri arasındaki tüketici tercihlerini araştırmışlardır (Örneğin: *beyaz pirinç ve kahverengi pirinç, sığır eti ve kanguru bifteği, domates sosu için konserve ve taze domates*). Araştırma sonuçlarına göre paketler üzerindeki bilgilendirmeler önemli görülmekte ve ürünlerde sağlıklı ve karbon içerikli logoların kullanılmasının tüketicilerin o ürünlere yönelmelerinde etkili olduğu ifade edilmektedir. Benzer şekilde Shewmake vd. (2015), tüketicilerin karbon ayak izi etiketindeki bilgilere nasıl tepki vereceğini tespit etmeye çalıştığı araştırmasında; karbon etiketleri emisyonları azaltabilmekle birlikte ürünlerdeki etiketlenmenin önemini vurgulamıştır. Buna göre tüketicilerin etiketli ürünlerden daha yüksek karbon ayak izine sahip etiketsiz ürünlerle ikame etmesinin mümkün olmasına bağlı olarak ters etkilere yol açabileceği bulunmuştur.

Vanclay vd. (2011)'nin araştırmasında; ürünler somutlaşmış karbon emisyonlarını gösterecek şekilde etiketlenerek satışlar 3 aylık bir süre boyunca izlenmiştir. Yeşil etiketler (ortalamanın altında), sarı etiketler (ortalamanın yakınında) ve siyah etiketler (ortalamanın üzerinde) ayak izlerini (*yiyeceklerden kaynaklanan karbon emisyonlarını*) göstermektedir. Alışılmış satın alma düzenindeki genel değişikliğe göre; siyah etiketli satışlar %6 azalırken, yeşil etiketli satışlar etiketlenmeden sonra %4 artmıştır. Bununla birlikte siyah etiketli satışlardan yeşil etiketli satışlara %20'lik bir geçiş (*yeşil etiketli ürünler aynı zamanda en ucuz ürünlerdir*) olduğu görülmüştür. Araştırma sonuçları; etiketlenmenin karbon emisyonlarındaki azalmayı teşvik etme potansiyeline sahip olduğunu göstermektedir. Bu kapsamda tüketicilerin daha düşük emisyon gösteren bilgi içerikli ürünlere duyarlı olduğunu söylemek mümkündür.

Onozaka ve McFadden (2011), tüketicilerin özellikle yerel menşeli olarak etiketlenmeleri durumunda düşük karbondioksit içerikli ürünleri satın alma olasılıklarının yüksek olduğunu vurgulamıştır.

Sonuçlar bize göstermektedir ki karbon azaltımı; tüketicileri sorumlu tüketime yönlendirmeyi ve devletlerin taahhütlerini dikkate alan, genişletilmiş bir ekonomik sistemde ürünlerin rekabetçi olabileceği ticari politikaları desteklemeyi amaçlayan bir stratejinin parçasıdır (Iriarte vd., 2014). Konu ile ilişkili olarak aynı zamanda karbon ayak izinin literatürde *Gıda Kilometresi* terimi ile de ilişkilendirildiği görülmüştür. Gıda kilometresi; gıdanın üretildiği andan tüketicilere ulaşana kadar kat ettiği mesafeyi belirtmek için türetilmiş bir terimdir. Gıda kilometrelerine odaklanan birçok çalışma,



gıda ürünlerinin dünya çapında taşınmasının çevresel etkilerine (Pretty Ball vd., 2005); Weber ve Matthews, 2008) ve yerli/ithal gıda ürünleri arasındaki farklılıklara odaklanmıştır (Pirog vd., 2001; Jones, 2002).

#### 4. KARBON AYAK İZİ VE İŞLETMELER

Önemli çevresel sürdürülebilirlik sorunlarından birisi küresel ısınma olarak bilinmektedir (Stam vd.,2000). Küresel ısınmaya sera gazı emisyonları, iş seyahatleri, kağıt üretimi, imalat gibi insan tarafından tetiklenen eylemler yoluyla ikincil olarak üretilen karbondioksit sebep olmaktadır. Dolayısıyla bu eylemler örgütsel iş süreçlerinin yürütülmesinde de kendini göstermekte ve işletmeler bu doğrultuda hareket etmek durumundadırlar. Bu kapsamda karbon ayak izinin iş süreçlerine dahil edilmesi önemli ve araştırılması gereken bir konu olarak görülmektedir.

Küresel nüfus artışıyla birlikte, tüketimin de hızla arttığı bilinmektedir (Desa, 2017). Dolayısıyla daha sürdürülebilir ürünlere ilgi duyan tüketicileri aktif olarak hedeflemek isteyen işletmelerin uygun yeşil pazarlama stratejilerini de bu kapsamda uygulaması gerekmektedir. Ayrıca bu stratejiler işletmelerin değer yaratmasına da olanak tanımaktadır (Peattie ve Crane, 2005; Creutzig vd., 2016; Brunelle vd., 2017).

İklim krizi, kuraklık, artan hava ısısı, tükenen doğa gibi gerçekler küresel ölçekte tehdit oluşturmakta; politika, ekonomi, toplum, teknoloji, çevre ve ekoloji gibi pek çok alana etki etmektedir. Uluslararası düzeyde yoğun endişelere sebep olan bu durum, ülkelerin dahil olduğu önlem çalışmalarını da beraberinde getirmektedir. *Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesi* (1992), *Kyoto Protokolü* (1997), *Bali Yol Haritası* (2007), *Kopenhag Anlaşması* (2009), *Paris Antlaşması* gibi uluslararası sözleşmeler bu durumun örneklerindedir. Genel kabul görmüş durum; ülkelerin emisyon azaltımları ve eylem planı konusunda taahhütleridir. Bu kapsamda düşük karbon ekonomisi, düşük karbonlu şehir, düşük karbonlu yaşam, karbon ticareti, karbon vergisi, karbon emisyonlarını azaltma anlamına gelen yenilikçi kavramlar önemli bir kalkınma stratejisi haline gelmiştir.

Karbon ayak izi bir ürünün doğrudan veya dolaylı olarak ortaya çıkan tüm karbondioksit emisyonlarının bir ölçüsü olarak tanımlanmaktadır. Bu aynı zamanda bireyler, gruplar, kuruluşlar, işletmeler, hükümetler ve üretim endüstrileri tarafından gerçekleştirilen tüm paydaşların faaliyetleri de kapsar. Bu anlamda ürün terimi, farklı işletmeler tarafından üretilen ve sunulan hem malları hem de hizmetleri kapsamaktadır. Doğrudan emisyon, tesis içi veya dahili emisyonu ifade ederken, dolaylı emisyon, tesis dışı veya harici emisyonu ifade etmektedir (Durojaye, vd., 2020). Bu kapsamda işletmelerin tüm faaliyetlerinde karbon ayak izlerini küçültmeye yönelik stratejiler geliştirilmesi çevresel boyutta önem taşımaktadır. Bu sayede çevreci müşterilerin işletmeye yönelmesi de mümkün olabilecektir.

Araştırmalar işletmelerin karbon performansını ölçmeye ve raporlamaya büyük önem verdiğini göstermektedir (Zvezdov ve Hack, 2016). Müşteriler, düzenleyiciler ve rakipler gibi çeşitli paydaş gruplarının kazanılmış çıkarları nedeniyle, tek tip, geniş çapta anlaşılır ve karşılaştırılabilir bir gösterge, yani karbon ayak izi gereklidir. İşletmelerin karbondioksit ve sera gazı emisyon profilleri, gönüllü olarak veya kanunen iklim değişikliği açıklamalarından elde edilir (Dawkins ve Fraas, 2011). Çevrenin ve tüketicilerin korunması, olası tüm paydaşları kapsayan çok boyutlu bir gerçekliktir (Munasinghe Jayasinghe vd., 2019).

Karbon ayak izi, tedarik yönetim süreçlerine de entegre edilmesi gereken önemli bir olgudur. Öyle ki çevresel kriterlerin tedarik yönetimine entegre edilmesi, birçok işletme için önemli bir stratejik konu haline gelmiştir. (Seuring ve Müller, 2008, Sarkis, 2003). Bu durum literatürde yeşil tedarik (Bowen vd., 2001), yeşil tedarik zinciri (Sarkis, 2003), yeşil tedarik zinciri yönetimi (Zhu ve Sarkis, 2006), çevresel tedarik zinciri yönetimi (Zsidisin ve Siferd, 2001, Handfield vd., 2005) ve yeşil tedarik zinciri uygulamaları (Vachon ve Klassen, 2006) olarak yer bulmuştur. Ortak payda da işletmelerin çevresel performansını iyileştirmek ve kurumsal sürdürülebilir rekabet gücünü artırmak amacıyla yeşil konuları tedarik zinciri yönetimine entegre eden bir anlayış söz konusudur (Handfield v., 2005, Lee ve Kim, 2009). Bu kapsamda İşletmelerin sürdürülebilir operasyonları faaliyetlerine entegre etmeleri ve performanslarını çevresel kriterlere göre değerlendirdiği tedarik zinciri yönetimi uygulamalarına katılmaları bir gerekliliktir.

Örneğin; tahıl üretiminden kaynaklanan tarımsal üretim artışının yaklaşık %50'si gübre kullanımına dayanmaktadır. Gübreler, temel bitki besinlerini sağlayarak toprak verimliliğini ve üretkenliği korumaya yardımcı olur. Gübreler aynı zamanda olumsuz dışsallıklar, özellikle üretim sürecinde ve ayrıca tarla uygulaması sırasında ve sonrasında sera gazı emisyonlarına neden olmaktadır (Zhang vd., 2017). Bu durumda bir bisküvi fabrikasının üretiminde kullandığı unun ne miktarda sera gazı salınımına neden olduğunu değerlendirmek zorunda kalması da düşündürücüdür.

### SONUÇ

Bir firmanın karbon emisyonu ve tüketimi, faaliyet gösterdiği sektöre, değer zincirindeki konumuna, ürün portföyü, teknolojik gelişmeler gibi işletmeye özgü faktörlere bağlıdır. Bir işletmenin karbon emisyonlarının ve tüketiminin daha iyi anlaşılması ve tanımlanmasında yaşam döngüsü perspektifi ile doğrudan ve dolaylı karbon emisyonları arasındaki ayırım da oldukça önemlidir. Özellikle karbon yönetimi konusu, tedarik zinciri yönetiminde önemli bir stratejik konu olarak düşünüldüğünde, tedarik zincirinin tamamındaki karbon emisyonlarının kapsamını ve sınırlarını anlamak önem kazanmaktadır (Sarkis, 2003). Seuring ve Müller (2008) tedarik zincirlerinin enerji ve emisyon etkileri bakımından önemli olduğunu ifade etmiştir. Bir işletme, karbon emisyon seviyesini iyileştirmek istiyorsa, işletmenin yalnızca sahadaki üretim tesislerine değil aynı zamanda tedarikçilerin üretim süreçlerine de dikkat etmesi gerekir (Lee, 2011). Örneğin; bir otomobil üreticisi, tüketicilerini belirli bir otomobil tipi veya modelinin karbon ayak izi hakkında bilgilendirilmesini istediğinde, hem doğrudan hem de dolaylı emisyonları hesaba katmalıdır. Yani işletmenin somut ürün karbon referansını tanımlaması ve analiz etmesi gerekir. Bu, işletmenin belirli bir ürüne katkıda bulunan tedarik zincirindeki dolaylı emisyonları analiz etmesi gerektiğini göstermektedir (Sarkis, 2003).

Sürdürülebilirliğin gerekliliğine dair artan farkındalık, işletmelerin ilgisini “yeşil” ve “sürdürülebilir” uygulamalar üzerine çekmektedir. Sürdürülebilirlik, gelecek nesillerin kendi ihtiyaçlarını karşılama yeteneğini sağlarken bugünün ihtiyaçlarını da karşılayan kalkınmadır (Stocdale, 1990). Bu çerçevede karbon nötrlüğü ilkesi; üretim sırasında toplam karbondioksit çıkışının nötr, yani sifıra eşit olduğu bir üretim biçimini temsil etmektedir (Becker vd., 2020). Buna rağmen amaç; işletmelerin sıfır karbon emisyonuna sahip olması değil bu emisyonların dengelenmesidir.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## TÜRK MÜZİĞİ ESERLERİNİN BİÇİMSEL ANALİZİNDEKİ FARKLILIKLARIN İNCELENMESİ

### AN EXAMINATION OF THE DIFFERENCES IN THE FORMAL ANALYSIS OF TURKISH MUSIC WORKS

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#### ÖZET

Bir müzik eserini ayrıntılı bir şekilde incelemek ve onu daha iyi anlamak için eser analizi yapılır. Eser analizlerinin makamsal-tonal olarak analizlerinin yapıldığı gibi, biçimsel analizleri de yapılmaktadır. Biçimsel analiz ile eserdeki bölüm, cümle ve motif gibi öğeleri incelemek mümkün olmaktadır. Tüm müziklerde yapıldığı gibi Türk müziği eserlerinde de biçimsel analiz yapılmaktadır. Birçok literatür ve araştırmada Türk müziği eserleri analiz edilmiştir. Fakat bazı Türk müziği eserlerinin analizinde, analiz edilen eserin notalarının aynı olmasına rağmen biçimsel analizinde kaynaklar arasında farklılıklar gözlemlenmiştir. Bu farklılıklar, biçimsel şemalarda görülmektedir. Biçimsel şema analizi yapılan bir literatürde A olarak ifade edilen bir bölüm, başka bir kaynaktan A' olarak yazılmıştır. Din dışı büyük formdaki sözlü bir Türk müziği eserinin *Terennüm* bölümleri bir literatürde üç bölüm olarak, bir başka literatürde beş bölüm olarak ifade edilmiştir. Biçimsel analizlerin motif, cümle gibi öğeleri ile makamsal analiz yapılan araştırmalar arasında farklılıklar olabilmektedir. Böyle durumlar, analiz eden kişinin bakış açısına göre değişebilmektedir. Fakat biçimsel analizde ortaya konulan biçimsel şemanın farklı olması pek beklenmemektedir. Çünkü aynı olan bölümler aynı harf ile, birbirine benzeyen bölümler aynı harfin *üssü* işareti konulmuş haliyle gösterilir. Benzerlik göstermeyen bölümler ise farklı harfler ile gösterilmektedir.

Bu araştırmada, aynı notalar ile farklı kaynaklarda analiz edilmiş olan eserlerin biçimsel analizlerindeki farklılıklar incelenmiştir. Elde edilen bulgular sonucunda gelecekte yapılması planlanan çalışmalara önerilerde bulunulmuştur. Bu araştırma ile literatürde yer alan Türk müziği eserlerinin biçimsel analizlerindeki farklılıkların incelenmesi amaçlanmıştır. Bu araştırma, literatürlerdeki biçimsel analizlerdeki farklılıkların karşılaştırılması ve daha önce böyle bir konunun ele alınmamış olması bakımından önem taşımaktadır.

**Anahtar Kelimeler:** Eser Analizi, Türk Müziği, Biçimsel Analiz.

#### ABSTRACT

Musical work analysis is performed to examine a musical work in detail and understand it better. In addition to the maqam-tonal analysis of the works, formal analyzes are also made. With formal analysis, it is possible to examine elements such as sections, phrases and motives in the work. Formal analysis is carried out in Turkish musical works, as is done in all music. Turkish musical works have been analysed in many literatures and research. However, in the analysis of some Turkish music works, differences were observed between the sources in the formal analysis, although the notes of the analysed musical work were the same. These differences are seen in the formal schemes. A section expressed as A in a literature where formal schema analysis was performed is written as A' in another source. The *Terennüm* sections of a large non-religious Turkish musical work with lyrics are expressed as three sections in one literature and as five sections in another literature. There may be differences between elements of formal analysis such as motives and phrases and studies using modal analysis. Such situations may vary depending on the perspective of the person analysing. However, the formal scheme revealed in formal analysis is not expected to be different. Because identical parts are shown with the same letter, and

similar parts are shown with the *base sign* of the same letter. Sections that are not similar are shown with different letters.

In this research, the differences in the formal analysis of musical works analysed in different sources with the same notes were examined. As a result of the findings, suggestions were made for future studies. This research aims to examine the differences in the formal analyzes of Turkish musical works in the literature. This research is important in terms of comparing the differences in formal analyzes in the literature and since such a subject has not been addressed before.

**Keywords:** Musical Work Analysis, Turkish Music, Formal Analysis.

## GİRİŞ

Türk müziği eserlerini anlamak ve onları ayrıntılı bir şekilde incelemek isteyen müzik araştırmacıları, eserlerin analizlerini yaparlar. Türk müziği eserlerinin analizlerini yapmak isteyen araştırmacılar, eserlerin güfte, makam ve biçimsel(formal) özelliklerini incelerler. Eserler eğer saz eseri ise, onların güfteleri olmadığından güfte analizi yapılamaz. Yapılan eser analizlerinde bazen farklılıklar olabilmektedir. Bu farklılıklar bazı analizlerde araştırmacının bakış açısı ya da tercih durumuna göre değişmektedir. Mesela güftelere yönelik ve iki ayrı kişi tarafından yapılan analizlerde farklılıkların olması pek beklenmez. Güfteler ayındır ve nasıl analiz edileceği bellidir. Bu durum makamsal analizde bazen aynı olmamaktadır. Biçimsel analizin motif, cümlecik, cümle gibi öğelerine ayrıldığı analizlerde de farklılıklar olabilmektedir. Örneğin daha önce bir araştırma (Bozkurt, Karaosmanoğlu, Karaçalı ve Ünal, 2014) için uzmanlara yaptırılmış olan eser bölütlemelerinde farklılıklar gözlemlenmiştir. Fakat biçimsel şemalarda, güftelerde olduğu gibi belirli müzikal öğeler vardır. Bu öğeler bellidir ve biçimsel analizler yapıldığında farklı sonuçlar pek beklenmez.

Biçimsel analizde eserin motif, cümlecik, cümle gibi öğelerinin incelenmesinin yanında, biçimsel şeması oluşturularak da inceleme yapılmaktadır. Bu inceleme sırasında notaları aynı olan müzik öğeleri aynı harflerle gösterilir. Notaları farklı olan müzik öğeleri ise alfabe sırasına göre bir sonraki harf ile gösterilir. Bazen müzik öğelerinde benzer notalara da rastlanmaktadır. Böyle durumlarda benzeyen müzik öğesinin harfinin yanına üssü (‘) işareti konularak belirtilebilir. Bunun yanında ikinci bir benzer müzik öğesinden sonra aynı harf ile iki üssü (‘‘) ya da bu durumun devam ettiği yerlerde harfin yanına üç üssü (‘‘‘) işareti bile konulduğu görülmektedir. “Yalnız bağlantı terennümleri ve ezgileri itibariyle küçük değişiklik arz eden kullanımlar, üssü (‘) işareti kullanmak suretiyle belirtilmiş ve çok benzer olduğu kendinden önceki ezgiden farklı bir harfle gösterilmemiştir” (Oter, 2018, s. 294-295).

Bu araştırmada Türk müziği eserlerinin analizlerinin yapıldığı araştırma ve çalışmalarındaki, notaları aynı olan eserlerin farklı biçimsel şemalarla gösterilen kaynakları incelemek amaçlanmıştır. Bu inceleme aynı eserleri, aynı notalarla analiz etmiş fakat farklı biçimsel şema oluşturmuş kaynaklar incelenerek yapılmıştır. Kaynaklar arasından aynı notalara sahip Şarkı ve Yürük Semai formlarında analiz edilmiş ve farklı biçimsel şemalar elde edilmiş eserler araştırmanın amacına yönelik incelenmiştir. Araştırma, bu formlardan ikişer eserin incelenmesi ile sınırlıdır. Ayrıca bu araştırma, elde edilen kaynaklarda yer alan biçimsel analizlerdeki farklılıkların karşılaştırılması ve daha önce böyle bir konunun ele alınmamış olması bakımından önem taşımaktadır.

### Biçimsel Analiz

Biçimsel analiz, motif, cümlecik, devrecik, periyod, devre gibi kaynaklar arasında farklı adlarda yer alan müzik öğelerinden oluşmaktadır. Biçimi oluşturan müzik öğelerine bazı kaynaklardan örnek verilecek olursa, Demir (2012: 53), müziğin kuruluşunu oluşturan öğeleri “Motif (Nakış), İbare, Cümle, Devir (Dönem, Periyot) ve Tema olarak ele almıştır”. Bir eseri oluşturan müzik öğeleri, biçimsel analizle tespit edilebilir. Biçim analizine yönelik yapılan analizler büyük-küçük harflerle gösterilir. Bu harflerle oluşturulan şemaya ise biçimsel şema denilmektedir. Bir başka kaynakta ise müzik formlarının öğeleri şu şekilde sıralanmıştır: “Motif, Figür ve Koşu, Cümle, Periyod (Dönem) ve Tema” (Sağır ve Albuz, 2008: 1-22). Birçok kaynakta müzik formlarının öğelerine yönelik farklı terminolojiler bulunmaktadır. Araştırmanın amacı dışında olduğu için diğer kaynaklardaki terminolojilerden örnekler verilmemiştir. Özellikle Türk müziğine yönelik hazırlanan kitaplarda müzik öğelerinin terminolojisi arasında



farklılıklar vardır. Bu durum Tekin'in (2021) araştırmasında ele alınmıştır. Müzik öğelerine yönelik iki kaynaktan verilen bilgiler, sadece bu öğelere yönelik bir fikir olması açısından verilmiştir.

Biçimsel şemayı oluşturan süreçleri ve harflendirmeyi Bora (2004: 2) şöyle açıklamıştır. "Formu oluşturan üç ana süreç, yineleme, karşıtlık ve varyasyondur. Bu süreçler A A, A B ve A A' olarak simgelenebilir. Form analizi, bu üç sürecin tanınması ve yapıtların bu süreçler cinsinden tarif edilmeleriyle uğraşır." Bu açıklamada görüldüğü gibi biçim terimi yerine form terimi kullanılarak harflerin bahsi geçen üç durumda nasıl kullanılacağına dair bilgi verilmiştir.

### Yürük Semai Formunun Nakış Biçimleri

Yürük Semai formu, bu formu belirleyen yürük semai ya da sengin semai usullerinden birinin kullanılmasıyla oluşan ve Terennüm bölmesi içeren bir formdur. Bu usullerle dört mısradan oluşan biçimlerine Murabba denilmektedir. Murabba biçimi kullanıldığı gibi Nakış biçimi de bu formda kullanılmaktadır. "Dört bölmelide, sözler dört dize ve Terennümden oluşur. Her dizeden sonra Terennüm seslendirilir. Bazen de sözler beyitler halinde yazılmış şiirlerden iki beyit alınarak bestelenir. Bu durumda eser iki bölmeli olup her beyitten yani her iki dizeden sonra Terennüm gelir. Böyle bir Yürük Semai'de Terennümler iki kez seslendirileceğinden, daha uzun ve bezekli bestelenir. Bu şekilde bestelenmiş Yürük Semaiye Nakış Yürük Semai denir" (Akdoğan, 1996: 289). Bu çalışmada iki adet Nakış Yürük Semai örneklem olarak kullanılmıştır.

Başka bir kaynaktan ise farklı bir terminoloji kullanılarak Yürük Semai formunun biçimsel şeması belirtilmiştir. "Değişik türleri bulunmakla birlikte en çok şu şekli görülür: Dört mısra ikişer mısralı iki bende ya da hanelere ayrılmıştır. Her mısradan sonra Terennüm devreleri gelir. Bu sebeple birinci, ikinci ve dördüncü mısraların bestesi aynıdır. Üçüncü mısra Miyanı teşkil eder. AB ve Lazime birinci, ikinci ve dördüncü mısralarda; CB üçüncü mısra ve Lazime olarak biçim şeması sıralanır" (Özalp, 1992: 18). Bu açıklamada görüldüğü gibi Terennüm yerine Lazime terimi kullanılmıştır. Bahsi geçen biçim Murabba biçimi olup her mısra sonrasında Terennüm gelmektedir. 3. mısra Miyan bölümü olup sonrasında yine Terennüm gelmektedir. Yine bahsi geçen kaynaktan *bölme* yerine *devre* kelimesi kullanılmıştır.

### Türk Müziği Şarkı Formunun Biçimleri

Şarkı formu Türk müziğinin küçük formdaki sözlü eserlerinden biridir. Genelde dört mısralı (Murabba) olarak bestelenir. Fakat beş, altı, yedi ya da daha fazla mısralı ve Terennümsüz olarak bestelenmektedir. "Şarkı formunda eserler, dize adına göre adlandırılmıştır. "2 mısralı müsennâ, 3 mısralı şarkılar müselles, 4 mısralılar murabba, 5 mısralılar muhammes, 6 mısralılar müseddes, 7 mısralılar müsebbâ, 8 mısralılar müsemmen, 9 mısralılar mütessâ, 10 mısralılar muaşşer ve 12 mısralılar isnâaşer" olarak adlandırılmaktadır (Özkan, 2015, s. 111). Özkan'ın da bahsettiği gibi şarkı formunda birçok mısra kullanılmaktadır.

Şarkı formunda her mısranın bir ismi vardır. Bunlara 4 mısralı şarkılara örnek verilecek olursa, 1. mısra Zemin (A), 2. mısra Nakarat (B), 3. mısra Miyan (C) ve 4. mısra Nakarat (B) olarak gösterilebilir. Bu biçim şarkı formunun yaygın olarak kullanılan biçimidir. Yavaşca (2002: 125), şarkı formunda kullanılan biçimlere örnek verdikten sonra "bunlardan en çok kullanılanı dört dizeli 'Murabba' olanıdır ve genellikle şu yapıyı taşır:" diye devam ederek az önce 4 mısralı şarkıya verilen örneği göstermiştir. Buna benzer fakat farklı terimlerle İlerici (1981: 318) bu bölümleri şöyle açıklamıştır: "...şarkılarda, dört mısralık kıtada birinci mısra ve bağlandığı müzik bölümüne (Ayrıltak = Zemin), ikinciye (Kavuştak = Nakarat), üçüncüye (Coştak = Miyan) denir. Dördüncü mısra ayrı sözlü de olsa Kavuştak ezgisine bağlanır."

Şarkı formunda mısralar çoğaldıkça Zemin, Nakarat ve Miyan bölümleri çoğalmakta ve yerleri değişmektedir. Biçimsel şemada farklı harfler kullanılsa da bölüm adları Zemin, Nakarat ve Miyan bölümlerinden biri olarak geçmektedir. Yavaşca (2002: 183), altı mısralı şarkılara örnek olarak Şevki Bey'e ait Gülzara nazam Uşşak şarkının biçimini şöyle belirtmiştir: A birinci mısra (Zemin), B ikinci mısra (Nakarat), C üçüncü mısra (1. Miyan), D dördüncü mısra (2. Miyan), E beşinci mısra (3. Miyan), B altıncı mısra (Nakarat) ve F Aranağme olarak biçimsel şema oluşturulmuştur. "Şarkıların bölümleri, Zemin, Nakarat ve Meyân diye birbirlerinden ayrılır. Bölümler arasında veya sonlarında aranağmeler olabilir" (Akdoğan, 2010: 139). Bu çalışmada Şarkı formunda iki eser örneklem olarak kullanılmıştır.



## YÖNTEM

### Araştırmanın Modeli

Bu araştırmada Türk müziği eserlerinin biçimsel analizinin yapıldığı literatürler incelenmiş ve farklılıklar ele alınmıştır. Araştırmada Nitel araştırma yöntemlerinden doküman analizi kullanılmıştır. “Doküman analizi bir nitel araştırma yöntemidir. Yazılı belgelerin içeriğini titizlikle ve sistematik olarak analiz etmek için kullanılmaktadır” (Wach, 2013: 1). Araştırmada Türk müziği eserlerinin notaları aynı olmasına rağmen farklı biçimsel şemalarla analiz etmiş olan kitap ve makale gibi araştırmalar karşılaştırılarak incelenmiştir. Karşılaştırmada biçimsel analizler sonucunda oluşturulan biçimsel şemalardaki farklılıklar ortaya konulacaktır. Bu bağlamda örneklem olarak ele alınan araştırmalar ve kitaplar ile araştırmada kullanılan kodlar şunlardır:

1. Ezgi, S. (1940). Nazari ve Ameli Türk Musikisi (Kaynak sayfa 195 - K1)
2. İlerici, K. (1981). Bestecilik Bakımından Türk Müziği ve Armonisi (Kaynak sayfa 341 - K2)
3. Oter, S. T. ve Benli, E. (2020). Tab'i Mustafa Efendi'nin Yürük Semai'lerinin Form Analizi (Kaynak sayfa 94 - K3)
4. Şenduran, F. M. (2021). Hekimbaşı Abdülaziz Efendi'nin Bayatı Nakış Yürük Semai'sinin İncelenmesi (Kaynak sayfa 278 - K4)
5. Şensoy, A. H. (1992). Karşılaştırmalı olarak 17. ve 20 yy.'lar arasında Türk Müziğinde ve Avrupa Kökenli Müzikte Kullanılan Formların Birbirlerine Benzerlikleri (Kaynak sayfa 101-102 - K5)
6. Ünsal, N. (1992). Hacı Arif Bey'in Şarkı Formu Açısından Musikimizdeki Yeri (Kaynak sayfa 144 - K6; Kaynak sayfa 34 - K6.1)
7. Yahya Kaçar, G. (2020). Türk Musikisinde Eser ve İcra Tahlili Yöntemleri (Kaynak sayfa 60 - K7)
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Bu araştırmada kullanılan kaynaklar, eserlerin notaları aynı olmasına rağmen farklı biçimsel şema ile analiz edildiği tespit edilebilen kaynaklar arasından seçilmiştir. Örneklem olarak seçilen eserler ise, bu kaynaklar içerisinde yer alan, notaları aynı olup biçim şeması farklı olan eserlerden seçilmiştir. Buna göre Şarkı formunda 2 eser, Yürük Semai formunda ise 2 eser örneklem olarak araştırmada kullanılmıştır.

### BULGULAR ve YORUM

Araştırmanın amacına yönelik olarak, Türk müziği eserlerinin biçimsel analizlerinin yapıldığı çalışmaların doküman analizleri sonucunda elde edilen bulgular aşağıda verilerek yorumlanmıştır.

#### 1. Tab'i Mustafa Efendi'ye ait Hüseyini Nakış Yürük Semai Eserinin Biçimsel Analizindeki Farklılıklar

Tab'i Mustafa Efendi'ye ait Hüseyini Nakış Yürük Semai eserinin biçimsel analizindeki farklılıklar beş kaynaktan bulunmuştur. Elde edilen veriler Tablo 1'de gösterilmektedir.

Tablo 1. Tab'i Mustafa Efendi'ye ait Hüseyini Nakış Yürük Semai Eserinin 5 Kaynaktan Elde Edilen Biçimsel Şeması

	K1	K5	K3	K2	K8
1. mısra	A	A	A	A	A
2. mısra	A'	A'	A	B	A'
Mülazime	B-C-D-E	B	B-C-D		B-C-Ç-D-E
2. mısra	A'	A'	A	B	A'
3. mısra	F	C	E	C	F
4. mısra	A'	A	A	B	A'

Tablo 1’de görüldüğü gibi analiz edilen beş dokümanda da farklı biçimsel şema ortaya konmuştur. İncelenen dokümanların yazıldığı yıllar arasında farklar vardır. Bu durum farklılıkların yıllardan kaynaklı olabileceği düşüncesini akla getirebilir. Fakat eserlerin analizleri arasındaki zaman farkı biçimsel farklılık olma durumuna neden değildir.

Tablo 1’de aynı eserin beş farklı kaynaktan elde edilen biçimsel şemasında, sadece 1. mısradaki kullanılan harfin aynı olduğu görülmektedir. 2. mısradaki bazı kaynaklar A’, bazıları A ya da B diye belirtmişlerdir. Mülazime bölümlerinde ise İlerici’nin herhangi bir harf ile belirtmediği görülmektedir. Bu kaynağın dışında Şensoy’un B ile gösterdiği, Oter ve Benli’nin B-C-D olarak belirttiği görülmektedir. Ezgi, kitabında B-C-D-E olarak gösterdiği Mülazime bölümünü, Yavaşca B-C-Ç-D-E harfleriyle biçimsel şemada göstermiştir.

2. mısra tekrarlarında beş kaynaktan da daha önce bu mısra için kullanmış oldukları aynı harf yer almaktadır. 3. mısranın biçimsel şemasını, Ezgi ve Yavaşca’nın F harfi ile İlerici ile Şensoy’un C harfi ile gösterdiği görülmektedir. Diğerlerinden farklı olarak Oter ve Benli E harfiyle 3. mısrayı göstermiştir. 4. mısradaki yine Ezgi ve Yavaşca’nın A’ olarak gösterdiği biçimi, Oter ve Benli ile Şensoy A harfi ile göstermiştir. İlerici ise, 4. mısrayı B harfi ile ifade etmiştir.

### **2. Hacı Arif Bey’e ait Meyhane Tarabgah-ı Mey-Aşam-ı Cihandır Adlı Şarkının Biçimsel Analizindeki Farklılıklar**

Hacı Arif Bey’e ait Meyhane Tarabgah-ı Mey-Aşam-ı Cihandır adlı şarkının biçimsel analizine yönelik veriler iki kaynaktan incelenmiştir. Elde edilen veriler Tablo 2’de yer almaktadır.

Tablo 2. Hacı Arif Bey’e ait Meyhane Tarabgah-ı Mey-Aşam-ı Cihandır Adlı Şarkının Kaynaklardan Elde Edilen Biçimsel Şeması

<b>1. Kıta</b>	K6	K8.1
1. Mısra	A	A
2. Mısra	B	B
3. Mısra	C	C
4. Mısra	B	B
<b>2. Kıta</b>		
1. Mısra	D	D
2. Mısra	E	E
2. Mısra	F	F
3. Mısra	G	G
4. Mısra	F’	H
4. Mısra	B	B

Ünsal ve Yavaşca’dan elde edilen bulgularda 1.kıtada 4 mısranın da biçimsel analizinin aynı olduğu Tablo 2’de görülmektedir. 2. kıtada ise, 4. mısradaki bir farklılık olduğu göze çarpmaktadır. Ünsal’ın yaptığı biçimsel şemadan anlaşılacağı gibi F’ bölmesinin, F bölmesindeki notalara benzer olduğu anlaşılmaktadır. Yavaşca’nın yaptığı biçimsel şemada ise, 4. mısradaki notaların tamamen farklı notalardan oluştuğu anlaşılmaktadır. İki çalışmada da notalar aynıdır. Eser incelendiğinde Ünsal’ın oluşturduğu şemada olduğu gibi, 2. mısradaki notalara benzeyen notalar görülmektedir. Bu durumda 4. mısraya F’ denilebilir.

### **3. Sultan III. Selim’e ait Gönül Verdim Bir Civane Adlı Şarkının Biçimsel Analizindeki Farklılıklar**

Sultan III. Selim’e ait Gönül Verdim Bir Civane adlı şarkının biçimsel analizine yönelik veriler iki kaynaktan incelenmiştir. Elde edilen veriler Tablo 3’te yer almaktadır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 3.** Sultan III. Selim'e ait Gönül Verdim Bir Civane Adlı Şarkının Kaynaklardan Elde Edilen Biçimsel Şeması

	K7	K6.1
1. Mısra	A	A
2. Mısra	B	B
3. Mısra	C	C
4. Mısra	Ç	D
Aranağme	D	

Tablo 3'te görüldüğü iki kaynak incelenmiş ve eserin biçimsel şemasındaki farklılıklar ortaya konulmuştur. Yahya Kaçar ile Ünsal, 4 mısra da aynı biçimsel şemayı oluşturmuşlardır. "C" harfinden sonra "Ç" ya da "D" harfinin kullanılması, biçimsel şemanın farklı olduğunu göstermemektedir. Bu durum tamamen analiz eden kişinin hangi harfleri tercih ettiğine bağlıdır. İki analizdeki fark sadece Aranağme bölümündedir. Bir araştırmada Aranağme harf ile gösterilmişken, diğer araştırmada ise herhangi bir harf eklenmemiştir. Bu da incelenmesi ve göz önünde bulundurulması gereken bir durumdur. Aranağmelerin biçimsel analizde bazı analiz yapanlar tarafından inceleme dışı bırakılıp, bazıları tarafından incelenmesi, biçimsel analizlerdeki farklılıkları ortaya koymaktadır.

#### 4. Hekimbaşı Abdülaziz Efendi'ye ait Bayati Nakış Yürük Semai Eserinin Biçimsel Analizindeki Farklılıklar

Hekimbaşı Abdülaziz Efendi'ye ait Bayati Nakış Yürük Semai eserinin biçimsel analizindeki farklılıklar iki kaynaktan bulunmuştur. Elde edilen veriler Tablo 4'te gösterilmektedir.

**Tablo 4.** Hekimbaşı Abdülaziz Efendi'ye ait Bayati Nakış Yürük Semai Eserinin Kaynaklardan Elde Edilen Biçimsel Şeması

	K4	K8.2
1. mısra	1.A (1.A + tb)	AA'
2. mısra	2.B (2.B + tb)	Bb
Terennüm		CDEBb
3. mısra	3.A	A''a + A''a'
4. mısra	4.B+T.1.C+4.B	Bb
5. mısra	5.Ç	AA'
6. mısra	6.B	Bb
Terennüm		CDEBb
7. mısra	7.A	
8. mısra	8.B+T.1.C+8.B	

Tablo 4'te görüldüğü gibi Şenduran'ın analizinde 8 mısra olduğu görülmektedir. Yavaşca'nın analizinde ise 6 mısra olarak analiz edilmiştir. Mısralar incelendiğinde Şenduran'ın 3. ve 4. mısra olarak Terennüm güftelerini gösterdiği anlaşılmaktadır. Yavaşca ise Terennüm bölümlerini ayrı bir mısra olarak almayıp, 6 mısra olarak analiz etmiştir. Yavaşca'nın analizinde 2. mısra sonrasında Terennüm bölümünü şemada göstermişken, Şenduran her mısradan sonra Terennüm bağlantısı (tb) olarak göstermiştir. Yavaşca'nın 1. mısra biçimsel şeması AA', Şenduran'ın biçimsel şemasında ise 1.A olarak gösterilmiştir. Yavaşca'nın 3.mısra olarak analiz ettiği mısrayı Şenduran, 5. mısra olarak ele almıştır. Bu durumda Yavaşca'nın 3. ve 4. mısraları ile Şenduran'ın 5. ve 6. mısraları karşılaştırıldığında yine benzer bir durum ortaya çıkmamaktadır.

#### SONUÇ

Notaları aynı olmasına rağmen aynı eserlerin farklı kaynaklarda, farklı biçimsel şemalarla analiz edildiği görülmüştür. Bazı kaynaklarda Terennüm-Mülazime bölümleri bir harf ile gösterilmişken, bazıların iki, üç ya da dört harf ile gösterildiği tespit edilmiştir. Bazı kaynaklarda hiçbir harf ile gösterilmemiştir. Bazı kaynaklarda Terennüm bölümlerinin mısra olarak yazıldığı, bazıları ise bu bölümlerin mısra olarak gösterilmediği görülmüştür. Biçimsel şemalarda bazı kaynakların mısraları gösterdiği harfin, notaları aynı olmasına rağmen üssü eklenmiş halinin biçimsel şemada yer aldığı anlaşılmıştır. Biçimsel şemada

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

kullanılan harf sıralamasının bazılarında A-B-C-D, bazılarında ise Türkçe alfabesindeki sıralama gibi A-B-C-Ç olarak sıralandığı görülmüştür. Yavaşça ve Ezgi'nin yapmış olduğu analizlerin birbirlerine yakın benzerlikte olduğu tespit edilmiştir. Aranağme bölümlerinin bazı analizlerde harfle gösterildiği, bazılarında ise hiçbir harf kullanılmadığı anlaşılmıştır.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## EXPLORING THE GENETIC DIVERSITY OF SUNFLOWER THROUGH SSR MARKERS: A REVIEW OF LITERATURE STUDY

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### ABSTRACT

Sunflower is one of the most important oilseed crops after soybean. Sunflower is a good source of high-quality vegetable oil. Besides a source of oil, sunflower seeds are considered a great source of various mineral elements, vitamins, and antioxidants. Sunflower oil contains 69% linoleic acid, 20% oleic acid, and 11% saturated fatty acids. Nowadays, the demand for cheap and high-quality vegetable oil is increasing because of the rapid and continuous rise of the human population. Therefore, there is a need to develop high-yielding sunflower cultivars to fulfill oil demands. However, a significant amount of sunflower yield loss occurs because of various biotic and abiotic stresses resulting from climate change. It is believed that climate change scenarios will become worse in upcoming years and there is a need to develop climate-resilient sunflower cultivars having better yield. These issues can be solved through germplasm characterization at molecular markers. Genetic diversity studies facilitate an opportunity for the plant breeder to identify novel variations that can be used for the marker-assisted breeding of crops. Simple sequence repeats (SSR) is a PCR-based co-dominant, highly polymorphic, and reproducible marker system. This marker system has been successfully used in the genetic diversity assessment studies of various crops including sunflower. Through this review study, we will compile recent studies conducted to explore the genetic diversity of sunflower through SSR marker system.

**Keywords:** *Helianthus annuus* L, Germplasm characterization, DNA fingerprinting, DNA markers, Microsatellites.

### Introduction

One of the main challenges to our agriculture is climate change. Climate change is limiting the production of various crops through various biotic and abiotic stresses (Mestre-Sanchis et al. 2009). The uneven climate change scenarios result in drought, floods, and creating optimum conditions required by insect pests for their growth and all these factors individually or altogether result in significant yield loss (Malhi et al. 2021). It is also believed that if human activity continues at the current pace, climate change scenarios will become worse in the upcoming years and will result in huge food security issues. Fastly fast-growing human population is also becoming a key threat to food scarcity and it is believed that the human population will be more than 9 billion by 2050. Therefore, it is very important to take serious steps by developing climate-resilient and high-yielding crop cultivars. Plant genetic resources always provide a cushion to the breeders involved in breeding activities by facilitating them to explore their genetic potential (Jarvis et al. 2015).

Genetic diversity within and among the populations facilitates the researchers to explore novel genetic variations that can be used in breeding programs (Swarup et al. 2021). Genetic diversity can be investigated at phenotypic and molecular levels. Phenotypic markers contributed significantly to the breeding of various crops involving classical breeding methods. However, the research community investigated various limitations in the phenotypic markers i.e. low trustability, influenced by the



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

environment, very laborious and time-consuming. All of these limitations leads the researcher to identify most trustable markers that can be used in the breeding activities (Agarwal et al. 2008).

The discovery of genetic markers in late 1980s changed the fate of plant breeding by allowing the researchers to identify genetic variations at DNA level (Agarwal et al. 2008). Genetic markers contributed significantly to identifying genetic diversity in various crops through germplasm characterization. A good number of molecular markers have been developed according to their utility and advantages (Grover and Sharma, 2016). Among these, Simple sequence repeats (SSR) markers also known as microsatellite marker is considered as marker of choice based on its various advantages i.e. PCR-based marker, co-dominant nature, easy to used, high throuput and reproducibility. Moreover, their its abundant distribution in the genome makes SSR an ideal marker for genetic diversity assessment, phylogenetic analysis, and genetic mapping studies. This markers has been successfully used in the marker-assisted breeding of various crops (Grover and Sharma, 2016; Agarwal et al. 2008).

The Asteraceae family is one of the largest plant families having more than 20 thousand species. The members value of this family including sunflower and safflower have great economic. Moreover, some member of this family has great medicinal value (Nikolić and Stevović, 2015). Among the various important species belonging to the he Asteraceae family, sunflower is the 4th most important oilseed crop after soybean, rapeseed, and oil palm. Sunflower is mainly used for cooking oil, however, it is also used in biofuel, emulsifier, or lubricant production (Dimitrijevic et al. 2017).

Until the beginning of the 1970s, open-pollinated varieties were preferred for large-scale production (Vear, 2016). Later the utilization of heterosis techniques allows the researchers to develop sunflower hybrids that have better yield and oil contents (Bohra et al., 2016). However, sunflower production was limited because of various biotic and biotic stresses. Therefore, it was very important to develop climate-resilient sunflower cultivars. Here comes in molecular markers that facilitated the sunflower breeders to identify novel genetic variations for the development of improved cultivars.

## **SSR markers for the genetic diversity and population structure of sunflower**

A good number of molecular markers have been used in the genetic diversity assessment of sunflower germplasm previously. However, SSR markers have been found an ideal marker system for genetic diversity assessment studies in sunflower.

The study of Zeinalzadeh-Tabrizi et al. (2018) was performed to identify genetic diversity levels in sunflower germplasm. They used a total of 68 sunflower genotypes and performed molecular characterization with 21 SSR primers. Molecular characterization resulted in a total of 49 bands. The polymorphism information contents (PIC) ranged from 0.10-0.58. Various calculated mean diversity indices in their study i.e. number of effective alleles (1.40), shahnnons information index (0.332), gene diversity (0.226), and % of polymorphic loci (59.18%) revealed the existence of a good level of genetic diversity within the evaluated germplasm. They performed principal coordinate analysis (PCoA) and revealed that 71% of variations in their study were accounted for by the first two PCs. The calculated genetic similarity and minimum was 0.364 between R26 and CMS502. These lines can be potential candidates for sunflower breeding. The UPGMA clustering divided the evaluated germplasm into two populations.

The goal of the study by Zia et al. (2014) was to explore the genetic diversity in sunflower germplasm. They characterized 40 sunflower lines with 96 SSR primer pairs. Molecular characterization resulted in a total of 135 alleles with 6.13 alleles per locus. The expected heterozygosity in their study ranged from 0.17 to 0.89. Their genetic distance analysis revealed the maximum genetic distance between L50 and V3 lines. The Unweighted pair group method using arithmetic averages (UPGMA) divided their studied germplasm into two main clusters (A and B).

The research conducted by Salem et al. (2019) aimed to investigate genetic diversity in Kenyan sunflower breeding lines. They used 24 sunflower accessions and performed molecular characterization with 32 SSR primers. The PCR analysis resulted in a total of 83 alleles with a mean value of 2.7 alleles per locus. In their study mean polymorphic information contents (PIC) was 0.384. They performed cluster analysis using similarity coefficients and all 24 sunflower genotypes were clustered into three groups. Moreover, they performed principal coordinates (PCoA) analysis and they found that the first



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

two PCs accounted for 34% and 13.38% of total variation respectively. They concluded that genetic diversity in Kenyan sunflower breeding material is narrow and there is a need to introduce elite genotypes from different origins for the selection of breeding lines with a broader genetic base in Kenyan sunflower breeding program.

Suresha et al. (2017) characterized 14 parental sunflower genotypes with 44 SSR primers. Among these primers, only three primers successfully produce polymorphic bands. The genetic similarity index ranged from 0.18-0.74 in their study.

A total of 78 SSR primers were used by Zhang et al. (2005) to investigate genetic diversity in 124 sunflower inbred lines. They found a total of 276 alleles with a mean of 3.5 alleles per SSR locus. The PIC value in their study ranged from 0.06 to 0.81 and 0.51 was the mean PIC value. In their study, genetic distance ranged from 0.4 and 0.6.

Jannatdoust et al. (2016) characterize 50 populations of confectionery sunflower belonging to various regions of Iran with 10 SSR primers. The range of the number of alleles 2-3 alleles, expected heterozygosity from 0.260-0.062, Shannon's index 0.384-0.089, revealed the existence of a significant level of genetic diversity in the evaluated germplasm. They performed a principal coordinate analysis and found that the two first components explained 7.86 and 6.16% of the total variance, respectively. Their analysis of molecular variance revealed maximum genetic variation i.e. 70% were due to genetic differences within the population.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## SERMAYE YAPISINA ETKİ EDEN FAKTÖRLER: YABANCI ORTAKLIĞI BAĞLAMINDA BORSA İSTANBUL'DA İŞLEM GÖREN FİRMALAR ÜZERİNE PANEL VERİ ANALİZİ

### FACTORS AFFECTING THE CAPITAL STRUCTURE: PANEL DATA ANALYSIS ON COMPANIES TRADING IN BORSA ISTANBUL IN THE CONTEXT OF FOREIGN PARTNERSHIP

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#### ÖZET

Üretim işletmeleri, yatırım aşamasında büyük arazi ve arsalar üzerine sabit varlık yatırımları ve bununla birlikte aynı zamanda makine ve teçhizat yatırımı gerektiren bu nedenle sermaye yoğun özellik gösteren işletmelerdir. Değişen ve gelişen ekonomik konjoktüre bağlı olarak küreselleşme ve global ekonomik durumlar firmaların daha güçlü sermaye yapılarıyla var olmalarını, hayatiyetini devam ettirebilmelerini ve rekabet avantajı elde etmelerini zorunlu kılmaktadır. Dolayısıyla üretim işletmeleri açısından sermaye yapısının bileşimi ve borçlanma kararlarını etkileyen değişkenlerin belirlenmesi önemlidir. Bu makale de BIST 100 de faaliyet gösteren üretim işletmelerinin sermaye yapılarına etki eden değişkenleri sahiplik yapısı bakımından yabancı ortaklı ve yabancı ortaklı olmayan olarak ayrıştırarak 42 yabancı sermayeli ve 106 yabancı sermayesi olmayan işletmelerinin sermaye yapılarının açıklanmasında hangi sermaye yapısı belirleyicisinin ve teorisinin geçerli olduğu belirlenmeye çalışılmıştır. Bu bağlamda BIST 100 deki imalat sektörüne ait firmaların sermaye yapısını etkileyen belirleyicilere ait veriler yıllar itibariyle (2010-2018) elde edilmiştir. Bu elde edilen veriler dinamik panel veri analizi ve sabit etki tahmin modeli kullanılarak saptanmaya çalışılmıştır. Bağımlı değişken finansal kaldıraç oranı ile temsil edilirken sermaye yapısını etkilediği düşünülen bağımsız değişkenler nakit dönüşüm süresi, aktif karlılık oranı, firma büyüklüğü ve varlık yapısı olarak ele alınmıştır. Analiz sonuçları BIST 'de hisseleri işlem gören Türk üretim işletmelerinin sermaye yapılarını sahiplik anlamında yabancı ortaklı olan şirketlerde sermaye yapısına en çok etki eden faktörün aktif karlılık oranı ve yabancı ortaklı olmayan şirketlerde ise sermaye yapısına en çok etki eden faktörün firma varlık yapısı olduğu, finansal hiyerarşi ve dengeleme teorilerinin değişken bazında açıklayıcıları literatüre uygun şekilde açıkladığı saptanmıştır.

**Anahtar kelimeler:** Sermaye yapısı, dengeleme teorisi, finansal hiyerarşi teorisi, yabancı ortaklı şirket, Türkiye

#### ABSTRACT

Production enterprises are capital-intensive businesses that require fixed asset investments on large lands and plots during the investment phase, as well as machinery and equipment investments. Depending on the changing and developing economic conjuncture, globalization and global economic conditions oblige companies to exist, maintain their viability and gain competitive advantage with stronger capital structures. Therefore, it is important to determine the composition of capital structure and variables that affect borrowing decisions for production companies. Within the scope of this article, it has been tried to determine which capital structure determinant and theory is valid in explaining the capital structures of 42 foreign capital and 106 non-foreign capital enterprises by separating the variables that affect the capital structures of the production enterprises operating in the BIST 100 as ownership structure. In this context, data on determinants affecting the capital structure of companies in the manufacturing sector in BIST 100 were obtained over the years (2010-2018). These obtained data were tried to be determined by using dynamic panel data analysis and fixed effect estimation model. While the dependent variable is represented by financial leverage ratio, the independent variables considered to affect the capital structure are considered as cash conversion time, asset profitability ratio, firm size and asset structure. Financial hierarchy and balancing theories are the most influential factor on the

capital structure of companies with foreign partners in terms of ownership of the capital structures of Turkish manufacturing companies whose shares are traded on the BIST, and that the most influential factor on the capital structure in companies with foreign partners is the firm asset structure. It was determined that he explained the explanatory on the basis of variables in accordance with the literature.

**Keywords:** Capital structure, compensation theory, pecking order theory, foreign partner companies, Turkey

### 1. GİRİŞ

Küreselleşen ve globalleşen dünyada sınırların ortadan kalkmasıyla beraber sermaye ve mal hareketleri yoğunlaşmıştır. Bu da işletmelerin daha güçlü sermaye yapılarıyla hareket edip rekabet gücü elde etmesini zorunlu hale getirmiştir. Bu çalışmamızda değişen ve gelişen ekonomik konjoktüre bağlı olarak BIST 100 de faaliyet gösteren imalatçı firmaların (hem yabancı ortaklı hem de yabancı ortaklı olmayan firmaların) sermaye yapılarının seçilen 4 bağımsız değişken (Nakit Dönüşüm Süresi, Aktif Karlılık Oranı, Firma Büyüklüğü, varlık yapısı)üzerindeki etkilerinin analiz edilmesi amaçlanmıştır.

Araştırmada, firmaların sermaye yapılarına etki eden faktörler incelenmiştir. Bu ilişki, sahiplik yapısı kapsamında yabancı sermayeye sahip firmalar ve yabancı sermayeye sahip olmayan firmalar bağlamında ele alınmıştır. Araştırmada sermaye yapısına etki eden faktörlerin firmaların yabancı sahipliği bağlamında ayrı ayrı incelenmesi ve farklı regresyon modelleri ile araştırılacak olması açısından çalışmanın önem arz ettiği düşünülmektedir. Bu doğrultuda çalışmanın ilgili alan yazımına katkı sağlayacağı ve özgünlük sunduğu da ifade edilebilir.

Gelişmekte olan ülkelerin ülke içinde sermaye birikimlerinin az olması yabancı sermayeli firmaların artmasına neden olmakla birlikte ekonomik büyüme, ihracat, istihdam artışı, teknik, üreti, yönetim ve pazarlama bilgisinin de girişi sağlanır (Koçtürk & Eker, 2012). Ülkemizde yapılan araştırmalar büyük sanayi kuruluşlarından 500'ü incelendiğinde 1990 yılında 88 firmanın yabancı sermaye ortaklığı varken, 2003 yılında her 10 firmadan 3'ünde yabancı sermaye ortaklığı olduğu belirlenmiştir (Türkan, 2005)

Yabancı ve yabancı olmayan sermayeli firmaların sermaye yapısının incelendiği birçok araştırma olmakla birlikte, yabancı sermayeli ve yabancı olmayan sermayeli firmaların sermaye yapısının incelendiği araştırma sayısı oldukça sınırlıdır. Globalleşmenin etkisi ile yabancı olmayan sermayeli firmaların yabancı sermayeli firma olarak verimlilik ve etkinliklerini artırma talepleri ise artmaktadır.

Araştırmada, firmaların sermaye yapılarına etki eden faktörler incelenmiştir. Bu ilişki, sahiplik yapısı kapsamında yabancı sermayeye sahip firmalar ve yabancı sermayeye sahip olmayan firmalar bağlamında ele alınmıştır. Araştırmada sermaye yapısına etki eden faktörlerin firmaların yabancı sahipliği bağlamında ayrı ayrı incelenmesi ve farklı regresyon modelleri ile araştırılacak olması açısından çalışmanın önem arz ettiği düşünülmektedir. Bu doğrultuda çalışmanın ilgili alan yazımına katkı sağlayacağı ve özgünlük sunduğu da ifade edilebilir.

Çalışmamızda bağımlı değişken olarak finansal kaldıraç kullanılmış bağımsız değişkenler olarak nakit dönüşüm süresi,aktif karlılık oranı,firma büyüklüğü ve varlık yapısı gibi değişkenlerden faydalanılmıştır. Çalışmada 2010-2018 yıllarına ait mali veriler kullanılmış olup yıllara sari veriler ile zaman faktörünü analiz etmek amacıyla yöntem olarak Panel Veri Analizi yönteminden faydalanılmıştır.

Bu araştırmada, BİST 100 de faaliyet gösteren üretim işletmelerinin yabancı ortaklı ve yabancı ortaklı olmayan şekilde ayrıştırılması ve bu işletmelerin sermaye yapısına etki eden belirleyicilerinin belirlenmesi amaçlanmıştır. Yapılan bu araştırmanın içeriği beş bölümden oluşmaktadır. Birinci bölüm giriş bölümü olup, araştırmanın amaç, önem, kapsam ve sınırlılıkları içermektedir. İkinci bölümde; yabancı ortaklı firmalar, sermaye yapısı ve sermaye kavramları tanımlanmış ayrıca sermaye yapısı teorileri üzerinde durulmuş ve kuramsal açıklamalar ve ilgili araştırmalara değinilmiştir. Bu çerçevede sermaye yapısına etki eden bağımlı ve bağımsız değişkenlerin neler olduğu kavramları açıklanmıştır. Üçüncü bölümde araştırmanın yöntemi kapsamında, araştırma model ve hipotezleri, evren ve örnekleme, veri toplama araçları ile verilerin analizi ile ilgili bilgilendirme yapılmıştır. Dördüncü bölümde araştırma

bulguları, tanımlayıcı istatistik bulgular, geçerlilik ve güvenilirlik analizleri ile hipotez test analizleri yapılmıştır. Araştırmanın beşinci ve son bölümünde sonuç ve değerlendirmelere yer verilmiştir.

## **2. LİTERATÜR TARAMASI**

İMKB’de işlem gören imalat sanayi firmalarının sermaye yapısını belirlemek amacıyla yapılan çalışmada toplam borçlar- toplam aktiflere, kısa vadeli borçlar-toplam aktiflere ve uzun vadeli borçlar-toplam aktiflere oranı bağımlı değişken, 12 boyutta 11 bağımsız değişken incelenmiştir. 2003-2011 yılları arasında sürekliliği olan 79 firma verileri sabit etkiler yöntemine göre panel veri analizi sonucunda elde edilen verilere göre sermaye yapısının negatif ilişkide olduğu değişkenler; varlık yapısı, kârlılık, varlık kullanımının etkinliği ve likitide oranı iken pozitif ilişkide olduğu değişkenler; büyüme oranı ve piyasa zamanlaması olarak belirlenmiştir. Sermaye yapısı ile ilişkili bulunmayan değişkenler ise firma büyüklüğü, vergi düzeyi, borç dışı vergi kalkanı ve işletme riski olarak belirlenmiştir. Sonuç olarak bu çalışmada denge ve finansal hiyerarşi teorisinin sermaye yapısını açıklamakta yetersiz olduğu sonucuna ulaşılmıştır (Akman, 2012, s. 172-178).

Çimento firmalarının sermaye yapısının incelenmesi amacıyla 2010-2017 yılları arasında 15 firmanın 480 adet bilanço ve gelir tablolarının incelenmesi 32 (üç aylık) dönem olarak ele alınmıştır. Aktif büyüklük, satış payı, toplam borç içindeki kısa vadeli borçların oranı, toplam borcun toplam aktiviteler içindeki oranları bulunmuş, araştırmada toplam aktiflerin kısa vadeli, uzun vadelive toplam borç oranı bağımlı değişken, büyüklük, öz sermaye kârlılığı, aktif kârlılık, teminat, borç dışı vergi kalkanı, likidite oranı, büyüme oranı bağımsız değişken olarak incelenmiştir. Araştırma sonucunda 6 model kurulmuş, sermaye yapısının en önemli değişkeninin borç dışı vergi kalkanı olduğu, uzun vadeli borçlanmanın sermaye yapısını açıklamadığı, sermaye yapısının büyüklük değişkeninde dengeleme modelini desteklediği, diğer değişkenlerde finansman hiyerarşisi teorisini desteklediği belirlenmiştir (Ay, 2018).

Factoring şirketlerinin sermaye yapısının belirlenmesi için yapılan araştırmada BDDK’nın faaliyet izni olan 57 adet şirketin 2013-2017 yılları arasında yılsonu bilançolarından elde edilen verileri incelenmiştir. Çalışmanın bağımlı değişkeni, toplam yabancı kaynakların özsermaye oranı alınmıştır. Bağımsız değişkenler; aktif kârlılık, özkaynakkârlılığı, aktif toplamı, şirket yaşı, gecikmeli toplam yabancı kaynakların özsermayeye oranı bağımlı değişken olarak kullanılmıştır. Makroekonomik değişkenler; faiz oranları, kur değişimi, gayrisafi yurtiçi hasıladaki artış, bankacılık sektörünün gelişmişlik düzeyi incelenmiştir. Araştırma sonucunda aktif kârlılığı sermaye yapısının önemli bir değişken olduğu belirlenmiştir. Aktif kârlılık, firma büyüklüğü ile gecikmeli bağımlı değişken arasında pozitif ilişki dengeleme teorisi ile uyumlu olduğu belirlenmiştir (Parlak, 2019).

Arsov ve Naumoski(2016), Hırvatistan, Makedonya, Slovenya ve Sırbistan’da yer alan şirketlerin sermaye yapısını sistematik olarak etkileyen herhangi bir belirleyici olup olmadığını incelemek ve mevcut sermaye yapısı teorilerinden herhangi birinin kendi durumunda ilgili olup olmadığını belirlemişlerdir. Daha büyük şirketlerin ve daha yüksek sabit kıymet yatırımına sahip olanların daha yüksek kaldıraç sergilerken, daha karlı şirketler ve daha somut varlıkları olanların daha az borç finansmanı kullandığı, faaliyet kârlılarının riskliliği ve etkin vergi oranları gibi diğer değişkenlerin istatistiksel olarak anlamlı bulunmadığı sonucuna ulaşmışlardır.

Khemiri ve Noubbigh(2018)2006-2016 döneminde beş Sahra Altı Afrika ülkesinde (Güney Afrika, Gana, Kenya, Nijerya ve Zimbabve) firmaların kaldıraç belirleyicilerini inceledikleri çalışmalarında, kaldıraç ve makroekonomik faktörlerin borç düzeyinin güçlü belirleyicileri oldukları, firmanın performansı ile kaldıraç seviyesi arasında ters U şekilli bir ilişkinin olduğu sonucuna varılmıştır. Çalışmada finansal olmayan 206 adet işletme incelenmiş ve değişim ve finansal hiyerarşi teorisini doğrulayan sonuçlara ulaşılmıştır.

İşletmelerin değeri sermaye yapısına göre belirlenmektedir. Diğer bir ifadeyle bir işletmenin finansal bileşiminin nasıl olduğu incelenerek işletmenin değerine karar verilebilmektedir. Bu nedenle geçmişten günümüze farklı sektörlerde faaliyet gösteren işletmelerin sermaye yapısının en önemli değişkenleri belirlenmeye çalışılmıştır. Farklı sektörlerde farklı özelliklere sahip işletmelerin sermaye yapısını belirlemeye yönelik birçok çalışma yapılmıştır. Yapılan çalışmaların değişkenleri incelendiğinde sermaye yapısının tanımlanmasında kısa ve uzun vadeli borçların düzeylerinin kaldıraç oranı olarak yaygın kullanıldığı görülmektedir.



Firma büyüklüğü, karlılık, işletme riski, BDVK, büyüme oranları, vergi düzeyi değişkenleri 1980'lerde yapılan çalışmalarda da önemli bağımsız değişkenler olarak değerlendirilmiş, sermaye yapısının en çok etkileyen değişkenler oldukları kabul edilmiştir.

2011 ve sonrasında yapılan araştırmaları incelediğimizde büyüme fırsatı, varlık yapısı, teminat değeri, likidite oranları, piyasa zamanlaması, temsilci maliyetleri, varlık kullanım etkinliği oranları, cari oran vb. bağımsız değişken olarak araştırmalarda yer verildiği görülmektedir.

### 3. ARAŞTIRMA VERİSİ VE YÖNTEMİ

Araştırmada BIST 100 de faaliyet gösteren imalat sektöründe faaliyet gösteren işletmelerin sermaye yapısına etki eden belirleyicilerin analizi hedeflenmiş ve BIST 100 de faaliyet gösteren imalat işletmelerin 179 firma olduğu tespit edilmiştir. BIST 100 de faaliyet gösteren işletmelerin yıllık mali rapor açıklamalarından (kap ve b1st 100) elde edilen bilgilerle bu firmaların tamamı analize dahil edilmeye çalışılmıştır. Araştırmada, 2010-2018 döneminde payları Borsa İstanbul'da işlem gören yabancı ortaklı ve yabancı ortağı bulunmayan firmaların sermaye yapılarına etki eden faktörleri ortaya koymak amaçlanmaktadır. Ayrıca tez çalışmasında, ulaşılabilecek bulgular ile sahiplik yapısı kapsamında firmaların sermaye yapılarını oluşturmada, piyasadaki devamlılıklarını devam ettirebilmelerinde ve pazar paylarını artırabilmelerinde yol gösterici ve faydalı bilgiler de sunmak hedeflenmektedir.

Araştırmada belirlenen bağımlı ve bağımsız değişkenler doğrultusunda ve sahiplik yapısı bağlamında iki farklı panel regresyon modeli kurgulanmıştır. Araştırmada oluşturulan modeller, Tablo 1'de gösterilmektedir.

*Tablo1. Araştırmada Kurgulanan Panel Regresyon Modelleri*

No	Panel Regresyon Modeli
1 (Yabancı Sermayeli)	$FİKD_{it} = \alpha_{it} + \beta_{2it} NDS_{it} + \beta_{3it} AKO_{it} + \beta_{4it} BUY_{it} + \beta_{5it} VY_{it} + \epsilon_{it} + \lambda_t$
2 (Yabancı Sermayeli Olmayan)	$FİKD_{it} = \alpha_{it} + \beta_{2it} NDS_{it} + \beta_{3it} AKO_{it} + \beta_{4it} BUY_{it} + \beta_{5it} VY_{it} + \epsilon_{it} + \lambda_t$

Araştırmada incelenecek modeller, araştırmanın bağımlı değişkeni konumunda olan toplam finansal kaldıraç oranı esas alınarak oluşturulmuştur. Tablo 10'da yer alan modellerde, Y her bir firma (i) ve yıllık dönem (t) için X1: nakit dönüş süresi, X2: aktif karlılık oranı, X3: firma büyüklüğü ve X4: varlık yapısını ifade ederken,  $\beta$  açıklayıcı değişkenlerin eğim katsayısını ve  $\epsilon$  ise hata terimini ifade etmektedir.

Bu bölümde Borsa İstanbul'a kote olmuş yabancı ortaklı ve yabancı ortağı bulunmayan firmalarda sermaye yapısına etki eden faktörler araştırılmıştır. Araştırma kapsamında panel veri analizi gerçekleştirilmiş olup elde edilen bulgular ve yorumlamalar çalışmanın ilerleyen kısımlarında açıklanmalı bir şekilde verilmiştir.

Araştırmada, yabancı sermayeli ve yabancı sermayeye sahip olmayan firmaların sermaye yapılarına etki eden faktörleri belirleyebilmek amacıyla panel veri regresyon analiz yönteminden yararlanılmıştır. Panel veri analizi kapsamında; Spearman korelasyon analizi ve varyans şişirme testi (VIF) ile çoklu doğrusal bağlantı; Pesaran CD Test (2004) testi ile yatay kesit bağımlılığı; Pesaran & Yamagata, 2008(2008)delta testi ile homojenlik; yatay kesit bağımlılığını dikkate alan ikinci nesil birim kök testi olan Bai & Ng (2004) PANICTesti ve yatay kesit bağımlılığını dikkate almayan Im, Pesaran, & Shin (2003) ve Levin, Lin, & Chu (2002) LLC testleriyle serilere ilişkin birim kök süreci, F, LM ve Honda testleri ile tahmin modeli seçimi; Breusch-Pagan-Godfrey Heteroscedasticity LM testi ile değişen varyans; Baltagi & Li(1991), Born & Breitung (2016)ve Bhargava, Franzini, & Narendranathan (1982)'inDurbin-Watson testleri ile otokorelasyon varsayımları sınanmıştır. Son olarak model Beck & Katz (1995) tarafından geliştirilen panel standart hataları düzelten dirençli tahminciler kullanılarak değişkenler arasındaki ilişkiler araştırılmıştır. Araştırmada, sahiplik yapısı kapsamında BIST (Borsa İstanbul)'te işlem gören firmaların sermaye yapılarına etki eden faktörleri belirleyebilmek amacıyla, 2010-2018 dönemine ait veriler araştırma kapsamında analiz edilmiştir. Firmalara ilişkin veriler, BIST (Borsa İstanbul) veri tabanından elde edilmiştir.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## 4. ARAŞTIRMA BULGULARI

Araştırmada, yabancı sermayeli ve yabancı sermayeye sahip olmayan firmaların sermaye yapılarına etki eden faktörleri belirleyebilmek amacıyla panel veri regresyon analiz yönteminden yararlanılmıştır. Panel veri analizi kapsamında; Spearman korelasyon analizi ve varyans şişirme testi (VIF) ile çoklu doğrusal bağlantı; Pesaran CD Test (2004) testi ile yatay kesit bağımlılığı; Pesaran & Yamagata, 2008(2008)delta testi ile homojenlik;yatay kesit bağımlılığını dikkate alan ikinci nesil birim kök testi olan Bai & Ng (2004)PANICtesti ve yatay kesit bağımlılığını dikkate almayan Im, Pesaran, & Shin (2003) ve Levin, Lin, & Chu (2002) LLC testleriyle serilere ilişkin birim kök süreci, F, LM ve Honda testleri ile tahmin modeli seçimi; Breusch-Pagan-GodfreyHeteroscedasticity LM testi ile değişen varyans; Baltagi & Li(1991), Born & Breitung (2016)ve Bhargava, Franzini, & Narendranathan (1982)'inDurbin-Watson testleri ile otokorelasyon varsayımları sınanmıştır. Son olarak model Beck & Katz (1995) tarafından geliştirilen panel standart hataları düzelten dirençli tahminciler kullanılarak değişkenler arasındaki ilişkiler araştırılmıştır.

Sahiplik yapılarında yabancı sermayeye sahip olan BIST firmaları için sermaye yapılarına etki eden faktörleri analiz edebilmek için oluşturulan Model 1'de kullanılan bağımlı ve açıklayıcı değişkenlere ilişkin tanımlayıcı istatistik verileri, Tablo 2'de gösterilmektedir.

**Tablo 2. Tanımlayıcı İstatistikler**

	FİKD	NDS	AKO	BUY	VY
<b>Ortalama</b>	0.4787	103.8044	0.0587	19.7438	0.2775
<b>Medyan</b>	0.4857	84.4505	0.0500	20.0205	0.2865
<b>Maksimum</b>	1.0110	700.4455	0.5087	24.4557	0.6548
<b>Minimum</b>	0.0233	-1054.3420	-0.1800	13.3957	0.0050
<b>Std. Sap.</b>	0.2140	135.1677	0.0823	2.1583	0.1607
<b>Çarpıklık</b>	-0.0447	-2.0756	1.3599	-0.7129	0.0920
<b>Basıklık</b>	2.4389	25.0662	7.5944	3.3356	2.1645
<b>Jarque-Bera</b>	5.0846	7940.3740	448.9722	33.7896	11.5291
<b>Olasılık</b>	0.0787	0.0000	0.0000	0.0000	0.0031
<b>Gözlem</b>	378	378	378	378	378

Grup etkisinin olduğu tek yönlü sabit etkiler modelinin geçerli olduğu modelde değişen varyans ve otokorelasyon sorunları doğrultusunda dirençli tahmincilerden biri olan White panel standart hataları düzelten tahminci kullanılarak model tahmini yapılmıştır. Tahmin sonuçları, aşağıdaki Tablo 3'de gösterilmektedir.

**Tablo 3. Yabancı Sermayeli Firmalar İçin Model Tahmin Sonuçları**

Bağımlı Değişken: FİKD				
Yöntem: Panel En Küçük Kareler				
Örneklem (düzeltilmiş): 2010–2018				
Periyot: 9				
Yatay Kesit: 42				
Toplam panel (dengeli) gözlem: 378				
White standart hata & kovaryans (nod.f. correction)				
Değişken	Katsayı	Std. Hata	t-istatistik	Olasılık Değeri
NDS	-0.000103	4.53E-05	-2.274209	0.0236**
AKO	-0.804007	0.115792	-6.943529	0.0000***
BUY	0.034032	0.006427	5.295063	0.0000***
VY	-0.141695	0.079162	-1.789942	0.0744*
C	-0.095946	0.140055	-0.685061	0.4938
R-kare	0.796169	Ort. Bağımlı Değ.		0.478738
Düzeltilmiş R-kare	0.768542	S.S. Bağımlı Değ.		0.214014

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

S.H. of regresyon	0.102962	Akaike Bilgi Kriteri	-1.595283
Resid Kare Ort.	3.519600	Schwarz Bilgi Kriteri	-1.116434
Loglikelihood	347.5086	Hannan-Quinn Bilgi Kriteri	-1.405235
F-istatistik	28.81784	***,** ve * sırasıyla %1, %5 ve %10 anlamlılık düzeyini göstermektedir.	
Olasılık(F-istatistik)	0.000000		

Yabancı Sermayeli Firmalar için Model 1 tahmin sonuçları değerlendirildiğinde, modelin anlamlı ve geçerliliğinin göstergesi olan F- istatistik olasılık değeri dikkate alındığında, elde edilen değer kritik değerin altında olduğu belirlenmiştir ve %1 anlamlılık düzeyinde modelin anlamlılığı geçerlidir. Modelin açıklama gücünün göstergesi olan diğer bir deyişle bağımsız değişkenlerin bağımlı değişkendeki değişimleri açıklama gücü anlamına gelen R2 değeri %76,8 olarak tespit edilmiştir. Model sonuçları incelendiğinde, FİKD ile NDS arasında istatistiksel olarak anlamlı ve negatif yönlü ilişki tespit edilmiştir. NDS değişkenindeki bir birim artış, sermaye yapısında 0,0001 birimlik azalışa yol açmaktadır. Yabancı sermayeye sahip olan firmalarda nakit dönüş süresinin artması sermaye yapılarını oluşturmada daha düşük borçlanmaya yol açmaktadır. NDS'nin artması firmanın kısa vadede ihtiyaç duyduğu çalışma sermayesine daha geç ulaştığı ve bu durumda finansal sıkıntıyla karşı karşıya kalabileceğini söylemek mümkündür. Bu durum firmaların borçlarını ödeyememesine yol açabilmekte ve yeniden borçlanmalarını imkânsız hale getirebilmektedir. Modelde ulaşılan bir diğer sonuç ise FİKD ile AKO arasında istatistiksel olarak anlamlı ve negatif yönlü ilişki tespit edilmiştir. AKO değişkenindeki bir birim artış, sermaye yapısında 0,804 birimlik azalışa yol açmaktadır. FİKD ile BUY arasında istatistiksel olarak anlamlı ve pozitif yönlü ilişki tespit edilmiştir. BUY değişkenindeki bir birim artış, sermaye yapısında 0,034 birimlik artışa yol açmaktadır. Modelde ulaşılan bir diğer bulgu da %10 anlamlılık düzeyinde FİKD ile VY arasında istatistiksel olarak anlamlı ve negatif yönlü ilişki tespit edilmiştir. VY değişkenindeki bir birim artış, sermaye yapısında 0,141 birimlik azalışa yol açmaktadır.

Sahiplik yapılarında yabancı sermayeye sahip olmayan BIST firmaları için sermaye yapılarına etki eden faktörleri belirleyebilmek için oluşturulan Model 2'de kullanılan bağımlı ve açıklayıcı değişkenlere ilişkin tanımlayıcı istatistik verileri, Tablo 4'de gösterilmektedir.

**Tablo 4. Tanımlayıcı İstatistikler**

	FİKD	NDS	AKO	BUY	VY
<b>Ortalama</b>	0.531434	148.3659	0.051858	19.25457	0.365809
<b>Medyan</b>	0.463942	128.0533	0.037054	19.2485	0.352953
<b>Maksimum</b>	8.674321	2391.32	7.949264	24.41304	2.566082
<b>Minimum</b>	0.017422	-697.3987	-1.108436	13.3957	0.000000
<b>Std. Sap.</b>	0.556232	191.8372	0.297209	1.701248	0.219518
<b>Çarpıklık</b>	7.839545	2.834123	20.53737	-0.242895	2.602546
<b>Basıklık</b>	86.41494	29.97223	532.4603	3.82635	24.10249
<b>Jarque-Bera</b>	286354.5	30195.3	11210111	36.52418	18778.22
<b>Olasılık</b>	0.000000	0.000000	0.000000	0.000000	0.000000
<b>Gözlem</b>	954	954	954	954	954

Grup etkisinin olduğu tek yönlü sabit etkiler modelinin geçerli olduğu modelde değişen varyans ve otokorelasyon sorunları doğrultusunda Beck ve KatzPeriod SUR (PCSE) panel standart hataları düzelten dirençli tahminci kullanılarak Model tahmini yapılmıştır. Tahmin sonuçları, aşağıdaki Tabloda gösterilmektedir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 5. Yabancı Sermayeli Olmayan Firmalar İçin Model 2 Tahmin Sonuçları**

Bağımlı Değişken: FİKD				
Yöntem: Panel En Küçük Kareler				
Örneklem (düzeltilmiş): 2010–2018				
Periyot: 9				
Yatay Kesit: 106				
Toplam panel (dengeli) gözlem: 954				
Period SUR (PCSE) hata & kovaryans (nod.f. correction)				
Değişken	Katsayı	Std. Hata	t-istatistik	Olasılık Değeri
NDS	-5.93E-05	6.90E-05	-0.859235	0.3905
AKO	-0.030520	0.016986	-1.796750	0.0727*
BUY	0.018909	0.020413	0.926336	0.3545
VY	0.613624	0.067371	9.108116	0.0000***
C	-0.046752	0.397078	-0.117740	0.9063
R-kare				
	0.826438		Ort. Bağımlı Değ.	0.531434
Düzeltilmiş R-kare				
	0.804023		S.S. Bağımlı Değ.	0.556232
S.H. of regresyon				
	0.246240		Akaike Bilgi Kriteri	0.143075
Resid Kare Ort.				
	51.17513		Schwarz Bilgi Kriteri	0.703529
Loglikelihood				
	41.75323		Hannan-Quinn Bilgi Kriteri	0.356573
F-istatistik	36.86991	***,** ve * sırasıyla %1, %5 ve %10 anlamlılık düzeyini göstermektedir.		
Olasılık(F-istatistik)	0.000000***			

Yabancı sermayeli olmayan firmalar için Model 2 tahmin sonuçları değerlendirildiğinde, modelin %1 anlamlılık düzeyinde anlamlı ve geçerli olduğu tespit edilmiştir. Modelin açıklama gücü R2 değeri %80,4 olarak hesaplanmıştır. Model sonuçları incelendiğinde, %10 anlamlılık düzeyinde FİKD ile AKO arasında istatistiksel olarak anlamlı ve negatif yönlü ilişki tespit edilmiştir. AKO değişkenindeki bir birim artış, sermaye yapısında 0,0305 birimlik azalışa yol açmaktadır. Yabancı sermayeye sahip olmayan firmalarda, yabancı sermayeye sahip olan firmalara göre nakit dönüş süresinin artması sermaye yapılarını oluşturmada daha düşük borçlanmaya yol açmakta ve daha fazla etkiye sahip olmaktadır. Modelde ulaşılan bir diğer bulgu da FİKD ile VY arasında istatistiksel olarak anlamlı ve pozitif yönlü ilişki tespit edilmiştir. VY değişkenindeki bir birim artış, sermaye yapısında 0,613 birimlik artışa yol açmaktadır. Yabancı sermayeye sahip olan firmalarda bu etki negatif iken, yabancı sermayeye sahip olmayan firmalarda ise bu etki pozitif yönlü gerçekleşmiştir. Diğer yandan FİKD ile NDS ve BUY değişkenleri arasında istatistiksel olarak anlamlı herhangi bir ilişkiye rastlanılmamıştır.

## 5. SONUÇ

Bu çalışmada, yabancı sermayeli ve yabancı sermayeye sahip olmayan BIST firmalarının sermaye yapılarına etki eden faktörlerin belirlenmesi amaçlanmıştır. Bu amaç doğrultusunda, 2010-2018 döneminde BIST'te işlem gören 42 yabancı sermayeli ve 106 yabancı sermayesi olmayan firma analiz kapsamında incelenmiştir. Sermaye yapısına etki eden faktörleri tespit edebilmek için panel veri analizinden yararlanılmıştır. Çalışmada, sermaye yapısı toplam finansal kaldıraç oranı ile temsil edilirken, sermaye yapısını etkilediği düşünülen nakit dönüş süresi, aktif karlılık oranı, firma büyüklüğü ve varlık yapısı bağımsız değişkenler olarak analize dâhil edilmiştir. Bu değişkenler kapsamında çalışmada 2 ayrı panel regresyon modeli oluşturulmuş ve 8 farklı hipotez sınaması gerçekleştirilmiştir. Araştırmada panel veri analizi kapsamında, normal dağılım, çoklu doğrusal bağlantı, yatay kesit bağımlılığı, homojenite, durağanlık, tahmin modeli belirleme, otokorelasyon ve değişen varyans varsayımları sınanmış ve elde edilen bulgular doğrultusunda White, Beck ve Katz panel standart hataları düzelten dirençli tahminciler ile tahminleme gerçekleştirilmiştir.

Yapılan analizler sonucunda, Yabancı Sermayeli Firmalar için oluşturulan Model 1'in %1 anlamlılık düzeyinde anlamlı ve geçerli olduğu tespit edilirken modelin açıklama gücünün ise R2 değeri %76,8

olduğu belirlenmiştir. Model 1’de yabancı sermayeye sahip firmalarda sermaye yapısı ile nakit dönüş süresi, aktif karlılık oranı ve varlık yapısı değişkenleri arasında istatistiksel olarak anlamlı ve negatif ilişkinin varlığı tespit edilirken, sermaye yapısı ile firma büyüklüğü arasında ise anlamlı ve pozitif ilişkinin varlığı tespit edilmiştir. Yabancı sermayeye sahip olan firmalarda sermaye yapısına en çok etki eden faktörün aktif karlılık oranı olduğu belirlenirken, en az etkiye sahip olan faktörün ise nakit dönüş süresi olduğu ortaya çıkarılmıştır. Bu bağlamda araştırma kapsamında oluşturulan ilk 4 Hipotezde sıfır hipotezleri reddedilerek anlamlı ilişkilerin varlığı ortaya çıkarılmıştır.

Yabancı sermayeli olmayan firmalar için oluşturulan Model 2’de ise elde edilen bulgulara göre modelin %1 anlamlılık düzeyinde anlamlı ve geçerli olduğu tespit edilmiş ve modelin açıklama gücü R2 değeri de %80,4 olarak hesaplanmıştır. Model 2 sonuçları incelendiğinde, sermaye yapısı ile aktif karlılık oranı arasında istatistiksel olarak anlamlı ve negatif yönlü ilişkinin varlığı tespit edilirken, sermaye yapısı ile firma varlık yapısı arasında istatistiksel olarak anlamlı ve pozitif yönlü ilişkinin varlığı tespit edilmiştir. Yabancı sermayeye sahip olan firmalarda bu etki negatif iken, yabancı sermayeye sahip olmayan firmalarda ise bu etki pozitif yönlü gerçekleşmiştir. Diğer yandan sermaye yapısı ile nakit dönüş süresi ve firma büyüklüğü değişkenleri arasında istatistiksel olarak anlamlı herhangi bir ilişki tespit edilememiştir. Yabancı sermayeye sahip olan firmalarda sermaye yapısına en çok etki eden faktör olarak firma varlık yapısı olduğu ortaya çıkarılırken, en az etkiye sahip olan faktör olarak ise aktif karlılık oranı olduğu ortaya çıkarılmıştır. Model 2’deki bulgular doğrultusunda Hipotez 6 ve 8’deki sıfır hipotezler reddedilerek anlamlı ilişkilerin varlığı ortaya çıkarılırken, Hipotez 5 ve 7’de ise sıfır hipotezler reddedilememiş ve anlamlı ilişkilere rastlanılmamıştır.

Sermaye yapısı ile nakit dönüş süresi (NDS) ve firma büyüklüğü arasında anlamlı ilişki yabancı sermayeli firmaların, yabancı sermayeli olmayan firmalara göre daha güçlü ve sürekliliği olan firmalar olduğunu söyleyebiliriz. Elde edilen sonuçlar literatür ile karşılaştırıldığında; sermaye yapısı ile NDS ve firma büyüklüğü arasında anlamlı ilişkinin bulunduğu görülmektedir (Külter & Demirgüneş, 2007; Albayrak & Akbulut, 2008; Bükler, Aşıkoglu, & Sevil, 2008; Akgüç, 2011, s. 487; Akgül & Başkır, 2013; Terzi, Atmaca, & Öktem, 2016; Tüdeş, 2018). Yabancı sermayeli olmayan firmalarda NDS ve firma büyüklüğü arasındaki ilişkinin anlamlı bulunmama nedeni ile ilgili firma dışı değişkenlerin etkili olabileceği düşünülmektedir.

Yabancı sermayeli ve yabancı sermayeli olmayan firmalarda aktif karlılık oranı ve varlık yapısının anlamlı olması, firmaların aktif değerlerini verimli kullanması ve varlık yapısının sermaye yeterliliği ile ilgili bilgi verdiğini göstermektedir. Elde edilen bulguların literatür ile uyumlu olduğu görülmektedir (Sayılğan & Uysal, 2011; Arsov & Naumoski, 2016; Motal & Moreiral, 2017; Cevheroglu-Acar, 2018; Topaloğlu, 2018; Dogan, Ghosh, & Petrova, 2019).

Bu araştırma sonucunda sermaye yapısının %10’undan fazlası yabancı sermayeli olan firmaların: Yabancı sermayeli firmalarda sermaye yapısı ile nakit dönüş süresi, aktif karlılık oranı, firma büyüklüğü, varlık yapısı arasında; yabancı sermayeli olmayan firmalarda sermaye yapısı ile aktif karlılık oranı ve varlık yapısı arasında istatistiksel olarak anlamlı bir ilişki; yabancı sermayeli olmayan firmalarda sermaye yapısı ile nakit dönüş süresi arasında ve firma büyüklüğü arasında ilişki görülmekle birlikte anlamlı bulunmamıştır.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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ÇOCUK GELİŞİMİ ÖĞRENCİLERİNİN OKURYAZARLIK ALGILARI VE KENDİ  
OKURYAZARLIK DURUMLARI ÜZERİNE BİR ARAŞTIRMA

A STUDY ON CHILD DEVELOPMENT STUDENTS' PERCEPTIONS OF LITERACY AND  
THEIR OWN LITERACY STATUS

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**ÖZET**

Bu araştırma öğrencilerin okuryazarlık kavramı hakkındaki görüşleri ve kendi okuryazarlık durumlarına yönelik görüşleri incelenmiştir. Araştırma nitel bir durum çalışması kullanılarak yürütülmüştür. Katılımcıları bir devlet üniversitesinde önlisans eğitimi gören çocuk gelişimi öğrencileri oluşturmuştur. Katılımcıların görüşleri ve kendilerini okuryazar olarak tanımlama durumları belirli temalar altında incelenmiştir. Görüşlerin analizi sonucunda, katılımcıların okuryazarlık kavramını okuryazar olma durumlarına ilişkin görüşleri, okuryazarlık ilgi alanları, beceriler ve yeterlilik, okuryazarlığın uygulanması olarak temalara ayrılmıştır. Katılımcılar kendi okuryazarlık becerilerini iletişim kurma, empati, eğitim ve mesleki hedeflerle ilişkilendirmektedirler. Araştırma sonucunda okuryazarlık kavramının bireylerin kişisel gelişimlerine katkı sağladığı gibi toplumsal açıdan da önemli bir rol oynadığı sonucuna varılmıştır. Ayrıca, farklı yaş grupları ve kültürel bağlamlardaki öğrencilerin okuryazarlık algılarını karşılaştıran daha fazla araştırmaya ihtiyaç olduğu anlaşılmaktadır.

**Anahtar Kavramlar:** Okuryazarlık, Okuryazarlık algısı, Nitel araştırma.

**ABSTRACT**

In this study, students' views on the concept of literacy and their views on their own literacy status were analysed. The research was conducted using a qualitative case study. The participants were child development students studying associate degree at a state university. The views of the participants and their self-identification as literate were analysed under certain themes. As a result of the analysis of the views, the participants' views on the concept of literacy were divided into themes as literacy interests, skills and competence, and application of literacy. Participants associate their literacy skills with communication, empathy, education and professional goals. As a result of the research, it was concluded that the concept of literacy not only contributes to the personal development of individuals but also plays an important role in society. In addition, it is understood that more research is needed to compare the literacy perceptions of students from different age groups and cultural contexts.

**Keywords:** Literacy, Literacy perception, Qualitative research

**Giriş**

Okuryazarlık, bireylerin okuma ve yazma becerilerini içeren bir kavramdır (Scribner, 1984) ve bireylerin bilgiye erişim, iletişim, eğitim, istihdam ve sosyal katılım gibi birçok alanda başarılı olmalarını sağlar (Lusardi & Mitchell, 2013). Okuryazarlık, modern toplumlarda önemli bir beceri olarak kabul edilir ve kişisel gelişim için temel bir gerekliliktir (Lusardi & Mitchell, 2013). Okuryazarlık kavramı çeşitli alanları ve bakış açılarını kapsayan çok yönlü bir kavramdır ve öğrencilerin okuryazarlık

hakkındaki görüşleri, çalışma alanlarına ve kişisel deneyimlerine bağlı olarak gerçekten de değişebilir. Çeşitli çalışmalar öğrencilerin okuryazarlığa bakış açılarını farklı bağlamlarda incelemiştir. Pe'er ve diğerleri (2007) tarafından yapılan bir çalışma, öğretmenlik eğitimi alan öğrenciler arasında çevre okuryazarlığına odaklanmıştır. Araştırmacılar, çevreyle ilgili alanlarda eğitim gören öğrencilerin, diğer disiplinlerdeki öğrencilere kıyasla daha yüksek düzeyde çevre bilgisine ve daha çevre odaklı tutumlara sahip olduğunu bulmuşlardır. Fakhriyah vd. (2017) ise, öğrencilerin fen okuryazarlığını içerik bilimi açısından incelemiştir. Araştırmacılar, öğrencilerin bilimsel bilgi, bilimsel yeterlilik, bilimsel bağlam ve fen okuryazarlığı becerilerini etkileyen faktörlerdeki yeteneklerini analiz etmiştir. Bu çalışma, öğrencilerin günlük yaşamlarında problemleri çözmek ve kanıta dayalı kararlar almak için gerekli becerilerle donatılmasında bilim okuryazarlığının önemini vurgulamaktadır. Harklau (2001) liseden üniversiteye geçiş sürecinde öğrencilerin okuryazarlık uygulamalarına bakış açıları üzerine bir çalışma yürütmüştür. Bulgular, öğrencilerin okuryazarlığa geçiş deneyimlerinin yalnızca ayrı okuryazarlık uygulamalarındaki aşamalı değişikliklerle karakterize olmadığını, aynı zamanda kendileri ve bilginin doğası hakkındaki inançlarından da etkilendiğini göstermektedir. Bu çalışma, geçiş dönemlerinde öğrencilerin okuryazarlığa bakış açılarının bütüncül bir şekilde anlaşılmasına duyulan ihtiyacı vurgulamaktadır. Glaze (2018), 21. yüzyılda bilim öğretme ve öğrenmenin zorluklarını, özellikle de bilim okuryazarlığı açısından tartışmıştır. Araştırma, öğrencilerin problem çözme becerilerini geliştirmeleri, kanıta dayalı kararlar almaları ve bilgiyi mantıksal olarak değerlendirmeleri gerektiğinin altını çizmektedir. Öğrencilerin kendilerini okuryazar olarak tanımlamaları, okuryazarlığın bağlamına ve alanına bağlı olarak değişebilir. Öğrencilerin kendilerini nasıl okuryazar olarak tanımladıklarını ele alan özel bir referans bulunmamakla birlikte, finansal okuryazarlık ve bilgi okuryazarlığı ile ilgili çalışmalardan konu hakkında farklı bakış açıları kazandırabilir. Mudzingiri vd., (2018) tarafından yapılan bir çalışmada, araştırmacılar üniversite öğrencilerinin finansal davranışlarını, güvenlerini, risk tercihlerini ve finansal okuryazarlıklarını araştırmıştır. Öğrencilerin kendilerini okuryazar olarak tanımlamalarını doğrudan ele almasa da, bu çalışma finansal okuryazarlık algılarının ve bilgisinin finansal davranışı şekillendirmedeki önemine işaret etmektedir. Bu araştırma, öğrencilerin kendi okuryazarlık algılarının karar alma süreçlerini ve davranışlarını etkileyebileceğini öne sürmektedir. Cameron vd. (2013) tarafından yapılan bir başka çalışmada, farklı ülkelerdeki lise öğrencilerinin kişisel okuryazarlıkları karşılaştırılmıştır. Özellikle öğrencilerin kendi okuryazarlık tanımlarına odaklanmamakla birlikte, bu çalışma okuryazarlığın boyutları ve bilişsel düzeyleri hakkında fikir vermektedir. Ayrıca, Liou vd. (2015) harmanlanmış öğrenme pedagojisi kullanarak hemşirelikte bilgi okuryazarlığı öğretimi üzerine bir çalışma yürütmüştür. Her ne kadar öğrencilerin kendi okuryazarlık tanımlarını doğrudan ele almasa da, bu çalışma bilgi okuryazarlığının önemini vurgulamaktadır. Bu araştırma öğrencilerin bilgi okuryazarlığı becerilerini anlamalarının ve uygulamalarının, mesleki gelişimleri ve kanıta dayalı bakım sağlama becerileri için çok önemli olduğunu öne sürmektedir. Bu çalışmalar, öğrencilerin kendilerini nasıl okuryazar olarak tanımladıklarını doğrudan ele almasa da, farklı okuryazarlık alanlarının önemi ve okuryazarlık algılarının davranış ve karar verme üzerindeki etkisi hakkında fikir vermektedir. Öğrencilerin kendilerini okuryazar olarak tanımlamaları, okuryazarlık veya bilgi okuryazarlığı gibi belirli okuryazarlık alanlarındaki bilgi, beceri ve güvenlerinden etkilenebilir. Sonuç olarak, öğrencilerin kendilerini nasıl okuryazar olarak tanımladıklarını ele alan özel bir referans bulunmamakla birlikte, okuryazarlık ve bilgi okuryazarlığı ile ilgili çalışmalardan içgörüler çıkarılabilir. Öğrencilerin kendilerini okuryazar olarak tanımlamaları, okuryazarlığın farklı alanlarındaki anlayış ve güvenlerinden etkilenebilir. Okuryazarlık farklı çalışmalarda farklı özelliklerle tanımlansa okuryazarlığın ne olduğu ve öğrencilerin kendi okuryazarlık durumu yeterince incelenmemiştir. Katılımcıların "Okuryazarlık" kavramı hakkındaki görüşleri, bu kavramın onlar için ne ifade ettiğini ve hangi becerileri içerdiğini içerebilir. Öğrencilerin bu konudaki görüşleri, okuryazarlık kavramının nasıl algılandığını ve değerlendirildiğini anlamamıza yardımcı olabilir. Ayrıca, katılımcıların "Okuryazar olma durumları" hakkındaki kendilerine yönelik görüşleri, kendi okuryazarlık seviyelerini ve becerilerini değerlendirmelerini içerebilir. Bu, katılımcıların kendilik algılarını, okuryazarlık yeteneklerini ve eksikliklerini anlamaya yardımcı olabilir. Bu araştırmanın amaçları şu şekildedir;

Katılımcıların "Okuryazarlık" kavramı hakkındaki görüşleri nelerdir?

Katılımcıların "Okuryazar olma durumları" hakkındaki kendilerine yönelik görüşleri nelerdir?

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## Yöntem

Bu araştırmada nitel araştırma yöntemlerinden durum çalışması tercih edilmiştir. Nitel araştırmalar kişilerin düşüncelerini, fikirlerini, bakış açılarını incelemek için kullanılmaktadır. Katılımcıları bir devlet üniversitesinde önlisans eğitimi gören çocuk gelişimi öğrencileri oluşturmaktadır. Ulaşılabilir ve maliyet gibi nedenlerden dolayı katılımcıları amaçlı örneklem grubu oluşturmuştur. Katılımcıları 90 öğrenci oluşturmaktadır. Bazı katılımcılar sorulara yanıt vermediği için ilk soruya 87, ikinci soruya 79 kişi yanıt vermiştir. Elde edilen görüşler içerik analizine tabi tutulmuştur. Görüşler Nvivo paket programı ile incelenmiştir. Katılımcı görüşleri tema ve kategorilere ayrılmıştır. Ardından tema ve kategoriler kodlar ile tabloda sunulmuştur. Ardından içerikler yorumlanmıştır.

## Bulgular

Öğrencilerin Okuryazarlık hakkındaki görüşleri

**Tablo 1.** Öğrencilerin Okuryazarlık hakkındaki görüşleri

Tema	Kategori	Kodlar
Okuryazarlığın Tanımı	Okuma ve Anlama	K1, K2, K3, K10, K11, K18, K23, K25, K44, K54, K68, K74, K86
	İfade Yetenekleri	K4, K12, K17, K21, K31, K47, K63, K85
	Bilgi ve Kendini Geliştirme	K5, K7, K8, K27, K38, K57, K59, K79, K84
Eğitim ve Öğretim	Eğitimsel Gelişim	K6, K14, K20, K28, K30, K34, K48, K56, K67, K70, K71, K73, K80
	Öğrenme ve Uygulama	K32, K43, K45, K50, K53, K66, K75, K81, K82
Toplumsal Etki	Sosyal ve Kültürel Katkı	K9, K19, K58, K60, K72, K83
	Eleştirel Düşünme	K7, K16, K38, K76
Kişisel Gelişim	Kendini İfade Etme	K13, K31, K48, K54, K78, K85
	Kişisel Gelişim	K15, K45, K79
Okuryazarlığın Önemi	Toplumdaki Rolü	K58, K60, K64, K69, K84
	Sürekli İyileştirme	K42, K46, K49, K52, K55, K62, K65, K77, K86

K: Katılımcı

Tablo 1’de katılımcıların görüşleri okuryazarlığın tanımı, eğitim ve öğretim, toplumsal etki, kişisel gelişim olarak temalara ayrılmıştır. Okuryazarlığın önemi kategorisinde, okuryazarlığı yazılı metinleri okuma ve anlama becerisi olarak vurgulayan görüşler oluşturmaktadır. Katılımcılar okuryazarlığın okunanı algılama ve anlamayı nasıl içerdiğini ifade etmektedir. İfade yeteneği kategorisinde okuryazarlığın toplumda kendini etkili bir şekilde ifade etme aracı olduğunu göstermektedir. Okuryazar bireylerin daha belirgin görüldüğünü ve düşünce ve duygularını aktarma becerisine sahip olduğunu düşünülmektedirler. Bilgi ve kendini geliştirme kategorisinde, okuryazarlığın bilgi edinme, kendini geliştirme ve eleştirel düşünme becerilerini geliştirme aracı olduğuna ilişkin görüşleri vurgulamaktadır. Katılımcılar okuryazarlığın kişisel gelişim ve anlayışa katkıda bulunduğunu öne sürmektedir. Eğitimsel gelişim kategorisinde katılımcılar okuryazarlığın örgün eğitimle ve okuma yazma öğrenme süreciyle nasıl bağlantılı olduğunu belirtmektedir. Öğrenme ve Uygulama kategorisinde okuryazarlığın öğrenmeyi ve öğrenilenleri çeşitli alanlarda uygulamayı içerdiği fikrine odaklanmaktadır. Katılımcılar ilgi alanları hakkında araştırma yapmanın ve yazmanın öneminden bahsetmektedir. Sosyal ve kültürel katkı kategorisinde katılımcılar okuryazarlığın sosyal meseleleri ele alma ve kültürel gelişime katkıda bulunma rolünü vurgulamaktadır. Okuryazarlığın toplumsal sorunlara nasıl adil ve kültürel çözümler getirebileceğini düşünmektedir. Eleştirel düşünme kategorisinde katılımcılar okuryazarlığın eleştirel düşünme becerilerini nasıl geliştirdiğini ve bireylerin bilgiyi eleştirel bir şekilde okumalarını ve düşünceli bir şekilde yazmalarını nasıl sağladığını tartışmaktadırlar. Kendini İfade Etme kategorisinde, okuryazarlığın kendini ifade etmeye ve kişisel düşünce ve duyguları etkili bir şekilde aktarmaya olanak sağladığına ilişkin görüşleri kapsamaktadır. Katılımcılar okuryazarlığın kendini ifade etmeye yardımcı olduğuna inanmaktadır. Kendini Geliştirme kategorisinde katılımcılar okuryazarlığın kişisel gelişime ve kişisel büyümeye yol açtığını belirtmektedir. Okuryazarlığı kendini ifade etme ve

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

kendini geliştirme ile ilişkilendirirler. Toplumdaki Rolü kategorisinde katılımcılar okuryazarlığın toplumdaki önemini vurgulamaktadır.

Sürekli İyileştirme kategorisinde katılımcılar okuryazarlığın erken yaşlardan itibaren başlayan ve hayat boyu devam eden bir süreç olduğundan bahsetmektedir.

## Okuryazar olma durumları hakkındaki kendilerine yönelik görüşleri

**Tablo 2.** Okuryazar olma durumları hakkındaki kendilerine yönelik görüşleri

Tema	Kategori	Kodlar
Okuryazarlık İlgi Alanları	Belirli Alanlarda Okuryazarlık	K2, K3, K4, K5, K6, K8, K18, K20, K23, K24, K25, K26, K27, K28, K29, K30, K32, K34, K36, K38, K42, K44, K45, K46, K47, K48, K49, K50, K52, K53, K54, K55, K56, K57, K58, K60, K61, K62, K63, K64, K65, K66, K67, K69, K70, K71, K72, K73, K74, K75
	Beceriler ve Yeterlilik	Okuryazarlık Seviyesi Zayıflık Alanları
Okuryazarlığın Uygulanması	İletişim ve Empati	K13, K15, K35, K45, K62, K63, K70, K76, K79
	Eğitim ve Mesleki Hedefler	K28, K36, K46, K51, K52, K66, K70, K69, K67, K75, K66, K68, K71

Katılımcıların okuryazarlık durumlarına ilişkin görüşleri okuryazarlık ilgi alanları, beceriler ve yeterlilik, okuryazarlığın uygulanması olarak temalara ayrılmıştır. Belirli alanlarda okuryazarlık kategorisinde katılımcılar kendilerini okuryazar olarak gördükleri çeşitli alanlardan bahsetmektedir. Bunlar arasında akademik konular, edebiyat türleri, teknoloji, tarih, felsefe, psikoloji, bilim ve daha fazlası yer almaktadır. Okuryazarlık düzeyi kategorisinde katılımcıların okuyucu ve yazar olarak yeterlilikleri hakkındaki görüşlerini yansıtmaktadır. Bazıları kendilerini oldukça okuryazar hissederken, diğerleri şüphelerini dile getirmekte veya zayıf oldukları alanları kabul etmektedir. Zayıflık alanları kategorisinde katılımcılar okuryazarlık becerilerinde ya da kendilerini güvende hissetmedikleri belirli alanlarda belirli zayıflıkları olduğunu kabul etmektedir.

İletişim ve Empati kategorisinde katılımcılar, okuryazarlık becerilerinin etkili iletişim kurmalarını, başkalarıyla empati kurmalarını ve insanlara sorunlarında yardımcı olmalarını nasıl sağladığını tartışmaktadır. Eğitimsel ve mesleki hedefler kategoride katılımcılar okuryazarlık becerilerini öğretmenlik, yazarlık ve araştırma gibi eğitimsel ve mesleki uğraşlara uygulama isteklerinden bahsetmektedir.

## Sonuç ve Tartışmalar

Araştırmada katılımcıların okuryazarlık ve kendi okuryazarlık olma durumları olma durumu hakkında benzer ve farklı görüşler olduğu görülmektedir. Benzer görüşlerinin kişinin kendini ifade etme, bilgiye erişim ve iletişim kurma yeteneklerini okuma ve yazmanın bir parçası olarak ifade edilmektedir. Çünkü okuryazarlığın eğitimle ilişkili olduğu ve eğitimle geliştirilebileceği ve şekillendirilebileceği göstermektedir. Okuryazarlık, aynı zamanda kişisel gelişim için önemli bir role sahiptir. Okuryazarlığı eğitimle ilişkili olduğu, okuryazarlığın eğitimle geliştirilebileceğini ve şekillendirilebildiğini göstermektedir. Ayrıca okuryazarlığın kişisel gelişim için önemli bir roldür. Kişilerin kendilerini ifade etme, düşünme becerilerini geliştirme ve bilgiye erişimlerini artırma sürecidir. Farklı görüşlerde ise, katılımcılar okuryazarlığı soyut bir açıklama sunar ve okuryazarlığı genel olarak okuma yazma durumu olarak tanımlarken, kendilerini farklı konularda okuryazar olduklarını ifade etmektedir. Çünkü okuryazarlık, bireylerin kendi potansiyellerini en üst düzeye çıkarmalarına katkı sağlar. Katılımcılar okuryazarlığı daha spesifik ve çeşitli dil ve konu alanlarına atıfta bulunurken katılımcılar okuryazarlığı bir dilin yazı dilini anlayabilme yeteneği olarak tanımlamaktadır. Bu perspektif, okuryazarlığın sadece genel bir yetenek olmadığını, aynı zamanda farklı dillerde ve konu alanlarında yazılı metinleri anlama ve yorumlama becerisini içermektedir. İnsanlar, birçok farklı dilde ve alanlarda yazılmış metinlerle karşılaşabilirler ve bu metinleri anlama yeteneği, okuryazarlıkla yakından ilişkilidir. Bazı katılımcılar okuryazarlığın eğitimle ilişkili olduğunu ifade ederken, diğerleri kişisel ilgi alanlarına vurgu yaparken,



okuryazarlık olma durumunu katılımcıların, okuryazarlığın eğitim ve meslek edinme süreciyle ilişkilendirilmesi gerektiğini belirtmektedir. Çünkü okuryazarlık bireylerin kendini ifade etme yeteneklerini artırır, düşünme becerilerini geliştirir ve genel yaşam kalitesini yükseltir. Bu nedenle, okuryazarlık olma durumunu sadece eğitim ve meslek edinme süreciyle değil, aynı zamanda kişisel gelişim ve kişisel tatminle de ilişkilendirirler. Katılımcılar okuryazarlığın topluma katkısına az atıf yaparken, kendilerinin okuryazar olma durumunda okuryazarlığın toplumsal açıdan faydalı olduğunu ve bir toplumu daha gelişmiş hale getirebileceğini vurgulamıştır. Çünkü okuryazarlık, bir toplumu daha bilinçli, daha bilgili ve daha demokratik kılabilir. İnsanların bilgiye erişim hakkını destekler, toplumsal katılımı artırır ve ekonomik kalkınmayı teşvik edebilir. Scribner (1984), okuryazarlığı bireylerin okuma ve yazma becerileri olarak tanımlarken, bu çalışmada okuryazarlığın temel bir bileşenini açıklamıştır. Bu araştırmada, okuryazarlık kavramının bireylerin bilgiye erişim, iletişim, eğitim, istihdam ve sosyal katılım gibi birçok yaşam alanında başarılı olma gibi farklı boyutları olduğunu göstermektedir. Lusardi & Mitchell (2013), okuryazarlığın modern toplumlarda temel bir gereklilik olduğunu ve kişisel gelişim için önemli bir rol oynadığını öne sürmektedir. Bu çalışma, okuryazarlığın bireylerin bilgiye erişim ve kararlar alma becerilerini nasıl etkilediğini göstererek, okuryazarlığın günlük yaşamın her alanında önemli olduğunu göstermektedir. Harklau (2001), liseden üniversiteye geçiş döneminde öğrencilerin okuryazarlık uygulamalarına nasıl baktığını incelemiştir. Bulgular, okuryazarlık deneyimlerinin sadece ayrı okuryazarlık uygulamalarındaki değişikliklerle sınırlı olmadığını, aynı zamanda öğrencilerin kendileri ve bilginin doğası hakkındaki inançlarını da etkilediğini göstermektedir. Cameron vd. (2013), farklı ülkelerdeki lise öğrencilerinin kişisel okuryazarlıklarını karşılaştırmıştır. Bu çalışma, farklı kültürel bağlamlarda okuryazarlık algılarının nasıl farklılık gösterebileceğini ve kişisel okuryazarlığın çeşitli boyutlarını vurgulamaktadır. Dolayısıyla bu çalışmada okuryazarlık, genellikle okuma, yazma, ifade yeteneği, bilgi edinme, eleştirel düşünme ve kişisel gelişim becerilerini içeren bir kavram olarak kabul edilmektedir. Bu, okuryazarlığın çok yönlü bir beceri olduğunu göstermektedir. Katılımcılar, okuryazarlığın eğitimle sıkı bir ilişkisi olduğunu düşünmektedir. Okuryazarlık, öğrenme sürecinin önemli bir parçası olarak görülürken, aynı zamanda öğrencilerin kişisel gelişimlerine katkı sağladığına göstermektedir. İleri ki araştırmalarda okuryazarlık kavramını farklı yaş gruplarından öğrencilerle karşılaştırmak ya da okuryazarlık algılarını farklı disiplinlerden öğrencilerle karşılaştırmak, okuryazarlık kavramının farklı bağlamlarda nasıl anlaşıldığını anlamamıza yardımcı olabilir. Ayrıca farklı kültürlerden ve coğrafyalardan gelen öğrencilerin okuryazarlık algıları arasındaki farklılıkları incelemek, kültürel çeşitlilik ve okuryazarlık arasındaki ilişkiyi daha iyi anlamamıza yardımcı olabilir.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
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VOLEYBOLA YENİ BAŞLAYAN SPORCULARIN TEMEL BİYOMOTORİK  
ÖZELLİKLERİNİN KARŞILAŞTIRILMASI  
COMPARISON OF BASIC BIOMOTORIC CHARACTERISTICS OF ATHLETES NEW TO  
VOLLEYBALL

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**Özet**

Bu çalışmada voleybol sporuna yeni başlayan bireylerin temel biyomotorik özelliklerinin karşılaştırılması amaçlanmıştır.

**Gereç ve Yöntem;** Araştırmaya sakarya’da farklı spor kulüplerinde spor yapan toplam 30 çocuk gönüllü olarak katılmıştır. Çalışmaya katılan çocukların yaş ortalaması 13,5±67 yıl, boy uzunluğu 156,8±2,6 cm, vücut ağırlıkları 47,6±6,7 kg. olarak tespit edilmiştir. Sporculara haftada 2 gün 6 hafta boyunca core egzersizleri uygulanmıştır. Araştırmada biyomotorik gelişimi tespit edebilmek için sağ ayak sıçrama, sol ayak sıçrama, esneklik ve durarak uzun atlama testleri yapılmıştır. Katılımcılardan 6 haftalık çalışma öncesi ve sonrası ölçümler alınmış, biyomotorik gelişimlerinin ne boyutta olduğunu belirlemek için elde edilen veriler spps 25.0 paket programında aktarılıp normalite testi, frekans ve Paired Sample t-test kullanılarak değerlendirilmiştir.

**Bulgular;** Katılımcıların ön test ve son test değerleri karşılaştırıldığında biyomotorik testlerden sağ ayak sıçrama, sol ayak sıçrama, esneklik ve durarak uzun atlama istatistiksel yönden önemli bir fark ortaya çıkmıştır ( $p<0,05$ ).

**Sonuç;** Elde edilen verilere dayalı olarak çalışmamızın sonucunda; voleybol antrenmanları yapan sporculara yönelik ileride kullanılacak referans değerlerin belirlendiği ifade edilebilir. Bunun yanı sıra yapılan antrenmanların biyomotorik özellikleri olumlu etkilediği belirlenmiştir. voleybol antrenmanı yapan sporculara ek olarak biyomotorik ve kuvvet antrenmanlarının yapılmasının yararlı olacağı söylenebilir.

**Anahtar Kelimeler:** Voleybol, Biyomotorik, Spor

**Abstract**

This study aimed to compare the basic biomotoric characteristics of individuals who have just started volleyball.

**Materials and Methods;** A total of 30 children participating in sports in different clubs in Sakarya participated in the research voluntarily. The average age of the children participating in the study was 13.5±67 years, height 156.8±2.6 cm, and body weight 47.6±6.7 kg. It was determined as . In the study, right foot jumping, left foot jumping, flexibility and standing long jump tests were performed to detect biomotoric development. Measurements were taken from the participants before and after the 4-week study, and to determine the extent of their biomotor development, the data obtained was transferred to the spps 25.0 package program and evaluated using the normality test, frequency and Paired Sample t-test.

**Results;** When the pre-test and post-test values of the participants were compared, a statistically significant difference emerged in the biomotoric tests of right foot jumping, left foot jumping, flexibility and standing long jump ( $p<0.05$ ).

**Conclusion;** As a result of our study based on the data obtained; It can be stated that reference values that can be used in the future for athletes doing volleyball training have been determined. In addition, it has been determined that the training has a positive effect on biomotoric properties. It can be said that it would be beneficial to do biomotoric and strength training in addition to athletes doing volleyball training.

**Key Words:** Volleyball, Biomotorics, Sports

## GİRİŞ

Sporla başarıyı yakalamak için bilimsel yöntemlerin kullanılması oldukça önemlidir. Başarı için ihtiyaç duyulan fiziksel ve zihinsel performansa ulaşmak için uzun süren antrenman programları kullanılmaktadır (Günaydın ve ark.2001). Voleybol maç bitiş süresi belli olmayan setlerle oynanan sporcuların temel motorik özellikleri olan kuvvet, sürat, dayanıklılık, esneklik ve çabukluğun ön plana çıktığı tempolu oldukça yüksek bir oyundur (Puhl ve ark.1982).

Voleybol bir çok kültürü ve farklı yapıdan insanı birleştiren geniş kitlelere hitap eden önemli bir spor branşıdır. Özellikle ülkemizde kadın voleybolu oldukça önemli ve popülerdir. İzleyenler için takımın başarısı elde edilen müsabaka sonucuna göre değerlendirilirken antrenörler için takımın genel performansı üzerinden değerlendirme yapılır (Mcgill, 2010). Bir çok spor olduğu gibi voleybolda da antrenmanların temel hedefi fizyolojik ve biyomotorik özelliklerin geliştirilmesine dayanmaktadır. Başarı için gerekli olan teknik ve taktik becerilerin uygulanabilmesi de yine iyi geliştirilmiş fiziksel ve motorsal özellikler ile mümkün olabilmektedir. Sağlam bir fiziki ve biyomotorik temeli olmayan sporcuların başarıya ulaşabilmesi voleybol branşı için oldukça zordur. Çocuk ve genç voleybolcularda biyomotor özelliklerin geliştirilmesi bu yönü ile oldukça önemlidir (Chiappini ve Polidori 2009). Sıçrama performansı voleybolda hem hücum yaparken hemde savunmada iken oldukça önemlidir ve maçın sonucuna doğrudan etki etmektedir. Voleybolda sıçrama yeteneği yatay olarak en ileriye dikey olarak ise en yükseğe yapılması esasına dayanır ve bir voleybol maçı sırasında fazlî zamanlarda oldukça fazla kullanılır. Voleybolda başarılı olabilmek için sıçrama yeteneğinin oldukça fazla olması önemlidir ve bu durum gerek sporcular gerek antrenörler tarafından bilinmelidir (Sheppard ve ark 2007).

## MATERYAL ve METOT

### Araştırma Modeli

Spora yeni başlayan voleybolcuların bazı biyomotorik özelliklerinin karşılaştırıldığı bu çalışmamızda nicel araştırma yöntemi kullanılmıştır.

### Araştırmanın Evren ve Örneklemi

Araştırmamızın evrenini sakarya ilinde spora yeni başlayan voleybolcular oluşturmaktadır. Araştırmanın örneğini ise sakarya ilinde voleybol oynayan ve spor geçmişi fazla olmayan 13-15 yaş aralığında 17 erkek 13 kadın toplam 30 voleybol sporcusu oluşturmaktadır.

### Veri toplama Yöntemleri

**Durarak Uzun Atlama :** Denekler işaretli çizginin arkasından, çift ayak ile, en yüksek eforu kullanarak en uzun mesafeye atlamaya çalıştılar. İlk sıçrama çizgisi ile sporcunun çizgiye en yakın bıraktığı iz arasındaki mesafe (cm) cinsinden ölçüldü. Ölçümler 2 kez tekrar edildi ve en iyi değerler kaydedildi.

**Sağ ve Sol Ayak Sıçrama:** Test deneğin dikey sıçrama özelliğini ölçer. Deneklerin ölçümü Takeı Physical Fitness Test Vertical jump-meter ile ölçüldü. Denekler jump-metrenin lastik bölümünün üzerine bastılar ve aynı zamanda jumpmetrenin ölçüm yapan kısmı bellerine bağlandı. Jump-metrenin ipi gergin duruma getirildi, deneklerin kollarını da kullanarak dikey sıçrayarak dijital olarak ölçüm yapıp değerler bilgisayara aktarıldı. Ölçümler 2 kez tekrar edildi ve en iyi değerler kaydedildi.

### Esneklik Ölçümü

Voleybolcularda esneklik ölçümleri öncesi sporculara 15 dakika ısınma ve germe egzersizleri yapıldıktan sonra oturma pozisyonunda (dizlerini bükmeden), ayaklar çıplak bir şekilde otur-uzan sehпасına dayalı olarak test sehпасının çubuğunu uzanabildiği en uzak mesafeye kadar itmeleri istendi.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Ölçümler 2 kez tekrar edildi ve en iyi değerler kaydedildi.

## Antrenman Protokolü

**Core Antrenman Programı:** 6 hafta boyunca haftada 2 gün olarak kontrol grubu olmadan, deney grubuna sezon antrenmanlarına ilave core antrenmanları uygulandı.

**Tablo 1. Tenisçilere uygulanan core antrenman programı**

Yapılan Hareketler	0-2 Hafta Set Sayısı	3-4 Hafta Set Sayısı	5-6 Hafta Set Sayısı	Uygunlama Süresi	Setler Arası Dinlenme Zamanı	Egzersizler Arası Dinlenme Zamanı
Plank	2	3	4	25 sn	30 sn	60 sn
Side Plank	2	3	4	25 sn	30 sn	60 sn
Crunch	2	3	4	25 sn	30 sn	60 sn
Reverse Crunch	2	3	4	25 sn	30 sn	60 sn
Superman	2	3	4	25 sn	30 sn	60 sn
Squat	2	3	4	25 sn	30 sn	60 sn

## BULGULAR

**Tablo 1. Çalışmaya Katılan Sporcuların Demografik Özellikleri**

Değişkenler	Gruplar	N	%
Cinsiyet	Erkek	17	56,7
	Kadın	13	43,3
Yaş	13 Yaş	14	46,7
	14 Yaş	15	50,0
	15 Yaş	1	3,3

Tablo 1 incelendiğinde, sporcuların %56,7'sinin erkek, %43,3'ünün kadın sporcu olduğu, %50,0'ının 14 yaş, %46,7'sinin 13 yaş ve %3,3'ünün 15 yaş aralığında olduğu tespit edilmiştir.

**Tablo 2. Araştırmaya Katılan Sporcuların Sağ Ayak Ön Ve Son Testlerinin Karşılaştırılması**

Parametreler	N	Test Sıralaması	X	S.s	T	P
Sağ Ayak	30	Ön Test	22,86	5,204	-9,570	,000*
		Son Test	24,86	4,861		

Tablo 2'e göre araştırmaya katılan sporcuların sağ ayak ön ve son testleri karşılaştırıldığında anlamlı bir fark bulunmuştur ( $p<0.05$ ).

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 3.** Araştırmaya Katılan Sporcuların Sol Ayak Ön Ve Son Testlerinin Karşılaştırılması

Parametreler	N	Test Sıralaması	X	S.s	T	P
Sol Ayak	30	Ön Test	22,90	6,081	-13,95	,000*
		Son Test	24,93	5,895		

Tablo 3'e göre araştırmaya katılan sporcuların sol ayak ön ve son testleri karşılaştırıldığında anlamlı bir fark bulunmuştur ( $p<0.05$ ).

**Tablo 4.** Araştırmaya Katılan Sporcuların Esneklik Ön Ve Son Testlerinin Karşılaştırılması

Parametreler	N	Test Sıralaması	X	S.s	T	P
Esneklik	30	Ön Test	25,23	5,096	-15,21	,000*
		Son Test	28,06	5,570		

Tablo 4'e göre araştırmaya katılan sporcuların esneklik düzeylerinin ön ve son testleri karşılaştırıldığında anlamlı bir fark bulunmuştur ( $p<0.05$ ).

**Tablo 5.** Araştırmaya Katılan Sporcuların Durarak Uzun Atlama Ön Ve Son Testlerinin Karşılaştırılması

Parametreler	N	Test Sıralaması	X	S.s	T	P
Durarak Uzun Atlama	30	Ön Test	139,6	20,03	-9,830	,000*
		Son Test	142,9	19,85		

Tablo 5'e göre araştırmaya katılan sporcuların durarak uzun atlama ön ve son testleri karşılaştırıldığında anlamlı bir fark bulunmuştur ( $p<0.05$ ).

## TARTIŞMA VE SONUÇ

Cingöz (2021) Farklı Yüzeylerde Yapılan Core Egzersizinin Fiziksel Performansa Etkisini araştırdığı çalışmada 18-24 yaş arasında bulunan 25 öğrenci ile çalışmış ve deneklere iki farklı zeminde yaptırdığı core egzersizleri sonucunda fiziksel performansta artış olduğunu tespit etmiştir. Arı ve Çolakoğlu (2021) core egzersizlerinin tenis sporunda performansa etkilerini inceledikleri bir çalışmada core antrenman programı sonrası deneklerde durarak uzun atlama, el kavrama kuvveti, otur-uzan esneklik ve mekik değerlerinde anlamlı artış olduğu tespit edilmiştir. Dedecan (2016) yaptığı çalışmada core egzersizlerinin erkek adolesanlar üzerinde bazı fiziksel ve fizyolojik özelliklerinde gelişim olduğunu tespit etmiştir. Atıcı (2013) yüzme sporu yapan 18-24 yaş arası kadınlarda core antrenmanın bazı fizyolojik ve motorik parametrelere etkilerini incelediği çalışmada 8 hafta süren ve haftanın 3 günü uygulanan core egzersizlerinin vücut yağ yüzdesi, sağ ve sol el kavrama, bacak ve sırt kuvveti, esneklik, denge, ve dikey sıçrama performansları üzerine istatistiki açıdan anlamlı etkisi olduğu tespit edilmiştir. Zemenu (2020) yaptığı bir çalışmada temel kuvvet antrenmanının voleybol oyuncularının esnekliğini olumlu yönde etkilediği sonucuna ulaşmıştır. Çalışmadan elde edilen sonuçların bizim çalışma sonuçlarımızı desteklediği görülmektedir. Voleybol oyuncularında stabilizasyon egzersizlerinin, esneklik üzerine etkilerini inceleyen çalışmalar incelendiğinde; Seid ve arkadaşları (2022), 22 voleybolcuya 10 hafta boyunca uygulanan core eğitimi sonrasında esneklikli otur-uzan testi ile değerlendirmiş ve pozitif yönde istatistiksel olarak anlamlı sonuçlar elde etmişlerdir.

Sonuç olarak çalışmamızda elde ettiğimiz sonuçlar literatürde bir çok çalışma tarafından desteklenmektedir. Belirli periyotlarla uygulanan core egzersizlerinin sporcularda ve sedanterlerde biyomotor özelliklerde gelişim gösterdiği ve performansı arttırdığı söylenebilir. Elde edilen verilere dayalı olarak çalışmamızın sonucunda; voleybol antrenmanları yapan sporculara yönelik ileride kullanılabilir referans değerlerin belirlendiği ifade edilebilir. Bunun yanı sıra yapılan antrenmanların biyomotorik özellikleri olumlu etkilediği belirlenmiştir. voleybol antrenmanı yapan sporculara ek olarak biyomotorik ve kuvvet antrenmanlarının yapılmasının yararlı olacağı söylenebilir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SPORA BAĞLILIK VE YAŞAM DOYUMU ARASINDAKİ İLİŞKİ: SPOR YAPAN BİREYLER ÜZERİNE BİR ARAŞTIRMA

### THE RELATIONSHIP BETWEEN SPORTS COMMITMENT AND LIFE SATISFACTION: A RESEARCH ON INDIVIDUALS PLAYING SPORTS

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#### ÖZET

Bu çalışmanın amacı spor yapan bireylerin spora bağlılık düzeyi ve yaşam doyumu arasındaki ilişkinin incelenmesidir. İlaveten spora bağlılık ve yaşam doyumu düzeyleri çeşitli değişkenler bağlamında da incelenmiştir. Araştırmanın örneklemini çeşitli branşlarla ilgilenen 54'ü kadın ve 94'ü erkek olmak üzere toplam 148 sporcu oluşturmaktadır. Anketler, Şırnak Gençlik ve Spor merkezinde ve ilçelerinde yer alan merkezlerde yüz yüze anket yolu ile elde edilmiştir. Araştırmada veri toplama aracı olarak; "Kişisel Bilgi Formu", "Spora Bağlılık Ölçeği" ve "Yaşam Doyumu Ölçeği" kullanılmıştır. Veriler SPSS programı kullanılarak analiz edilmiştir. Verilerin normal dağılım gösterip göstermediğinin tespit edilmesinden sonra analizler gerekli testler ile yapılmıştır. Katılımcıların demografik verilerinin dağılımının belirlenmesi için betimsel istatistik yöntemler, yüzde (%) ve frekans (f) analizleri uygulanmıştır. Araştırmada verilerin incelenmesinde t testi ve One-Way ANOVA testlerinden faydalanılmış olup, anlamlılık düzeyi  $p < 0,05$  olarak kabul edilmiştir. Katılımcıların spor bağlılıkları ile yaşam doyumları arasındaki ilişki Pearson Korelasyon testiyle incelenmiştir. Bulgular ışığında incelendiğinde cinsiyet değişkenine göre spora bağlılık alt boyutları arasında istatistiksel olarak dinç olma alt boyutunda anlamlı bir fark bulunmaktadır. Gelir durumuna göre incelendiğinde dinç olma, odaklanma alt boyutları ile spora bağlılık toplam puanında durumu iyi olanlar lehine anlamlı farklılık tespit edilmiştir. Sonuç olarak; gelir düzeyi, milli sporcu olma durumu ve spor yapılma amacı spora bağlılık ile yaşam doyumu üzerinde etkiye sahip olmakta ve farklılık meydana getirmektedir. Çalışma daha farklı örneklem gruplarına ve başka kurumlarda öğrenim gören öğrencilere uygulanabilir.

**Anahtar kelimeler:** Sporcu, spora bağlılık, yaşam doyumu.

#### ABSTRACT

The aim of this study is to examine the relationship between the level of sports commitment and life satisfaction of individuals who do sports. Additionally, sports commitment and life satisfaction levels were examined in the context of various variables. The sample of the research consists of a total of 148 athletes, 54 female and 94 male, who are interested in various branches. The surveys were obtained through face-to-face surveys in Şırnak Youth and Sports Center and its districts. As a data collection tool in the research; "Personal Information Form", "Sports Commitment Scale" and "Life Satisfaction Scale" were used. The data were analyzed using the SPSS program. After determining whether the data showed normal distribution, analyzes were carried out with the necessary tests. Descriptive statistical methods, percentage (%) and frequency (f) analyzes were applied to determine the distribution of the demographic data of the participants. In the study, t-test and One-Way ANOVA tests were used to examine the data, and the significance level was accepted as  $p < 0.05$ . The relationship between the participants' sports commitment and life satisfaction was examined with the Pearson Correlation test. When examined in the light of the findings, there is a statistically significant difference in the sub-dimension of being vigorous among the sports commitment sub-dimensions according to the gender variable. When examined according to income level, a significant difference was detected in the sub-dimensions of being vigorous, focusing and the total score of commitment to sports in favor of those who were well off. In conclusion; Income level, status of being a national athlete and the purpose of

doing sports have an impact and make a difference on commitment to sports and life satisfaction. The study can be applied to different sample groups and students studying in other institutions.

**Keywords:** Athlete, commitment to sports, life satisfaction.

### GİRİŞ

Spora bağlılık kavramı; sporcuların sportif etkinliklere tutku ile bağlanmasını, sadık kalabilmesini ve o aktivitelerin gerektirdiği sorumlulukları uygulamak zorunluluğunda olduğunu ifade etmektedir. Sporsal etkinliklerin gerçekleştirildiği alanlarda inanç, azim-gayret, enerji ve zevk benzeri kavramları kapsayan devamlı ve tutarlı davranışların tamamı spora bağlılığı oluşturmaktadır (Lonsdale ve ark., 2007). Yaşam tatmini ise kişinin yaşam beklentilerine yönelik olarak bu beklentileri karşılama derecesi arasındaki pozitif fark şeklinde ifade edilmektedir. Başka bir ifadeyle, bireyin iş ve iş dışı zamanlarından oluşan yaşamın bütününe göstermiş olduğu duygusal tepkisi veya tutumudur (Özdevecioğlu, 2003).

Bu bağlamda araştırmanın amacı; spor yapan bireylerin spora bağlılık düzeyi ve yaşam doyumu arasındaki ilişkinin incelenmesidir. İlaveten spora bağlılık ve yaşam doyumu düzeyleri çeşitli değişkenler bağlamında da incelenmiştir.

### YÖNTEM

#### Araştırma Modeli

Bu araştırmada nicel araştırma deseni kullanılmıştır. Bu çerçevede araştırma modeli olarak genel tarama modellerinden biri olan ilişkisel tarama yaklaşımı benimsenmiştir. Bu model, iki ve daha çok sayıdaki değişken arasında birlikte değişim varlığını ve derecesini belirlemede kullanılmaktadır (Karasar, 2007).

#### Evren ve Örneklem

Araştırmanın örneklemini çeşitli branşlarla ilgilenen 54'ü kadın ve 94'ü erkek olmak üzere toplam 148 sporcu oluşturmaktadır. Anketler, Şırnak Gençlik ve Spor merkezinde ve ilçelerinde yer alan merkezlerde yüz yüze anket yolu ile elde edilmiştir.

#### Veri Toplama Araçları

Bu araştırma kapsamında spor yapan bireylerden veri toplamak amacıyla bireylerin demografik özelliklerine ilişkin verileri elde etmek için "Kişisel Bilgi Formu" ile iki ölçme aracı kullanılmıştır. Spora bağlılığı ölçmek amacıyla "Spora Bağlılık Ölçeği" (SBÖ) kullanılmıştır. Bireylerin yaşam doyumlarını ölçmek için "Yaşam Doyum Ölçeği" kullanılmıştır.

**Spora Bağlılık Ölçeği (SBÖ):** Veri toplama aracı olarak Guillen ve Martinez-Alvarado (2014) tarafından geliştirilmiş olan ve Kayhan, Bardakçı ve Caz tarafından 2020 yılında Türkçe'ye uyarlanan "Spora Bağlılık Ölçeği" kullanılmıştır. Ölçek, 2 alt boyut (Dinç olma ve Odaklanma) ve 10 maddeden oluşmaktadır. Ölçek maddeleri 7'li Likert (1= Hiçbir Zaman, 7= Her Zaman) şeklinde derecelendirmeye sahiptir. Ölçekten alınabilecek puan 10 ile 70 arasında değişmektedir. Ölçekte ters kodlanması gereken madde (olumsuz madde) bulunmamaktadır (Kayhan ve ark., 2020). Bu çalışmada dinç olma alt boyutuna ilişkin cronbach alfa değeri ,957 olarak hesaplanmıştır. Odaklanma alt boyutunun cronbach alfa değeri ise ,897 olarak bulunmuştur.

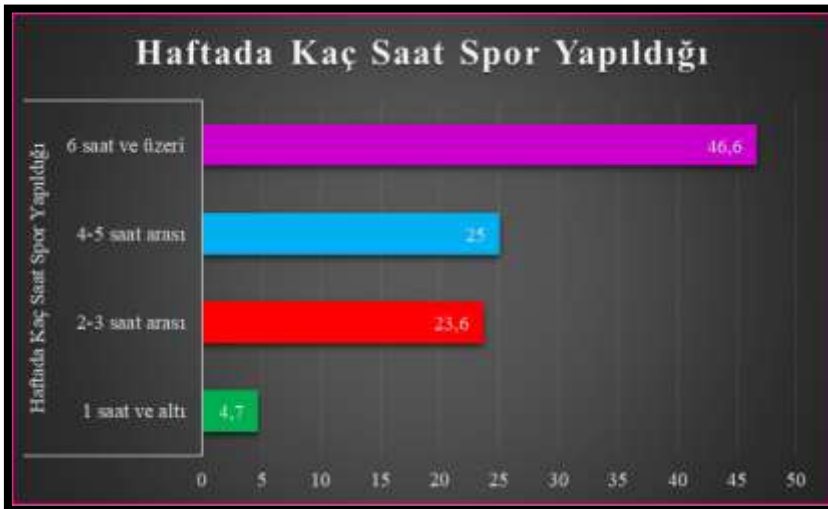
**Yaşam Doyumu Ölçeği:** Diener ve arkadaşları (1985) tarafından geliştirilen ölçek 5 madde, tek alt boyut ve 7'li likert yapısına sahi olan ölçek toplam puan üzerinden değerlendirildiğinde maksimum puanı 35 minimum puanı ise 5'dir. Bu değerlendirmede 5-9 arası tatminsizlik, 20-24 arası hafif tatmin ve 30-35 arası yüksek tatmin düzeyini göstermektedir. Çalışmanın cronbach alfa değeri ,933 olarak hesaplanmıştır.

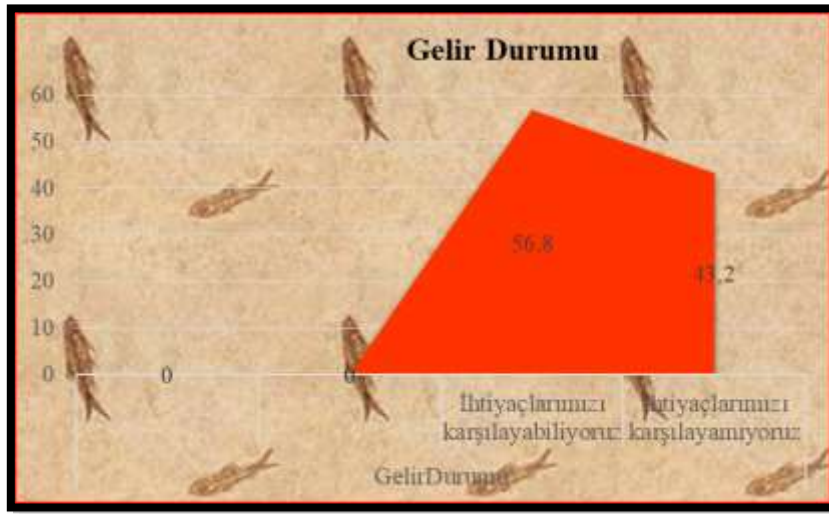
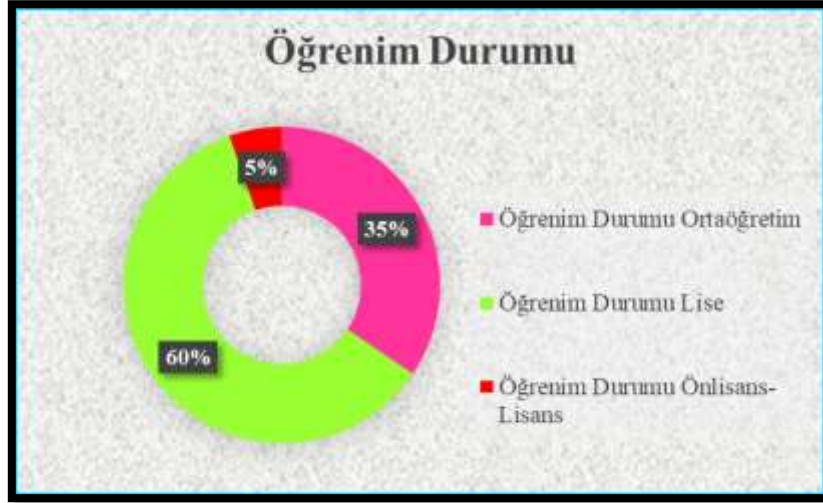
#### Verilerin Analizi

Demografik verilerin belirlenmesinde yüzde (%) ve frekans (f) analizleri yapılmıştır. Spor yapan bireylerin spora bağlılık düzeyi ve yaşam doyumu arasındaki ilişkinin incelenmesi amacıyla t testi ve Çok Yönlü Varyans Analizi (ANOVA) kullanılmıştır. Spora bağlılık ile yaşam doyumu arasındaki ilişkiyi belirlemek için Pearson Korelasyon Analizi kullanılmıştır.

**BULGULAR**

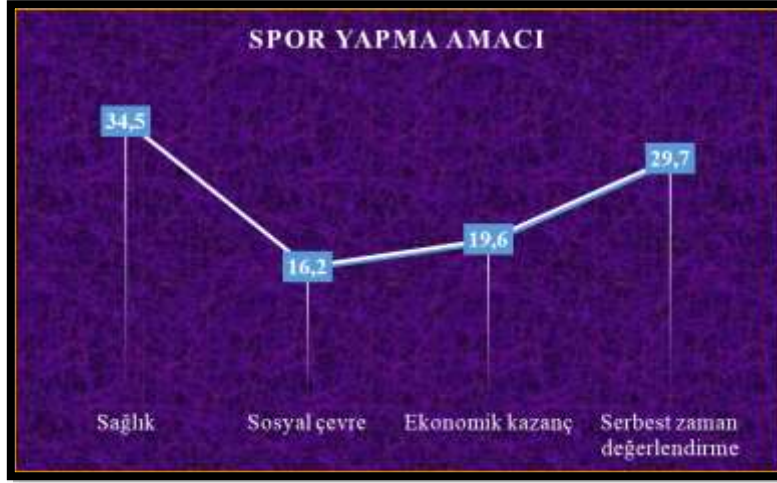
Bu bölümde demografik bilgiler grafik şeklinde gösterilmiştir. İlaveten çalışmanın amacı doğrultusunda gerçekleştirilen hipotez testlerine ait bulgulara yer verilmiştir.





# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023



**Tablo 1.** Spora bağlılık ve yaşam doyumunun cinsiyet değişkenine göre incelenmesi

	Cinsiyet	N	Ort.	SS	t	p
Dinç Olma	Kadın	54	41,74	8,74	-1,995	,048
	Erkek	94	44,27	6,54		
Odaklanma	Kadın	54	17,57	3,90	-1,421	,158
	Erkek	94	18,37	2,88		
Spora Bağlılık Toplam	Kadın	54	59,31	12,31	-1,898	,060
	Erkek	94	62,64	8,87		
Yaşam Doyumu	Kadın	54	13,22	5,46	-1,145	,254
	Erkek	94	14,31	5,61		

\* $p < 0,05$

**Tablo 2.** Spora bağlılık ve yaşam doyumunun yapılan spor türü değişkenine göre incelenmesi

		N	Ort.	SS	Min.	Max.	F	p
Dinç Olma	Bireysel spor	92	42,1848	8,43844	16,00	49,00	3,554	,031 Bireysel<Takım
	Takım sporu	51	45,5686	5,06065	30,00	49,00		
	Her ikisi	5	42,0000	4,84768	38,00	49,00		
	Toplam	148	43,3446	7,48669	16,00	49,00		
Odaklanma	Bireysel spor	92	17,8152	3,69118	5,00	21,00	1,942	,147
	Takım sporu	51	18,7255	2,47450	12,00	21,00		
	Her ikisi	5	16,4000	1,94936	14,00	19,00		
	Toplam	148	18,0811	3,30226	5,00	21,00		
Spora Bağlılık Toplam	Bireysel spor	92	60,0000	11,63549	24,00	70,00	3,138	,046 Bireysel<Takım
	Takım sporu	51	64,2941	7,19526	42,00	70,00		
	Her ikisi	5	58,4000	6,42651	53,00	68,00		
	Toplam	148	61,4257	10,34315	24,00	70,00		
Yaşam Doyumu	Bireysel spor	92	13,0870	5,91822	6,00	25,00	2,740	,068
	Takım sporu	51	15,2745	4,85419	6,00	25,00		
	Her ikisi	5	15,2000	2,04939	13,00	17,00		
	Toplam	148	13,9122	5,56218	6,00	25,00		

\* $p < 0,05$



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 3.** Spora bağlılık ve yaşam doyumunun haftada kaç saat spor yapıldığı durumuna göre incelenmesi

		N	Ort.	SS	Min.	Max.	F	p
Dinç Olma	1 saat ve altı	7	47,2857	4,53557	37,00	49,00	2,516	,061
	2-3 saat arası	35	40,9143	5,66917	27,00	49,00		
	4-5 saat arası	37	44,9459	7,83137	16,00	49,00		
	6 saat ve üzeri	69	43,3188	8,04855	17,00	49,00		
	Toplam	148	43,3446	7,48669	16,00	49,00		
Odaklanma	1 saat ve altı	7	18,7143	1,97605	15,00	21,00	2,085	,105
	2-3 saat arası	35	17,0000	2,18282	12,00	20,00		
	4-5 saat arası	37	18,8649	3,62217	5,00	21,00		
	6 saat ve üzeri	69	18,1449	3,59442	5,00	21,00		
	Toplam	148	18,0811	3,30226	5,00	21,00		
Spora Bağlılık Toplam	1 saat ve altı	7	66,0000	6,27163	52,00	70,00	2,534	,059
	2-3 saat arası	35	57,9143	7,23298	40,00	69,00		
	4-5 saat arası	37	63,8108	11,27396	24,00	70,00		
	6 saat ve üzeri	69	61,4638	11,07937	26,00	70,00		
	Toplam	148	61,4257	10,34315	24,00	70,00		
Yaşam Doyumu	1 saat ve altı	7	16,7143	2,28869	13,00	20,00	,630	,597
	2-3 saat arası	35	13,7714	4,73464	6,00	21,00		
	4-5 saat arası	37	13,9189	6,66824	6,00	25,00		
	6 saat ve üzeri	69	13,6957	5,55005	6,00	25,00		
	Toplam	148	13,9122	5,56218	6,00	25,00		

$p>0,05$

**Tablo 4.** Spora bağlılık ve yaşam doyumunun gelir durumu değişkenine göre incelenmesi

	Gelir Durumu	N	Ort.	SS	t	p
Dinç Olma	İhtiyaçlarımızı karşılayabiliyoruz	84	45,46	4,63	4,159	,000
	İhtiyaçlarımızı karşılayamıyoruz	64	40,56	9,42		
Odaklanma	İhtiyaçlarımızı karşılayabiliyoruz	84	18,76	2,23	2,948	,004
	İhtiyaçlarımızı karşılayamıyoruz	64	17,19	4,18		
Spora Bağlılık Toplam	İhtiyaçlarımızı karşılayabiliyoruz	84	64,23	6,49	3,957	,000
	İhtiyaçlarımızı karşılayamıyoruz	64	57,75	13,04		
Yaşam Doyumu	İhtiyaçlarımızı karşılayabiliyoruz	84	14,39	5,27	1,206	,230
	İhtiyaçlarımızı karşılayamıyoruz	64	13,28	5,91		

$*p<0,05$



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 5.** Spora bağlılık ve yaşam doyumunun milli sporcu olma durumuna göre incelenmesi

	Milli Sporcu Olma Durumu	N	Ort.	SS	t	p
Dinç Olma	Evet	12	43,42	8,76	,035	,972
	Hayır	136	43,34	7,40		
Odaklanma	Evet	12	18,42	3,37	,366	,715
	Hayır	136	18,05	3,31		
Spora Bağlılık Toplam	Evet	12	61,83	12,05	,142	,887
	Hayır	136	61,39	10,23		
Yaşam Doyumu	Evet	12	10,67	4,79	-2,134	<b>,035</b>
	Hayır	136	14,20	5,55		

*\*p<0,05*

**Tablo 6.** Spora bağlılık ve yaşam doyumunun spor yapma amacına göre incelenmesi

		N	Ort.	SS	Min.	Max.	F	p
Dinç Olma	Sağlık	51	44,4706	4,46924	27,00	49,00	1,448	,231
	Sosyal çevre	24	40,7500	8,57321	21,00	49,00		
	Ekonomik kazanç	29	43,9655	8,80537	16,00	49,00		
	Serbest zaman değerlendirme	44	43,0455	8,54252	17,00	49,00		
	Toplam	148	43,3446	7,48669	16,00	49,00		
Odaklanma	Sağlık	51	18,5294	2,41125	11,00	21,00	,656	,580
	Sosyal çevre	24	17,4167	2,94761	12,00	21,00		
	Ekonomik kazanç	29	18,0345	4,09253	5,00	21,00		
	Serbest zaman değerlendirme	44	17,9545	3,80303	5,00	21,00		
	Toplam	148	18,0811	3,30226	5,00	21,00		
Spora Bağlılık Toplam	Sağlık	51	63,0000	6,23217	40,00	70,00	1,249	,294
	Sosyal çevre	24	58,1667	10,58574	37,00	70,00		
	Ekonomik kazanç	29	62,0000	12,68295	24,00	70,00		
	Serbest zaman değerlendirme	44	61,0000	12,10804	26,00	70,00		
	Toplam	148	61,4257	10,34315	24,00	70,00		
Yaşam Doyumu	Sağlık	51	11,1176	5,39869	6,00	25,00	9,104	,000
	Sosyal çevre	24	13,9583	4,25777	7,00	20,00		
	Ekonomik kazanç	29	16,8966	5,74049	7,00	25,00		
	Serbest zaman değerlendirme	44	15,1591	4,88445	6,00	25,00		
	Toplam	148	13,9122	5,56218	6,00	25,00		

*\*p<0,05*

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 7.** Spora Bağlılık İle Yaşam Doymu Arasındaki İlişki

Ölçek ve alt boyutları		Dinç Olma	Odaklanma	Spora Bağlılık Toplam	Yaşam Doymu
Dinç Olma	r	1	,809**	,982**	,107
	p		,000	,000	,197
	n	148	148	148	148
Odaklanma	r	,809**	1	,905**	,115
	p	,000		,000	,163
	n	148	148	148	148
Spora Bağlılık Toplam	r	,982**	,905**	1	,114
	p	,000	,000		,168
	n	148	148	148	148
Yaşam Doymu	r	,107	,115	,114	1
	p	,197	,163	,168	
	n	148	148	148	148

## TARTIŞMA VE SONUÇ

Araştırmanın amacı, spor yapan bireylerin spora bağlılık düzeyi ve yaşam doymu arasındaki ilişkinin incelenmesidir. Analizlerin akabinde elde edilen bilgiler ışığında bu bölümde aşağıdaki yorumlamalara yer verilmiştir.

Cinsiyet değişkeni bağlamında spora bağlılıkta dinç olma alt boyutunda anlamlı bir fark tespit edilmiştir (Tablo 1). Literatür incelendiğinde; Önal ve ark., (2017) tarafından yapılan çalışmada, spora yönelik tutum puanlarında cinsiyet değişkeni bağlamında anlamlı ilişki saptanmıştır. Yine Aykora ve Dinçer (2022) araştırmalarında kadın öğrencilerin erkek öğrencilerden spora bağlılık düzeylerinin daha fazla olduğunu tespit etmişlerdir. Türkmen ve ark., (2016) tarafından yapılan çalışmada da kadın ve erkek öğrenciler arasında spora yönelik tutum noktasında anlamlı farklılık belirlenmiştir. Yerlikaya (2019)'nın araştırmasında da, kadın sporcuların erkek sporculara oranla dinçlik alt boyutunda daha düşük sporcu bağlılığına sahip oldukları belirlenmiştir. Yıldız ve ark., (2017) tarafından yapılan çalışmada kadın ve erkek öğrencilerin spora yönelik tutumlarında anlamlı farklılık meydana gelmiştir. Sivrikaya ve Biricik (2019) kadın sporcuların erkek sporculara oranla bazı alt boyutlarda daha yüksek sporcu bağlılığına sahip olduklarını belirlemişlerdir.

Yapılan spor türü ile spora bağlılık arasından Dinç Olma alt boyutu ile Spora bağlılık toplam puanlarında anlamlı farklılık tespit edilmiştir. Bu fark Bireysel branşla uğraşanlar ile Takım sporuyla ilgilenenler arasında meydana gelmiştir (Tablo 2). Siyahtaş ve arkadaşları (2020) yapmış oldukları çalışmada takım sporunda mücadele eden sporcuların bireysel branşlarda mücadele eden sporculara göre spora bağlılıklarının daha düşük olduğunu belirlemişlerdir. Yine Aykora ve Dinçer (2022) araştırmalarında takım sporları ile ilgilenen öğrencilere göre bireysel sporları yapan öğrencilerin spora bağlılık düzeylerinin daha fazla olduğunu saptamışlardır.

Haftada kaç saat spor yapıldığına yönelik spora bağlılık alt boyutları ve yaşam doymunda anlamlı bir farka rastlanmamıştır. Fakat incelendiğinde spora bağlılık toplam puanında farka yakın bir değer çıktığını söylemek mümkündür (Tablo 3). Gülen ve arkadaşları (2021) tarafından yapılan çalışmada sporcuların spor tecrübesi bakımından spora bağlılık durumları arasındaki ilişki incelenmiş ve anlamlı bir fark tespit edilmemiştir. Peke (2020) tarafından yapılan çalışmada ise sporcuların spor deneyimi yükseldikçe bazı boyutlarda yükselme gözlemlenmiş ve spora bağlılık düzeylerinin spor deneyimiyle ilgili olduğu kanısına varılmıştır.

Gelir durumuna göre incelendiğinde dinç olma, odaklanma alt boyutları ile spora bağlılık toplam puanında durumu iyi olanlar lehine anlamlı farklılık tespit edilmiştir (Tablo 4). Çalışmaya benzer şekilde Yerlikaya (2019) tarafından yapılan çalışmada sporcuların sosyoekonomik durumuna göre incelendiğinde spora bağlılık durumundaki farkın istatistiksel olarak anlamlı seyrettiği görülmektedir.

Milli sporcu olma değişkenine göre yaşam doymunda anlamlı farklılık tespit edilmiştir (Tablo 5). Yapılan bir çalışmada amatör ve profesyonel olma durumuna göre hem spora bağlılık toplamında hem de alt boyutlarında anlamlı farklılıkların olduğu görülmektedir (Güney ve ark., 2021). Caz ve Bardakçı

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

(2023)'nın çalışmalarında spora bağlılık ölçeğinde profesyonel spor yapan öğrencilerin ortalama puanlarının amatör spor yapan öğrencilere göre anlamlı olduğu ifade edilmektedir.

Bireylerin spor yapma amacına göre spora bağlılıkları ve yaşam doyumları incelendiğinde; yaşam doyumundaki farkın istatistiksel olarak anlamlı olduğu tespit edilmiştir. Farkın sağlık, serbest zaman değerlendirme ve ekonomik kazanç maddelerinde olduğu görülmektedir (Tablo 6). Ulukan (2021) yapmış olduğu çalışmada ölçeğin bütünü ve alt boyutları ile "spor yapma amacı" değişkeni arasında anlamlı bir farklılık olmadığı tespit etmiştir.

Spora bağlılık ile yaşam doyumunu arasındaki ilişkiye bakıldığında farkın anlamlı düzeyde olmadığı görülmektedir (Tablo 7). Çalışmanın aksine; Han ve Polat (2022) spor bağlılığı ile yaşam doyumunu arasındaki ilişkiyi pozitif anlamlı olarak tespit etmiştir. Yine Ekizoğlu (2023)'nun araştırmasında, spor bağlılığı ile yaşam doyumunu arasında pozitif yönlü anlamlı bir ilişki bulunmuş ve spor bağlılığının, yaşam doyumunu %47 arttırdığı sonucuna ulaşılmıştır.

Sonuç olarak çalışmada, spor yapan bireylerin spora bağlılık durumları ve yaşam doyumları çeşitli değişkenler perspektifinden farklılaşmaktadır. Cinsiyet değişkeni bağlamında, dinç olma alt boyutunda erkeklerin daha yüksek puan ortalamalarına sahip oldukları belirlenmiştir. İlaveten, gelir düzeyi, milli sporcu olma durumu ve spor yapılma amacının Spora Bağlılık ile Yaşam Doyumu üzerinde etkiye sahip olmakta ve farklılık meydana getirmektedir. Çalışma daha farklı örneklem gruplarına ve başka kurumlarda öğrenim gören öğrencilere uygulanabilir. İlaveten spor branşları çeşitlendirilerek farklı alanlardaki sporcular üzerinde yapılabilir.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ULUS MARKA DEĞERİ ENDEKSİ VE EKONOMİK ÖZGÜRLÜK ENDEKSİ İLİŞKİSİ RELATIONSHIP OF NATION BRAND VALUE INDEX AND ECONOMIC FREEDOM INDEX

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### ÖZET

Günümüzde rekabetin küresel bir noktaya gelmesiyle birlikte yarış sadece ülkeler arasında değil ülkeler arasında da gerçekleşmektedir. Ulusların bu yarışta hangi konumda oldukları da bir çok farklı endeksle elde edilmektedir. Bu sıralamaları oluşturan endeksler arası bir bağlantı olup olmadığı da bir araştırma konusu haline gelmektedir. Bir ülkenin ulusal marka değeri ve imajının oradaki markalar ve bir bütün olarak ekonomi üzerindeki etkisi artık geniş çapta kabul görmektedir. Bu endekslerden bir tanesi olan Ulus Marka Değeri Endeksi, Brand Finance şirketi tarafından gerçekleştirilmekte ve ülke marka değerlerinin ne derece güçlü olduğunu çeşitli analizlerle ortaya koymaya çalışmaktadırlar. Her bileşen için ham veriler, diğerlerinin uygun gördükleri şekilde çalışabilmeleri, ağırlık verebilmeleri ve entegre edebilmeleri için sağlanır. Temel amacı incelenen her ülkedeki ekonomik ve girişimci ortamı mümkün olduğunca dengeli bir şekilde yansıtmak olan endeks genel olarak araştırmacılara ülkelere yönelik bilgi sağlamaktadır. Bu endeksler arasında yer alan ulus marka değeri endeksi ve ekonomik özgürlük endeksi arasında bir ilişki olup olmadığının tespiti de çalışmamızın amacını oluşturmaktadır. Bu amaç doğrultusunda gerçekleştirilen analizler sonucunda da bu iki endeks arasında bir ilişki olduğu tespit edilmiştir.

**Anahtar Kelimeler:** Marka Değeri, Ulus Marka Değeri, Ekonomik Özgürlük, Ekonomik Özgürlük Endeksi

**Jel Kodlar:** E00,E20,M31,M00,O10

### ABSTRACT

Nowadays, as competition has reached a global point, the race takes place not only between countries but also between countries. The position of nations in this race is obtained by many different indices. Whether there is a connection between the indices that make up these rankings is also becoming a subject of research. The impact of a country's national brand equity and image on its brands and the economy as a whole is now widely accepted. One of these indexes, the Nation Brand Value Index, is carried out by the Brand Finance company and they try to reveal how strong the country's brand values are through various analyses. Raw data for each component is provided so that others can study, weight, and integrate as they see fit. The index, whose main purpose is to reflect the economic and entrepreneurial environment in each country examined as balanced as possible, generally provides researchers with information about the countries. The aim of our study is to determine whether there is a relationship between the nation brand value index and the economic freedom index, which are among these indices. As a result of the analyzes carried out for this purpose, it was determined that there is a relationship between these two indices..

**Keywords:** Brand Equity, Nation Brand Equity, Economic Freedom, Economic Freedom Index

**Jel Codes:** E00,E20,M31, M00,O10

## **GİRİŞ**

Rekabet ve mücadele olgusu günümüzde gerçekleşen değişimlerin çok daha hızlı hale gelmesiyle birlikte artık her alan ve düzeyde çok hızlı bir şekilde gerçekleşmektedir. İşletmelerden ziyade artık ülkeler arasında da bir rekabet ve kıyaslama yarışının olduğu açıkça görülmekte ve bu yarış ve kıyaslamada ülkelerin hangi konumda olduğu bir çok farklı kritere göre belirlenen endeksler ile anlaşılmaktadır.

. Bu değerlendirmeyi gerçekleştirirken de yatırımlar, öz sermaye(hisseler) ve performans ana başlıkları altında yirmi alt başlık kullanılmaktadır. Bu kriterlerin etki oranlarına göre hem her kriter için ayrı ayrı puanlar hesaplayıp hem de tüm kriterleri dikkate alarak ülke marka değeri için genel bir puan hesaplaması gerçekleştirilmektedir.

Ülkelerin rekabetinde farklı bir ölçüm olan ekonomik özgürlük endeksinin temel amacı incelenen her ülkedeki ekonomik ve girişimci ortamı mümkün olduğunca dengeli bir şekilde yansıtmak olan endeks genel olarak araştırmacılara ülkelere yönelik bilgi sağlamaktadır. Bu amaç doğrultusunda endeks hukuk kuralı, devlet büyüklüğü, düzenleyici verimlilik ve piyasa açıklığı şeklinde dört kategorideki koşulları değerlendirirken, Endeks her biri 0'dan 100'e kadar derecelendirilen 12 spesifik ekonomik özgürlük bileşenini ölçer.

Bu açıklamalar doğrultusunda çalışmamızın amacı bu iki endeks arasındaki bir ilişki olup olmadığını değişkenleri ve yıllık verileri dikkate alarak ortaya koymaktır. Bu çerçevede çalışmamızda öncelikle ulus marka değeri ve ekonomik özgürlük endeksine yönelik bilgiler verilecek ardından değişkenler arası ilişki teorik çerçevede incelenecektir. Ardından endeks verileri kullanılarak teorik olarak ilişki olduğu düşünülen değişkenler arası gerçekleştirilen analiz sonuçları paylaşılıp çalışmanın sonuç verileri ve gelecek çalışmalar için öneriler sunulacaktır.

### **1. ULUS MARKA DEĞERİ**

Kotler ve Gertner (2002, s. 251) ulus markasının insanların bir yer hakkında edindikleri inanış ve izlenimlerin toplamı olduğunu, imajın bir yerle bağlantılı çok sayıda ilişkilendirme ve bilgi parçasının basitleştirilmesini temsil ettiğini, bir yerle ilgili çok büyük miktardaki verileri işleyerek temel bilgileri seçmeye çalışan zihnin ürünü olduğunu belirtmiştir.

Anholt (2005, s. 296-297) ulus markasını, kültürel, siyasi, ticari ve insan kaynakları, yatırım potansiyeli ve turist çekiciliği bileşenlerinden oluşan altı ulusal kabiliyet alanında insanların bir ülkeye ilişkin algılarının toplamı olduğunu ifade etmiştir.

Fetscherin (2010, s. 468) ülke markasının kamuya ait olduğunu; karmaşık ve birçok düzeyde bileşen ile disiplinler içerdiğini, hitap ettiği birçok paydaşlarının toplu katılımını gerektirdiğini ve bir ülkenin siyasi, ekonomik, sosyal, çevresel, tarihi ve kültürel yönleri dâhil olmak üzere bütün imajıyla ilgili olduğunu belirtmiştir. Fan (2010, s. 98) göre ulus markalaşması uluslararası paydaşların zihnindeki tüm algılardır ve bir ulusun imajını desteklemek için markalaşma ile pazarlama iletişimi tekniklerinin uygulanmasıyla ilgilidir. Ulus markalaşması, menşe ülke, turizmde destinasyon markalaşması, kamu diplomasisi ve ulusal kimlik gibi çeşitli kaynakları “ebeveynleri” olarak saymaktadır.

Ülke markası, ulus markalama olarak da adlandırılabilir ülke marka değeri artan ilgiye rağmen halen gelişmekte olan bir alandır. Son yıllarda artan ilgiye rağmen kavrama ilişkin tanımlamalar konusunda bile net fikir birlikleri bulunmamaktadır (Hao ve diğ., 2019). Ülke marka değerinin bir ülkenin imajının geliştirilmesi için marka ve pazarlama iletişimi tekniklerinin kullanımıyla ilgili olduğu söylenebilir (Fan, 2006). 1998 - 2018 yılları arasında ulus markası ile ilgili olarak yapılmış 40 çalışmadan, kriterleri sağlayan 32'sini inceleyerek geleceğe yönelik bir araştırma ajandası oluşturmaya çalışan Hao ve diğ. (2019) tarafından gerçekleştirilen çalışma, bu alandaki kapsamlı çalışmalardandır.

Anholt (2005) ülke marka değerini insanların bir ülkenin kültürel, politik, ticari, işgücü altyapısı, yatırım potansiyeli ve turist çekiciliği açılarından algılarının bütünü olarak tanımlamaktadır.

Kotler ve Gertner ise ülke marka değerini insanların bir ülkeye ilişkin inanç ve izlenimlerinin bütünü olarak değerlendirmektedir. Ülke markalamayı, literatürde ülke imajı ile ele alan çalışmalar yapılmıştır (Heslop ve diğ.,2010; Hakala ve diğ., 2013; Herrero-Crespo ve diğ., 2016; Kerrigan ve diğ., 2012; Sun ve diğ., 2016; Sun ve Paswan, 2011) Ülke markalaşmayı ülke itibarı ile birlikte ele alan çalışmalar ise



yine 2010 yılı ve sonrasında yapılmıştır (Kang ve Yang, 2010; Rojas-Mendez, 2013; Yousaf ve Li, 2015).

Ülke marka değerinin ölçümü, Yoo ve Donthu'nun (2001) marka değeri ölçeğine dayanmakta ve ülke marka sadakati, algılanan ülke marka kalitesi ve ülke marka bilinirliği olarak üç boyuttan oluşmaktadır. Zeugner-Roth ve diğ. (2008) ise ülke marka değerini kavramsal olarak, bir tüketicinin algıladığı şekilde, bir ürünün veya markanın belirli bir ülkenin adıyla ilişkilendirmesinin getirdiği katma değer olarak tanımlamaktadır.

Bir ülkenin ulusal marka değeri ve imajının oradaki markalar ve bir bütün olarak ekonomi üzerindeki etkisi artık geniş çapta kabul görmektedir. Küresel bir pazarda, ulus markası, içe dönük yatırımı teşvik etmesi, ihracata değer katması ve turistleri ve vasıflı göçmenleri çekmesi gibi birçok sebepten ötürü herhangi bir devletin en önemli varlıklarından biridir. Öte yandan, bir ülke, zayıf bir ulus marka değerinden bir çok zarar da görebilmektedir.

Ulusal markaların gücü ve değeri, marka değerlendirme (ISO 20671) ve marka değerlendirme (ISO 10668) konusunda uluslararası kabul görmüş standartlarda belirtildiği gibi, kurumsal markalara değer vermek için kullanılanlara benzer yöntemler kullanılarak zaman içinde ölçülebilir ve izlenebilir.

Bir ulusun sahip olduğu marka değerini ölçmek için kullanılan endekslerden bir tanesi olan Brand Finance Ulus Marka Endeksi ( Brand Nation Brand Index) ile ilgili bilgi aşağıda verilmektedir.

### 1.1. Brand Finance Ulus Marka Endeksi ( Brand Nation Brand Index)

Brand Finance, dünyanın önde gelen bağımsız marka değerlendirme danışmanlığıdır. Brand Finance, İngiltere ve Galler'deki Yeminli Mali Müşavirler Enstitüsü tarafından düzenlenen yeminli bir muhasebe firmasıdır ve Uluslararası Değerleme Standartları Konseyi'ne katılan ilk marka değerlendirme danışmanlığıdır. Brand Finance, "pazarlama ve finans arasındaki boşluğu doldurmak" amacıyla 1996 yılında kurulmuştur. 20 yıldan fazla bir süredir, her türden şirket ve kuruluşun markalarını kar hanesine bağlamasına yardımcı olmuşlardır. Öne çıkan dört temel güçlü yönleri şu şekildedir:

- + Bağımsızlık
- + Teknik Güvenilirlik
- + Şeffaflık
- + Uzmanlık

Her yıl dünyanın en büyük binlerce markasını teste tabi tutan kuruluş, hangilerinin en güçlü ve en değerli olduğunu değerlendirmektedir. Markaları tüm sektörlerde ve ülkelerde sıralayarak, yılda yaklaşık 100 rapor yayınlamaktadırlar.

Marka Finansmanı, Uluslararası olarak tanınan Marka Değerleme standardı - ISO 10668 ve yakın zamanda onaylanan Marka Değerlendirme standardı - ISO 20671'in oluşturulmasına yardımcı oldu.

Pazarlama ve pazar araştırmasından marka stratejisine ve görsel kimliğe, vergi ve muhasebeye kadar çok çeşitli disiplinlerde deneyimli ekiplere sahiptirler. Bu sayede yüksek bir uzmanlık kombinasyonu sunarak hizmet sağlamaktadır.

Brand Finance uygulamalarında ülkelere puana dayalı olarak, her Ulusal Markaya benzer bir formatta bir marka gücü derecelendirmesi atanır. Bunu belirlerken de kredi notları şu şekilde değerlendirilir;

Ülkelerin değerlendirmelerinde yatırımlar %25'lik bir orana sahiptir. Yatırım başlığı altında sırasıyla şu alt kategoriler bulunmaktadır;

- İşletme ve Ticaret: Vergi, altyapı, risk sermayesi
- Yönetişim: Yasal çerçeve, yargı bağımsızlığı
- Uluslararası İlişkiler: Çevre, uluslararası açıklık.
- Medya ve İletişim: İnternet kullanımı / erişimi, devlet çevrimiçi hizmetleri
- Eğitim ve Bilim: Personel eğitimi, üniversiteler, patentler, mezun sayıları

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

• İnsanlar ve Değerler: Emniyet ve güvenlik, ortalama yaşam süresi, eşitlik

Ülkelerin değerlendirmelerinde bir diğer kriter olan Öz sermaye (Hisseler) %50'lik bir orana sahiptir. Öz sermaye (Hisseler) başlığı altında sırasıyla şu alt kategoriler bulunmaktadır;

- Aşinalık: İlgili ülke (ler) ile aşinalık
- Genel Etki: İlgili ulus (lar) ın algılanan etkisi
- İtibar: İlgili ulusun algılanan itibarı
- İş ve Ticaret: Markalar, iş yapma kolaylığı
- Yönetişim: Siyasi iklim, güvenlik, yasal uluslararası ilişkiler
- Uluslararası İlişkiler: Etki, ülke ilişkileri
- Kültür ve Miras: Miras, yaşam tarzı, yemek
- Medya ve İletişim: Güvenilir, etkili
- Eğitim ve Bilim: Eğitimde liderler
- İnsanlar ve Değerler: Hoşgörülü, arkadaş canlısı, eğlenceli

Brand Finance tarafından gerçekleştirilen ülkelerin değerlendirmelerinde üçüncü kriter ise Performanstır ve %25'lik bir etki oranına sahiptir. Performans başlığı kategorileri şu şekildedir;

- GSYİH: GSYİH ve büyüme göstergeleri
- Piyasalar: Doğrudan yabancı yatırım, işsizlik oranları
- Turizm: Turizm - sıklık ve ortalama harcama
- Refah: Genel refah ve mutluluk hakkında genel nüfus algıları

Düzenli yayınlanan raporlarda ülkelerin yıllara yönelik sıralaması aşağıdaki tabloda verilmiştir.

**Tablo 1 : 2010-2020 Yılları Arası Brand Finance Ulus Marka Endeks Sıralaması**

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Amerika	1	1	1	1	1	1	1	1	1	1	1
Çin	4	3	2	2	2	2	2	2	2	2	2
Almanya	2	2	3	3	3	3	3	3	3	3	4
Japonya	3	4	4	5	5	5	4	4	5	4	3
Birleşik Krallık	5	5	5	4	4	4	5	5	4	5	5
Fransa	7	6	6	6	7	6	6	6	6	6	6
İtalya	6	7	10	12	11	9	9	9	8	10	9
Kanada	8	8	7	7	6	8	8	7	7	8	8
Hindistan	9	9	9	9	8	7	7	8	9	7	7
Brezilya		10	8	8	10	11	15	18	17	17	16
Avustralya		14	12	10	9	10	10	11	11	12	12
Güney Kore		16	17	16	16	12	-	10	10	9	10
Türkiye		19	19	19	19	19	25	24	34	31	30

**Kaynak:** 2010-2020 Brand Finance Nations Brands Index Reports

## 2. EKONOMİK ÖZGÜRLÜK ENDEKSİ

Temel amacı incelenen her ülkedeki ekonomik ve girişimci ortamı mümkün olduğunca dengeli bir şekilde yansıtmak olan endeks genel olarak araştırmacılara ülkelere yönelik bilgi sağlamaktadır. Endeks hiçbir zaman ekonomik büyümeyi veya başka herhangi bir bağımlı değişkeni açıklamak için özel olarak tasarlanmamıştır; Her bileşen için ham veriler, diğerlerinin uygun gördükleri şekilde çalışabilmeleri, ağırlık verebilmeleri ve entegre edebilmeleri için sağlanır.

Ekonomik özgürlük endeksi konulu çalışmalar incelendiğinde çeşitli çalışmalar yer almaktadır. Akhter(2014) çalışmasında 75 ülkeyi kapsamına almış ve küreselleşme, insanı gelişim endeksi ve ekonomik özgürlük endeksi verilerini kullanarak bir analiz yapmıştır. Amalız sonucunda ekonomik

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

özgürlük endeksi ve insani gelişim endeksi arasında pozitif yönlü bir ilişki olduğunu ortaya koymuştur. Kicsi & Burciu (2014) benzer bir çalışmayı daha fazla ülkeyi dahil ederek gerçekleştirmiş ve iki değişken arası olumlu bir ilişki olduğu sonucuna ulaşmıştır.

Yapılan çeşitli çalışmalarda ekonomik özgürlük endeksinin bireysel girişimciliğin desteklenmesi, ekonomiye yönelik bilgilerin şeffaflığın sağlanması ve adil rekabet ortamının oluşturulması, yatırımlarda artış elde edilmesi sonucu toplumsal refah ve beşeri sermayede artışın sağlanması gibi olumlu etkilerinin olduğu sonuçlarına da ulaşılmıştır (Dawson, 1998).

Literatürde ekonomik özgürlük ile ilgili yapılan çalışmalarda daha çok ekonomik özgürlük ile ekonomik büyüme arasındaki ilişki incelenmiştir (Islam (1996); Easton ve Walker (1997); Dawson (1998); De Haan ve Siermann; (1998); De Haan ve Sturm (2000); Adkins ve diğerleri (2002); Powell; (2002); Karabegovic vd. (2003); Clark ve Lawson (2008); Heckelman (2000); Heckelman ve Knack (2008); Razmi ve Rafeai (2013); Kılıç ve Arıca (2014); Tunçsiper ve Biçen (2014); Güney (2017); Anwar; vd (2012); Akkaya (2019)). Ekonomik özgürlük ve ekonomik büyüme arasındaki ilişki genellikle pozitif yönlü olarak bulunmaktadır.

Negatif yönlü bulan çalışmalarda görülmektedir (Erdem ve Tugcu (2012); Türkay (2015)). Birçok çalışma, ekonomik büyümenin bir aracı olarak GSYİH büyüme oranını yaygın olarak kullanmıştır. Bunların arasında Abid vd. (2016); Pattanaik ve Nayak (2014) ve Razmi ve Rafeai (2013) sayılabilir. Ekonomik özgürlük ile ilgili yapılan diğer yayınlarda ise literatürde nadir görülmek ile birlikte bankacılıkla ilişkilendirilen çalışmalar oluşturmaktadır (Sarpong vd (2018); Cetorelli ve Gambera(2001). Ulusal ve uluslararası literatürde ekonomik özgürlük ile ilgili yapılan çalışmaların diğer bir kısmında ise doğrudan yabancı yatırımlar ile ilişkisi incelenmektedir (Bengoa ve Robles (2003). Artan ve Hayaloğlu (2013) çalışmalarında 110 ülkenin 2000-2009 yılları arasında panel veri analizi yöntemi ile Ekonomik Özgürlüğün büyüme üzerindeki etkisi incelenmişlerdir. Çalışma sonucunda ekonomik özgürlüğün ve politik özgürlüğün büyüme üzerindeki etkisi pozitif olarak tespit edilmiştir.

Bu kapsamda yerleşik olmakla birlikte istikrarlı bir yasal ve parasal sisteme, verimli işgücüne, ürün pazarlarına, serbest ticaret ve yatırım fırsatlarına sahip ekonomik açıdan özgür bir ülke, daha rekabetçi bir iş ortamına olanak tanımaktadır (Easton ve Walker,1997; Knack ve Keefer, 1995; Mauro,1995). Ayrıca turizm rekabet gücü ile ilgili olarak bilgiye ulaşımında sınırlanmamış olması önemli avantajlar sağlayabilmektedir (Das ve Dirienzo, 2009).

## 2.1.Ekonomik özgürlük endeksinin metodolojisi

Ekonomik özgürlüğün yıllık olarak analiz edilmesi, Endeks'in ülkeden ülkeye sunulan en son bilgileri içermesini sağlar. Tüm ülkelere adil davranılması için bir veri kesme tarihi kullanılır. Yukarıda açıklandığı gibi, cari yıl Endeksi için çalışma dönemi, bir önceki yılın Haziran ayının son günü itibariyle tüm bilgileri dikkate alır. Düzenli olarak oluşturulan raporlardan elde edilen sıralamalar aşağıdaki tabloda yer almaktadır.

**Tablo 2 : 2010-2021 Yılları Arası Ekonomik Özgürlük Endeks Sıralaması**

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Singapur	2	2	2	2	2	2	2	2	2	2	1	1
Yeni Zelanda	4	4	4	4	5	3	3	3	3	3	3	2
Avusturalya	3	3	3	3	3	5	5	5	5	5	4	3
İsviçre	6	5	5	5	4	4	4	4	4	4	5	4
İrlanda	5	7	9		9	9	8	9	6	6	6	5
Tayvan										10		6
Birleşik Krallık							10		8	7	7	7
Estonya						8	9	6	7		10	8
Kanada	7	6	6	6	6	6	6	7	9	8	9	9
Danimarka	9	8		9	10						8	10
Türkiye	67	67	74	69	64	70	79	60	58	68	71	76

**Kaynak:** 2010-2021 Economic Freedom Index Reports

Ekonomik Özgürlük Endeksi, hükümetlerin tipik olarak politika kontrolü uyguladığı ekonomik ve girişimci ortamın dört temel yönüne odaklanır. Bunlar;

- Hukuk kuralı,
- Devlet büyüklüğü,
- Düzenleyici verimlilik ve
- Piyasa açıklığı şeklinde sıralanmaktadır.

Bu dört kategorideki koşulları değerlendirirken, Endeks her biri 0'dan 100'e kadar derecelendirilen 12 spesifik ekonomik özgürlük bileşenini ölçer. Bir dizi alt değişkenden hesaplanan bu 12 ekonomik özgürlük bileşenine ilişkin puanlar , eşit ağırlıklı bir uygulamayla ve her ekonomi için genel bir ekonomik özgürlük puanı üretmek için ortalaması alınır. Bu dört ana başlığın içeriğini sırasıyla şu şekilde açıklamak mümkündür

### 2.1.1.HUKUK KURALI

Endeks hukuk kuralları başlığı altında mülkiyet hakları, yargı etkinliği ve devlet dürüstlüğü olmak üzere üç alt konu başlığını incelemektedir.

**Mülkiyet hakları:** Mülkiyet hakları bileşeni, bir ülkenin yasal çerçevesinin, bireylerin hükümetin etkin bir şekilde uyguladığı açık yasalarla güvence altına alınan özel mülkleri edinmelerine, elinde tutmalarına ve kullanmalarına ne ölçüde izin verdiğini değerlendirir. Bu bileşenin puanı, tümü eşit ağırlıkta olan aşağıdaki beş alt faktörün puanlarının ortalaması alınarak elde edilir:

- Fiziksel mülkiyet hakları,
- Fikri Mülkiyet Hakları,
- Yatırımcı korumasının gücü,
- Kamulaştırma riski ve
- Arazi idaresinin kalitesi

**Yargı Etkinliği:** İyi işleyen yasal çerçeveler, hükümetler ve güçlü özel partiler de dahil olmak üzere diğerlerinin yasa dışı eylemlerine karşı tüm vatandaşların haklarını korumak için gereklidir. Yargı etkinliği, yasalara tam olarak uyulmasını ve ihlallere karşı uygun yasal işlemlerin yapılmasını sağlamak için verimli ve adil yargı sistemleri gerektirir. Adli etkililik bileşeni puanı, tümü eşit ağırlıkta olan aşağıdaki üç alt faktörün;

- Yargı Bağımsızlığı,
- Yargı sürecinin kalitesi ve
- Devlet görevlilerinin kararlarında kayırmacılık puanlarının ortalaması alınarak elde edilir.

**Devlet Dürüstlüğü:** Yolsuzluk, ekonomik ilişkilere güvensizlik ve zorlama getirerek ekonomik özgürlüğü aşındırır. En büyük endişe, hükümet kurumlarının sistemik yozlaşması ve rüşvet, haraç, adam kayırma, patronaj, zimmete para geçirme ve rüşvet gibi uygulamalarla karar vermedir. Bu tür uygulamalardan kaynaklanan devlet bütünlüğünün olmaması, ekonomik faaliyetin maliyetlerini artırarak halkın güvenini ve ekonomik canlılığı azaltır. Bu bileşenin puanı, tümü eşit ağırlıkta olan aşağıdaki altı alt faktörün puanlarının ortalaması alınarak elde edilir:

- Halkın politikacılara güveni,
- Düzensiz ödemeler ve rüşvetler,
- Hükümet politikalarının şeffaflığı,
- Yolsuzluk olmaması,
- Yolsuzluk algıları ve
- Devlet ve kamu hizmetlerinde şeffaflık.

### **2.1.2.DEVLET BÜYÜKLÜĞÜ (BOYUTU)**

Endeks devlet boyutu ana başlığı içerisinde vergi yükü, devlet harcamaları ve mali sağlık alt unsurlarını inceleyerek ülkeleri buna göre değerlendirmektedir.

**Vergi yükü:** Vergi yükü, hem kişisel hem de kurumsal gelir üzerindeki marjinal vergi oranlarını ve gayri safi yurtiçi hasılanın (GSYİH) bir yüzdesi olarak genel vergilendirme düzeyini (hükümetin tüm düzeyleri tarafından uygulanan doğrudan ve dolaylı vergiler dahil) yansıtan bileşik bir ölçüdür. Bileşen puanı, üç nicel alt faktörden elde edilir:

- Bireysel gelir üzerindeki en yüksek marjinal vergi oranı,
- Kurum kazancı üzerindeki en yüksek marjinal vergi oranı ve
- GSYİH'nın yüzdesi olarak toplam vergi yükü.

Bu sayısal değişkenlerin her biri, bileşen puanının üçte biri kadar eşit ağırlıktadır. Bu eşit ağırlıklandırma, bir ülkenin üçüncü faktörde 0 puan olsa bile iki faktöre göre 67 gibi yüksek bir puan almasına olanak tanır.

**Devlet harcamaları:** Devlet harcama bileşeni, devlet tarafından yapılan tüketimi ve çeşitli yetkilendirme programlarıyla ilgili tüm transfer ödemelerini içeren devlet harcamalarının getirdiği yükü ortaya koymaktadır.

En uygun hükümet harcaması düzeyini belirlemek için hiçbir girişimde bulunulmamakla birlikte ideal düzey, kültürden coğrafyaya ve ekonomik gelişmişlik düzeyine kadar değişen faktörlere bağlı olarak ülkeden ülkeye değişiklik göstermektedir. Ancak bir noktada, kamu sektörünün boyutundaki ve kapsamındaki büyüme kaçınılmaz olarak kaynakların yanlış tahsisine ve ekonomik verimlilik kaybına yol açtığından, hükümet harcamaları kaçınılmaz bir yük haline gelir. Ciltler dolusu araştırma, kronik bütçe açıklarına ve kamu borçlarının birikmesine neden olan aşırı devlet harcamalarının ekonomik dinamizm üzerindeki en ciddi engellerden biri olduğunu göstermiştir.

Endeks metodolojisi, sıfır hükümet harcamasını kıyaslama olarak ele alır. Sonuç olarak, az gelişmiş ülkeler, özellikle de hükümet kapasitesi az olanlar, yapay olarak yüksek puanlar alabilirler. Bununla birlikte, herhangi bir kamu malı varsa bile çok az sağlayabilen bu tür hükümetlerin, hükümetin etkinliğini ölçen ekonomik özgürlüğün diğer bileşenlerinden (mülkiyet hakları, finansal özgürlük ve yatırım özgürlüğü gibi) bazılarında düşük puanlar alması muhtemeldir.

**Mali Sağlık:** hükümet bütçe yönetiminden kaynaklanan genişleyen açıklar ve artan borç yükü her ikisi açıdan da zayıflık, bir ülkenin genel mali sağlığının aşınmasına yol açar. Kötüleşen mali sağlık, sırayla, makroekonomik istikrarsızlık ve ekonomik belirsizlik ile ilişkilidir.

Borç, zaman içinde bütçe açıklarının birikmesidir. Teoride, kamu harcamalarının borç finansmanı, üretken yatırımlara ve nihayetinde ekonomik büyümeye olumlu bir katkı yapabilir. Bununla birlikte, özellikle sadece hükümet tüketimini veya transfer ödemelerini artıran harcamalar olmak üzere, kalıcı bütçe açıklarının neden olduğu artan kamu borcu, genellikle genel üretkenlik büyümesini baltalar ve sonuçta büyümeden ziyade ekonomik durgunluğa yol açar.

Mali sağlık bileşeni puanı, genel bileşen puanı hesaplanırken aşağıdaki şekilde ağırlıklandırılan;

- Son üç yıl için GSYİH yüzdesi olarak ortalama açıklar (puanın yüzde 80'i) ve
- GSYİH yüzdesi olarak borç (puanın yüzde 20'si). iki alt faktöre dayanmaktadır.

### **2.1.3. MEVZUAT VERİMLİLİĞİ (DÜZENLEYİCİ VERİMLİLİK)**

Bu ana başlık altında iş özgürlüğü, çalışma özgürlüğü ve parasal özgürlük alt unsurları dikkate alınmaktadır.

**İş Özgürlüğü:** İş özgürlüğü bileşeni, düzenleyici ve altyapı ortamlarının işletmelerin verimli çalışmasını ne ölçüde kısıtladığını ölçer. Nicel puan, bir işletmeyi başlatma, işletme ve kapatma kolaylığını etkileyen bir dizi faktörden elde edilir. Her ülke için iş özgürlüğü puanı 0 ile 100 arasında bir sayıdır ve 100 en serbest iş ortamını gösterir. Skor, Dünya Bankası'nın İş Yapma Kolaylığı raporundaki veriler kullanılarak tümü eşit ağırlıkta olan 13 alt faktöre dayanmaktadır:

- Bir İş kurma—prosedürler (sayı);
- Bir İş kurma—zaman (gün);
- Bir iş kurma—maliyet (kişi başına gelirin yüzdesi);
- Bir iş kurma—asgari sermaye (kişi başına gelirin yüzdesi);
- Lisans alma—prosedürler (sayı);2
- Lisans alma—zaman (gün);
- Lisans alma—maliyet (kişi başına gelirin yüzdesi);
- Bir işi kapatma—zaman (yıl);
- Bir işi kapatma—maliyet (mülkün yüzdesi);
- Bir işi kapatma—geri kazanım oranı (dolar bazında sentler);
- Elektrik alma—prosedürler (sayı);
- Elektrik alma—zaman (gün); ve
- Elektrik alma—maliyet (kişi başına gelirin yüzdesi).

**Çalışma Özgürlüğü:** diğer bir ifadeyle işgücü özgürlüğü bileşeni, bir ülkenin işgücü piyasasının yasal ve düzenleyici çerçevesinin çeşitli yönlerini, asgari ücretlerle ilgili düzenlemeler, işten çıkarmaları engelleyen yasalar, kıdem tazminatı gereklilikleri ve işe alma ve çalışılan saatlerle ilgili ölçülebilir düzenleyici kısıtlamalar ve ayrıca işgücü piyasasındaki istihdam fırsatlarının göstergesi niteliğinde bir ölçüsü olarak zorla katılım oranı, işgücünü dikkate alan nicel bir ölçüdür Çalışma Özgürlüğünün ölçülmesinde yedi nicel alt faktör eşit ağırlıkta kabul edilir ve her bir alt faktör, çalışma özgürlüğü bileşeninin yedide biri olarak sayılır:

- Asgari ücretin işçi başına ortalama katma değere oranı,
- Ek işçi çalıştırmanın engellenmesi,
- Saat sertliği,
- Gereksiz çalışanları işten çıkarma zorluğu,
- Kanunen zorunlu ihbar süresi,
- Zorunlu kıdem tazminatı ve
- İş gücüne katılım oranı.

### Parasal Özgürlük

Parasal özgürlük, fiyat istikrarının bir ölçüsünü fiyat kontrollerinin bir değerlendirmesiyle birleştirir. Hem enflasyon hem de fiyat kontrolleri piyasa faaliyetlerini bozar. Mikro ekonomik müdahale olmaksızın fiyat istikrarı, serbest piyasa için ideal durumdur. Parasal özgürlük bileşeninin puanı iki alt faktöre dayanmaktadır:

- Son üç yılın ağırlıklı ortalama enflasyon oranı ve
- Fiyat kontrolleri.

Bu faktörlerden son üç yılın ağırlıklı ortalama enflasyon oranı, parasal özgürlük için taban puanı oluşturan bir denklemin birincil girdisi olarak hizmet eder. Fiyat kontrollerinin kapsamı daha sonra taban puandan 20 puana kadar ceza indirimi olarak değerlendirilir

### 2.1.4. AÇIK PİYASALAR (PİYASA AÇIKLIĞI)

Bu başlık içerisinde ticaret özgürlüğü yatırım Özgürlüğü ve finansal özgürlük unsurları endeks hesaplamalarında dikkate alınmaktadır.

**Ticaret Özgürlüğü:** Ticaret özgürlüğü, mal ve hizmetlerin ithalat ve ihracatını etkileyen tarife ve tarife dışı engellerin kapsamının bileşik bir ölçüsüdür. Ticaret özgürlüğü puanı iki girdiye dayanmaktadır:



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- Ticaret ağırlıklı ortalama tarife oranı ve
- Tarife dışı engeller (NTB'ler).

Bir ülkeye giren farklı ithalatlar farklı tarifelerle karşı karşıya kalabilir (ve çoğu zaman da böyledir). Ağırlıklı ortalama tarife, her bir mal için ithalat payına dayalı olarak her tarife için ağırlıklar kullanılan tamamen nicel bir ölçüdür.

**Yatırım Özgürlüğü:** Ekonomik olarak özgür bir ülkede, yatırım sermayesinin akışı üzerinde hiçbir kısıtlama olmayacaktır. Bireylerin ve firmaların kaynaklarını kısıtlama olmaksızın hem ülke içinde hem de ülke sınırlarının ötesinde belirli faaliyetlere ve faaliyetlerden çıkarmalarına izin verilecektir. Böyle ideal bir ülke, Endeksin yatırım özgürlüğü bileşeninden 100 puan alacaktır.

Ancak uygulamada, çoğu ülkede yatırım konusunda çeşitli kısıtlamalar vardır. Bazılarının yabancı ve yerli yatırım için farklı kuralları vardır. Bazıları dövize erişimi kısıtlar. Bazıları ödemeler, transferler ve sermaye işlemleri üzerinde kısıtlamalar getirir. Bazılarında, belirli endüstriler yabancı yatırımlara kapalıdır.

Endeks, tipik olarak yatırıma uygulanan çeşitli düzenleyici kısıtlamaları değerlendirir. Aşağıda belirtildiği gibi puanlar, bir ülkenin yatırım rejiminde bulunan kısıtlamaların her biri için ideal 100 puandan düşülür. Bir hükümetin, yatırım özgürlüğünü ortadan kaldırmak için listelenen tüm kısıtlamaları maksimum düzeyde dayatması gerekli değildir.

## Yatırım Kısıtlamaları

### Yabancı yatırımın ulusal muamelesi

- Ulusal muamele yoksa ön taramadan 25 puan düşülür
- Bazı ulusal muamele varsa bazı ön elemelerden 15 puan düşülür
- Bazı ulusal muamele veya ön taramadan 5 puan düşülür

### Yabancı yatırım kodu

- Şeffaflık ve külfetli bürokrasi yoksa 20 puan düşülür
- Verimsiz politika uygulaması ve bürokrasiden 10 puan düşülür
- Bazı yatırım kanunları ve uygulamaları şeffaf değil veya verimsiz uygulanıyorsa 5 puan düşülür

### Arazi mülkiyeti üzerindeki kısıtlamalar

- Tüm gayrimenkul alımlarında sınırlı 15 puan düşülür
- Yabancı gayrimenkul alımlarında 10 puan düşürülür
- Gayrimenkul alımlarında bazı kısıtlamalardan 5 puan düşürülür

### Sektörel yatırım kısıtlamaları

- Birden fazla sektör kısıtlanmışsa 20 puan düşürülür
- Az sayıda sektör sınırlanmışsa 10 puan düşürülür
- Bir veya iki sektör kısıtlanmışsa 5 puan düşülmüştür

### Yatırımların adil tazminat olmaksızın kamulaştırılması

- Yasal başvuru olmaksızın ortak 25 puan düşülür
- Bazı yasal başvurularda ortak, 15 puan düşülür
- Yaygın olmayan başvurularda 5 puan düşülür

### Döviz kontrolleri

- Yabancıların veya yerleşiklerin erişimi yoksa 25 puan düşülür
- Erişim mevcut ancak büyük ölçüde kısıtlanmışsa 15 puan düşülür

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- Birkaç kısıtlamayla erişim sağlanıyorsa 5 puan düşülür

Sermaye kontrolleri

- Karların ülkesine geri gönderilmemesi; tüm işlemler devlet onayı gerektirirse 25 puan düşülür
- İç ve dış sermaye hareketleri onay gerektirir ve bazı kısıtlamalarla karşı karşıya kalırsa 15 puan düşülür
- Çoğu transfer, bazı kısıtlamalarla onaylanmışsa, 5 puan düşülür

**Finansal özgürlük:** Finansal özgürlük, bankacılık verimliliğinin bir göstergesi olduğu kadar hükümet kontrolünden ve finans sektörüne müdahaleden bağımsızlığın bir ölçüsüdür. Bankaların ve sigorta şirketleri ve sermaye piyasaları gibi diğer finansal kuruluşların devlet mülkiyeti rekabeti azaltır ve genellikle krediye erişim düzeyini düşürür.

Asgari düzeyde hükümet müdahalesi ile karakterize edilen ideal bir bankacılık ve finansman ortamında, bağımsız merkez bankası denetimi ve finans kurumlarının düzenlenmesi, sözleşmeden doğan yükümlülüklerin uygulanması ve dolandırıcılığın önlenmesi ile sınırlıdır. Kredi piyasa şartlarına göre tahsis edilir ve hükümetin mali kurumları yoktur. Finansal kurumlar, bireylere ve şirketlere çeşitli finansal hizmetler sunar. Bankalar kredi açmakta, mevduat kabul etmekte ve yabancı para cinsinden işlem yapmakta serbesttir. Yabancı finans kurumları serbestçe faaliyet gösterir ve yerli kurumlarla aynı muameleye tabi tutulur. Endeks, beş geniş alana bakarak bir ekonominin finansal özgürlüğünü puanlamaktadır:

- Mali hizmetlere ilişkin devlet düzenlemesinin kapsamı,
- Doğrudan ve dolaylı mülkiyet yoluyla bankalara ve diğer finansal firmalara devlet müdahalesinin derecesi,
- Kredi tahsisi üzerindeki hükümet etkisi,
- Mali ve sermaye piyasası gelişiminin kapsamı ve
- Dış rekabete açıklık.

Bu beş alanın, ekonomideki insanlar ve işletmeler için finansman fırsatlarına kolay ve etkili erişim sağlayan bir ekonominin genel finansal özgürlük düzeyini değerlendirdiği düşünülmektedir.

## ULUS MARKA DEĞERİ ENDEKSİ VE EKONOMİK ÖZGÜRLÜK ENDEKSİ İLİŞKİSİ

Çalışmamızın bu kısmında iki endeks arasındaki ilişkiyi açıklamaya yönelik analizimizi destekleyici nitelikte olması için ülkelerin yıllık verilerini kullanarak gerçekleştirilen regresyon analizlerinin sonuçları paylaşılacaktır. Bu analizler yapılırken Kanada ve Avusturalya seçilmiştir. Bu iki ülkenin seçilmesindeki neden çalışma içerisinde de görüleceği üzere dikkate alınan tüm yıllarda sıralamada ilk on beş içerisinde yer alıyor olmasıdır.

İki endeks arasındaki ilişkiyi genel olarak sıralama ve puanlarına göre değerlendirmek istediğimizde elde edilen sonuç aşağıdaki tabloda ifade edilmektedir.

**Tablo 3:** Ulus Marka Değer ve Ekonomik Özgürlük Endeksleri İlişkisi

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12,100	1	12,100	7,539	,023 <sup>b</sup>
	Residual	14,445	9	1,605		
	Total	26,545	10			

a. Dependent Variable: ulus\_marka\_değeri

b. Predictors: (Constant), ekonomik\_özgürlük

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1	(Constant)	15,764	1,647	9,569	,000
	ekonomik özgürlük	-1,100	,401	-,675	,023

a. Dependent Variable: ulus\_marka\_değeri

Tablo incelendiğinde endekslerde ülkelerin yıllara göre genel sıralaması ve genel puanlaması arasında % 95 anlamlılık seviyesinde anlamlı bir ilişki bulunmaktadır. Endeksler arası ilişkiyi diğer boyutlardan da ele alacak olursak şunları söylemek mümkündür;

Ulus marka değeri endeksinde ülkeler arası bir sıralama gerçekleştirilirken yönetim başlığı altında yasal çerçeve ve yargı bağımsızlığı gibi alt faktörler dikkate alınmaktadır. Yine aynı endekste insan ve değerler başlığı tarafından hükümet tarafından sağlanması gereken emniyet güvenlik eşitlik gibi uygulamalar yer almaktadır. Ekonomik özgürlük endeksinin hukukun üstünlüğü ana başlığı içerisinde ise yer alan mülkiyet hakları, yargısal etkinlik ve hükümet bütünlüğü unsurları içerisinde güven şeffaflık hakların korunması ve yargı bağımsızlığı gibi alt konular incelenmektedir. Burada yer alan benzer içerikler ulus marka endeksi ile ekonomik özgürlük endeksi arasında bir bağlantı noktası olarak kabul edilebilmektedir. Bu durumu daha bilimsel ifade edebilmek için yapılan analize yönelik sonuç tablosu aşağıda verilmiştir.

**Tablo 4:** Brand finance yönetim ve ekonomik özgürlük hukuk kuralları ilişkisi analiz sonucu

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48,406	1	48,406	10,519	,010 <sup>b</sup>
	Residual	41,415	9	4,602		
	Total	89,821	10			

a. Dependent Variable: ekoözgür hukuk kuralları

b. Predictors: (Constant), brand\_yönetişim

## Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1	(Constant)	55,019	1,022	53,849	,000
	brand_yönetişim	7,926	2,444	,734	,010

a. Dependent Variable: ekoözgür hukuk kuralları

Tablo incelendiğinde %95 anlamlılık düzeyinde ekonomik özgürlük endeksinin hukuk kuralları ile ulus marka değerinin yönetim boyutu arasında anlamlı bir ilişki bulunmaktadır.

Her iki endeks arasındaki bir diğer ortak nokta GSYİH'dir. Ulus marka değeri endeksi bu ölçütü genel bir değerlendirme kriteri olarak ele alırken, ekonomik özgürlük endeksi GSYİH'i devlet büyüklüğü ana başlığı içerisinde yer alan vergi yükü mali sağlık gibi kriterler içerisinde değerlendirmektedir. Aynı bir nokta olarak vergi hususu ulus marka değeri endeksi tarafından işletme ve ticaret başlığı içerisinde de ele alınmaktadır.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 5:** Brand finance GSYİH ve ekonomik özgürlük devlet büyüklüğü ilişkisi analiz sonucu

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	261,132	1	261,132	9,359	,028 <sup>b</sup>
	Residual	139,505	5	27,901		
	Total	400,637	6			

a. Dependent Variable: ekoözgürlük devlet büyüklüğü

b. Predictors: (Constant), brand\_GSYİH

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	404,815	70,759		5,721	,002
	brand_GSYİH	-31,347	10,247	-,807	-3,059	,028

a. Dependent Variable: ekoözgürlük\_devlet\_büyükülüğü

Tablo incelendiğinde %95 anlamlılık düzeyinde ekonomik özgürlük endeksinin devlet büyüklüğü unsuru ile ulus marka değerinin GSYİH boyutu arasında anlamlı bir ilişki bulunmaktadır.

Ekonomik özgürlük ve ulus marka değeri endeksleri iş yapma ve işgücünün korunması konusunu değerlendirmeye almaktadır. Konuyla ilgili olarak ekonomik özgürlük endeksi düzenleyici verimlilik içerisinde iş özgürlüğü çalışma özgürlüğü ve piyasa özgürlüğü konularıyla çalışma sektörünü dikkate alırken ulus marka değeri endeksi de iş ve ticaret başlığı içerisinde iş yapma kolaylığı gibi konuları ele almaktadır.

**Tablo 6:** Brand finance yönetim ve ekonomik özgürlük düzenleyici verimlilik ilişkisi analiz sonucu

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	598,189	1	598,189	29,604	,000 <sup>b</sup>
	Residual	202,061	10	20,206		
	Total	800,250	11			

a. Dependent Variable: brand\_insan\_değerler

b. Predictors: (Constant), ekonomik\_özgürlük\_düzenleyici\_verimlilik

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2,833	4,495		,630	,543
	Ekonomik özgürlük düzenleyici verimlilik	4,258	,782	,865	5,441	,000

a. Dependent Variable: brand\_insan\_değerler

Tablo incelendiğinde %95 anlamlılık düzeyinde ekonomik özgürlük endeksinin devlet büyüklüğü unsuru ile ulus marka değerinin GSYİH boyutu arasında anlamlı bir ilişki bulunmaktadır.

İki endeks arasında çalışma kapsamında dikkate alınacak bir diğer ortak nokta ise piyasalar konusudur. Ulus marka değeri endeksi piyasalar başlığı altında yatırımlar kapsamında doğrudan yabancı yatırımları dikkate almaktadır. Ekonomik özgürlük endeksi de piyasa açıklığı ana başlığı içerisinde ticaret

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

özgürlüğü, yatırım özgürlüğü ve finansal özgürlükleri dikkate almaktadır. Bu hususta yatırımlar konusu iki endeksin kesiştiği bir diğer nokta olarak karşımıza çıkmaktadır.

**Tablo 7:** Brand finance piyasa ve ekonomik özgürlük piyasa açıklığı ilişkisi analiz sonucu

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19,219	1	19,219	26,762	,001 <sup>b</sup>
	Residual	5,745	8	,718		
	Total	24,964	9			

a. Dependent Variable: ekonomik\_piyasa\_ açıklığı

b. Predictors: (Constant), brand\_piyasalar

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	34,583	1,894		18,259	,000
	brand_piyasalar	,000	,000	,877	5,173	,001

a. Dependent Variable: ekonomik\_piyasa\_ açıklığı

Tablo incelendiğinde %95 anlamlılık düzeyinde ekonomik özgürlük endeksinin piyasa açıklığı unsuru ile ulus marka değerinin piyasalar boyutu arasında anlamlı bir ilişki bulunmaktadır.

## SONUÇ

Çalışmamızın amacı doğrultusunda ulus marka değeri endeksi ve ekonomik özgürlük endeksi arasındaki ilişkinin incelenmesi kapsamında iki endeks arasındaki ilişki teorik bir biçimde ortaya konulduktan sonra analizle de bu sonuç desteklemektedir. Bu açıdan ulus marka değeri ve ekonomik özgürlük endeksinin ilişkisi ekonomik endeksinin dört ana ölçütü ve ulus marka değerinin bu unsurlara karşılık gelen unsurlarıyla incelenmiştir. Ekonomik özgürlük endeksinin piyasa açıklığı, düzenleyici verimlilik, hukuk kuralları ana başlıkları ile ulus marka değeri endeksinin insan ve değerler, işletme ve ticaret, piyasalar, ve yönetim ana başlıkları analize tabi tutulmuştur.

Sonucunda yukarıda tablolarda da görüleceği üzere ekonomik özgürlük endeksinin dört boyutu ile ulus marka değerinin dört boyutu arasında anlamlı ilişkiler elde edilmiştir. Ayrıca ulus marka değeri endeksi genel sıralaması ile ekonomik özgürlük endeksi sıralamaları da ayrı bir şekilde teste tabi tutulmuş ve sıralamalar arasında da anlamlı bir ilişki olduğu ortaya çıkarılmıştır.

Sonuç olarak çalışmamızın ana amacı olan ulus marka değeri ve ekonomik özgürlük endeksi arasında ilişkinin incelenmesi sonucunda hem genel olarak hem de boyutlar kapsamında endeksler arası olumlu bir ilişkinin olduğu ispatlanmıştır.

Araştırmada kullanılan yılların değiştirilmesi, farklı ülkelerin dikkate alınması ve ek değişkenler kullanılması sonuçlarda değişiklik oluşmasına sebebiyet vermektedir. Bu çalışma gerçekleştirilirken her ana unsur için iç alt değişken kullanılmıştır. Bu hususta değişken sayılarının, yılların ve ülkelerin artırılmasıyla çalışma geliştirilebilir.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

## MODELING PUNDING AND DOPAMINE DYSREGULATION SYNDROME IN PARKINSONISM ANIMAL MODEL

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### ABSTRACT

In Parkinson's disease, punding and dopamine dysregulation syndrome (DDS) are associated with a reduced quality of life. Only a few studies have so far demonstrated that these behaviors stem from dopamine-dependent sensitization to appetitive stimuli within the dorsolateral and ventral striatum, respectively. In this study, we aimed to build an animal model of these behaviors for studying their pathophysiology and showed the role of ventral/dorsal distribution of dopaminergic denervation by injecting a low dose of 6-hydroxydopamine toxin in the bilateral ventral tegmental area (VTA) or substantia nigra (SN) specifically. To explore the rewarding properties of apomorphine, the conditioned place preference (CPP) paradigm was used. Stereotypic and dyskinetic behaviors were induced with daily high-dose apomorphine treatment and analyzed using two different scales. At the end of all behavioral tests, the extent of dopaminergic denervation was shown with tyrosine hydroxylase immunohistochemistry staining. All dopaminergic denervation-induced rats developed dyskinetic behaviors after apomorphine treatment. The severity of these behaviors increased day by day and was strongly and positively correlated with the mean lesion volume ( $r=0.849$ ,  $p<0.001$ ). Low-dose apomorphine-induced CPP in rats with parkinsonism and conditioned place avoidance in normal rats. The conditioning score was higher in the ventral dominant denervated group, and it was moderately and positively correlated with the mean ventral lesion volume ( $r=0.642$ ,  $p=0.001$ ). This study concludes that the rewarding properties of DRT are related to the sensitization of the ventral striatum due to dopaminergic denervation.

**Keywords:** Dopamine dysregulation syndrome, Punding, 6-OHDA, Ventral tegmental area, Substantia Nigra

### 1. INTRODUCTION

Parkinson's Disease (PD) is a common progressive neurodegenerative disease. Symptomatic treatment is very effective with dopaminergic drugs or surgical methods for motor symptoms, which is the main characteristic of the disease. However, these approaches are inadequate in the advanced stages of the disease, and treatment options are limited for added non-motor symptoms. In recent years, our awareness has increased about dopamine replacement therapy (DRT) related to impulsive compulsive behaviors (ICBs). Impulse control disorders, punding, and dopamine dysregulation syndrome (DDS) are classified under ICBs. In our study, we focused on punding and DDS.

"Punding" is the name given to the stereotypical behavior that goes through complex, extreme, purposeless, repetitive movements. Punding was first recognized in amphetamine addicts [1]. The most common causes of punding are psychostimulant dependence and dopamine replacement therapy in PD. Punding prevalence in PD patients taking low-dose and high-dose DRT are 1.4% and 14% respectively [2, 3]. Interestingly, all patients with Parkinson's disease have dyskinetic movements at a point during their replacement therapy. But punding occurs in less than one of five patients. As known, the variation of dopaminergic denervation at dorsal striatum is very low among PD patients but it is not the case for ventral dopaminergic denervation. So, studying the differential effects of dopaminergic denervation at different topographic extensions is crucial for understanding the pathophysiology of punding.

Stereotypy is described as abnormal timing or release of normal movements and is usually repetitive and aimless [4]. Punding is thought to be similar to stereotypical movements that have been working in animal models for many years. Our clinical knowledge about PD suggests that D2 / D3 receptor agonists rarely lead to the development of punding [5]. So, in our study, we used D1/D2 receptor agonist apomorphine at a high dose (1mg/kg) for chronic treatment to induce stereotypic and dyskinetic movements.

DDS is similar to a drug addiction clinic in which patients receive dopaminergic medications at otherwise unacceptably high doses despite the complications. Dopaminergic drugs taken are generally L-dopa and high potency-fast effect DAs such as subcutaneous apomorphine [6]. DDS prevalence is 3.4%-4.1% in the PD population [6, 7].

DDS is thought to be due to a sensitization in the ventral striatum. In imaging studies, it was found that L-dopa-related dopamine release was greater in patients with DDS than in those without DDS [8]. For the DDS model, conditioned place preference has been used so far by several studies. Furthermore, parallel with these imaging results, bilateral nucleus accumbens (NAc) denervation has been performed by bilateral posterior VTA 6-OHDA injection and denervated animals showed CPP with D2 and D3 agonists but not with cocaine [9]. In addition, a different study showed that pramipexole in a bilateral 6-OHDA-induced striatal lesion model and D2-D3 agonists in a 6-OHDA injected in bilateral medial forebrain bundle (MLF) model triggered CPP [10, 11]. Lastly, the unilateral denervation model by 6-OHDA injection to MLF demonstrated that D1/D2 agonist apomorphine is rewarding at low doses for denervated animals [12].

The appropriate animal model for DDS has not been determined yet. Unilateral 6-OHDA lesion is a well-validated animal model but for studying ICBs, unilateral models are not preferred because of possible postural biases and contralateral sensory-motor neglect [13]. On the other hand, bilateral 6-OHDA models cause severe adipsia, aphagia, and bradykinesia. Locomotor activity limitations because of severe bradykinesia may influence the results of experiments like CPP. Differential effects of ventral versus dorsal dopaminergic denervation have not been investigated so far. Thus, by bilateral injections of 6-OHDA at lower than standard doses to SN or VTA, we aimed to generate bilateral partial dorsal or ventral predominant dopaminergic denervation of the striatum.

## **2. MATERIALS AND METHODS**

### **2.1. Animals**

Male, Sprague Dawley rats (n=64) weighing 200-400 grams were used in this study (Hacettepe University, Ankara, Turkey). All animals were kept at constant humidity, at room temperature 18-20°C, and 12 hours of light/dark cycle throughout the entire study. Food and drink restrictions were not made. This study was approved by our local ethics committee. Animals were brought to the laboratory two days before the experiments to allow them to adapt to their cages and environments. All experiments, except the ones that required special apparatus, were performed when the rats were in their cages. Rats were divided into 5 different groups randomly 6-OHDA injected in VTA or SN, 0.9% saline injected in VTA or SN, and intact rats to create partial dopaminergic denervation in the striatum at different topographic extensions. This study was supported by Hacettepe University with the grand number THD-2015-6917.

### **2.2. Surgical procedures**

Rats were anesthetized with intraperitoneal injections of ketamine (50mg/kg) and xylazine (8mg/kg) and placed in a stereotaxic frame. 10 µg of 6-OHDA hydrobromide (Sigma-Aldrich, ABD), dissolved in 5µl 0.9% with 0.02% ascorbic acid (w/v) infused at a rate of 1µl/min and needle was left in the same position after injections for an additional 3 minutes to give time for adequate diffusion chance of 6-OHDA to the region of interest. 21 rats received bilateral stereotaxic 6-OHDA injection targeted to SN according to Pellegrino rat brain atlas at coordinates 5.2mm posterior and 2mm lateral to bregma, 7.2 mm ventral to dural surface and tooth bar 2.3mm below the interaural line. VTA coordinates were 6mm posterior and 1mm lateral to bregma, 8mm ventral to the dural surface, and the tooth bar was left at the neutral position for 17 rats [14]. Sham-operated rats (n=10 for SN, n=10 for VTA) underwent the same surgical procedures but only received 5µl 0.9% saline, and intact rats (n=6) did not undergo any surgical

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

procedure. After surgical procedures were completed, a 3-week interval was given before starting with the behavioral experiments.

## 2.3. Behavioral Experiments

To determine the extent of motor disturbances based on bilateral dopaminergic neuronal loss, an open-field test was used. The rats were placed in an activity cage (45 cm × 45 cm × 30 cm) and analyzed for basal motor activity for 1 hour. After the experiment, the total distance traveled, and average speeds of the animals were evaluated using Ethovision XT video tracking software.

For CPP, a three-chambered box separated by guillotine doors which has two identical end chambers (15x15x20cm) and a central chamber (5x15x20cm) was used. The end chambers were arranged differently for visual and tactile cues as wall paintings (mottled or striped) and floor properties (4mm or 4cm diameter holes). At the pretest, while the doors of the CPP box were open, rats were allowed to spend 15 minutes of free time. The time spent at each chamber was noted. The end chamber which the rat spent less time at the pretest associated with apomorphine injection. At conditioning days rats received either apomorphine 0.1mg/kg (Britannia Pharmaceuticals-Gen Drugs) or same volume saline intraperitoneally and were placed immediately in the chamber assigned while the guillotine doors closed. All rats had 8 conditioning sessions each lasting 30 minutes and an apomorphine day followed by a saline day. After conditioning, on test day the rats were allowed to spend 15 minutes of free time with the entire apparatus again. At the end of the experiment conditioning score was calculated in seconds as the time spent on test day at drug drug-associated chamber minus the time at the pretest in there. Positive and negative scores are considered as CPP and conditioned place avoidance (CPA) respectively.

After the CPP experiment, rats were divided into two groups and given daily apomorphine 1mg/kg(n=45), or saline treatment(n=19). After 7 days of treatment, a last challenge dose was given after a week drug-free interval. For all treatment days rats videotaped the 20th minute and 50th minute of injections. These videos were then analyzed by an investigator blind to treatment groups.

Dyskinesias were analyzed with a scale adapted for bilateral models [15]. In this scale, dyskinesias were classified into four types: locomotive dyskinesias, axial dystonia, orolingual dyskinesias, and right and left forelimb dyskinesias. Each of these four types was scored from 0 (absent) to 4 (severe), giving a total score between 0 and 20 (for the limb dyskinesias, the right and left sides were scored separately). Stereotypic behavior is analyzed by the classical stereotypy scale [16]. Animals were rated as follows: 0=asleep or stationary; 1=active; 2=mostly active with a burst of rearing or sniffing; 3 =sniffing along the same patch of the cage; 4=sniffing on the same cage spot; 5=stereotypic plus burst of licking; 6 = continuous licking or gnawing at the same location. The timeline of the study is shown in Figure 1.

Figure 1.

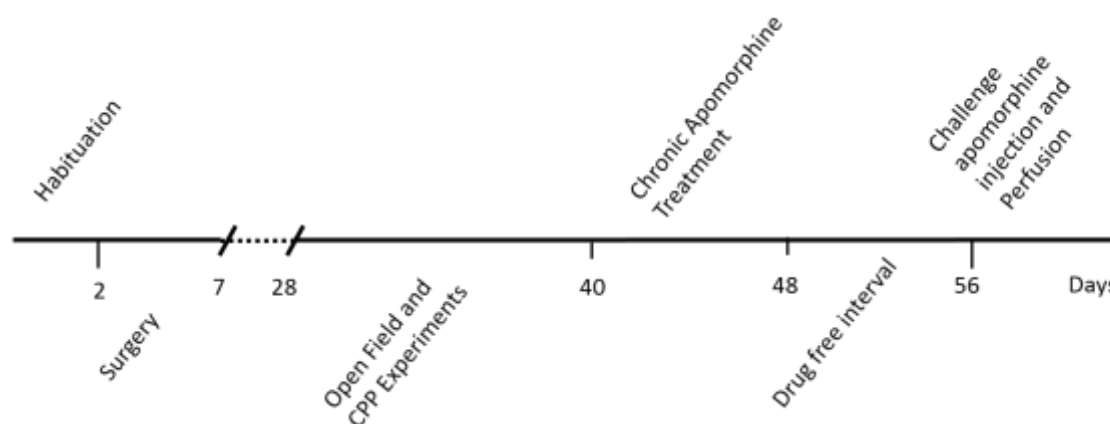


Figure 1. Timeline of the study.

## 2.4. Perfusion and Staining



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

At the end of experiments, after 2-4 hours of the last injections, all animals were decapitated after high-dose chloralhydrate anesthesia followed by intracardiac perfusion with a 4% paraformaldehyde solution in 0.1 M phosphate buffer. Brains were extracted and maintained for one day at room temperature in perfusion solution (4% paraformaldehyde) and then 30% glucose solution at +4°C for at least 24 hours for cryoprotection. 20 µm fresh frozen coronal brain sections which were acquired with a microtome (Leica CM 1100), were placed on poly-L-lysine covered slides and dried on air to fix.

1 section per 200µm of striatum was selected to stain. Before the staining protocol, for antigen retrieval, the sections were subjected to a solution containing 0.05% trypsin and 0.1% calcium chloride for 30 min at 37 ° C. After washing twice with PBS, slides left in H<sub>2</sub>O<sub>2</sub> blocking solution (Abcam- IHC kit- ab80436) for 10 min. Again, washed with PBS and protein blocking solution (Abcam- IHC kit- ab80436) was put on slides for another ten min. After blocking finished, a 1:1000 concentration of anti-tyrosine hydroxylase antibody (Abcam- EP1533Y) in PBS-covered sections was kept at +4°C overnight. The next day firstly, complement solution (Abcam- IHC kit- ab80436) for ten min, then HRP conjugate (Abcam- IHC kit- ab80436) for 15 min performed to section. Lastly, a 1:50 concentration of DAB chromogen (Abcam- IHC kit- ab80436) in DAB substrate (Abcam- IHC kit- ab80436) was put on slides up to the brownish color emergence. After the protocol had finished, the slides were examined by a camera-embedded light microscope (Nikon Eclipse E600, Ex 450-560 nm), and pictures of sections were captured at 10x magnification with software (NIS-Elements AR 2.30).

Sections of the striatum that are 1.7, 1.2, and 0.7mm anterior to bregma were selected for evaluation of dopaminergic denervation. For each brain, the lesion area and total striatal area were calculated with an image processing program (ImageJ 1.50i) at these three coordinates and an average of these values were used to calculate the mean lesion volume. The rats that showed less than %10 and more than %80 mean lesion volume were excluded from the study. To determine the dorsal and ventral extent of the lesion, the line that combines the most ventral edge of the lateral ventricle and external capsule is accepted as a border. The lesions dorsal to the line are accepted as dorsal lesions and ventral ones as ventral lesions. For each subject mean dorsal and ventral lesion volume was calculated separately too (Figure 2).

## 2.5. Statistical Analyzes

All statistical analyses were performed using SPSS 21.0 (Statistical Package for Social Sciences, SPSS Inc, Chicago, USA). The mean values of the variables examined in this study for each experiment group were determined using a t-test. Difference of variables according to groups is done by one-way ANOVA and Tukey HSD was used for postdoc analysis. Changes in dyskinesia and stereotypy scores by treatment days were analyzed by repeated measures ANOVA. Statistical significance was accepted as  $p = 0.05$ . The relation between striatal lesion percentages and behavioral parameters was examined using the Pearson correlation coefficient. All data are shown as means  $\pm$  standard deviation.



Figure 2.

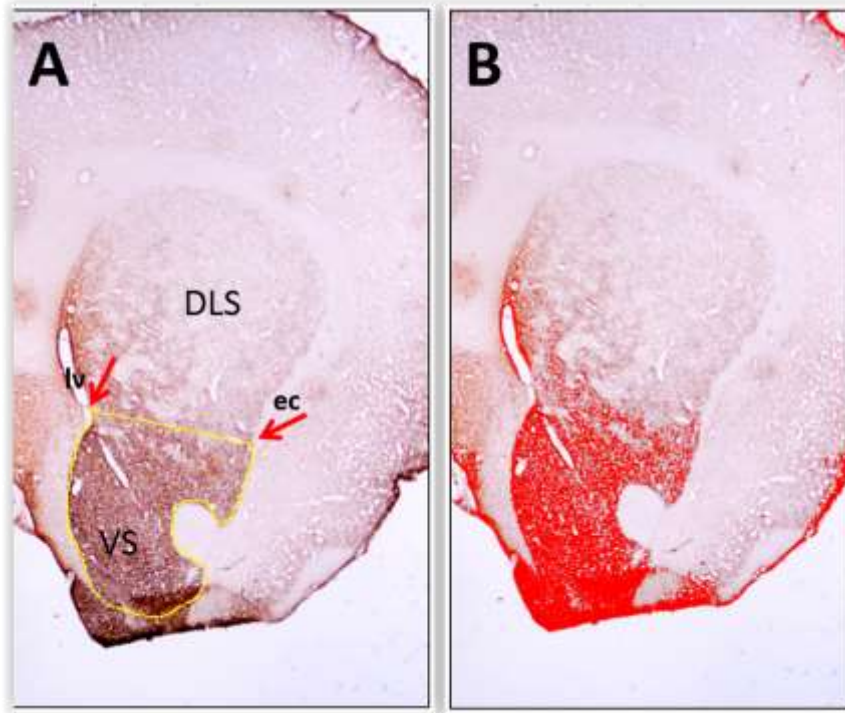


Figure 2: Lesion volume calculation. A) An example of a stained right striatum section of the SN group is shown. The line between the lateral ventricle and the external capsule is accepted as the border between DLS and VS. B) Area selection with image processing program.

### 3. RESULTS

#### 3.1. Bilateral partial dopaminergic denervation does not cause severe weight loss and bradykinesia

The bilateral 6-OHDA toxin models can lead to mortality rates of up to 82% [17]. Because of severe adipsia and aphagia, animals sometimes need even tube feeding for survival. Although unilateral models are more compatible with survival, postural biases, especially ipsilateral rotation induced by apomorphine can cause misinterpreting the results of behavioral tests.

In this study, we built a bilateral partial denervation model. For the VTA group ( $n = 17$ ), the mean total striatal lesion percentage was  $34 \pm 3.23$ , the mean ventral striatal lesion percentage was  $48 \pm 2.09$ , and the mean dorsal striatal lesion percentage was  $22 \pm 4.78$ .

For the SN group ( $n=21$ ), the mean total striatal lesion percentage was  $42 \pm 4.43$ , the mean ventral striatal lesion percentage was  $24 \pm 5.89$ , and the mean dorsal striatal lesion percentage was  $58 \pm 1.23$ . The dorsal lesion percentage in the SN group is significantly higher than the VTA group ( $p < 0.001$ ) and the ventral lesion percentage in the VTA group is significantly higher than the SN group ( $p = 0.002$ ). Total striatal lesion volume was similar in VTA and SN groups ( $p = 0.185$ ). Sham-operated subjects and controls did not show dopaminergic denervation. Striatal lesion percentages according to groups are shown in Table 1.

Table 1.

		N	Mean	SEM	p
Mean striatal lesion	<i>VTA group</i>	17	34,1895	3,23	0,185
	<i>SN group</i>	21	42,3982	4,43	
Mean ventral lesion	<i>VTA group</i>	17	48,1268	2,09	<b>0,002</b>
	<i>SN group</i>	21	24,5390	5,89	
Mean DSL lesion	<i>VTA group</i>	17	22,2115	4,78	<b>&lt;0,001</b>
	<i>SN group</i>	21	58,1494	1,23	

Table 1: Striatal lesions according to groups. For the VTA group (n=17), mean total striatal, ventral, and DSL lesion percentages were 34%, 48%, and 22%, and for the SN group (n=21) 42%, 24%, and 58%. The mean ventral lesion is higher in the VTA group (p=,002), and the mean DSL lesion is higher in the SN (P<0,001). VTA: Ventral Tegmental Area, DSL: Dorsolateral, SN: Substansia Nigra.

After surgical procedures, all animals survived and continued with further experiments. Also, severe weight loss is not detected. The average weight of the animals was  $358 \pm 43$  gr, which showed no significant difference between the groups (p=0.595). Basic motor abilities are studied with open-field locomotor activity tests. According to test results, as expected the average speed of the dorsal predominant denervated group ( $v=131 \pm 29$  cm/min) was lower than the ventral predominant ( $v=134 \pm 38$  cm/min) denervated group, sham-operated ( $v=144 \pm 39$  cm/min) and controls ( $v=141 \pm 36$  cm/min). However, the difference between the groups was not statistically significant (p=0.535). This finding supports that partial dopaminergic denervation does not cause severe bradykinesia.

### 3.2. Apomorphine treatment induces dyskinetic behaviors in all dopaminergic denervated animals

Dyskinetic behaviors developed and increased significantly day by day during treatment in all denervated subjects that get apomorphine for treatment (n=28, p<0,001). In addition, it was observed that after a one-week drug-free interval following the treatment period, a challenge dose of apomorphine-induced dyskinetic behaviors close to the last day of treatment. This is explained by behavioral sensitization. Dyskinesia scores according to the treatment days are shown in Figure 3. Sham-operated rats, controls, and the denervated rats treated with SF did not develop dyskinetic behaviors.

Dyskinesia scores that were compared for each day of treatment separately did not show significant differences between SN and VTA groups (1st day p=0,548, challenge day p=0,292). In parallel with our findings, PD patients suffer from dyskinetic behaviors as DRT duration is getting longer. Also, being at a late stage of the disease (more severe dopaminergic denervation) is a risk factor for developing dyskinesias. When the relationship between the dyskinetic behaviors (last day's dyskinesia scores) and the weight of the dopaminergic denervation was investigated in our data, it was found that the mean lesion percentage and the dyskinesia score were strongly and positively correlated (Pearson test  $r=0.849$ ,  $p < 0.001$ ).

Figure 3.

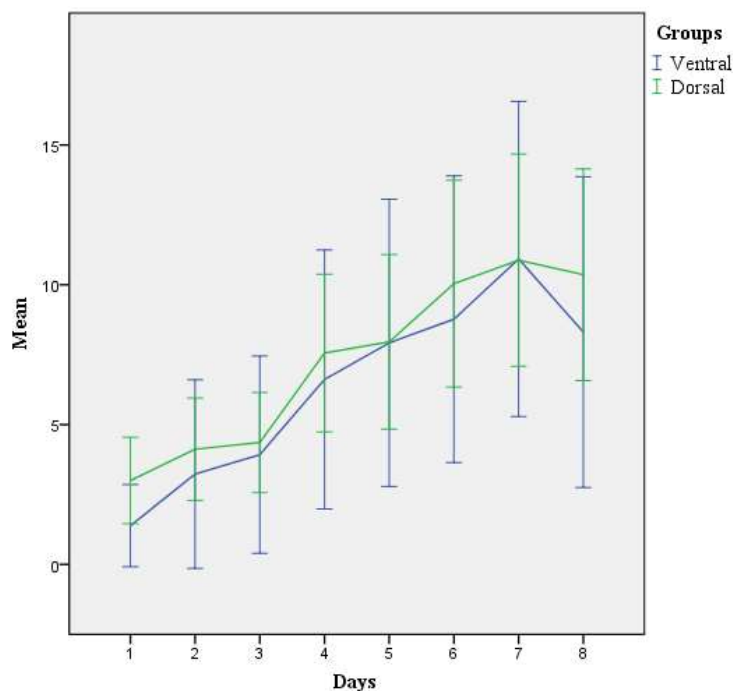


Figure 3. Mean dyskinesia scores of groups according to treatment days. The blue line shows ventral, green line shows dorsal predominant dopaminergic denervated groups. After the 7th day a week drug-free interval was given.

### 3.3 Stereotypies

All rats treated with apomorphine, including the sham-operated ones and controls, had developed stereotypic behavior (n=45). Stereotypies do not show a gradual increase with treatment days like dyskinesia. Rather than a linear increase, first increased and then stayed at similar levels (Figure 4). The first and the last treatment day dyskinesia scores between groups and change of the scores with time do not show a significant difference (1st day btw groups  $F=0.983$ ,  $p=0.411$ , 7th day btw groups  $F=1.153$ ,  $p=0.340$ , change by day  $p=0.453$ ). In addition, after challenge apomorphine injection, stereotypies were more pronounced in sham-operated animals and controls. For challenge day stereotypy scores showed a significant difference between groups ( $F=9.625$ ,  $p<0.001$ ). Post hoc analysis pointed out that SN group stereotypy scores were significantly lower than sham-operated and controls ( $p<0.001$ ,  $p=0.003$  respectively).

The mean CS was  $172 \pm 214$  in the ventral weighted lesion group,  $99 \pm 202$  in the dorsal weighted lesion group,  $-32 \pm 92$  in the sham-operated group, and  $-62 \pm 60$  in the controls. CS showed a significant difference between groups ( $F=5.810$ ,  $p=0.001$ ). Post hoc analysis determined that the difference depends on higher CS values in the VTA group according to sham-operated ones and controls ( $p=0.003$ ,  $p=0.026$  respectively).

VTA and SN groups did not display significant differences ( $p=0.549$ ) (Figure 5).

When we looked closer at the correlation between lesion volumes and CS, the mean ventral lesion percentages were positively correlated with CS (Pearson test,  $r = 0.642$ ,  $p < 0.001$ ).

## 4. DISCUSSION

In our study, locomotor activity is measured with an open-field test. We didn't find significant differences in locomotor activity between groups. This is in agreement with the knowledge that PH motor findings begin after more than 80% dopaminergic denervation develops in the SN. No subject in our study has bilateral >80% striatal dopaminergic denervation. Similar to our study, in a study in which bilateral partial medial VTA and SNpc lesions were formed with 6-OHDA, there was no difference between the locomotor activities of the subjects and the controls [18]. To show subtle changes in motor

performance due to bilateral SN lesions, it is decided to use a test considering fine motor movements like the stepping test in further studies.

The results show that the development of DDS in PD is related to ventral striatal dopaminergic denervation severity. Previously, parallel with our findings, it was shown that denervation of posterior VTA inhibits the induction of CPP with cocaine in normal rats [9]. Furthermore, a recently published study showed that in PD, dopaminergic denervation in VTA is more variable among patients than in SN [19]. The post-mortem studies indicated that the intersubject VTA denervation variability could be in a wide range (%40-77) [20]. This result could explain why DDS is not seen in every PD patient like dyskinesia is.

Spine enlargement of medium spiny neurons (MSNs) is taught to be the pathological hallmark of levodopa-induced dyskinesia (LID). In a rat LID model, it is shown that MSNs of NAc also had enlarged spines [21]. This excitatory super sensitivity of NAc MSNs could have a role in the development of DDS.

All rats treated with apomorphine developed stereotypic behaviors in this study. Our results showed stereotypic behaviors which are accepted as punding models are not associated with dopaminergic denervation. Similarly, in the diseases that are treated with DAs, punding can also occur without denervation like prolactinomas and restless leg syndrome.

Studies have shown that there is a positive correlation between the severity of "punding" and the severity of dyskinesias [4, 22].

Up to our knowledge, this is the first study that investigates the induction of CPP with apomorphine in the bilateral PD model which compares ventral and dorsal weighted dopaminergic denervated groups. The main result of this study is that the development of DDS in PD is related to ventral striatal dopaminergic denervation severity. In addition, in our study, dyskinetic behaviors were found to be associated with the severity of dopaminergic denervation and the duration of the treatment. On the other hand, the difference between denervated and intact animals and the effects of dose or duration of treatment are not always clear for stereotypic behaviors that are rated with stereotypy scales in studies. The reduction of stereotypy scores in rats with dorsal predominant dopaminergic denervation in this study is explained by the inadequacy of the scales for the rich recurrent behavioral repertoire in the dopaminergic denervated animals. A new stereotypy scale in which dyskinetic and stereotypic movements of animals are dissected is needed to be developed for further understanding of these behaviors and their relations with dopaminergic denervation.

## 5. CONCLUSION

This study suggests an association between the severity of ventral striatal dopaminergic denervation and the development of DDS in PD. Imaging studies have revealed that ventral dopaminergic neuron loss is more variable in PD. Emerging neuroimaging methods will allow the determination of VTA neuron loss in patients, and our study has indicated that these individuals may be at risk for developing DDS. Furthermore, all rats receiving dopamine agonists developed stereotyped behaviors, suggesting that all PD patients under this treatment are at risk for punding. Punding screening should be added to routine PD examinations.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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BAĞIMSIZ BİR OTOMATİK GERİLİM REGÜLATÖRÜ PERFORMANSININ  
İYİLEŞTİRİLMESİNE YÖNELİK YILAN ARAMA ALGORİTMASI TABANLI EKLEMELİ  
PD-PI DENETLEYİCİ TASARIMI

SNAKE SEARCH ALGORITHM BASED CASCADE PD-PI CONTROLLER DESIGN FOR  
PERFORMANCE ENHANCEMENT OF A STANDALONE AUTOMATIC VOLTAGE  
REGULATOR SYSTEM

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**ÖZET**

Otomatik gerilim regülatörü (OGR), elektrik güç sisteminde cihazların sağlıklı çalışabilmesi için gerekli sabit gerilimi sağlayabilmesi için iyi bir dinamik tepkiye sahip olmalıdır. Bu açıdan OGR güç kalitesi, şebeke güvenliği ve güvenilirliğini yakından etkileyen bir sistemdir. OGR sistemin performansını artırmak için bu çalışmada eklemeli PD-PI denetleyici tasarımı gerçekleştirilmiştir. Denetleyicinin bilinmeyen parametreleri, 2022 yılında ortaya çıkan yılan arama algoritması (YAA) ve tanımlanan bir amaç fonksiyonu ile insan yardımı olmadan elde edilmişlerdir. Önerilen yaklaşım benzer OGR sistemi için saygın dergilerde yayımlanan bir dizi çalışmayla karşılaştırılmıştır. Karşılaştırma analizi sonuçlarına göre YAA tabanlı PD-PI denetleyici önceki muadillerine göre daha iyi gerilim tepkisi vermiştir, öyle ki sistem çıkışı birim basamak referansa daha kısa sürede ve çok küçük bir aşım ile oturmaktadır. Bu yanıt ile OGR sisteminin daha iyi kararlılık derecesiyle kontrol edildiği anlaşılmıştır.

**Anahtar Kelimeler:** otomatik gerilim regülatörü, PD-PI denetleyici, çok amaçlı optimizasyon, yılan arama algoritması, performans kriteri, geçici yanıt analizi, kararlılık analizi

**ABSTRACT**

Automatic voltage regulator (AVR) should have a good dynamic response to ensure a constant voltage necessary for healthy operation of devices in an electric power system. From this perspective, AVR is a system that influences closely the power quality, grid security and reliability. In this study, cascade PD-PI controller design is made to escalate the performance of an AVR system. The unknown parameters of this controller are acquired by the snake search algorithm (SSA) emerged in 2022 via an objective function introduced. The proposed method is compared with a number of studies published in prestigious journals for the identical AVR system. As per comparative analysis results, SSA based PD-PI controller gives a better voltage response profile than its earlier counterparts in a way that the system output settles to the unit step reference in less time and with very small overshoot. It is evident from this response that AVR system is controlled with a better stability margin.

**Keywords:** automatic voltage regulator, PD-PI controller, multi-objective optimization, snake search algorithm, performance criterion, transient response analysis, stability analysis



### INTRODUCTION

As the name indicates, an automatic voltage regulator (AVR) is a device that is mainly used for automatically maintaining the terminal voltages of large synchronous generators at a specified voltage level in electric power grids [1]. Thereof, it holds an important role in attenuating the system voltage variation under abnormal conditions such as load fluctuation and faulty conditions which corresponds to power quality, grid security and grid reliability, being one of the main control problems for an electric power system [2]. On the other hand, ensuring the constancy of the rated voltage level in a power station is important with regard to the performance and life span of the equipment connected to this power station since they are designed to work efficiently for a particular voltage level.

An uncontrolled AVR has severe transient regime presenting high oscillations and a notable deviation in steady-state. In order to avoid such unwanted regimes and improve the behavior of AVR system, a suitable controller is required with its parameters tuned appropriately. There are various control theories suggested in academia during the past decades. We observe the wide acceptance of proportional integral (PI) and proportional integral derivative (PID) controllers in industry [3, 4]. The reason of such acceptability can be attributed to its simple structure, easy implementation effort, and robust performance over a wide range of operating scenarios [5, 6]. Nonetheless, it has been difficult to tune PID controller gains suitably owing to the fact that many real-world industrial plants often face problems such as time delays, high order and saturation phenomena.

When the literature is investigated, it is seen that many artificial intelligence-based optimization algorithms have been recently given much interest by the researchers in the hope of achieving highly efficient PID controlled-AVR system by searching the optimal controller parameters. In 2009, artificial bee colony (ABC) algorithm is suggested in [2] for a self-tuning PID controller for the AVR system and its application results are compared with those based on particle swarm optimization (PSO) and differential evolution (DE) algorithm through different kinds of analysis techniques. It is shown that the ABC has a better tuning capability than the other approaches and thereby it leads to an increase in system performance. Researches in the concerned field are still in progress for offering new powerful algorithms in solving the tuning problem of PID parameters in a more efficient sense. For instance, in 2016, a PID controller equipped with a first-order low pass filter in the derivative path is considered in [3] and its gains as well as the low-pass filter parameters are optimized using teaching-learning based optimization (TLBO) algorithm. According to the findings, good results are achieved in comparison with other indicated studies as far as time-domain specifications of the response are concerned. However, to the knowledge of this work's authors, the proposed AVR system does not have a desirable stability margin. In 2018, a first attempt of applying stochastic fractal search (SFS) algorithm to the efficient design of an AVR system is performed in [1]. Using integral of time-weighted-squared-error (ITSE) criterion as objective function, the controller gains are optimized and their performance are widely illustrated with the state-of-the-art techniques, where the same objective function is used. At the end of the study, AVR system tuned by SFS is found to exhibit better dynamic response profile than the existing techniques. Since the minimum value of ITSE is achieved, it is claimed that the designed controller gains are made far closer to the optimal ones. However, minimizing the value of ITSE leads to improvement in the time response characteristics at the cost of possible deterioration in the frequency-domain performance of the system response. Chaotic PSO (CPSO) and global neighborhood algorithm (GNA) are applied to tuning problem of PID gains for an AVR system in [7, 8], where a comparison with standard PSO is also presented. The results based on transient response analysis show that CPSO and GNA perform better than the original PSO.

Snake search algorithm (SSA) is a new nature-inspired optimization algorithm, recently proposed by [9], which mitigates the identified characteristics of the individual and social intelligence of snakes. Forage and mating behavior of snakes are found interesting and are modelled to solve optimization problems alternatively.

In this study, a cascade PD-PI controller is designed to improve the performance of an AVR system. The unknown parameters of this controller are acquired by the SSA via an objective function introduced. The proposed method is compared with a number of studies [2, 3] published in prestigious journals for the identical AVR system. For the purpose of performance evaluation amongst the controllers, an

investigation of the system behavior during transient-state is first realized using transient response analysis. Afterwards, root locus analysis is performed.

### AVR SYSTEM CONTROLLED BY THE STRUCTURED PD-PI CONTROLLER

#### PD-PI Controller

Modified versions of PID controller have understandable structure and provide robust control performance regardless of uncertainties in model parameter variation and external disturbances [10]. In Laplace mode, the transfer function of a PD-PI controller is expressed by the following s-domain equation.

$$TF_{PD-PI}(s) = (K_P + sK_D) \times \left( K_{P2} + \frac{K_I}{s} \right) \quad (1)$$

The four parameters of this controller in Eq. 1 are proportional gains ( $K_P, K_{P2}$ ), integral gain ( $K_I$ ), and derivative gain ( $K_D$ ). In order to have a PD-PI controller with satisfactory and robust control performance against a wide range of operating conditions, its design parameters need to be tuned appropriately.

#### Mathematical Model of an AVR System

An AVR is a system that regulates the terminal voltage of a synchronous generator at a rated constant voltage level by controlling the machine excitation current. In addition to its inherent cost advantage, excitation control of a synchronous alternator is one of the most significant factors to enhance power system stability and security as well as the quality of produced electrical power [1]. Sensor, amplifier, exciter and generator are the main components in an AVR model as seen in Fig. 1(a). The complete transfer function block diagram of the AVR system can be given as in Fig. 1(b).

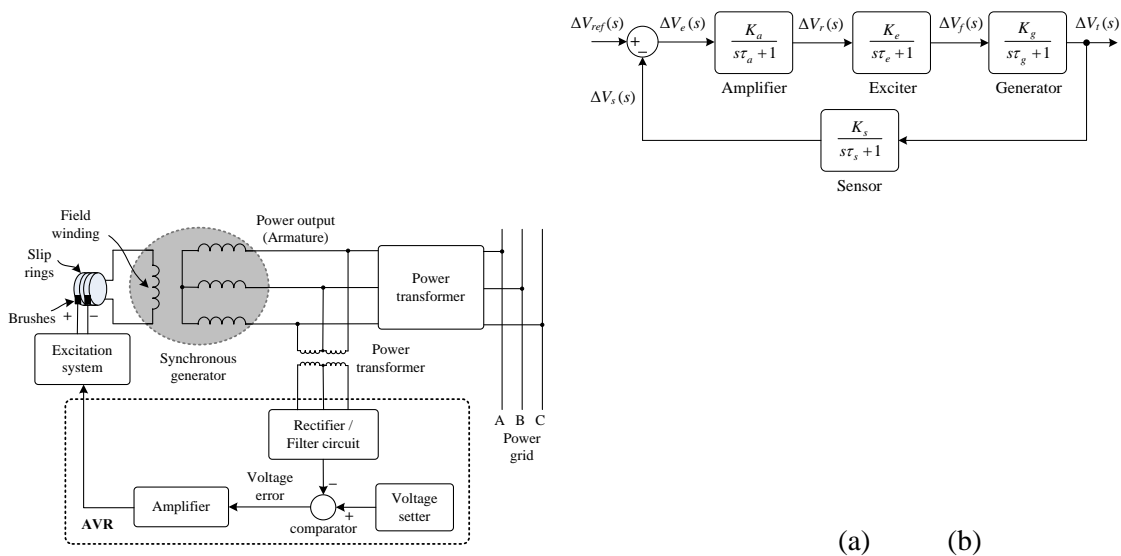


Figure 1. (a) AVR model (b) Complete transfer function block diagram of the AVR system

The typical limits of the parameters used in these transfer functions as well as their chosen values in this paper are tabulated in Table 1. The chosen parameter values are equal to those in [2, 3], which are considered for comparison purposes.

Table 1. Typical limits and chosen values of the parameters used in the AVR system

Component	Parameter limits	Chosen parameter values
Amplifier	$10 \leq K_a \leq 40, \quad 0.02 \leq T_a \leq 0.1$	$K_a = 10, \quad T_a = 0.1$
Exciter	$1 \leq K_e \leq 10, \quad 0.4 \leq T_e \leq 1.0$	$K_e = 1, \quad T_e = 0.4$
Generator	$0.7 \leq K_g \leq 1.0, \quad 1.0 \leq T_g \leq 2.0$	$K_g = 1, \quad T_g = 1$
Sensor	$0.001 \leq T_s \leq 0.06$	$K_s = 1, \quad T_s = 0.01$

Thus, using the above parameters, the transfer function of the entire AVR system can be represented as,

$$\frac{\Delta V_t(s)}{\Delta V_{ref}(s)} = \frac{TF_{Amplifier}(s) \cdot TF_{exciter}(s) \cdot TF_{Generator}(s)}{1 + TF_{Amplifier}(s) \cdot TF_{exciter}(s) \cdot TF_{Generator}(s) \cdot TF_{Sensor}(s)} = \frac{0.1s+10}{0.0004s^4+0.0454s^3+0.555s^2+1.51s+11} \quad (2)$$

Thanks to Eq. 2, it is now possible to obtain the unit step response of the studied uncontrolled AVR system as shown in Fig. 2.

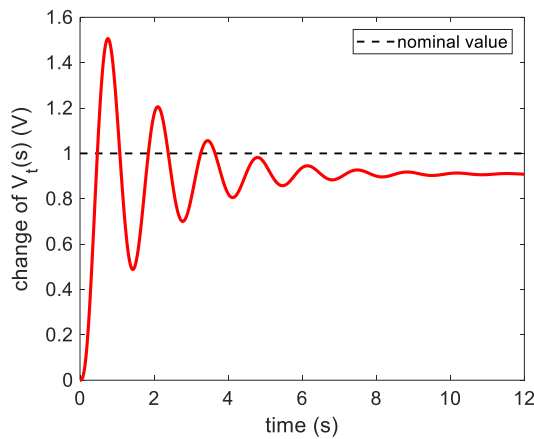


Figure 2. Unit step response of the studied AVR system without controller

From Fig. 2, it is clear that the uncontrolled system is stable, but presents high oscillatory behavior during transient-state and a remarkable deviation from the rated value of 1 p.u at steady-state. As a result, a suitable controller must be installed in the closed-loop AVR system in order to improve the system performance at both transient-state and steady-state.

### OPTIMIZATIN OF PD-PI CONTROLLER USING SSA

The main inspiration source is special mating concept of snakes. Mating between males and females occurs under some conditions. For example, the temperature should be low enough. Moreover, availability of food also affects the mating process. If the conditions are satisfied, opponent males will fight each other to be a king and accordingly impress females. If the female decides to mate, mating takes place and the female begins to lay its eggs in a nest or burrow. Once the eggs come out, the female leaves the location. The mathematical modelling of the identified behavior of snakes is described next.

#### 3.2.1. Initialization

SO begins its search by generating a random population from uniform distribution, similar to other metaheuristic algorithms. The random initialization is done by:

$$S_i = S_{min} + rand \cdot (S_{max} - S_{min}) \quad (3)$$

where  $S_i$  is the position of the  $i$ th snake,  $rand$  is a random number in the range  $[0, 1]$ ,  $S_{min}$  and  $S_{max}$  are the problem constraints, standing for the minimum and maximum limits of decision variables, respectively.

#### 3.2.2. Splitting the population into two equal groups: males and females

In original SO, it is assumed that the population of snakes is equally splitted into two groups: male group and female group. To do this, Eq. 4 is used.

$$\begin{aligned} N_m &\approx N/2 \\ N_f &= N - N_m \end{aligned} \quad (4)$$

where  $N$  is the total number of solutions,  $N_m$  and  $N_f$  denote the number of male and female individuals, respectively.

### 3.2.3. Evaluation of each group based on temperature and food quantity

The best individual in each group is evaluated and assigned as  $f_{best,m}$  for the best male and  $f_{best,f}$  for the best female. The food position  $f_{food}$  is also gained.

Using the iteration index  $t$  and maximal iteration number  $T$ , the temperature is altered in an exponentially-decreasing trend in the algorithm as:

$$Temp = \exp\left(\frac{-t}{T}\right) \quad (5)$$

As concerned to food quantity, it is calculated by:

$$Q = c_1 \cdot \exp\left(\frac{t-T}{T}\right) \quad (6)$$

where  $c_1$  is a constant equal to 0.5.

### 3.2.4. Exploration phase with no food

If  $Q$  is smaller than a threshold value, i.e. 0.25, SO emphasizes on exploration where the snakes look for food source by choosing a random solution from the population and updating their position relative to it. This is governed by:

$$S_{i,m}(t+1) = S_{rand,m}(t) \pm c_2 \cdot A_m \cdot (S_{min} + rand \cdot (S_{max} - S_{min})) \quad (7)$$

where  $S_{i,m}$  is the  $i$ th male position,  $S_{rand,m}$  is the position of random male,  $c_2$  is a constant equal to 0.05 and  $A_m$  is the male ability to discover food, which is calculated as:

$$A_m = \exp\left(\frac{-f_{rand,m}}{f_{i,m}}\right) \quad (8)$$

where  $f_{rand,m}$  indicates the fitness of  $S_{rand,m}$  whereas the fitness of  $S_{i,m}$  is given by  $f_{i,m}$ .

Similarly, Eqs. 15 and 16 are also applied to the group of females as in Eqs. 9 and 10.

$$S_{i,f}(t+1) = S_{rand,f}(t) \pm c_2 \cdot A_f \cdot (S_{min} + rand \cdot (S_{max} - S_{min})) \quad (9)$$

$$A_f = \exp\left(\frac{-f_{rand,f}}{f_{i,f}}\right) \quad (10)$$

where  $S_{i,f}$  is the  $i$ th female position,  $S_{rand,f}$  is the position of random female,  $A_f$  is the female ability to discover food,  $f_{rand,f}$  is the fitness of  $S_{rand,f}$ , and  $f_{i,f}$  is the fitness of  $S_{i,f}$ .

### 3.2.5. Exploitation phase with food

If  $Q$  is greater than the threshold value and  $Temp$  is higher than a threshold value (0.6 treated as hot), snakes will locate themselves around the food using Eq. 11.

$$S_{i,j}(t+1) = S_{food} \pm c_3 \cdot Temp \cdot rand \cdot (S_{food} - S_{i,j}(t)) \quad (11)$$

where  $S_{i,j}$  is the position of the  $i$ th snake in the  $j$ th dimension (either male or female),  $S_{food}$  is the position of the best individual, and  $c_3$  is a constant whose value is tuned to 2.

If  $Temp$  falls below 0.6 (treated as cold), snakes will fight or mate. In case they fight, the following position update rules are governed:

$$S_{i,m}(t+1) = S_{i,m}(t) + c_3 \cdot FM \cdot rand \cdot (Q \cdot S_{best,f} - S_{i,m}(t)) \quad (12)$$

where  $S_{i,m}$  is the  $i$ th male position,  $S_{best,f}$  is the best position in female group, and  $FM$  is the fighting ability of the male individual. It is assumed that similar fight also takes place among the female snakes and Eq. 12 is modified as in Eq. 13 for the individuals in female group.

$$S_{i,f}(t + 1) = S_{i,f}(t) + c_3 \cdot FF \cdot rand \cdot (Q \cdot S_{best,m} - S_{i,f}(t)) \quad (13)$$

where  $S_{i,f}$  is the  $i$ th female position,  $S_{best,m}$  is the best position in male group, and  $FF$  is the fighting ability of the female individual.  $FM$  and  $FF$  are calculated as:

$$FM = \exp\left(\frac{-f_{best,f}}{f_i}\right) \quad (14)$$

$$FF = \exp\left(\frac{-f_{best,m}}{f_i}\right) \quad (15)$$

where  $f_{best,f}$  and  $f_{best,m}$  refer to the fitness of  $S_{best,f}$  and  $S_{best,m}$ , respectively.

In case the snakes are mating, the following position update rules are used:

$$S_{i,m}(t + 1) = S_{i,m}(t) + c_3 \cdot M_m \cdot rand \cdot (Q \cdot S_{i,f}(t) - S_{i,m}(t)) \quad (16)$$

$$S_{i,f}(t + 1) = S_{i,f}(t) + c_3 \cdot M_f \cdot rand \cdot (Q \cdot S_{i,m}(t) - S_{i,f}(t)) \quad (17)$$

where  $S_{i,m}$  is the  $i$ th male position,  $S_{i,f}$  is the  $i$ th female position,  $M_m$  and  $M_f$  are the mating ability of male and female, respectively. They are calculated by:

$$M_m = \exp\left(\frac{-f_{i,f}}{f_{i,m}}\right) \quad (18)$$

$$M_f = \exp\left(\frac{-f_{i,m}}{f_{i,f}}\right) \quad (19)$$

If egg hatches, then the worst male and female individuals are replaced as follows:

$$S_{worst,m} = S_{min} + rand \cdot (S_{max} - S_{min}) \quad (20)$$

$$S_{worst,f} = S_{min} + rand \cdot (S_{max} - S_{min}) \quad (21)$$

where  $S_{worst,m}$  and  $S_{worst,f}$  refer to the position of individuals in male group and female group, respectively. The operator  $\pm$  used in the above equations is named as flag direction operator or diversity factor, which adds to or subtracts from solutions' positions to alter the direction of search agents so that the given search space is sampled and scanned thoroughly in different directions.

As we have 4 controller parameters  $K_p$ ,  $K_{p2}$ ,  $K_I$  and  $K_D$  for optimization, each set of controller parameters composes an individual in SSA by a vector  $K = [K_p, K_D, K_{p2}, K_I]$ . In order to acquire a quantitative measure regarding how well each individual performs, the following cost function is defined and used in this article, which involves some time response performance parameters. Better control performance corresponds to these parameters when they are minimum following a step input perturbation.

$$J = \alpha \int_0^{t_{sim}} t|e(t)|dt + (1 - \alpha)T_s \quad (22)$$

The first term on the right side of Eq. (22) is integral time of absolute error (ITAE) index based on simulation time  $t_{sim}$ , and  $T_s$  are settling time obtained from the transient response.  $\alpha$  is the weighting factor, which is set to 0.3 in the present work. The concerned AVR design problem has been tried to be solved by formulating it as a constrained optimization problem subject to the following constraints of PID controller gains bounds:

Minimize  $J$

Subject to:

$$\left. \begin{aligned} K_P^{min} &\leq K_P^* \leq K_P^{max} \\ K_D^{min} &\leq K_D^* \leq K_D^{max} \\ K_{P2}^{min} &\leq K_{P2}^* \leq K_{P2}^{max} \\ K_I^{min} &\leq K_I^* \leq K_I^{max} \end{aligned} \right\} \quad (23)$$

where the superscripts *min* and *max* are the minimum and maximum bounds of the respective controller parameter. In the study, in order to render a fair comparison with the indicated techniques in literature, all the gains are similarly assumed in the range [0.2, 2.0]. As a result, we conclude that the set of controller parameters  $K_P^*$ ,  $K_D^*$ ,  $K_{P2}^*$ , and  $K_I^*$  yielding the smallest value of  $J$  is considered as optimal expected to exhibit desired level of system response.

### SIMULATION RESULTS

In this section, two different analysis techniques are considered in order to explore the effectiveness and superiority of proposed SSA-tuned PD-PI controller compared with ABC-tuned PID [2] and TLBO-tuned PID [3] controllers. In SSA, the population size (number of search agents) is 40 and the number of iterations is tuned to 200. The convergence characteristic of the algorithm during the minimization of  $J$  is depicted in Fig. 3. It is clear from Fig. 3 that SSA is able to converge below 0.18. Thus, the solution yielding the minimum value of  $J$  is assumed to have optimal PD-PI controller parameters.

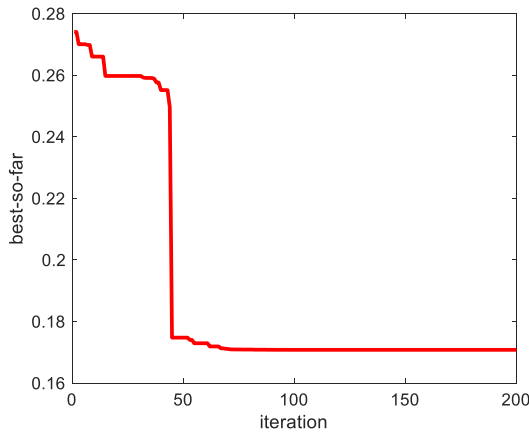


Figure 3. Convergence curves of DSA for the ten random runs

One of the major observations of the present study for analyzing the voltage response curve is given in Fig. 4, where the incremental change of terminal voltage response of the proposed PID-controlled AVR system to the step input perturbation is shown in a superimposed manner with those yielded by the other approaches. The dashed vertical lines are for signifying settling times. It is apparent from Fig. 4 that our proposal is the pioneer in achieving better unit step response, since it leads to a response that settles to the reference faster than other existing techniques after a very mild overshoot. Besides, the steady-state error observed for the proposed approach is much smaller than for other published studies.



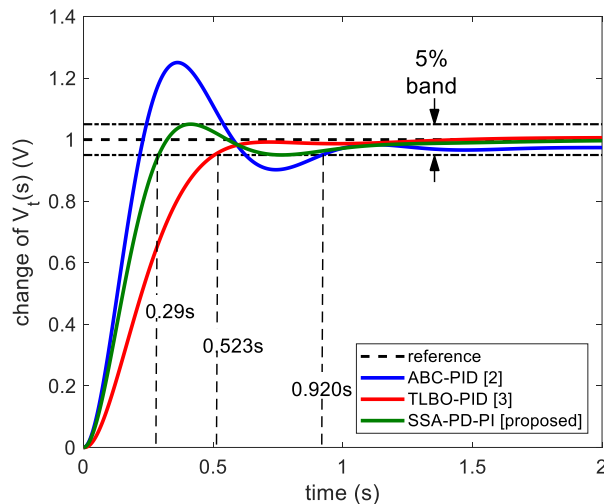


Figure 4. Comparative response profiles of the incremental change in terminal voltage

A comparison of the optimized controller parameters, as well as their respective time domain performance characteristics such as maximum overshoot, settling time, rise time and steady-state error computed from Fig. 4 is shown in Table 2 for the compared methods, where the results of attention are indicated by **bold** numbers in their respective sections. From this table, it can be inferred that PD-PI controller parameters found by the SSA concept and cost function  $J$  are different from those offered by the other approaches. This difference results in better transient time performance parameters with regard to minimum overshoot, shorter settling time and less steady-state error as shown in Table 2. It is also evident from Table 2 that the response using the TLBO-based PID controller does not have an overshoot. Though such a response seems desirable at first glance, it may not offer a good stability margin, as will be demonstrated.

Table 2. Optimized PID controller parameters and transient performance of AVR system with different approaches

Algorithm	$K_P$	$K_D$	$K_{P2}$	$K_I$	Maximum overshoots	Settling times	Rise times
SSA-PD-PI	0.4598	0.3557	0.8925	1.1641	<b>1.05</b>	<b>0.29</b>	0.210
ABC-PID [2]	1.6524	0.3654	-	0.4083	1.250	0.920	<b>0.156</b>
TLBO-PID [3]	0.5302	0.1787	-	0.4001	–	0.523	0.372

In order to examine the results from the perspective of stability concern, root locus analysis is applied to the AVR system controlled by the proposed controller and the respective root locus curve is given in Fig. 5.

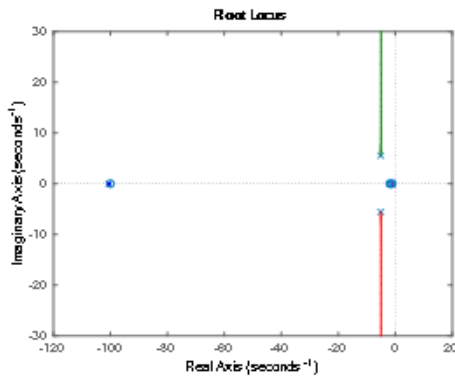


Figure 5. Root locus curve of the studied system

The closed-loop poles and their respective damping ratios are also computed and provided in Table 3 in comparison with the results based on the reported studies. This table shows that all closed-loop poles are on the left  $s$ -plane, meaning that all the AVR systems under consideration are stable. It is to be highlighted that the sum of damping ratio of the system poles should be high for better stability margin. In this sense, our proposal has the best stability margin with the biggest damping ratio, which followed by ABC- and TLBO-based AVR systems.

Table 3. Comparative closed-loop poles and their damping ratios related to root locus analysis

Algorithm	Closed-loop poles	Damping ratio
SSA-PD-PI	-100.56	1
	-1.63	1
	-1.14	1
	<b>-5.09±5.55i</b>	<b>0.679</b>
ABC-PID [2]	-100.98	1
	-4.74	1
	-0.25	1
	-3.75±8.40i	0.40
TLBO-PID [3]	-100	1
	-1.33±0.43i	0.951
	-5.17±4.92i	0.724

## CONCLUSIONS

In this research, SSA is applied to procure the optimal PD-PI controller parameters in an AVR application. Besides, a more reasonable performance criterion beneficial to both time domain and frequency domain performance is proposed. For the purpose of validation, the obtained results are compared with those offered by other state-of-the-art techniques for the identical AVR system. All the analysis results demonstrate that SSA is an efficient optimization tool for the AVR application. As per the findings obtained from transient response analysis, it is found that settling time, peak overshoot and steady-state error of the incremental change of terminal voltage profile are enhanced. These improvements lead to an AVR system being controlled with increased degree of stability as affirmed by the root locus stability criterion.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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EFFECTS OF FOOD SUPPLEMENTS ON SPORTS NUTRITION

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**ABSTRACT**

Food supplements are becoming increasingly popular in sports nutrition. The effects of various food supplements on the performance and recuperation of athletes are investigated in this study. The most popular and extensively used protein supplement promotes muscle mass and recovery. A wonderful choice for athletes who are lactose intolerant or follow a plant-based diet. It contains all nine necessary amino acids. Minerals are necessary for sports performance since they support and regulate the body's processes. Iron aids in the delivery of oxygen throughout the body; calcium is necessary for bone health; and magnesium aids in the regulation of muscle and nerve function. Vitamins help the body's functions and overall wellness. Athletes most typically consume vitamins C, E, and D. Vitamin C can assist lessen muscular soreness after exercise; vitamin E can help increase endurance; and vitamin D can help improve bone density and immunological function. Electrolytes aid in fluid balance and avoid dehydration during exercise. For athletes, the most critical electrolytes are sodium, potassium, and chloride. Food supplements can help with muscle repair, discomfort reduction, and general athletic readiness. Food supplements, when utilized correctly, can help athletes train harder and for longer periods of time, resulting in enhanced performance. When paired with resistance exercise, certain nutritional supplements, such as protein and creatine, can assist enhance muscle mass and strength. The FDA does not oversee the safety or effectiveness of food supplements, therefore it is critical to conduct research before purchasing them. Some food supplements have been associated to unpleasant side effects such as nausea, GI distress, and an increased risk of chronic diseases. Food supplements can occasionally be contaminated with dangerous chemicals, such as heavy metals or prescription medicines. Food supplements can help athletes improve their performance and overall health, but they must be used with caution and responsibility. Athletes can properly use nutritional supplements into their training regimen and maximize their athletic potential with the correct study, understanding, and professional assistance.

**Keywords:** food supplements, sport, nutrition, performance.

TİMOKİNON, SİSPLATİN KAYNAKLI NEFROTOKSİSİTEDE DEĞİŞMİŞ MMP-9 VE  
VEGF İMMÜNREAKTİVİTELERİNİ DÜZENLEYEBİLİR

THYMOQUINONE MAY REGULATE ALTERED MMP-9 AND VEGF  
IMMUNOREACTIVITIES IN CISPLATIN-INDUCED NEPHROTOXICITY

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**ÖZET**

Sisplatin (CIS), böbrek dokularında birikerek nefrotoksik yan etki gösteren antineoplastik bir ajandır. Bir monoterpen olan Timokinon (ThQ), geniş spektrumlu biyolojik fonksiyonlara (antioksidan, antikarsinojenik, vb.) sahiptir. Matriks metaloproteinaz-9 (MMP-9), hücre dışı matriksin parçalanmasında ve metastaz sırasında vasküler yeniden yapılanmada rol oynar. MMP-9, membrana bağlı vasküler endotelial büyüme faktörünü (VEGF) parçalayarak VEGF sinyal eksenini düzenlemektedir. Bu çalışma, CIS tedavisinin böbrek dokularında MMP-9 ve VEGF immünreaktivitelerini nasıl etkilediği ve buna yönelik ThQ takviyesinin düzenleyici potansiyelini değerlendirmeyi amaçlamaktadır.

Çalışmada 28 adet erkek sıçan rastgele dört eşit gruba ayrıldı (n=7): kontrol (uygulama yok), CIS (deneyin 1. günü 7 mg/kg CIS intraperitoneal), CIS+ThQ (deneyin 1. günü 7 mg/kg CIS intraperitoneal ve 10 mg/kg/gün ThQ oral gavaj) ve ThQ (10 mg/kg/gün ThQ oral gavaj). Deney sonunda (15. gün) alınan böbrek dokularında Avidin-Biotin-Peroxidase Kompleks yöntemi kullanılarak MMP-9 ve VEGF immünreaktiviteleri belirlendi.

Böbrek dokularında MMP-9 ve VEGF immünreaktiviteleri kontrol [sırasıyla; 0.20(0.10-0.60); 0.40(0.20-0.80)] ve ThQ [sırasıyla, 0.40(0.05-0.60); 0.40(0.10-0.80)] gruplarında benzer düzeydeydi (p>0.05). CIS grubunda MMP-9 ve VEGF immünreaktiviteleri [sırasıyla, 1.80(1.20-2.70); 2.70(1.80-2.70)] kontrol grubuna kıyasla artmıştı (p=0.001). MMP-9 ve VEGF immünreaktiviteleri CIS+ThQ grubunda [sırasıyla, 0.60(0.20-0.90); 1.20(0.60-1.80)] ise CIS grubuna kıyasla azalmıştı (sırasıyla, p=0.001, p=0.002).

ThQ, CIS kaynaklı nefrotoksistide artan MMP-9 ve VEGF immünreaktivitelerini azalttı. ThQ takviyesi, CIS tedavisinin neden olduğu nefrotoksisteyi hafifletmeye yönelik terapötik bir yaklaşım olabilir.

**Anahtar kelimeler:** Sisplatin, Timokinon, Nefrotoksistite, Matriks metaloproteinaz-9, Vasküler endotelial büyüme faktörü.

**ABSTRACT**

Cisplatin (CIS) is an antineoplastic agent that accumulates in kidney tissues and has nephrotoxic side effects. Thymoquinone (ThQ), a monoterpene, has broad-spectrum biological functions (antioxidant, anticarcinogenic, etc.). Matrix metalloproteinase-9 (MMP-9) is involved in the degradation of the extracellular matrix and vascular remodeling during metastasis. MMP-9 regulates the VEGF signaling axis by cleaving membrane-bound vascular endothelial growth factor (VEGF). This study aims to evaluate how CIS treatment affects MMP-9 and VEGF immunoreactivities in kidney tissues and the regulatory potential of ThQ supplementation for this.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

In the study, 28 male rats were randomly divided into four equal groups (n=7): control (no administration), CIS (7 mg/kg CIS intraperitoneally on day 1 of the experiment), CIS+ThQ (7 mg/kg CIS intraperitoneally on day 1 of the experiment and 10 mg/kg/day ThQ oral gavage), and ThQ (10 mg/kg/day ThQ oral gavage). MMP-9 and VEGF immunoreactivities were determined using the Avidin-Biotin-Peroxidase Complex method in kidney tissues taken at the end of the experiment (15<sup>th</sup> day).

MMP-9 and VEGF immunoreactivities in kidney tissues were similar in the control [respectively, 0.20(0.10-0.60); 0.40(0.20-0.80)] and ThQ [respectively, 0.40(0.05-0.60); 0.40(0.10-0.80)] groups ( $p>0.05$ ). MMP-9 and VEGF immunoreactivities were increased in the CIS group [respectively, 1.80(1.20-2.70); 2.70(1.80-2.70)] compared to the control group ( $p=0.001$ ). MMP-9 and VEGF immunoreactivities were decreased in the CIS+ThQ group [respectively, 0.60(0.20-0.90); 1.20(0.60-1.80)] compared to the CIS group (respectively,  $p=0.001$ ,  $p=0.002$ ).

ThQ reduced MMP-9 and VEGF immunoreactivities, which were increased in CIS-induced nephrotoxicity. ThQ supplementation may be a therapeutic approach to alleviating CIS treatment-induced nephrotoxicity.

**Keywords:** Cisplatin, Thymoquinone, Nephrotoxicity, Matrix metalloproteinase-9, Vascular endothelial growth factor.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## THE REFLECTION OF BERRY'S MODEL OF ACCULTURATION IN BRENTON AND ALİ'S PLAY *IRANIAN NIGHTS*

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### ABSTRACT

Berry's model of acculturation offers a categorization of the individuals' mode of adaptation to another culture after being introduced to it. An individual, therefore, must exhibit two basic ways upon meeting another culture, especially when they migrate: to adopt or reject. Many Iranians migrated to the UK during the Iranian Revolution, leading to socio-cultural interplays between Iranians and the British. In their play *Iranian Nights* (1989), Howard Brenton and Tariq Ali humorously depict this intercultural contact and immigrants' response to this new culture by utilizing two types of characters in stark contrast. Caliph embodies an oppressive, ill-disposed tyrant in Iran who exhibits ethnocentric attitudes, while Omar embodies a revolting, secular citizen against the oppressive ruler. Later in the play, these two characters turn inside out after migrating to the UK and disguise themselves as the Father and the Son. However, the Father, Caliph in Iran, becomes a secular and decent family man who adapts to British culture in the UK. In contrast, the Son, Omar in Iran, rejects British culture and becomes a strict, radical extremist. The juxtaposition between the Father's *integration* into British culture and Son's *separation* from British culture provides valuable insight into the socio-cultural impacts of immigration. In this respect, this study investigates characters' socio-cultural transformations in *Iranian Nights* according to Berry's model of acculturation to understand the dynamics of immigrants' responses to a new culture.

**Keywords:** Iranian Nights, Berry's model of acculturation, migration, intercultural contact.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SÜRREALİZM SANAT AKIMININ ELSA SCHIAPARELLI TASARIMLARININ ÜZERİNDEKİ ETKİSİ

### THE EFFECT OF THE SURREALISM ART MOVEMENT ON ELSA SCHIAPARELLI DESIGNS

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#### ÖZET

Sürrealizm sanat akımının bir diğer adı "Gerçeküstücülük" dür. Fransız şair Breton, 1922'de Paul Éluard (1895 - 1982) gibi farklı şairlerle Dadacılar'dan sıyrılmış ve bu akımın nihilist davranışına karşı, olumlu anlamda yaratıcılığı savunan Gerçeküstücü sanatın prensiplerini hazırlamaya başlamışlardır. Plastik sanatların haricinde edebiyat, müzik ve sinema gibi diğer birçok sanat alanlarını da kapsayan Sürrealizm, iki dünya savaşı arasında bir felsefe ve yaşam formunu da belirlemiştir. Breton, Sigmund Freud'un (1856 - 1939), özel olarak hayaller ve bilinçaltı kuramlarına oldukça ilgi göstermiştir. Gerçeküstü sanatta bu kuramların tesiri büyük olmuştur. Breton akımın ismini, yazar ve sanat eleştirmeni olan Apollinaire'in, 1917 yılında sahnelenmiş olan "Les Mamelles de Tirésias" isimli eseri için sarf ettiği "gerçeküstücü" sözcüğünden etkilenerek vermiştir. Sürrealizm sanat üslubu, alışlagelmişin dışında olanı, farklı ve özgünü, yeni tasarlanmış ve sıklıkla birbirine uymayan nesnelere aynı ortamda birleştirerek yıkıma uğratmıştır. 1920'li yılların son demlerinde, avangart moda ve sürrealizmin mantıksızlığının yollarının karşılaşması, modernist oluşumun saygın işlevselliğinin karşısında ihtiyaç duyulan bir antidottur. Hareketin ilk akla gelen simalarından İtalya doğumlu moda tasarımcısı Elsa Schiaparellidir. Modacı, Trompe l'oeil (göz yanıltması) yardımıyla tasarladığı merak uyandıran örme tasarımlarla ün kazanmıştır. Göz yanıltması (trompe l'oeil) efektleri, gerçek olmayan fiyonklar, eşarplar, fularlar, denizci dövmelemleri ve siyah zemin üzerine beyaz iskelet gibi farklı stilleri de çerçevesi kapsamına almıştır. Schiaparelli, en önde gelen Sürrealizm sanat akımının duayeni Salvador Dali ile ortaklık yapmıştır. Tasarladıkları kıyafet grupları arasında etek bölümü Salvador Dali tarafından çizilen ıstakoz figürü ile süslenmiş beyaz bir gece elbisesi ve cepleri tıpkı bir şifonyere benzeyen etek ceket döpiyes vardır.

**Anahtar Kelime:** Sürrealizm, Moda Tasarımı, Elsa Schiaparelli

#### ABSTRACT

Another name for the Surrealism art movement is "Above Reality". The French poet Breton got rid of the Dadaists with different poets such as Paul Éluard (1895 - 1982) in 1922 and started to prepare the principles of Surrealist art, which defended creativity in a positive sense against the nihilistic behavior of this movement. Surrealism, which includes many other art fields such as literature, music and cinema apart from plastic arts, also determined a philosophy and life form between the two world wars. Breton was particularly interested in Sigmund Freud's (1856 - 1939) theories of dreams and the unconscious. The influence of these theories in surreal art has been great. The name of the Breton movement was inspired by the word "surrealist" used by the writer and art critic Apollinaire for his work "Les Mamelles de Tirésias", which was staged in 1917. Surrealism art style has destroyed the unconventional, different and original, newly designed and often incompatible objects in the same environment by combining them. The encounter of the ways of avant-garde fashion and the irrationality of surrealism in the late 1920s is a needed antidote against the respectable functionality of the modernist formation. One of the first figures of the movement that comes to mind is Italian-born fashion designer Elsa Schiaparelli. The fashion designer is famous for his intriguing, knitted designs, designed with the help of Trompe l'oeil (illusion). It also encompasses different styles such as trompe l'oeil effects, unreal bows, scarves,

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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kerchiefs, sailor tattoos and a white skeleton on a black background. Schiaparelli partnered with Salvador Dali, the doyen of the most prominent Surrealism art movement. Among the clothing groups they designed, there is a white evening dress decorated with a lobster figure, whose skirt part was drawn by Salvador Dali, and a skirt and jacket doublet with pockets that look like a dresser.

**Keywords:** Surrealism, Fashion Design, Elsa Schiaparelli

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ASSESSING INTERLEUKIN-6 EXPRESSION LEVEL AND SOME LABORATORY BIOMARKERS UPON COVID-19 INFECTION IN IRAQI PATIENTS

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### ABSTRACT

Interleukin-6 cytokine is a type of signaling molecule, and play role in promoting inflammation and immune response, may play a major role in the pathology of COVID-19, Activation of IL-6 triggers the immune response to fight off the infection, and the elevated inflammatory cytokines suggest cytokine storm. Specimens were collected from 70 patient admitted to ICUs of hospital in Baghdad (Medical City) suspected to be infected with COVID-19 in additions to 35 individuals as healthy controls. Specimens were collected from both genders during the period from June 2022 to April 2023 with age ranged age from 15 to 80 years. Real-time reverse transcriptase PCR was used to confirm the diagnosis of infection in 70: 35 showed sever infection while the other 35 showed moderate level of infection. IL-6 serum level was measured using Enzyme linked immunosorbent Assay and the expression level of the IL-6 gene was measured using RT-PCR. Among 105 samples the results of IL-6 level showed a significant difference between the severe and moderate with COVID19 and control group with of IL-6 in a higher-level severe infection followed by moderate infection to control (387 and 63.82 vs. 27.16, respectively. p-value=0.001). The expression level in the group of COVID-19 patients showed results of IL-6 level showed a significant difference between the COVID-19 with severe and moderate compared to healthy control. IL-6 gene expression relations upon Moderate and Severe infection of SARS-CoV2 (21.83 ±0.61 and 8.21 ±0.44 vs. 1.00 ±0.00, respectively. p-value=0.001). A significant difference was also obtained for each IL-6, CRP, and D dimer between the study groups, The patients with severe disease were older and had high D-dimer, C-reactive protein, IL-6, and neutrophilia with lymphopenia, where it found the mean concentrations of IL-6, CRP, and D dimer, i.e., 15.02 ±0.52, 78.85±32.91 and 373.14±102.62, respectively., were high in the patient's group than in controls, The study found a significant positive correlation between IL-6 and CRP, D.dimer, while it showed a significant negative correlation WBC, lymphocyte, and did not correlation between platelets, HCT and HGB, these finding indicate to risk correlation between COVID19 levels between severe, moderate infection and immune response.

**Keywords:** COVID-19, Gene expression; Interlukine-6, cytokine storm, Laboratory biomarkers

OTİZM SPEKTRUM BOZUKLUĞU OLAN BİREYLERDE MÜZİK EĞİTİMİNİN ÖNEMİ  
ÜZERİNE BİR DERLEME

A REVIEW ON THE IMPORTANCE OF MUSIC EDUCATION IN INDIVIDUALS WITH  
AUTISM SPECTRUM DISORDER

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**ÖZET**

Bireylerin yaşadıkları toplumda sosyal kabul görebilmeleri ve kendilerini o toplumun bir parçası olarak düşünebilmeleri için, toplum yapısına uygun davranmaları gerekmektedir. Fakat bazı bireyler dünyaya farklılıkları ile birlikte gelmekte ve sosyal uyum konusunda dezavantajlı olabilmektedirler. Bu grupların bir kesimini de otizm spektrum bozukluğu bireyler oluşturmaktadır. Son zamanlarda sayısında belirgin bir artış gözlemlenen otizm spektrum bozukluğu, sosyal iletişim ve etkileşimde zorluklar ile karakterize olup sınırlı ve tekrarlayıcı aktivite, ilgi alanları ve davranışları olan nöro-gelişimsel bir bozukluk olarak tanımlanmaktadır. Otizm spektrum bozukluğu bireylerin sosyalleşebilmesi, topluma kazandırılabilmesi için özel eğitim almaları gerekmektedir. Bu eğitimin alanlarından birini de müzik oluşturmaktadır. Çünkü müzik çok eski tarihlerden beri kullanılan ve çeşitli hastaları tedavi etmek amacıyla kullanılan müzik terapi, bireyin gerek fiziksel gerek psiko-sosyal ihtiyaçlarını gidermede müziği ve müzik aktivitelerini kullanan bir uzmanlık dalıdır. Otizm spektrum bozukluğu tanılı bireyler kendileri için hazırlanacak bireyselleştirilmiş eğitim programları sayesinde, hayatını devam ettirecek düzeye gelmesi sağlanabilmektedir. Hazırlanacak bu programlar içerisinde müzik eğitiminin dahil edilmesi gerektiği yapılan çeşitli bilimsel çalışmalarla desteklendiği görülmektedir. Bu araştırma otizm spektrum bozukluğu olan bireylerin eğitiminde müziğin etkisinin belirlenmesinde, özel eğitim çalışmalarında müziğin de etkisini ortaya koymak açısından önemlidir. Bu önem doğrultusunda araştırmanın amacı, otizm spektrum bozukluğu tanısı almış bireylerin eğitiminde müziğin ne denli önemli olduğunun bir değerlendirmesini yapmak ve bu alanda yapılan ulusal ve uluslararası araştırmaları çeşitli kriterler açısından karşılaştırılmıştır. Bu araştırmada nitel araştırma yöntemlerinden tarama modeli kullanılmıştır. Bu doğrultuda, başlığında “otizm spektrum bozukluğu ve müzik” ifadesi geçen ulusal ve uluslararası çalışmalar literatür taraması yapılarak incelenmiştir. Araştırmanın sonucunda müziğin birçok hastalıkta ve durumda müziğin etkilerin araştırıldığı görülmüş, müzik terapinin otizm spektrum bozukluğu olan bireylerdeki hedefleri; kaba, ince hareket yeteneklerinin geliştirilmesi, konsantrasyonun artması, beden farkındalığının, sosyal becerinin geliştirilmesi, sözlü-sözsüz iletişimin geliştirilmesi, temel eğitim kavramlarının öğrenmesinin kolaylaştırılması vb. etkilerinin olduğu, gelişim evrelerine göre normal olan çocuklar gibi birtakım müzikal yeteneklerle dünyaya gelen özel gereksinim gerektiren çocuklarda müzik araç olarak kullanılarak zihinsel, sosyal, fiziksel gelişimine katkı sağladığı şeklinde sonuçlara ulaşılmıştır.

**Anahtar Kelimeler:** Otizm, Müzik eğitimi, Müziksel Terapi

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**ABSTRACT**

In order for individuals to be socially accepted in the society in which they live and to consider themselves a part of that society, they must behave in accordance with the structure of society. But some individuals come into the world with their differences and may be disadvantaged in terms of social cohesion. Some of these groups are also composed of individuals with autism spectrum disorders. Autism spectrum disorder, which has recently seen a significant increase in its number, is defined as a neuro-developmental disorder characterized by difficulties in social communication and interaction, with limited and repetitive activity, interests and behaviors. Individuals with autism spectrum disorder need to receive special education in order to be able to socialize and be included in society. One of the areas of this education is music. Because music has been used since ancient times and is used to treat various patients, music therapy is a specialty that uses music and musical activities to meet both the physical and psycho-social needs of an individual. Individuals diagnosed with autism spectrum disorder can be ensured to reach a level to continue their lives thanks to individualized educational programs that will be prepared for them. It is seen that it is supported by various scientific studies that music education should be included in these programs to be prepared. This research is important in determining the effect of music on the education of individuals with autism spectrum disorder and in terms of revealing the effect of music in special education studies. In line with this importance, the aim of the research is to make an assessment of how important music is in the education of individuals diagnosed with autism spectrum disorder and to compare national and international research conducted in this field in terms of various criteria. In this research, screening model, one of the qualitative research methods, was used. In this direction, national and international studies with the phrase “autism spectrum disorder and music” in the title were examined by conducting a literature review. As a result of the research, it was found that the effects of music on music in many diseases and conditions were investigated. The goals of music therapy in individuals with autism spectrum disorder are to improve gross, fine movement abilities, increase concentration, improve body awareness, social skills, improve oral-nonverbal communication, facilitate the learning of basic educational concepts, etc. results have been reached that it contributes to mental, social and physical development by using music as a tool in children with special needs who are born with some musical abilities, such as children who have effects, who are normal according to their developmental stages.

**Keywords:** Autism, Music education, Musical Therapy



PROSTAT KANSERİ HÜCRELERİ ÜZERİNDE ALFA-LİPOİK ASİT ETKİSİ  
ALPHA-LIPOIC ACID'S IMPACT ON PROSTATE CANCER CELLS

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**ÖZET**

Alfa-lipoik asit (1,2-ditiolan-3-pentanoik asit) her tür prokaryotik ve ökaryotik hücrede bulunur. Mitokondriyal dehidrogenaz reaksiyonunda temel bir rol oynar ve antioksidan ve antiinflatuar bir bileşik olarak büyük ilgi görmektedir. Hem Alfa-lipoik asit hem de indirgenmiş formu olan dihidrolipoik asit, serbest radikalleri etkisizleştirerek ve diğer hücrel antioksidanların geri dönüşümüne katılarak doğrudan bir antioksidan etki gösterir. Alfa-lipoik asit, iskemi-reperfüzyon, diyabet, katarakt oluşumu, nörodejenerasyon ve radyasyon yaralanması dahil olmak üzere çeşitli oksidatif stres modellerinin tedavisinde etkinlik göstermiştir. Ek olarak, belirli kanser türlerinde programlanmış hücre ölümünün bir şekli olan apoptozu indüklediği bildirilmiştir. Bu bilgilerden yola çıkarak, alfa-lipoik asidin prostat kanseri hücrelerinde apoptotik yolu nasıl etkileyebileceğine dair bir araştırma yaptık. Bu çalışmada prostat kanseri hücreleri, hücre kültürü ortamında alfa-lipoik aside maruz bırakılmış ve bu bileşiğin apoptotik yol üzerindeki etkileri incelenmiştir. Apoptotik yolda önemli bir yer tutan kaspaz-3, bax ve bcl-2 proteinlerinin miktarlarındaki değişim ELISA yöntemi kullanılarak analiz edilmiştir. Daha sonra elde edilen veriler Student's t-test kullanılarak istatistiksel olarak değerlendirilmiştir. Alfa-lipoik asitle tedavi edilen hücrelerde, proapoptotik bir faktör olan kaspaz-3'ün artan seviyeleri gözlenmiştir. Ayrıca, alfa-lipoik asit ile tedavi edilen hücrelerde proapoptotik protein Bax seviyeleri yükselirken, antiapoptotik protein Bcl-2 seviyeleri azalmıştır. Sonuç olarak, çalışmamız alfa-lipoik asidin prostat kanseri hücrelerinde apoptotik aktiviteye sahip olduğuna dair kanıtlar sunmaktadır. Bu, alfa-lipoik asidin prostat kanseri tedavisinde terapötik bir ajan olarak potansiyelini göstermektedir.

**Anahtar Kelimeler:** alfa-lipoik asit, prostat kanseri, kaspaz-3, bax, bcl-2.

**ABSTRACT**

Alpha-lipoic acid (1,2-dithiolane-3-pentanoic acid) is present in all types of prokaryotic and eukaryotic cells. It plays a fundamental role in the mitochondrial dehydrogenase reaction and is of great interest as an antioxidant and anti-inflammatory compound. Both Alpha-lipoic acid and its reduced form, dihydrolipoic acid, exert a direct antioxidant effect by quenching free radicals and participating in the recycling of other cellular antioxidants. Alpha-lipoic acid has demonstrated effectiveness in treating various models of oxidative stress, including ischemia-reperfusion, diabetes, cataract formation, neurodegeneration, and radiation injury. Additionally, it has been reported to induce apoptosis, a form of programmed cell death, in certain types of cancer. As a result, we conducted a study about how alpha-lipoic acid might impact the apoptotic pathway in prostate cancer cells. Prostate cancer cells were exposed to alpha-lipoic acid in a cell culture environment, and the effects of this compound on the apoptotic pathway were examined. Changes in the amounts of caspase-3, bax and bcl-2 proteins, which play an important role in the apoptotic pathway, were analyzed using the ELISA method. Then, the obtained data were evaluated statistically using Student's t-test. The alpha-lipoic acid-treated cells exhibited increased levels of caspase-3, a proapoptotic factor. Furthermore, the levels of the proapoptotic protein Bax were elevated, while the levels of the antiapoptotic protein Bcl-2 were reduced in cells treated with alpha-lipoic acid. In conclusion, our study provides evidence that alpha-lipoic acid

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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possesses apoptotic activity in prostate cancer cells. This suggests its potential as a therapeutic agent in the treatment of prostate cancer.

**Keywords:** alpha-lipoic acid, prostate cancer, caspase-3, bax, bcl-2.

### CRIME CLASSIFICATION USING CATEGORICAL FEATURE ENGINEERING AND MACHINE LEARNING

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#### ABSTRACT

Crime is one of the biggest problems for societies in the developing world order. Due to growing urban life, deterioration in social dynamics, unemployment, etc., crimes are committed every day and it becomes important to control these crimes. In order to ensure this control, keeping and analysing past crime records is one of the most common approaches. Thus, it is possible to make predictions for the future. The main purpose of this paper is to predict whether the crime reports are legally criminal or not and to help solve the problem. For this prediction, 10 of the 11 attributes of the time periods of the crime and the location of the crime on the San Francisco Crime dataset (competition dataset) were selected and after a series of pre-processing (data categorization, standardisation, over-sampling, etc.), classification was performed with Random Forest. Among the 39 crime records in the dataset, 15 crime types with the highest number of records were selected and 280 thousand crime records committed between 2003 and 2015 were used in the training and testing processes. In the tests, an average accuracy value of 86.5% was obtained, while similar values were obtained for precision, recall, and f-score. The AUC value is 0.98 and the MSE value for the regression solution is 0.1. These results will allow both law enforcement agencies to work efficiently and shed light on policymaking regarding crime. With the proposed model, future crime reports will be analysed automatically by using past crime records and only crime reports will be examined by the police.

**Keywords:** Crime classification, Prediction analysis, Random Forest, San Fransisco Crime Dataset, Criminal vs. Non-Criminal

#### 1. INTRODUCTION

Crime represents an important threat to humanity and is a concept that needs to be analysed. Today, big cities attract people due to the wide range of opportunities, level of development and work capacities they offer. This situation brings about initiatives to facilitate the lives of people in many areas such as urban development, security, energy capacity and environment. The most important of these initiatives is increasing the security capacity and strengthening the organisational structure. In this way, it will be possible to control the crime rates that determine the quality of life in cities and to create more livable cities. Although many modern technological structures are used to ensure the security of citizens in these cosmopolitan cities, it is still a major problem for today's cities and this problem is growing with the increasing population [1].

It is the responsibility of security units to control and reduce this problem. However, in order to fulfil this responsibility, firstly, the crimes committed in cities should be analysed in depth and the level of threat to the society should be determined. In order to make this analysis in more detail, country and city-based crime statistics from the past to the present are prepared and shared with researchers [2-4]. In this way, it is possible to determine the types of crime, to reveal the regional densities of each type of crime, and to conduct research to determine their prevalence. Regardless of the countries, a large number of crime records are reported daily in big cities and many of them correspond to a real crime in the legal sense. On the other hand, some of these may be records that do not involve a crime. Making this distinction may be beneficial in terms of crime intervention.

The San Francisco Crime Dataset, which was shared for a competition to analyse this problem, is an open access dataset containing information on more than 800,000 crime records from 39 different crime types. It contains details of all crime reports made to the police over a 112-year period. With this

database, it is possible to analyse crimes and make evaluations and modelling for the future with past crime records. In this way, it helps to obtain information about the general situation of the city and to make plans for better protection [5].

Many studies have been carried out to develop prediction models for the future by using statistical data of past years for the detection of crime types. Forradellas et al. [6] proposed a regional crime prediction model for the city of Buenos Aires. The model is based on modelling the records obtained for different types of crimes such as homicide and theft between 2016 and 2019 with machine learning models. The average MAE and MSE values obtained with the proposed model after a series of preprocessing and very transformation processes were 0.4095 and 1.4602, respectively. Wu et al. [7] aimed to predict the crime pattern and rate by using data mining and machine learning based on regional historical crime records. Using the records of 2012-2015 and Bayesian network and Random Forest classifier models, the link between the type of crime and the job and gender of the offenders was estimated. As a result, it was observed that the Bayesian network has low correlation and poor performance in terms of various crimes and characteristics compared to other classifiers. Kim et al. [8] analysed crime records for the last 15 years in the city of Vancouver. The data were obtained from the National Crime Records Bureau. Using the data obtained, crime patterns were extracted and classified with various techniques. Among the structures using various models, the highest success rate was between 39% and 44% with KNN. Alves et al. [9] conducted a study on crime prediction by examining the correlation structure between past crime records. With the Random Forest based model, crime classification was performed with 97% success. While it was determined that urban structure is an issue that directly affects crime prediction, it was determined that the main factor for Brazil is unemployment. This situation proves that models should be prepared by using country and city specific records. Bandekar et al. [10] proposed a structure based on machine learning models based on the location, time and nature of crimes committed in India. Their aim is to reveal the connection between settlement locations and the type of crime. Thus, regional determination of risk factors and some predictions about crime were provided. As a result, location detection with Bayesian, Levenberg and Scaled algorithm and statistical correlation with ANOVA achieved 78% success. Aldossori et al. [11] analysed potential crime situations to enable law enforcement officers to detect crimes and suspicious situations. It is aimed to detect regional crime categories by using existing crime records with machine learning. In the tests where the CLEAR dataset of the Chicago Police Department was used and 9 attributes were extracted and given to Naïve Bayes and Decision Tree classifiers, 91.68% success was achieved. Djon et al. [12] aimed to analyse only theft crime among different types of crimes. Prediction was provided by using the spatio-temporal information of the crime. As a result of data preprocessing and hyper parameter optimisation, an f-score of 86% was obtained with XGB.

The main purpose of this study is to propose, test and share the results of a machine learning based methodology for the units responsible for the security of a city to use their capacities more efficiently and to better predict and fight against crime. In this way, it will be possible to detect environmental and regional crimes and to reveal possible scenarios based on past data. The most basic of these scenarios is the evaluation of whether the reported crime records are real crimes or not. Considering the fact that not every crime record will contain a real crime, it is very critical to make a prediction about whether this crime report is a real criminal incident with the help of the reported region and basic information. In this way, it will be possible to intervene only in criminal incidents and non-criminal incidents will be automatically evaluated without any loss of labour thanks to this prediction. In order to perform this modelling, a series of analyses such as (1) converting the San Francisco dataset into a trainable form with machine learning models, (2) analysing the regional distribution of criminal and non-criminal incidents in the dataset, (3) revealing the variability of the crime in terms of date time and day must be completed and all these processes have been carried out in this study. Then, in the modelling phase, steps related to machine learning models such as data preprocessing, classifier selection, training and testing processes, data balancing were applied respectively. Thus, it was possible to detect criminal and non-criminal cases with higher success.

Section 2 of this paper presents the proposed methodology, Section 3 presents the test results and discussion, and the last section provides an overall evaluation of the topic in crime-based terms.

## **2. METHODOLOGY**

In this study, it is aimed to determine whether the crime reports are criminal events in the legal sense. The process steps applied for this purpose are shown in detail in Figure-1. Accordingly, San Francisco Crime Dataset, which is a competition dataset, was used as the dataset. Since the dataset is not directly usable from learning models, a series of pre-processing processes are required. Data transformation, data cleaning, feature categorization, data filtering, standardisation and oversampling, which are explained in section 2.1, were performed respectively. Since Random Forest was chosen as the classifier, the data were not actually divided into training and test sets. Due to its nature, 30% of the data will always be used as a test for Random Forest. As a result of the obtained learnable very and classifier design, it was tried to determine whether the crime reports were criminal or non-criminal in binary. Thus, it is aimed to prevent unnecessary effort of police departments for non-criminal incidents and to increase efficiency.

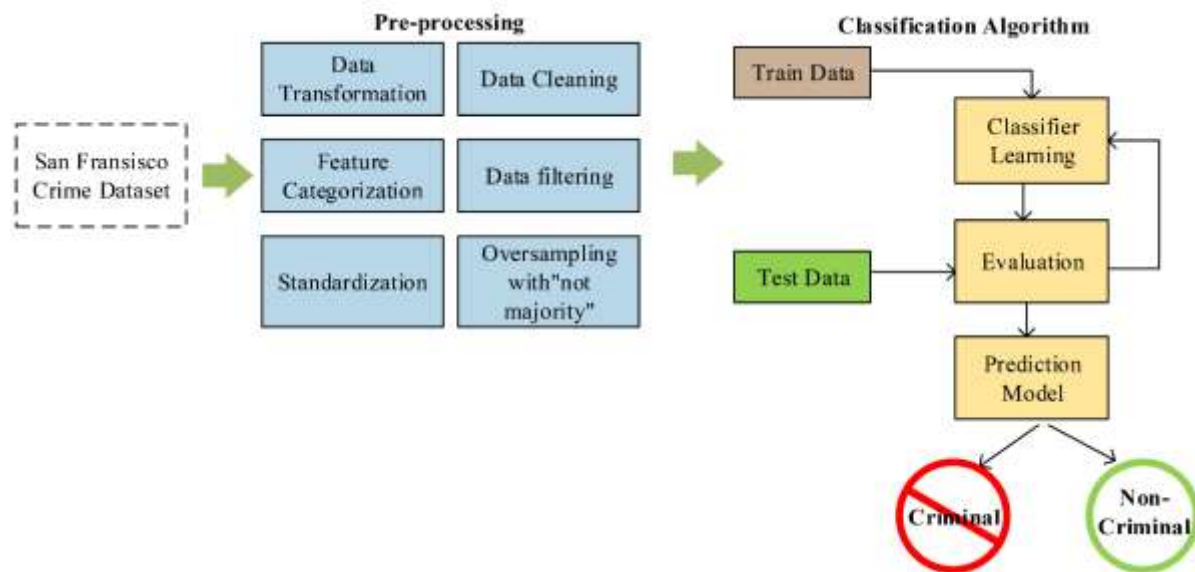


Figure 1 Methodology Diagram of Proposed Model

**2.1. Dataset, data pre-processing and feature selection**

The Sanfransisco dataset used in this study has 8 basic attributes shown in Table-1. In order to use these attributes in the training and testing processes of the Random Forest classifier used in this study, the data must be categorized. For this reason, Descript and Adress information that cannot be categorized are removed from the attributes. Among the remaining attributes, Dates attribute was transformed into 6 categorizable attributes as Year, Month, Day, Hour, Minutes and Seconds. As a result of these operations, crime records with 11 attributes were revealed.

Table 1 Feature Transformation from Original Dataset to Proposed Model

Original Feature from Dataset	Categorical Features derived from Dataset
<b>Dates</b> Sample: (2015-05-13 23:53:00)	Year, Month, Day, Hour, Minutes, Seconds
Descript	Removed from feature vector
DayOfWeek Sample: (Wednesday)	DayofWeek
PdDistrict	PdDistrict
Resolution	Resolution
Address	Removed from feature vector
X	X
Y	Y

When the dataset is analysed, there are data on 39 different types of offences in total, with a total of approximately 878 thousand offence records for 12 years between 2003 and 2015. In some types of offences, the number remains 1000 and below. This prevents the use of these crime types in learning

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

models. For this reason, in this study, the training and test dataset was prepared by considering the crime categories with at least 10000 or more records. Approximately 140 thousand records belonging to 14 different criminal offence types and approximately 92 thousand non-criminal offence records are considered. Then, the very balancing was balanced according to the "not majority" class and the training models were tested with a total of 280 thousand records.

Table 2 Dataset Sample Distribution for Different Crime Types and Category Conversion

Crime Type	Count	Converted Category
LARCENY/THEFT	10000	CRIMINAL
OTHER OFFENSES	10000	CRIMINAL
ASSAULT	10000	CRIMINAL
DRUG/NARCOTIC	10000	CRIMINAL
VEHICLE THEFT	10000	CRIMINAL
VANDALISM	10000	CRIMINAL
WARRANTS	10000	CRIMINAL
BURGLARY	10000	CRIMINAL
SUSPICIOUS OCC	10000	CRIMINAL
MISSING PERSON	10000	CRIMINAL
ROBBERY	10000	CRIMINAL
FRAUD	10000	CRIMINAL
FORGERY/COUNTERFEITING	10000	CRIMINAL
SECONDARY CODES	9985	CRIMINAL
<b>TOTAL FOR CRIMINAL</b>	139975	
<b>NON-CRIMINAL</b>	92304 -> 139975	NON-CRIMINAL

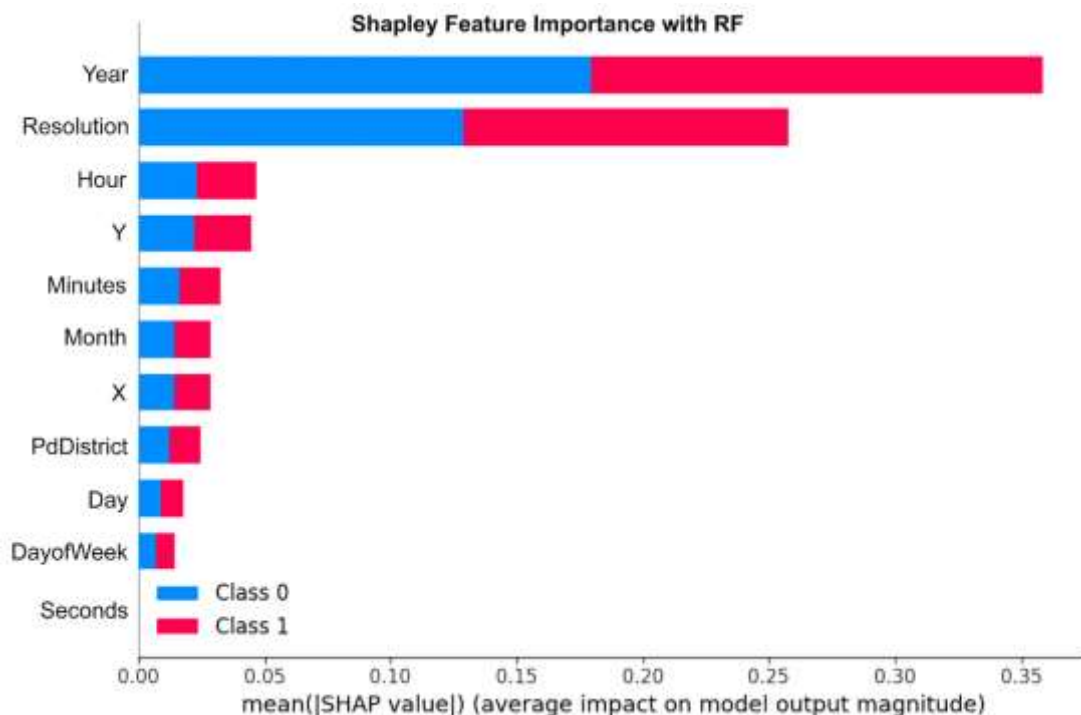


Figure 2 Feature Importance Graph for Random Forest according to Shap values

SHAP (SHapley Additive exPlanations) [13] value was calculated for 11 features obtained as a result of preprocessing for 280 thousand records and classification contribution levels were calculated and the results are given in Figure-2. The larger Shapley value indicates that the feature is more classifier. As can be seen in the Figure, Minutes value does not contribute positively to any of the Criminal or Non-



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Criminal classes for classification. The main reason for this is that it has the same value for all data. For this reason, this attribute was not used in the training and test models. As a result, 10 attributes and 280 thousand records were used.

## 2.2. Random Forest and Evaluation Metrics

Random Forest is one of the most widely used algorithms in machine learning models. It can be used for both classification and regression problems and has a structure that makes predictions based on majority voting by creating decision tools over different examples [14]. It uses the results of more than one decision tree over different subsamples by combining them and thus provides more successful classification results. Although a classification problem is addressed in this study, random forest has the ability to reduce overfitting in complex datasets thanks to multiple trees [15]. In addition, there are categorical variables in the San Francisco dataset and random forest is successful in processing these features. For all these reasons, Random Forest, which has the highest performance with other classifiers, was preferred in this study. The hyper-parameters of the classifier were optimised [16]. In addition, tests were performed with different classifiers [17] such as ET, DT, GB, GNB, Adaboost, LDA to compare the results.

The results of this study are measured by accuracy, precision, recall, fscore and auc value [18-19], which are the basic metrics for machine learning, and are evaluated comparatively in the next section.

Accuracy, calculated as  $(tp+tn / tp+tn + tp+tn+fp+fn)$ , indicates the ability of the model to accurately predict both positive and negative samples. Precision, calculated as  $(tp / tp + fp)$ , indicates the ability of the model to intuitively avoid labelling a negative sample as positive. Recall is calculated by  $(tp/ tp+fn)$  and indicates the ability of the model to intuitively find all positive samples. F1-Score is calculated as  $(2*(precision*recall) / (precision+recall))$  and is the harmonic mean of the precision and recall values.

## 3. Results and Discussion

As a result of the tests carried out in this study, it is aimed to determine the Criminal and Non-Criminal status of crime notifications in crime prediction. For this purpose, tests were performed for 9 different machine learning models and the results are given in Table-3. Accordingly, the highest performance is obtained with Random Forest and the Accuracy value is 86.35%. For the same classifier, precision, recall and f-score values were 86.36%, 86.35% and 86.35%, respectively. These values show that the preliminary analysis of crime reports can predict whether there is a criminal incident or not and can contribute to police organisations in terms of efficiency in case noncriminal incidents are not evaluated. In addition, these values were obtained without using any attributes related to the offence. Only temporal and regional data such as the region where the relevant crime is located, the date of the crime, etc. were used. These results prove that crimes can be evaluated spatially for cities and that the probability of crime depends on regional conditions.

Table 3 Classification Results for Different ML Algorithms

Classifier	Accuracy	Precision	Recall	F-score
LR	0.7429	0.7432	0.7429	0.7428
GNB	0.6424	0.7295	0.6424	0.6050
LDA	0.7575	0.7612	0.7575	0.7567
AdaBoost	0.8024	0.8045	0.8024	0.8021
GB	0.8074	0.8108	0.8074	0.8069
XGB	0.8275	0.8279	0.8275	0.8275
DT	0.8188	0.8193	0.8188	0.8188
ET	0.8585	0.8585	0.8585	0.8585
RF	0.8635	0.8636	0.8635	0.8635

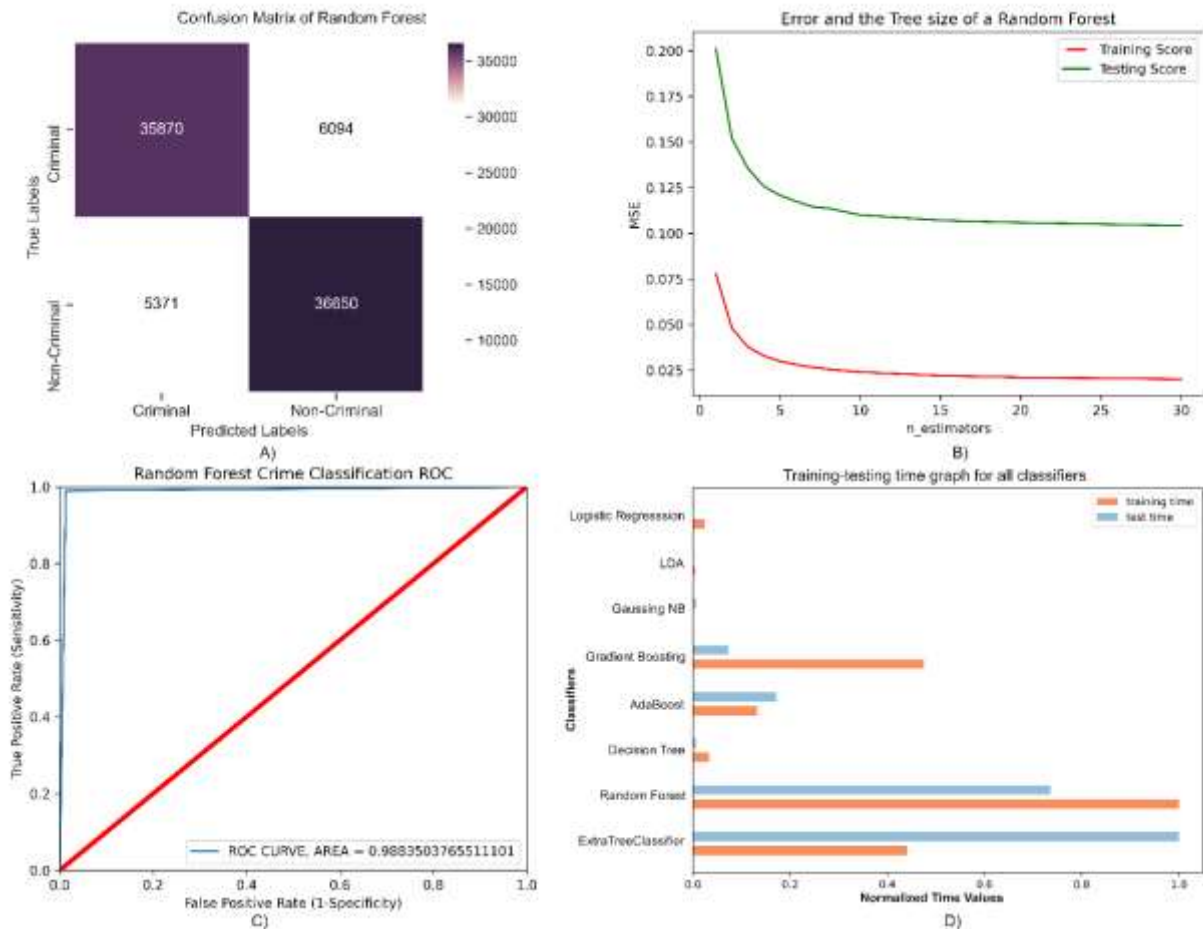


Figure 3 Classification Results Analysis for Random Forest Classifier

In order to analyse the results obtained with random forest, the confusion matrix, roc curve value, error and tree size MSE graph and training-testing time graph given in Figure-3 were examined:

- **Figure-3 (A) Confusion matrix:** when this table, which gives 4 different combinations of predicted and actual values, is analysed, it is seen that Random Forest can detect Non-Criminal cases better than Criminal class. In addition, FP and FN values are high in both classes and this decreases the performance.
- **Figure-3 (B) Error ve Tree size:** If the dataset is large enough, it is highly unlikely that the Random forest classifier will overfit. If the patient rate decreases in the train graph while the test error curve increases and approaches each other, this will indicate that the model may have overfitted. When the SHAP loss value graph given within the scope of this study is analysed, the Training and Test loss graphs decrease in parallel to each other and do not approach each other. This proves that the Random Forest classifier gives the results without overfitting.
- **Figure-3 (C) ROC:** The AUC value is a probability curve and the AUC value shows the separability of the classes from each other. When the graph is analysed, it is seen that the AUC value is obtained a very high value of 0.98. This shows that the models trained with more attributes and more crime records can be classified with higher success.
- **Figure-3 (D) Training-testing time graph:** In the graph, training and test times for 8 different classifiers performed in this study are measured and presented. For the Random Forest classifier, which has the highest performance for this study, both training and testing time are higher than the other classifiers. This is one of the most important disadvantages of the proposed model. More processing time is needed. However, other classifiers have lower classification performance. For this reason, Random Forest is preferred for this study.

In addition, since Random Forest classifier was used, no cross-validation was performed. A single run was performed for the whole data set. The training and test samples are already automatically selected [14]. For this reason, the K-fold plot is not taken and the classification results obtained are considered to be at a similar level without standard deviation.

When the results are evaluated together, it shows that temporal and spatial data have distinctive features for the detection of crime notifications whether there is a criminal situation. However, in order to achieve higher achievements, different features such as address etc. are needed. In addition, the models vary from city to city and each city needs to be analysed within itself.

#### 4. Conclusion

In this study, a machine learning model based on the binary classification of Criminal and Non-Criminal offences is proposed and tested using the San Francisco database. Tests were performed with 8 different machine learning models and the highest performance was achieved with random forest. While the Accuracy value was 86.5%, the AUC value was 0.98. It can be used by police forces and it is possible to provide automatic classification of crime reports in advance. It is possible to apply the proposed model to data prepared for different cities. It is possible to further increase the performance value obtained in this study. For this, further studies will be carried out by feature engineering. In addition, the learning capability will be increased by performing tests with artificial neural network based deep learning architectures. Text-based feature extraction structures will be tested in order to use the address information, which cannot be used in this study and which contains qualities that can be distinctive about the crime, as a feature.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ASSESSMENT OF ANTIFUNGAL ACTIVITIES OF SILVER NANO PARTICLES ON CANDIDIASIS AMONG FEMALE STUDENTS OF FEDERAL POLYTECHNIC KAURA NAMODA, ZAMFARA STATE

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### ABSTRACT

Silver nanoparticles (AgNPs) have attract huge attention in the scientific world today, due to their fascinating physical, chemical and antimicrobial properties. In this research, AgNPs was synthesized using green neem leaves extract and wet chemical techniques, the nanoparticles were characterized using Fourier Transform spectroscopy (FTIR), XRD, and UV-visible spectrophotometer at 240 nm. Ten virginal swab samples was collected among the female's volunteer students using virginal swab sticks. *Candida albincas* was identified and isolated using microbial techniques and only four samples are positive (*candida albincas*). The activities of the silver nanoparticles synthesized was carried out using sensitivity disc at different concentration and 24 hours of incubation, 200 µg/ml is the most effective against *candida albincas* the inhibition zone is almost 2.5cm follow by 2.0 cm, 1.0 cm for 100 µg/ml and 50 µg/ml respectively. It was concluded that silver nanoparticles synthesized from neem leave extract has antifungal activity against *candida* species at concentration of 200 µg/ml.

**Keywords:** Neem leaf Extract, silver nanoparticles, *candida albincas*,

ZEYTİNYAĞININ MİKROENKASPÜLASYONU  
MICROENCAPSULATION OF OLIVE OIL

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**ÖZET**

Zeytinyağı, benzersiz fonksiyonel değer sağlaması nedeniyle dünya çapında büyük önem kazanmıştır. Zeytinyağı, tekli doymamış yağ asitleri, antioksidan fenolik bileşikler, E vitamini ve K vitamini ile zenginleştirildiği için birçok kronik ve akut metabolik bozukluk riskini önler. Zeytinyağındaki yağ asitlerinin oksidatif olarak bozulması raf ömrünün kısalmasına neden olur ve biyolojik aktiviteleri azaltır. Bu bozulma istenmeyen organoleptik özelliklerden sorumludur. Zeytinyağının kalitesini korumanın için mikroenkapsülasyon işlemi önemli bir proses olarak düşünülmektedir. Bu çalışmada zeytinyağı mikrokapsülü hazırlama yöntemleri incelenmiştir. Mikroenkapsülasyon, kimyasal ve fiziksel reaksiyonları önlemek ve çekirdek malzemelerinin biyolojik, fonksiyonel ve fizikokimyasal özelliklerini korumak için çekirdek ve duvar malzemesi arasında işlevsel bir bariyer oluşturma işlemidir. Deniz, bitkisel ve uçucu yağların mikrokapsüllemesinde emülsifikasyon, sprey kurutma, koaksiyel elektrosprey sistemi, dondurarak kurutma, koaservasyon, ekstrüzyon ve akışkan yataklı kaplama gibi farklı yöntemler kullanılmaktadır. Uygun mikrokapsülleme tekniğinin ve duvar malzemesinin seçimi, ürünün son kullanımına ve ilgili işleme koşullarına bağlıdır. Mikroenkapsülleme, yağların oksidatif stabilitesini, termostabilitesini, raf ömrünü ve biyolojik aktivitesini artırma yeteneğine sahiptir. Mikroenkapsülün hazırlanması birçok faktörden etkilendiği için zeytinyağı mikrokapsülünün farklı özellikleri özetlenmiştir. Kapsüllemiş zeytinyağının gıda, ilaç ve kozmetik endüstrilerindeki çeşitli uygulamaları kapsamlı olarak incelenmiştir.

**Anahtar Kelimeler:** Mikroenkapsülasyon, zeytinyağı, mikrokapsül, fonksiyonel özellikler

**ABSTRACT**

Olive oil has gained great importance worldwide because it provides unique functional value. Since olive oil is enriched with monounsaturated fatty acids, antioxidant phenolic compounds, vitamin E and vitamin K, it prevents the risk of many chronic and acute metabolic disorders. Oxidative degradation of fatty acids in olive oil causes a shortening of its shelf life and reduces biological activities. This degradation is responsible for undesirable organoleptic properties. Microencapsulation is considered an important process to preserve the quality of olive oil. In this study, olive oil microcapsule preparation methods were examined. Microencapsulation is the process of creating a functional barrier between the core and wall material to prevent chemical and physical reactions and preserve the biological, functional and physicochemical properties of the core materials. Different methods such as emulsification, spray drying, electrospray system, freeze drying, coacervation, extrusion and fluidized bed coating are used in microencapsulation of marine, vegetable and essential oils. The selection of the appropriate microencapsulation technique and wall material depends on the end use of the product and the relevant processing conditions. Microencapsulation has the ability to increase the oxidative stability, thermostability, shelf life and biological activity of oils. Since the preparation of the microcapsule is affected by many factors, the different properties of the olive oil microcapsule are summarized. Various applications of encapsulated olive oil in the food, pharmaceutical and cosmetic industries have been extensively studied.

**Keywords:** Microencapsulation, olive oil, microcapsule, functional properties



EBELİK ÖĞRENCİLERİNİN KLİNİK UYGULAMALARDA MOBBİNGE MARUZİYET  
DURUMLARI: EGE BÖLGESİ ÖRNEĞİ

EXPOSURE OF MIDWIFERY STUDENTS TO MOBBING IN CLINICAL PRACTICES:  
EXAMPLE OF AEGEAN REGION

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**ÖZET**

Mobbing, iş yerinde gerçekleşen zorbalık, psikolojik taciz ya da genel olarak işyeri şiddeti olarak tanımlanır ve son yıllarda tüm örgütlerin sorunu haline gelmeye başlamıştır. Sağlık sektörü de mobbing yüksek oranda yaşandığı bir alandır. Ebelik eğitiminde, uygulamalı eğitim ve stajlar sağlık kuruluşlarında gerçekleştiğinden sağlık çalışanlarının karşılaştıkları her türlü risk ebelik öğrencileri de için de geçerlidir. Bu bağlamda araştırma, Ege bölgesinde ebelik bölümü olan üniversitelerde ebelik eğitimi alan öğrencilerin klinik uygulamalarda mobbinge maruziyet durumlarını incelemek amacıyla gerçekleştirilmiştir. Kesitsel tipteki çalışma Nisan-Haziran 2023 tarihlerinde Ege Bölgesindeki devlet üniversitelerinin ebelik bölümlerinde öğrenim gören 453 öğrenci ile gerçekleştirilmiştir. Veriler, öğrencilerin sosyodemografik özellikleri ile mobbinge ilişkin bilgilerini ve deneyimlerini belirlemeye yönelik soruların yer aldığı Öğrenci Tanımlayıcı Bilgi Formu ile toplanmıştır. Bilgi formu, Google Forms aracılığı ile online anket yöntemi ile uygulanmıştır. Çalışma verilerinin analizi SPSS 25 paket programı ile yapılmıştır. Verilerin değerlendirilmesinde tanımlayıcı istatistiksel metotlar (minimum, maksimum, ortalama, standart sapma) kullanılmıştır. Araştırmaya katılan öğrencilerin yaş ortalaması 21.45±1.58 (min:19-max:34)'tir. Öğrencilerin %98.0'si mobbing kavramını duymuştur ve en çok duydukları %43.9 ile medya/sosyal medya ve %30.6 ile iş sağlığı ve güvenliği eğitimidir. Öğrencilerin %51.4'ü mobbinge maruz kalmıştır, %85.7'si mobbingin suç olduğunu, %91.6'sı mobbingin önlenbilir olduğunu düşünmektedir. En fazla mobbinge maruz kalınan dönem 3. sınıf, maruz kalınan kurum üniversite hastanesi, en fazla mobbing uygulayan kişi hemşire, maruz kalınan mobbing türü ise sözlü şiddettir. %43.5'i maruz kalınan mobbingin nedenin stajyer ebe olmak olduğunu düşünmektedir. Mobbinge maruz kalan öğrencilerin %45.9'u mobbingi önlemek için herhangi bir girişimde bulunmamıştır. Mobbing sonrası ne tepki verdikleri sorulduğunda %46.4'ü yaşadığı durumu arkadaşları/ailesi ile paylaştığını, %32.2'si mobbingin motivasyonunu olumsuz etkilediğini belirtmiştir. Çalışmada ebelik öğrencilerinin tamamına yakının mobbing kavramını duyduğu, yarısından fazlasının mobbinge maruz kaldığı bulunmuştur. Tüm bu sonuçlar bağlamında, sağlık kurumlarının ve üniversitelerin öğrencilerin klinik uygulamalarda kendilerini daha güvende hissedecekleri ortam oluşturması, akademisyenlerle sağlık çalışanları arasındaki iş birliğinin geliştirilmesi, mobbinge maruz kalma durumunda öğrencilerin okullarda/sağlık kurumlarında başvurabilecekleri birimler oluşturulması önerilebilir.

**Anahtar Kelimeler:** Ebelik, öğrenci, mobbing

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ABSTRACT

Mobbing is defined as bullying, psychological harassment, or workplace violence in general, and has become a problem for all organizations in recent years. In midwifery education, since practical training and internships take place in health institutions, all kinds of risks faced by health workers are also valid for midwifery students. In this context, the study was conducted to examine the exposure to mobbing in clinical practice of students studying midwifery at universities with midwifery departments in the Aegean region. The cross-sectional study was conducted between April-June 2023 with 453 students studying in midwifery departments of state universities in the Aegean Region. The data were collected with the Student Descriptive Information Form, which included questions to determine the sociodemographic characteristics of the students and their knowledge and experiences regarding mobbing. The information form was applied by online survey method via Google Forms. The analysis of the study data was performed with SPSS 25 package program. Descriptive statistical methods (minimum, maximum, mean, standard deviation) were used to evaluate the data. The mean age of the students participating in the study was  $21.45 \pm 1.58$  (min:19-max:34). 98.0% of the students have heard of the concept of mobbing, and the most common ones are media/social media with 43.9% and occupational health and safety training with 30.6%. 51.4% of the students were exposed to mobbing, 85.7% thought that mobbing was a crime, and 91.6% thought that mobbing was preventable. The period most exposed to mobbing was the 3rd grade, the institution exposed to mobbing was a university hospital, the person who applies mobbing the most was a nurse, and the type of mobbing exposed was verbal violence. 43.5% thought that the reason for mobbing was being a trainee midwife. 45.9% of the students exposed to mobbing did not take any action to prevent mobbing. When asked how they reacted after mobbing, 46.4% stated that they shared the situation with their friends/family and 32.2% stated that mobbing negatively affected their motivation. In the study, it was found that almost all midwifery students had heard of the concept of mobbing and more than half of them had been exposed to mobbing. In the context of all these results, it can be suggested that health institutions and universities should create an environment where students feel safer in clinical practices, improve the cooperation between academicians and health professionals, and establish units that students can apply to in schools/health institutions in case of mobbing.

**Keywords:** Midwifery, student, mobbing

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## FUNDRAISING STRATEGY OF ZAKAT, INFAQ, AND SADAQAH OF INDONESIAN PHILANTHROPIC INSTITUTIONS

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### ABSTRACT

Indonesian philanthropic institutions, one of which is LAZISNU located in Doro District. Strategy fundraising of zakat, infaq, and sadaqah by Lazisnu Doro District uses three steps: First, planning, planning of fundraising strategies directly, namely looking for volunteers, preparing a socialization schedule. Then planning the fundraising strategy, namely preparing social media, preparing contacts that can be contacted, and digital wallets in the form of bank accounts used by Lazisnu Doro District. Second, the implementation of fundraising using direct fundraising and indirect fundraising methods through three strategies, namely: dialogue fundraising strategy, Corporate fundraising strategy, multichannel fundraising strategy. Third, it includes internal and external evaluation.

Internal evaluation is motivating the volunteers, and external evaluation is reporting fundraising activities to the wider community through social media. As well as reporting the results of fundraising funds to the supervisory institution of zakat management at the sub-district level. zakat management at the sub-district level.

In the fundraising process, there are supporting factors and inhibiting factors. Supporting factors are internal and external factors. Internal factors are adequate pre-facilities. External supporting factors are people who are well acquainted with Lazisnu because Lazisnu is still under the auspices of Nahdhatul ulama. Internal inhibiting factors are limited officers or volunteers, delays in depositing the results of branch donations by branch volunteers, external inhibiting factors are the response of some people who do not know what Lazisnu institutions are, and the lack of public awareness in charity.

**Keywords:** Strategy, Fundraising, ZIS (zakat, infaq, and sadaqah)

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## THE IMPACT OF DIGITAL INFLUENCER MARKETING ON THE DEVELOPMENT OF BUSINESS STRATEGY (A LITERATURE STUDY)

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### ABSTRACT

*Social media connects individuals around the world, where the power of interaction and information sharing has shifted from corporate to customer oriented. Social media is considered one of the best ways for businesses to promote their products to potential customers. This study aims to explain the impact of digital influencer marketing on the development of business strategy. This research is a literature study with a qualitative approach. The data sources in this study were obtained through the study of various references such as books, journal articles, the internet, and other sources relevant to the research topic. The data analysis in this study uses content analysis techniques from existing referral sources. The result obtained is a broad description of the influencer's role so that it can become input for business organizations in developing their marketing strategy. Influencer marketing can have a significant impact on business. It can help increase brand awareness, achieve higher engagement rates, improve SEO, and promote your brand in a cost-effective way. However, it's important to choose the right influencer for brand and to ensure that their values align with brand's values. By doing so, can create an authentic and effective influencer marketing campaign that resonates with target audience.*

**Keywords:** Digital Influencer, Social Media Marketing, Business Strategy

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## PRODUCTIVE UTILIZATION OF ZAKAT FOR POVERTY ALLEVIATION: CASE STUDY IN INDONESIA

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### ABSTRACT

This research aims to explain the importance of productive utilization of zakat for poverty alleviation: case study in Indonesia. This research is library research with a qualitative approach. The data sources used in this research come from various literature, journal articles that are relevant to the research topic. The data analysis method used is content analysis of the literature used in the research. The research results show that zakat expenditure is a minimum expenditure to make income distribution more equal. With zakat, poor and needy people can play a role in their lives, carrying out their obligations to Allah. With zakat, people who have nothing also feel that they are part of society. Effective utilization of zakat can contribute to alleviating poverty and improving the quality of human resources (HR) in accordance with an institution's human development program. It is hoped that the productive distribution of zakat can empower poor mustahik to accelerate poverty reduction by providing access to business capital on a rolling basis. So far, poor people have had great difficulty accessing business capital from financial institutions. The process of managing productive zakat can be done in three ways: zakat recipients become creditors and debtors at the same time; transactions are recorded in a profit sharing system; zakat is given in full. Utilization is usually carried out by distributing zakat, including providing business capital for certain businesses with assistance so that the mustahik can manage the business and be independent.

**Keywords:** Utilization, productive zakat, poverty, Indonesia

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## THE IMPORTANCE OF PRODUCT QUALITY IN MAINTAINING CONSUMER LOYALTY IN THE BATIK INDUSTRY IN INDONESIA

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### ABSTRACT

This research aims to explain the role of product quality in maintaining consumer loyalty in the batik industry in Indonesia.

This research is library research with a qualitative approach. The data sources used in this research come from various literature from journal articles that are relevant to the research topic. The data analysis method used is content analysis from literature sources used in the research

The research results show that product quality has an important role in increasing consumer loyalty, because maintaining or improving product quality in the batik industry will certainly make consumers feel satisfied. Maintaining consumer loyalty is very important, maintaining loyalty will certainly have an impact on the development of the batik industry in the long term. Making various different batik motifs is one trick to attract new and old consumers. Indirectly, loyal consumers will introduce the products or services they use to the people closest to them. Consumer loyalty can be formed if the product that consumers want meets their expectations or even exceeds their expectations. This can be measured through consumer satisfaction, so companies must be able to make products with good quality and have good value for consumers.

**Keywords:** service quality, loyalty, batik industry



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

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## THE CONCEPT OF MURABAHAH CONTRACT AT BANK SYARIAH INDONESIA KC PEKALONGAN PEMUDA

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### ABSTRACT

This article intends to decide the idea of a murabahah financing item contract at Bank Syariah Indonesia KC Pemuda Pekalongan. The utilization of islamic money angles in Indonesia is progressively broad and progressively known by the more extensive local area. Islamic banks will be banks that utilization sharia standards in doing their business exercises where the legitimate reason for carrying out these sharia standards alludes to the Qur'an and Hadits with respect to a few different guidelines identified with sharia bank business exercises as *Financial Intermediary*, to be specific gathering and disseminating assets to people in general, particularly in directing exercises to the general population. In this general public, there are a few financings that are completed in sharia standards, including purchasing and selling financing for sure we normally know as murabahah contracts. Murabahah is perhaps the most widely recognized kinds of contract applied in islamic financial financing exercises. Murabahah is executed through the instrument of purchasing and selling products with the expansion of an edge as a benefit to be acquired by the bank.

**AVRUPA BİRLİĞİNDE ÇİFTLİKLERİN EKONOMİK DURUMU  
ECONOMIC SITUATION OF FARMS IN EUROPEAN UNION**

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**ÖZET**

Bu çalışma, Avrupa Birliğindeki (AB) çiftliklerin ekonomik performansını, çiftlik muhasebesi veri ağı (FADN) verilerine dayalı olarak AB üye ülkelerindeki yıllık verilere, çiftlik türlerine ve ekonomik büyüklük düzeylerine odaklanarak incelemektedir. AB'deki çiftlik gelirlerini ve işletme operasyonları, ortak tarım politikası faaliyetlerinin etkisini ölçmek için önemli bir bilgi kaynağı olan FADN ile takip edilmektedir. Bu çalışma ile AB düzeyindeki yıllık ekonomik tarımsal faaliyet verileri, ekonomik büyüklük, toplam hasıla, toplam işgücü girdisi, çiftlik geliri ve çiftlik net katma değerine göre uzmanlaşmış çiftliklerin ekonomik ve mali konularına odaklanılarak ülke ve sektör bazında analiz edilmiştir. Başlangıçta grupların bilinmediği durumlarda veri setini farklı gruplara ayırmak için kullanılan kümeleme modeli, AB ülkelerini ekonomik performansa göre sınıflandırmak için kullanılmıştır. Sonuçlara göre Danimarka ve Hollanda, 2021 yılı için sırasıyla 581.500 bin € ve 573.200 bin € değerleriyle AB'nin en yüksek ekonomik büyüklük grubunda yer aldı. Bu ülkeler aynı zamanda çiftlik başına toplam hasıla, yıllık iş birimi (AWU) başına çiftlik net katma değeri ve aile iş birimi (FWU) başına aile çiftliği geliri bakımından da en yüksek grupta yer aldı. Danimarka ve Hollanda için sırasıyla çiftlik başına toplam hasıla 695.759 ve 670.333 €/çiftlik, çiftlik net katma değeri 102.598 ve 70.575 €/AWU, aile çiftliği gelirleri ise 115.768 ve 81.207 €/AWU'dur. Ekonomik büyüklük, çiftlik başına toplam hasıla, çiftlik net katma değeri ve aile çiftliği geliri sırasıyla 98 k€, 110.546 €/çiftlik, 29.112 €/AWU ve 27.154 €/FWU olan AB-27 üye ülke değerleri dikkate alındığında, bu ülkelerin ekonomik performanslarının oldukça güçlü olduğu görülmektedir. Romanya, Yunanistan, Hırvatistan ve Slovenya, 30.000 k€'nin altındaki değerleriyle AB'nin en düşük ekonomik büyüklüğüne sahip ülkeleridir. Bu ülkeler aynı zamanda çiftlik başına toplam hasıla açısından da en düşük değere sahip olup, bu değerleri 40.000 €/çiftlik'in altındadır.

**ABSTRACT**

This study examines the economic performance of European Union (EU) farms, focusing on yearly data at EU member states, farming types, and economic size levels based on farm accountancy data network (FADN) data. FADN, a significant source of information for understanding the impact of the common agricultural policy's actions, tracks farm income and company operations in the EU. Annual economic farming data at the EU level was analyzed in this study by country and sector by focusing on the economic and financial outline of specialized farms by economic size, total output, total labor input, farm income, and farm net value added. The cluster model, which is used to cluster the dataset into distinct groups when those groups are not known at the beginning, was used to define the clusters of EU countries according to economic performance. According to the results, Denmark and the Netherlands were classified as the highest economic size group in the EU, with values of 581.500 k€ and 573.200 k€, respectively, for the year 2021. These countries were also in the highest group regarding total output per farm, farm net value added per annual work unit (AWU), and family farm income per family work unit (FWU). Total outputs per farm were 695.759 and 670.333 €/farm, farm net values added were 102.598 and 70.575 €/AWU, and family farm incomes were 115.768 and 81.207 €/FWU for Denmark and the Netherlands, respectively. The economic performances of these countries are very sound considering the whole EU-27 performance of 98 k€, 110.546 €/farm, 29.112 €/AWU, and 27.154 €/FWU for economic size, total output per farm, farm net value added, and family farm income, respectively. Romania, Greece, Croatia and Slovenia were the countries with the lowest economic size

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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in the EU, with values below 30,000 k€. These countries also had the lowest values in terms of total output per farm, below €40,000/farm.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## BİYOKÜLTÜREL MİRASIN KORUNMASINDA OLEOTURİZM KURTARICI OLABİLİR Mİ?

### CAN OLEOTOURISM BE A SAVIOUR IN BIOCULTURAL HERITAGE?

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#### ÖZET

Biyokültürel miras, toprak ile bağı arayan, bu bağı farklı anlamlarda yaşatan post-endüstriyel dönemin bireyinin sahip çıkmaya başladığı bir kavramdır. Bu kavram farklı kapsamlarda karşımıza çıkmakla birlikte, zeytin ağaçlarının Akdeniz Havzası'ndaki kutsallığı ile birleştiğinde karşılığını oleoturizm terimi ile bulmuştur. Araştırmanın amacı, biyokültürel mirasa sahip çıkılmasında oleoturizm unsurlarının kurtarıcılık potansiyelini araştırmaktır. Sonuç olarak, araştırmanın gerçekleştirildiği Kahramanmaraş'ta asırlık zeytinler ile bağın kurulmuş olduğu ancak bu bağın imar politikaları ve yüksek yapılaşma sonucunda koparıldığı ortaya çıkmıştır. Konu ile ilgili kültürel miras bağının sürdürülmesine ilişkin öneriler de getirilmiştir.

**Anahtar kelimeler:** biyokültürel miras, oleoturizm, Akdeniz Havzası

Jel kodu: Z3, Q57

#### ABSTRACT

Bio-cultural heritage is a concept that the post-industrial era has begun to embrace as an individual who seeks to connect with the soil and experiences this connection in different ways. While this concept comes across in different spheres, when combined with the sacredness of olive trees in the Mediterranean Basin, it has been countered by the term oleotourism. The aim of the study is to explore the rescue potential of the elements of oil tourism in the acquisition of bio-cultural heritage. As a result, it was revealed that Kahramanmaraş, where the research was carried out, was linked to centuries-old olive groves, but this link was broken as a result of construction policies and high structuralization. Proposals have also been made to maintain the link between cultural heritage on the subject.

**Keywords:** bio-cultural heritage, oil tourism, Mediterranean

Jel code: Z3, Q57

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## THE ROLE OF PRODUCT INNOVATION IN IMPROVING THE MARKETING PERFORMANCE OF CULINARY BUSINESSES IN INDONESIA

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### ABSTRACT

This research aims to explain the role of product innovation in improving the marketing performance of culinary businesses in Indonesia. This research is library research with a qualitative approach. The data sources used in this research are from various journal articles that are relevant to the research topic. The data analysis method used is content analysis from literature sources used in the research. The research results show that product innovation plays a role in improving the marketing performance of culinary businesses in Indonesia. This product innovation focuses on 1) Product packaging; 2) Addition of product variants; and 3) Development of product quality. This means that the implementation of product innovation can be done by packaging the product so that it is unique, being able to develop new products and actively developing the quality of the product. Culinary entrepreneurs by producing product innovation that is always maintained will have an impact on maximum marketing performance. This is because product innovation can make production easier, in addition, product innovation is important for effective marketing and as a result the company's financial performance will also increase. In an effort to improve marketing performance in culinary businesses, this product innovation strategy is key for companies because innovation in food products will have the potential to increase the company's value in the eyes of consumers. Where consumers will feel attracted to the products offered with good packaging, variants and quality. These results show that the better the implementation of product innovation in a culinary business, the better its marketing performance capabilities will be.

**Keywords:** Product Innovation, Marketing Performance, Culinary Business.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ANALYSIS OF HALAL PRODUCT CERTIFICATION AND LABELIZATION IN INDONESIA

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### ABSTRACT

The development of the halal lifestyle in Indonesia provides an illustration that the Islamic Economy in Indonesia is also developing well. Various sectors and dimensions of the Islamic Economy are starting to improve systems for monitoring and educating about halal products in Indonesia. So it is hoped that Halal Products in Indonesia can comply with Islamic Economic Law which is guided by the Qur'an and Hadith. In this case, halal certification and labeling of products in Indonesia is one of the indicators that is expected to become the halal legality of products in Indonesia. Objective- This research aims to explain the importance of Analysis of Halal Product Certification and Labeling in Indonesia. Method – This research is library research with a qualitative approach. The data sources used in this research come from various journal articles that are relevant to the research topic. The data analysis method used is content analysis from literature sources used in the research. The research results of Halal Certification, Halal Labeling and Fatwa regarding halal products are appropriate so as to provide protection and guarantee legal certainty for halal products circulating in Indonesia. However, of course there must be several evaluations that need to be improved by each sector and dimension of the Islamic Economy in Indonesia. Especially in terms of government regulations as supervisors which can further support the appropriate implementation of halal product certification and labeling in Indonesia.

**Keywords:** Halal, halal certification, halal labeling, halal products



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## A BIBLIOMETRIC ANALYSIS: ANALYSIS OF THE CAUSES OF INEQUALITY IN INCOME DISTRIBUTION IN INDONESIA

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### ABSTRACT

This research intends to explain in depth the inequality of income distribution in Indonesia according to central statistics agency (BPS). This research is library research with a qualitative approach. The data sources used in this research come from various literature journal articles that are relevant to the research topic. The data analysis method used is content analysis of the literature sources used in the research. Rapid economic growth needs to be accompanied by equal distribution of income to improve people's welfare. Distribution inequality can be measured using the Gini ratio, which shows the proportion of disadvantage in income distribution. Inequality in Indonesia is caused by the concentration of main sectors and investment only in certain areas. Inequality has negative impacts such as reducing investment attractiveness, increasing poverty, and decreasing productivity levels in a region. However, inequality can also have a positive impact by encouraging less developed regions to increase their growth. In Indonesia, there is income inequality between provinces as shown by the contribution of Gross Regional Domestic Product (GRDP) to Gross Domestic Product (GDP). GDP per capita in Indonesia in 2018-2022 experienced fluctuations in each province, East Nusa Tenggara had the lowest GDP per capita value, with an average of IDR. 13,298.85 in 2022. On the other hand, DKI Jakarta is the province with the highest GDP per capita value, with an average of IDR. 182 908.69 thousand in the same period. This difference in income is the main cause of inequality in income distribution in Indonesia.

**Keywords:** Inequality, Income Distribution, and Gini Ratio.

ISOLATION OF ENDOGENOUS BACTERIA FROM *Adenosma bracteosum* Bonati IN TAY  
NINH PROVINCE WITH ANTIBACTERIAL ACTIVITY ON *Staphylococcus aureus*

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**ABSTRACT**

Currently, the dependent and unbalanced use of antibiotics has caused antibiotic-resistant bacteria. Therefore, many studies focus on using medicinal plants to treat diseases without causing drug resistance. However, most of the research related to medicinal plants focuses on essential oils or plant extracts, while research on endogenous bacteria in medicinal plants has not received adequate attention. These bacteria have been shown to possess potent antibacterial properties in several studies, making their isolation from *Adenosma bracteosum* Bonati, which was collected from Lo Go - Xa Mat National Park, a crucial step in searching for antibiotics from microorganisms. This study aims to isolate endophytic bacteria from different parts of *Adenosma bracteosum* Bonati, such as the roots, stems, and leaves, and culture them on the NA medium. Out of the 24 endophytic bacterial strains isolated, the majority were rod-shaped and Gram-negative. These strains were subjected to assessment for their resistance against *Staphylococcus aureus* using the agar disc diffusion technique. Among 24 strains, 4 endophytic bacterial strains could resist *Staphylococcus aureus* after 24 hours of incubation. Notably, the SB1R13.2 strain displayed a considerable inhibition zone diameter of 14.00 mm. As a result of 16S rDNA identification, strain SB1R13.2 has 99.93% similarity with *Bacillus velezensis* strain EBCH16. This study indicates that *Adenosma bracteosum* Bonati contains bacterial strains with notable resistance against *Staphylococcus aureus*, suggesting promising avenues for natural interventions in combatting bacterial infections and aiming to apply antibacterial drugs of microbial origin to contribute to protecting public health.

**Keywords:** *Adenosma bracteosum*, antibacterial activity, endogenous bacteria, isolation, strains.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## COMPUTER LABORATORY OPTIMIZATION IN LEARNING: A LITERATURE STUDY

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### ABSTRACT

This research aims to explain the importance of optimizing computer laboratories in the practical learning process, including in processing data. This research is library research with a qualitative approach. The data sources used come from various journal article sources that are relevant to the research topic. The data analysis method used is content analysis from literature sources used in the research. The computer laboratory is a center of statistical development that suits the needs of the academic community and industry. Therefore, it is necessary to have computer laboratory governance, by always updating the installation of various software. Apart from that, there is a need to socialize the rules and SOPs for using the computer laboratory, so that the practicum runs in an orderly and smooth manner. A computer laboratory is a means for carrying out activities that are directly related to practical activities that require a medium to achieve learning objectives related to skills and competencies in the computer field. Thus, the computer laboratory is a supporting facility in improving the practicum service process. With these facilities, it is a necessity that computer laboratories can play an optimal role in improving students' abilities, so that efforts in managing and functioning the laboratory are achieved. Another reason is as a place for research and community service as stated in the Tri Dharma of Higher Education. It is not uncommon to find that the laboratory is just a formal room without activity, the laboratory is tangible but lacks function. Good computer laboratory management at universities will provide students with lots of computing resources. The positive impact of this technology on student learning has led many groups or governments to create technology integration programs. So it will provide a positive contribution and benefit in computer laboratory governance activities, because it is related to easy, friendly, fast and accurate service to students. The existence of a good laboratory is also a parameter for the faculty to excel. This computer laboratory optimization activity is important to support the achievement of the higher education's vision and mission as well as providing strengthening of spiritual values, intellectuality, professionalism. Meanwhile, the education and learning process requires the support of adequate facilities so that it can run well.

**Keywords:** Optimization, Laboratory, Computer, Learning

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## CHAT GPT: A TECHNOLOGICAL SOLUTION OR DILEMMA FOR THE EDUCATION SYSTEM IN 2023

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### ABSTRACT

Chat-GPT, an AI chatbot, is revolutionizing the way we interact with technology. Its ability to hold human-like conversations, generate essays, and perform other tasks has raised questions about its impact on education. Some educators believe that Chat-GPT could be a valuable addition to the classroom, providing students with personalized tutoring and assistance with their assignments. Others are concerned that Chat-GPT could be used to cheat or plagiarize, and that it could lead to a decline in critical thinking skills. Early evaluations suggest that Chat-GPT can outperform many students when given English assignments. The bot is also capable of generating high-quality content, such as cover letters and literary summaries. However, it is important to note that Chat-GPT is still under development, and its capabilities are constantly evolving. The integration of AI into education is a rapidly evolving field, and it is important for educators to stay up-to-date on the latest developments. This paper explores the potential impact of Chat-GPT on education, and it recommends that educators use the tool responsibly. Overall, the impact of Chat-GPT on education is still unknown. However, it is clear that this technology has the potential to both benefit and harm students. It is important for educators to use Chat-GPT responsibly and to be aware of the potential risks.

**Keywords:** Artificial Intelligence, Chat-GPT, OpenAI.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## REVIEWING THE ACADEMIC LANDSCAPE: THE IMPLEMENTATION OF ELEARNING INITIATIVES IN HIGHER EDUCATION

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### ABSTRACT

This paper explores the challenges tied to infrastructure, pedagogical considerations, and the effective integration of technology to enrich the learning experience. Technology integration is viewed as a means to augment learning, not as a replacement for educators. Both educators and students grapple with the ramifications of eLearning. Universities face increasing demands for quality and flexibility to cater to diverse student needs, necessitating tailored course designs to align with varied educational requirements. Educators must adapt their teaching styles to accommodate changing student learning preferences, which can result in heavier workloads necessitating proactive management. Furthermore, eLearning poses a potential challenge to the traditional university structure. As institutions confront pressure to depart from traditional facilities and lecture-centric teaching methods, they must carefully navigate this transition. While the benefits of eLearning are eagerly anticipated, thoughtful assessment of the implications of eLearning program implementation is imperative. In the UK, many universities are embracing technology for eLearning solutions, yet some costly implementations fall short in terms of engaging learners and promoting active participation. These implementations often function as content repositories, lacking robust pedagogical practices. When institutions adopt eLearning without a strong pedagogical foundation, activities may prioritize technology over student progress and engagement.

**Keywords:** eLearning, Higher Education, Quality Assurance, Teaching and Learning Styles.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## COMPUTATIONAL PLATFORMS-GUIDES GENOME MINING TO UNLEASH POTENTIAL OF STREPTOMYCES MK37H STRAIN

### HESAPLAMALI PLATFORMLAR, STREPTOMYCES MK37H SUŞUNUN POTANSİYELİNİ AÇIĞA ÇIKARMAK İÇİN GENOM MADENCİLİĞİNE REHBERLİK EDİYOR

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#### ABSTRACT

One of the most interesting class of biopharmaceuticals is therapeutic peptides. These peptides have become the main motive of scientists' interest in the field of bacteria-derived drug discovery, especially those that enable them to overcome the universal issue which is considered the next pandemic that the world may face next time, which is antimicrobial resistance. Due to the unique physiochemical properties of peptide drugs, including their larger size and more flexible backbone, enable them to act as potent inhibitors of protein-protein interactions. Therapeutic peptides commonly act as hormones, growth factors, neurotransmitters, ion channel ligands, or anti-infective agents. They bind to cell surface receptors and trigger intracellular effects with high affinity and specificity, with a similar mode of action to biologics, including therapeutic proteins and antibodies. However, compared with biologics, therapeutic peptides show less immunogenicity and have lower production costs.

One of among amazing bacteria that enable the scientists to defeat pathogenic microbes along 80 years ago is Streptomyces. Here we report novel Streptomyces MK37H strain which exhibited bioactivity against some pathogenic bacteria and fungi. This strain registered at NCBI database under NCBI Reference Sequence: NZ\_JAAAYH000000000.1.

Computational analysis showed that this strain has more than 20 potential peptides that have wide variety of biological activity. A mass spectrometry-guided genome mining approach been used for structure prediction of novel antimicrobial peptide.

**Keywords:** Peptides, Therapeutic peptides, Protein-Protein interactions

#### ÖZET

Biyofarmasötiklerin en ilginç sınıflarından biri terapötik peptidlerdir. Bu peptitler, bilim adamlarının bakteri kaynaklı ilaç keşfi alanına, özellikle de dünyanın bir dahaki sefere karşı karşıya kalabileceği bir sonraki salgın olarak kabul edilen evrensel sorunun, yani antimikrobiyal direncin üstesinden gelmelerini sağlayanlara olan ilgisinin ana nedeni haline geldi. Peptit ilaçlarının, daha büyük boyutları ve daha esnek omurgaları da dahil olmak üzere benzersiz fizyokimyasal özelliklerinden dolayı, protein-protein etkileşimlerinin güçlü inhibitörleri olarak hareket etmelerine olanak sağlar. Terapötik peptitler genellikle hormonlar, büyüme faktörleri, nörotransmitterler, iyon kanalı ligandları veya anti-enfektif ajanlar olarak görev yapar. Hücre yüzeyi reseptörlerine bağlanırlar ve terapötik proteinler ve antikörler da dahil olmak üzere biyolojik maddelere benzer etki mekanizmasıyla yüksek afinite ve özgüllükle hücre içi etkileri tetiklerler. Ancak biyolojiklerle karşılaştırıldığında terapötik peptitler daha az immünojenite gösterir ve üretim maliyetleri daha düşüktür.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Bilim adamlarının 80 yıl önce patojen mikropları yenmesini saęlayan muhteşem bakterilerden biri de Streptomyces'ti. Burada bazı patojen bakteri ve mantarlara karşı biyoaktivite sergileyen yeni Streptomyces MK37H suşunu sunuyoruz. Bu suş, NCBI Referans Sırası altında NCBI veri tabanında kayıtlıdır: NZ\_JAAAYH000000000.1.

Hesaplamalı analiz, bu suşun çok çeşitli biyolojik aktiviteye sahip 20'den fazla potansiyel peptite sahip olduğunu gösterdi. Yeni antimikrobiyal peptidin yapı tahmini için kütle spektrometresi destekli genom madencilięi yaklaşımı kullanıldı.

**Anahtar Kelimeler:** Peptitler, Terapötik peptitler, Protein-Protein etkileşimleri

21. YÜZYILDA ÜNİVERSİTE ÖĞRENCİLERİNİN EŞ SEÇİMLERİNE DAİR  
GÖRÜŞLERİNİN İNCELENMESİ: NİTEL BİR ARAŞTIRMA

AN INVESTIGATION OF UNIVERSITY STUDENTS' VIEWS ON MATE SELECTION IN  
THE 21ST CENTURY: A QUALITATIVE RESEARCH

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**ÖZET**

**Giriş:** Aile kurmanın ilk basamağı olan eş seçimi, insan yaşamının en önemli kararlarından biridir. Bireylerin eş seçimini etkileyen en önemli faktörlerden bazıları çocukluk yaşantıları, bağlanma stilleri, duygusal ihtiyaçları ve ebeveyn özellikleridir. Ayrıca Psiko-biyolojik Yaklaşım (PACT) bireylerin kişisel özellikleri ve mizacının da etkili olduğunu savunmaktadır. Araştırmalar bireylerin değerlerinin, içinde bulunduğu sosyokültürel bağlamın, beklentilerin eş seçiminde önemli bir rol oynadığını ifade etmektedir. Toplumun normları ve değerleri, evlenme tercihlerini etkiler ve bazı toplumlarda evlenme, sınıf, din veya etnik köken gibi faktörlere dayalı olarak düzenlenir. Bu nedenle, sosyal etkiler, bir kişinin eş seçimi üzerinde önemli bir etkiye sahip olduğu düşünülmekte, değişen toplumsal yaşam ve kültürle birlikte üniversite öğrencilerinin eş tercihlerine dair düşünceleri önemli görülmüştür.

**Amaç:** Bu araştırmanın amacı, 21. Yüzyılda üniversite öğrencilerinin eş seçimlerine dair görüşlerinin incelenmesidir.

**Yöntem:** Araştırmada nitel araştırma desenlerinden biri olan yorumlayıcı fenomenolojiden yararlanılmıştır. Araştırmanın çalışma grubu, 2022-2023 eğitim-öğretim yılının bahar döneminde eğitime devam eden 19-21 yaş aralığındaki 8 üniversite öğrencisinden oluşmaktadır. Araştırmada veriler, odak grup görüşmesi yoluyla, yarı yapılandırılmış görüşme formu aracılığıyla toplanmış ve verilerin çözümlenmesinde yorumlayıcı fenomenolojik analiz yöntemi kullanılmıştır.

**Bulgular:** Üniversite öğrencileri eş seçiminde flört döneminin önemli olduğunu dile getirmişlerdir. Öğrencilerden büyük bir kısmı flört döneminde partnerlerini tanıdıklarını, çoklu görüşmelerin ardından beğendikleri kişi ile flört dönemine göre daha ciddi bir adım olarak nitelendirdikleri sevgili olma aşamasına geçtiklerini bildirmişlerdir. Öğrencilerden birkaçı flört döneminde çoklu görüşmelerin uygun olmadığını bildirmiş olsa da diğerleri genel olarak böyle bir aşamanın var olduğundan bahsetmiştir. Öğrenciler sosyal medya üzerinde tanışmaların ve yapılan evliliklerin olduğunu ve bunu ilişki sürecinin olağan bir parçası olarak gördüklerini söylemişlerdir. Bu durumun da uzak ilişkilerin yaygınlığını artırdığını belirtmişlerdir. Ayrıca eş seçiminde sosyal medyada paylaşılanların kişileri birbirinden uzaklaştırıcı veya yakınlaştırıcı fonksiyonu olduğunu dile getirmişlerdir. Öğrenciler 'tuhaf' olarak nitelendirdikleri karmaşık ilişki yapısına çok sık maruz kaldıklarından bahsetmişlerdir. Onlara göre bu dönemde gençler, açık ilişki yaşamayı daha fazla tercih etmektedirler. Ancak katılımcıların tamamı, gittikçe yaygınlaştığını belirttikleri bu ilişki biçiminden çok hoşlanmadıklarını, kültürel bir değişimin bir parçası olduğunu düşündüklerini bildirmişlerdir. Özellikle ücretli tv kanallarının onların ilişki yaşama biçimini etkilediklerini dile getirmişlerdir. Onlara göre eş seçimi sürecinde ebeveynlerin değil profesyonellerin yardımına ihtiyaçları olmaktadır.

**Sonuç:** Bu bulgular dikkate alındığında üniversite öğrencilerinin eş seçimi sürecini sosyal medya platformları, ücretli tv kanalları gibi değişen teknoloji ve medya hizmetlerinden etkilendiği anlaşılmıştır. Bireylere, sürecin eş seçimleri üzerindeki etkilerine yönelik önleyici/koruyucu danışmanlık hizmetlerinin verilmesi önerilmektedir.

**Anahtar Kelimeler:** Eş seçimi, duygusal ilişki, evlilik danışmanlığı, teknoloji ve medya hizmetleri.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ABSTRACT

**Introduction:** Choosing a mate, the first step in starting a family, is one of the most important decisions of human life. Some of the most important factors affecting individuals' choice of mate is their childhood experiences, attachment styles, emotional needs and parental characteristics. In addition to that The Psycho-Biological Approach (PACT) argues that individuals' personal characteristics and temperament are also effective. Research suggests that individuals' values, sociocultural context and expectations play an important role in mate selection. Society's norms and values influence marriage choices, and in some societies marriage is regulated based on factors such as class, religion or ethnicity. Therefore, psychosocial resources are thought to have a significant impact on a person's choice of a mate, and university students' thoughts on mate preferences are considered important with the changing social life and culture.

**Aim:** The aim of this study is to evaluate the Views of university students in the 21st century regarding their choice of a mate.

**Method:** Interpretative phenomenology, one of the qualitative research designs, was utilized in the study. The study group of the research consists of 8 university students between the ages of 19-21 who continue their education in the spring semester of the 2022-2023 academic year. In the study, data were collected through a focus group interview and a semi-structured interview form and interpretative phenomenological analysis method was used to analyze the data.

**Results:** University students stated that the dating period is important in choosing a mate. Most of the students reported that they got to know their partners during the dating period and after multiple meetings, they moved on to the stage of becoming lovers with the person they liked, which they characterized as a more serious step compared to the dating period. Although a few of the students reported that multiple meetings were not appropriate during the dating period, others generally mentioned that such a phase existed. They stated that meetings and marriages occur on social media and that they see this as a normal part of the relationship process. They also stated that what is shared on social media has the function of distancing or bringing people closer to each other in mate selection. Students mentioned that they were often exposed to a complex relationship structure that they described as 'strange'. According to them, young people in this period prefer to have open relationships more. However, all of the participants reported that they disliked this form of relationship, which they said was becoming more and more widespread, and that they thought it was part of a cultural degeneration. In particular, they stated that pay TV channels affect the way they live their relationships. According to them, they need the help of professionals, not parents, in the process of choosing a spouse.

**Conclusion:** Considering these findings, it is understood that university students' mate selection process is influenced by changing technology and media services such as social media platforms and pay TV channels. It is recommended that preventive/protective counseling services be provided to individuals regarding the effects of the process on their

**Keywords:** Mate selection, emotional relationship, marriage counseling, technology and media services, choice of mate.

UTILIZING MACHINE LEARNING IN CRYPTOCURRENCY MARKET ANALYSIS  
KRİPTO PARA PİYASA ANALİZİNDE MAKİNE ÖĞRENİMİNDEN YARARLANMA

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**ÖZET**

Finans sektörü, sürekli evrilen ve dinamik bir şekilde değişen bir yapıya sahipken, şimdi dijital varlıkların, özellikle Bitcoin'in yükselişiyle sürdürülen teknolojik devrimin ön saflarında yer alıyor. Tahmin edilemez fiyat yörüngeleriyle Bitcoin, gelecekteki fiyatlarını tahmin etme konusunda büyük bir zorluk oluşturuyor. Bu kripto paranın volatilitesi ve karmaşık davranış kalıpları, ileri düzey tahmin modellerinin kullanılmasını zorunlu kılıyor. Bu zorluğu ele almak adına araştırmamız, üç öne çıkan derin öğrenme modelinin karşılaştırmalı analizine odaklandı: Yapay Sinir Ağı (ANN), Evrişimli Sinir Ağı (CNN) ve Uzun Kısa Vadeli Bellek (LSTM). Bu çalışma için kullanılan veri seti Kaggle'dan alındı ve detaylı bir inceleme için zengin bir veri noktası koleksiyonu sağladı. Değerlendirilen modeller arasında, CNN en umut verici olarak öne çıktı. Bu, LSTM'lerin zaman serilerini tahmin etme için yaygın kullanımını göz önünde bulundurduğumuzda biraz şaşırtıcı bir bulgu. CNN, 0.0632 RMSE, 0.0373 MAE ve 0.9469 etkileyici bir korelasyon katsayısı kaydederek üstün performans gösterdi. Bu, özellikle gizli mekansal kalıplar bulunduğu CNN'lerin zaman serisi verilerini çözme ve tahmin etme konusundaki doğal gücünü vurguluyor. CNN'lere temel olan evrişimli katmanlar, bu kalıpları ustaca yakalayarak Bitcoin fiyatlarının hızlı hareketlerine detaylı içgörüler sunabilir. Buna karşın, bellek hücreleri nedeniyle sıralı veri tahminleri için altın standart olarak kabul edilen LSTM, bu özel senaryoda ününe uygun bir performans sergilemedi. LSTM'in etkinliği hakkındaki geleneksel inançlardan bu sapma ilgi çekiciydi. Bu beklenmedik sonuçla ilgili birkaç tahminde bulunabiliriz. Olası bir açıklama, veri ön işlemenin yöntemi ve kalitesi olabilir. LSTM'in performansı, verinin nasıl sunulduğuna oldukça duyarlıdır. Ek olarak, seçilen hiperparametreler veya modelin mimarisindeki ince nüanslar performansını etkileyebilir. Başka bir ilginç olasılık, doğası gereği volatil olan ve çok sayıda faktörden etkilenen Bitcoin fiyatlandırma verisinin, geleneksel zaman serisi verilerinden farklı davranabileceği ve bu nedenle LSTM gibi güçlü modeller için bile zorluklara neden olabileceğidir. Araştırmamız, Bitcoin fiyat tahminleri için CNN'lerin potansiyeline dikkat çekerken, dar bir perspektif benimsememek esastır. Tahmin modellemesi dünyası karmaşıktır ve bir modelin başarısı, verinin özelliklerine, ön işleme tekniklerine ve model yapılandırılmalarına bağlı olarak değişebilir. Finansal teknolojilerin ve kripto paraların sürekli gelişen manzarasında uyum yeteneği anahtardır. Araştırmacıların ve uygulayıcıların modellerini sürekli olarak test etmeleri, tekrarlamaları ve rafine etmeleri şarttır. Son bir not olarak, Bitcoin fiyat tahmini alanı, daha fazla keşif için fırsatlarla doludur. Çeşitli tekniklerin güçlerini birleştiren hibrid modeller, bir sonraki sınır olabilir. Araştırmamız sadece bir basamaktır ve bu heyecan verici alanda tahminlerde doğruluğu sürekli olarak yenilik yapma ve sürdürme sorumluluğu küresel topluluktur.

**Anahtar Kelimeler:** Derin Öğrenme, Kripto, Tahmin.

**ABSTRACT**

The finance sector, ever-evolving and dynamically shifting, is now at the forefront of technological revolution driven by the rise of digital assets, most notably Bitcoin. With its unpredictable price

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

trajectories, Bitcoin presents a monumental challenge in terms of forecasting its future prices. The volatility and complex behavior patterns of this cryptocurrency necessitate the deployment of advanced predictive models. To address this challenge, our research focused on the comparative analysis of three predominant deep learning models: Artificial Neural Network (ANN), Convolutional Neural Network (CNN), and Long Short-Term Memory (LSTM). The dataset utilized for this study was sourced from Kaggle, providing a rich trove of data points for rigorous examination. Among the models evaluated, the CNN emerged as the most promising, a somewhat surprising revelation considering the widespread application of LSTMs for time-series forecasting. The CNN showcased superior performance metrics, recording an RMSE of 0.0632, an MAE of 0.0373, and an impressive correlation coefficient of 0.9469. This underscores the inherent strength of CNNs in deciphering and forecasting time-series data, particularly when there are latent spatial patterns. The convolutional layers, which are fundamental to CNNs, might adeptly capture these patterns, thereby offering granular insights into the erratic movements of Bitcoin prices. Contrastingly, the LSTM, often considered a gold standard for sequential data forecasting due to its memory cells, did not live up to its reputation in this particular scenario. This divergence from the conventionally held beliefs about LSTM's efficacy was intriguing. Several conjectures arise regarding this unexpected outcome. One possible explanation is the method and quality of data preprocessing. The LSTM's performance is highly sensitive to how data is presented to it. Additionally, the hyperparameters chosen, or even subtle nuances in the architecture of the model, could have influenced its performance. Another intriguing possibility is that Bitcoin pricing data, inherently volatile and influenced by myriad factors, might behave differently from traditional time-series data, posing challenges even for stalwart models like LSTM. While our research shines a spotlight on the potential of CNNs for Bitcoin price forecasting, it's crucial to not adopt a tunnel-vision approach. The world of predictive modeling is intricate, and the success of a model can vary based on the specifics of the data, preprocessing techniques, and model configurations. In the ever-evolving landscape of financial technologies and cryptocurrencies, adaptability is key. It's imperative for researchers and practitioners to continually test, iterate, and refine their models. As a concluding note, the realm of Bitcoin price prediction is rife with opportunities for further exploration. Hybrid models, which combine the strengths of multiple techniques, might be the next frontier. Our research is but a stepping stone, and the onus is on the global community to continually innovate and drive accuracy in predictions in this exciting domain.

**Keywords:** Deep Learning, Crypto, Prediction.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

6 ŞUBAT 2023 KAHRAMANMARAŞ/PAZARCIK DEPREMİNDE HATAY İLİ İÇİN  
YAPILARA GİREN YER HAREKET ENERJİSİNİN ARAŞTIRILMASI

INVESTIGATION OF THE SEISMIC INPUT ENERGY FOR HATAY PROVINCE DURING  
THE FEBRUARY 6, 2023 KAHRAMANMARAŞ/PAZARCIK EARTHQUAKE

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## ÖZET

6 Şubat 2023 günü Türkiye’de yıkıcı etkisi yüksek iki deprem meydana geldi. Bu depremler sonucunda çok fazla can ve mal kaybı gerçekleşti. Birçok şehir belki de uzun yıllar etkisini hissedecek ağır hasarlar aldı. En fazla hasarın olduğu illerden bir de Hatay’dır. Yapısal deprem mühendisliğinde genellikle kuvvet ve yer değiştirme esaslı yöntemler tercih edilmektedir. Bu çalışmada ise yapıların kümülatif hasarının belirlenmesinde etkin bir yöntem olan enerji bazlı sismik değerlendirme yöntemine göre belirlenen yapılara giren sismik enerjiler üzerinden değerlendirme yapılmıştır. Bu amaç doğrultusunda 5 katlı betonarme bir bina tasarlanmıştır. Hatay’daki 23 adet istasyondan elde edilen toplam 46 adet deprem ivme kaydı, deprem yönetmeliğindeki farklı yer hareket düzeylerine göre belirlenen elastik tasarım spektrumları ile eşleştirilmiştir. Lineer olmayan zaman tanım alanındaki analizler ile yapılara giren sismik enerjiler elde edilmiştir. Analizler sonucunda Hatay’ın Antakya, Defne, Arsuz, Hassa ve Kırıkhan ilçelerinde tasarım deprem senaryosundan daha fazla sismik enerjinin yapılara intikal ettiği ortaya çıkmıştır. Ayrıca birçok bölgede elde edilen en büyük yer hareketi ivmeleri, Türkiye Deprem Tehlike Haritasından elde edilen ivmelerden daha yüksek değerler elde etmiştir.

**Anahtar kelimeler:** Hatay, Kahramanmaraş depremi, Sismik giriş enerjisi, tasarım spektrumu

## ABSTRACT

On February 6, 2023, two devastating earthquakes occurred in Turkey. As a result of these earthquakes, there was a lot of loss of life and property. Many cities suffered heavy damage, the effects of which will be felt for many years to come. Hatay is one of the provinces with the most damage. Force and displacement based methods are generally preferred in structural earthquake engineering. In this study, seismic input energies were evaluated according to the energy-based seismic evaluation method, which is an effective method for determining the cumulative damage of structures. For this purpose, a 5-storey reinforced concrete building was designed. A total of 46 earthquake acceleration records obtained from 23 stations in Hatay were matched with elastic design spectra determined according to different ground motion levels in the earthquake code. Seismic energies entering the structures were obtained through the nonlinear time history analysis. As a result of the analysis, it was revealed that more seismic energy was transferred to the structures in Antakya, Defne, Arsuz, Hassa and Kırıkhan districts of Hatay than the design earthquake scenario. In addition, the peak ground motion accelerations obtained in many regions have higher values than the accelerations obtained from the Turkey Earthquake Hazard Map.

**Keywords:** Hatay, Kahramanmaraş earthquake, input energy, design spectrum

## GİRİŞ

6 Şubat 2023'te, Türkiye'de 9 saat arayla iki büyük deprem meydana geldi. Bu depremleri anlayabilmemiz için öncelikle Türkiye'yi depremsellik açısından bir yere konumlandırmamız gerekmektedir. Türkiye, Arap plakası tarafından yaklaşık 1-2 cm/yıl kuzeye doğru hareket hızıyla Avrasya plakasına itilen ve sismik açıdan oldukça aktif olan Anadolu Plakası üzerinde yer almaktadır. Avrasya Plakası ağır olduğundan, Anadolu Plakası batıya doğru uzanır ve karmaşık sol yanal atımlı



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Doğu Anadolu Fayı (DAF) ile sağ yanal atımlı Kuzey Anadolu Fayı (KAF) oluşturur (Duman ve Emre 2013; Stayron ve Pagani 2020; Tao vd. 2023). Bu topraklarda 1900 yılından bu yana büyüklüğü 7'nin üzerinde 20 deprem meydana gelmiş ve Türkiye depremden etkilenen ülkeler arasında ilk sıralarda yer almıştır. Bölgede ise 1900 yılından 06.02.2023 depremlerine kadar en büyüğü 6.0 olmak üzere 224 adet  $M \geq 4.0$  deprem meydana gelmiştir. Ayrıca bahsi geçen bölgeye ait, 1900 yılı öncesi için, 75 adet tarihsel dönem depremi kaydı mevcuttur (AFAD 2023).

Kahramanmaraş/Pazarcık ( $M_w$  7,7) ve Kahramanmaraş/Elbistan ( $M_w$  7,6) merkezli bir dizi yıkıcı deprem Türkiye'nin güneyi ve Suriye'nin kuzeybatısını içine alan geniş bir coğrafyada etkili olarak binlerce insanın hayatını kaybetmesine ve çok daha fazlasının yaralanmasına yol açtı. Ana sarsıntılardan sonra günümüze kadar meydana gelen binlerce artçı sarsıntı, depremin etkisinin azalarak ta olsa sürmesine neden oldu. Depremin etkisi o kadar büyüktü ki Türkiye'de özellikle Kahramanmaraş, Hatay, Adıyaman, Gaziantep, Diyarbakır, Malatya, Osmaniye, Adana, Kilis ve Şanlıurfa'da ciddi yıkımlara neden oldu. Bu depremlerde en büyük yıkımlardan biri Hatay'da gerçekleşti (Şekil 1). Hatay,  $M_w$  7,7 büyüklüğündeki ilk depremin merkez üssüne yaklaşık 200 km, ikinci depremin merkez üssüne ise 300 km uzaklıkta bulunmaktadır. Deprem özellikle Hatay'ın merkezinde ağır yıkıma yol açmıştır. Antakya, Samandağ, İskenderun ve Dört Yol'un bazı kesimleri başta olmak üzere Hatay'ın büyük bölümünde çok sayıda bina çöktü ve ciddi yapısal hasarlar görüldü. Bu tahribat bir kez daha bölgenin büyük bir kısmına hakim olan alüvyonlu toprağın sonucuydu (Mertol vd. 2023).

6 Şubat depremlerinden sonra birçok araştırmacı depremlerin neden olduğu hasarları çalışmalarında incelemiştir (Işık 2023; Işık vd. 2023; İTÜ 2023; Mertol vd. 2023; Şenol 2023; Tao vd. 2023). 6 Şubat günü meydana gelen ardışık iki büyük depremin zaman aralığının dokuz saat gibi çok kısa bir süre olması depremin yıkıcı etkisini daha fazla arttırdığı sonucuna varılmıştır. Ayrıca depremlerin odak derinliği bu depremlerin sığ depremler olduğu gerçeğini ortaya koymaktadır. Yerleşimlerin bir kısmının alüvyon araziler üzerinde olmasının ve özellikle yapısal kusurların depremin yıkıcı etkisine sebep olduğu görüşü hakimdir. Çalışmalarda özellikle sismik yönetmeliklerde yer alan elastik tasarım spektrumları üzerinden değerlendirmeler yapılmıştır. Belirli spektral büyüklüklerin yönetmelik gerekliliklerini karşılamadığı sonucu literatürde yaygın bir görüş olmuştur.

Kuvvetli yer hareketi etkisinde doğrusal elastik davranmayan yapılarda ortaya çıkacak tepkilerin gerçekçi olarak belirlenmesi deprem mühendisliği alanının başlıca konularından birisidir (Uçar ve Merter 2017). Özellikle yer değiştirme esaslı yöntemlerde kümülatif hasarın belirlenmesi konusundaki yetersizlik, yapısal deprem mühendisliğinde son yıllarda enerji tabanlı sismik yaklaşımların yapıların sismik değerlendirilmesinde ön plana çıkmasına neden olmuştur. Yer hareketinin genliğini, frekansını ve süresini dikkate aldığı için, kümülatif ölçümler olarak enerji parametrelerinin sismik tehlike analizinde mühendislik talep parametreleri ile güçlü bir şekilde ilişkili olduğu ortaya çıkmıştır (Chen vd. 2023). Sisteme giren enerji kinetik enerji, sönmüleme enerjisi, elastik şekil değiştirme enerjisi ve histeretik enerji bileşenlerinin toplamına eşittir (Dedeoğlu ve Calayır 2021). Bu nedenle sisteme giren enerjinin miktarının bilinmesi önemlidir. Bu çalışmada, yıkımın muazzam olduğu Hatay ili için 6 Şubat 2023 Kahramanmaraş/Pazarcık depreminde yapılara giren sismik enerjiler araştırılmıştır. Bu araştırma, gerçek deprem ivme kayıtları ile 2018 Türk Bina Deprem Yönetmeliğine (TBDY 2018) göre ölçeklenmiş ivme kayıtlarının ürettiği sismik giriş enerjilerinin karşılaştırmasını ortaya koymuştur. Böylelikle, yönetmeliğin sismik giriş enerjisi açısından yetersiz kaldığı bölgelerin tespit edilmesi amaçlanmıştır.



Şekil 1. Hatay/Antakya 6 Şubat 2023 depreminden sonraki görüntüsü

## YÖNTEM

Bu çalışmada, 6 Şubat depreminde Hatay’da meydana gelen yıkıma ışık tutabilmek için yapılara giren sismik enerjinin tespiti gerçekleştirilmiştir. Bu amaçla özellikle bölgenin yapı stokunu yansıtabilecek orta katlı (5 kat) ve sadece kolon ve kirişlerden oluşturulan betonarme konut tipi yapı tasarlanmıştır. Bütün kat yükseklikleri eşit ve 3,0 m’dir. Yapı her iki cephede de dört açıklıktan oluşmakta ve her açıklık ise eşit ve 4,0 m olarak belirlenmiştir. Kolonlar 50x50 cm kirişler ise 25x50 cm boyutlarındadır. Yapısal elemanlarda C25 betonu ve akma dayanımı 420 N/mm<sup>2</sup> olan çelik donatı kullanılmıştır. Bütün katlarda rijit diyafram modeli gerçekleştirilmiştir. Yapının ağırlığına ek olarak döşemelere ilave 2,0 kN/m<sup>2</sup> ölü yük ve 2,0 kN/m<sup>2</sup> hareketli yük etki ettirilmiştir. 23 adet istasyonun hem Doğu-Batı hem de Kuzey-Güney yönünde elde edilen toplam 46 adet ivme kaydı ile tasarlanan yapının zaman tanım alanında doğrusal elastik olmayan analizleri gerçekleştirilmiştir. Ayrıca, sismik giriş enerjileriyle kıyas yapabilmek için TBDY 2018’e göre hem DD-1 hem de DD-2 için elastik tasarım spektrumları oluşturulmuştur. Enerji bazlı değerlendirme yapabilmek için istasyonlardan elde edilen ivme kayıtları, istasyon koordinatlarına göre belirlenmiş hedef tasarım elastik spektrumuna göre en uygun şekilde eşleştirilmelidir. Bu eşleştirme işlemi SeismoMatch programı vasıtasıyla gerçekleştirilmiştir (SeismoMatch 2021). Ayrıca depremin enerji talebini ifade eden birim kütle başına düşen en büyük enerji miktarı (EI/m) tüm kayıtlar için ayrı ayrı hesaplanmıştır.

Tek serbestlik dereceli sistemlerde (TSD) sistemin hareket denklemi eşitlik 1’deki gibidir.

$$m\ddot{u}(t) + c\dot{u}(t) + f_s(t) = -m\ddot{u}_g(t) \quad (1)$$

Bu denklem aynı zamanda enerji denge denklemi olarak ifade edilmektedir. Bu denklemde m kütle, c sönüm katsayısı  $f_s$  yay kuvveti, u rölatif yer değiştirme,  $u_g$  yer hareketi yer değiştirmesidir. Denklem sol tarafı sırasıyla kinetik enerjiyi, sönüm enerjisini ve elastik şekil değiştirme enerjisini ifade etmektedir. Denklem sağ tarafı ise depremlerle birlikte giren toplam enerjiyi ifade etmektedir.

## BULGULAR

6 Şubat depremlerinde ölçüm alan Hatay ilindeki kayıt istasyonları Tablo 1’de verilmiştir. Elastik tasarım spektrumlarının oluşturulmasında kullanılacak zemin sınıfları, istasyonun kurulu olduğu arazilerin kayma dalgası hızlarının ( $V_{s30}$ ) TBDY 2018’e göre değerlendirilmesiyle belirlenmiştir. Arazinin çoğunun, çok sıkı kum, çakıl ve sert kil tabakaları veya ayrıışmış, çok çatlaklı zayıf kayalardan oluştuğu (ZC) tespit edilmiştir.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**Tablo 1.** Hatay ili deprem kayıt istasyon bilgileri

İstasyon	İl	İlçe	Enlem	Boylam	V <sub>s30</sub> (m/s)	Zemin Sınıfı
3112	Hatay	İskenderun	36,58801	36,14766	233	ZD
3115	Hatay	Belen	36,54634	36,16459	424	ZC
3116	Hatay	İskenderun	36,61618	36,20661	870	ZB
3123	Hatay	Antakya	36,21423	36,15973	470	ZC
3124	Hatay	Antakya	36,23870	36,17220	283	ZD
3125	Hatay	Antakya	36,23808	36,13264	448	ZC
3126	Hatay	Antakya	36,22020	36,13750	350	ZD
3129	Hatay	Defne	36,19117	36,13430	447	ZC
3131	Hatay	Antakya	36,19121	36,16328	567	ZC
3132	Hatay	Antakya	36,20673	36,17159	377	ZC
3133	Hatay	Reyhanlı	36,24320	36,57360	377	ZC
3134	Hatay	Dörtyol	36,82763	36,20485	374	ZC
3135	Hatay	Arsuz	36,40886	35,88310	460	ZC
3136	Hatay	Altınözü	36,11593	36,24722	344	ZD
3137	Hatay	Hassa	36,69293	36,48852	688	ZC
3138	Hatay	Hassa	36,80262	36,51119	618	ZC
3139	Hatay	Kırıkhan	36,58383	36,41439	272	ZD
3140	Hatay	Samandağ	36,08155	35,94982	210	ZD
3141	Hatay	Antakya	36,37260	36,21973	338	ZD
3142	Hatay	Kırıkhan	36,49797	36,36612	539	ZC
3143	Hatay	Hassa	36,84891	36,55714	444	ZC
3144	Hatay	Hassa	36,75691	36,48574	485	ZC
3145	Hatay	Kırıkhan	36,64536	36,40640	533	ZC

Hatay ilinin deprem davranışını anlayabilmek için öncelikle Türkiye Deprem Tehlike Haritasından elde edilen yer hareketi parametrelerinin incelenmesi gerekmektedir. Tablo 2’de 6 Şubat 2023 Kahramanmaraş/Pazarcık depreminde kayıt alan ivmeölçer istasyonlarına ait spektral katsayılar ve en büyük ivme ve hız değerleri verilmektedir. İstasyon koordinatlarından elde edilen spektral katsayılar kullanarak elastik tasarım spektral ivmeleri hesaplanır ve elastik tasarım spektrumları oluşturulur. Sismik parametreler bütün deprem yer hareket düzeyleri için elde edilebilmektedir. Fakat bu çalışmada seyrek ve büyük depremleri ifade eden DD-1 ile tasarım depremini ifade eden DD-2 kullanılmıştır. Özellikle elastik tepki spektrumunun en büyük spektral ivmesinin koordinatlara göre değişkenlik göstermesi, 2007’de yürürlüğe giren Deprem Bölgelerinde Yapılacak Binalar Hakkında Yönetmelikten (DBYBHY 2007) farklı olduğunu göstermektedir. Şekil 2 ve 3’te, Türkiye Deprem Tehlike Haritasından ve istasyonlardan elde edilen sırasıyla PGA ve PGV değerleri verilmiştir. 6 Şubat depreminde en büyük yer hareket ivmesi 1,37 g değeriyle 3129 istasyonundan (Hatay/Defne), en büyük yer hızı ise 212,94 cm/s değeriyle 3138 (Hatay/Hassa) istasyonunda elde edilmiştir. 3125, 3126, 3129, 3135 ve 3141 istasyonlarından elde edilen ivmeler, Türkiye Deprem Tehlike Haritasından elde edilen hem DD-1 hem de DD-2 deprem yer hareket değerleri için bulunan ivmelerden daha yüksek değerler elde etmiştir. 3123,

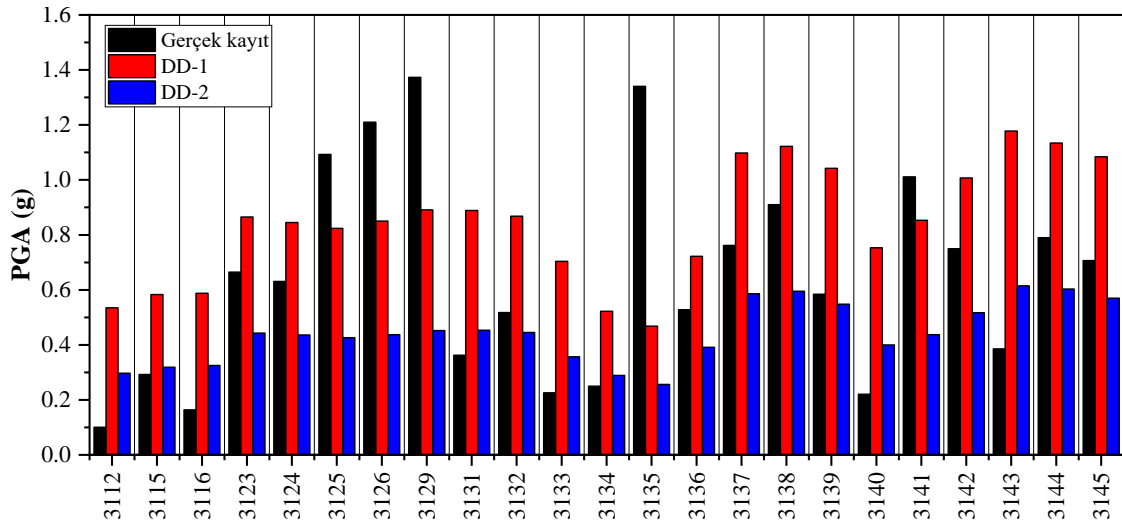
# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

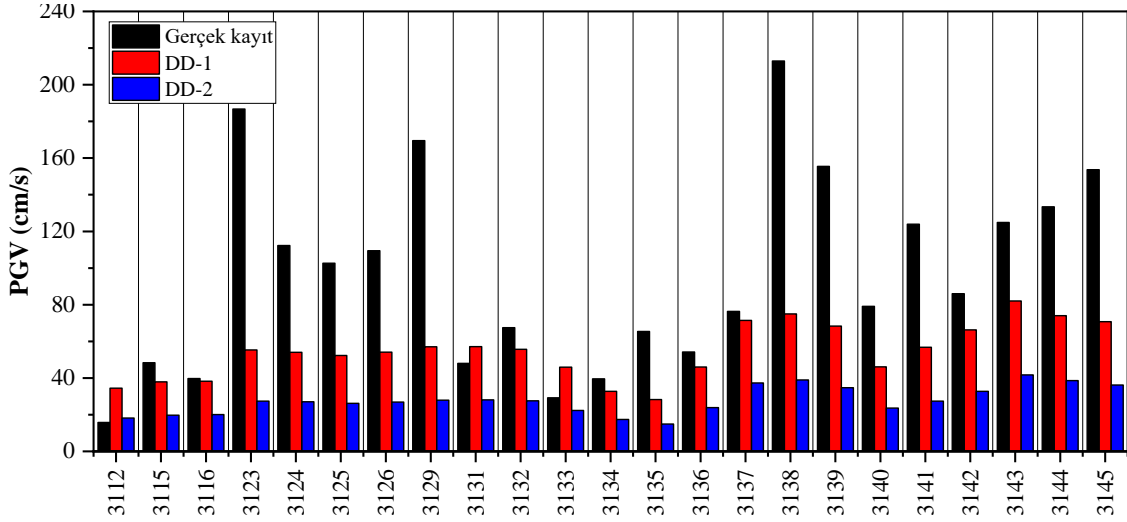
3124, 3132, 3136, 3137, 3138, 3139, 3142, 3144 ve 3145 istasyonlarından ölçülen ivmelerin DD-1'den düşük DD-2'den büyük değerler elde ettiği tespit edilmiştir. En büyük yer ivmesi 1,37 g değerine kadar ulaşmıştır. Bu ivme değerleri depremin yıkıcılığının sebeplerinden biridir. Yer hareket hızları birçok istasyonda beklenen değerlerin üzerindedir.

**Tablo 2.** Hatay iline ait Türkiye Deprem Tehlike Haritası yer hareketi parametreleri

İstasyon	Türkiye Deprem Tehlike Haritası											
	DD1						DD2					
	S <sub>s</sub>	S <sub>1</sub>	S <sub>DS</sub>	S <sub>D1</sub>	PGA	PGV	S <sub>s</sub>	S <sub>1</sub>	S <sub>DS</sub>	S <sub>D1</sub>	PGA	PGV
3112	1,307	0,198	1,307	0,731	0,535	34,455	0,697	0,198	0,866	0,436	0,297	18,173
3115	1,427	0,415	1,712	0,623	0,583	37,879	0,753	0,210	0,904	0,315	0,319	19,697
3116	1,449	0,418	1,304	0,334	0,588	38,258	0,766	0,214	0,689	0,171	0,325	20,069
3123	2,110	0,575	2,532	0,819	0,865	55,306	1,044	0,272	1,253	0,408	0,443	27,442
3124	2,066	0,563	2,066	0,978	0,845	54,023	1,029	0,269	1,120	0,555	0,436	27,026
3125	2,014	0,543	2,417	0,719	0,824	52,290	1,004	0,261	1,205	0,391	0,426	26,224
3126	2,076	0,562	2,076	0,977	0,850	54,118	1,028	0,268	1,119	0,553	0,437	26,928
3129	2,172	0,591	2,606	0,833	0,891	57,029	1,064	0,276	1,277	0,414	0,452	27,963
3131	2,167	0,595	2,600	0,836	0,889	57,174	1,065	0,278	1,278	0,417	0,453	28,082
3132	2,119	0,581	2,543	0,824	0,868	55,711	1,049	0,274	1,259	0,411	0,445	27,603
3133	1,712	0,481	2,054	0,722	0,704	45,974	0,843	0,228	1,012	0,342	0,357	22,331
3134	1,268	0,362	1,522	0,543	0,522	32,776	0,676	0,191	0,831	0,287	0,289	17,376
3135	1,126	0,315	1,351	0,472	0,468	28,260	0,594	0,167	0,750	0,250	0,256	14,932
3136	1,780	0,487	1,780	0,883	0,722	46,023	0,924	0,244	1,044	0,515	0,391	23,867
3137	2,715	0,759	3,258	1,063	1,098	71,404	1,387	0,363	1,664	0,544	0,586	37,311
3138	2,775	0,779	3,330	1,091	1,122	75,002	1,413	0,370	1,696	0,555	0,595	38,924
3139	2,570	0,720	2,570	1,224	1,042	68,305	1,290	0,338	1,290	0,663	0,548	34,729
3140	1,859	0,473	1,859	0,864	0,753	46,129	0,944	0,237	1,060	0,504	0,400	23,604
3141	2,096	0,592	2,096	1,011	0,853	56,779	1,034	0,273	1,123	0,561	0,437	27,397
3142	2,458	0,697	2,950	0,976	1,007	66,258	1,210	0,319	1,452	0,479	0,517	32,727
3143	2,903	0,829	3,484	1,161	1,178	82,058	1,457	0,384	1,748	0,576	0,615	41,741
3144	2,802	0,783	3,362	1,096	1,134	74,022	1,427	0,373	1,712	0,559	0,603	38,634
3145	2,671	0,746	3,205	1,044	1,084	70,745	1,342	0,350	1,610	0,525	0,570	36,199

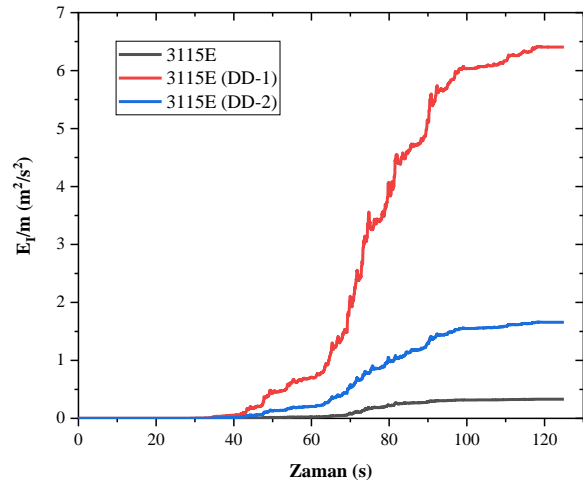
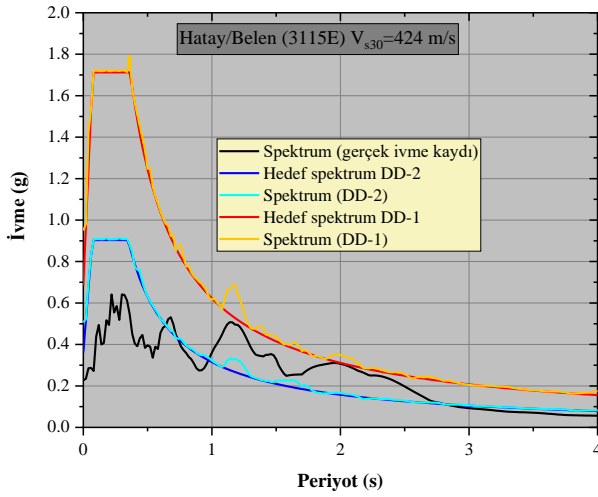


**Şekil 2.** En büyük ivme değerleri

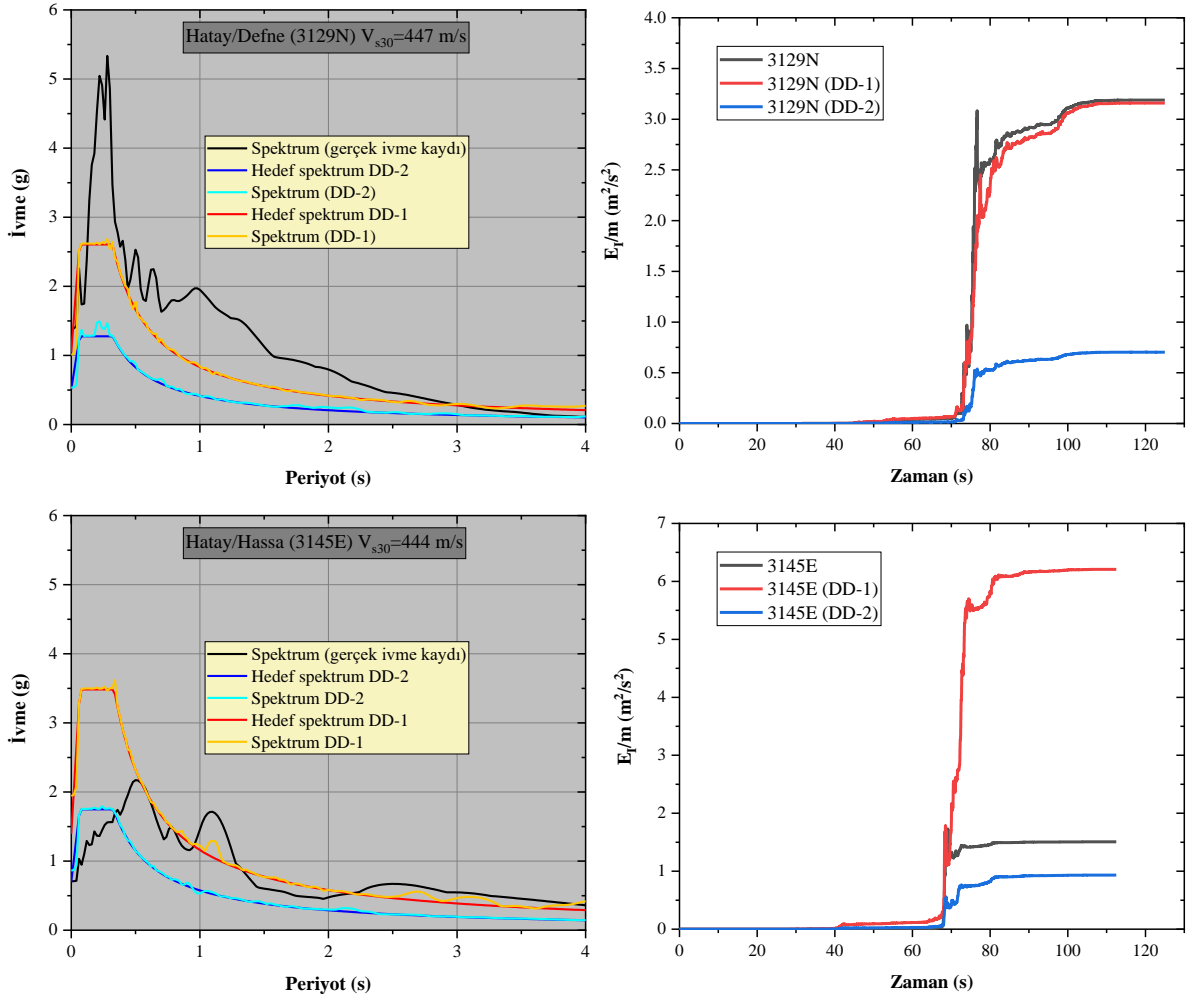


Şekil 3. En büyük hız değerleri

5 katlı ve 0,47 sn periyot değerine sahip betonarme konut tipi yapının, hem istasyonlardan elde edilmiş hem de deprem yer hareket düzeylerine göre hazırlanan spektrumlara göre eşleştirilmiş kayıtlar ile yapısal analizleri gerçekleştirilmiştir. Bu analizler sonucunda her üç durum için yapıya giren kümülatif sismik enerji hesaplanmış ve elastik tasarım spektrumları ile birlikte Şekil 4'te verilmiştir. 3115 istasyonundan elde edilen sismik giriş enerjisi DD-1 ve DD-2 için hedeflenen enerjilerden daha düşük değerler elde etmiştir. Özellikle kısa periyotlarda bu durumun ivme spektrumlarında da olduğu görülmektedir. 3129 istasyonu sismik giriş enerjisi DD-1 için elde edilen enerjiyle benzer değerler elde etmiştir. Fakat DD-2'nin çok üzerinde değerler almıştır. 3145 istasyonunda ise gerçek deprem kaydına göre hesaplanan sismik giriş enerjisi DD-1 ve DD-2 düzeylerine göre elde edilen enerjilerin arasında değerler elde etmiştir. 3129 istasyonunda özellikle kısa periyotlarda daha büyük spektral ivmeler ortaya çıkmıştır.







Şekil 4. İvme spektrumları ve sismik giriş enerjileri (İstasyon: 3115-3129-3145)

Tablo 3'te, gerçek ivme kayıtlarından elde edilen sismik giriş enerjilerinin DD-1 ve DD-2 yer hareket düzeylerine göre eşleştirilmiş ivme kayıtlarından elde edilen sismik giriş enerjilerine göre yüzde değerleri verilmiştir. 3124, 3125, 3126, 3129, 3135, 3138, 3141 ve 3141 istasyonlarından elde edilen sismik giriş enerjileri DD-2'ye göre daha yüksektir. Sadece 3135 istasyonu DD-1'e göre daha büyük değer elde etmiştir. 3129 istasyonu sismik giriş enerjisi DD-1 ile yakın değerdedir. 3135 (Hatay/Arsuz) istasyonunda DD-2'nin yaklaşık dokuz katı daha fazla enerji sisteme giriş yapmıştır. Aynı zamanda yaklaşık 2 kat DD-1 değerindedir. Şekil 5, gerçek ivme kaydından ve DD-2 yer hareket düzeyi için hazırlanmış spektruma eşleştirilmiş kayıttan elde edilmiş sismik giriş enerjileri verilmiştir. Daha yüksek değerler elde edilen istasyonlar grafikte belirtilmiştir. Enerji tabanlı değerlendirme yapıldığında 10'un üzerinde istasyona ait sismik giriş enerjisi yönetmelik gerekliliklerinin üzerinde olduğu gerçeğini ortaya koymaktadır. Yapıların çoğunun tasarım depremi olan DD-2 yer hareket düzeyine göre tasarlandığı düşünülürse Hatay ilinde birçok bölgede yapılara beklenenin üzerinde sismik enerji etki etmiştir.

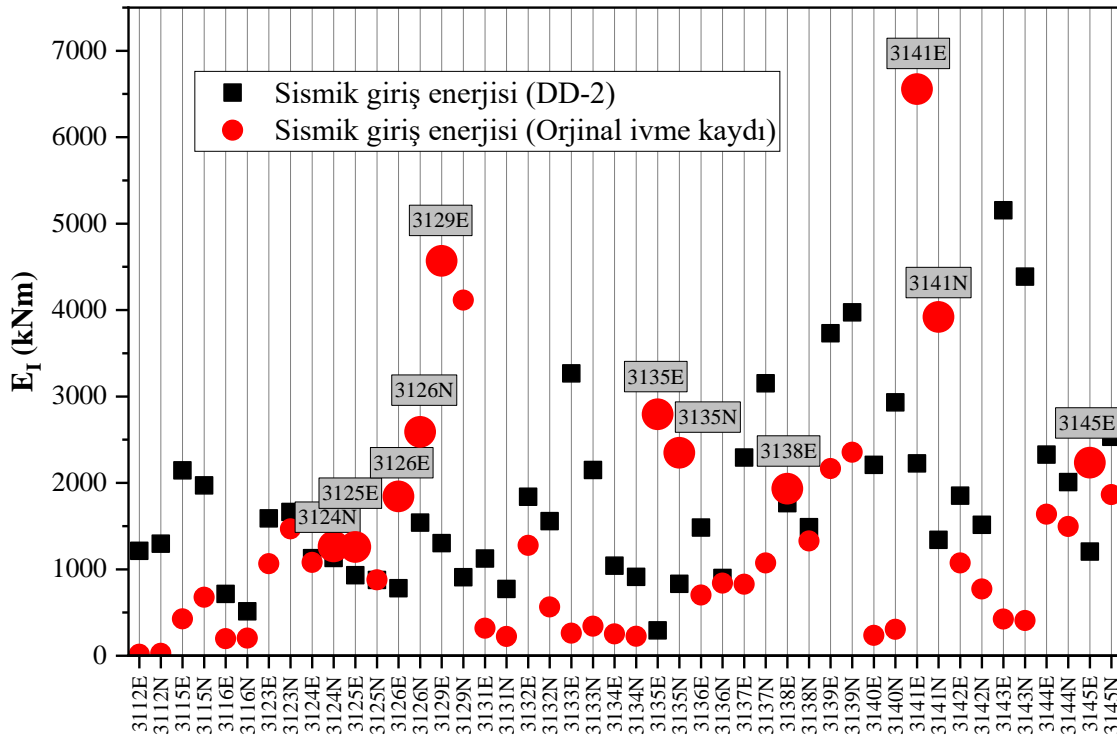


# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Tablo 3.** Gerçek ivme kaydı ile elde edilen sismik giriş enerjilerinin DD1 ve DD2'ye göre yüzdelik durumu

İstasyon	DD-1	DD-2	İstasyon	DD-1	DD-2
3112E	-99%	-99%	3134N	-94%	-75%
3112N	-98%	-98%	3135E	<b>112%</b>	<b>852%</b>
3115E	-95%	-80%	3135N	-21%	<b>182%</b>
3115N	-91%	-66%	3136E	-85%	-53%
3116E	-92%	-72%	3136N	-76%	-7%
3116N	-89%	-60%	3137E	-91%	-64%
3123E	-85%	-33%	3137N	-91%	-66%
3123N	-82%	-12%	3138E	-80%	<b>9%</b>
3124E	-81%	-4%	3138N	-82%	-11%
3124N	-69%	<b>12%</b>	3139E	-85%	-42%
3125E	-71%	<b>35%</b>	3139N	-84%	-41%
3125N	-74%	0%	3140E	-97%	-89%
3126E	-54%	<b>136%</b>	3140N	-96%	-90%
3126N	-61%	<b>68%</b>	3141E	-15%	<b>195%</b>
3129E	-8%	<b>251%</b>	3141N	-15%	<b>192%</b>
3129N	<b>1%</b>	<b>353%</b>	3142E	-84%	-42%
3131E	-94%	-72%	3142N	-90%	-49%
3131N	-94%	-71%	3143E	-98%	-92%
3132E	-82%	-31%	3143N	-98%	-91%
3132N	-91%	-64%	3144E	-84%	-30%
3133E	-98%	-92%	3144N	-83%	-26%
3133N	-96%	-84%	3145E	-72%	<b>86%</b>
3134E	-95%	-76%	3145N	-81%	-26%



**Şekil 5.** Sismik giriş enerji değerleri

## SONUÇ

6 Şubat'ta Kahramanmaraş'ta meydana gelen yıkıcı depremler birçok ili etkilemiş ve binlerce insanın ölümüne neden olmuştur. En büyük yıkımın ve can kaybının gerçekleştiği illerden bir Hatay'dır. Hatay'da mevcut alüvyonlu toprak tipinin yer ivmesini ve deprem süresini arttırması nedeniyle binalardaki yapısal hasarın boyutu diğer illere göre çok daha belirgindir.

Enerji kavramlarına dayalı tasarımda yapının enerji tüketme kapasitesi yer hareketinin enerji talebine göre belirlenmektedir. Çünkü yapıların hasar potansiyeline en yakın değerlendirme enerji bazlı sismik yöntemler ile yapılmaktadır. Bu çalışma, spektral büyüklükler üzerinden değil yapıya giren yer hareketi enerjisi üzerinden değerlendirme yapmaktadır. Bu değerlendirme sonucunda özellikle Hatay'ın, Antakya, Defne, Arsuz, Hassa ve Kırıkhan ilçelerinde tasarım deprem senaryosuna göre yapılara beklenenin üzerinde sismik enerji intikal ettiği ortaya çıkmıştır. Ayrıca birçok istasyondan elde edilen ivmeler, Türkiye Deprem Tehlike Haritasından elde edilen ivmelerden daha yüksektir. Bu nedenle arazi tipi ve fay hatlarını da göz önünde bulundurarak deprem parametrelerinin yeniden değerlendirilmesi önerilmektedir. Aynı zamanda benzer durum en büyük yer hareketi hızı için de geçerlidir. Bu çalışma sadece 5 katlı bir konut türü yapı için gerçekleştirilmiş, farklı periyot değerlerinin sismik giriş enerjilerine etkisini değerlendirebilmek için daha farklı periyotlara sahip yapıların da analiz edilmesi gerekmektedir. Belirtilmesi gereken diğer bir husus ise bu değerlendirmenin sadece 2018 deprem yönetmeliğine göre gerçekleştirildiğidir. Bölgedeki Bütün yapıların 2018'den sonra inşa edilmediği bilindiğine göre mümkün olduğunca eski deprem yönetmeliklerinin de sonraki çalışmalarda hesaba katılması gerekiyor.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

BAKIR NANOPARTİKÜLÜNÜN *VICIA PANNONICA* CRANTZ KÖK MERİSTEM  
HÜCRELERİ ÜZERİNDEKİ GENOTOKSİK ETKİLERİ

GENOTOXIC EFFECTS OF COPPER NANOPARTICLE ON *VICIA PANNONICA* CRANTZ  
ROOT MERİSTEM CELLS

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## ÖZET

Devrim niteliğinde bir bilim olan nanoteknoloji, birçok endüstriyel ve araştırma alanlarında muazzam bir şekilde üretilen ve kullanılan nanopartiküller nedeniyle bilim camiasında trend haline gelmiştir. Metal nanopartiküllerinin artan kullanımı ile besin zincirine erişimleri bilim adamları için temel bir endişe haline gelmiştir. Bu araştırma günümüzde birçok endüstride yaygın olarak kullanılan bakır nanopartikülüne (Cu NP) ışık tutmaktadır. Çalışma materyali olarak bitkisel kaynaklar içerisinde yem bitkisi olarak sıkça kullanılan *Vicia pannonica* bitkisinin tohumları kullanılmıştır. Mikroskopik gözlemlerde kromozomların büyük olması, ekonomik olarak düşük maliyetli olması ve kolay çimlenebilmesi gibi özellikler avantaj sağlamaktadır. Bu nedenle genotoksik araştırmalarda muhteşem bir biyoindikatör olan *Vicia pannonica* bitkisi tercih edilmiştir. Araştırmada kullanılan, metal bazlı Cu (60-80 nm) NP'li Sigma-Aldrich (Houston, TX, ABD) firmasından ticari olarak temin edilmiştir. Cu NP' lünün karakterizasyonu için analizler yapılmıştır. Nano boyuttaki bu malzeme için belirlenen tüm bulgular üretici firmanın belirttiği değerler ile karşılaştırılmıştır. Şekil ve boyut olarak veriler doğrulandıktan sonra biyodeneysel çalışmalarında kullanılmıştır. Bitkinin kök meristem hücreleri üzerindeki genotoksik etkilerini belirlemek amacıyla, toplam 4 grup (Kontrol, 50 ppm, 150 ppm ve 300 ppm) Cu NP çözeltisi hazırlanmıştır. Çalışmada kullanılan *Vicia pannonica*' da Cu NP'lüne bağlı birikim ve eliminasyon oranının belirlenmesi, X-ışını Difraksiyon (XRD), Taramalı Elektron Mikroskobu (SEM), SEM element haritası ve EDS karakteristik spektrumu analiziyle yapılmıştır. Ayrıca belirlenen konsantrasyonlarda yetiştirilen tohumların kök gelişimi ve kök meristem hücreleri üzerindeki genotoksik etkileri araştırılmıştır. Çalışma in vivo ortamda 3 tekrarlı olarak yürütülmüştür. Cu NP'lünün belirlenen bütün dozları *Vicia pannonica*'nın meristem hücrelerinde mitotik indekste kontrole kıyasla önemli düzeyde düşüşe sebep olmuştur. Özellikle en yüksek konsantrasyonda, mitotik indeks en düşük seviyeye ulaşmıştır. Çalışmada çok yönlü yapılan analizler, Cu NP'lünün, hücre bölünmesinde C-metafaz, yapısı bozulmuş metafaz, yapısı bozulmuş anafaz ve telofaz, kromozom kırığı, asenkron bölünme, ileri kromozomlar, mikronukleus ve genetik materyal kaybı gibi anormalliklere sebep olduğunu göstermiştir. Bu bulgular Cu NP'lünün *Vicia pannonica* üzerinde genotoksik etki yaptığını desteklemektedir. Bu bulgu besin zincirinde yer alan organizmalar tarafından alınan Cu NP' lünün, çevresel olarak nano-metalik biyobirikimini azaltmak için kontrollü ve güvenli bir şekilde üretilmesini ve bertaraf edilmesini teşvik edecektir.

**Anahtar Kelimeler:** : Nanopartikül, Cu, Nanotoksosite, mitotik anomali, Genotoksosite

## ABSTRACT

Nanotechnology is a revolutionary science that has become a trend in the scientific community due to the mass production and use of nanoparticles in many industries and research fields. With the increasing use of metal nanoparticles, their access to the food chain has become the main concern for scientists. The present study sheds light on the copper nanoparticle (Cu NP), which is widely used in many industries in our present day. *Vicia pannonica* seeds, which take the first place among plant sources in fodder plant, were used as the material in the present study. Characteristics such as low number of chromosomes, low cost economically, and easy germination provide advantages in microscopic observations. Due to its excellent bioindicator value, *Vicia pannonica* is generally a suitable plant for

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

genotoxic studies. In this study, commercially obtained Cu NP were used. These were 60 to 80 nm wide and were purchased from Sigma-Aldrich. Methods have been developed to characterize metallic NPs. Data collected and analyzed for the size of this material produced were deemed to conform to specifications set by the manufacturer. This was later used to study its biological effects. To determine the genotoxic effects of the plant on root meristem cells, a total of 4 groups (Control, 50 ppm, 150 ppm, and 300 ppm) Cu NP solutions were prepared. The determination of the accumulation and elimination rate because of Cu NPs in *Vicia pannonica* used in the study was carried out with X-Ray Diffraction (XRD), Scanning Electron Microscopy (SEM), SEM element map, and EDX characteristic spectrum analysis. Also, the genotoxic effects of seeds grown at the determined concentrations on root development and root meristem cells were investigated. The study was conducted in 3 replicates in vivo. All doses of Cu NP caused significant decreases in the Mitotic Index of *Vicia pannonica* meristem cells compared to the control. The Mitotic Index reached the lowest level, especially at the highest concentration. Multiple analyzes carried out in the study showed that Cu NP caused abnormalities in cell division such as chromosome bridges in anaphase, C-metaphase, polar aberration, deconstructed anaphase, chromosome breakage and micronucleus, loss of genetic material, failure to assemble in the metaphase plate, deconstructed metaphase, asynchronous division remaining chromosome in metaphase, adhesion, deconstructed prophase, advanced chromosomes, chromosome bridges in anaphase. These findings support that Cu NP has a genotoxic effect on *Vicia pannonica*. This finding will promote the controlled and safe production and disposal of Cu NP taken up by organisms in the food chain to reduce the environmental nano-metallic bioaccumulation.

**Keywords:** Nanoparticle, Cu, Nanotoxicity, Mitotic Anomaly, Genotoxicity

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ASSESSMENT OF HAZARD INDEX OF ORGANIC CHLORINE PESTICIDE (OCP) RESIDUES IN WATERMELON (*Citrus lanatus*) SOLD IN KAURA NAMODA, ZAMFARA STATE, NIGERIA

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### ABSTRACT

Synthetic chemical pesticides are globally used to prevent pest from crops in order to have good yield. Organochlorine pesticide OCP are commonly used by farmers because they consider it more effective, cheap and readily available. The indiscriminate use of this pesticide in developing countries by the farmers to protect their crop resulted in the deposition of residues which in turn entered the food chain. This research work aimed to determine the levels of organochlorine pesticide OCP residues in watermelon sold in Kaura Namoda, Nigeria and the hazard index. Watermelons sampled were obtained from the Kaura Namoda market. QuEChERS and GC-MS are used for sample preparation and analysis respectively. The twenty OCP residues standard were used and only seven OCP residues were detected, namely: Alpha-lindane, Delta-lindane, Endosulphan i, Isodrin, DDMU, Dieldrin, Endosulphan ii with concentrations of 0.00145 mg/kg, 0.000402 mg/kg, 0.008389 mg/kg, 0.009329 mg/kg, 0.00145 mg/kg, 0.001538 mg/kg, 0.00037 mg/kg respectively. Hazard index was estimated using EDI and ADI reference values; the result shows that only Endosulphan i residues have a hazard index greater than 1 for children and adults. Therefore, they pose a potential health effect.

**Keywords:** Organochlorine, Watermelon, Hazard index



KÖPEK OVER KÖKENLİ MEZENKİMAL KÖK HÜCRE EKSOZOMLARININ (COMS-  
EXO), EPİTELYAL BARIYER FONKSİYONUNU ARTIRMA POTANSİYELİNİN  
ARAŞTIRILMASI

EXPLORATION OF THE POTENTIAL OF CANINE OVARY-DERIVED MESENCHYMAL  
STEM CELL EXOSOMES (COMS-EXO) IN ENHANCING EPITHELIAL BARRIER  
FUNCTION

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**ÖZET**

Bu çalışma, köpek ovaryum kökenli mezenkimal kök hücrelerden elde edilen eksozomların (COMS-Exo), epitelyal bariyer fonksiyonunu artırma potansiyelini incelemeyi amaçlamaktadır. Köpek over mezenkimal kök hücreleri (COMS), farklılaşma yeteneklerini belirlemek amacıyla osteojenik, adipojenik ve kondrojenik farklılaşma analizleri gerçekleştirilmiştir. Akım sitometrik analizler, bu hücrelerin yüzeyinde pozitif işaretçilerin (CD90, CD73, CD105) varlığını ve negatif işaretçilerin (CD34, CD11b, CD19, HLA-DR) olmadığını doğrulamıştır. COMS-Exo ile zenginleştirilmiş koşullandırılmış ortam (CM), fibroblast epitelyal bariyerlerin transepitelyal elektriksel direnç (TEER) ölçümleri yoluyla yeniden yapılanma etkisini değerlendirmek üzere hazırlanmıştır.

TEER ölçümleri, tedavi sonrası 6., 12. ve 24. saatlerde kaydedilmiştir. Epitelyal bariyer modelimizde, COMS-Exo'nun epitelyal bariyer direncini belirgin bir şekilde artırdığı gözlenmiştir. TEER analizi, COMS-Exo tedavisinin 12. ve 24. saatlerde epitelyal bariyer direncini sırasıyla 200  $\Omega \cdot \text{cm}^2$ 'ye çıkardığını, kontrol grubunun ise aynı süreçlerde sırasıyla 145  $\Omega \cdot \text{cm}^2$  ve 185  $\Omega \cdot \text{cm}^2$  değerlerini gösterdiğini ortaya koymuştur.

Bu çalışma, COMS-Exo'nun epitelyal bariyerlerin onarılmasını ve güçlendirilmesini desteklediğini göstermektedir. COMS-Exo, yara iyileşme sürecini hızlandırma ve bariyer bütünlüğünü koruduğunu göstermektedir. Bu bulgular, COMS-Exo'nun regeneratif tıp alanlarında hücresiz tedavi seçeneği olarak önemini belirtmektedir.

**Anahtar kelimeler:** Canine, Transepitelyal elektriksel direnç (TEER), Mezenkimal Kök Hücre, Eksozom

**ABSTRACT**

This study aims to investigate the potential of exosomes derived from canine ovarian mesenchymal stem cells (COMS-Exo) in enhancing epithelial barrier function. Canine ovarian mesenchymal stem cells (COMS) were subjected to osteogenic, adipogenic, and chondrogenic differentiation analyses to determine their differentiation capabilities. Flow cytometric analyses confirmed the presence of positive surface markers (CD90, CD73, CD105) and the absence of negative markers (CD34, CD11b, CD19, HLA-DR) on these cells. Conditioned medium (CM) enriched with COMS-Exo was prepared for evaluating its regenerative impact on fibroblast epithelial barriers through transepithelial electrical resistance (TEER) measurements.

TEER measurements were recorded at 6th, 12th, and 24th hours post-treatment. In our epithelial barrier model, COMS-Exo exhibited a remarkable capacity to significantly enhance epithelial barrier resistance when compared to the control group. TEER analysis revealed that COMS-Exo treatment increased epithelial barrier resistance to 200  $\Omega \cdot \text{cm}^2$  at the 12th and 24th hours, while the control group exhibited values of 145  $\Omega \cdot \text{cm}^2$  and 185  $\Omega \cdot \text{cm}^2$  at the same respective time points.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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This study underscores the promising potential of COMS-Exo in promoting the repair and reinforcement of epithelial barriers. COMS-Exo demonstrated the ability to expedite the wound healing process, leading to improvements in barrier integrity and permeability. These findings emphasize COMS-Exo as an exciting candidate for cell-free therapy in the field of regenerative medicine.

**Keywords:** Canine, Transepithelial Electrical Resistance (TEER), Mesenchymal Stem Cell, Exosome

İNSAN UMBİLİKAL CORD MEZENKİMAL KÖK HÜCRE KAYNAKLI EXSOZOMLARIN  
KEDİLERİN ENFEKSİYÖZ PERİTONİTİSİ (FIP)'Lİ KEDİLERİN PBMC'LERİ  
CANLILIĞI ÜZERİNE ETKİLERİNİN *İN VİTRO* ORTAMDA ARAŞTIRILMASI

AN IN VITRO INVESTIGATION OF THE EFFECTS OF HUMAN UMBILICAL CORD  
MESENCHYMAL STEM CELL-DERIVED EXOSOMES ON THE VIABILITY OF  
PERIPHERAL BLOOD MONONUCLEAR CELLS (PBMCs) IN CATS WITH FELINE  
INFECTIOUS PERITONITIS (FIP)

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ÖZET

**Giriş ve Amaç:** Hem insanlar hem de hayvanlarda çeşitli enfeksiyonlara neden olan coronavirüsler arasında, kedi coronavirüslerinin yol açtığı Kedilerin Enfeksiyöz Peritonitisi (FIP) dikkat çeker. Eksozomlar, rejeneratif tıpta immünmodülasyon, doku onarımı ve hücre yenilenmesi için potansiyel terapötik ajanlar olarak kabul edilmektedir. Bu çalışmada insan umbilikal cord kaynaklı eksozomların (iUK-MKH-Exo) FIP'li kedilerin periferal kan mononükleer hücreleri (PKMH) üzerindeki canlılıkları üzerine etkisinin araştırılması amaçlanmıştır.

**Gereç ve Yöntem:** Çalışmaya FIP tanısı konulmuş 5-13 yaş arası 5 kedi dahil edilmiştir ve venöz kanlarından periferal mononükleer hücreler izole edilmiştir. iUK-MKH-Exo'ları ticari olarak Global Stem Cells Group'dan alınmıştır. PKMH (1x10<sup>6</sup>/ml) ve iUK-MKH-Exo'lar 48 kuyulu plakta 5 gün kültüre edilmiştir. Kültür sonrası Lenfosit canlılıklarına Annexin-V-7AAD apoptoz kiti ile akım sitometride bakılmıştır.

**Bulgular:** FIP tanılı olan kedilerden alınan PKMH'lar ve iUK-MKH-Exo'ların 5 günlük kültür süresi sonrasında hücre canlılıkları akım sitometride analiz edilmiştir. Elde edilen verilere göre, kök hücre bulunmayan ortamda PKMH'ların canlılık oranı (Annexin V neg/7AAD neg) 45.8 iken, iUK-MKH-Exo varlığında canlılık oranı %77.3 olarak bulunmuştur. (p<0.05). Bununla beraber erken ve geç apoptoz oranlarına bakıldığında (Annexin V poz), iUK-MKH-Exo eklenmeyen kültürlerde apoptotik PKMH oranı %53 iken, kök hücrenin eklenmesiyle bu oran %20.6'ya düşmüştür.

**Sonuç:** Sonuç olarak, bu çalışma, insan umbilikal cord kaynaklı eksozomların (iUK-MKH-Exo) FIP'li kedilerin periferal kan mononükleer hücrelerinin (PKMH) canlılığı üzerinde olumlu bir etkisi olduğunu göstermektedir. İUK-MKH-Exo'nun PKMH'ların canlılık oranını arttırdığı ve apoptozisini azalttığı bulunmuştur. Bu sonuçlar, FIP hastalığının tedavisinde potansiyel bir terapötik ajan olarak iUK-MKH-Exo'nun kullanılabilirliğini desteklemektedir.

Bu çalışma, FIP tedavisinde yeni bir yaklaşım sunabilen ve immün sistemi düzenleyebilen iUK-MKH-Exo'nun potansiyelini vurgulamaktadır. Gelecekte, daha fazla çalışma ve klinik denemeler ile bu terapötik ajanın etkinliği ve güvenliği daha fazla doğrulanmalıdır. Ancak, bu bulgular FIP tedavisinde umut verici bir yoldur ve bu ölümcül hastalığa karşı yeni tedavi seçenekleri geliştirme potansiyelini işaret etmektedir.

**Anahtar kelimeler:** Kedi, Coronavirus, FIP (feline infectious peritonitis), Lenfosit (PKMH)

ABSTRACT

**Introduction and Objective:** Among the various coronaviruses that cause infections in both humans and animals, Feline Infectious Peritonitis (FIP) caused by feline coronaviruses is noteworthy. Exosomes are considered potential therapeutic agents in regenerative medicine for immunomodulation, tissue repair, and cell renewal. This study aimed to investigate the effect of human umbilical cord-derived

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

exosomes (iUC-MSC-Exo) on the viability of peripheral blood mononuclear cells (PBMCs) in cats with FIP.

**Materials and Methods:** The study included five cats diagnosed with FIP aged between 5 and 13 years, and peripheral mononuclear cells were isolated from their venous blood. iUC-MSC-Exosomes were commercially obtained from the Global Stem Cells Group. PBMCs ( $1 \times 10^6/\text{ml}$ ) and iUC-MSC-Exosomes were cultured for 5 days in a 48-well plate. After culture, lymphocyte viability was assessed by flow cytometry using the Annexin-V-7AAD apoptosis kit.

**Results:** PBMCs obtained from cats diagnosed with FIP and the cell viability of iUC-MSC-Exosomes were analyzed by flow cytometry after a 5-day culture period. According to the obtained data, the cell viability rate of PBMCs in the absence of stem cells (Annexin V neg/7AAD neg) was 45.8%, whereas in the presence of iUC-MSC-Exosomes, the viability rate was 77.3% ( $p < 0.05$ ). Moreover, when early and late apoptosis rates were examined (Annexin V positive), the apoptotic PBMC rate in cultures without iUC-MSC-Exosomes was 53%, whereas with the addition of stem cells, this rate decreased to 20.6%.

**Conclusion:** In conclusion, this study demonstrates a positive effect of human umbilical cord-derived exosomes (iUC-MSC-Exo) on the viability of peripheral blood mononuclear cells (PBMCs) in cats with FIP. It has been found that iUC-MSC-Exo increases the viability rate of PBMCs and reduces apoptosis. These results support the potential use of iUC-MSC-Exo as a therapeutic agent for the treatment of FIP.

This study highlights the potential of iUC-MSC-Exo, which can offer a new approach to FIP treatment and regulate the immune system. In the future, further research and clinical trials are needed to further validate the effectiveness and safety of this therapeutic agent. However, these findings provide a promising avenue for the treatment of FIP and the development of new treatment options for this deadly disease.

**Keywords:** Cat, Coronavirus, FIP (Feline Infectious Peritonitis), Lymphocyte (PBMC)

HEMŞİRELİK EĞİTİMİNDE YAPAY ZEKA KULLANIMI: CHATGPT FIRTINASI  
USE OF ARTIFICIAL INTELLIGENCE IN NURSING EDUCATION: CHATGPT STORM

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ÖZET

ChatGPT, OpenAI tarafından yapay zeka sohbet robotu olarak 2022 yılında ücretsiz olarak kullanımına açılmıştır. Hızla kullanıcı sayısını arttıran ChatGPT, soruları yanıtlamak ve bilgi sağlamak gibi çok çeşitli görevlere yardımcı olmak amacıyla doğal insan dilini anlayabilmek ve yorumlayabilmek için tasarlanmış bir makine öğrenimi sistemidir. ChatGPT insan olmamasına rağmen insanlarla bir insanın yapacağına benzer bir şekilde iletişim ve etkileşim kurabilmek için tasarlanmıştır. Eğitimde yapay zekanın kullanımına ilişkin çalışmalar 1970'lerden beri yürütülmektedir. Sağlık bilimleri alanında ChatGPT'nin intihali ve kopya çekmeyi arttıracığı düşünülmüş olsa da eğitimde uyarlanabilir öğrenme üzerinden kurgulanmış bir yapı sunarak eğitimin kalitesini artırılabilirliği de düşünülmektedir. Bu derleme, uluslararası alanda ChatGPT yapay zeka sohbet robotunun hemşirelik eğitimi alanında kullanımı ile ilgili yayınlanmış çalışmaların gözden geçirilmesi ve çalışmalardan elde edilen verilerin incelenmesi amacıyla gerçekleştirilmiştir. ChatGPT'nin hemşirelik alanında kullanımını içeren literatürün incelemesi için PubMed, Science Direct ve Google Akademik elektronik veri tabanı üzerinden, 2022-2023 yılları arasında yayınlanmış olan, yayın başlığında "ChatGPT" ve "Nursing" anahtar kelimeleri olan, tam metin yayınlar üzerinden tarama yapılmıştır. Belirlenen tarama kriterleri doğrultusunda 11 makaleden iki makale elenerek 9 makale incelenmiştir. Hemşirelik eğitiminde ChatGPT nasıl yararlı olabilir, hemşirelik öğrencileri ChatGPT'yi nasıl kullanabilir, Perianestezi Hemşireliğinde ChatGPT'nin rolü neler olabilir, öğretim elemanları ChatGPT'den nasıl yararlanabilir ve kullanımın etik boyutu nedir, hemşirelik uygulamalarını desteklemede ChatGPT nasıl kullanılabilir ve hemşirelik öğrencilerinin klinik muhakame becerilerinin geliştirilmesinde nasıl kullanılabilirliğine ilişkin makalelerin yayınlandığı saptanmıştır. Sonuç olarak; Literatür incelemesi sonucunda, ChatGPT'nin hemşirelik öğrencilerinin öğrenmesini geliştirmek, klinik karar vermeyi geliştirmek, işbirliğini ve iletişimi kolaylaştırmak, kişiselleştirilmiş öğrenmeyi desteklemek, erişilebilirliği ve esnekliği artırmak için kullanılabilirliği belirlenmiştir. ChatGPT'yi hemşirelerin ve hemşirelik öğrencilerinin ilaçlar, prosedürler ve hasta bakımı hakkında hızlı bir şekilde bilgi bulmak için kullanılabilirliği vurgulanmaktadır. Ayrıca öğretim elemanlarını öğrencilerin öğrenmesini geliştirmek ve eleştirel düşünme becerilerinin ve klinik karar verme becerilerinin gelişimini desteklemek için ChatGPT'nin hemşirelik eğitimine entegre edilmesini sağlamaları gerektiği vurgulanmaktadır.

**Anahtar Kelimeler:** ChatGPT, Yapay Zeka, Hemşirelik, Hemşirelik Eğitimi.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ABSTRACT

ChatGPT was launched by OpenAI as an artificial intelligence chatbot for free in 2022. ChatGPT is a machine learning system designed to understand and interpret natural human language to help with a wide range of tasks, such as answering questions and providing information. Although ChatGPT is not human, it is designed to be able to communicate and interact with humans in a similar way that a human would. Studies on use of artificial intelligence in education have been conducted since 1970s. Although it is thought that ChatGPT will increase plagiarism and cheating in field of health sciences, it can improve quality of education by providing a structure built on adaptive learning in education. This paper was conducted to review studies published internationally on use of ChatGPT artificial intelligence chatbot in field of nursing education and to examine data obtained from studies. For review of literature on use of ChatGPT in field of nursing, PubMed, Science Direct and Google Scholar electronic databases were searched through full-texts published between 2022-2023, with keywords "ChatGPT" and "Nursing" in title of publication. In line with the screening criteria, 9 articles were analyzed by eliminating two articles from 11 articles. The articles were published on how ChatGPT can be useful in nursing education, nursing students can use ChatGPT, instructors can benefit from ChatGPT, ChatGPT can be used to support nursing practice and to improve nursing students' clinical reasoning skills, what can be role of ChatGPT in Perianesthesia Nursing and what is ethical dimension of its use. As a result of literature review, ChatGPT can be used to improve nursing students' learning, clinical decision-making, facilitate collaboration and communication, support personalized learning, and increase accessibility and flexibility. ChatGPT can be used by nurses and nursing students to quickly find information about medications, procedures and patient care. Instructors should ensure that ChatGPT is integrated into nursing education to enhance student learning and support development of critical thinking skills and clinical decision-making skills.

**Keywords:** ChatGPT, Artificial Intelligence, Nursing, Nursing Education.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## BİREYİN TANINMA SAVAŞIMININ CHARLES TAYLOR'IN PERSPEKTİFİNDEN İNCELENMESİ: KÜLTÜRLERE YAKLAŞIM VE DEĞER ÖNVARSAYIMI

### EXAMINING THE INDIVIDUAL'S STRUGGLE FOR RECOGNITION FROM CHARLES TAYLOR'S PERSPECTIVE: APPROACH TO CULTURES AND PRESUPPOSITION OF VALUE

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#### ÖZET

Gerek mikro ve makro ölçekte uluslararası arenada gerçekleşen göçler gerekse küreselleşmenin topluma etkileri dolayısıyla kültürel anlamda giderek heterojenleşen devletlerde çokkültürcülük tartışmaları önem kazanmıştır. Bu kapsamda özellikle 1960'lar itibari ile birey, kimlik ve kültür gibi kavramlar tartışma sahasına çıkarılmış ve bu kavramların günümüz dünyasındaki karşılıkları süregelen zaman içerisinde farklı perspektiflerden incelenmiştir. Hiç şüphesiz Charles Taylor da modern toplumlarda birey ve toplum arasındaki ilişki, bireylerin kimlikleri ve bu kimliklerin tanınması sorunu, bu tanınma savaşımında liberalizmin yeri gibi konularda önemli eserler kaleme almıştır. Bu çalışma, Taylor'ın birey ve kimlik kapsamında üzerinde durduğu önemli konulardan biri olan kültür ve bunun tanınma ile olan ilişkisi üzerinde duracaktır. Düşünürün kültürlere yaklaşım konusunda yapmış olduğu temellendirmeler ve bu yaklaşımlara yönelik sınıflandırmaları incelenecektir. Bu incelemeler yapılırken bireyin tanınma savaşımında kültür neden önemli bir unsur olarak karşımıza çıkar, bir toplum farklı bir kültürle karşılaştığında ideal olan yaklaşım neleri içerir gibi sorulara Taylor'ın perspektifinden cevaplar aranacaktır. Taylor'ın farklı kimlikteki bireylerin tanınması gerekliliğini temellendirirken üzerinde durduğu değer önvarsayımı kavramını incelemek de çalışmanın amaçlarındadır. Hem bireysel hem de toplumsal bağlamda kimlik ve kültür kavramları, günümüzde de halen tartışılmaya devam eden ve önemini koruyan konulardır. Bu kavramların, Siyaset Bilimi literatürüne önemli katkılarda bulunmuş Charles Taylor'ın perspektifiyle incelenmesi, giderek çokkültürlülüşen toplumları daha iyi anlayabilmek için önem taşır. Tanınmanın bireyin varoluşunda kaçınılmaz bir öneme sahip olduğunu ileri süren Taylor, bu bağlamda bireyin özgüllüğünün yapı taşlarından biri olarak gördüğü kültüre önemli bir alan ayırır. Taylor farklı kültürlere yaklaşım konusunda üç yöntemin var olduğunu ileri sürer ve bunları doğa bilimleri (natural science), düzeltilmezlik tezi (in corrigibility thesis) ve yorumlayıcı görüş (interpretative view) olarak kavramsallaştırır. Bu yaklaşımları ayrı ayrı ele alan Taylor, doğa bilimleri ve düzeltilmezlik tezi yaklaşımının karşısında durarak hatalı bulduğu kısımları inceler. Yorumlayıcı görüş ise düşünürün idealize ettiği toplum modelinin bir parçası olarak karşımıza çıkar ve Taylor bunu Hans-Georg Gadamer'in "ufukların kaynaşması" kavramı ile bütünleştirerek ele alır.

**Anahtar Kelimeler:** Kimlik, Kültür, Birey, Charles Taylor, Çokkültürcülük, Değer Önvarsayımı

#### ABSTRACT

Discussions on multiculturalism have gained importance in states that are becoming increasingly heterogeneous in cultural terms due to both micro and macro migrations and the effects of globalization on society. In this context, especially since the 1960s, concepts such as individual, identity and culture have been brought into the discussion area, and the equivalents of these concepts in today's world have been examined from different perspectives over time. Undoubtedly, Charles Taylor also wrote important works on subjects such as the relationship between the individual and society in modern societies, the identities of individuals and the problem of recognition of these identities, and the place of liberalism in this struggle for recognition. This study will focus on culture and its relationship with recognition, which is one of the important issues that Taylor emphasizes within the scope of individual and identity.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Taylor's justifications for approaching cultures and his classifications of these approaches will be examined. While conducting these studies, answers will be sought from Taylor's perspective to questions such as why culture is an important element in the individual's struggle for recognition, and what the ideal approach includes when a society encounters a different culture. One of the aims of the study is to examine the concept of value presupposition, which Taylor emphasizes when establishing the necessity of recognizing individuals with different identities. The concepts of identity and culture, both in individual and social contexts, are issues that continue to be discussed and maintain their importance today. Examining these concepts from the perspective of Charles Taylor, who made significant contributions to the Political Science literature, is important in order to better understand increasingly multicultural societies. Claiming that recognition has an inevitable importance in the existence of the individual, Taylor allocates an important area to culture, which he sees as one of the building blocks of the individual. Taylor argues that there are three methods of approaching different cultures and conceptualizes them as natural science, incorrigibility thesis, and interpretive view. Addressing these approaches separately, Taylor stands against the natural sciences and the incorrigibility thesis approach and examines the parts he finds faulty. The interpretive view appears as a part of the social model idealized by the thinker, and Taylor handles it by integrating it with Hans-Georg Gadamer's concept of "fusion of horizons".

**Key Words:** Identity, Culture, Individual, Charles Taylor, Multiculturalism, Value Presupposition

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

AVRUPA'NIN EN KİRLİ ŞEHRİNDE HAVA KİRLİLİĞİ DİKKATE ALINARAK EN  
UYGUN UÇAĞIN BELİRLENMESİ

DETERMINING THE MOST SUITABLE AIRCRAFT CONSIDERING AIR POLLUTION IN  
THE MOST POLLUTED CITY IN EUROPE

*Uğur KILIÇ*

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## ÖZET

İsviçre merkezli hava kalitesi teknolojisi şirketi IQAir'in 131 ülke ve 7323 şehirde, 2022 için havadaki ortalama partikül madde (PM<sub>2,5</sub>) konsantrasyonuna ( $\mu\text{g}/\text{m}^3$ ) göre yaptığı çalışmaya göre avrupanın en kirli şehri 53,0  $\mu\text{g}/\text{m}^3$  PM<sub>2,5</sub> konsantrasyonu ile Iğdır şehri olmuştur. Bunun sebepleri arasında Iğdır ilinin etrafının dağlarla çevrili bir mikroklima bölgesi olması, Ermenistan sınırına yakın bulunan Metsamor Nükleer santralının yaydığı emisyonlar, artan betonlaşma, egzoz salınımları, doğalgazın sınırlı kullanımı ve kalitesiz kömür kullanımı gibi nedenler bulunmaktadır. PM<sub>2,5</sub> konsantrasyonu, çapı 2,5 mikrona kadar olan ince parçacıklı aerosol parçacıklarının miktarını tanımlar. Dünya sağlık örgütünün (WHO) yayınladığı rapora göre solunabilir hava içindeki PM<sub>2,5</sub> oranı en çok 5,0  $\mu\text{g}/\text{m}^3$  olmalıdır. Bu durum Iğdır kentinde canlı sağlığını yüksek derecede tehdit etmektedir. Bu çalışmada Iğdır ilindeki hava kirliliğinin havacılık kaynaklı emisyonlarının incelenerek kentin emisyon düzeyinde bir azaltma sağlanmaya çalışılmıştır. Bu kapsamda 2023 yılı için kış ve ilkbahar aylarında Iğdır ilinde gerçekleşen uçuşlarda uçak başına yolcu yoğunluğunun az olduğu görülmüştür. Havacılık kaynaklı emisyonları azaltmaya yönelik olarak ilgili aylar için dar gövdeli yolcu uçakları yerine daha küçük boyutlu bölgesel jetlerin kullanımı ile elde edilen yakıt tasarrufu ve emisyon miktarları incelenmiştir. Uçaklar için yakıt tüketiminin ve gaz emisyonlarının hesaplanmasında EUROCONTROL tarafından geliştirilen Entegre Uçak Gürültüsü ve Emisyonları Modelleme Platformu (IMPACT) kullanılmıştır. Bulgular, havayollarının uçuşlarını yakıt tasarrufu ve çevresel maliyetler gibi parametreleri göz önünde bulundurarak yapabilmeye olanak sağlamaktadır. Ülkemizde havacılık kaynaklı emisyon vergisi uygulaması bulunmadığından, Sivil Havacılık Genel Müdürlüğü (SHGM) acil olarak emisyon vergilendirmesi yapmalı ve Iğdır ili gibi kirlenmenin yüksek olduğu şehirlerde en uygun uçağın seçilmesini sağlayarak havacılık kaynaklı emisyonların azaltılmasını sağlamalıdır. Bu çalışmanın havayolu işletmecilerine yakıt tüketimi ve emisyon parametrelerine göre filo seçimi konusunda yol gösterici olması beklenmektedir.

**Anahtar Kelimeler:** Yakıt tüketimi, Uçak emisyonları, PM<sub>2,5</sub>, Bölgesel jetler, Dar gövdeli yolcu uçakları, Hava ulaşım.

## ABSTRACT

According to the study conducted by Switzerland-based air quality technology company IQAir in 131 countries and 7323 cities, based on the average particulate matter (PM<sub>2.5</sub>) concentration ( $\mu\text{g}/\text{m}^3$ ) in the air for 2022, the most polluted city in Europe is Iğdır with a PM<sub>2.5</sub> concentration of 53.0  $\mu\text{g}/\text{m}^3$ . The reasons for this include the fact that Iğdır province is a microclimate region surrounded by mountains, the emissions from the Metsamor Nuclear Power Plant located close to the Armenian border, increased concretion, exhaust emissions, limited use of natural gas and the use of poor quality coal. PM<sub>2.5</sub> concentration describes the amount of fine aerosol particles up to 2.5 microns in diameter. According to the report published by the World Health Organization (WHO), the PM<sub>2.5</sub> rate in breathable air should be at most 5.0  $\mu\text{g}/\text{m}^3$ . This situation poses a high threat to the health of living things in the Iğdır province. In this study, an attempt is made to reduce the emission level of the city by examining the aviation-related emissions of air pollution in Iğdır province. In this context, it has been observed that the

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

passenger density per aircraft is low in the flights operating in Iğdır province in the winter and spring months of 2023. To reduce aviation-related emissions, the fuel savings and emission amounts achieved by using smaller-sized regional jets instead of narrow-body passenger aircraft are examined for the relevant months. Integrated Aircraft Noise and Emissions Modeling Platform (IMPACT) developed by EUROCONTROL is used to calculate fuel consumption and gas emissions for aircraft. The findings enable airlines to conduct their flights by taking into account parameters such as fuel savings and environmental costs. Since there is no aviation-related emission tax in our country, the General Directorate of Civil Aviation (SHGM) should urgently impose emission taxation and reduce aviation-related emissions by ensuring that the most suitable aircraft are selected in cities with high pollution, such as Iğdır province. It is expected that this study will guide airline operators in fleet selection according to fuel consumption and emission parameters.

**Keywords:** Fuel consumption, Aircraft emissions, PM2.5, Regional jets, Narrow-body passenger aircraft, Air transportation.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## VETERİNER CERRAHİDE ROBOTİK CERRAHİ UYGULAMALARI ROBOTIC SURGERY APPLICATIONS IN VETERINARY SURGERY

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### ÖZET

Çalışmada; veteriner cerrahi açısından yeni bir uygulama olarak nitelendirilen robotik cerrahi sistemlerinin ve ekipmanlarının geliştirilebilir olması ve yeniden tasarlanabilirliği ile, uygulamanın alana sağlayacağı avantajlarının vurgulanması amaçlanmıştır. Ayrıca robotik uygulamalar sayesinde, mevcut cerrahi teknikleri geliştirmenin yanı sıra, yeni cerrahi aletlerle gerçekleştirilecek operasyonların ve yeni prosedürlerin geliştirilmesine de geniş olanaklar sunacağı düşünülmektedir.

Araştırmanın hazırlanmasında yöntem olarak konu ile ilgili yapılmış bilimsel araştırmalara ait literatür kaynaklarının taramaları yapılmıştır. Elde edilen verilerle konunun geçmişten geleceğe taşınmasında önemi ortaya konulmaya ve yapılacak yeni çalışmalara yön vermesine çalışılmıştır.

Robotik cerrahi sağladığı birçok avantajın yanı sıra, geliştirilen yeni aletler, manuel prosedürlere kıyasla manipülasyon hassasiyetini de potansiyel olarak geliştirmiştir. Ayrıca hasta ile gelişmiş görüntüleme ekipmanı tarafından verilen hacimsel görüntüsü arasında gelişmiş haritalama olanağı da sağlamaktadır. İlerleyen yıllarda cerrahi robotların daha fazla sensör, daha iyi kameralar, yeni ve devrim niteliğinde aletlerle küçülecekleri düşünülmektedir. Bu sistemler için öngörülen teknik iyileştirme ve yeniliklerin yanı sıra, cerrahların daha fazla deneyim kazanmasıyla, ameliyat sürelerinin kısalmasıyla birlikte cerrahi verimliliğin artmasına yol açacağı beklenmektedir.

Gerek veteriner cerrahide gerekse insan hekimliğinde kısa sürede çok sayıda cerrahi alanda robotik müdahaleler uygulanma alanı bulmuş ve hemen her alanda uzmanlık için hızla bir olasılık haline gelmiştir. Robotik sistemler yardımıyla yapılabilecek en çok işlemler; Nöroşirurji, üroloji cerrahisi, jinekolojik cerrahi, kardiyotorasik cerrahi, gastrointestinal cerrahi ve genel cerrahi alanlarında kendine yer bulmuştur.

Robotik cerrahi uygulamaları uygun fiyatlı hale geldikçe ve daha fazla uygulama kullanılabilir oldukça, veteriner cerrahisi açısından daha çok ilgi duyulacağı ve kliniklerde daha etkin bir şekilde kullanılacağı öngörülmektedir. Bu öngörü, veteriner hekimlerin zaten canlı hayvanların kullanıldığı eğitim oturumlarında beşerî tıp uzmanlarıyla iş birliği yapması gerçeğiyle de desteklenmektedir.

Sonuç bakımından değerlendirildiğinde; veteriner cerrahi alanında zamanla yaygınlaşacak olan uygulamadan olumlu ve etkili sonuçlar alınacağı, cerrahlar açısından bakıldığında gerek klinik gerekse bilimsel araştırmalar açısından çok yeni ve hala gelişmekte olduğunu söylemek mümkündür. Yapılacak yeni çalışmalarla gelecekte çok daha yaygın bir şekilde kullanım alanları bulacağı kaçınılmazdır.

**Anahtar Kelime:** Robotik cerrahi, Hayvan, Cerrahi, Veteriner

### ABSTRACT

In the study; It is aimed to emphasize the developability and redesignability of robotic surgery systems and equipment, which are described as a new application in terms of veterinary surgery, and the advantages of the application to the field. It is also thought that, thanks to robotic applications, in addition to improving existing surgical techniques, it will also provide ample opportunities for the development of operations and new procedures to be performed with new surgical instruments.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

As a method in the preparation of the research, literature sources of scientific research on the subject were scanned. With the data obtained, it was tried to reveal the importance of moving the subject from the past to the future and to guide new studies to be carried out.

In addition to the many advantages that robotic surgery provides, new tools have also potentially improved manipulation precision compared to manual procedures. It also provides advanced mapping between the patient and the volumetric image provided by advanced imaging equipment. It is thought that surgical robots will become smaller in the coming years with more sensors, better cameras, and new and revolutionary tools. In addition to the technical improvements and innovations envisaged for these systems, it is expected that surgeons will gain more experience, leading to shorter surgery times and increased surgical efficiency.

Robotic interventions have found application in many surgical fields in a short time, both in veterinary surgery and human medicine, and have rapidly become a possibility for specialization in almost every field. The most operations that can be done with the help of robotic systems are; It has found its place in the fields of neurosurgery, urological surgery, gynecological surgery, cardiothoracic surgery, gastrointestinal surgery and general surgery.

As robotic surgery applications become affordable and more applications become available, it is anticipated that there will be more interest in veterinary surgery and that it will be used more effectively in clinics. This prediction is supported by the fact that veterinarians already collaborate with human medicine experts in training sessions using live animals.

When evaluated in terms of results; It is possible to say that positive and effective results will be obtained from the practice, which will become widespread over time in the field of veterinary surgery, and from the perspective of surgeons, it is very new and still developing in terms of both clinical and scientific research. It is inevitable that it will find much more widespread use in the future with new studies.

**Keywords:** Robotic Surgery, Animal, Surgery, Veterinary



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## İMAM HATİP OKULLARINDA GÖREV YAPAN ÖĞRETMENLERİN AHLAKİ İDEOLOJİLERİ

### MORAL IDEOLOGIES OF TEACHERS SERVING IN İMAM HATİP SCHOOLS

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#### ÖZET

Ahlak, toplumsal yaşamda istikrarlı ve istenilen düzeyde kişiler arası ilişkileri sürdürmek için kritik öneme sahip olmasına rağmen neyin ahlaki ve neyin gayri ahlaki olduğu konusunda tam bir fikir birliği olduğunu söylemek güçtür. Bu çeşitliliğe birçok faktör yol açar ancak bunların en önemlilerinden biri, insanların farklı ahlaki ideolojileri yani bireysel ahlak felsefelerini benimsemeleridir. Ahlaki ideoloji, bir bireyin doğru ve yanlışla dair yönelimini tanımlayan bütüncül inançlar, değerler, standartlar ve öz değerlendirme (benlik imajı) sistemidir. Bu bağlamda bu çalışmanın amacı, imam hatip okullarında görev yapan öğretmenlerin benimsedikleri ahlaki ideolojilerin incelenmesi ve bazı demografik değişkenler açısından karşılaştırılmasıdır. Betimleyici nitelikteki bu araştırma tarama modeliyle gerçekleştirilmiştir. Araştırmada veri toplama aracı olarak Forsyth'i (1980) tarafından geliştirilen, Yazıcı ve Yazıcı (2010) tarafından Türkçe'ye uyarlanan Etik Durum Ölçeği (EDÖ) kullanılmıştır. Araştırmanın örneklemini 2020-2021 eğitim-öğretim yılında Türkiye'deki yedi coğrafi bölgeyi temsilen İstatistik Bölge Birimleri Sınıflandırmasına (İBBS) göre Düzey 1'deki 12 bölgeden alınan 26 ildeki imam hatip liseleri ve ortaokullarında görev yapan öğretmenlerden oluşmaktadır. Öğretmenlerin görüşlerine göre katılımcıların ahlaki ideolojinin idealizm boyutundaki ortalama puanlarının yüksek düzeyde, rölativizm boyutunda ise orta düzeyde oldukları tespit edilmiştir. Araştırma bulgularına göre öğretmenlerin benimsedikleri ahlaki ideolojiler, cinsiyet, yaş, branş değişkenleri açısından hem idealizm hem de rölativizm boyutlarında istatistik açıdan anlamlı bir şekilde farklılaşırken, medeni durum, öğrenim durumu ve sosyoekonomik durum değişkenleri açısından ahlaki idealizm boyutunda gruplar arasında anlamlı bir farklılık görülmezken rölativizm boyutunda istatistik açıdan anlamlı bir farklılık saptanmıştır. Söz konusu verilerden hareketle imam hatip okullarında görev yapan öğretmenlerin okul ortamında karşılaştıkları durum ve olayları yorumlamada ve değerlendirmede başkalarına zarar vermekten kaçınma ve ahlaki ilkeleri önemseme yönelimine sahip oldukları söylenebilir.

**Anahtar Kelimeler:** Din Eğitimi, Ahlak, Ahlaki İdeoloji, İmam Hatip Okulu, Öğretmen.

#### ABSTRACT

Although morality is plays a critical role in maintaining stable and desirable interpersonal relationships in social life, it is difficult to assert a consensus on what is moral and what is immoral. Many factors lead to this diversity, but one of the most important is that people adopt different moral ideologies, that is, individual moral philosophies. Moral ideology is a holistic system of beliefs, values, standards and self-evaluations (self-image) that define an individual's orientation towards right and wrong. In this context, the aim of this study is to examine the moral ideologies adopted by teachers working in imam-hatip schools and compare them in terms of some demographic variables. This descriptive study was conducted with the survey model. Ethics Position Questionnaire (EPQ) developed by Forsyth (1980) and adapted into Turkish by Yazıcı and Yazıcı (2010) was used as a data collection tool. The sample of the study consists of teachers working in imam hatip high schools and middle schools in 26 provinces taken from 12 regions according to Nomenclature of Territorial Units for Statistics or NUTS representing seven geographical regions in Turkey in the 2020-2021 academic year. According to the opinions of the teachers, it was determined that the mean scores of the participants in the idealism dimension of moral ideology were at a high level and in the relativism dimension they were at a medium

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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level. According to the research findings, the moral ideologies embraced by teachers differ significantly in terms of gender, age, and branch variables in both idealism and relativism dimensions. However, there was no significant difference between groups in terms of marital status, educational status, and socioeconomic status in the moral idealism dimension, while a statistically significant difference was observed in the relativism dimension. Based on the data in question, it can be said that teachers working in imam-hatip schools have the tendency to avoid harming others and to care about moral principles when interpreting and evaluating the situations and events they encounter in the school environment.

**Keywords:** Religious Education, Morality, Moral Ideology, Imam Hatip School, Teacher.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## BATI ANADOLU'DA İTALYAN İŞGAL SİYASETİ VE İSPARTA'NIN TUTUMU ITALIAN OCCUPATION POLICY IN WESTERN ANATOLIA AND THE ATTITUDE OF ISPARTA

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### ÖZET

Osmanlı Devleti büyük beklentilerle girdiği I. Dünya Savaşından Mondros Ateşkesini imzalayarak 30 Ekim 1918 de kayıtsız şartsız savaştan ayrılmak zorunda kaldı. Mondros görünüşte bir ateşkes olmasına rağmen özellikle 7.maddesi I. Dünya Savaşı öncesi imzalanan gizli antlaşmaların uygulama noktası özelliğini taşımaktadır.. Mütarekenin imzalanmasından kısa bir süre sonra İtalya ve müttefikleri derhal harekete geçerek yönetime el koydular. İtalya'nın Batı Anadolu'dan beklentisi nedir diye baktığımızda; kendisine fazla gelen nüfusuna iş alanları açmak, bölgedeki kömür ve buğdaya sahip olmaktır. İtalyanlar diğer müttefiklerinden farklı olarak yerli halkın desteğini alarak bölgeye sorunsuz bir şekilde yerleşmeyi planladılar. İtalyan işgal yöntemlerine bakarsak; Asayişi ihlal ederek halkın mevcut otoriteye güvensizliğini sağlamak, çeşitli metotlarla halkın sevgisini kazanarak "İtalyan hamiliği" imajını vermek, halka mahalli ve güzel lisanla hitap etmek, halka Sağlık Hizmetleri vermek, otomobil ile yolcu taşımak, bazı kimselere himaye vesikası dağıtmak, İtalyan bayrağının renginde kuşaklar dağıtmak, sivil ve askeri posta teşkilatı kurmak, çeşitli banka şubeleri açmak, okullar açmak . Paris Barış Konferansı'nda İzmir ve çevresi Yunanlılara verilmiş hâlbuki daha önceki gizli anlaşmalarla İtalya'ya bırakılması gereken bu bölgenin Yunanistan'a verilmesi üzerine İtalya, konferansı terk ettikten kısa süre sonra 28 Mart 1919'da Antalya'yı 24 Nisan 1919'da Konya'yı 28 Nisan 1919'da Burdur'u işgal ettiler. Burdur ile Konya arasındaki İtalyan irtibatını kesen tek engel Isparta sancağı olmaktadır. İtalyanlar Burdur'u işgal ederken yukarıdaki diplomatik faaliyetlerde buldukları gibi Isparta sancağının işgali öncesinde de aynı yöntemlere başvurdular. İtalyan mümessili mahiyeti ve tercümanı ile Isparta ve Eğirdir'e 25.05.1919 tarihinde hareket etti. İtalyan mümessili ekonomik tetkiklerde bulunmak üzere geldiğini söyledi ise de amacının işgal zemini hazırlamak olduğu aşıkardı. Antalya'ya gelen işgal kuvvetlerinden bir kısmının Burdur'dan Isparta ve Eğirdir'e kadar uzanan bölgeyi işgal etmek, Antalya'dan Konya'ya kadar olan bölgeyi kontrol altına almayı amaçlayan İtalyanlar Isparta engelini ortadan kaldırmak amacıyla Antalya işgal komutanı General (Emilton Duryani ihl) 168 Süvari ve 2 tabur piyade ile yola çıktığı haberinin Burdur telgraf müdürü tarafından haber verilmesi üzerine Hafız İbrahim, Yüzbaşı Mustafa Hüsnü Bey Çünür-Çerçin hattında pusu kurarak İtalyan birliğini durdurdular ve yapılan istişareler sonrasında İtalyan general Burdur'a geri gönderildi.

**Anahtar Kelimeler:** İtalya, Batı Anadolu, Isparta, İşgal

### ABSTRACT

The Ottoman Empire entered World War I with great expectations and had to leave the war unconditionally on October 30, 1918, by signing the Armistice of Mudros. Although Mudros is ostensibly a ceasefire, especially its 7th article is the implementation point of the secret agreements signed before World War I. Thus, they prepared the legal basis for dividing the points they had previously determined among themselves. Shortly after the armistice was signed, Italy and its allies took immediate action and seized power. When we look at what Italy expects from Western Anatolia; Its aim is to create jobs for its large population and to own the coal and wheat in the region. Unlike their other allies, the Italians planned to settle in the region smoothly by gaining the support of the local people. If we look at the Italian occupation methods; To ensure the public's distrust of the existing authority by violating the public order, to give the image of "Italian patronage" by gaining the love of the people

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

through various methods, to address the public with local and beautiful language, to provide health services to the public, to transport passengers by automobile, to distribute patronage certificates to some people, to paint in the color of the Italian flag distributing belts, establishing a civil and military postal organization, opening various bank branches, and opening schools. At the Paris Peace Conference, Izmir and its surroundings were given to the Greeks, but this region, which should have been left to Italy with previous secret agreements, was given to Greece, and shortly after leaving the conference, Italy transferred Antalya to Konya on 24 April 1919. They occupied Burdur on April 28, 1919. The only obstacle that cut off Italian communication between Burdur and Konya was the Isparta sanjak. While the Italians occupied Burdur, they used the same methods before the occupation of the Isparta sanjak, as they did the above diplomatic activities. He departed for Isparta and Eđirdir on 25.05.1919 with his Italian representative and translator. Although the Italian representative said that he came to conduct economic studies, it was obvious that his purpose was to prepare the ground for invasion. Some of the occupation forces that came to Antalya aimed to occupy the region extending from Burdur to Isparta and Eđirdir, and to take control of the region from Antalya to Konya. In order to eliminate the Isparta obstacle, the Antalya occupation commander General (Emilton Duryani ihl) After the Burdur telegraph director informed them that they were setting out with 168 cavalry and 2 battalions of infantry, Hafız İbrahim and Captain Mustafa Hüsnu Bey stopped the Italian unit by setting an ambush on the Çünür-Çerçin line, and after consultations, the Italian general was sent back to Burdur.

**Keywords:** Italy, Western Anatolia, Isparta, Occupation

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ERGENLERİN YAŞAM DOYUMLARI VE YAŞADIKLARI DUYGUSAL İLİŞKİ NİTELİĞİ ARASINDAKİ İLİŞKİNİN İNCELENMESİ

### INVESTIGATION OF THE RELATIONSHIP BETWEEN ADOLESCENTS' LIFE SATISFACTION AND THE QUALITY OF THEIR EMOTIONAL RELATIONSHIP

Asiye DURSUN<sup>1</sup>

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#### ÖZET

Pozitif psikoloji bağlamında, bireylerin mutlulukları, öznel iyi oluşları ve hayattan aldıkları doyum çok önemli konuları oluşturmaktadır. Nitekim farklı nedenlerle zaman zaman bireylerin algıladıkları sosyal destek azalabilmekte, bireyler arasındaki ilişkiler daha yüzeysel hale gelebilmektedir. Bunun sonucunda farklı çatışmaların yaşanılması kaçınılmaz hale gelebilmektedir. İnsanların temel ihtiyaçlarından olan sevgi ait olmanın insan yaşamı üzerindeki önemi ve insanın sosyal bir varlık olduğu düşünüldüğünde, ilişki niteliği önem kazanmaktadır. Özellikle bireylerin yakın ilişki kurmayı umdukları ya da kurdukları kişilerden algıladıkları destek önem kazanmaktadır. Kurulan ilişkiler ve nitelikleri gelişim dönemlerine göre farklılaşmaktadır. Ergenlik yıllarında ilişkilerin yönü aileden hem kendi cinsinden hem de karşı cinsten arkadaş ortamına yönelmektedir. Ergenlik genellikle arkadaş ortamına kabul edilmenin önemli olduğu ve arkadaşlığın etkisinde kaldığı bir dönemdir. Bu ilişkilerin ergenlerin hayattan aldıkları doyum üzerinde ne şekilde etkisi olduğu merak konusudur. Bu nedenle bu çalışmada ortaöğretim düzeyindeki öğrencilerin ergenlikle birlikte karşı cins ile etkileşimin artacağı ve var olabilecek sorunların yaşam doyumunu etkileyebileceği düşünülerek, yaşam doyumunu ve ilişki niteliği arasındaki ilişkiyi araştırmayı amaçlamaktadır. Araştırmanın çalışma grubunu; Bursa İli Yıldırım İlçesinde bulunan bir lisede 2018-2019 eğitim öğretim yılında 9, 10, 11. sınıfta öğrenim gören 101 kız 70 erkek toplam 171 ortaöğretim öğrencisi ergen oluşturmaktadır. Veriler araştırmanın amacına uygun olarak, önceden alınan ebeveyn bilgilendirme ve bilgilendirilmiş onam sonrasında Kişisel Bilgi Formu, Diener (1985) tarafından geliştirilen Yaşam Doyumu Ölçeği ve Pierce ve arkadaşları (1991) tarafından geliştirilen ve Özabacı tarafından uyarlanan (2007) İlişki Niteliği Ölçeği ile toplanmıştır. Verilerin analizi için t testi, varyans analizi ile (one way ANOVA) Pearson Momentler Çarpımı Korelasyon tekniği, Regresyon analizi teknikleri kullanılmıştır. Araştırma sonucunda katılımcıların yaşam doyumunu ve ilişki niteliği alt boyutlarının (çatışma, derinlik, sosyal destek) cinsiyet ve sınıf düzeyine göre farklılaşmadığı görülmüştür. Yaşam doyumunun çatışma alt boyutu ile arasındaki ilişki anlamlı bulunmazken, sosyal destek ve derinlik alt boyutları ile pozitif düşük düzeyde anlamlı ilişkilere sahip olduğu sonucuna ulaşılmıştır. Bununla birlikte ilişki niteliği alt boyutlarının (çatışma, derinlik, sosyal destek) yaşam doyumunun %5'ini açıkladığı tespit edilmiştir. İlişki niteliğinin yaşam doyumunu üzerinde etkisinin az olması, ergenlerin yaşam doyumunu etkileyecek farklı değişkenlerin olabileceğini akla getirmektedir. Bir üst öğretime hazırlanılması, kimlik kazanımı gibi farklı gelişim görevlerinin yerine getirilme çabası ve çatışmanın daha yoğun yaşanma ihtimali olan aile ve öğretmenlerle ilişkilerin de hayattan alınan doyum üzerinde etkisi olabilir. Bu nedenle farklı çalışmalarda yaşam doyumunu ile ilgili olabilecek farklı değişkenlere odaklanılması önerilebilir.

**Anahtar Kelimeler:** Ortaöğretim öğrencileri, ilişki niteliği, yaşam doyumunu, çatışma, derinlik, sosyal destek.

#### ABSTRACT

In the context of positive psychology, individuals' happiness, subjective well-being and life satisfaction are very important issues. As a matter of fact, for different reasons, the social support perceived by individuals may decrease from time to time and the relationships between individuals may become more

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

superficial. As a result, it may become inevitable to experience different conflicts. Considering the importance of love, which is one of the basic needs of people, on human life and that humans are social beings, the quality of relationship becomes important. In particular, the support that individuals perceive from people with whom they hope to establish close relationships or with whom they have established a close relationship becomes important. Established relationships and their qualities differ according to developmental periods. During adolescence, the direction of relationships shifts from family to friends of both the same and opposite sex. Adolescence is generally a period when it is important to be accepted into the circle of friends and the influence of friendship is felt. It is a matter of curiosity how these relationships affect adolescents' life satisfaction. For this reason, this study aims to investigate the relationship between life satisfaction and relationship quality, considering that secondary school students' interaction with the opposite sex will increase with adolescence and that any problems that may exist may affect life satisfaction. The study group of the research; A total of 171 secondary school students, 101 girls and 70 boys, studying in the 9th, 10th and 11th grades in the 2018-2019 academic year in a high school located in Yıldırım District of Bursa Province, constitute adolescents. In accordance with the purpose of the study, data were collected with the Personal Information Form, the Life Satisfaction Scale developed by Diener (1985) and the Relationship Quality Scale developed by Pierce et al. (1991) and adapted by Özabacı (2007) , after prior parental information and informed consent . To analyze the data, t test was used with analysis of variance ( one way ANOVA) Pearson Product Moment Correlation technique, Regression analysis techniques were used. As a result of the research, it was seen that the participants' life satisfaction and relationship quality sub-dimensions (conflict, depth, social support) did not differ according to gender and grade level. While the relationship between life satisfaction and the conflict sub-dimension was not found to be significant, it was concluded that it had positive, low-level significant relationships with the social support and depth sub-dimensions. However, it was determined that relationship quality sub-dimensions (conflict, depth, social support) explained 5% of life satisfaction. The fact that relationship quality has little effect on life satisfaction suggests that there may be different variables that will affect adolescents' life satisfaction. Efforts to fulfill different developmental tasks such as preparation for higher education, identity acquisition, and relationships with family and teachers, where conflict is likely to occur more intensely, may also have an impact on life satisfaction. Therefore, it may be recommended to focus on different variables that may be related to life satisfaction in different studies.

**Key Words:** Secondary school students, relationship quality, life satisfaction, conflict, depth, social support.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## KUR'AN'DA GEÇEN HABERÎ SIFATLARIN TE'VİLİNDE ELMALILI'NİN YERİ THE PLACE OF ELMALILI IN THE ISSUE OF INTERPRETATION OF GOD'S KHABARI ATTRIBUTES MENTIONED IN THE QUR'AN

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*KSÜ İlahiyat Fak.*

### ÖZET

#### Amaçlar

Tebliğde, tefsir yanında kelimeler ve felsefedeki vukufiyetiyle de dikkat çeken Elmalılı Hamdi Yazır'ın Kur'an'da geçen haberî sıfatları açıklarken/tevilde derken ne gibi bir yöntem izlediğini açıklığa kavuşturmak ve ilim dünyasına katkılarını tespit etmektir.

#### Yöntemler

Bunun için haberî sıfatların geçtiği ayetlerin tefsiri/te'vili Elmalılı tefsirinden taranacak, metodik açıdan bunlar yorumlanacak ve Elmalılı'nın haberî sıfatları tevilde izlediği ilke, yol ve yöntemler tespit edilecektir.

Haberî sıfatlar, el, yüz, kadem parmak gibi naslarda geçen ancak akli deliller nedeniyle zahiri manalarıyla Allah Teâlâ'ya nispet edilemeyen sıfatlardır. Bu sıfatların anlaşılması, teşbihden ve nasları yanlış değerlendirmekten kaçınmak açısından önemlidir.

#### Sonuçlar

Elmalılı Kur'an üslubundaki i'câz ile bağdaşmayacak yorumları; temelsiz ve Batinî te'villeri reddeder; ama aynı zamanda Kur'an'daki lafızları Kur'an'daki anlamının dışında bir mana yüklü olarak tekrarlayan açıklamaları; lafzî yorumları da çürütür. Bu bağlamda, haberî sıfatları tevil eder. Bunu yaparken de ibarelerin dildeki farklı kullanımlarında taşıdıkları farklı manaları,

- İlgili ibarenin başka ayetlerdeki veya hadislerdeki kullanımlarından,

- Arap şairlerinin beyitlerinden,

- Araplar arasında kullanılagelen deyim ve atasözlerinden hareketle saptamaya yönelir. Tevilde, Akli, lügavî ve ilmî delilleri dayanır. Muhtemel manalardan ve yapılan tevillerden hangisinin daha doğru olduğunu belirlemeye çalışır. Bunun birlikte, tek anlama indirgemeci yaklaşımlardan da kaçınır; ayetlerin Allah'ın yüceliğine yaraşır mana zenginliğini göstererek muhtemel tevillerin Allah'ın yüceliğinin hangi yönlerine işaret ettiğini, başka bir ifadeyle Kur'an'ın üslubundaki hikmetleri ve icâzı göstermeye önem verir.

Elmalılı'nın tefsir yönteminde görülen önemli bir ilke de naslarda Allah'a izafe edildiği için haberî sıfatlar olarak nitelenen kelimeleri tek başına almanın doğru olmayacağını; bu kelimeleri cümle içinden sıyrıp hakikat veya mecaz olarak nitelenmek yerine içinde yer aldığı cümlenin bütün olarak verdiği mesajın anlaşılması gerektiğidir. Bu durumda "Allah'ın sağ elinden" söz edilmeyecek; "bi-yemîni-h" ibaresinin geçtiği ayette, evrendeki tüm olgu ve oluşların Allah'ın kudretine bağlı oluşunun belîğ ve parlak ifadesini olduğu görülecektir.

**Anahtar kelimeler:** Elmalılı, haberî sıfatlar, antropomorfizm, tesbih, tecsim, tenzih, te'vil, yöntem

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ABSTRACT

### Objectives

The aim of this presentation is to clarify the method followed by Elmalılı Hamdi Yazır, who is notable for his proficiency in exegesis as well as in theology and philosophy, when explaining/interpreting khabari attributes mentioned in the Qur'an, and to determine his contributions to the world of knowledge.

### Methods

For this purpose, the interpretation/exegesis of the all verses where the khabari attributes are mentioned will be examined from Elmalılı's exegesis. In term of methodology, these will be interpreted, and the principles, ways, and methods followed by Elmalılı in interpreting the khabari attributes will be determined.

Khabari attributes are attributes mentioned in the texts such as hand, face, foot, and finger in the Qur'an, but cannot be attributed to Allah Almighty with their literal meanings due to rational evidence. Understanding these attributes is important to avoid anthropomorphism and misinterpretation of the texts.

### Results

Elmalılı rejects interpretations that are inconsistent with the miraculous nature (i'jaz) of the Qur'an; baseless and heretic interpretations. On the other hand, he interprets the news attributes. In doing so, he aims to determine the different meanings of the metaphoric expressions through following ways:

- Investigation the different uses of them in the language.
- Analysis of the relevant expression in other verses or hadiths.
- Dissection the Arabic idioms, proverbs, and couplets in which the relevant expressions are mentioned.

In interpretation, Elmalılı relies on rational, linguistic, and scientific evidence. He tries to determine which of the possible meanings and interpretations is more accurate. However, he avoids reducing them to a single meaning; he emphasizes the wisdom and miraculous nature of the Qur'an by showing the richness of possible interpretations, indicating which aspects of Allah's exaltation the possible interpretations point to.

An important principle seen in Elmalılı's interpretation method is that taking the words, which are referred to Allah in the texts and categorized as khabari attributes, alone would not be correct because they are attributed to Allah out of their contexts in relavation. Instead of isolating these words from the sentence and categorizing them as reality or metaphor, one should understand the message conveyed by the entire sentence in which they are included.

**Keywords:** Elmalılı, khabari attributes, metaphor, anthropomorphism, to exalt Allah, interpretation, method.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## YUNUS EMRE'DE EKOLOJİK ANLAYIŞ ECOLOGICAL UNDERSTANDING IN YUNUS EMRE

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*KSÜ İlahiyat Fak.*

### ÖZET

#### Amaçlar

Tebliğde Yunus Emre'nin ekolojik yaklaşım ve çevre ahlakına temel oluşturan zihin şiirlerinden hareketle ortaya konacak; günümüz çevre sorunlarının çözümüne inanç ve teorik düzeyinde ne gibi katkıları olacağı değerlendirilecektir.

#### Yöntemler

yunus Emre'nin şiirleri taranarak doğa'daki varlıklara, hayata ve canlılara yaklaşımı tespit edilecek; bunlar, İslam medeniyetinde çevre ahlakına yön veren prensiplere karşılaştırılacak yorumlanacak ve değerlendirilecektir.

#### Sonuçlar

Yunus Emre'nin şiirlerinde de tabiat, hâl lisanyla Allah'ı anar ve insana onu tanıtır. İnsanoğlunun Yüce Allah'ı tefekkür ve tedebbür, zikir ve tesbihata iştirak eder. Varlıkların kendi dillerince Allah'ı zikretmeleri, tesbih ve takdis etmeleri, onun şiirlerindeki temel temalardan biridir.

Yunus Emre, "sevilelim, sevilelim..." derken sadece insanlara değil tabiatı da sevgiyle yaklaşmayı salık verir. O, "Çiçek eydür derviş baba / Annem babam topraktr." dizeleriyle, insan ile doğa arasındaki canlı ilişkiye dikkat çeker. Ancak, ona göre doğadaki sevgi ve aşk, Allah aşkından azade değildir. Aslında sevginin sahibi, el-Vedud olan yani seven ve sevilen Allah'tır. Doğa sevgisi, varlıklar arasındaki insicam ve aşk, Allah'ın el-Vedud isminin tecellisidir. Yunus Emre'nin aşağıdaki dizlerinde aşkın ilahî membana şöyle işaret edilmektedir:

"Bülbül âşık olmuş güle

Öter Allah deyu deyu"

Ekolojik yaklaşımın temeli, canı "can" bilmek, tabiatla hayatı zenginleştiren bir ilişki içinde olmaktır. Bunun için tüm varlıkları, ilahî hikmetin eserleri olarak görmek gerekir. Nitekim Yunus Emre de şöyle demektedir:

"Cümle yaradılmışa

Bir göz ile bakmayan

Halka müderris [hoca] ise

Hakîkatte âsidir."

Yunus Emre'nin şiirleri, temelinde tevhid inancının, iyilik ve salih amel kavramının, sevgi, şefkat ve merhamet duygularının bulunduğu bir ekolojik yaklaşım ve ahlaka kılavuzluk etmektedir. Onun yüzyıllar öncesinden gelen bu yaklaşımının, ekolojik düzenin bozulduğunu görünce başvurulan **dönemsel bir söylem** değil inanç ve değerler dünyasından kaynaklanan **evrensel bir bilgelik** olduğu açıktır.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

**ABSTRACT**

**Objectives**

In this paper, Yunus Emre's ecological approach and his ideas that form the basis of environmental ethics will be put forward through his poems; what kind of contributions he will make to the solution of today's environmental problems at the level of belief and theory will be evaluated.

**Methods**

Yunus Emre's poems will be scanned and his approach to beings, life and living things in nature will be determined; these will be interpreted and evaluated in comparison with the principles that guide environmental ethics in Islamic civilization.

**Results**

In Yunus Emre's poems, nature commemorates Allah within its own language and introduces Him to human beings. Nature participates in human beings' contemplation of Almighty Allah, dhikr and tasbih. One of the main themes of Yunus Emre's poetry is the remembrance, adoration and sanctification of Allah by the beings in their own language.

When Yunus Emre says "let us love, let us be loved...", he recommends approaching not only human beings but also all nature with love. He draws attention to the lively relationship between human beings and nature with the lines "The flower says dervish father / My mother and father are the earth."

According to him, love and affection in nature is not free from the love of God. In fact, the owner of love is Allah, who is al-Wadud, the one who loves and is loved. The love of nature, the harmony, tendency, and love between beings are the manifestation of Allah's name al-Wadud. In a poetry of Yunus Emre, the divine source of love is pointed out as follows:

"The nightingale is in love with the rose

It sings saying Allah Allah"

The basis of the ecological approach is to know the all living as "soul" and to have a life-enriching relationship with nature.

For this, it is necessary to see all beings as works of divine wisdom. As a matter of fact, Yunus Emre also states:

"A person who does not see all creation as equal,  
even if he is been seen a teacher of/by public, in truth he is a rebel."

Yunus Emre's poems guide an ecological approach and environmental ethics based on the belief in tawhid, the concept of goodness and righteous deeds, and feelings of love, compassion and mercy. His approach, which comes from centuries ago, is not a periodic discourse resorted to when the ecological order had deteriorated, but a universal wisdom stemming from his world of beliefs and values.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## 14-16 YAŞ KIZ VOLEYBOLCULARDA ALT EKSTREMİTEYE UYGULANAN 8 HAFTALIK ELASTİK BANTLARLA YAPILAN DİRENÇ EGZERSİZLERİNİN DİKEY SIÇRAMA VE SÜRAT PERFORMANSINA ETKİSİ

### THE EFFECT OF 8 WEEKS RESISTANCE EXERCISES WITH ELASTIC BANDS APPLIED TO THE LOWER EXTREMITY ON THE VERTICAL JUMP AND SPEED PERFORMANCE OF 14-16 YEARS OLD FEMALE VOLLEYBALL PLAYERS

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#### ÖZET

**Amaç:** Sıçrama yeteneği voleybolda başarı için kritik öneme sahiptir. Bu hücumda ve ayrıca savunmada rekabet avantajı sağlar. Dikey sıçramayı artırmada, alt vücut kuvvetini ve gücünü geliştirmek için genellikle yüklü sıçramalar kullanılır. Bunun, bacak ekstansörlerinin kuvvetini ve gücünü artırmada çok yararlı olduğu gösterilmiştir. Sonuç olarak, bu artışın kısmen dikey sıçrama yüksekliğinde bir iyileşmeye katkıda bulunduğu görülmektedir. Ancak küçük yaş grubundaki kız voleybolcularda alt ekstremiteye uygulanan 8 haftalık direnç egzersizlerinin dikey sıçrama ve sürat performansına etkisini inceleyen bir çalışmaya rastlanmamıştır. Bu yüzden bu çalışmanın amacı 14-16 yaş kız voleybolcularda alt ekstremiteye uygulanan 8 haftalık elastik bantlarla yapılan direnç egzersizlerinin dikey sıçrama ve sürat performansına etkisini araştırmaktır.

**Metot ve Yöntem:** Çalışmaya antrenman grubu(n=10)ve kontrol grubu(n=12)olmak üzere toplam 22 kız voleybolcu katıldı. Antrenman grubuna(n=10)elastik bantlarla desteklenmiş alt ekstremiteye uygulanan sürat, sıçrama, kuvvet çalışmalarını içeren 8 haftalık periozide edilmiş bir antrenman uygulanmıştır. Katılımcıların sırayla; antropometrik ölçümleri, dikey sıçrama ve sprint performans testleri alındı. Her test arasında bir dakikalık dinlenme verildi. Antrenman öncesi ve 8 hafta sonrası değerler karşılaştırıldı.

**Bulgular:** Antrenman grubunun ön test ve son test değerleri karşılaştırıldığında vücut ağırlığı  $58,75\pm 11,29$ -  $58,36\pm 8,35$  (\*p0,031) ve dikey sıçrama  $29,29\pm 4,55$ - $31,67\pm 5,24$ - (\*p0,000)- (\*p<0,05 anlamlılık düzeyi)parametresinde istatistiksel olarak anlamlı farklılık bulunurken 20m.sürat  $3,60\pm 0,20$ - $3,54\pm 0,24$  (\*p0,308)parametresinde istatistiksel olarak anlamlı farklılık bulunmadı. Kontrol grubunun ön test ve son test değerleri karşılaştırıldığında vücut ağırlığı  $58,37\pm 8,35$ - $57,48\pm 7,62$  (\*p0,003)ve 20m.sürat  $3,58\pm 0,30$ - $3,64\pm 0,29$ -(\*p0,002)parametresinde istatistiksel olarak anlamlı farklılık bulunurken dikey sıçrama  $31,37\pm 3,46$ - $31,35\pm 3,48$ -(\*p0,655)- (\*p<0,05 anlamlılık düzeyi)parametresinde istatistiksel olarak anlamlı farklılık bulunmadı. Gruplar arası fiziksel ve fizyolojik parametrelere ait ön-test ve son-test değerlerinde ise istatistiksel olarak anlamlı bir farklılık bulunmadı.

**Sonuçlar:** 8 hafta elastik bant ile yapılan direnç antrenmanlarının 14-16 yaş grubu kız voleybolcularda dikey sıçrama ve sürat performansında herhangi bir etkisi olmadığını söyleyebiliriz.

**Anahtar Kelimeler:** Dikey sıçrama, kadın sporcu, sprint, voleybol

#### ABSTRACT

**Purpose:** Jumping ability is critical to success in volleyball. This provides a competitive advantage offensively and also defensively. Loaded jumps are often used to increase vertical jump and improve lower body strength and power. This has been shown to be very useful in increasing the strength and power of the leg extensors. Conclusion As a result, it seems that this increase partially contributes to an improvement in vertical jump height. However, no study has been found examining the effect of 8-week resistance exercises applied to the lower extremities on vertical jump and speed performance in girls

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

volleyball players aged 14-16 years. To investigate the effect of 8-week resistance exercises with elastic bands applied to the extremities on vertical jump and speed performance.

**Method and Method:** A total of 22 female volleyball players, including the training group (n = 10) and the control group (n = 12), participated in the study. The training group (n = 10) participated in an 8-week training program that included speed, jumping and strength exercises applied to the lower extremities supported by elastic bands. A periodized training was applied. Anthropometric measurements, vertical jump and sprint performance tests were taken from the participants, respectively. A one-minute rest was given between each test. Pre-training and 8-week post-training values were compared.

**Results:** When the pre-test and post-test values of the training group were compared, body weight was  $58.75 \pm 11.29$ -  $58.36 \pm 8.35$  (\*p0.031) and vertical jump was  $29.29 \pm 4.55$ - $31.67 \pm 5$ . While there was a statistically significant difference in the .24- (\*p0.000)-(\*p<0.05 significance level) parameter, the 20m.speed parameter was  $3.60 \pm 0.20$ - $3.54 \pm 0.24$  (\*p0.308). No statistically significant difference was found. When the pre-test and post-test values of the control group were compared, body weight was  $58.37 \pm 8.35$ - $57.48 \pm 7.62$  (\*p0.003) and 20m. speed was  $3.58 \pm 0.30$ - While there was a statistically significant difference in the parameter  $3.64 \pm 0.29$ -(\*p0.002), the vertical jump was  $31.37 \pm 3.46$ - $31.35 \pm 3.48$ -(\*p0.655)-(\*p<0 No statistically significant difference was found in the parameter (0.05 significance level). No statistically significant difference was found in the pre-test and post-test values of physical and physiological parameters between the groups.

**Results:** We can say that 8 weeks of resistance training with elastic band has no effect on the vertical jump and speed performance of female volleyball players in the 14-16 age group.

**Key Words:** Vertical jump, female athlete, sprint, volleyball.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## İSLAM'IN EKOLOJİK FARKINDALIĞI: DİN EĞİTİMİNİN ROLÜ VE SORUMLULUĞU

### ISLAM'S ECOLOGICAL AWARENESS: THE ROLE AND RESPONSIBILITY OF RELIGIOUS EDUCATION

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#### ÖZET

Çevresel sorunlar, insanlığın karşı karşıya olduğu büyük bir tehdit haline gelmiştir. Doğal kaynakların tükenmesi, çevre kirliliği ve iklim değişikliği gibi sorunlar, sürdürülebilir bir geleceği tehlikeye atmakta ve gelecek kuşakların yaşamını ciddi şekilde etkilemektedir. İslam dini, çevre bilinci oluşturma ve doğanın korunması konularında ilkel öğretilere sahiptir. Bu bildiri, İslam dininin çevre sorunlarına yaklaşımını ve din eğitiminin çevre bilinci oluşturmada oynadığı rolü ele almaktadır.

İslam, doğanın yaratılışının Allah'ın büyüklüğünü gösterdiği ve insanların bu doğayı koruma sorumluluğunu taşıdığını öğretir. Kur'an-ı Kerim ve Hadislerde doğanın kutsallığına ve doğanın bir emanet olduğuna vurgu yapılır. İslam, insanlara doğayı koruma ve sürdürülebilirlik ilkelerini benimseme çağrısı yapar.

Kur'an-ı Kerim, çevre ve doğanın korunmasına dikkat çeken birçok ayet içermektedir. Örneğin, “*Yeri de yadık, ona sabit dağlar yerleştirdik ve orada ölçülü (bir biçimde) her şeyi bitirdik.*” (Hicr 15/19) ayetiyle ekosistemin Allah tarafından bir denge ile oluşturulduğu belirtilirken “*Göğü Allah yükseltti ve mizanı (dengeyi) koydu. Sakın dengeyi bozmayın*” (Rahman 55/7-8) ayetiyle de bu sistemin bozulmaması gerektiği vurgulanmıştır. Hz. Muhammed'in hadisleri de çevre bilinci konusunda yol gösterici niteliktedir. Örneğin, “*Yarın kıyametin kopacağını bilseniz bile, bugün elinizdeki fidanı dikin!*” (Buharî, el-Edebül-Müfred s. 168) şeklindeki hadis, ağaç dikmenin ve doğayı korumanın ne kadar önemli olduğunu gösterir.

İslam dininin çevreye karşı farkındalık yaratma konusundaki öğretileri takip edilerek, çevremizi korumak, doğal kaynakları sürdürülebilir bir şekilde kullanmak ve dünyayı daha güzel ve yaşanılır bir yer haline getirmek için önemli bir rol oynanabilir. İslam, doğayı yok etmekten kaçınmayı, suyun israfını önlemeyi ve hayvanlara merhametli davranmayı emreder. Bu değerler, din eğitimi aracılığıyla yeni nesillere aktarılabilir. Din eğitimi, Müslüman bireylerin çevre sorunlarına karşı bilinçlenmesini ve çevre dostu davranışları benimsemesini sağlar. İslam, toplumda çevresel farkındalığı artırırken, aynı zamanda doğal dünya ile uyumlu bir insanlığın gerçekleşmesi için de sağlam bir çerçeve oluşturur.

Din eğitimi, toplumun her kesimine ulaşma potansiyeline sahiptir, zira örgün din eğitimi kurumlarıyla birlikte yaygın din eğitimi araçları da kullanılarak bu öğretiler daha geniş bir kitleye ulaştırılabilir. İslam'ın çevre koruma öğretileri ve doğanın kutsallığına vurgusu, sadece okul sıralarında değil, aynı zamanda camilerde, seminerlerde, televizyon programlarında ve diğer toplumsal platformlarda da aktarılabilir. Bu, din eğitiminin güçlü bir araç olduğunu gösterir ve toplumun her kesiminin çevre bilinci oluşmasına katkı sunabilir. Bu sayede, çevre koruma değerleri toplumun geneline yayılarak daha sürdürülebilir bir gelecek için temel bir bilinç oluşturabilir.

**Anahtar Kelimeler:** İslam, çevre, din eğitimi.

#### ABSTRACT

Environmental problems have become a major threat facing humanity. Problems such as depletion of natural resources, environmental pollution and climate change jeopardise a sustainable future and seriously affect the lives of future generations. Islam has principled teachings on environmental

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

awareness and protection of nature. This paper deals with the approach of Islam to environmental problems and the role of religious education in raising environmental awareness.

Islam teaches that the creation of nature shows the greatness of Allah and that people have the responsibility to protect this nature. The Holy Quran and Hadiths emphasise the sanctity of nature and that nature is a trust. Islam calls on people to protect nature and adopt the principles of sustainability.

The Holy Qur'an contains many verses that draw attention to the protection of the environment and nature. For example, the verse "*And We have spread the earth, and placed in it firm mountains, and therein We have planted everything in measure*" (Hijr 15/19) states that the ecosystem was created by Allah with a balance, while the verse "*Allah raised the sky and set the balance. Do not disturb the balance*" (Rahman 55/7-8), emphasising that this system should not be disturbed. The hadiths of the Prophet Muhammad are also instructive about environmental awareness. For example, the hadith, "*Even if you know that doomsday will come tomorrow, plant the sapling you have today!*" (Bukhari, al-Adeb al-Mufred p. 168) shows how important it is to plant trees and protect nature.

By following the teachings of Islam in raising awareness about the environment, we can play an important role in protecting our environment, using natural resources in a sustainable way and making the world a more beautiful and livable place. Islam enjoins us to avoid destroying nature, avoid wasting water and treat animals with compassion. These values can be transmitted to new generations through religious education. Religious education helps Muslim individuals to become aware of environmental problems and adopt environmentally friendly behaviours. While raising environmental awareness in society, Islam also creates a solid framework for the realisation of a humanity in harmony with the natural world.

Religious education has the potential to reach out to all segments of society, as these teachings can be disseminated to a wider audience by using non-formal religious education tools in addition to formal religious education institutions. Islam's teachings on environmental protection and its emphasis on the sanctity of nature can be conveyed not only in the school classroom, but also in mosques, seminars, television programmes and other public fora. This shows that religious education is a powerful tool and can contribute to raising environmental awareness among all segments of society. In this way, environmental protection values can spread throughout the society and create a basic awareness for a more sustainable future.

**Keywords:** Islam, environment, religious education.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ÂMÂL MESLÛSÎ'NİN “(NACİ EN PALASTİNA (NACİ VE FİLİSTİN)” VE YASMİN LEVY'NİN “NACİ EN ALAMO” ŞARKILARINDA FİLİSTİN PALESTINE IN ÂMÂL MESLÛSÎ'S "(NACİ EN PALASTİNA (NACİ AND PALESTINE))" AND YASMIN LEVY'S "NACİ EN ALAMO" SONGS

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### ÖZET

Dünya medeniyetinin oluşumunda sanat önemli bir yere sahiptir. Sanatçılar dünyayı daha güzel yaşanabilir bir yer yapmak için uğraşırlar. Bunlar toplum için sanat yapanlardır. Ayrıca sanat için sanat yapanlarda vardır. Buda sanatın önemini anlamak açısından önemlidir. Çünkü sanat farklı amaçlarla yapılmaktadır. Ele aldığımız Âmâl Meslûsî'nin (Naci En Palastina (Naci ve Filistin) ve Yasmin Levy'Nin Naci En Alamo Şarkıları toplum için sanat gurubuna girer. Âmâl Meslûsî aslen Filistinli olup kendi ülkesinin mazlumiyetini şarkılarında seslendirirken; Türkiye Manisa doğumlu Yasmin Levy ise şarkılarında Yahudilerin gidecek vatanlarının olmadığından bahsederek bir yerde Yahudi toplumunun mazlumiyetini ortaya koymaya çalışır. Ancak Yasmin Levy “Naci En Alamo” şarkısını Âmâl Meslûsî'nin “(Naci En Palastina (Naci ve Filistin))” e karşı yazmış gibidir. Burada önemli olan tarih boyunca Yahudilerin ezilmiş ve gidecek yerlerinin olmadığı temasıdır. Ancak Âmâl Meslûsî ise Yahudilerin ezilmişliklerini, kurbanlıklarını Filistinlere yaşatarak Filistinlileri kurbanların kurbanları haline getirdiğinden bahsetmektedir. Yani Yahudilerin mazlum olması Filistinlilere yapılanları haklı çıkarmamaktadır. Kudüs üç büyük tek Tanrılı dinlerin genel merkezidir. Tek tanrılı dinlerin barışı vazettiği düşünülürse barışın olması gereklidir. Ama insanoğlu dinleride farklı yorumlayarak kendi çıkarları doğrultusunda kullanmaktadır. Haçlı seferleri bunun en büyük örneklerindedir. Siyasetin savaşa evrildiği Filistin'de sanatçıların iki tarafın mazlumiyetini vurgulamaya çalışması anlamlıdır. Buradan çıkarılacak sonuç sanatın barışı isterken ve bu doğrultuda çalışma yaparken siyasetin siyasetçileri barışı değil savaşı körüklemesidir. İsrailin şiddeti tercih etmesi noktasında Filistin'in kendini savunmak dışında başka çareside yoktur.

**Anahtar Kelimeler:**Âmâl Meslûsî, Naci En Palastina (Naci ve Filistin), Yasmin Levy, “Naci En Alamo”, Filistin

### ABSTRACT

Art has an important place in the formation of world civilization. Artists strive to make the world a more beautiful and livable place. These are the ones who make art for society. There are also those who make art for art's sake. This is important in terms of understanding the importance of art. Because art is made for different purposes. The songs we have discussed, Âmâl Meslûsî's (Naci En Palastina (Naci and Palestine)) and Yasmin Levy's Naci En Alamo, belong to the group of arts for the society. While Âmâl Meslûsî is originally from Palestine and sings about the oppression of her own country in her songs, Yasmin Levy, born in Manisa, Turkey, sings about the Jews' demise. In one place, she tries to reveal the oppressedness of the Jewish community by mentioning that they have no homeland. However, Yasmin Levy seems to have written the song "Naci En Alamo" against Âmâl Meslûsî's "(Naci En Palastina (Naci and Palestine))". What is important here is that throughout history, the Jews have been oppressed and will go This is the theme that they have no place. However, Amal Meslusi mentions that the Jews inflict their oppression and sacrifice on the Palestinians, making the Palestinians the victims of the victims. In other words, the fact that the Jews are oppressed does not justify what was done to the Palestinians. Jerusalem is the headquarters of the three major monotheistic religions. Considering that monotheistic religions preach peace, there must be peace. But human beings also interpret religions differently and use them for their own interests. The Crusades are the biggest examples of this. It is meaningful that

artists try to emphasize the oppression of both sides in Palestine, where politics has evolved into war. The conclusion to be drawn from here is that while art desires peace and works in this direction, the politicians of politics encourage war, not peace. If Israel chooses violence, Palestine has no choice but to defend itself.

**Key Words:** Âmâl Meslusî, Naci En Palastina (Naci and Palestine), Yasmin Levy, "Naci En Alamo", Palestine

## GİRİŞ

Her zaman olduğu gibi sanatçılar dünyayı santlarıyla genelde güzelleştirmeye çalışırlar. Bunu yaparken de kırmadan incitmeden yapmaya çalışırlar. İşte bu sanatçılardan ikisi Filistinli Âmâl Meslûsî'nin (Emel Mathlouthi) ve Türkiye Manisalı İsraili Yasmin Levy'dir.

Âmâl Meslûsî (Emel Mathlouthi) ( Arapça : امل المثلوثي ), 11 Ocak 1982 doğumlu, Tunuslu şarkıcı-söz yazarı, müzisyen, aranjör ve yapımcıdır. Tunus Devrimi ve Arap Baharı'nın marşı haline gelen protesto şarkısı " Kelimeti Hurra " ("Sözüm Özgürdür") ile üne kavuştu . Yine Kelimeti Hurra adını taşıyan ilk stüdyo albümü 2012 yılında dünya çapında yayınlandı ve büyük beğeni topladı: Arap kökenlerini batı etkisiyle birleştirdi. Elektronik ile klasik müziği harmanladığı ikinci albümü Ensen'i 2017 yılında çıkardı. 2019'da Baktığımız Her Yer Yanıyordu , şarkının tüm sözlerini İngilizce söyledi.

2020 yılında Tunus Arapçasında söylediği "Hulm" ("Bir Rüya") şarkısının videosu birkaç ay içinde birkaç milyon kez izlendi. Sadece ses, tek enstrüman olarak akustik gitar ve dizüstü bilgisayar ile kaydettiği The Tunis Diaries adlı ikili albümde "Hulm/Holm" da yer aldı . Hulm, müziği Anoushiravan Rohani'ye ve sözleri Mohammad Ali Shiraz'a ait olan İran şarkısı "Soltane Ghalbhaa"nın Arapça yeniden yapıdır .

Ayrıca Tricky , Valgeir Sigurðsson , Steve Moore ve Vitalic gibi diğer sanatçılarla da işbirliği yaptı .

Emel Mathlouthi, memleketi Tunus'un bir banliyösünde 8 yaşında şarkı söylemeye ve oyunculuğa başladı. İlk şarkısını 10 yaşındayken yazdı. Güçlü vokal kapasitesini 15 yaşındayken, çevresinin teşvikiyle ve 90'ların büyük pop şarkıcılarından ilham alarak keşfetti. Bir süre sonra ağır metale ve gotik müziğe güçlü bir sığınak buldu ve 19 yaşındayken Tunus'taki bir üniversitede ilk metal grubunu kurdu. Birkaç yıl sonra , grup arkadaşı " The The" şarkısını çaldıktan sonra Joan Baez'in sesinden ve fikirlerinden derinden etkilendi. Onun için gruptan ayrıldı ve siyasi şarkılar yazmaya başladı, fırsatların yetersizliğinden ve yurttaşlarının ilgisizliğinden duyduğu hayal kırıklığını keşfetti, örneğin "Ya Tounes Ya Meskina"/ Ya Tunus ya Miskina ("Zavallı Tunus"). 2006'da Prix RMC Moyen-Orient Musique yarışmasında finalist oldu. 2008 yılında Tunus hükümetinin şarkılarını radyo ve televizyonda yasaklaması üzerine Paris, Fransa'ya taşınmaya karar verdi. Tunus yayınlarında yasaklanmış olmasına rağmen, canlı performanslarının kopyaları Fransa, Tunus'ta internette dolaştı. Mohamed Bouazizi'nin ölümünden sonra Joan Baez'in " Here's To You " şarkısının Arapça versiyonunu ona ithaf etti.

2011'in başlarında, Habib Bourguiba Bulvarı'nda protestoculara "Kelmti Horra" şarkısını söylerken kaydedildi ve viral bir video haline geldi. Kelmti Horra (Sözüm Özgür ) ( 2012–2016 )

Emel Mathlouthi ilk albümü Kelmti Horra'yı Ocak 2012'de yayınladı. Eleştirel beğeni topladı. The Guardian, beş üzerinden dört yıldızlı incelemesinde, Arap kökenlerini batı tatlarıyla (biraz rock ama çoğunlukla derin trip-hop) bir araya getirdiği için albümü övdü. "Karışım, Mathlouthi'nin çarpıcı vokallerinin en fazla melodiyi bulduğu öne çıkan "Dhalem" ve "Ma Ikit"te iyi çalışıyor; diğer yerlerde ise anlaşılır derecede ciddi protesto ve üzüntü havası biraz düzleşiyor. Yine de güçlü, yeni bir ses". Albüm Joan Baez, Massive Attack ve Björk'ten etkilendi.. Albümdeki şarkılar, politik bilinci olan bir müzisyen olarak Emel'in, çok sevdiği Tunus'ta tanık olduğu her türlü haksızlığı dile getirme görevini üstlendi. İnsanlığı ve daha iyi bir dünyayı anlatan şarkılar söylerken, bu albümün başarısı onun dünyanın farklı yerlerinde çok daha fazla insana ulaşmasını sağladı. Mısır ve Irak'ta konserler verdi, Kanada'da Vancouver Halk Müziği Festivali ve Festival du Monde Arabe de Montréal'de sahne aldı .

Temmuz 2012 başında Irak'ın Bağdat kentinde çığır açan bir konser verdi. 28 Temmuz'da Belçika'daki Sfinks Festivali'nde bir konser verdi ve burada Leonard Cohen'in " Hallelujah " şarkısını cover'laması

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

ayakta alkışlandı . 2013 yılında, devrimden bu yana Kahire'de verdiği ilk konserin ardından Ahram Online onu " neslinin Fairuz'u " olarak tanımladı. Lyon'daki Les nuits de Fourvière festivalinde Dead Can Dance'in açılışını yaptı ve Birleşik Krallık'ın Charlton Parkin'deki WOMAD Festivalinde sahne aldı. İsrail yetkilileri gösteri yapmak için Ramallah'a girmesine izin vermedi, bu yüzden Ürdün'de bir kamera önünde şarkı söyledi. Küçük gösterisi Ramallah'taki bir tiyatro salonunda Filistinli izleyicilere yayınlandı.

"Kelmti Horra" (Sözüm Özgür) şarkısı "Arap Baharı'nın marşı" olarak değerlendirildiğinden Emel'in bugüne kadar en çok bilinen şarkısı oldu. Bu şarkının olağanüstü başarısı, onu 11 Aralık 2015'te, Oslo'da Tunus Ulusal Diyalog Dörtlüsü'ne verilen 2015 Nobel Barış Ödülü'nün ödül töreninde seslendirmesine yol açtı. Nobel Barış Ödülü Töreninde "Kelmti Horra" adlı şarkısının iki yorumunu, biri sadece gitarist Karim Attoumane eşliğinde, diğeri ise tam orkestra ve koro eşliğinde seslendirdi. Konserin sunuculuğunu Jay Leno yaptı ve konser basın toplantısında dikkatini çeken ilk Arapça şarkıcı olarak onu övdü.

Bu süre zarfında Tricky ile işbirliği yaptı ve "Emel" şarkısında baş vokallik yaptı. Ensen ( İnsan ) Şubat 2017'de Partisan Records tarafından piyasaya sürüldü . Albüm İzlanda , İsveç, Fransa ve ABD'nin de aralarında bulunduğu yedi ülkede kaydedildi. Albümün yapımcıları arasında Björk'ün eski işbirlikçisi, İzlandalı yapımcı Valgeir Sigurðsson ve Emel'in ana işbirlikçisi Fransız-Tunuslu yapımcı Amine Metani yer alıyor. Dirgen albümün ilk single'ı "Ensen Dhaif"i (Human, Helpless Human) "yüksek ritimler ve koyu gölgeli Arap minör tonlarının muhteşem bir şekilde süslenmiş bir birleşimi" olarak selamlandı. Bu kışkırtıcı tonu, Mathlouthi'nin sırayla çalan galvanik savunmasız ve güçlü sesi tarafından yönetiliyor. "Ensen Dhaif"te uzlaşmayı reddeden bir kişiyi, gerçek riskler ve gerçeğin gerekliliği üzerine kurulu yakıcı bir vizyonu duyuyorsunuz." Mathlouthi'nin açıkladığı gibi, şarkı "çok küçük bir yüzdeliğin gücün tadını çıkarabilmesi için ağırlığı ve tüm mücadeleleri taşımak zorunda olan insanlara" ithaf edilmiştir. Daha sonra Ensen'in şarkıları remix albümü Ensenity'de tamamen yeniden düzenlendi. Parçaların elektronika tarafını vurgulamak için farklı geçmişlerden dokuz farklı yapımcı davet edildi.

2019 yılında tamamı İngilizce olan ilk albümü Everywhere We Looked Was Burning'i /Baktığımız Her Yer Yanıyordu ( 2019 ) çıkardı, "bu mücadelesinin yanı sıra doğa hakkında da yazmak" istiyordu. TS Eliot ve John Ashbury gibi ABD'li şairlerin "temel imgelerinden" ilham aldı. O sırada birkaç yıldır New York bölgesinde yaşıyordu. New York Times bunu şöyle değerlendirdi; "Gizemli bir deneyim hakkında şarkı söylerken, sürekli, modal melodi ve drone armonisinin uzantıları, Kuzey Afrika ve Arap temellerini ima ederken, elektrikli ve elektronik enstrümanları sanal alanda titreşip gezinerek gizemi sürdürüyor". Brooklyn Veganı "Bunlar gerçekten onun şimdiye kadarki en nefes kesici şarkılarından bazıları" diye yazdı. Baktığımız Her Yer Yanıyordu filmin yapımcılığını kısmen Steve Moore üstlendi .

Emel o yıl Moore'un Beloved Exile EP'sinde de şarkı söyledi. AllMusic, performansını şöyle değerlendirdi: "Açılış şarkısı 'Your Nöbetçileriniz Güçle Karşılacak', Moore'un ışıltılı, titreşen elektroniklerine muhteşem yeni bir boyut katan Tunuslu şarkıcı Emel Mathlouthi'nin büyüleyici vokallerini içeriyor".

2017 yılında, prestijli Kartaca Festivali'nin başrolünde yer alarak beş yıl aradan sonra ilk konseri için Tunus'a döndü. O yaz ayrıca Lübnan'daki Beitaddine Festivali'nde ve New York City Central Park'taki SummerStage festivalinde sahne aldı.

2020 yılında Tunus'ta çocukluğunun geçtiği evde tatildayken, sadece akustik gitar ve kendi sesiyle tek başına The Tunis Diaries / Tunus Günlükleri ( 2020- günümüz ) adlı çift albüm kaydetti. Uzun zamandır akustik gitar çalmamıştı. Tunus Günlükleri "Gündüz" ve "Gece" olmak üzere iki kısma ayrılmıştır. İlk disk, kısmen İngilizce ve Tunusça olarak yeniden söylenen Emel şarkılarını ve ayrıca Ocak 2021 itibarıyla YouTube'da 3,5 milyondan fazla izlenen, yayınlanmamış "Holm" şarkısını içeriyor. İkinci diskte birkaç cover yer alıyor . Leonard Cohen , David Bowie ve Jeff Buckley'den. Albümün Paris'te tanıtımını yaparken, Fransız Televizyonu için bir defaya mahsus olarak bir Siouxsie and the Banshees şarkısının yorumunu kaydetti .

2021'de, 2019 albümünün canlı versiyonu olan Everywhere We Looked Was Burning Live'ı çıkardı . Eylül ayında, Paris'te Théâtre du Châtelet'te gerçekleşen tek seferlik bir konser için elektronik müzik



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

yapımcısı Vitalic ile işbirliği yaptı: Variations adlı bir etkinlik için birlikte Ghada Al-Samman'ın şiiri etrafında yeni bir müzik yarattılar . Gösteri Culturebox kanalı için çekildi ve YouTube'a yüklendi. Kasım ve Aralık aylarında Japonya'ya gezdi. İlk albümü Kelmti Horra, 10. yıl dönümünü kutlamak için 2022'de ilk kez plak formatında yayınlandı. CD'de de yayınlanan yeniden basım bonus parçalar içeriyordu.

İşgal ve Normalleşmeyi Çevreleyen Tartışmaların Ortasında 2023 Temmuz'da Filistin'e Ziyaret eden Emel Mathlouthi, İsrail'in ilhak ettiği Doğu Kudüs'ün yanı sıra İsrail işgali altındaki Batı Şeria'da Beytüllahim ve Ramallah'ta şarkılarını seslendirdi. Tunus BDS hareketi tarafından İsrail işgalini normalleştirmekle suçlandı. Sonuç olarak Hammamet festivali, Tunus'taki konserini kendisine haber vermeden iptal etti. Mathlouthi Instagram hesabından yaptığı açıklamada, konserlerinin ne BDS yönergeleriyle ne de İsrail'e Akademik ve Kültürel Boykot için Filistin Kampanyası'nın yönergeleriyle "çelişmediğini" söyledi. Mathlouthi'yi performans sergilemeye davet eden Birzeit Üniversitesi Edward Said Ulusal Müzik Konservatuvarı'nın genel müdürü Suhail Khoury, "Yaptıkları nedeniyle kınanmak değil, övülmeli... Olağanüstüydü, muhtemelen şimdiye kadarki en iyi performanslardan biriydi" dedi. Filistin bunu hiç görmedi."

Albümleri

2012. Kelmti Horra

2017. Ensen

2018. Ensenity (Remix Albümü)

2019. Baktığımız Her Yer Yanıyordu

2020. Tunus Günlükleri

## **Katkıda Buldukları**

2013. Arap Devriminin Kaba Rehberi ( Dünya Müzik Ağı )

2016. "Şimdi Bağımsız Arabistan" ( Evrensel Müzik Grubu )

2017. "Philia: Sanatçılar İslamofobiye Karşı Yükseliyor" (Floating House Kayıtları)

Âmâl Meslûsî'nin "(Naci En Palastina (Naci ve Filistin)'in Şarkı Sözleri  
Yerim yok

Ve ükem yok

Benim Anavatanım yok

Parmaklarımla ateşler yakıyorum

Sana şarkılar söylüyorum kalbimle

Yürek telim ağlıyor

Ben Filistin'de doğdum

Ben Filistin'de doğdum

Yerim yok

Ve ülkem yok

Benim anavatanım yok

Yerimde yok

Zamanım da yok

Yurdum da yok

Ellerimle alevler yakıyorum

Kırık kalbimden



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Senin için yaralı bir tını çalıyorum

Filistin'de doğdum

Filistin'de doğdum

Yerimde yok

Zamanım da yok

Yurdum da yok

Filistin'de doğdum

Filistin'de doğdum

Tarihim silinmeyecek

İspanyolca, Arapça

Orijinal şarkı sözleri

Nací en Palestina

No tengo lugar

y no tengo paisaje

yo menos tengo patria

con mis dedos hago el fuego

y con mi corazón te canto

las cuerdas de mi corazón lloran.

Nací en Palestina

nací en Palestina

No tengo lugar

y no tengo paisaje

yo menos tengo patria.

ما عندي مكان

و ما عنديش زمان

و ما عنديش بلاد

من يدنيا نصنع نار

من قلبي البلار

نجرحلك وتر حزين

مولود في فلسطين

مولود في فلسطين

ما عندي مكان

و ما عنديش زمان

و ما عنديش بلاد

مولود في فلسطين

مولود في فلسطين

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

تاريخي عمرو ما يتمحي

Yasmin Levy 1975 doğumlu 47 yaşındadır. 2005 yılında evlenip Michael Amir adında bir çocuğu dünyaya gelmiştir. Yasmin Levi (İbrani: יסמין לוי, d. 23 Aralık, 1975, Kudüs) Yahudi-İspanyol müziğiyle ilgilenen İsraili şarkıcı ve söz yazarıdır.

Levi, Sefarad Yahudilerindendi. Ailesi Türkiye'den göçmeniydi. Manisa doğumlu babası Yitzhak Isaac Levy, bestekar ve kantordu. Ladino müziğinin tarihi, İspanyol Yahudilerinin kültürü ve diasporası konularında öncü bir araştırmacıydı. Aynı zamanda da Ladino lisanında yayımlanan Aki Yerushalayim dergisinin editörüydü. Annesi Kohava Levy, Sefarad şarkılarıyla tanınan bir şarkıcıydı.

Kendine özgü ve duygusal tarzıyla Levi, Endülüs flamenkosu ve geleneksel Türk müziğinin daha "modern" tınlarını bir araya getirdi. Bunun yanında darbuka, ud, keman, çello ve piyano gibi enstrümanları birleştirerek Orta Çağ Yahudi-İspanyol (Ladino) şarkılarına yeni bir yorum getirdi.

İlk albümü 2000 yılında Romance & Yasmin ile fRoots / BBC Radio 3 World Music Awards 2005'te "En İyi Çıkış Yapan Sanatçı" dalında aday gösterildi. 2005 yılında ikinci albümü La Judería ile devam etti. 2006 yılında "Kültür Geçişi" kategorisinde tekrar aday gösterildi. 2007'de Mano Suave albümünü yayınladı ve diğer yıllarda çeşitli albümler çıkarmayı sürdürdü.

2004. Romance & Yasmin

2005. La Judería

2006. Live at the Tower of David, Jerusalem

2007. Mano Suave

2009. Sentir

2012. Libertad

2014. Tango

2017. Rak Od Layla Echad

2021. Voice & Piano

İstanbul'da konser veren Yasmin Levy, Sela okumasıyla da gündeme geldi.

## YASMIN LEVY'NİN "NACİ EN ALAMO" ADLI ŞARKISI

### İspanyolca

Nací en Alamo

No tengo lugar y no tengo paisaje

yo menos tengo patria.

Con mis dedos hago el fuego

y con mi corazón te canto

las cuerdas de mi corazón lloran

nací en alamo, nació en alamo.

No tengo lugar y no tengo paisaje

yo menos tengo patria.

Con mis dedos hago el fuego

y con mi corazón te canto

las cuerdas de mi corazón lloran

nací en alamo, nació en alamo.

No tengo lugar y no tengo paisaje  
yo menos tengo patria  
nací en alamo, nací en alamo.

No tengo lugar y no tengo paisaje  
yo menos tengo patria.

Con mis dedos hago el fuego  
y con mi corazón te canto  
las cuerdas de mi corazón lloran  
nací en alamo, nací en alamo.

Nací en alamo, nací en alamo.

No tengo lugar y no tengo paisaje  
yo menos tengo patria.

Nací en alamo, nací en alamo.

No tengo lugar y no tengo paisaje  
yo menos tengo patria.

#### **Naci en Alamo**

#### **Çevirisi**

Alamoda doğdum

Adsız yerlerden geldim toprağım yok  
anavatanım yok.

Ateşler yakıyorum parmaklarımda  
sana şarkılar söylüyorum kalbimle  
yürek telim gönül yakıyor

alamoda doğdum, alamoda doğdum

Adsız yerlerden geldim toprağım yok  
anavatanım yok.

Ateşler yakıyorum parmaklarımda  
sana şarkılar söylüyorum kalbimle  
yürek telim gönül yakıyor  
alamoda doğdum, alamoda doğdum.

Adsız yerlerden geldim toprağım yok  
anavatanım yok

alamoda doğdum, alamoda doğdum.

Adsız yerlerden geldim toprağım yok  
anavatanım yok.

Ateşler yakıyorum parmaklarımda

sana şarkılar söylüyorum kalbimle  
yürek telim gönül yakıyor  
alamoda doğdum, alamoda doğdum.  
Alamoda doğdum, alamoda doğdum.  
Adsız yerlerden geldim toprağım yok  
anavatanım yok.  
Alamoda doğdum, alamoda doğdum.  
Adsız yerlerden geldim toprağım yok  
anavatanım yok.

### SONUÇ

İki sanatçının şarkılarına baktığımızda yoğun bir lirik ve duygusallık hemen göze çarpmaktadır. İki sanatçıda iki halkın mazlum olduğunu şarkılarıyla ispatlamaya çalışmaktadır. Yasmin Levy'in şarkı sözlerinin Âmâl Meslûsî'nin "(Naci En Palastina (Naci ve Filistin) ile benzerliğide dikkat çekicidir. Özellikle gidecek vatanlarının olmayışı noktasında. Âmâl Meslûsî "Benim Anavatanım yok" nakaratını kullanırken; Yasmin Levy "Vatanım yok" nakaratını kullanmaktadır. Uluslararası toplum Filistin trajedisinin barışla evrilmesini beklemektedir. Bu iki sanatçının yoğun duygu sözlerinden anladığımız barışı yine sanatçıların yoğuracağı ve siyasetçilerin eyleme döküp kesinleştireceğidir.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## NECİP TOSUN'UN DÜNYA ROMANININ SERÜVENİ KİTABINDA NECİP MAHFUZ NECIP MAHFUZ IN THE ADVENTURE OF THE WORLD NOVEL BY NECIP TOSUN

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### ÖZET

İnsanoğlu yaratılışından bugüne iyilerle kötülerin savaşına sahne olmuştur. Dünya medeniyetinin gelişmesini de genelde iyi insanlara borçluyuz denebilir. İnsanoğlu bu gelişimini sürdürürken bildiği alanların dışında bilmediği alanlara da girmeye heves etmiştir. Halbuki insanlar bildiklerini yapsalar daha doğru sonuçlar ortaya çıkacaktır. Bildiklerini yapıp dünya medeniyetine katkı sağlayanlardan biri de Türkiye’li yazar ve öykücü Necip Tosun’dur. Necip Tosun “Dünya Romanın Serüveni” adlı kitabında kırk dünya romancısını inceleyerek Türkiye’de önemli bir boşluğu doldurmuştur. Ancak Necip Tosun bu incelemeyi yaparken İslam dünyasında ilk Nobel edebiyat ödülü alan Necip Mahfuz’un eserlerini yanlış vermiştir. Yazarın Midak Sokağı adlı eseri Türkçe’ye üç farklı adla ara dil İngilizce’de Türkçe’ye çevrilmiştir. Necip Tosun bunu bilmediğinden olsa gerek bu üç çeviriyi Necip Mahfuz’un farklı romanları zannetmiştir. Halbuki basitçe Wikipedi veya başka kaynaklara bakılsa Necip Mahfuz’un bu adlarla romanlarının olmadığı görülecektir. Necip Tosun Necip Mahfuz’un Midak Sokağı romanını Medak Sokağı adıyla yazdığı gibi, aynı romanın farklı adlarla çevirileri olan Ara Sokak ve Sokaktakiler romanını da farklı zannedip öyle değerlendirmiştir. Halbuki Midak Sokağı Türkçe’ye Ara Sokak, Sokaktakiler be Midak Sokağı adıyla çevrilmiştir. Necip Tosun’un Midak Sokağını Medak Sokağı diye çevirmesinde matbaa hatası değilse hatadır. Zira Ulusal Tez’de de yapılan dört tez Midak Sokağı adıyla adlandırılmıştır. Buradan anlaşılan Arapça bilmeyen veya bilip alana hakim olmayanların o sahada kalem oynatmamaları kendileri için daha iyi olacaktır. Ferid Edgü’nün Yaklaşımlar adıyla You Tube’da yaptığı programda bu örneklerden biridir. Ferid Edgü, Necip Mahfuz’u anlatmaktadır. Ama Arapça bilmediğinden bu anlatısı eksik kalmaktadır. Dolayısıyla alana hakim olunmadan o alanla ilgili bir şey yazmamak daha tutarlıdır.

**Anahtar Kelimeler:** Necip Tosun, Roman, Dünya Romanı, Ferid Edgü, Necip Mahfuz

### ABSTRACT

Humankind has been the scene of the war between good and evil since its creation. It can be said that we owe the development of world civilization to good people in general. As human beings continue their development, they are eager to enter areas they do not know, as well as areas they know. However, if people did what they know, more accurate results would emerge. One of those who do what they know and contribute to world civilization is Turkish writer and storyteller Necip Tosun. Necip Tosun filled an important gap in Turkey by examining forty world novelists in his book "The Adventure of the World Novel". However, while making this review, Necip Tosun misrepresented the works of Necip Mahfuz, who received the first Nobel Prize in literature in the Islamic world. The author's work, Midak Street, has been translated into Turkish under three different names, and the intermediary language, English, has been translated into Turkish. Perhaps because Necip Tosun did not know this, he thought these three translations were different novels by Necip Mahfuz. However, if you simply look at Wikipedia or other sources, you will see that Necip Mahfuz does not have any novels with these names. Just as Necip Tosun wrote Necip Mahfuz's novel Midak Street under the name Medak Street, he also thought that the novels Ara Sokak and Sokaktakiler, which are translations of the same novel with different names, were different and evaluated them accordingly. However, Midak Street was translated into Turkish as Ara Sokak, Sokaktakiler and Midak Street. Necip Tosun's translation of Midak Street as Medak Street is also a mistake, unless it is a printing error. Because four theses in the National Thesis

are named Midak Street. It is understood from this that it would be better for those who do not know Arabic or who do not know Arabic but do not use their pens in that field. Ferid Edgü's program on You Tube called Approaches is one of these examples. Ferid Edgü tells about Necip Mahfuz. But since he does not know Arabic, this narrative remains incomplete. Therefore, it is more consistent not to write anything about that field without mastering the field.

**Key Words:** Necip Tosun, Novel, World Novel, Ferid Edgü, Necip Mahfouz

### NECİP TOSUN'UN HAYATI

Öykü ve deneme yazarı. 10 Eylül 1960, Kırıkkale doğumlu. Rasattepe İlkokulu (1972), Karşıyaka Ortaokulu (1975), Kırıkkale Ticaret Lisesi (1978) ve Gazi Üniversitesi (1983) mezunu. Devlet Su İşleri ve Tarım Kredi Kooperatiflerindeki (1984-88) çalışmalarından sonra 1988'de Sayıştay'a geçti. Bu kurumda başdenetçi ve uzman denetçisi olarak görev yaptı.

İlk öyküsü "Yangın", Aylık Dergi'de (Şubat 1983) yer aldı. Daha sonra öykü ve yazılarını Maveria, Dergâh, Yedi İklim, Hece, Heceöykü ve Eşik Cini dergilerinde yayımladı. Zengin betimlemelerle ve geçmişe özlem duygusuyla ördüğü öykülerinde şiirsel bir anlatıma ulaştı. Öyküde bilinçaltı tekniğini modern öykünün temel biçimi olarak kullandı. Öykülerini olay ve diyaloglardan uzak bir iç sesle oluşturdu. Temada geleneğe yaslanırken biçimde arayışlar içinde oldu.

Öykü yazarlığının dışında; başta Ahmet Hamdi Tanpınar, Orhan Kemal, Sabahattin Ali, Memduh Şevket Esenal, Tomris Uyar, Nezihe Meriç, Füzulan, Adalet Ağaoğlu olmak üzere çağdaş Türk öykücülerine üzerine incelemeler yapan Tosun, Rasim Özdenören ve Mustafa Kutlu öykücülüğü üzerine bağımsız kitaplar yazdı. Yazımsal bir tür olarak öykü üzerine de çalıştı, öykünün kuramsal temellerine eğildi. Bu bağlamda yazılarında öykünün, ritim, şiirsellik, kurgu, dil, görüntüleme gibi temel öğe ve sorunlarını işledi.

Sinemayla da ilgilenerek, çeşitli gazete ve dergilerde sinema üzerine eleştiriler ve kuramsal yazılar yayımladı. Sonsuz Kare dergisinde düzenli sinema yazıları yazdı (2005-2006). Radyo Birlik'te 1987'de bir yıl süreyle "Sinema Notları" adlı programı hazırlayıp sundu. Yönetmen yardımcılığı da yapan Tosun, Devlet Bakanlığı bünyesindeki çalışmalarında, pek çok dizi filmin ve sinema filmlerinin senaryo danışmanlığını ve yapımcılığını üstlendi. Otuzüçüncü Peron adlı öykü kitabıyla 2005 Türkiye Yazarlar Birliği Yılın Hikâyecisi Ödülünü aldı. Düzyazı Defteri ve Hece dergileri öykücülüğü üzerine bölümler düzenledi.

Modern Öykü Kuramı'nda öykünün gelişimini, dönüşümünü, yeni yönelimlerini belirlemeye çalıştı. Öykü adına ortak bir bilinç ve bellek oluşturmak amacıyla, öykü sanatının poetik alt yapısını anlama, çözümleme ve tespit etmeyi hedefledi. Öykünün yapısını, tarihsel serüvenini, anlatım imkânlarını ve karakterize olduğu özellikleri tartıştı.

"Necip Tosun, kişisel hislenmelerle, çevresinde olan bitenlerden etkilenmeyle öykü yazan biri değil, sahici öyküyü ciddiye alan ve onda ısrar eden bir öykücü." (Ömer Lekesiz)

"Necip Tosun, öykü üzerine de yazıları olan az öykücüden biri. Hayatın savurduğu, kimini intihara kadar sürüklediği insanlara kulluk bilinciyle ve hakikat ışığıyla eğildi. Bol imgeli, bol simgeli bir dili tercih etti." (Necati Mert)

"Necip Tosun dilin imkânlarını zorlayan, kendisine göre dil, üslup oluşturmuş bir öykücümüzdür. Dile özenle yaklaşır, öykülerinde gereksiz cümle ve sözcüğe rastlayamayız. Öykü dili şiirsel bir dildir. Necip Tosun dile dikkat çeken, Türk öykücülüğünde dil izleği oluşturan yazarımızdır; Feyyaz Kayacan, Bilge Karasu, Vüsat O. Bener, Hasan Ali Toptaş gibi. Necip Tosun öykülerinde neyi anlatırsa anlatsın dilinin o müthiş büyüklüğüne kapılız. Sanki öykünün konusunu değil de dilini okur, dile yoğunlaşırız. Edebiyat da zaten dile yaslı bir sanat değil midir?.. (Bünyamin Hazar)

ESERLERİ:

DENEME-İNCELEME: Türk Öykücülüğünde Rasim Özdenören (1986), Hayat ve Öykü (1999), Türk Öykücülüğünde Mustafa Kutlu (2004), Film Defteri (2005), Modern Öykü Kuramı (2011).



SÖYLEŞİ: Mesut Uçakan'la Sinema Söyleşileri (1992).

ÖYKÜ: Küller ve Uçurumlar (1998), Otuzüçüncü Peron (2005) (Tosun,2022:3).

Midak Sokağı Necip Mahfuz'un 35 romanından birisidir. Türkiye'de yapılan Ulusal Tez merkezinde bu romanla ilgili dört tez yapılmıştır ve şunlardır:

“1. Zeynep Orhan, (2009) Peyami Safa'nın Fatih-Harbiye ve Necip Mahfuz'un Midak Sokağı romanlarındaki karakterlerin analitik karşılaştırılması (Analytical comparison of the characters in Peyami Safa's Fatih-Harbiye and Necip Mahfuz's Midak Sokağı), Eskişehir Osmangazi Üniversitesi Sosyal Bilimler Enstitüsü Yayınlanmamış Yüksek Lisans Tezi, Eskişehir.

2. Mehmet Ali Ersöz, (2014), Necip Mahfuz'un Midak Sokağı adlı romanının tahlili (The analysis of Naguib Mahfouz's novel Midak Alley), İstanbul Üniversitesi Sosyal Bilimler Enstitüsü Yayınlanmamış Yüksek Lisans Tezi, İstanbul.

3. Nada Ahmad Sayed, (2020), Modern Türk ve Mısır romanlarında sokak Akile Hanım Sokağı ve Midak Sokağı örneği (Street in modern Turkish and Egyptian novels samples of Akile Khanem Street and Midaq alley), Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Yayınlanmamış Yüksek Lisans Tezi, Konya.

4. Fatma Ayman Elagamy, (2022), Modern Türk ve Mısır romanlarında toplumsal değişim: Fatih-Harbiye ve Midak Sokağı (Social change in modern Turkish and Egyptian novels: Fatih-Harbiye and Midaq Alley), İstanbul Medeniyet Üniversitesi Sosyal Bilimler Enstitüsü Yayınlanmamış Yüksek Lisans Tezi, İstanbul (Ulusal Tez,2023)”

Bu yapılan tezlerden romanın isminin Medak Sokağı değil Midak Sokağı olduğunu anlıyoruz. Necip Tosun'un Dünya Romanının Serüveni Necip Mahfuz: Kadim Kahire'nin Hikaye Anlatıcısı (Tosun,2022:422) kısmında matbaa hatası değilse hata yaptığımızı anlıyoruz.

İlk kez 1947'de basılan bu eser, basımından kısa bir süre sonra okuyucu ve eleştirmenlerin büyük çapta dikkatini çekti. Romanın ünü, sadece Mısır sınırları içerisinde kalmayıp diğer Arap ülkelerine, daha sonra da Batı dünyasına ulaştı. Eser, birçok dile çevrildi. Romanın Türkçeye ilk çevirisi, Güler Dikmen tarafından yapılmıştır. İngilizce çevirisinden "Ara Sokak" adıyla Türkçeye aktarılan bu romanı, Hürriyet Yayınları 1977 yılında bastı. Romanın ikinci çevirisi Hasan Akay tarafından Arapça aslından "Sokaktakiler" adıyla yapılmış ve İnsan Yayınları 1989 yılında yayımlamıştır.

Roman, 1963 yılında sinemaya aktarıldı. Yönetmenliğini Hassân İmâm'ın yaptığı filmin başrollerini Şâdiye ve Salâh Kâbîl paylaşmıştır. Senaryo, yine Necîb Mahfûz'a aittir. Bu eser, ayrıca 1995 yılında Meksika'da Jorge Fons yönetmeliğinde çekilen filme esin kaynağı olmuştur. Filmin başrollerinde Salma Hayek ve Ernesto Gomez Cruz vardır. Senaryo, Vicente Lenero'ya aittir. Filmin orijinal adı, El Callejon de Los Milogros'dur; Türkçeye Sokağın Mucizeleri olarak çevirebiliriz. Romanda konu edilen olayların büyük bir kısmı eski Kahire'de Ezher Mahallesinin el-Huseyn bölgesinde bulunan dar bir sokakta geçmektedir. Bu sokak, Sanâdikkiye havalisinde bulunur. Bu sokağın adı,Zukâku'l-Midakk olup romana adını vermiştir. Eserde genel anlamda belli başlı temel bir kurgu yoktur. Sokakta yaşayan bazı kimselerin hayatlarını konu almakta ve yaşamalarından birkaç aylık kesitler vermektedir. İkinci Dünya Savaşı'na rastlayan 1943-44 yılları bir zaman dilimi olarak seçilmiştir. Savaş, haliyle sokağı ve insanların yaşamını etkilemiştir.

### ROMANIN ÖZETİ

Romandaki ana karakter, sokağın güzel kızı Hamîde'dir; okumamış, tecrübesiz, ama zeki ve arsız bir kızdır. Hamîde fazla kaprislidir. Bu güzel kızdan hoşlanan iki kimse vardır sokakta. Bunlardan birisi de, ona aşırı derecede tutkun olan fakir ve iyi huylu berber Abbâs el-Hulv'dur. Genç adamın küçük bir dükkânı vardır; kendisi dindardır ve azla yetinmeye çalışır. Hamîde, çevrede kendisine en uygun olacak kocanın Abbâs olduğunu çok iyi bilmektedir. Ancak onun fakir bir berber olması, geleceğini gölgelemekte ve bir takım endişelerduymaktadır. Bunun kısmen farkında olan Abbâs, daha fazla para kazanarak ona iyi bir hayat verme düşüncesi içindedir. Bu bakımdan arkadaşı Hüseyin Kirşa'nın önerisini kabul ederek çölde bulunan İngiliz ordu kampında çalışmaya karar verir. Kampa gitmeden önce Hamîde ile konuşur ve ona kendisiyle nişanlanması önerisinde bulunur. Para biriktirip

döndükten sonra evlenmek istemektedir. Hamîde pek istekli olmamakla birlikte öneriyi kabul eder. Kâmil Amca ve Abbâs Ümmü Hamîde'ye giderler. Kâmil Amca yaptığı tatlıyı hediye olarak götürür; kızı, Abbâs'a ister. Şerbetler içilir ve Ayete'lKürsî okunur, dualar edilir. Abbâs'ın İngiliz ordusunda çalışmaya gitmesinden sonra başka bir talip daha çıkar. Bu kişi Selim Ulvân'dır. Kendisi çok zengindir. Elli yaşlarında olup evli ve dört çocuk babasıdır. Hamîde'yi görmüş ve ona vurulmuştur. Böyle yirmi yaşlarında, uzun boylu, teni pürüzsüz bir kızla evlenme dürtüsünü bir türlü bastıramamaktadır. Durumu, Hamîde'nin analığına açar. Hamîde ve analığı teklifi hemen kabul edip çöldeki Abbâs'ı unuttururlar. Ancak her ikisinin de varlıklı bir hayata olan hevesleri kursaklarında kalır. Ağır bir hastalığa yakalanan Selim Ulvân, iyice zayıflamış ve evlenmekten vazgeçmiştir. Bu arada sahneye sokak sakinlerinden olmayan Farac İbrâhîm isimli biri ortaya çıkar. Büyük bir beceri ve ustalıklı toy ve tecrübesiz Hamîde'yi baştan çıkarır. Sonunda onu, evini terk edip kendisiyle yaşaması için ikna eder. Hamîde çok geçmeden yeni sevgilisinin bir kadın simsarı olduğunu anlar. Adamın yabancı askerleri eğlendirmeye yönelik kızlar yetiştiren bir okulu vardır. Hamîde, büyük bir hayal kırıklığına uğrar ve bütün duygu ve düşünceleri birbirine karıştır. Sonunda kendisi de bu bataklığa sürüklenir ve düşlediği bütün maddi çıkarları elde eder. Abbâs birkaç ay sonra izne gelince sevgilisinin ortadan kaybolduğunu öğrenir. Kendisini terk ederek başkasıyla evlenmek üzere evden kaçtığı fikrine kapılarak onu kandıran kimseden öç almaya yemin eder. Bir gün caddede tesadüfen Hamîde ile karşılaşır. Çok alımlı ve müsrifane bir şekilde giyinmiş olan sevgilisine sitem eder, serzenişte bulunur. Abbâs'ın kafasından geçen şeyleri hemen okuyabilir Hamîde. Kız, onun bu duygularını kendi çıkarı için kullanmaya karar verir. Artık Farac İbrâhîm'e karşı duyduğu ilk sevgiyi tamamen yitirmiş, ondan nefret etmeye başlamıştır. Abbâs'ı kullanarak Farac'tan öcünü alacaktır. Hamîde, kendisini kandıran kişiyi göstermek için birkaç gün sonra Abbâs'la bir meyhanede buluşmak üzere sözleşir. Ancak Abbâs sabredemez ve adı geçen meyhaneye gününden önce gider. Orada Hamîde'yi bir grup sarhoş İngiliz askerini eğlendirirken görür. Buna dayanamaz. Boş bir içki şişesini eline alarak Hamîde'ye saldırır ve onu birkaç yerinden yaralar. Bunu gören sarhoş askerler, kızarak Abbâs'ın üzerine atılırlar ve onu döve döve öldürürlür (Ersöz,2014:98-99)

Necip Tosun'un Dünya Romanının Serüveni Necip Mahfuz: Kadim Kahire'nin Hikaye Anlatıcısı Medak Sokağı pasajını kitabında şöyle verir:

*“Kahire'nin sokakları, camileri, kahvehaneleri, piramitleri, yoksul mahalleleri, Nil Nehri eserlerine yansır. Kahire sokaklarındaki insan manzaraları en büyük ilgisi olur. Geçmiş ve şimdiki zamanın hükümünün birliktr sürdüğü Kahire'nin Medak Sokağı'ni ele alıp Fırıncı Hüsniye'nin, tatlıcı Kamil Amca'nın, berber Abbas Hal'û Efendinin, şirket sahibi Selim Ülvan'ın, sokak güzeli Hamide'nin, Kahveci Kirşa'nın, Şeyh Derviş'in dünyasını belgeler. Bu sokaktaki tutkuları, yükselme hırslarını, aşkları, kuşak çatışmalarını gündeme getirir (Tosun,2022:422).”*

Necip Tosun aynı kitabında “Sokaktakiler” pasajını ayrı bir roman gibi şu şekilde verir:

*“Necip Mahfuz eserlerinde Kahire insanların modernleşme macerasını izler. Sokaktakiler romanında, Kahirede'ki hikaye anlatıcılığının sonunu gündeme getirir. Yirmi yıldır aynı kahvehanelerde hikaye anlatan âşık, sonunda kahvehane sahibi tarafından susturulur. Hikaye anlatıcısının karşısına modernizm, daha doğrusu radyo çıkar. Kahvehane sahibi gerekçesini açıklar: “Anlattığın bütün hikayeleri biliyoruz, ezberledik artık, yeniden bir daha anlatmaya gerek yok ki! Hem bugünün insanları âşık, şair falan istemiyorlar; herkes bana radyo soruyor, işte şimdi radyoyu kurduruyorum. Bizi rahat bırak ve git (Tosun,2022:422).”*

Necip Tosun Necip Mahfuz'un romanları ile ilgili sayıya yanlıış vermiştir. Necip Mahfuz'un otuz dört romanı vardır diyor; ama Necip Mahfuz'un otuz beş romanı (Mahfuz,2011:591-593) vardır. Tosun'un otuz dört roman vardır ile ilgili pasajı şudur:

*“Necip Mahfuz'un dünyaca tanınmasının arkasında kuşkusuz 1988'de aldığı Nobel Edebiyat ödülü yatar. Otuz dört roman, üç yüz elli kısa hikaye yazan ... (Tosun,2022:422).”*

Necip Tosun Necip Mahfuz hakkındaki olumsuz yargıları alıp kendi desteler mahiyette şu şekilde vermiştir:

*“Necip Mahfuz'un İsrail'le yapılan barış anlaşmasını desteklediği için pek çok ülkede eserleri yasaklanmış, özellikle siyasi tutumu geniş tepkiler görmüştür (Tosun,2022:422).”*

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

*Bu cümlelerdeki yanlışlık sadece Evlâdu Hâratinâ (Sokağımızın Çocukları) adlı eserinin Mısır'da basılmaması üzerinedir. Ki Mısır'da da gazetelerde basılmıştır. Ayrıca Beyrut başta olmak üzere diğer ülkelerde basılmıştır.*

Yine Necip Tosun'un şu cümleleri Necip Mahfuz'u anlatmaz:

*"Mısır halkının birikimlerine, inançlarına karşı oryantalist bir gözle bakıp Batıcı bir tavır sergilemekle suçlanmış, bu yüzden Necip Mahfuz'un Nobel alışı kendi ülkesinde de tıpkı Orhan Pamuk gibi siyasi mesajlarına ve bu tutumuna bağlanmıştır. Necip Mahfuz ülkesinin dindar insanlarına, o toplumun entellektüel camiasına hep mesafeli durmuştur. Ancak ömrünün sonlarında İslami camiayla ilişkileri düzelterken özellikle Müslüman Kardeşlere sıcak mesajlar vermiştir (Tosun,2022:422,423)."*

Necip Mahfuz'un otuz beş romanından onu Kuran'daki surelerle biter. Romanlarının surelerle bitmesi İslamı olumladığı anlamına gelmez diye sorulacak olursa on romanını da Rahman ve Duha Suresi ile bitirerek ben bu sureleri okuyunca rahatlıyorum der. Necip Mahfuz'un kişisel eşyalarında şu an Mısır Kahire'de Osmanlıdan kalma bir tekkede sergilenmektedir. Dolayısıyla böyle bir insana dinle ilgili olumsuz cümleler kurmak kul hakkına girmektedir diye düşünüyoruz (Baran,2022:254-258,293).

Yine Necip Tosun yazarı sosyalist ve toplumsal gerçekçi (Tosun,2022:422,423) olarak alır ki buda yanlıştır. Necip Mahfuz sosyalist değildir. Ki toplumsal gerçekçi roman kominüst bir toplumda mümkündür. Toplumsal gerçekçi romanın öncülü eleştirel gerçekçi romandır ki buda komünizm öncesi sosyalist toplumda mümkündür (Baran,2022:1-324).

Bu noktada Sezai Karakoç Necip Mahfuz hakkında daha doğru değerlendirmelerde bulunmuştur ve cümleleri şudur:

*"Necip Mahfuz bir romancı olarak belli bir seviyenin üzerinde. Bizde roman, Peyami Safa'dan sonra ideoloji bataklığına saplanıp kaldı. Tanpınar'ın Huzur'u sanki mezar taşı oldu romanımıza. Anlaşıyor ki Mısır'da Necip Mahfuz neslinden sonra benzeri bir olay yaşanmış. Necip Mahfuz'un uzun ömürlü oluşu ve romancılıktaki ısrarı, onu Batı'nın dikkatini çekecek bir konumda tutmuş. Yoksa o da iyice eski nesilden (Karakoç,2000:8)."*

Sezai Karakoç'un değerlendirmeleri daha objektif ve yerindedir. Zira Necip Mahfuz'da Orhan Pamuk'ta birçok çalışma yaptıktan sonra bu ödülü almıştır.

## SONUÇ

Çalışma yapacak kişilerin kendi alanlarıyla ilgili kalem oynatmalarının yerinde olacağını düşünüyoruz. Özellikle bu çalışma yabancı dilde olacaksa ve yapılacak çalışma ile ilgili alanın dili bilinmiyor veya o dile hakim değinirse o çalışmanın yapılmaması daha yerinde olacaktır diye düşünüyoruz. Bu çalışmada kendi alanının dışına çıkılmasının bir örneğidir. Zira Arapça bilinmediği için yazarın romanları ile ilgili yanlışlık yapılmıştır. Aynı şey Ferid Edgü içinde geçerlidir. Necip Mahfuzla ilgili youtube'da yaptığı çalışma Edgü'nün Arapça bilmiyor oluşundan dolayı eksiktir. Dolayısıyla eksik, yetersiz veya yanlış olacak çalışmaların yapılmaması daha yerinde olacaktır.

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<https://www.youtube.com/watch?v=7fQkp8feVSM&t=10s>

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

Necip Mahfuz, “Midak Sokađı” Eriřim Tarihi: 30.09.2023  
<https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp>

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DEVLET BAŞKANLARININ BELİRLENMESİNDE SIRA DIŞI YÖNTEMLER UNUSUAL METHODS IN DETERMINING PRESIDENTS

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### ÖZET

Devlet başkanı seçimlerinde yaygın olarak mutlak çoğunluk sistemi kullanılmaktadır. Bu sistemde oyların yarısından fazlasını alan aday devlet başkanı olarak seçilmekte, hiçbir adayın bu oranda oy alamaması durumunda ikinci tur seçimleri yapılmaktadır. Bu sistemde bazen ilk turda ikinci olan aday ikinci turda seçimi kazanabilmektedir. Basit çoğunluk sisteminde ise adaylar arasından en çok oyu alan kişi devlet başkanı olarak seçilmektedir. Meşruiyet sorununa ve tartışmalarına neden olabilen bu sistem Filipinler, Güney Kore, Meksika, Venezüella ve Singapur'da devlet başkanı seçimlerinde kullanılmaktadır. Basit çoğunluk sisteminin farklı şartlara bağlanarak uygulandığı ülkeler de vardır. Örneğin, Arjantin ve Bolivya'da adaylardan birinin seçimi kazanabilmesi için %45'in üzerinde oy alması veya en az %40 oranında oy alma koşuluyla ikinci adaydan %10 daha fazla oy alması gerekmektedir. Devlet başkanı seçimlerinde kullanılan bir diğer sistem ise devredilebilir/aktarılabılır oy sistemidir. Bu sistemde seçmenler birden fazla aday arasından sıralama yapmaktadır. Seçmenlerin ilk tercihlerine göre oylar sayılmakta, oyların yarısından fazlasını alan aday seçimi kazanmaktadır. Herhangi bir aday oyların mutlak çoğunluğunu alamamışsa, en az oyu alan aday seçimden elenmekte ve en az oyu alan adaya oy veren seçmenlerin ikinci tercihleri dikkate alınarak oy dağılımları tekrar yapılmaktadır. Bu süreç, adaylardan birinin mutlak çoğunluğa ulaşmasına dek devam etmektedir. Oyların ilk dağıtımında birinci olamayan bir adayın, dağıtımların tamamlanmasının ardından seçimi kazanabilme ihtimalinin olduğu bu sistem İrlanda'da kullanılmaktadır. Şartlı mutlak çoğunluk sisteminde ise mutlak çoğunluğun yanı sıra ülkedeki seçim bölgelerinin en az yarısında belirli bir oranda oy alınması gerekmektedir. Kenya'da uygulanan bu sisteme göre, bir adayın seçimi kazanabilmesi için hem ülke genelinde %50'nin üzerinde hem de 47 seçim çevresinin yarısında en az %25 oranında oy alması gerekmektedir. Devlet Başkanlığı seçimlerindeki sıra dışı bir sistem ise Bosna Hersek'te uygulanmaktadır. Bosna Hersek'te Boşnaklar, Hırvatlar ve Sırp'ları temsil eden üç başkan seçilmekte, başkanlar sekiz ay ve ikişer dönem görev yapmaktadırlar.

**Anahtar Kelimeler:** Devlet Başkanlığı, Seçim Sistemleri, Siyasal Kurumlar, Anayasal Kurumlar.

### ABSTRACT

The absolute majority system is widely used in presidential elections. In this system, the candidate who get more than half of the votes is elected as president. If no candidate gets this amount of votes, a second round of elections is held. In this system, sometimes the candidate who comes second in the first round can win the election in the second round. In the simple majority system, the person who get the most votes among the candidates is elected as the president. This system, which can cause legitimacy problems and debates, is used in presidential elections in the Philippines, South Korea, Mexico, Venezuela and Singapore. Here are also countries where the simple majority system is implemented under different conditions. For example, in Argentina and Bolivia, a candidate must get over 45% of the votes to win the election or 10% more votes than the second candidate, provided that he/she gets at least 40% of the votes. Another system used in presidential elections is the transferable vote system. In this system, voters vote for more than one candidate. Votes are counted according to the voters' first preferences, and the candidate who gets more than half of the votes wins the election. If any candidate did not get the absolute majority of votes, the candidate with the fewest votes is eliminated from the election and the vote distribution is made again, taking into account the second preferences of the voters

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

who voted for the candidate with the least votes. This process continues until one of the candidates reaches an absolute majority. A candidate who does not come first in the first distribution of votes has the possibility of winning the election after the distribution is completed. This system is used in Ireland. In the conditional absolute majority system, in addition to the absolute majority in the country, a certain percentage of votes must be get in at least half of the electoral districts in the country. According to this system implemented in Kenya, in order for a candidate to win the election, she/he must get over 50% of the votes throughout the country and at least 25% of the votes in half of the 47 electoral districts. An unusual system in Presidential elections is implemented in Bosnia and Herzegovina. Three presidents representing Bosnians, Croats and Serbs are elected in Bosnia and Herzegovina. Presidents serve for eight months and two terms each.

**Keywords:** Presidency, Electoral Systems, Political Institutions, Constitutional Institutions.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SOSYAL BİLGİLER ÖĞRETİMİNDE DİSİPLİNLER ARASI ÖĞRETİM YAKLAŞIMINA DAYALI MULTİDİSİPLİNLER BİR MODÜL ÖRNEĞİ: “GÖBEKLİTEPE’NİN İZİNDE”

### AN EXAMPLE OF A MULTİDİSİPLİNARY MODULE BASED ON AN INTERDİSİPLİNARY TEACHİNG APPROACH İN SOCIAL STUDİES TEACHİNG: “İN THE FOOTSTEPS OF GÖBEKLİTEPE”

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#### ÖZET

Bu çalışmanın amacı Sosyal bilgiler eğitiminde öğretmenlere etkinlik temelli multidisipliner bir modül örneği sunmaktır. Sosyal bilgiler farklı disiplinlerle doğrudan ve dolaylı ilişkili bir ders olması sebebiyle disiplinlerarası öğretim yaklaşımı için önemli bir zemin konumundadır. Bu sebeple disiplinlerarası öğretim yaklaşımına dayalı olarak öğretmenlere örnek olacak ve fikir verebilecek uygulama örnekleri içeren etkinlik ve ders planlarına ihtiyaç bulunmaktadır. Bu amaç kapsamında 5. sınıf Sosyal bilgiler dersi “Kültür ve Miras” öğrenme alanı “SB.5.2.2. Çevresindeki doğal varlıklar ile tarihî mekânları, nesnelere ve eserleri tanıtır” kazanımı temel alınarak multidisipliner yapıda bir modül oluşturulmuştur. “Göbeklitepe’nin İzinde” isimli modülde Göbeklitepe’nin önemi, özellikleri ve tanıtımı konusu ele alınarak farklı disiplinlerle sunulmaya çalışılmış ve Sosyal bilgilerin dışında 12 farklı disiplin ile ilişki kurularak disiplinler arası anlayış yansıtılmaya çalışılmıştır. Modülde ortaokul düzeyinde matematik (6), fen ve teknoloji (7), sosyal bilgiler (tarih, coğrafya) (7), Türkçe (48), görsel sanatlar (12), müzik (11), teknoloji ve tasarım (8), drama (6), bilişim teknolojileri ve yazılım (8), din kültürü ve ahlak bilgisi (2), yabancı dil (4), beden eğitimi ve spor (4), hukuk ve adalet (5) derslerinin kazanımlarıyla ilişkilendirmeler yapılmıştır. Ders tasarımı kapsamında ilişkilendirmelerin dışında beceri ve değer eğitimi ile kavram öğretimi başlıklarına yer verilmiştir. Öğrenciler için kazanımlar doğrultusunda farklı hedeflerde iş paketleri oluşturulmuştur. Belirlenen iş paketleri bir senaryo içerisinde bütünleştirilerek sunulmuştur. Etkinlikler için zaman yönetimi esnek bırakılmış olup, uygulayıcılar için bir (40) ders saati önerisinde bulunulmuştur. Modül geliştirilirken disiplinlerarası öğretim ile ilgili çalışmaları bulunan ve alan eğitim uzmanı olan iki öğretim üyesinin görüşleri alınmış ve modüle son şekli verilmiştir. Multidisipliner yaklaşıma dayalı olarak 13 farklı etkinlikle hazırlanan modülde öğrencilerin araştırma, karar verme, problem çözüme, harita okuryazarlığı, iş birliği, konum analizi, mekân algılama, yenilikçi ve yaratıcı düşünme, iletişim, empati gibi becerilerini geliştirmeye yönelik uygulamalara öncelik verilmiştir. Modülde; altı şapka, argümantasyon, zihin haritası, beyin fırtınası, öyküleştirme, örnek olay, istasyon, balık kılıcı, drama gibi pek çok öğrenci merkezli yöntem ve tekniklerin kullanılmasına özen gösterilmiştir. Bununla birlikte Google Earth, Sanal geziler, Youtube, Logaster, Padlet, Storyjumper, Storybird, Powtoon, Timeline, Wordart, Postermywall, Canva gibi web 2.0 teknolojilerinden yararlanılmıştır. Yapılan bu çalışmayla disiplinlerarası öğretim yaklaşımının daha iyi anlaşılması, Sosyal bilgiler derslerinde yaygınlaştırılması ve literatüre katkı sağlayarak yeni çalışmalara vesile olması beklenmektedir.

**Anahtar Kelimeler:** Sosyal Bilgiler Öğretimi, Disiplinlerarası Öğretim Yaklaşımı, Multidisipliner İlişkilendirme, Göbeklitepe.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ABSTRACT

The aim of this study is to present an example of an activity-based multidisciplinary module to teachers in social studies education. Since social studies is a course directly and indirectly related to different disciplines, it is an important basis for an interdisciplinary teaching approach. For this reason, there is a need for activity and lesson plans based on an interdisciplinary teaching approach that include application examples that will set an example and give ideas to teachers. For this purpose, 5th grade Social Studies course "Culture and Heritage" learning area "SB.5.2.2. A module with a multidisciplinary structure has been created based on the objective of "Introduces the surrounding natural assets and historical places, objects and works". In the module named "On the Trail of Göbeklitepe", the importance, characteristics and promotion of Göbeklitepe were discussed and presented with different disciplines, and an interdisciplinary understanding was tried to be reflected by establishing relationships with 12 different disciplines other than social studies. The module includes secondary school level mathematics (6), science and technology (7), social studies (history, geography) (7), Turkish (48), visual arts (12), music (11), technology and design (8), drama. Associations were made with the achievements of (6), information technologies and software (8), religious culture and ethics (2), foreign language (4), physical education and sports (4), law and justice (5). Within the scope of the course design, in addition to associations, the topics of skill and value education and concept teaching are included. Work packages have been created for students with different objectives in line with their achievements. The determined work packages were integrated and presented in a scenario. Time management for activities is left flexible and a recommendation of one (40) class hours is made for practitioners. While developing the module, the opinions of two faculty members who have studies on interdisciplinary teaching and who are field education experts were taken and the module was given its final form. In the module prepared with 13 different activities based on a multidisciplinary approach, priority is given to practices aimed at improving students' skills such as research, decision-making, problem solving, map literacy, collaboration, location analysis, spatial perception, innovative and creative thinking, communication and empathy. In the module; Care was taken to use many student-centered methods and techniques such as six hats, argumentation, mind map, brainstorming, storytelling, case study, station, fishbone, drama. In addition, web 2.0 technologies such as Google Earth, Virtual tours, Youtube, Logaster, Padlet, Storyjumper, Storybird, Powtoon, Timeline, Wordart, Postermywall, Canva were used. With this study, it is expected that the interdisciplinary teaching approach will be better understood, disseminated in social studies courses, and lead to new studies by contributing to the literature.

**Keywords:** Social Studies Teaching, Interdisciplinary Teaching Approach, Multidisciplinary Association, Göbeklitepe.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ÇAĞDAŞ DÖNEMDE TEFSİR: GÜNÜMÜZ İSLAM TOPLUMLARININ BEKLENTİLERİ VE TEFSİRİN DEĞİŞEN ROLÜ

### TAFSİR IN THE CONTEMPORARY PERIOD: THE EXPECTATIONS OF CONTEMPORARY ISLAMIC SOCIETIES AND THE CHANGING ROLE OF TAFSİR

*Servet DEMİRBAŞ*

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#### ÖZET

Kur'an-ı Kerim, Allah Teâlâ'nın insana sözlü hitabı olan ilahî kelimedir. Tefsir ise insanın kendi beşeri gücü nispetince onda içkin bulunan manaları keşfedip anlamlandırmasıdır. Bu ilahî kelam bir kere söylenmiş olup sabitesini korurken, anlamlandırılması ise insan var oldukça değişerek devam edecektir. Bu anlam arayışı nüzul süreciyle eşzamanla olarak Hz. Peygamberle başlamış, geçen uzun zaman içinde çeşitli aşamalardan geçerek muhteva ve mahiyet bakımından çeşitli kırılmalar, radikal değişim ve çeşitlenmelere günümüze kesintisiz olarak ulaşmıştır. İslami ilimler amaç olarak geçmişle bağlarını koparmadan geleceği inşaya yönelmişlerdir. Klasik dönemde Kur'an merkezli nakli ilimler olan tefsir, hadis, fıkıh ve kelam İslam toplumunun dünya görüşlerinin odağında bulunuyordu. Bu ilimler çağdaş döneme kadar yaratılıştan ölüm ve ötesine, inanç esaslarından hukuka kadar hayatın bütün alanlarını kapsayacak şekilde tanzim edilmişlerdi. Böylece toplumun düşünceleri ve yaşamları bu ilimlerin belirlediği çerçevede yürütülüyordu. Bu durum insanların karşılaştıkları her türlü maddi ve manevi sorunun çözümünde bu ilimlere yönelmelerini gerekli kılıyordu. Klasik dönemde tefsir her ne kadar inanç ve hukuk alanında bazı öneri ve hükümler koysa da Kur'an bir hukuk ve kelam kitabı olarak algılanmadığı için problemlerin çözüm noktası daha çok kelam ve fıkıh gibi ilimler oluyordu. Bu dönemde tefsir geniş halk kitlelerine hitap eden ilim olmaktan ziyade daha seçkin gruplar olan ulema sınıfının ilgilendiği üst tabaka bir ilim halindeydi. Sonuç olarak klasik dönemde fıkıh ve kelam disiplinleri kural koyucu ve bağlayıcı bir konumdayken tefsir disiplinine bu yetki verilmemişti.

Çağdaş dönemde 19. yüzyıldan itibaren klasik tefsirin insanların ihtiyaçlarını pratik olarak karşılamada problemler yaşamasından hareketle tefsire ve Kur'an araştırmalarına yeni görevler yüklendi. Çağdaş dönemde köklü toplumsal değişimler İslam ümmetinin gelenekle çağdaşlık arasında aldığı pozisyon ve yaşadığı sorunların tek kaynaktan çözümü için Kur'an'ı merkeze alan toplumsal ağırlıklı bir tefsir anlayışına yönelmeyi gerekli kıldı. Böyle bir anlayış doğal olarak tefsir ilminden beklentileri ve tefsirin ilimler hiyerarşisindeki konumunu kelam ve fıkıh disiplinlerinden daha aktif hale getirdi. Bu dönemin insanları problemlerini fıkıh, kelam ve benzeri ilimlerden ziyade Kur'an merkezli çözüme kavuşturmayı önemsedikleri için Kur'an'ı ortaya çıkabilecek sorunları çözümleyecek yegâne merci olarak gördüklerinden tefsirin işlevi ve alanı daha da genişlemiştir. Bu süreçte tefsir yeni ihtiyaçları karşılama ve modern dönüşümlerin ortaya koyduğu problemleri cevaplandırma ve sorunları birinci kaynak olarak çözüme kavuşturacak bir görev yüklenen ilim haline gelmiştir. Buna bağlı olarak Kur'an'ın hidayet yönünü öne çıkarmak için modern dönem insanının ihtiyaç duyduğu konuları inceleyen yöntemler geliştirilmiştir. Bu bağlamda ilmî tefsir, içtimâî tefsir, edebî tefsir ve konulu tefsir gibi tefsir yaklaşımları ve yöntemleri yaygın hale gelmeye başlamıştır.

Çağdaş dönem Kur'an araştırmacılarına klasik döneme nazaran daha büyük görevler ve sorumluluklar terettüp etmektedir. Modernitenin ve hızlı ve hazlı yaşamı beraberinde getiren internet çağının insanların içinde buldukları buhranlardan kurtarmak için Kur'an'ın hidayetini ve önerdiği dünya ve ahiret mutluluğunun yolunu göstermenin çaresini aramak gerekir.

**Anahtar Kelimeler:** Tefsir, Kur'an, Çağdaş Dönem, Beklentiler, Değişen Rol.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ABSTRACT

The Holy Qur'ān is the divine word, which is the verbal address of Allah to man. The science of tafsir deals with the discovery and interpretation of the meanings inherent in it according to the human power of man. While this divine word has been uttered once and preserves its constancy, its interpretation will continue to change as long as man exists. This search for meaning started with the Prophet Muhammad (PBUH) simultaneously with the process of revelation, and it has passed through various stages in the long time that has passed, and it has reached the present day uninterrupted through various breaks, radical changes and diversifications in terms of content and nature. Islamic sciences have tended to construct the future without severing their ties with the past. In the classical period, tafsir, hadith, fiqh and kalām, which are the Qur'ān-centered and fundamental Islamic sciences, were at the center of the world views of the Islamic society. Until the modern period, these sciences were organized to cover all areas of life from creation to death and beyond, from belief principles to law. Thus, the thoughts and lives of the society were carried out within the framework determined by these sciences. This situation made it necessary for people to turn to these sciences in solving all kinds of material and spiritual problems they faced. In the classical period, although tafsir made some suggestions and judgements in the field of faith and law, since the Qur'ān was not perceived as a book of law and theology, the solution point of the problems was mostly sciences such as kalām and fiqh. In this period, tafsir was not a science addressed to the masses of the people, but rather to more elite groups. As a result, while the disciplines of fiqh and kalām were in a rule-making and binding position in the classical period, the discipline of tafsir was not given this authority.

In the contemporary period, from the 19th century onwards, classical exegesis had difficulties in responding practically to the needs of the people, so that new tasks were imposed on exegesis and Qur'ānic studies. The radical social changes in the contemporary period made it necessary to turn to a socially oriented understanding of tafsir centred on the Qur'ān for the position of the Islamic ummah between tradition and modernity and the solution of its problems from a single source. Such an understanding naturally made the expectations from the science of tafsir and the position of tafsir in the hierarchy of sciences more active than the disciplines of kalām and fiqh. Since the people of this period cared about solving their problems centered on the Qur'ān rather than fiqh, theology and similar sciences, they saw the Qur'ān as the sole authority to solve the problems that may arise, and the function and field of tafsir expanded even more. In this process, tafsir has become a science that has the task of meeting new needs and answering the problems posed by modern transformations and solving problems as the first source. Accordingly, in order to emphasize the guidance aspect of the Qur'ān, methods have been developed to examine the issues that the people of the modern period need. In this context, tafsir approaches and methods such as scientific tafsir, social tafsir, literary tafsir and thematic tafsir have become widespread.

Contemporary Qur'ānic scholars have greater duties and responsibilities than those of the classical period. They have to show the guidance of the Qur'ān and the path of happiness in this world and the hereafter in the age of modernity and the Internet, which brings with it a fast and pleasurable life, and thus bring new suggestions to save people from the crisis they are in.

**Keywords:** Tafsir, Qur'ān, Contemporary Period, Expectations, Changing Role.

KUMAŞ KESİMİNDE KULLANILAN KESİCİ TAKIM İÇİN SONLU ELEMANLAR  
YÖNTEMİYLE BİLEME SAYISI TESPİTİ

DETERMINATION OF THE NUMBER OF CUTS BY FINITE ELEMENT METHOD FOR  
CUTTING TOOL USED IN FABRIC CUTTING

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**ÖZET**

CNC otomatik kesim makinesinde kesici takım yani bıçak yorulması, tekstil kesim işleminin sağlıklı bir şekilde yapılması için incelenmesi gereken bir durumdur. Kumaş kesme işleminde kesici takımlar, iyi mekanik özellikleri (yüksek aşınma direnci ve tokluk) nedeniyle genellikle yüksek hız çeliklerinden üretilir. Buna ek olarak, tekstil malzemelerinin kesilme işlemi sırasında bıçak şeklinin ve keskinliğinin korunması gerekir. Bu nedenle, bileme yoluyla bıçağın keskinleştirilmesi, iyi bir kesme kabiliyetini korumak için çok önemli bir işlemdir. Bununla birlikte, bıçak keskinliğini bir ölçüt olarak tanımlamak çok zordur. Bu nedenle, tek bir bıçağın sadece bir aşındırıcı malzeme ile maksimum bileme sayısı göz önüne alındığında, bileme, kesici takım için hayati bir işlemdir. Bileme ile elde edilen kenar, yeterli keskinlikte bir bıçak sağlamalıdır ve ekstra yeniden bilemenin amacı, kesme sırasında oluşan çapağı temizlemek ve belirli bir kenar doğruluğunu korumaktır. Bu çalışmada, sert bir malzeme olan denim kumaşın üst üste bindirilmiş katlarının düz kesim işlemi esnasında kullanılan bıçağın hasar görmeden kesimi gerçekleştirebilmesi için Ansys Workbench programı ile maksimum bileme sayısı tespiti amaçlanmıştır. Bu amaç doğrultusunda, birçok gerinim ölçer içeren sensörden (loadcell) alınan veriler kullanılarak, bıçağa gelen kesme doğrultusundaki kuvvetler bulunmuştur. Bu kuvvetler Ansys Workbench programına aktarılıp yorulma analizinde girdi verisi olarak kullanılmıştır. Yorulma emniyet faktörü değerleri bıçak bileme sayısı tespitinde referans alınmıştır.

**Anahtar Kelimeler:** Tekstil kesimi, yüksek hız çeliği, bıçak, bileme, yorulma

**ABSTRACT**

Cutting tool, i.e. blade fatigue in CNC automatic cutting machine is a situation that needs to be examined in order to perform the textile cutting process in a healthy way. Cutting tools in the fabric-cutting process are usually manufactured from high-speed steels due to their good mechanical properties (high wear resistance and toughness). In addition, the blade shape and sharpness must be maintained during the cutting process of textile materials. Therefore, sharpening the blade is a very important process to maintain a good cutting ability. However, it is very difficult to define blade sharpness as a criterion. Therefore, given the maximum number of times a single blade can be sharpened with only one abrasive material, sharpening is a vital process for the cutting tool. The edge obtained by sharpening should provide a blade of sufficient sharpness, and the purpose of extra re-sharpening is to remove the burr formed during cutting and maintain a given edge accuracy. In this study, it was aimed to determine the maximum sharpening number with the Ansys Workbench program so that the blade used during the straight-cutting process of the overlapped layers of denim fabric, which is a hard material, can be cut without being damaged. For this purpose, the forces in the cutting direction were found by using the data obtained from the sensor (loadcell) containing many strain gauges. These forces were transferred

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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to Ansys Workbench and used as input data in fatigue analysis. Fatigue safety factor values were used as a reference for determining the number of blade sharpenings.

**Keywords:** Textile cutting, high-speed steel, knife, sharpening, fatigue



PREMATÜR OVERYAN YETMEZLİKTE ÜRIDİNİN OLASI ETKİSİ  
POSSIBLE EFFECT OF URIDINE IN PREMATURE OVARIAN FAILURE

Ayşen ÇAKIR

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ÖZET

İnfertilite, Dünya Sağlık Örgütünc 12 ay boyunca düzenli ve korunmasız cinsel ilişkiye rağmen gebe kalınmaması olarak tanımlanır (WHO, 2018). Prematür overyan yetmezlik (POY), kadınlarda 40 yaşından önce primordiyal folikül sayısının ve oosit kalitesinin azalması olarak tanımlanmakta ve kadın faktörlü infertilite sebeplerinin büyük bir kısmını oluşturmaktadır (Hu vd., 2020). POY oluşumunun nedeni apoptoziste anormal artış olabileceği gibi foliküler mikroçevrede bozulmalar da olabilir. Kullanılan tedavilerin tartışmalı olması nedeniyle yeni tedavi protokolleri için araştırmalar devam etmektedir.

Üridin, insan dolaşımındaki temel pirimidin nükleozididir (Cansev, 2006). Üridin, hücre membranlarının temel bileşeni olan fosfolipid miktarının korunması hücre membran bütünlüğünün sağlanması açısından çok önemlidir (Cansev, 2006). Laboratuvarımızda yapılan çalışmalar ile üridinin öğrenme-bellek üzerine olumlu etkilerinin (Ocalan vd., 2019) yanı sıra hiperoksi (Goren vd., 2017a) ve hipoksik-iskemik ensefalopati (Goren vd., 2017b) sonrasında nöroprotektif etkinliğinin olduğu, apoptozisi azalttığı (Khezri vd., 2021), ekstrasellüler matriksin düzenlenmesinde önemli olan matriks metalloproteinaz düzeylerini etkilediği (Çakir vd., 2022) gösterilmiştir. Üridin trifosfatın (UTP) anti-apoptotik Bcl-2 gen ekspresyonunu arttırdığı, pro-apoptotik Bax ekspresyonunu ise azalttığı (Chorna vd., 2004) saptanmıştır. Yakın zamanda yapılan bir çalışmada da üridinin rejenerasyonu teşvik ettiği gösterilmiş pro-rejeneratif bir metabolit olduğu vurgulanmıştır (Liu vd., 2022).

Üridinin ovaryumdaki endojen varlığı daha önce gösterilmiştir (Rogers ve Segal, 1991). Fare ve maymunlarda direk over dokusu veya over boşluğuna üridin enjeksiyonu yapılan bir çalışmada oositlerin folikül hücreleri ve antral sıvı katmanları ile çevrili olması nedeniyle üridinin olgunlaşan oositlere düşük düzeyde dahil olduğu görülmüştür (Baker vd., 1969). Farelerde intraperitoneal üridin enjeksiyonundan 1 saat sonra yapılan incelemede folikül büyüklüklerinde, granuloza hücre sayılarında ve folikül tiplerinde bir fark olmadığı belirlenmiştir (Moore vd., 1974). Üridinin transportunda görev alan dengeleyici taşıma proteinleri (ENT) ve konsantre taşıma proteinlerinin (CNT) (Cansev, 2006) ovaryum dokusunda eksprese edildiği saptanmıştır (Bock vd., 2012).

Üridinin antiapoptotik etkinliği, ekstrasellüler matriks üzerindeki etkisi nedeniyle POY tedavisinde potansiyel bir rol oynayabileceği düşünülmektedir.

**Anahtar Kelimeler:** İnfertilite, prematür overyan yetmezlik, apoptozis, üridin

ABSTRACT

Infertility is defined by the World Health Organization as the inability to become pregnant despite regular and unprotected sexual intercourse for 12 months (WHO, 2018). Premature ovarian failure (POF) is characterized by a reduction in the number of primordial follicles and a decline in oocyte quality in women under the age of 40 and constitutes a large part of the causes of female factor infertility (Hu et al., 2020). POF can result from abnormal increases in apoptosis or disruptions in the follicular microenvironment. Since the treatments used are controversial, research continues for new treatment protocols.

Uridine is the main pyrimidine nucleoside in the human circulation (Cansev, 2006). Uridine is very important to ensure cell membrane integrity and preserving the amount of phospholipid that is the basic

component of cell membranes (Cansev, 2006). Studies conducted in our laboratory have shown that uridine has positive effects on learning-memory (Ocalan et al., 2019), has neuroprotective activity after hyperoxia (Goren et al., 2017a) and hypoxic-ischemic encephalopathy (Goren et al., 2017b) and reduces apoptosis (Khezri et al., 2021) In addition it has been shown that uridine affect matrix metalloproteinase levels, which are important in the extracellular matrix (Cakir et al., 2022). It has been determined that uridine triphosphate (UTP) increases anti-apoptotic Bcl-2 gene expression and decreases pro-apoptotic Bax expression (Chorna et al., 2004). A recent study has demonstrated that uridine is a pro-regenerative metabolite that has been shown to promote regeneration (Liu et al., 2022).

The endogenous presence of uridine in the ovary has been previously established (Rogers and Segal, 1991). In a study in which uridine was injected directly into the ovarian tissue or ovarian cavity in mice and monkeys, it was observed that uridine was incorporated into maturing oocytes at low levels because the oocytes were surrounded by follicle cells and antral fluid layers (Baker et al., 1969). Additionally, a study found no significant differences in follicle sizes, granulosa cell numbers, and follicle types when mice were examined one hour after receiving intraperitoneal uridine injections (Moore et al., 1974). Equilibrative nucleoside transporters (ENT) and concentrative nucleoside transporters (CNT) (Cansev, 2006), which are involved in the transport of uridine, were found to be expressed in the ovarian tissue (Bock et al., 2012).

It is thought that uridine may play a potential role in the treatment of POF due to its antiapoptotic activity and its effect on the extracellular matrix.

**Key Words:** Infertility, premature ovarian failure, apoptosis, uridine

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## GEÇMİŞİN İZLERİNE SANATSAL BİR BAKIŞ; SARIKAMIŞ ŞEHİTLERİ AN ARTISTIC LOOK AT THE TRACES OF THE PAST; MARTYRS OF SARIKAMIŞ

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### ÖZET

Çalışmada 1914-1916 yılları arasında Sarıkamış'ta görev almış askerlerin giysileri yazılı, görsel vb. kaynaklar araştırılarak incelenmiştir. Bu incelemeler ışığında tasarım ve giysi üretim teknikleri kullanılarak minyatür şeklinde askeri giysili tasarımlar üretilmiştir. Tasarım sürecinde uniformalar rütbelere göre gruplandırılmıştır. Bu gruplandırma; başa, üst bedene, alt bedene, içe ve ayağa giyilen giysiler olarak ayrı ayrı tasarlanmıştır. Giysi ve parçaları döneme ait kumaş ve giysi özelliklerine göre kalıplar çıkarılarak üretilmiştir. Sonrasında uniformaların üzerinde kullanılan tabanca, tüfek, kurşunluk, barutluk, dürbün, bıçak, sırt çantası vb. tamamlayıcı parçalar üretilmiştir. Minyatürlerin yüz formları (kaş, bıyık, göz vb...) Osmanlı döneminde (14.-16 yy.) görev yapmış askerlerin fiziki özelliklerine göre detaylandırılmıştır.

Tasarımların muhafazası için ahşap zemin üzerine çıkarılıp takılabilen camekân tasarlanıp özel üretim yaptırılmıştır. Minyatür askerlerin zemininde Sarıkamış'ın doğal yeraltı kaynaklarından biri olan Obsidyen taşı kullanılmış ve taşa alüminyum malzeme geçirilerek minyatürler sergilenmek üzere sabitlenmiştir. Uniformalar üzerinde kullanılan apolet, nişan vb. parçalar askerlerin rütbe ve aidiyetini temsil etmektedir. Çalışmada Osmanlı İmparatorluğu'nun son yıllarında etkin olan Osmanlı askeri ve siyasetçisi olan Enver Paşa (İsmail Enver), Yemenden Sarıkamış'a desteğe giden askerlerin anılarından ve aylarca kış şartlarında yazlık uniformalarla yolculuk yapıp bu yolculuk esnasında donarak şehit düşen Yemen askerleri, Sarıkamış'ın son esirleri olarak geçen sancaklı ve bayraklı askerler, savaş alanında yaralı askerlere tıbbi müdahale yapan ve üstün başarı nişanı alan doktor üniformalı subay asker, paşa, general, subay ve erler tasarlanmıştır.

Ayrıca Sarıkamış harekâtı esnasında soğuktan donarak şehit olmuş askerlerimizin yaşadığı olaylardan esinlenilerek, 16 adet askeri giysili kahramanı temsil eden, üç adet kompozisyon tasarlanmıştır. Birincisi Rus Kafkas Ordusu Kurmay Başkan Vekili Dük Aleksandroviç Petroviç anılarında geçen ve Sarıkamış'ın son birliği olarak bahsedilen kompozisyon çalışmasıdır. Bu çalışmada biri binbaşı olmak üzere on iki adet askeri üniformalı tasarım kullanılmıştır. Tasarım zemini; savaş alanını yansıtan zeminler 4 katman şeklinde; ağaç, toprak, kaya, kar gibi çeşitli malzemeler kullanılarak oluşturulmuştur. Boyutları; zemin en 125 cm, boy 100 cm, camekân yüksekliği 50 cm olarak tasarlanmıştır. İkinci çalışmada elinde bayrak ile donarak şehit olmuş asker tasarımıdır. Üçüncü kompozisyon çalışması ise Sarıkamış harekâtı esnasında donarak şehit olmuş üç adet kahraman askerimizin tasarımlarından oluşmaktadır.

Çalışma dönemin askeri giysilerini ve Sarıkamış harekâtı esnasında yaşanan bazı olaylar sanatsal bir yaklaşımla tasarlanmıştır. Çalışmalar Sarıkamış'ı Anma, Gazi ve Şehitler günü gibi etkinliklerde sergilenerek döneme ait askeri giysiler tanıtılmakta ve kahraman ecdadımızın ile ilgili kahramanlık hikâyeleri minyatür çalışmalarla aktarılmaktadır. Günümüz insanına ve gelecek nesillerimize geçmişin izlerini unutturmamak için tasarlanan bu koleksiyon ile yeni çalışmalara ışık tutacağı düşünülmektedir. Ayrıca kahramanlık hikâyeleri ile dolu geçmişimizi yaşatmak ve anlatmak için alanla ilgili araştırmacılara, akademisyenlere ve girişimcilere büyük görev düşmektedir.

**Anahtar Kelimeler:** Askeri üniforma, Sarıkamış şehitleri, sanat.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ABSTRACT

In the study, the clothes of the soldiers who served in Sarıkamış between 1914 and 1916 were written, visually etc. The sources were researched and examined. In the light of these investigations, miniature military-clothed designs were produced using design and clothing production techniques. During the design process, uniforms were grouped by rank. This grouping; They are designed separately as clothes worn on the head, upper body, lower body, inside and feet. Clothing and parts were produced by making patterns according to the fabric and clothing characteristics of the period. Afterwards, pistols, rifles, bullets, gunpowder containers, binoculars, knives, backpacks, etc. were used on the uniforms. Complementary parts have been produced. The facial forms of the miniatures (eyebrows, moustache, eyes, etc.) were detailed according to the physical characteristics of the soldiers who served in the Ottoman period (14th-16th centuries).

In order to preserve the designs, a display case that can be removed and installed on the wooden floor was designed and specially produced. Obsidian stone, one of Sarıkamış's natural underground resources, was used on the base of the miniature soldiers, and the miniatures were fixed for display by inserting aluminum material into the stone.

Epauettes, insignia, etc. used on uniforms. The pieces represent the soldiers' rank and affiliation. In the study, Enver Pasha (Ismail Enver), an Ottoman soldier and politician who was active in the last years of the Ottoman Empire, the memories of the soldiers who went to support Sarıkamış from Yemen, and the Yemen soldiers who traveled in summer uniforms in winter conditions for months and died by freezing during this journey, the last days of Sarıkamış. Soldiers with banners and flags, who are considered prisoners of war, and officers, pashas, generals, officers and privates in doctor uniforms who provide medical attention to wounded soldiers on the battlefield and receive the order of superior achievement are designed.

In addition, three compositions representing 16 heroes in military uniform were designed, inspired by the events experienced by our soldiers who were martyred due to cold during the Sarıkamış operation. The first is the composition work mentioned in the memoirs of Duke Aleksandrovich Petrović, Deputy Chief of Staff of the Russian Caucasian Army, and mentioned as the last unit of Sarıkamış. Twelve military uniform designs, one of which was a major, were used in this study. Design ground; The floors reflecting the battlefield are in 4 layers; It was created using various materials such as trees, soil, rocks and snow. Dimensions; The floor width is designed as 125 cm, the length is 100 cm, and the glass height is 50 cm. In the second work, there is a design of a soldier who was martyred by freezing with a flag in his hand. The third composition work consists of the designs of three heroic soldiers who were frozen to death during the Sarıkamış operation.

The work depicts the military clothing of the period and some events that took place during the Sarıkamış operation, designed with an artistic approach. The works are exhibited at events such as the Commemoration of Sarıkamış, Veterans and Martyrs' Day, where military clothing from the period is introduced and the heroic stories of our heroic ancestors are told through miniature works. It is thought that this collection, designed to prevent today's people and future generations from forgetting the traces of the past, will shed light on new studies. In addition, researchers, academicians and entrepreneurs in the field have a great responsibility in keeping our past full of heroic stories alive and telling.

**Keywords:** Military uniform, Sarıkamış martyrs, art.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## PLATON'UN PROTAGORAS, GORGİAS VE DEVLET DİYALOGLARINDA ERDEM KAVRAMI

### THE CONCEPT OF VIRTUE IN PLATO'S PROTAGORAS, GORGİAS AND STATE DIALOGUES

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#### ÖZET

Felsefe alanındaki görüşleri düşünce tarihinin ve Batı felsefesinin başlangıç noktasını oluşturan ünlü Yunan filozofu Platon M.Ö 469-399 yılları arasında yaşamış ve “erdem” terimini felsefe tarihinde ilk kullanan hocası Sokrates’ten sonra ahlak konusunda önemli fikirler öne sürerek kendi felsefi sistemini oluşturmuştur. Platon, hiçbir sorunu tek bir diyalogunda ele alıp sonlandırmamıştır. Erdem kavramı için de aynı şeyi söylemek mümkündür. Türkçe’ye “erdem” olarak çevrilen “Yunanca’daki “arete” sözcüğü, İngilizce “virtue” ya da “excellence” sözcükleriyle karşılanmaktadır. Gökberk’e göre, “Erdemin özü ve kavramı, erdemin birliği ve çokluğu, erdemin bilgiye ve öğretilenilmeye olan ilgisi incelediği, çözmeye çalıştığı başlıca sorunlardır” (2016, s. 55).

Bu çalışma, Platon’un Protagoras, Gorgias ve Devlet adlı diyaloglarında erdem konusunu ele alışı biçimini ve bu kavramla ilgili yapmış olduğu tanımları ortaya koymak amacıyla hazırlanmıştır: *Platon, Protagoras*’ta erdemin birliği ve özellikle de öğretilip öğretilmeyeceği sorununu incelemiş, Sokrates’in fikri olan erdemin öğretilebileceği tezinin güçlüğüyle karşılaşmıştır. Bu diyalogunda erdemle ilgili düşüncelerini henüz kesinleştirmiş değildir. O, erdemin ne olduğu ve nasıl kazanıldığı sorularına geçiş diyaloglarında da yanıt aramıştır. *Gorgias* adlı yapıtında doğruluk, bilgi ve erdem bağlantılarını ele alarak insanı erdemin bilgisine götüreceği olan şeyin felsefi bilgi olduğunun altını çizmiştir. Olgunluk diyalogları arasında yer alan *Devlet*’te, bu konuyu yeni bir ilkeye dayandırmayı hedeflemiş ve erdem ile tam erdem arasında bir ayırım yaparak devleti oluşturan sınıfların ayrı ayrı hangi erdemlere sahip olmaları gerektiği konusunu tartışmıştır.

Platon’un adı geçen üç diyalogunda erdemi nasıl tanımladığını incelemeyi hedefleyen bu çalışma nitel bir çalışmadır. Nitel araştırma süreci, bir sorunun çözümüne ilişkin araştırmacının gözlemleri, görüşme ve araştırılan olguya ilişkin söylev ve doküman analizi gibi nitel veri toplama tekniklerini kullanarak daha önceden bilinen ya da fark edilmemiş sorunların algılanmasına, soruna ilişkin doğal olguların gerçekçi bir şekilde ele alınmasına yönelik öznal-yorumlayıcı bir süreçtir. Çalışmanın verileri doküman incelemesi yoluyla toplanmıştır. Elde edilen veriler betimleme, içerik analizi, söylev analizi ve metin analizi yöntemleri kullanılarak analiz edilmiş ve araştırmacı tarafından eleştirel bir bakış açısı ile ele alınarak yorumlanmıştır.

**Anahtar Kelimeler:** Platon, erdem, Protagoras, Gorgias, Devlet.

#### ABSTRACT

The famous Greek philosopher Plato, whose views on philosophy constitute the starting point of the history of thought and Western philosophy, lived between 469-399 BC and created his own philosophical system by putting forward important ideas about morality after his teacher Socrates, who was the first to use the term "virtue" in the history of philosophy. Plato never addressed and concluded any problem in a single dialogue. It is possible to say the same thing for the concept of virtue. The Greek word "arete", translated into Turkish as "virtue", is equivalent to the English words "virtue" or "excellence". According to Gökberk, "The essence and concept of virtue, the unity and multiplicity of



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

virtue, and the interest of virtue in knowledge and teachability are the main problems that he examines and tries to solve" (2016, p. 55).

This study has been prepared to reveal Plato's approach to the issue of virtue and his definitions of this concept in his dialogues Protagoras, Gorgias and the Republic: In Protagoras, Plato examined the unity of virtue and especially the problem of whether it can be taught or not, and encountered the difficulty of Socrates' idea that virtue can be taught. In this dialogue, he has not yet finalized his thoughts about virtue. He also sought answers to the questions of what virtue is and how it is acquired in transitional dialogues. In Gorgias, he discussed the connections between truth, knowledge and virtue and underlined that philosophical knowledge is what will lead people to the knowledge of virtue. In Republic, which is among the maturity dialogues, he aimed to base this issue on a new principle and discussed the issue of which virtues the classes that make up the state should have separately, making a distinction between virtue and full virtue.

This study, which aims to examine how Plato defines virtue in the three dialogues mentioned, is a qualitative study. The qualitative research process is a subjective-interpretive process aimed at perceiving previously known or unrecognized problems and realistically addressing natural phenomena related to the problem by using qualitative data collection techniques such as the researcher's observations regarding the solution of a problem, interviews, and discourse and document analysis regarding the phenomenon under investigation. The data of the study was collected through document review. The data obtained was analyzed using description, content analysis, discourse analysis and text analysis methods and was interpreted by the researcher from a critical perspective.

**Keywords:** Plato, virtue, Protagoras, Gorgias, Republic

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## VERGİ MEVZUATI AÇISINDAN E-TİCARETİN VERGİLENDİRİLMESİNDE KARŞILAŞILAN SORUNLAR

### PROBLEMS FACED IN THE TAXATION OF E-COMMERCE IN TERMS OF TAX LEGISLATION

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#### ÖZET

Küreselleşme ve iletişim teknolojilerinde yaşanan gelişmelerle elektronik ticaret (e-ticaret) kavramı gündeme gelmiştir. E-ticaret, mal ve hizmetlerin, işletmeler, bireyler, hükümetler, özel veya kamu kurum ve kuruluşları arasında, internet aracılığıyla alınıp satılmasıdır. E-ticaret ile ülkeler coğrafi sınırlarının ötesine geçerek diğer ülkelerden de alışveriş yapabilir hale gelmiştir. Ülkelerin birbirleriyle olan ticari faaliyetleri e-ticaret hacmini arttırmıştır. E-ticaret ile ticaretin küresel boyuta ulaşması, ülkelerin rekabet güçlerini ve ticaretteki paylarını arttırmış, maliyetlerde düşüş yaşanmış ve tüketicilerin daha ucuz ve kolay tüketim imkânlarına kavuşması sağlanmıştır. E-ticaret ile elektronik iletişimin kolaylaşması ve taraflar arası iletişimin ucuzlaması, fiziksel yatırımın işletmeler açısından gerekliliğini de ortadan kaldırmıştır. Ticari faaliyetleri olumlu etkilemekle birlikte bazı sorunları da beraberinde getirmiştir. Öncelikle ülkelerin mevcut olan yasal düzenlemeleri uluslararası anlamda yetersiz kalmıştır. E-ticaretin vergilendirilmesinde gelirin elde edildiği yer, işyeri kavramı, kaynak ve varış ilkesi ayrımı ülkelerin vergilendirme yetkisini belirlenmesi açısından önemli hale gelmiştir. E-ticaretin vergilendirilmesinde öncelikli olarak kaynak ve ikametgâh ilkesi üzerinde durulmaktadır. Ancak buna rağmen e-ticaret ile yapılan işlemlerin nasıl yapılması gerektiği konusunda günümüzde hala kesin bir hüküm bulunmamaktadır. Bu nedenle e-ticaretin vergilendirilmesi ulusal ve uluslararası alanda önemli bir tartışma konusudur. E-ticaret nedeniyle ortaya çıkan vergi kayıplarının önleyebilmek ve adil vergi dağılımı için devletlerin uluslararası iş birliğinde olduğu bir vergilendirme sisteminin oluşturulmasına yönelik çalışmalar sürmektedir. Nitekim BEPS eylem planları, küresel asgari kurumlar vergisi oranı gibi uygulamalar bu çalışmalar sonucu ortaya çıkmıştır. Bu çalışmada e-ticaretin vergilendirilmesinde vergi mevzuatı açısından karşılaşılan sorunlar ele alınarak değerlendirmeler yapılmıştır. Mevcut vergi mevzuatı e-ticaretin vergilendirilmesinde yetersiz kalmaktadır. Vergi kanunlarımızın dijital çağa uyumu sağlanarak, yasal boşlukların en kısa zamanda giderecek şekilde düzenlemelerin yapılması gerekmektedir. Bu şekilde vergi kayıp ve kaçakları önlenerek vergi gelirlerinde artış yaşanabilecektir.

**Anahtar Kelimeler:** Elektronik ticaret, dijitalleşme, teknoloji, vergileme,

#### ABSTRACT

With the developments in globalization and communication technologies, the concept of electronic commerce (e-commerce) has come to the fore. E-commerce is the buying and selling of goods and services over the internet between businesses, individuals, governments, private or public institutions and organizations. With e-commerce, countries have become able to go beyond their geographical borders and shop from other countries. The commercial activities of countries with each other have increased the e-commerce volume. The fact that trade has reached a global dimension through e-commerce has increased the competitiveness of countries and their shares in trade, reduced costs and enabled consumers to have cheaper and easier consumption opportunities. The facilitation of electronic communication through e-commerce and the cheaper communication between parties have eliminated the necessity of physical investment for businesses. Although it has a positive impact on commercial activities, it has also brought about some problems. First of all, the existing legal regulations of the countries are inadequate in international terms. In the taxation of e-commerce, the distinction between the place where the income is generated, the concept of workplace, and the principle of source and

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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destination have become important in determining the taxation authority of the countries. In the taxation of e-commerce, the principle of source and residence is primarily emphasized. However, today there is still no definitive provision on how e-commerce transactions should be carried out. For this reason, taxation of e-commerce is an important topic of discussion nationally and internationally. Efforts are continuing to create a taxation system in which states have international cooperation in order to prevent tax losses arising from e-commerce and to distribute fair taxes. As a matter of fact, practices such as BEPS action plans and the global minimum corporate tax rate emerged as a result of these studies. In this study, evaluations were made by considering the problems encountered in terms of tax legislation in the taxation of e-commerce. Current tax legislation is insufficient in taxing e-commerce. It is necessary to ensure that our tax laws comply with the digital age and make arrangements to eliminate legal gaps as soon as possible. In this way, tax losses and evasion can be prevented and tax revenues can increase.

**Keywords:** Electronic commerce, taxation, technology

BAŞ ÇEVRESİ BÜYÜKLÜĞÜ VE VÜCUT KİTLE İNDEKSİNİN LS CE-CHIRP UYARAN  
İLE ELDE EDİLEN İŞİTSEL BEYİN SAPI CEVAPLARINA ETKİSİ  
EFFECT OF HEAD CIRCUMFERENCE SIZE AND BODY MASS INDEX ON AUDITORY  
BRAINSTEM RESPONSES OBTAINED WITH LS CE-CHIRP STIMULUS

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**ÖZET**

**Giriş:** İşitsel beyin sapı cevapları, uyarın ve uyarana bağı parametreler ile bireysel faktörlerden etkilenmektedir. Son yıllarda, baziler membran ve işitme siniri liflerinde daha güçlü nöral senkronizasyon sağlayarak büyük amplitüdü yanıtı ortaya çıkarmasından dolayı LS CE-Chirp uyarınına olan ilgi artmaktadır. Bu çalışmanın amacı, LS CE chirp uyarın kullanarak elde edilen işitsel beyin sapı cevaplarını cinsiyete göre latans, dalgalar arası latans ve amplitüd açısından karşılaştırmak; dalgaların vücut kitle indeksi ve baş çevresi büyüklüğü ile olan ilişkisini incelemektir.

**Yöntem:** Çalışmaya yaşları 19-26 arasında değışen (ort.: 21,80 ± 1,84) 31 kadın, 19 erkek katılımcıdan oluşan normal işitmeye sahip, vücut sıcaklığı 37,5°C'nin altında olan 50 kiş i dahil edilmiştir. Katılımcıların baş çevresi büyüklüğünün belirlenmesinin ardından boy ve kilo ölçümleri ile vücut kitle indeksi hesaplanmıştır. Ardından insert kulaklıklar aracılığıyla alterne polarite, 21.1 rate ve 2000 sweep kullanılarak 80 dB nHL şiddetindeki LS CE chirp uyarın ile yanıt toplandı.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Bulgular:** Bilateral V. dalga latansları ve I-V dalgalar arası latanslar, kadınlarda anlamlı olarak daha kısa elde edilmiştir ( $p<0.05$ ). V.dalga amplitüdü sağ kulakta erkeklerde anlamlı olarak daha büyük iken ( $p<0.05$ ), sol kulakta kadınların amplitüdüleri anlamlı olarak daha yüksektir ( $p<0.05$ ). Sol kulak III-V dalgalar arası latanslar kadınlarda anlamlı olarak daha kısa ( $p<0.05$ ) iken, sağ kulak I. dalga amplitüdü anlamlı olarak daha büyük ( $p<0.05$ ) elde edilmiştir. Tüm katılımcıların baş çevresi büyüklüğü ile bilateral V. dalga latansları anlamlı orta derecede korelasyon, bilateral III.dalga amplitüdüleri katılımcıların baş çevresi büyüklüğü ile anlamlı negatif orta derecede korelasyon, V. dalga amplitüdüleri anlamlı negatif zayıf düzeyde korelasyon göstermiştir ( $p<0.05$ ). Katılımcıların vücut kitle indeksi ile anlamlı herhangi bir ilişki bulunamamıştır ( $p>0.05$ ).

**Sonuç:** Çalışmamız, nörodiagnostik etkisi kanıtlanmış LS CE-Chirp ile baş çevresi büyüklüğü ve vücut kitle indeksinin işitsel beyin sapı yanıtları üzerindeki etkisini değerlendirmiştir. Sonuçlarımız, baş çevresi büyüklüğünün amplitüd, latans ve dalgalar arası latans üzerindeki etkisinin sürdüğünü ancak yanıtlar üzerindeki temel değişkenin vücut kitle indeksi olmadığına işaret etmektedir.

**Anahtar Kelimeler:** baş çevresi, LS CE-chirp, işitsel beyin sapı yanıtları, vücut kitle indeksi

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## YAHYA KEMAL BEYATLI'NIN ŞİİRİNDE ŞAHSÎ VE MİLLÎ DEĞERİYLE SEVGİLİ FİĞÜRÜ

### THE BELOVED FIGURE IN YAHYA KEMAL BEYATLI'S POETRY WITH PERSONAL AND NATIONAL SIGNIFICANCE

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#### ÖZET

Modern Türk Şiirini yapılandıran önemli şairlerden biri olan Yahya Kemal Beyatlı (1884-1958), şiirlerinde sevgili figürüne önemli bir tema olarak çeşitli boyutlarıyla yer vermiştir. Yahya Kemal'in şiirlerinde sevgili, 'canan' olarak anılan, kimliği saklanan, fizikî ve ruhî bakımdan idealize edilmiş, kavuşulması güç, daima özlenen, âşığının ayrılık acısı ve kavuşma arzusu/umudu ile kendisine bağlandığı 'mâşuk' olarak belirir. Bu bağlamıyla Yahya Kemal'de sevgili figürü Divan şiirine gönderimleriyle dikkat çekmektedir. Nitekim Yahya Kemal, Divan şiirinde sevgili figürüne yaklaşımı değerlendirirken, eski şiir geleneğimizde sevgiliye tutkulu, coşkulu ve derin duygularla bağlanıldığını vurgulayıp sevgiliye duyulan aşkın "bir çehreye alâka" manasında değil "bir umman" olduğunu söyler ve yeni Türk şiirinin bu eski şiirin gövdesini miras aldığını dile getirir. Nitekim özellikle şairin sevgili figürünü hicran ve vuslat dairesinde ele aldığı şiirlerinde Divan şiiri geleneğinden yararlandığı, bu şiire ait mazmunlar sistemini bazen bağlamından koparmadan kullandığı; bazen de modernize edip değiştirdiği görülür. Yahya Kemal'in şiirlerinde sevgili figürü varlığı ile mekânları anlamlandırır, İstanbul'un farklı köşeleri ve manzaraları eski aşkların hatıralarını canlandırır, sevgiliye ve aşka kavuşma umudunu uyandırır. Bu anlamda Yahya Kemal'in kimi şiirlerinde aşk duygusu, insanın içinde yer eden, 'unutulmaz, onulmaz, dinmez bir acı' olarak ayrılık olgusu ve sevgiliye kavuşma arzularıyla iç içe ele alınmıştır. Yahya Kemal'e göre 'vuslat', özlenene, hayâl edilene kavuşmak, vâsıl olmaktır ve insan tabiatında aşk en yüksek his olduğu için, insanın hayatta bütün gayesi vuslattır. Yahya Kemal'in şiirlerinde sevgili figürünün ele alınışında ikinci temel bakış açısı onun, seçkin güzelliği, zarafeti, yetişme tarzı ve üslubuyla İstanbul merkezli bir Türk kültür sentezinin temsilcisi olarak sunulmasıdır. Bu dolayında Yahya Kemal'in şiirlerinde sevgili figürü, yalnız cinsî cazibesi ile bağlanılan bir kadın değildir. Sevgilin güzelliğinin temelinde yüzyıllara kök salmış Osmanlı saltanatının akisleri görülür. Sevgili figürü, yetişme tarzı, dış görüntüsü, hâli, tavrı, konuşması ile İstanbul odağında gelişen incelmış millî Türk kültürünün simgesi olarak ortaya çıkmakta; ona duyulan aşk ve bağlılık bu temellere dayanmaktadır. Bu bildiride, Yahya Kemal'in şiirinde sevgili figürü bu iki boyut merkeze alınarak 'Vuslat ve Hicran Dairesinde Sevgili Figürü' ve 'İstanbul Odağındaki Türk Millî Kültürünün Simgesi Olarak Sevgili Figürü' olmak üzere iki alt başlıkta irdelenecektir.

**Anahtar Kelimeler:** Yahya Kemal, Şiir, Sevgili, Vuslat, Aşk, Milli kültür, İstanbul.

#### ABSTRACT

Yahya Kemal Beyatlı (1884-1958), one of the prominent poets who made significant contributions to modern Turkish poetry, explored the figure of the beloved as a crucial theme in his poems, delving into various dimensions of it. In Yahya Kemal's poetry, the beloved is referred to as "canan," an enigmatic identity, idealized both physically and spiritually. The beloved is depicted as someone elusive, constantly yearned for, and becomes the focal point of the lover's feelings of separation and the desire/hope for reunion. While addressing the beloved figure in his poetry, Yahya Kemal draws attention to classical Ottoman poetry, evaluating the approach to the beloved figure in our ancient poetry tradition. He emphasizes that in this tradition, the lover's connection to the beloved is characterized by intense and profound emotions. He argues that love for the beloved is not merely a shallow and physical attraction,



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

but a deep and heartfelt sentiment. He also contends that the essence of this old poetry tradition has been inherited by modern Turkish poetry. Particularly in his poems where he addresses the beloved figure within the context of separation and reunion, it can be observed that Yahya Kemal sometimes employs the imagery system of classical poetry without disconnecting it from its original context, while at other times, he modernizes and transforms it. In Yahya Kemal's poetry, the presence of the beloved figure imbues various settings with meaning, reviving memories of past loves in different corners and scenes of Istanbul, and igniting hope and affection for the beloved. In this context, in some of Yahya Kemal's poems, the emotion of love intertwines with the concept of separation, which he defines as an "unforgettable, incurable, and unceasing pain" that resides within the human heart, along with desires for reunion with the beloved. According to Yahya Kemal, "vuslat" (reunion) signifies attaining what one yearns for, what one envisions, and since love is the highest emotion within human nature, a person's ultimate goal in life is reunion. Another fundamental perspective in Yahya Kemal's portrayal of the beloved figure is presenting her as a representative of a refined Turkish cultural synthesis centered around Istanbul, characterized by her exceptional beauty, elegance, upbringing, and style. Therefore, in Yahya Kemal's poetry, the beloved figure is not merely an ordinary woman associated with her physical allure. The essence of the beloved's beauty is deeply rooted in the centuries-old Ottoman heritage. The beloved figure emerges as a symbol of the sophisticated national Turkish culture that developed around the center of Istanbul, and the love and devotion towards her are founded on these principles. In this paper, Yahya Kemal's portrayal of the beloved figure is analyzed, focusing on two dimensions: "The Beloved Figure in the Context of Reunion and Separation" and "The Beloved Figure as a Symbol of Turkish National Culture Centered Around Istanbul."

**Key Words:** Yahya Kemal, Poetry, Beloved, Reunion, Love, National culture, Istanbul.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## İHRACATTA KARMAŞIKLIK İLE EKONOMİK KALKINMA ARASINDAKİ DOĞRUSAL OLMAYAN İLİŞKİNİN TESPİTİ

### THE NONLINEAR RELATIONSHIP BETWEEN EXPORT COMPLEXITY AND ECONOMIC DEVELOPMENT

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#### ÖZET

Kalkınma modelleri ülkelerin gelişimi açısından yapısal dönüşümün gerekliliği üzerinde sıkça durmaktadır. Üretimde ortaya çıkan bu dönüşümler yoğun bir şekilde ürün farklılaştırması veya ürün yoğunlaşması hususlarının da etkilerini dikkate almaktadır. Buna ilaveten teknolojik gelişime paralel olarak üretim süreçlerindeki değişimler üretilen ürünlerde de teknolojik yoğunluğun önemini ortaya çıkarmaktadır. Ülkelerin üretimleri ile doğrudan ilişkili olan dış ticaret de bu doğrultuda kalkınma açısından önemli bir yer tutmaktadır. Imbs ve Wacziarg'ın 2003'teki çalışmasına kadar literatür ürün farklılaşması ile kalkınma arasındaki ilişkinin doğrusal boyutuna dikkat çekmekteydi. Bahsi geçen çalışma ise literatürde ürün çeşitliliği ile kalkınma arasındaki "Ters U" şeklindeki ilişkiyi ilk defa ifade etmiştir. Devamında bu ilişki çeşitli yazarlarca ihracat ve kalkınma arasında aranır olmuştur. Bu çalışmada sadece çeşitlilik değil ürünlerin sofistikasyon boyutu da dahil edilerek ihracat ile kalkınma arasındaki "Ters U" şeklindeki ilişki Avrupa Birliği üyeleri ve Türkiye'yi içeren bir veri setiyle test edilmektedir. Gelişmiş ve gelişmekte olan ülkelerin yer aldığı 26 ülke için 1996-2021 yıllarını içeren verilerle yapılan panel veri analizlerinde kalkınma göstergesi olarak kişi başı GSYH değeri ve ihracatta hem ürün farklılaştırmasını hem de ürün sofistikasyonunu bir arada ifade etmek için ise Ekonomik Karmaşıklık Endeksi kullanılmıştır. Ekonomik Karmaşıklık Endeksi ülkenin ihracatındaki ürün çeşitliliğine ve bu ihraç ürünlerini üretebilen ülkelerin yaygınlığına bağlı olarak hesaplanan bir endekstir. Endeks değeri arttıkça ihracatta ürün çeşitliliği ve sofistikasyonunun arttığını ifade etmektedir. Sabit etkiler ve rassal etkiler için yapılan analizlerde ekonometrik varsayımlardan sapmaları ait testler dikkate alınarak, ihracat karmaşıklığı ve kalkınma arasındaki ilişki sapmalara karşı etkili bir tahmin gerçekleştiren Driscoll-Kraay dirençli standart tahmincisi ile tahmin edilmiş ve elde edilen sonuçta göre Ters U şeklindeki ilişkinin 26 ülkeli gurupta mevcut olduğu tespit edilmiştir. Ayrıca kişi başı gelirin yaklaşık 22.000\$ seviyesinde olduğu durumda dönüşümün gerçekleştiği, yani bu gelir düzeyine kadar kişi başı gelir arttıkça ihraç ürünlerinde karmaşıklığın arttığı, bu gelir düzeyi aşıldıktan sonra karmaşıklığın azaldığı sonucuna ulaşılmıştır. Elde edilen bu bulgu Imbs ve Wacziarg tarafından öne sürülen hipotezi destekler nitelikte olsa da kalkınma arttıkça yoğunlaşmanın etkisinin sofistikasyonun etkisinden daha yüksek olduğuna dair yeni bir bulguyu da ortaya çıkarmaktadır.

**Anahtar Kelimeler:** İhracat, Ekonomik Kalkınma, Karmaşıklık Endeksi.

#### ABSTRACT

Development models often emphasise the need for structural transformation for countries to develop. These transformations in production strongly consider the effects of product differentiation or product concentration. In addition, the changes in production processes that accompany technological development highlight the importance of the technological intensity of the products produced. Foreign trade, which is directly related to a country's production, plays an important role in this development. Until the study by Imbs and Wacziarg in 2003, the literature drew attention to the linear dimension of the relationship between product differentiation and development. The aforementioned study, on the other hand, was the first in the literature to express the inverted U-shaped relationship between product diversification and development. Subsequently, this relationship has been sought by various authors between exports and development. This study tests the "inverted U" relationship between exports and

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

development by including not only diversity but also the sophistication dimension of products, using a data set that includes European Union members and Turkey. In panel data analyses with data covering the years 1996-2021 for 26 countries, including developed and developing countries, GDP per capita is used as an indicator of development and the Economic Complexity Index is used to express both product differentiation and product sophistication in exports. The Economic Complexity Index is an index calculated on the basis of the product diversity in a country's exports and the prevalence of countries that can produce these export products. The higher the index value, the higher the product diversity and sophistication in exports. Taking into account the tests for deviations from econometric assumptions in the fixed and random effects analyses, the relationship between export sophistication and economic development was estimated using the Driscoll-Kraay robust standard estimator, which performs an effective estimation against deviations, and according to the result obtained, it was found that the inverted U-shaped relationship exists in the group of 26 countries. Furthermore, it is concluded that the transformation takes place at a per capita income of around \$22,000, i.e. up to this income level, the complexity of export products increases as per capita income increases and decreases after this income level is exceeded. Although this result supports the hypothesis put forward by Imbs and Wacziarg, it also reveals a new finding that the effect of concentration is higher than the effect of sophistication as development increases.

**Keywords:** Exports, Economic Development, Complexity Index.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## FOMO, COVID-19 VE UZAKTAN ÇALIŞMA İİŞKİSİ ÜZERİNE BİR ARAŞTIRMA A RESEARCH ON FOMO, COVID-19 AND REMOTE WORKING RELATIONSHIP

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### ÖZET

Teknolojik gelişmeler arttıkça, bireylerin iyi bilgilendirilmiş ve en son gelişmelerden haberdar olmaları konusunda da zorunlulukları artmaktadır. Bununla birlikte, söz konusu sürekli güncel kalma ihtiyacının bireylerin zihinsel ve fiziksel refahı üzerinde olumsuz etkileri olabilmektedir (Baker vd., 2016). Kaçırma Korkusu (FOMO- Fear Of Missing Out), bireyler sosyal kopukluğu, reddedilmeyi veya dışlanmayı algıladığında sıkıntı olarak kendini göstermekte ve özellikle teknolojik gelişmeler karşısında belirgin hale gelebilmektedir (Budnick vd., 2020). İş alanında ise çalışanlar iyi bilgilendirilmiş olmak, sosyal faaliyetlere aktif olarak katılmak ve karar alma süreçlerinde etkin rol oynamak için benzer bir zorlama yaşamaktadır. Fırsatları kaçırmamak için artan söz konusu baskı ve korku, artan stres seviyelerine ve ezici bir zorunluluk duygusuna yol açabilmektedir (Budnick vd., 2020).

Çalışanların güncel kalma ihtiyacının artması, özellikle çalışma ortamını tamamen etkileyen COVID-19 pandemisinden sonra çalışanların refahı üzerinde derin etkilere sahiptir (Hayran & Anık, 2021). Geleneksel çalışma yapılarını yeniden tanımlayan, yeni zorluklar ve fırsatlar getiren uzaktan çalışmanın ortaya çıkışıyla başlayan çok sayıda dönüşüm gerçekleşmiştir (Battisti vd., 2022). Bireyler artık toplantılara uzaktan katılma, iş arkadaşları ve müşterilerle uzaktan iletişim kurma yeteneğine sahip hale gelmiştir. Uzaktan çalışma, düzenli prosedürlere yardımcı olmasına rağmen, teknolojik gelişmelerin de etkisiyle iş yükünü de artırmıştır (Rousseau vd., 2016). Bu bağlamda COVID-19 döneminde FOMO olgusunun incelenmesi oldukça önemlidir. Çünkü pandeminin neden olduğu kısıtlamalar ve aksamalar, bireylerin işleri ve sosyal ağlarıyla bağlantı kurmalarını, etkileşimlerini ve etkileşim kurma biçimlerini önemli ölçüde değiştirmiştir (Battisti vd., 2022).

Bu çalışmada Covid-19 döneminde uzaktan çalışma sistemine geçmiş örgütlerde çalışan bireylerin FOMO olgusunu nasıl algıladıkları ve nasıl yönettikleri anlaşılmaya çalışılmıştır. Söz konusu araştırma keşif niteliğinde olup, araştırma yöntemi olarak nitel araştırma yöntemi, desen olarak olgu bilim deseni, veri toplama tekniği olarak da odak grup görüşmesi tercih edilmiştir. Çalışma kapsamında 12 gönüllü katılımcı ile görüşülmüş olup, Covid-19 döneminde FOMO'nun yükseldiği, bu nedenle çalışanların internette, sosyal medyada çok daha fazla zaman geçirdiği, işleri ile ilgili olarak yapılan çevrimiçi toplantıların toplantı odağından uzaklaşan konular nedeniyle uzadığı, zaman yönetiminin zorlaştığı, iş- ev sınırının bulanıklaştığı ve evde de sürekli işe dair konuların sohbet konusu olarak öne çıktığı görülmektedir.

**Anahtar Kelimeler:** FOMO, Kaçırma Korkusu, Covid-19, Uzaktan Çalışma.

### ABSTRACT

As technological developments increase, the necessity of individuals to be well-informed about the latest developments is also increasing. However, the need to stay up-to-date may have negative effects on the mental and physical well-being of individuals (Baker et al., 2016). Fear Of Missing Out (FOMO) manifests itself as a distress when individuals perceive social disconnection, rejection or exclusion and can become especially pronounced in the face of technological developments (Budnick et al., 2020). In the field of business, employees experience a similar compulsion to be well informed, actively participate in social activities and play an active role in decision-making processes. This increased

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI October 13-14, 2023

pressure and fear in order not to miss opportunities can lead to increased stress levels and an overwhelming sense of obligation (Budnick et al., 2020).

The increasing need of employees to stay up-to-date has profound effects on the well-being of employees, especially after the COVID-19 pandemic, which completely affects the working environment (Hayran & Anik, 2021). Many transformations have taken place, starting with the emergence of remote working, which redefines traditional work structures and brings new challenges and opportunities (Battisti et al., 2022). Individuals have now become capable of participating in meetings remotely, communicating remotely with colleagues and customers. Although remote working helps with regular procedures, it has also increased the workload due to technological developments (Rousseau et al., 2016). In this context, it is very important to study the phenomenon of FOMO during the COVID-19 period. Because the restrictions and disruptions caused by the pandemic have significantly changed the way individuals connect, interact and interact with their jobs and social networks (Battisti et al., 2022).

In this study, it was tried to understand how individuals working in organizations that have switched to the remote working system during the Covid-19 period perceive the phenomenon of FOMO and how they manage it. The study has adopted qualitative research methods and a phenomenological approach which provides the opportunity to explore how individuals interpret their ownfocus group interview as a data collection technique were preferred. Within the scope of the study, 12 volunteer participants were interviewed and it is observed that FOMO increases during the Covid-19 period, therefore employees spend much more time on the Internet, social media, online meetings held about their jobs are prolonged due to issues that move away from the meeting focus, time management becomes difficult, the work-home boundary becomes blurred, and permanent work-related issues at home also stand out as a topic of conversation.

**Keywords:** FOMO, Covid-19, Remote Working

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## AFRİKA İLE GÜVENLİK İŞBİRLİĞİNDE YENİ ORTAKLARIN MUKAYESESİ: FARKLI YAKLAŞIMLARIYLA RUSYA, ÇİN VE TÜRKİYE

### COMPARISON OF NEW PARTNERS IN SECURITY COOPERATION WITH AFRICA: RUSSIA, CHINA AND TURKEY WITH THEIR DIFFERENT APPROACHES

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#### ÖZET

İkinci Dünya Savaşı sonrasında zayıflayan sömürgecilik hareketleri yerini sömürgeci devletlerin kontrolündeki dekolonizasyona bırakmıştır. Büyük çoğunluğu sömürgeleştirilmiş olan Sahraaltı Afrika ülkeleri dekolonizasyon dalgasının neticesi olarak bağımsızlığını kazanarak devletleşmişlerdir. Bununla birlikte sömürge imparatorluklarının bakiyesi olan güçlü devletler bu kez yeni sömürgeci eğilimlerle etki alanlarında belli bir nüfuz düzeyini hep muhafaza etmişlerdir. Siyasi, ekonomik, askeri ve kültürel boyutlarıyla kendini son derece yoğun hissettiren bu dış nüfuz, Sahraaltı'nda bağımsız bir dış politika kurma imkânını en aza indirmekteydi. 1960'lardan itibaren gelişme adına kendi ülkesinin sınırlarını zorlayan pek çok Afrikalı lider askeri darbe, iç savaş veya doğrudan yabancı müdahalesi altında görevden uzaklaştırılmıştır. 2000'lere kadar Sahraaltı Afrikalı devletlerin dış politikada karar ve uygulama anlamındaki en temel sorunu partnerlerini çeşitlendirme veya farklılaştırma arzusuna karşı iç ve dış engellerle karşılaşmalarıydı.

21. yüzyıla gelindiğinde ise küresel gelişmelerin hegemonik sınırları daraltmasının bir sonucu olarak yeni aktörlerin kıtada belirginleşen rolleri öne çıkmaya başlamıştır. Ticari faaliyetler, kalkınma yardımı ve insani yardımlar vasıtasıyla Sahraaltı Afrika'da boy gösteren bu aktörler, farklı yaklaşım ve araçlarla zamanla güvenlik alanında da önemli birer aktöre dönüşmüşlerdir. Afrika'da sömürgecilik sonrası yıpranan "yerel Westfalyan düzen" sınırlarda değişim meydana getirirken, terör ve illegal ticaret trafiği devlet otoritesini zayıflatmıştır. Güvenlik sorunlarıyla baş etmekte zorlanan bölge ülkelerinin ciddi bir kısmı "en az gelişmiş ülkeler" kategorisinde yer almakta, peş peşe gelen küresel ekonomik krizlerin zararlarını tehditlere cevap verirken ciddi şekilde hissetmektedir. İttifakların yeniden şekillendiği bu dönemde kıtada üç yeni güvenlik aktörü niteliği kazanan Çin, Rusya ve Türkiye'nin faaliyet alanları, araçları ve yaklaşımları arasındaki benzerlik ve farklar kapsamlı bir değerlendirmeyi hak etmektedir. Üç ülkenin Sahraaltı Afrika'daki tarz ve eğilimlerinin analiz edilmesi gelecek öngörülerini açısından da önem taşımaktadır. Bu doğrultuda üç aktörün kıtadaki güvenlik işbirliği birkaç parametrede ele alınacak ve karşılaştırılacaktır: Askeri İşbirliği ve Yardımlar, Uluslararası Barış Misyonları, Savunma Sanayi İşbirliği ve Silah Tedariki, Özel Askeri Şirketler, Askeri Üsler, Askeri Eğitim ve Danışmanlık Faaliyetleri.

**Anahtar Kelimeler:** Sahraaltı Afrika, Güvenlik İşbirliği, Çin, Rusya, Türkiye.

#### ABSTRACT

Colonial movements, which weakened after the Second World War, were replaced by decolonization under the control of colonial states. Sub-Saharan African countries, the majority of which were colonized, gained independence and became states as a result of the decolonization wave. However, the powerful states that are the remnants of colonial empires have always maintained a certain level of influence in their spheres of influence, this time with neo-colonial tendencies. This external influence, which made itself felt extremely intense with its political, economic, military and cultural dimensions, was minimizing the possibility of establishing an independent foreign policy in the Sub-Saharan region. Since the 1960s, many African leaders who pushed their country's limits in the name of development were removed from office under military coups, civil wars or direct foreign intervention. Until the 2000s,



**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

the main problem of Sub-Saharan African states in terms of decisions and implementation in foreign policy was that they encountered internal and external obstacles to their desire to diversify or differentiate their partners.

In the 21st century, as a result of global developments narrowing the hegemonic boundaries, the roles of new actors on the continent began to come to the fore. These actors, who appear in Sub-Saharan Africa through commercial activities, development aid and humanitarian aid, have over time turned into important actors in the field of security with different approaches and tools. While the "local Westphalian order", which was worn out after colonialism in Africa, brought about a change in the borders, terrorism and illegal trade traffic weakened the state authority. A significant part of the countries in the region, which have difficulty in coping with security problems, are in the category of "least developed countries" and they seriously feel the damage of successive global economic crises while responding to threats. In this period when alliances are being reshaped, the similarities and differences between the fields of activity, tools and approaches of China, Russia and Turkey, which have become three new security actors on the continent, deserve a comprehensive evaluation. Analyzing the styles and trends of the three countries in Sub-Saharan Africa is also important for future predictions. In this regard, the security cooperation of the three actors on the continent will be discussed and compared in several parameters: Military Cooperation and Assistance, International Peace Missions, Defense Industry Cooperation and Weapons Supply, Private Military Companies, Military Bases, Military Training and Consultancy Activities.

**Keywords:** Sub-Saharan Africa, Security Cooperation, China, Russia, Turkey.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## TÜRKİYE EKONOMİSİNDE PARA TALEBİ FONKSİYONU İÇİN PARAMETRE İSTİKRARLILIK TAHMİNİ

### ON THE PARAMETER STABILITY FOR MONEY DEMAND FUNCTION IN TURKISH ECONOMY

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#### ÖZET

Para talebi fonksiyonunun analiz edilmesi literatürde uzun ama sürekli bir tartışma konusu olmuştur. Özellikle son dönemde yaşanan finansal çalkantıların ardından para piyasalarında yaşanan gelişmelerle merkez bankalarının fiyat istikrarını hedefleyen para politikasının yürütülmesinde para talebine yönelik araştırma ilginin yeniden canlanmasına yol açmıştır. Türkiye ekonomisinde kurumsal ve yapısal dönüşümler dikkate alındığında para arzı ile para talebini açıklayan değişkenler arasındaki ilişkinin değiştiği söylenebilir. Dolayısıyla hem para talebi fonksiyonunun uzun dönemli tahmini hem de değişkenlerin istikrarlı olup olmadığının tahmin edilmesi önemli hale gelmektedir. Bu bağlamda çalışmanın amacı, yapısal değişimlerin varlığında 2006:Q1-2023:Q1 dönemi için hem para talebi fonksiyonunun tahmini hem de para talebi ile gelir ve faiz oranı arasında istikrarlı bir ilişkinin olup olmadığını geleneksel eşbütünlük yaklaşımından ayrılarak çoklu yapısal kırılmalarla birlikte eşbütünlük regresyon modellerinde kısmi parametre istikrarlılığını test eden Kejriwal, Perron ve Yu (2022) yöntemini kullanarak analiz etmektir. Para talebi fonksiyonunun tahmin edilmesine yönelik olarak kısıtlı (Para talebi=f (gelir, faiz oranı)) ve kısıtsız model (Para talebi=f(gelir, faiz oranı)) olarak iki fonksiyonel form (log-log ve semi-log form) birçok çalışmada geleneksel yöntemlerle tahmin edilmişken, bu çalışmanın ilgili literatüre katkısı oldukça yeni bir yöntemin Türkiye ekonomisine uygulanmasını amaçlamaktadır. Çalışmada, katsayıların istikrarlılığına yönelik sonuçlara göre, kısıtsız modelde sabit ve gelir esnekliğinin katsayıları istikrarsızken diğer tüm modellerde gelir ve faiz esnekliği istikrarlıdır. Kısıtsız modelin her iki formu için para talebi, çıktı ve faiz oranı ile ilişkilendirilen uzun dönemli ilişkinin geçerli olduğuna yönelik kanıtlara ulaşırlarken kısıtlı modelde uzun dönemli ilişkinin olduğunu yönelik bulgulara ulaşamamıştır. Tahmin edilen modellerde 2018:Q2 döneminde kırılma tespit edilmiştir. Her iki model ve alt rejimlerdeki ampirik bulgularına göre para talebinin gelir esnekliği istatistiksel olarak anlamlı, pozitifdir. Sonuçlar, gelir esnekliğinin kırılma öncesine göre kırılma sonrasında (2018:Q3-2023:Q1) arttığını göstermektedir. Para talebinin faiz esnekliğine ilişkin bulgular ise istatistiksel olarak anlamlı ve negatiftir. Tahmin edilen alt dönemlerde önemli değişkenlik göstermiştir. Para talebinin faize karşı duyarlılığı kırılma sonrası dönemde kırılma öncesi döneme göre artış göstermiştir. Çalışmanın bulguları literatürdeki çalışmalarla tutarlılık göstermektedir.

**Anahtar Kelimeler:** Para talebi, Yapısal kırılma, Türkiye ekonomisi.

#### ABSTRACT

Analyzing the money demand function has been a long-standing topic of debate in the literature. In particular, the developments in the money markets following the recent financial turmoil have led to a revival of interest in the estimation of the money demand function in the execution of monetary policy aimed at price stability. Considering the institutional and structural changes in the Turkish economy, it can be stated that the relationship between the variables explaining the money supply and money demand has changed. Therefore, both the long-term analysis of the money demand function and the estimation of the stability of the variables become important. In this context, the aim of the study is to analyze the money demand function in the Turkish economy for the period 2006:Q1-2023:Q1 using the Kejriwal, Perron and Yu (2022) method, which tests partial parameter stability in cointegrated

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

regression models with multiple structural breaks. Two functional forms (log-log and semi-log form) as constrained (Money demand=f(interest rate)) and unconstrained (Money demand=f(income, interest rate)) models for estimating the money demand function have been estimated by traditional methods in many studies. The contribution of this study to the relevant literature aims to apply a fairly new method to the Turkish economy. According to the results of the study regarding the stability of the coefficients, the constant and income elasticity coefficients are unstable in the unconstrained model, while income and interest elasticity are stable in all other models. In addition, while there is evidence for a valid long-term relationship between money demand, output and interest rate for both forms of the unrestricted model, no evidence of a long-term relationship was found in the constrained model. In the estimated models, 2018:Q2 is the structural break period. According to the empirical findings in both models and sub-regimes, the income elasticity of money demand is statistically significant and positive. The results show that income elasticity increased post-break (2018:Q3-2023:Q1) compared to the period pre-break period. The interest elasticity of money demand is statistically significant and negative. It showed significant variability in the estimated subperiods. The interest elasticity of money demand increased in the post-break period compared to the pre-break period. The findings of the study are consistent with studies in the literature.

**Keywords:** Money demand, structural break, Turkish economy.

DONDURULMUŞ SEBZELERDE *Listeria monocytogenes* VARLIĞININ ARAŞTIRILMASI  
DETECTION OF THE PRESENCE OF *Listeria monocytogenes* IN FROZEN VEGETABLES

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ÖZET

*Listeria monocytogenes*, ciddi halk sağlığı sorunlarına ve ekonomik kayıplara yol açan, zoonotik, gıda kaynaklı bir patojendir. Listeriosis insanlarda ensefalit, septisemi, menenjit ve abort gibi durumların yanı sıra gastroenterik semptomlara da yol açabilen tehlikeli bir hastalıktır. Bu çalışma, marketlerde satılan sunulan dondurulmuş patates ve bezelye örneklerinde *L. monocytogenes* varlığının belirlenmesi amacıyla gerçekleştirildi. Çalışmada 20 adet dondurulmuş patates ve 20 adet dondurulmuş bezelye örneği olmak üzere toplam 40 adet dondurulmuş sebze örneği materyal olarak kullanıldı. *L. monocytogenes* izolasyonu klasik kültür tekniği kullanılarak TS EN ISO 11290-1'da belirtilen yöntemle yapıldı. İdentifikasyon amacıyla biyokimyasal testler uygulandı ve *hlyA* geninin tespitine yönelik PCR çalışmalarıyla identifiye edilen izolatların doğrulamaları gerçekleştirildi. Çalışma bulguları doğrultusunda analiz edilen 20 dondurulmuş patates örneğinin 13'ünde (%65), 20 adet dondurulmuş bezelye örneğinin 15'inde (%75) *Listeria* spp. varlığı tespit edildi. İdentifikasyon sonuçlarına göre 2 adet dondurulmuş patates (%10) ve 3 adet dondurulmuş bezelye örneği (%15) *L. monocytogenes* açısından pozitif olarak tespit edildi. Biyokimyasal testler sonucu *L. monocytogenes* olarak tespit edilen tüm izolatlar *hlyA* geninin varlığı yönünden PCR ile doğrulandı. Sonuç olarak dondurulmuş sebzelerdeki *L. monocytogenes* kontaminasyonu halk sağlığı açısından önemli bulunmuştur. Bu ürünlerin tüketilmeden önce uygun ısı parametrelerine riayet edilerek pişirilmesi ve çiğ üründen kaynaklanabilecek çapraz kontaminasyona karşı dikkatli olunması gerektiği düşünülmektedir.

**Anahtar Kelimeler:** *Listeria monocytogenes*, Dondurulmuş sebze, PCR, Listeriosis

ABSTRACT

*Listeria monocytogenes* is a zoonotic, foodborne pathogen that poses serious public health concerns and economic losses. Listeriosis is a dangerous disease in humans, causing conditions such as encephalitis, septicemia, meningitis, and abortion, in addition to gastroenteric symptoms. This study aimed to determine the presence of *L. monocytogenes* in frozen potato and pea samples sold in supermarkets. A total of 40 frozen vegetable samples, including 20 frozen potatoes and 20 frozen peas, were used as materials in the study. Isolation of *L. monocytogenes* was performed using the classical culture technique following the method specified in TS EN ISO 11290-1. Biochemical tests were applied for identification, and isolates confirmed through PCR studies by targeting the *hlyA* gene. According to the study findings, *Listeria* spp. was detected in 13 out of the 20 frozen potato samples (65%) and in 15 out of the 20 frozen pea samples (75%). Based on identification results, 2 frozen potato samples (10%) and 3 frozen pea samples (15%) were identified as *L. monocytogenes* positive. All isolates identified as *L. monocytogenes* through biochemical tests were confirmed by PCR for the presence of the *hlyA* gene. In conclusion, contamination of *L. monocytogenes* in frozen vegetables is considered significant for public health. It is recommended to cook these products by following appropriate heat parameters before consumption, and to be cautious about the potential cross-contamination that may arise from the raw products.

**Keywords:** *Listeria monocytogenes*, Frozen vegetables, PCR, Listeriosis

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ENDOSKOPIK INTRAGASTRİK BOTULİNÜM TOKSİN-A VE MİDE BALONUNUN OBEZİTE TEDAVİSİNDEKİ ROLÜ

### THE ROLE OF ENDOSCOPIC INTRAGASTIC BOTULINUM TOXIN-A AND GASTRIC BALLOON IN OBESITY TREATMENT

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#### ÖZET

Global sağlıkta öne çıkan bir endişe olarak obezite, etkili müdahaleleri zorunlu kılmaktadır. Bu yenilikçi çalışmada, endoskopik intragastrik botulinum toksin-A (btx) ile mide balonu (bln) arasındaki faydalar karşılaştırıldı. Prospektif bir tasarım kullanılarak, yaş ve cinsiyete göre eşleştirilmiş 106 hasta ya btx ya da bln müdahalesi için ayrıldı. Dağılım kriteri olarak VKİ kullanıldı. Bln'nin ortalama kilo azaltma konusunda üstünlüğü dikkat çekiciydi (14,6 kg'a karşılık 8,3 kg,  $P < 0,001$ ). Bununla birlikte, btx, işlem süresi (12 dakika'ya karşılık 17 dakika,  $P < 0,001$ ), fazla kilo kaybı yüzdesi (%58,1'e karşı %41,2,  $P < 0,001$ ) ve erken doyum puanlarında (3,4'e karşı 2,1,  $P < 0,001$ ) başarılıydı. Ek olarak, btx, postoperatif komplikasyon oranında (8%'a karşı 28%,  $P = 0,001$ ) ve olumsuz semptomların süresinde (0,6 gün'e karşı 4,2 gün,  $P < 0,001$ ) daha azdı. Her iki yöntem de yaşam kalitesini benzer şekilde artırdı. Veriler, özellikle daha hafif obezite vakaları için btx'nin umut vaat eden, daha güvenli bir alternatif olduğunu öne sürmektedir.

**Anahtar Kelimeler:** Botulinum Toksin-A, mide balonu, obezite, endoskopik müdahale, P-değerleri, yaşam kalitesi.

#### ABSTRACT

Emerging as a prominent concern in global health, obesity necessitates effective interventions. In this innovative study, the benefits between endoscopic intragastric botulinum toxin-A (btx) and gastric balloon (bln) were compared. Using a prospective design, 106 patients, matched by age and gender, were allocated to either btx or bln treatments. BMI was used as the allocation criterion. The superiority of bln in terms of average weight reduction was striking (14.6 kg vs. 8.3 kg,  $P < 0.001$ ). However, btx excelled in procedure duration (12 minutes vs. 17 minutes,  $P < 0.001$ ), percentage of excess weight loss (58.1% vs. 41.2%,  $P < 0.001$ ), and early satiety scores (3.4 vs. 2.1,  $P < 0.001$ ). Additionally, btx demonstrated a reduced postoperative complication rate (8% vs. 28%,  $P = 0.001$ ) and a shorter duration of adverse symptoms (0.6 days vs. 4.2 days,  $P < 0.001$ ). Both methods similarly elevated the quality of life. The data suggests that, especially for milder cases of obesity, btx offers a promising and safer alternative.

**Keywords:** Botulinum Toxin-A, gastric balloon, obesity, endoscopic intervention, P-values, quality of life.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## YAZ ANAOKULUNA DEVAM EDEN ÇOCUKLARININ ERKEN OKURYAZARLIK BECERİLERİNE YÖNELİK BİR ARAŞTIRMA

### A RESEARCH ON THE EARLY LITERACY SKILLS OF CHILDREN ATTENDING SUMMER KINDERGARTEN

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#### ÖZET

Okul öncesi eğitimin temel amaçlarından biri de çocukları ilkokula hazırlamaktır. Erken okuryazarlık becerileri ilkokula hazırlık kısmının önemli bir kısmını oluşturmaktadır. Okul öncesi eğitimde erken okuryazarlık becerileri farklı yöntem ve tekniklerin kullanıldığı etkinliklerle desteklenmektedir. Burada amaç, çocuklara okuma ve yazma öğretmek değil onların ilkokula başladıklarında okuma ve yazmayı kolaylıkla öğrenebilmesi desteklemek için gereken ön becerileri kazandırmaktır. Bu bağlamda okul öncesi dönem çocuklarının erken okuryazarlık becerilerini ele alan çalışmaları yapmak bu konunun önemine dikkat çekmek açısından önemlidir. Bu çalışmada, yaz anaokulu eğitim programının okul öncesi dönem çocuklarının erken okuryazarlık becerilerine etkisini belirlemek amacıyla gerçekleştirilmiştir. Araştırmanın çalışma grubunu, Mardin İli Midyat ilçesinde 2023 yılında yaz anaokuluna devam eden 20 çocuk oluşturmaktadır. Yaz anaokulları daha önce hiç okul öncesi eğitimi almamış çocuklar için Millî Eğitim Bakanlığı tarafından düzenlenmektedir. Araştırmada nicel araştırma yöntemlerinden öntest-sontest kontrol grupsuz deneysel desen kullanılmıştır. Veri toplama aracı olarak Karaman (2013) tarafından geliştirilen Erken Okuryazarlık Becerileri Değerlendirme Aracı (EOBDA) ve demografik bilgi formu kullanılmıştır. Okul öncesi dönem çocuklarının erken okuryazarlık becerilerini inceleyebilmek için geliştirilmiş olan EOBDA; ses bilgisel farkındalığı, yazı farkındalığı, öyküyü anlama, görselleri eşleştirme ve yazı yazma öncesi becerileri değerlendirme olmak üzere beş alt boyuttan oluşmaktadır. Demografik bilgi formunda çocuklara ve ailelerine ait bilgilere yönelik sorular yer almaktadır. Gerekli izinler alındıktan sonra veri toplama aşamasına geçilmiştir. Öncelikle araştırmacı çocuklar ile belirli bir süre eğitim ortamında vakit geçirmiştir. Sonraki aşamada veri toplama yönelik açıklamalar araştırmacı ve öğretmen tarafından çocuklara yapılmıştır. EOBDA uygulamak için okulda çocukların dikkatlerinin dağılmayacağı bir bölüm seçilmiş ve araştırmacı Erken Okuryazarlık Becerileri Değerlendirme Aracını uygulayarak öntest verilerini toplamıştır. İlk ölçümden altı hafta sonra sontest puanlarını belirlemek için ikinci ölçüm yapılmıştır. Çalışmadan elde edilen veriler SPSS 20.0 paket programı ile analiz edilmiştir. Araştırma sonucuna göre, deney grubunun Erken Okuryazarlık Becerileri Değerlendirme Aracı alt boyutlarından olan öyküyü anlama ve yazı yazma öncesi becerileri öntest ve sontest puanları arasında anlamlı bir fark olduğu saptanmıştır. Öte yandan ses bilgisel farkındalığı, görselleri eşleştirme ve yazı farkındalığı alt boyutlarında öntest ve sontest puanları arasında anlamlı bir fark olmadığı belirlenmiştir.

**Anahtar Kelimeler:** Okul öncesi eğitim, yaz anaokulu, erken okuryazarlık

#### ABSTRACT

One of the main purposes of pre-school education is to prepare children for primary school. Early literacy skills constitute an important part of the preparation for primary school. In pre-school education, early literacy skills are supported by activities using different methods and techniques. The aim here is not to teach children how to read and write, but to provide them with the necessary preliminary skills to help them learn to read and write easily when they start primary school. In this context, it is important to conduct studies on early literacy skills of preschool children to draw attention to the importance of this issue. This study was conducted to determine the effect of the summer kindergarten education program on the early literacy skills of preschool children. The study group of the research consists of 20



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

children attending summer kindergarten in Midyat district of Mardin Province in 2023. Summer kindergartens are organized by the Ministry of National Education for children who have never received preschool education before. In the research, a pretest-posttest experimental design without a control group, one of the quantitative research methods, was used. The Early Literacy Skills Assessment Tool (EOBDA) and demographic information form developed by Karaman (2013) were used as data collection tools. EOBDA was developed to examine the early literacy skills of preschool children; It consists of five sub-dimensions: phonological awareness, print awareness, story comprehension, matching visuals and evaluating pre-writing skills. The demographic information form includes questions regarding information about children and their families. After obtaining the necessary permissions, the data collection phase began. First of all, the researcher spent time with the children in the educational environment for a certain period of time. In the next stage, explanations regarding data collection were made to the children by the researcher and the teacher. To apply EOBDA, a section of the school where children would not be distracted was chosen and the researcher collected pretest data by applying the Early Literacy Skills Assessment Tool. Six weeks after the first measurement, the second measurement was made to determine the scores. The data obtained from the study were analyzed with the SPSS 20.0 package program. According to the results of the research, it was determined that there was a significant difference between the pretest and posttest scores of the experimental group in story comprehension and pre-writing skills, which are sub-dimensions of the Early Literacy Skills Assessment Tool. On the other hand, it was determined that there was no significant difference between the pretest and posttest scores in the subscales of phonological awareness, visual matching and print awareness.

**Key Words:** Preschool education, summer kindergarten, early literacy

EPILEPTİK NÖBETLE TANI ALAN ERİŞKİN GİTELMAN SENDROMU: OLGU SUNUMU  
ADULT GITELMAN SYNDROME DIAGNOSED WITH EPILEPTIC SEIZURE: CASE  
REPORT

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**ÖZET**

**Giriş:** Gitelman Sendromu (GS), hipokalemi metabolik alkaloz, hipomagnezemi ve düşük idrar kalsiyumu ile karakterize otozomal resesif ailesel tübüler bir hastalıktır. GS tanısı genellikle çocukluk, ergenlik veya yetişkinlik döneminde semptom göstermeyen bireylerde kan testi ile tesadüfen konur. Bazen kas krampları, tetani, yorgunluk, ventriküler aritmi, uyuşukluk, epilepsi ve noktüri gibi belirtilerle teşhis konur. GS'de nöbetlerle başvuru çok nadirdir. Burada ilk kez epilepsi şikayetiyle başvurduktan sonra GS tanısı konulan bir olgu sunulmaktadır.

**Vaka Özeti:** 31 yaşında, bilinen herhangi bir kronik hastalığı olmayan erkek hasta, acil servise dört ekstremitede güçsüzlük, karıncalanma ve yorgunluk şikayetiyle başvurdu. Acil servise kabulünün 20. dakikasında tonik-klonik nöbet geçirdi. Nöbet sonrası bilincini kaybeden hastanın acil kraniyal bilgisayarlı tomografisi ve diffüzyon kraniyal MR (Manyetik Rezonans Görüntüleme) incelemesinde herhangi bir patolojik bulguya rastlanmadı. Nöroloji bölümü tarafından değerlendirilen hastada santral bir patoloji saptanmadı ve mevcut durum metabolik bozukluklarla ilişkilendirildi. Elektrolit dengesizliği ve bilinç bulanıklığı nedeniyle hasta dahiliye yoğun bakım ünitesine yatırıldı. Hastada metabolik alkaloz (7,51), hipomagnezemi (0,6 mg/dL), hipokalemi (2,3 mmol/L), hipokalsiüri (2,5 mmol/d), normal kan basıncı, aldosteron aktivitesinde ve plazma renin aktivitesinde (PRA) artış mevcuttu. (Sırasıyla yatarken ve dik pozisyonda PRA 58 ve 126 ng/mL/saat ve aldosteron 325 ve 450 pg/mL). Tedavide hipomagnezemi ve hipokalemi nedeniyle intravenöz magnezyum ve potasyum replasmanı uygulandı. Takiplerinde bilinci yerine gelen hastanın tedavisine oral potasyum efervesan tablet, spiranolakton tablet ve magnezyum kaşe eklendi. Takiplerinde serum potasyum düzeyi 3,5 mmol/L, magnezyum düzeyi ise 1,7 mg/dL olarak belirlendi. Hipomagnezemi, hipokalemi ve metabolik alkaloz nedeniyle hastaya KDIGO (Kidney Disease: Improving Global Outcomes) kılavuzu Gitelman tanı kriterlerini karşılaması nedeniyle GS tanısı konuldu.

**Sonuç:** Hipokalemi, hipomagnezemi ve metabolik alkaloz gelişen hastalarda Gitelman sendromu akılda tutulmalıdır. Gelişebilecek ciddi komplikasyonları engellemek için potasyum ve magnezyum replasmanı uygulanmalıdır.

**Anahtar Kelimeler:** Gitelman Sendromu, Hipokalemi, Hipomagnezemi, Nöbet, Metabolik Alkaloz

**ABSTRACT**

**Background:** Gitelman Syndrome (GS) is an autosomal recessive familial tubular disease characterized by hypokalemic metabolic alkalosis, hypomagnesemia, and low urine calcium. GS is usually diagnosed incidentally by blood tests in asymptomatic individuals in childhood, adolescence, or adulthood. Sometimes it is diagnosed with symptoms such as muscle cramps, tetany, fatigue, ventricular arrhythmia, numbness, epilepsy, and nocturia. Presentation with seizures is very rare in GS. Here, a case who was diagnosed with GS after first presenting with epilepsy is presented.

**Case Summary:** A 31-year-old male patient with no known chronic disease was admitted to the emergency room with complaints of generalized weakness and fatigue. He also described weakness and tingling in his four extremities. He had a tonic-clonic seizure within the 20th minute of his admission to the emergency room. No pathological findings were detected in the emergency cranial computed

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

tomography and diffusion cranial Magnetic Resonance Imaging of the patient, who lost consciousness after the seizure. No central pathology was detected in the patient evaluated by the neurology department and the current situation was associated with metabolic disorders. The patient was admitted to the internal medicine intensive care unit due to electrolyte imbalance and confusion. The patient had metabolic alkalosis (arterial pH: 7.51), hypomagnesemia (0.6 mg/dL), hypokalemia (2.3 mmol/L), hypocalciuria (2.5 mmol/d), normal blood pressure, and increased activity of aldosterone and plasma renin activity (PRA) (PRA 58 and 126 ng/mL/h and aldosterone 325 and 450 pg/mL in the supine and upright position, respectively). In the treatment, intravenous magnesium and potassium replacement were applied due to hypomagnesemia and hypokalemia. Oral potassium effervescent tablet, spironolactone tablet, and magnesium cachet were added to the treatment of the patient, whose consciousness was regained during the follow-up. During the follow-up, serum potassium level was found to be 3.5 mmol/L and magnesium level was 1.7 mg/dL. The patient was diagnosed with GS due to hypomagnesemia, hypokalemia and metabolic alkalosis and because he met the Kidney Disease: Improving Global Outcomes (KDIGO) guide Gitelman diagnostic criteria.

**Conclusion:** Gitelman syndrome should be considered in patients who develop hypokalemia, hypomagnesemia and metabolic alkalosis. Potassium and magnesium replacement should be applied to prevent serious complications that may develop.

**Keywords:** Gitelman Syndrome, Hypokalemia, Hypomagnesemia, Seizure, Metabolic Alkalosis

**A PRACTICAL AND SHORT-STEP SYNTHESIS OF NEW DOPAMINE ANALOGUES VIA  
ACYLATION AND METHYLATION**

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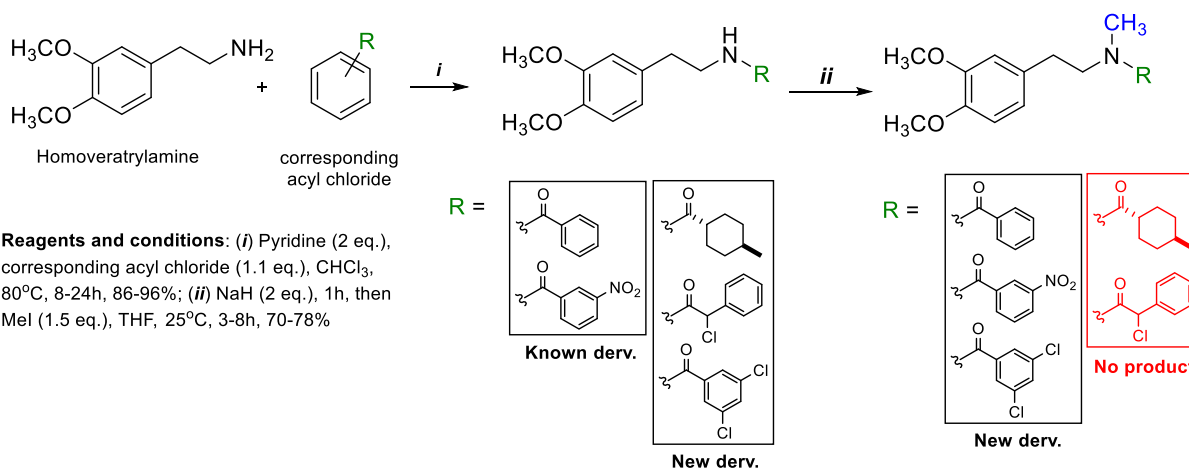
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**ABSTRACT**

Dopamine, a monoamine hormone, is a neuromodulatory molecule that plays a very important role in the central nervous system. Dopamine, formed by the decarboxylation of L-DOPA which is carboxylic acid derivative of dopamine, is synthesized by the kidney and brain and used in the body. This neurotransmitter molecule is among the most important structures involved in central nervous system-related diseases such as schizophrenia and Parkinson's. Decreasing dopamine levels in the brain leads to attention deficit hyperactivity disorder, Parkinson's, Alzheimer's and restless leg syndrome. Increasing dopamine levels lead to health problems such as high energy, schizophrenia, addiction, insomnia and stress. As a small and functionalizable molecule, dopamine has fascinated the attention of synthetic organic chemists. Currently, there have been many studies on dopamine derivatives in the literature, such as their affinity studies to receptors, antifungal effects, and analytical applications (Namballa et al., 2023; Nawaz et al., 2023; Wang et al., 2023). In addition, there are also only synthesis-oriented studies (Akbaba et al., 2016; Özgeriş et al., 2015; Yılmaz & Göksu, 2014). In the present study, the synthesis of new dopamine derivatives was carried out in a two-step reaction. Homoveratrylamine was used as the starting material for the syntheses. The amine group in this structure was converted to the secondary amide derivatives with corresponding acyl chlorides. Then, tertiary amide structures were synthesized using iodomethane. All synthesized structures were characterized by <sup>1</sup>H and <sup>13</sup>C NMR techniques. Some of the secondary amides and all tertiary amides are not known in the literature. Therefore, the biochemical effects of these structures have not yet been investigated. In the future, new substituted groups will be attached and the biological effects of these derivatives will be investigated.

**Keywords:** Dopamine; Homoveratrylamine; Schizophrenia, Iodomethane



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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## NESNE SINIRLARININ KENAR BULMA ALGORİTMALARIYLA ELDE EDİLMESİ OBTAINING OF OBJECT BOUNDARIES WITH EDGE DETECTION ALGORITHMS

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### ÖZET

Uydu görüntüleri, hava fotoğrafları ve LiDAR verilerinden nesne (obje) tespiti son yıllarda popüler hale gelen çalışmalar arasında yer almaktadır. Son yıllarda sıklıkla kullanılan LİDAR teknolojisi sayesinde otomatik olarak 3B nokta koordinatları elde edilebilmektedir. 3B noktalar arazi koordinatlarını içermesinin yanında arazi üzerindeki nesnelere de koordinatlarını da içermektedir. Bu nedenle çalışmada LİDAR verisi tercih edilmiştir. Çalışma kapsamında; LİDAR sisteminden elde edilen 3B nokta bulutu verisi ile 10 adet veri seti oluşturulmuştur. Daha sonra 3B nokta bulutu verisinden elde edilen görüntüler kullanılarak, tarımsal alandaki nesne sınırları tespit edilmiştir. Bu amaçla yapılan çalışmada öncelikle nokta bulutu verisinden elde edilen gri görüntüler belirli filtrelerden geçirilerek Canny, Sobel, Roberts ve Prewitt kenar bulma algoritmaları uygulanmış ve bu algoritmalar için en uygun parametre değerleri tespit edildikten sonra kenar bulma algoritmalarının başarısı karşılaştırılmıştır. Oluşturulan referans veri setleri yardımıyla doğruluk analizleri yapılmış ve bu kapsamda F1-Score, Tepe Sinyal Gürültü Oranı, Sinyal Gürültü Oranı, Ortalama Karesel Hata, Yapısal Benzerlik İndeksi ve Korelasyon Katsayısı ölçütleri kullanılmış olup bu ölçütlerin sonuçlara etkisi ve performansları test edilmiştir. Elde edilen sonuçlara göre F1-Score değerinde ortalama % 86 oranında başarı elde edildiği görülmüştür. Yapılan bu çalışma, sadece uydu ve hava fotoğrafları ile değil aynı zamanda nokta bulutu verilerinden de nesne sınırlarının kenar bulma algoritmalarıyla başarılı bir şekilde tespitinin mümkün olduğunu göstermiştir.

**Anahtar Kelimeler:** Nokta Bulutu, LİDAR, Kenar Tespiti

### ABSTRACT

Object detection from satellite images, aerial photographs and LiDAR data has become popular in recent years. By means of LIDAR technology, which has been used frequently in recent years, 3D point coordinates can be obtained automatically. 3D points contain terrain coordinates as well as coordinates of objects on the terrain. For this reason, LIDAR data was preferred in the study. Within the scope of the study, 10 data sets were generated with 3D point cloud data. Afterwards, using images obtained from 3D point cloud data, parcel boundaries in the agricultural area were determined. In the study, Canny, Sobel, Roberts and Prewitt edge detection algorithms were applied to the gray images obtained from the point cloud data were passed through the specific filters and the most appropriate parameter values for these algorithms have been determined. Then, the success of edge detection algorithms was compared.



**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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Accuracy analyzes were conducted with reference data sets. The effect and performance of the accuracy criteria that F1-Score, Peak Signal to Noise Ratio, Signal to Noise Ratio, Mean Squared Error, Structural Similarity Index Measure and Correlation Coefficient were tested on the results. The results showed that an average success rate of 86 % was achieved in the F1-Score value. This study showed that it is possible to successfully detect object boundaries from point cloud data with edge detection algorithms not only from satellite and aerial photographs but also from point cloud data.

**Keywords:** Point Cloud, LIDAR, Edge Detection

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

AZƏRBAYCAN MİLLİ ELMLƏR AKADEMİYASININ (AMEA) MƏRKƏZİ ELMI  
KİTABXANASINDA (MEK) HEYDƏR ƏLİYEV İRSİ

THE LEGACY OF HEYDAR ALIYEV IN THE CENTRAL SCIENTIFIC LIBRARY (CSL)  
OF THE AZERBAIJAN NATIONAL ACADEMY OF SCIENCES (ANAS)

*Mammad ALİYEV*

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Kütüphanesi başkanı, filoloji, Bakü, Azərbaycan.*

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## ÖZET

Azərbaycanın müstəqil dövlət quruculuğu birbaşa Heydər Əliyevin imzası ilə bağlıdır. Onun adı təkcə ölkəmizin dünəni yox, bugünü və gələcəyi ilə bərabər səsləşir. 1970-ci illərdən vətənimizin bütövlükdə varlığı Heydər Əliyevin səyləri nəticəsində yeni impuls qazanaraq yeni mərhələyə qədəm qoydu. Heydər Əliyev kursunun müzəffər ali baş-komandan, qalib lider İlham Əliyev tərəfindən layiqiylə davam etdirilməsi də tariximizin Heydər Əliyev mərhələsinin davam etdiyini göstərir. Azərbaycan Respublikasının Prezidenti İlham Əliyevin 29 sentyabr, 2022-ci il tarixli 2023-cü ilin Azərbaycan Respublikasında “Heydər Əliyev İli” elan etməsi haqqında Sərəncam imzalaması onun dünya tarixindəki yerinə, müstəqil dövlətimiz və xalqımız qarşısındakı tarixi xidmətlərinə dövlət səviyyəsində göstərilən yüksək münasibətin göstəricisidir. Heydər Əliyevin diqqət ayırdığı sahələr içərisində elm ən başlıca yer tutur. Görkəmli dövlət xadimi Heydər Əliyev ölkə elmini və Elmlər Akademiyasını xalqın və dövlətimizin mənafeələrinə uyğun şəkildə inkişaf etdirmək istiqamətində əhəmiyyətli tədbirlər həyata keçirmişdir. Azərbaycan elmi və Milli Elmlər Akademiyasının formalaşması və inkişafı yollarında Heydər Əliyev-İlham Əliyev epoxası xüsusi tarixi mərhələ təşkil edir.

Azərbaycan Respublikasında 2023-cü ilin ölkədə “Heydər Əliyev İli” elan edilməsi ilə əlaqədar AMEA-nın prezidenti, hörmətli akademik İsa Həbibbəyli Akademiya institutlarının da bu istiqamətdə səfərbər olunmasıyla bağlı sərəncam imzalamışdır. Rəhbəri olduğum AMEA-nın Mərkəzi Elmi Kitabxanası da Heydər Əliyev ili çərçivəsində mühüm işlər görmüşdür. MEK-də bu il Ulu öndərin həyatı və siyasi fəaliyyətini özündə əks etdirən kitablarının əks olunduğu bibliografik göstərici, azərbaycan və ingilis dillərində Heydər Əliyev kəlamları adlı audio vəsait və “Heydər Əliyev-100” adlı illik təqvim hazırlanıb. Təqvimin hər səhifəsində ümummilli lider Heydər Əliyevin əlamətdar və tarixi günlərlə, 20 Yanvar hadisələri, Xocalı faciəsi, Novruz bayramı, Azərbaycan Respublikasının dövlət müstəqilliyi, Milli Ordu, mətbuat, Azərbaycan dili və təhsili ilə bağlı fikirləri yer alıb. Kitabxananın Sərbəst Elektron Resurslar şöbəsi tərəfindən Vikipediya da dahi lider haqda 100 məqalə yaradılıb. İlboyu MEK-də Heydər Əliyev lektoriyasının məşğələləri keçirilir. Onu da qeyd edirəm ki, bu ilin noyabr ayında Heydər Əliyevə həsr olunmuş beynəlxalq konfrans keçiriləcək. İlin sonunda akademiyanın ümumi yığıncağında ümummilli liderə həsr olunmuş kitab sərgisi də təşkil olunacaq. Xatırladım ki, Milli Elmlər Akademiyası bugünədək ümummilli liderə ithaf olunmuş 40-a yaxın kitab nəşr edib.

**Anahtar Kelimələr:** Heydar Aliyev, bilim, Azərbaycan Milli Bilim Akademisi, Mərkəzi İlmî Kütüphanesi

## ABSTRACT

The independent state building of Azerbaijan is directly related to Heydar Aliyev's signature. His name resonates not only with the past, but also with the present and future of our country. Since the 1970s, the existence of our homeland as a whole entered a new stage, gaining a new impulse as a result of Heydar Aliyev's efforts. The worthy continuation of Heydar Aliyev's course by the victorious commander-in-chief, victorious leader İlham Aliyev also shows that the Heydar Aliyev phase of our history continues. The signing of the Decree by the President of the Republic of Azerbaijan İlham Aliyev on September 29, 2022 on the declaration of 2023 as the "Year of Heydar Aliyev" in the Republic of

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

Azerbaijan is an indicator of the high attitude shown at the state level to his place in world history and his historical services to our independent state and people. Among the fields that Heydar Aliyev paid attention to, science occupies the most important place. The prominent statesman Heydar Aliyev took important measures to develop the country's science and the Academy of Sciences in accordance with the interests of the people and our state. The Heydar Aliyev-Ilham Aliyev era constitutes a special historical stage in the formation and development of the Azerbaijan Academy of Sciences and National Sciences.

In connection with the declaration of 2023 as the "Year of Heydar Aliyev" in the Republic of Azerbaijan, the president of ANAS, respected academician Isa Habibbeyli, signed an order on the mobilization of Academy institutions in this direction. The Central Scientific Library of ANAS, which I am the head of, has also done important work within the Heydar Aliyev year. A bibliographic index containing the books of the great leader's life and political activities, audio materials called Heydar Aliyev's sayings in Azerbaijani and English, and an annual calendar called "Heydar Aliyev-100" were prepared at the CSL this year. On each page of the calendar, national leader Heydar Aliyev's thoughts on significant and historical days, events of January 20, Khojaly tragedy, Novruz holiday, state independence of the Republic of Azerbaijan, National Army, press, Azerbaijani language and education are included. The library's Free Electronic Resources department created 100 articles about the great leader on Wikipedia. Heydar Aliyev lectures are held at CSL throughout the year. Let me also mention that an international conference dedicated to Heydar Aliyev will be held in November of this year. At the end of the year, a book exhibition dedicated to the national leader will be organized at the general meeting of the academy. I reminded that the National Academy of Sciences has published about 40 books dedicated to the national leader.

**Keywords:** Heydar Aliyev, science, Azerbaijan National Academy of Sciences, Central Scientific Library

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SIKIŞMALI ARAÇ İÇİ KAZALARDA YÜZ YÜZE ENTÜBASYON YAPILABİLMESİNİ SAĞLAYAN VIDEO LARİNGOSKOP TASARLANMASI

### DESIGNING A VIDEO LARYNGOSCOPE TO ENABLE FACE-TO-FACE INTUBATION IN TRAPPED IN-VEHICLE ACCIDENTS

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#### ÖZET

Sıkışmalı trafik kazalarında hastaların boynunu sabitlemek ve özellikle araç içinde entübasyon yapmak ciddi zorlaşmaktadır. Gerek hastaların fiziksel sıkışmalarına bağlı gerekse de şahsın havayolunun obstrüksiyonu sebebiyle hastalarda acil endotrakeal entübasyon gereksinimi ortaya çıkabilmektedir (1).

Araç içinde genellikle klasik metoduyla endotrakeal entübasyon yapmak için yeterli alan bulunmayacaktır ve bu durumda da yüz yüze entübasyon (Tomahawk) metodu uygulanması gerekebilecektir (2-4). Literatürde ki çalışmalara bakıldığında; çalışmalar klasik metod için kullanılan, sol elle kullanıma uygun laringoskopların birbiriyle karşılaştırılmasına yöneliktir ve manken üzerinde yapılmış çalışmalar ağırlıklıdır (5-8).

Bu bildiriye klasik laringoskoplardan farklı olarak, klasik metod la sol elle kullanıma uygun olmayan, klasik laringoskopların koordinat düzleminde Y eksenine göre ayna tersi olan ve yüz yüze entübasyonun sol elle yapılmasını sağlayabilecek "Reverse Laringoskop Prototipi" sunulacaktır.

#### Teknoloji

Cihaz iki temel öğeden oluşmaktadır; handle bölümü ve video ünitesi bölümü. Handle bölümü kısmında video kamera kanalı mevcut sol el laringoskopunun Y koordinat eksenine göre tam tersi yönünde yer almaktadır (Resim-1, Resim-2).

Video ünitesi bölümü ise yerleşik bir cep telefonu ve buna bağlı kablo kameradan oluşmaktadır (Resim-3).

**Yenilik:** Mevcut kullanımda olan tüm laringoskoplar sol elle tutularak kullanılmakta ve gerek tüp ilerleme alanı gerekse ışık kaynağı sol elle kullanıma uygun olarak yerleştirilmiştir. Geliştirdiğimiz laringoskopta ise ışık kaynağı ve tüp ilerletme kanalı koordinat düzleminde Y eksenine göre ters olarak yerleştirilmiştir.

Resim-4'te ise yüz yüze entübasyon uygulaması maket üzerinde gösterilmiştir.

#### Sonuç

Klasik laringoskoplar sağ elle tutularak kullanıldığında tüpün sol elle ilerletilmesi durumunda eller çapraz hale gelip koordinasyon bozulacak, görüş alanı kapanacaktır. Geliştirilen cihazda ise sağ elle cihaz tutularak uygulama yapılacaktır. Işık kaynağı sağ tarafta, tüp kanalı da sol elin olduğu sol tarafta olacağı için çapraz duruş olmayacak ve yüz yüze entübasyon imkânı oluşacaktır. Görüş alanı korunacak ve el-göz koordinasyonu korunacaktır. Ayrıca video laringoskop olduğu için videolaringskopinin sağladığı tüm imkanları sağlayacaktır.

**Anahtar Kelimeler:** Ters laringoskop, yüz yüze entübasyon, video laringoskopi, Tomahawk metodu

#### ABSTRACT

It is extremely difficult to stabilize neck and perform intubation in the vehicle in trapped traffic accidents. Emergent endotracheal intubation may be required due to either physical compression or

airway obstruction of patient [1]. In the vehicle, generally there will be inadequate area for endotracheal intubation via classical technique, necessitating the use of face-to-face intubation (Tomahawk) method [2-4]. In the literature, studies have focused on comparison across laryngoscopes compatible with use by left hand in classical intubation technique and majority of the studies were conducted on manikin [5-8]. Here, unlike classical laryngoscopes, we present "Reverse Laryngoscope Prototype" which is mirror-inverted on Y-axis of classical laryngoscopes not compatible for use with left hand and can provide ability to perform face-to-face intubation using left hand.

### Technology

The device has two major components: handle and video unit. In the handle, there is a video camera canal at total opposition direction according to Y-axis of left hand laryngoscope (Picture 1 and 2). The video unit includes a built-in cell phone with an attached cable camera (Picture 3).

### Innovation

All available laryngoscopes are used by holding left hand and both tube canal and light source are placed to be compatible for use with left-hand. In the laryngoscope we developed, tube canal and light source are placed at total opposition according to Y-axis.

Picture 4 illustrates face-to-face intubation on manikin.

### Conclusion

When classical laryngoscopes are used with right hand and tube was advanced using left hand, hands will cross-over and impair coordination and obscure field of vision. In the device we developed, intubation will be performed while using device with right hand. There will be no cross-over of hands since light source is at the right side and tube canal is at the left side, allowing face-to-face intubation. This will maintain field of vision and eye-hand coordination. In addition, it will offer all advantages of a video laryngoscopes.

**Keywords:** Reverse laryngoscope, face-to-face intubation, video laryngoscope, Tomahawk method

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

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**Resim 1:** Reverse Laringoskop Prototipi handle





Resim 2: Reverse Laringoskop Prototipi video ünitesi



**Resim 3:** Reverse Laringoskop Prototipi video ünitesi; yerleşik bir cep telefonu ve buna bağlı kablo kameradan oluşmaktadır



Resim 4: Yüz yüze entübasyon uygulamasının maket üzerinde gösterilmesi

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## YÜKSEKÖĞRETİME GEÇİŞTE ÖĞRENCİ HAREKETLİLİĞİ ve NİĞDE TRANSITION TO HIGHER EDUCATION: STUDENT MOBILITY and NİĞDE

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### ÖZET

Öğrenciler üniversiteyi tercih ederken farklı faktörleri göz önüne almaktadır. Üniversite okumak hem bilimsel hem de sosyal açıdan bir gelişim imkanı sunmaktadır. İş hayatına atılmadan önce bilimsel birikimle birlikte kültürel ve sosyal birikimini şekillendirme imkanı sunması noktasında öğrenciler genellikle imkanları dahilinde buldukları ilden farklı bir ilde okumayı tercih etmektedir. Bu nedenle hem üniversitenin kalitesi hem de yaşanılan şehrin sosyo-ekonomik durumu öğrenciler için önemli bir faktör olarak karşımıza çıkmaktadır. Dolayısıyla üniversite seçiminde üniversitenin kalitesi kadar şehrin sosyo-ekonomik durumu daha önemli hale gelebilmektedir. Bu ekseninde öğrencilerin şehir seçiminde birçok farklı unsur devreye girmektedir. Bu faktörler arasında üniversitenin mevcut kalitesiyle birlikte şehirdeki ulaşım imkanı, şehrin sosyolojik yapısı, şehrin öğrencilere sunduğu alanlar ve şehrin ekonomik durumu yer almaktadır. Bu çerçevede bir şehirdeki üniversitedeki öğrencilerin varlığı şehrin sosyo-ekonomik yapısını etkileyerek dönüştürmektedir. Birçok şehir üniversite öğrencilerinin istek ve taleplerine göre sunduğu hizmeti güncelleyebilmektedir. Bu nedenle öğrenciler arasında popüler olan şehirler olduğu gibi üniversite tercihlerinde diğer şehirlere göre arka planda olan şehirler de bulunmaktadır. Bu noktada öğrencilerin üniversite tercihleriyle birlikte şehir seçiminde dikkat ettikleri hususların analiz edilmesi önemlidir. Bu çalışmada Yüksek Öğretim Kurulu Yükseköğretime Geçişte Öğrenci Hareketliliği Raporuna ait veriler Niğde il bazında yorumlanmıştır. Yükseköğretime Geçişte Öğrenci Hareketliliği raporunda illere göre ikametgah, farklı illere yerleşenlerin oranı, ikametgâh ilinde kalmayı tercih edenler, illerin başarı sıralamasına göre dağılımı ve engellilik durumuna göre yerleşenlerin durumu iller bazında orantısal olarak yer almaktadır. Çalışmada illere göre ikametgâh ili ve farklı illere yerleşenlerin oranlarına bakıldığında şehirler arasında büyük bir farklılaşma olduğu görülmektedir. Çalışmada Niğde ilini en çok tercih edenlerin il dağılımı, bu dağılımda Niğde ilinden en fazla hangi illere öğrenci gittiği ve engelli öğrencilerin Niğde ilini tercih edip etmediklerine ilişkin veriler yer almaktadır. Bu çalışmadaki verilerin bölgedeki önemli yerel aktörler tarafından ele alınması durumunda şehirlerin üniversite öğrencilerinin istek ve taleplerinin dikkate alındığı bir yapıya doğru evrileceği ve şehirlerin daha öğrenci dostu olacağı ifade edilebilir.

**Anahtar Kelimeler:** Yükseköğretime Geçiş, Öğrenci Hareketliliği, Niğde.

### ABSTRACT

Students take different factors into consideration when choosing a university. Students generally prefer to study in a different city than the one they live in, as it provides them with the opportunity to shape their cultural and social knowledge along with scientific knowledge before entering business life. For this reason, both the quality of the university and the socio-economic opportunities of the city are important factors for students. In this axis, many different factors come into play in students' city selection. These factors include the current quality of the university, transportation, the sociological structure of the city, the areas it offers to students and cost factors. Many cities can update their transportation, food, venue and PR activities according to the wishes and demands of university students. The presence of a university in a city transforms the city by activating in socio-economically. For this reason, while there are cities that are popular among students, there are also places that are in the background compared to other cities in university preferences. At this point, it is important to analyze the issues that students pay attention to when choosing a city along with their university preferences. In

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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this study, the data of the Student Mobility Report were systematically interpreted on a Niğde province basis. The study includes data on the provincial distribution of those who prefer Niğde the most, which provinces most students go to in Niğde, whether disabled students prefer Niğde, and which disability status those who prefer Niğde fall into. All these data were evaluated from a sociological perspective in the study, based on the reasons. It can be stated that if the data in this study are handled by important local actors in the region, cities will evolve towards a structure where the wishes and demands of university students are taken into account and cities will become student-friendly.

**Keywords:** Transition To Higher Education, Student Mobility, Niğde



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## MAX WEBER'İN SOSYALİZM ANLAYIŞI VE 1917 RUS DEVRİMİ HAKKINDAKİ GÖRÜŞLERİ

### MAX WEBER'S THOUGHTS ON SOCIALISM AND RUSSIAN REVOLUTION OF 1917

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#### ÖZET

Sosyolojinin ve sosyal teorinin kurucu babalarından biri kabul edilen Alman düşünce adamı Max Weber (1864-1920) diğer tüm çalışmalarından daha çok kapitalizm analizleriyle tanınmaktadır. Bilhassa *Protestan Ahlakı ve Kapitalizmin Ruhunu* (*Die protestantische Ethik und der Geist des Kapitalismus*) isimli ölümünden sonra kitaplaşan makale dizisi bugün hâlâ pek çok tartışmaya zemin oluşturmaktadır. Fakat kapitalizmin dünya sathına muazzam bir hızla yayılımına rağmen, Weber'in entelektüel yaşamı hem Karl Marx'ın fikirlerinin dolaşımında olduğu, hem Alman Sosyalistlerinin dünyanın en büyük sosyalist siyasi partisine dönüştüğü, hem İkinci Enternasyonalin kurulup tüm Avrupa sathında güçlendiği hem de 1917 Rus Devriminin gerçekleştiği bir döneme tesadüf etmiştir. Weber gibi saygın bir sosyal bilimcinin sosyalizm ve komünizm konusunda kamusal tartışmalardaki temkinli sessizliği bir hayli dikkat çekicidir. Bu alanda, devasa Weber külliyatında sosyalizmle ilişkili kapsamlı analizler bulmak da, günümüzün Weber uzmanlarından Weber düşüncesinde sosyalizmin yerine dair ortaya konmuş açıklayıcı değerlendirmeler okumak da pek mümkün değildir. Bu kör nokta, Weber'in entelektüel mirasında dair bir tür küçük bir kara delik etkisi yaratmaktadır. Bu konuda tek bir istisna vardır. Weber sosyalizm, komünizm ve devrimcilik konularında esasen bir kez geniş bir çerçeve çizmiştir: Weber'in 1918'de Viyana'da yayınlanan *Der Sozialismus (Sosyalizm)* adlı incelemesi, Birinci Dünya Savaşı sırasında gerçekleşen Rus Devriminin ardından Berlin ve Viyana'da da yükselen devrimci enerjiye istinaden Avusturya Genelkurmayına verdiği konferansın notlarına dayanan küçük bir risaledir. Hayli ilginç gözlemlere ve izlenimlere dayanan bu çalışma Max Weber'in entelektüel açıdan en kıdemli ve prestijli olduğu dönemde sosyalizm fenomenine bakışını anlamak adına başlıca materyalin bulunabildiği kaynaktır. Bu bağlama yerleştirilen sunumda, kapitalizm ve liberalizmle ilişkilendirilen Weber'in dikkatli bir sessizlik içinde izlediği Almanya'daki sosyalist hareketlere, Karl Marx hakkındaki fikirlerine ve 1917 Devrimine ilişkin görüşlerine yakından ve eleştirel bir nazarla bakılacaktır. Weber'in 1918'den bakarak 1917 Devrimine dair yaptığı değerlendirmelerin bugünün dünyasında ne anlam ifade ettiği sorgulanacaktır. Marx'ın fikri mirası ile Weber'in düşüncesi arasındaki entelektüel bağlantıya ilişkin bazı hususlar da vurgulanarak sonuç ve değerlendirmeler paylaşılacaktır.

**Anahtar Kelimeler:** Max Weber, Sosyalizm, Komünizm, Karl Marx, 1917 Rus Devrimi.

#### ABSTRACT

German thinker Max Weber (1864-1920) considered one of the founding fathers of sociology and social theory is better known for his detailed analysis of capitalism than for any of his other works. In particular, his posthumously published *Die protestantische Ethik und der Geist des Kapitalismus* (*The Protestant Ethic and the Spirit of Capitalism*) still provides an intellectual basis for many debates even today. However, despite the fact of enormous spread of capitalism across the world, Weber's intellectual life coincided with a period in which Karl Marx's ideas were in circulation, the German Socialists became the largest socialist political party in the world, the Second International was founded and strengthened throughout Europe, and the Russian Revolution of 1917 took place, too. Under these circumstances, the cautious silence of Weber as a highly respected social science scholar in public debates on socialism and communism seems quite remarkable. In this field, it is nearly not possible to find comprehensive analyses of socialism in the vast Weber corpus, nor is it possible to read explanatory



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

assessments of the place of socialism in Weber's thought from contemporary Weber scholars. This blind spot creates a kind of small black hole in Weber's intellectual legacy. There is only one exception in this regard. Weber essentially gave a general outline of socialism, communism and revolutionism once in his career: Weber's treatise *Der Sozialismus* (Socialism), published in Vienna in 1918, is a small pamphlet based on notes from a lecture he delivered to the Austrian Military General Staff in response to the rise of revolutionary energy in Berlin and Vienna following the Russian Revolution during the First World War. This work, based on some interesting observations and impressions, is the primary source of material for understanding Max Weber's view of the phenomenon of socialism at a time when he was at his most intellectually senior and prestigious moment. In this context, this presentation will take a close and critical look at the socialist movements in Germany, which Weber, who was associated with capitalism and liberalism, watched in careful silence. Additionally this presentation will pay attention to place of Karl Marx, and the Revolution of 1917 in Max Weber's thought. It will be questioned what Weber's evaluations of the 1917 Revolution from 1918 mean in today's world, and some aspects of the intellectual connection between Marx' legacy and Weber will be emphasized in conclusion.

**Keywords:** Max Weber, socialism, communism, Karl Marx, Russian Revolution of 1917.

OECD ÜLKELERİYLE KARŞILAŞTIRMALI OLARAK TÜRKİYE'DE VERGİ YÜKÜ  
TAX BURDEN IN TÜRKİYE COMPARED TO OECD COUNTRIES

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**ÖZET**

Kamu maliyesinin önemli bir parçası olarak vergi politikalarıyla bir taraftan vergi kayıplarını önlemek diğer taraftan piyasaların etkin çalışmasını teşvik etmek amaçlanmaktadır. Vergilemede etkinliğinin sağlanmasının yanında vergilemenin diğer temel ilkesi vergi adaletinin sağlanmasıdır. Vergilemede adalet ilkesinin temel prensibi ise ödeme gücüne göre vergileme ilkesidir. Bu çalışmanın konusu; OECD ülkelerinin vergi sistemlerinin etkinlik ve adalet açısından nicel verilerle karşılaştırması amacıyla toplam vergi gelirlerinin GSYH'ye oranını ifade eden vergi yüklerinin incelenmesidir. Bu amaçla, toplam vergi yükü yanında, vergi türleri bazında da vergi yükleri incelenmiştir. Bu çerçevede çalışmanın amacı; bir yandan toplam vergi yükü ile vergilemede etkinlik, diğer taraftan vergi türlerine göre vergi yüklerini incelemek suretiyle vergilemede adalet düzeylerini OECD ülkeleriyle karşılaştırılarak Türkiye'nin görece durumunu değerlendirmektir. Bu amaçla çalışmada yöntem olarak; genel tarama modelinde kesit alma yöntemine uygun olarak vergi yüküne ilişkin belirli bir döneme ait OECD ülkeleri verileri analiz edilecektir. Çalışmanın sonucunda; genel olarak OECD ülkelerinin vergi sistemlerinde vergi yükü açısından, 1960'ların ortasından 2010'ların başına kadar genel olarak vergi oranlarının düştüğü, ayrıcalıklı sektörlere vergi kolaylıkları sağlandığı, sermaye kazançlarının ayrı vergilendirildiği ve bu doğrultuda düz oranlı ya da ikili vergi sistemlerinin uygulandığı görülmektedir. Türkiye'de ise vergi yükü açısından, vergi oranlarının gelişmiş ülkelere göre genelde düşük olması pozitif bir faktör olarak görülmekte, ancak vergilemede kayıt dışılığın büyüklüğü, vergi istisna, muafiyet ve indirimleri ile dolaylı vergilerin göreceli yüksekliğinin vergi adaletini bozması, gelir ve kurumlar vergileri ile KDV'nin dar bir mükellef tabanından alınması, ücretlilerin vergi yükünün yüksek olmasının vergi sisteminin zayıf yönleri olduğu görülmektedir. Vergi politikalarında etkinliğin sağlanabilmesi için vergi yükünün piyasaları teşvik edici düzeylerde olmasının yanısıra vergilemede kayıt dışılığın önlenmesi gerekmektedir. Vergilemede adaleti sağlayacak, ödeme gücüne dayanan, emek ve sermayeyi ayırıştıran, mükelleflerin ödeme ve fayda düzeylerinin birlikte dikkate alındığı vergi politikalarına gereksinim duyulmaktadır.

**Anahtar Kelimeler:** Vergi Yükü, Vergilemede Etkinlik, Vergilemede Adalet, Ödeme Gücü, Düz Oranlı Vergi Sistemi, İkili Vergi Sistemi

**ABSTRACT**

As an essential part of public finance, tax policies aim to prevent tax losses on the one hand and to encourage the efficient functioning of markets on the other hand. In addition to ensuring the effectiveness of taxation, the other fundamental principle of taxation is to provide tax justice. The basic principle of justice in taxation is the principle of taxation according to the ability to pay. The subject of this study is; an examination of tax burdens, which represent the ratio of total tax revenues to GDP, to compare the tax systems of OECD countries with quantitative data regarding efficiency and fairness. For this purpose, in addition to the total tax burden, tax burdens were examined based on tax types. In this context, the aim of the study is; on the one hand, it is to evaluate the relative situation of Turkey by comparing the total tax burden and efficiency in taxation, and on the other hand, the levels of fairness in taxation with OECD countries by examining the tax burdens according to tax types. For this purpose, as a method in the study; in the general screening model, data from OECD countries regarding the tax burden for a certain period will be analyzed by the cross-section method. As a result of the study; in general, in terms of the tax burden in the tax systems of OECD countries, it is seen that tax rates generally

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

---

decreased from the mid-1960s to the early 2010s, tax facilities were provided to privileged sectors, capital gains were taxed separately, and flat-rate or dual tax systems were applied accordingly. In Turkey, in terms of the tax burden, the lower tax rates compared to developed countries are seen as a positive factor, but it seems that the tax system has, in general, weaknesses such as the unregistered tax base, tax exemptions, and discounts, and the relative highness of indirect taxes disrupting tax justice, income, and corporate taxes and VAT collecting from a narrow taxpayer base, and the high rate of tax burden of wage earners. To ensure efficiency in tax policies, the tax burden must be at levels encouraging markets and preventing the unregistered tax base. Tax policies are needed to ensure justice in taxation based on the ability to pay, setting apart labor and capital, and considering taxpayers' payment and benefit levels together.

**Keywords:** Tax Burden, Efficiency in Taxation, Fairness in Taxation, Ability to Pay, Flat Rate Tax System, Dual Tax System

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## RUTİN OLARAK HAZIRLANMIŞ PARAFİN KEMİK DOKUSU KESİTLERİNDE İMMÜNOHİSTOKİMYASAL REAKSİYONLAR İÇİN ISI VE ENZİM ARACILI ANTİJEN GERİ KAZANIMI YÖNTEMLERİNİN DEĞERLENDİRİLMESİ

### EVALUATION OF HEAT AND ENZYME-MEDIATED ANTIGEN RETRIEVAL METHODS FOR IMMUNOHISTOCHEMICAL REACTIONS IN ROUTINELY PROCESSED PARAFFIN BONE TISSUE SECTIONS

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#### ÖZET

İmmünohistokimya (IHC), hücrelerdeki ve dokulardaki spesifik antijenleri tespit etmek için antikor ile antijen arasındaki spesifik bağlanmadan yararlanan yaygın olarak kullanılan bir tekniktir. IHC'deki ilk adım genellikle antijen geri kazanımıdır (AR). AR fiksasyonla maskelenen antijenlerin maskesinin kaldırılması ve geri kazanılan antijenleri antikor bağlanması için daha erişilebilir hale getirmek üzere dokunun ön işleme tabi tutulmasını içerir. AR yöntemleri arasında ısı aracılı AR (HMAR) ve enzim aracılı AR (EMAR) bulunur. HMAR yöntemi sıklıkla tercih edilmektedir. Ancak HMAR, IHC boyama işlemi sırasında doku bütünlüğünün bozulmasına neden olmasının yanı sıra bazı antijenlerin peptit zincirini de yok edebilir. Bu çalışmada doku bütünlüğünün korunması, IHC boyama özgüllüğü ve yoğunluğu açısından parafine gömülmüş dekalsifiye kemik doku kesitlerinde HMAR ve EMAR'daki farklılıklar değerlendirildi. Sağlıklı sıçanlardan alınan kemik dokuları fiksasyon, dekalsifikasyon ve doku takibi işlemlerinden sonra parafine gömüldü. Her parafin bloğundan HMAR ve EMAR işlemleri için doku kesitleri alındı. Daha sonra dokuya özgü antijenler için her bir doku kesit serisine immünohistokimyasal boyama yöntemi uygulandı. EMAR yöntemi doku bütünlüğünü büyük ölçüde korudu. Aksine, HMAR yöntemi doku ayrılmasıyla sonuçlandı. Ayrıca EMAR yöntemi HMAR yöntemine göre daha spesifik boyama ve daha yüksek IHC-pozitif boyama sağladı. Çalışmamızın sonuçları IHC boyamaları için EMAR yönteminin sıçan kemik dokularının parafin kesitlerinde doku ayrılması, düşük immünreaktivite ve spesifik olmayan arka plan boyanması gibi zorlukların çözümü için HMAR yönteminden daha uygun olduğunu gösterdi.

**Anahtar Kelimeler:** İmmünohistokimya, kemik doku, parafin doku kesitleri, antijen geri kazanımı yöntemleri.

#### ABSTRACT

Immunohistochemistry (IHC) is a commonly used technique that exploits the specific binding between an antibody and antigen to detect specific antigens in cells and tissues. The first step in IHC is usually antigen retrieval (AR), which involves the pretreatment of tissue to retrieve antigens masked by fixation and make them more accessible to antibody-binding. AR methods include heat-mediated AR (HMAR) and enzyme-mediated AR (EMAR). The HMAR method is frequently preferred. However, in addition to causing tissue integrity to deteriorate during the IHC staining process, HMAR can also destroy the peptide chain of some antigens. In the present study, differences in HMAR and EMAR in paraffin-embedded decalcified bone tissue sections were evaluated in terms of tissue integrity preservation, IHC staining specificity, and intensity. Bone tissues taken from healthy rats were embedded in paraffin after fixation, decalcification, and tissue processing. The tissue sections were taken for both HMAR and EMAR steps from each paraffin block. Then, the immunohistochemical staining method was applied to the tissue section series for antigens specific to bone tissue. The EMAR method maintained the integrity of the tissue to a great extent. Unlike, the HMAR method resulted in tissue detachment. In addition, the EMAR method provided more specific staining and higher IHC-positive staining than the HMAR method. The results of our study showed that the EMAR method for IHC staining is more suitable than

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

---

the HMAR method to resolve difficulties such as tissue detachment, insufficient staining, and non-specific background staining in paraffin sections of rat bone tissues.

**Keywords:** Immunohistochemistry, bone tissue, paraffin tissue sections, antigen retrieval methods.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DEĞİŞEN BÖLGESEL DİNAMİKLER KARŞISINDA BİDEN YÖNETİMİNİN "ZORAKI" ORTADOĞU POLİTİKASI

### BIDEN ADMINISTRATION'S "FORCED" MIDDLE EAST POLICY IN THE FACE OF CHANGING REGIONAL DYNAMICS

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#### ÖZET

Sahip olduğu politik ve ekonomik değerinden ötürü, geleneksel olarak Ortadoğu Bölgesi, ABD dış politikası içerisinde Batı Yarımküreden (Western Hemisphere) sonra en çok önem atfedilen bölge olagelmış ve her dönem göreve gelen ABD yönetimleri bölge içi gelişmelerde etkin rol oynama gayreti içerisinde olmuşlardır. Dolayısıyla 2021 yılında göreve gelen Biden yönetiminin de Ortadoğu'ya yönelik etkin bir politika geliştirmesi beklenmiştir. Nitekim kendisinden önceki başkan olan Trump'ın izlediği İran'a yönelik "maksimum baskı" ve Kudüs'ü İsrail'in başkenti olarak tanıma gibi ABD dış politikası açısından ezber bozan politikalar, ABD'nin bölge politikaları içerisinde daha etkin bir şekilde var olmasını zorunlu kılmıştır. Ancak beklenildiğinin aksine Biden yönetimi göreve geldiği günden bu yana geçen yaklaşık üç sene içerisinde bölge politikalarında etkili olamamış, hatta bölgeye yönelik kapsamlı bir politika geliştirememiştir. Biden yönetiminin Ortadoğu'ya yönelik bu zayıf duruşu, literatürde kısmen Ukrayna Savaşı, kısmen de Çin yükselişine karşı ABD'nin izlediği Hint-Pasifik stratejisinden kaynaklandığı ileri sürülmüştür. Nitekim yayınladıkları Ulusal Strateji Belgesinde Biden yönetimin genel dış politika hattının "büyük güç rekabetine" odaklanması, söz konusu faktörlerin yönetimin izlediği dış politikanın temelini oluşturduğunu ortaya koymaktadır. Bununla birlikte, Biden yönetiminin Ortadoğu bölgesine yönelik izlediği dış politikanın analiz edileceği bu çalışmada iki önemli faktörün daha Biden'in bölgeye yönelik zayıf bir dış politika izlemesinde etkili olduğu ileri sürülecektir. Bu faktörlerden birincisi, Biden'ın yönetim anlayışının temelini oluşturduğunu iddia ettiği liberal değerler ile Trump'ın bölgeye yönelik oluşturduğu realist temelli "otoriter" politikaların uyumsuzluğudur. Her ne kadar Biden yönetimi bu politikaları benimsemese de, bu politikalara alternatifler üretmediği için "gönülsüzce" de olsa onları sürdürmek zorunda kalmıştır. Bu bağlamda değerlendirilmesi gereken bir diğer faktör ise bölgedeki öne çıkan aktörlerin dış politika anlayışlarındaki önemli değişimlerdir. Türkiye, Suudi Arabistan ve İsrail gibi ABD'nin bölgedeki geleneksel müttefiklerinin daha bağımsız politikalar üretme niyetleri, Biden yönetiminin bu ülkelerle ilişkilerinde istediği sonuçları elde etmesini zorlaştırmıştır.

**Anahtar Kelimeler:** Biden Yönetimi, ABD Dış politikası, Ortadoğu,

#### ABSTRACT

Due to its political and economic value, the Middle East Region has traditionally been the most important region after the Western Hemisphere in US foreign policy, and the US administrations that took office in each period have tried to play an active role in regional developments. Therefore, the Biden administration, which took office in 2021, was expected to develop an effective policy towards the Middle East. As a matter of fact, ground-breaking policies for US foreign policy, such as "maximum pressure" on Iran and recognizing Jerusalem as the capital of Israel, followed by his predecessor Trump, have made it necessary for the US to be more active in regional policies. However, contrary to expectations, the Biden administration has not been effective in regional policies or even developed a comprehensive policy for the region in the nearly three years since it took office. It has been claimed in the literature that this weak stance of the Biden administration towards the Middle East is partly due to the Ukraine War and partly to the Indo-Pacific strategy followed by the US against the rise of China. As a matter of fact, the fact that the Biden administration's general foreign policy line focuses on "great



**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

---

power competition" in the National Strategy Document they published reveals that these factors form the basis of the foreign policy followed by the administration. However, in this study, which will analyze the foreign policy followed by the Biden administration towards the Middle East region, it will be argued that two important factors are effective in Biden's weak foreign policy towards the region. The first of these factors is the incompatibility of the liberal values that Biden claims to form the basis of his management approach and the realist-based "authoritarian" policies that Trump has created for the region. Although the Biden administration did not adopt these policies, it had to continue them, albeit "reluctantly", because it could not produce alternatives to these policies. Another factor that needs to be evaluated in this context is the significant changes in the foreign policy understanding of the prominent actors in the region. The intention of the US's traditional allies in the region, such as Turkey, Saudi Arabia and Israel, to produce more independent policies has made it difficult for the Biden administration to achieve the desired results in its relations with these countries.

**Keywords:** Biden Administration, the US Foreign Policy, the Middle East

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## AKADEMİK PODCASTLERİN BİLİM İLETİŞİMİ İÇİN ETKİLİ PAZARLAMA ARAÇLARI OLARAK SAHİP OLDUKLARI POTANSİYEL ÜZERİNE KEŞİFSEL BİR ÇALIŞMA AN EXPLORATORY STUDY ON THE POTENTIAL OF ACADEMIC PODCASTS AS EFFECTIVE MARKETING TOOLS FOR SCIENCE COMMUNICATION

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### ÖZET

Bilim iletişimi, bilim ile toplum arasındaki iletişim kopukluğunun giderilmesinde önemli rol oynar. Akademik podcastler de karmaşık bilimsel konuları erişilebilir ve ilgi çekici hale getirerek zamanla bilim iletişimi için güçlü birer pazarlama araçları haline gelmişlerdir. Akademik podcastlerin bilim iletişimi için etkili pazarlama araçları olarak sahip oldukları potansiyeli keşfetmeyi amaçlayan bu çalışmada öncelikle indirme sayıları, dinleyici değerlendirmeleri, aboneler ve sosyal medya etkileşimine dayalı olarak başarılı bulunan 12 akademik podcast belirlenmiştir. Ardından Apple Podcasts kaynağından çekilen bu podcastlere yönelik 586 değerlendirmenin NVivo ile yapılan içerik analizleri başarılı akademik podcastlerin yedi boyutunu ortaya koymaktadır.

Sonuçlar, geleneksel akademik dergiler veya uzun araştırma makalelerinin aksine podcastlerin erişimi kolay ve her zaman, her yerde tüketilebilir olmalarıyla algılanan (1) **erişilebilirliklerini ve kolaylıklarını** vurgulamaktadır. Başarılı akademik podcastler karmaşık bilimsel (2) **kavramları ilgi çekici ve anlaşılır** bir şekilde sunmada da başarılıdır. Ağır jargon içermeyen sade dil kullanımı ve bilimi geniş bir izleyici kitlesine erişilebilir kılmak için kullanılan hikaye anlatma teknikleri, röportajlar ve örnekler ön plana çıkmaktadır. Dinleyiciler, tanınmış araştırmacılarla yapılan röportajlardan doğru ve güvenilir bilgi aldıklarına güvenmekte ve bu da akademik podcastleri bilim iletişimi için güvenilir bir kaynak haline getirerek (3) **uzmanlık ve güvenilirliklerini** pekiştirmektedir. Herkese hitap edecek şekilde (4) **farklı ve geniş perspektiften konuları** içermeleri geniş ve çeşitli bir izleyici kitlesini cezbetmelerini sağlamaktadır. Sosyal medya ve forumlar aracılığıyla dinleyici kitlesiyle iletişime girmeleri ise bir (5) **topluluk oluşturmalarını** sağlar. (6) **Yüksek kaliteli** ses, titiz düzenleme ve prodüksiyon genel dinleme deneyimini artıran ve profesyonelliği yansıtan önemli bir etken olarak görülmektedir. Hatta zaman zaman bu özelliğin yokluğunun içeriğin önemini yitirmesine neden olabildiği gözlenmiştir. Son olarak, akademik podcastleri tüketicilerin (7) bilgi ve becerilerini geliştirirerek birer (7) **kişisel gelişim aracı** olarak görüldüğü ortaya çıkmaktadır.

Ortaya konan bu yedi kategorinin kombinasyonunun (erişilebilirlik, kavranabilirlik, güvenilirlik, çeşitlilik, topluluk oluşturma, üretim kalitesi ve eğitim değeri) akademik podcastleri bilimsel bilginin yaygınlaştırılmasında etkili birer pazarlama araçları haline getirdiğini göstermektedir. Akademik podcastlerin popülaritesi artmaya devam ederken bu çalışma ile ortaya konan temel özelliklerin bilimsel bilgiyi dünyayla paylaşma arayışındaki eğitimciler, araştırmacılar ve iletişimciler için yol gösterici nitelik taşıdığına inanılmaktadır.

**Anahtar Kelimeler:** Akademik Podcast, Dinleyici Değerlendirmeleri, Bilim İletişimi, Keşifsel Araştırma

### ABSTRACT

Science communication plays an important role in bridging the communication gap between science and society. Academic podcasts have become powerful marketing tools for science communication, reaching a global audience and making complex scientific topics accessible and engaging. Intending to explore the potential of academic podcasts as effective marketing tools for science communication, 12

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

successful academic podcasts were identified based on download numbers, listener reviews, subscribers, and social media engagement. Content analysis of 586 reviews retrieved from Apple Podcasts, manually coded and analyzed through NVivo, uncovered seven dimensions of successful academic podcasts.

Results reveal that, unlike traditional academic journals or lengthy research papers, podcasts are easy to access and can be consumed anytime, anywhere, emphasizing their (1) **accessibility and convenience**. Successful academic podcasts excel at presenting complex scientific concepts in (2) an **interesting, engaging, and understandable** manner. They use plain language without heavy jargon and use storytelling techniques, interviews, and relatable examples to make science accessible to a broad audience. Listeners trust that they receive accurate and reliable information from interviews with renowned researchers, making academic podcasts a trusted source for science communication, reinforcing perceptions of (3) **expertise and credibility**. (4) **A diverse range of scientific topics** ensures there is something for everyone, attracting a broad and varied audience. It allows listeners to explore different scientific disciplines and fosters a sense of curiosity and learning. These podcasts engage with their audience by (5) **building community** through social media and forums, creating a network of like-minded individuals who share a passion for science. (6) **High-quality** audio, editing, and production values enhance the listening experience. A polished presentation helps retain listeners and reflects professionalism. The absence of these features can sometimes diminish the importance of the content. Lastly, reviewers perceive these podcasts as valuable resources for expanding their knowledge and **self-improvement** (7).

Results show that the success of academic podcasts hinges on their unique combination of these seven categories (i.e., accessibility, engagement, trustworthiness, diversity, community-building, production quality, and educational value), making them effective marketing tools for disseminating scientific knowledge to global audiences. As the popularity of academic podcasts continues to grow, understanding and leveraging these key features can empower educators, researchers, and communicators in their quest to share scientific knowledge with the world.

**Keywords:** Academic Podcasts, Listener Reviews, Science Communication, Exploratory Study

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ELEKTRİK MOTORLARI İÇİN TEST SİSTEMİ GELİŞTİRİLMESİ DEVELOPMENT OF TEST SYSTEM FOR ELECTRIC MOTORS

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### ÖZET

Elektrik makineleri dünya genelinde üretilen elektrik enerjisinin büyük bölümünü harcamaktadır. Bu durum, elektrik makinalarının verimlerinde sağlanabilecek bir iyileştirmelerin bile çok önemli olduğunu göstermektedir. Bu kapsamda Avrupa Birliği Enerji Komisyonu endüstride kullanılan elektrik motorlarının sağlaması gereken en düşük verimlilik değerlerini belirlemiştir. Avrupa Birliği Enerji Komisyonunun yayınlamış olduğu regülasyonlar incelendiğinde elektrik motorlarının verim değerlerinin ölçülmesi konusunun önemi açıkça görülmektedir. Bu bağlamda motor test sistemleri literatürde önem kazanmıştır. Motor test sistemleri motorların sürekli çalışma ve kesik süreli çalışma gibi çeşitli rejimlerdeki çalışmalarını test ederler. Bu çalışmada standart elektrik motor test sistemlerinden farklı olarak sadece sabit hız ve sabit moment değerlerinde değil farklı hız ve moment değerlerinin sisteme girilerek bir saykıl verimi de ölçülmüştür. Saykıl veriminin ölçülmesi elektrikli taşıtlarda kullanılan elektrik motorlarının verim değerlerinin tespit edilmesi için önem arz etmektedir. Otomatik olarak çalışan ve istenildiği durumlarda manuel kontrol edilebilen bir elektrik motoru test sisteminin tasarımı yapılmıştır. Ansys uygulaması ile tasarımı yapılan test sisteminin titreşim, darbe ve mukavemet analizi sonuçları literatürde bulunan diğer test sistemleri ile karşılaştırılmıştır. Test Sisteminin prototip üretimi gerçekleştirilmiştir. Test Sistemi maksimum 6000 devir/dakika hızda çalışabilen ve anlık 5kW gücün test edilebileceği bir sistem olup çalışma kapsamında aynı test sehpasında hem yük hücresinin kullanıldığı ve hem de toz frenin kullanılabildiği bir test sehpası geliştirilmiştir. Fren sisteminde sadece sürekli çalışma rejimindeki motorların değil aynı zamanda farklı çalışma rejimindeki motorların performans testleri de yapılacak şekilde tasarlanmıştır.

**Anahtar Kelimeler:** Elektrik Makineleri, Motor Test Sistemleri, Motor Verimi

### TEŞEKKÜR

Bu çalışma OSTİM Teknik Üniversitesi Bilimsel Araştırma Projeleri Koordinatörlüğü tarafından koordinatörlüğün 202209 numaralı “ELEKTRİK MOTOR TEST SİSTEMİ GELİŞTİRİLMESİ”

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

başlıklı projesi ile desteklenmiştir. Bu bağlamda OSTİM Teknik Üniversitesi Bilimsel Araştırma Projeleri Koordinatörlüğü'ne teşekkür ederiz.

## ABSTRACT

Electrical machines consume most of the electrical energy produced worldwide. This shows that even improvements in the efficiency of electrical machines are very important. In this context, the European Union Energy Commission has determined the minimum efficiency values that electric motors used in industry must provide. When the regulations published by the European Union Energy Commission are examined, the importance of measuring the efficiency values of electric motors is clearly seen. In this context, engine test systems have gained importance in the literature. Engine test systems test the operation of engines in various regimes such as continuous operation and intermittent operation. In this study, unlike standard electric motor test systems, cycle efficiency was measured not only at constant speed and constant torque values, but also by entering different speed and torque values into the system. Measuring cycle efficiency is important for determining the efficiency values of electric motors used in electric vehicles. An electric motor testing system that works automatically and can be controlled manually when desired has been designed. Vibration, impact and strength analysis results of the test system designed with the Ansys application were compared with other test systems in the literature. Prototype production of the Test System has been completed. The Test System is a system that can operate at a maximum speed of 6000 rpm and instantaneous 5kW power can be tested. Within the scope of the study, a test bench has been developed in which both a load cell and a powder brake can be used on the same test stand. It is designed to perform performance tests on the brake system not only of engines in continuous operation, but also of engines in different operating regimes.

**Keywords:** Electrical Machines, Motor Testing Systems, Motor Efficiency

## THANKS

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## SAĞLIK TURİZMİ, SAĞLIK HİZMETLERİ FİYATLARI VE DÖVİZ KURU İLİŞKİSİ: GRANGER NEDENSELLİK ANALİZİ İLE TÜRKİYE ÖRNEĞİ

### HEALTH TOURISM, HEALTH SERVICES PRICES AND EXCHANGE RATE RELATIONSHIP: THE CASE OF TURKEY WITH GRANGER CAUSALITY ANALYSIS

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#### ÖZET

Gelişmiş ülkelerde sağlık hizmetleri maliyetlerinde yaşanan artışlar ve uzun bekleme süreleri gelişmekte olan ülkelerde sağlık turizminde önemli gelişmeler yaşanmasına sebep olmaktadır. Dolayısıyla gelişmekte olan ülkeler için günden güne önemi artan sağlık turizmini artıran etkenleri ortaya koymak önem kazanmaktadır. Bu çalışmada da Türkiye’de artan sağlık turizminde döviz kurunun etkisi ve sağlık turizmi sonucunda sağlık hizmetleri fiyatlarında bir artış olup olmadığı Granger nedensellik analizi çerçevesinde incelenmiştir. Çalışmanın ilk kısmında sağlık turizmi teorik anlamda incelenmiş ve sağlık turizmini etkileyen faktörler ortaya konmuştur. Çalışmanın ikinci kısmında ise Türkiye’nin sağlık turizminde son yıllar ortaya koyduğu performans değerlendirilmiştir. Çalışmanın bir sonraki bölümünde değişkenler arasındaki ilişki Granger nedensellik analizi çerçevesinde ampirik olarak analiz edilmiş ve sonuçları değerlendirilmiştir. Çalışmada 2003-2020 yılları arasındaki çeyreklik veriler incelenmiştir. Ulaşılan sonuçlar çerçevesinde artan döviz kurunun Türkiye’nin sağlık turizminden sağladığı geliri artırdığı, artan bu gelirin ise yurt içi fiyatlarda meydana gelen yükselişin sebebi olmadığı ortaya konmuştur. Bu anlamda sağlık hizmetleri fiyatlarında yaşanan artışın sağlık turizminde yaşanan talep artışından kaynaklanmadığı sonucuna ulaşılmaktadır. Çalışmada ayrıca döviz kurundaki artışın yurtiçi sağlık hizmetleri fiyatlarını artırdığının altı çizilerek sağlık turizminde yaşanan gelir artışının sürdürülebilir bir yapıya ulaşması için döviz kuru dışında sağlık turizmini etkileyen diğer faktörlere ağırlık verilmesi gerektiği ortaya konmuştur.

**Anahtar Kelimeler:** Sağlık turizmi, Döviz Kuru, Granger Nedensellik Analizi, Sağlık Hizmetleri Fiyatları

#### ABSTRACT

The increasing costs of healthcare services and long waiting times in advanced countries have led to significant developments in health tourism in developing countries. Therefore, it is important to identify the factors that are boosting health tourism, which is becoming increasingly significant for developing countries. In this study, the impact of exchange rates on the growing health l tourism in Turkey and whether there has been an increase in healthcare service prices as a result of health tourism has been examined within the framework of Granger causality analysis. In the first part of the study, health tourism is theoretically examined, and the factors influencing health tourism are identified. In the second part of the study, the performance of Turkey in health tourism in recent years is evaluated. In the next section of the study, the relationship between variables is empirically analyzed within the framework of Granger causality analysis, and the results are evaluated. Quarterly data between 2003 and 2020 were examined in the study. Furthermore, the study emphasizes that the increase in exchange rates raises domestic healthcare service prices and so it is highlighting the need to focus on factors other than the exchange rate that affect health tourism in order for the growth in health tourism income to become sustainable.

**Keywords:** Health tourism, Exchange Rate, Granger Causality Analysis, Health Services Prices



### GİRİŞ

Sağlık turizmi bir bölgeden başka bir bölgeye sağlık hizmeti almak amacıyla yapılan seyahati ifade eder. Sağlık turizmi sağlığı korumak, geliştirmek ya da rehabilitasyon amacıyla yapılır (Carrera ve Bridges, 2006). Sağlık turizminin içeriğini Helmy (2011) daha geniş bir tanımda ifade etmiş ve sağlık turizminin tedavi, cerrahi operasyon, plastik cerrahi, spa ve rehabilitasyon amacıyla gerçekleştirildiğini ortaya koymuştur.

Sağlık turizmi özellikle son yıllarda dünya ölçeğinde büyük bir önem kazanmıştır. Sağlık turizminin bu denli büyük bir boyuta ulaşmasının temel nedeni gelişmiş ülkelerde sağlık hizmetleri maliyetleri ve bekleme sürelerinin artmasıdır. Öyle ki Amerika Birleşik Devletleri'nde 2000 yılında 4532 olan kişi başına düşen sağlık harcaması 2020 yılında 11700 dolara yükselmiştir. Bu rakam Kanada'da 2000 yılında 2000 dolardan 2023 yılında 6086 dolara, Birleşik Krallık'ta 2020 yılında 2033 dolardan 2023 yılında 5634 dolara yükselmiştir (The World Bank, 2023).

Gelişmiş ülkelerde sağlık hizmetleri fiyatlarındaki artışın yanında sağlık turizmini öne çıkartan birçok farklı etken de mevcuttur. Bu etkenlerden biri bazı gelişmekte olan ülkelerin sağlık yatırımlarını artırmalarına bağlı olarak sağlık ekipmanlarında kaliteyi sağlayarak gelişmiş ülkeler ile yarışır hale gelebilmeleridir (Aydin ve Karamehmet, 2017). Bunun yanında sağlık turizmini artıran diğer bir unsur ise gelişmiş ülkelerde dış sağlığı, kozmetik, plastik cerrahi gibi tedavi yöntemlerinin sigorta kapsamı dışında olmasıdır (Eissler ve Casken, 2013).

Sağlık turizmini geliştiren diğer önemli bir başka unsur ise seyahat özgürlüğünün artması ve bilgi iletişim teknolojilerinin yaygınlaşmasıdır. Bu iki unsurun dünya genelinde yaygınlaşmasıyla birlikte hem seyahat kolaylaşmakta hem de sağlık hizmeti talep edenler, arz sağlayıcılar hakkında daha fazla bilgi sahibi olabilmektedirler. Bunun bir sonucu olarak da sağlık turizmi bir risk haline gelmemekte ve bu durum sağlık turizmini artırmaktadır (OECD, 2012).

Sağlık turizminin artışı bu alanda yatırım yapan gelişmekte olan ülkeleri için önemli kazanımları da beraberinde getirmektedir (De Arellano, 2007; Connell, 2006; Eissler ve Casken, 2013). Öyle ki sağlık turizminin artışı bir yandan sektörel bazda sağlık hizmetlerinin gelişimine sebep olmakta bir yandan da ülkeye giren döviz miktarını artırmaktadır. Bunun yanında artan turist sayısı dışsallık yaratarak ülke için farklı sektörlerde harcama yapılmasına da sebep olmaktadır. Bu açıdan Türkiye, Malezya, Singapur, Hindistan Tayland, Kosta Rika, Panama gibi ülkeler özellikle son yıllarda sağlık turizmine yönelik yatırım ve tanıtım faaliyetlerini artırmaktadırlar (Ghasemi, Mehdiabadi, Spulbar ve Birau, 2021).

Gelişmekte olan bu ülkelerin bu alanda yaptıkları yatırımların karşılıklarını almaları ise çeşitli etkenlere bağlıdır. Bunlardan en önemlisi yeterli sağlık ekipman ve nitelikli sağlık çalışanlarına sahiplik durumu ve sağlık hizmetlerinin fiyatlarıdır. Bunun yanında sağlık turizminde gidilecek ülkeyi belirleyen diğer bir unsur ise coğrafi konumdur. Nitekim ABD ve Kanada vatandaşları sağlık turizminde büyük oranda Panama ve Kosta Rika'yı tercih ederken Orta Doğu ülkeleri bu alanda büyük oranda Türkiye gibi kendilerine yakın ülkeleri tercih etmektedirler (Moghimehfar ve Nasr-Esfahani, 2011).

Sonuç olarak özellikle son yıllarda sağlık turizmi büyük bir artış trendi içerisinde. Dolayısıyla bu noktada sağlık turizmini etkileyen unsurları ve sağlık turizminin artması sonucu ortaya çıkan sonuçları ortaya koymak uygulanacak politikaların belirlenmesi noktasında önem kazanmaktadır. Buradan hareketle bu çalışmada da Türkiye'de döviz kurundaki artışın sağlık turizm gelirininde yaşanan artışın sebebi olup olmadığı ve artan sağlık turizm gelirinin sağlık hizmetleri fiyatlarını artırıp artırmadığı ampirik bir analiz çerçevesinde incelenmiştir.

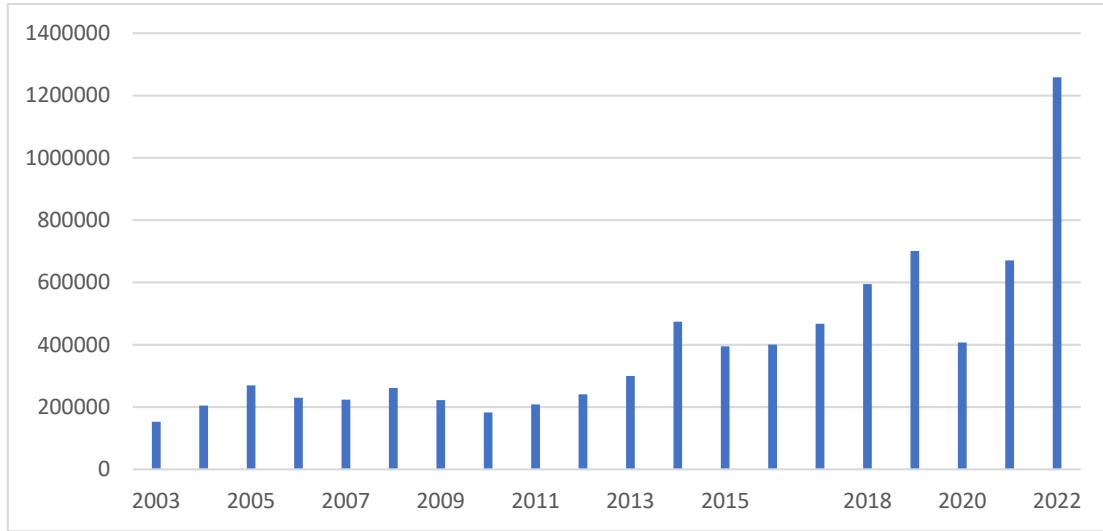
### TÜRKİYE'DE SAĞLIK TURİZMİ

Sağlık turizmi açısından Türkiye dünyanın en çok tercih edilen 10 ülkesinden biridir. Bu durumun temel sebeplerine bakıldığında sağlık çalışanlarının niteliği, fiyatlardaki görece ucuzluk ve Türkiye'nin coğrafi konumu öne çıkmaktadır (Collins, Medhekar ve Şanal, 2022). Öyle ki Türkiye sağlık çalışanlarının niteliği konusunda oldukça ileri bir düzeydedir. Bununla birlikte gelişmiş ülkelere kıyasla Türkiye'de sağlık hizmetlerinin fiyatları da oldukça ucuz kalmaktadır. Türkiye'nin Avrupa'ya ve Orta Doğu'ya yakın oluşu da sağlık turizmi açısından avantaj sağlamaktadır. Nitekim Türkiye'ye hem Avrupa'dan hem Orta Doğu'dan önemli sayıda sağlık turisti gelmektedir. Grafik 1'de yıllar itibarıyla sağlık hizmeti almak amacıyla Türkiye'yi ziyaret eden turist sayıları gösterilmiştir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

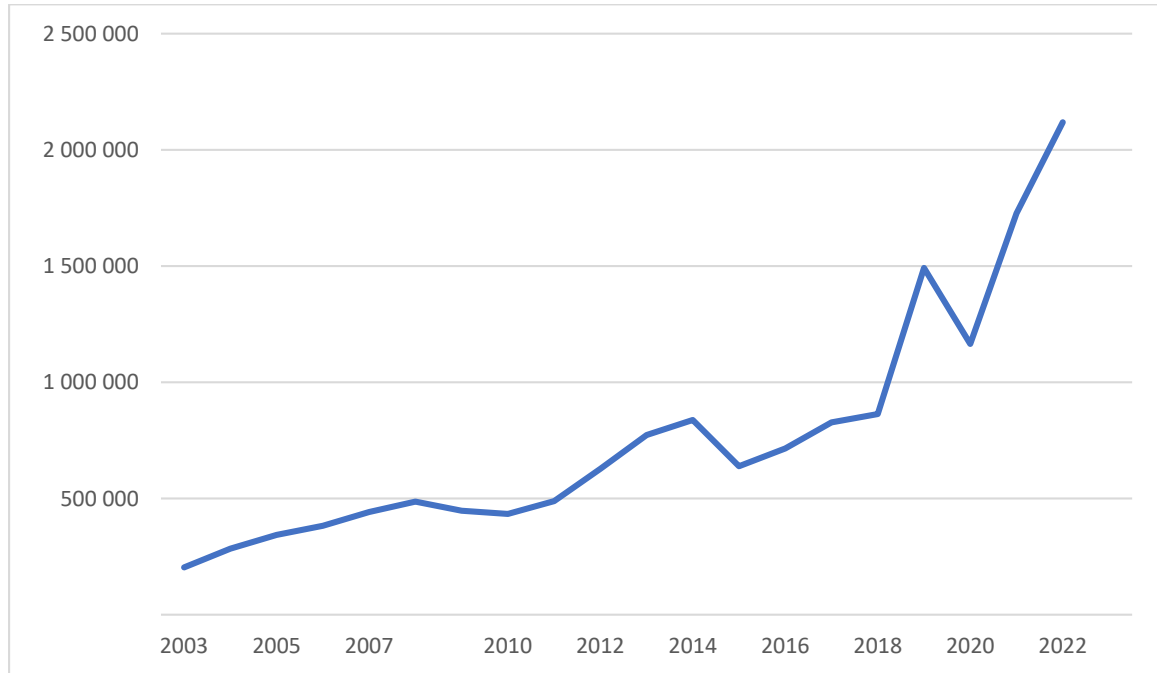
**Grafik 1:** Türkiye'ye Gelen Sağlık Turist Sayıları (2003-2022)



**Kaynak:** (TÜİK, 2023)

Grafikten de anlaşılacağı üzere Türkiye'ye gelen sağlık turist sayısı yıllar itibari ile önemli ölçüde artış göstermiştir. Öyle ki 2003 yılında Türkiye'de sağlık turist sayısı 153 bin iken bu rakam 2010 yılında 183 bine, 2020 yılında 400 bine ve nihayet 2022 yılında 1 milyon 258 bine yükselmiştir. Artan sağlık turist sayısı Türkiye'nin sağlık turizminden elde ettiği geliri de önemli ölçüde artırmıştır. Tablo 2'de Türkiye'nin sağlık turizminden elde ettiği gelirler gösterilmiştir.

**Grafik 2:** Sağlık Turizm Geliri (Bin \$)



**Kaynak:** (TÜİK, 2023)

Grafik 2'ye göre sağlık turist sayısında olduğu gibi sağlık turizminden elde edilen gelirlerde de yıllar itibariyle önemli ölçüde artışlar olmuştur. Nitekim 2003 yılında sağlık turizminden elde edilen gelir 203 milyon dolar iken bu rakam 2010 yılında 433 milyon dolara yükselmiştir. İlerleyen dönemlerde artış trendine devam eden sağlık turizm geliri 2020 yılında 1 milyar 164 milyon dolara 2022 yılında ise 2 milyar 119 milyon dolara kadar yükselmiştir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Sonuç olarak verilere bakıldığında Türkiye'nin önemli bir sağlık turizm ülkesi olduğu ve sağlık turizminden sağladığı geliri artırdığı görülmektedir. Sağlık turizminde yaşanan gelişmelerin de sadece sağlık sektörüne değil, turizmin diğer alanlarına da katkılar sunduğu dikkate alınır Türkiye'nin sağlık turizminde yakaladığı ivmeyi koruması gerektiği söylenebilir.

## LİTERATÜR TARAMASI

Turizm gelirleri ile döviz kuru arasındaki ilişkiyi inceleyen çalışmaların önemli bir çoğunluğunda bu iki değişken arasında pozitif bir ilişkinin varlığı ortaya konmuştur. Webber (2001), 1983-1997 yılları arasında çeyreklik veriler ile Avustralya'da döviz kuru ve turizm talebi arasındaki ilişkiyi Johansen ve Engle-Granger bütünleşme yöntemlerini kullanarak analiz etmiş ve döviz kurunun turizm talebinin önemli bir belirleyicisi olduğu sonucuna varmıştır.

Algieri (2006), ise Rusya'nın 1993-2002 yılları arasındaki aylık verileri ile VAR modeli oluşturmuştur. Bu çalışmada da yine turizm talebi ve döviz kuru arasındaki ilişki incelenmiş bu iki değişken arasında önemli bir ilişkinin varlığı tespit edilmiştir.

Belloumi 2010 yılında Granger nedensellik analizini kullanarak Tunus için bir çalışma gerçekleştirmiştir. 1990-2007 yılları arasını kapsayan bu çalışmada Tunus'ta yerli paranın değer kaybetmesinin turizmde Tunus'a rekabet gücü kazandırdığını ortaya konmuştur.

Ghartey (2013), 1963-2008 yılları arasında Jamaika'da turizm, büyüme ve döviz kuru arasındaki ilişkiyi Johansen eşbütünleşme analizi çerçevesinde incelemiştir. Çalışmada Ghartey döviz kurundaki düşüşün turizmi geliştirdiğini ortaya koymuştur.

Cheng, Kim ve Thompson (2013), ise çeyreklik verileri kullanarak 1973-2010 yılları arasında ABD'de döviz kuru ve turizm arasındaki ilişkiyi VAR modeli çerçevesinde incelemişlerdir. Bu çalışmada yerli paranın değer kaybetmesi durumunda turizm gelirinin arttığı sonucuna ulaşılmıştır.

Vita ve Kyaw (2013), 1996-2009 yılları arasında Almanya'dan Türkiye'ye gelen turist sayısının döviz kuru ile ilişkisini incelemişlerdir. Çalışmada döviz kurunun turist sayısını belirleyen önemli bir etken olduğunu ortaya konmuştur.

Tang ise 2013 yılında 1974-2009 yılları arasında Malezya'da döviz kuru ve turizm geliri arasındaki ilişkiyi Granger nedensellik analizi çerçevesinde incelemiş ve bu iki değişken arasında anlamlı ilişki tespit etmiştir.

Sharma ve Pal (2019) da yine döviz kuru ve turizm talebi ilişkisini 2006-2018 yılları arasında Hindistan için analiz etmişlerdir. Çalışmanın sonuç bölümünde döviz kurunun sağlık talebini etkileyen bir unsur olduğu ortaya konmuştur.

## EKONOMETRİK YÖNTEM VE VERİ SETİ

### Veriler

Bu çalışmada Türkiye'nin 2003-2020 yılları arasındaki çeyreklik verileri kullanılarak Granger nedensellik analizi uygulanmıştır. Çalışmada kullanılan değişkenler; sağlık turizminden elde edilen dolar geliri, döviz kuru ve sağlık hizmetleri fiyatlarıdır. Sağlık turizm geliri ve sağlık hizmetleri fiyatlarının verileri TÜİK'ten, döviz kuru verileri ise Merkez Bankası'ndan temin edilmiştir. Tablo 1'de çalışmada kullanılan değişkenler gösterilmiştir.

Tablo 1: Değişkenler

Değişken	Kısaltma	Kaynak
Sağlık Turizm Geliri (\$)	TG	TÜİK
Sağlık Hizmetleri Fiyatları	SF	TÜİK
Döviz Kuru	DK	Merkez Bankası

### Durağanlık Analizi

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Granger nedensellik analizinin uygulanabilmesi için serilerin durağan olması gerekmektedir. Serilerin durağan olmaması durumunda sahte regresyon sorunu ortaya çıkabilmektedir (Zhang, 2014).

Durağan bir modelde trend yoktur. Bu modelin ortalama ve varyansı sabittir, zamanla değişmez. Kovaryansı ise dönemler arası farka bağlıdır. Durağanlığın temsili denklemi aşağıda gösterilmiştir.

$$E(Y_t) = \mu \quad (1)$$

$$Var(Y_t) = E(Y_t)^2 = \sigma^2 \quad (2)$$

$$k = E[(Y_t - \mu)(Y_t - k - \mu)] \quad (3)$$

(k: Bütün t değerleri için gecikme sayısı)

Bir serinin durağan olup olmadığı serinin şeklinden anlaşılabilir. Fakat kesin sonuçlara ulaşabilmek için serilere birim kök testleri uygulanmalıdır. Bu çalışmada da serilere Augment Dickey Fuller (ADF) ve Elliot Rothenberg Stock (ERS) birim kök testleri uygulanmış ve sonuçları Tablo 2'de gösterilmiştir.

**Tablo 2:** Birim Kök Test Sonuçları

Değişken	ADF		ERS	
	Sabitli	Sabitli ve Trendli	Sabitli	Sabitli ve Trendli
TG	0,3400	-2,7777	1,1771	-2,6979
DK	5,5270	3,0142	0,9106	-0,0828
SF	2,1543	0,0397	1,1682	3,8084***
d_TG	-3,0716**	-3,2297*	-2,9515***	-2,8345*
*%1 d_DK	-8,4926***	-9,7944***	2,6927***	-8,9518***
d_SF	2,8666	-0,3310	0,3718	-1,1150
d2_SF	-7,0820	-9,2624***	-7,1466***	-5,9661***

anlamlı \*\*%5 anlamlı\*\*\*%10 anlamlı

Yapılan birim kök test sonuçlarına göre 3 değişken de düzeyde durağan değildir. Sağlık turizm geliri ve döviz kuru değişkenleri birinci farkları alındığında, sağlık hizmetleri fiyatları değişkeni ise ancak ikinci farkı alındığında durağan hale gelmektedir. Dolayısıyla bu çalışmada da sağlık turizm geliri ve döviz kuru değişkenlerinin birinci farkı, sağlık hizmetleri değişkeninin ise ikinci farkı kullanılmıştır.

## Granger Nedensellik Analizi

Granger'a göre bağımsız değişkenin geçmiş değerleri, bağımlı değişkenin gelecekteki değerlerini tahmin edebiliyorsa bu ilişkide nedensellik söz konusudur (Granger, 1969). Granger nedensellik testinin modeli aşağıdaki denklemde gösterilmiştir.

$$y_{1t} = a_{10} + \beta_{11}y_{1t-1} + \beta_{12}y_{2t-1} + \mu_{11}y_{1t-2} + \mu_{12}y_{2t-2} + u_{1t} \quad (4)$$

$$y_{2t} = a_{20} + \beta_{21}y_{1t-1} + \beta_{22}y_{2t-1} + \mu_{21}y_{1t-2} + \mu_{22}y_{2t-2} + u_{2t} \quad (5)$$

Granger nedensellik testi, yukarıda iki farklı denklemde yer alan bağımsız değişkenlerin gecikmeli değerlerinin katsayılarının, belirli bir anlamlılık düzeyinde sıfıra eşit olup olmadığını test etmek amacıyla kullanılır. Eğer 4. denklemin katsayıları sıfırdan farklı bulunursa, X'in Y'nin nedeni olduğu kabul edilir. Benzer şekilde, 5. denklemin katsayıları da sıfırdan farklı bulunursa, Y'nin X'in nedeni olduğu olarak kabul edilir (Granger, 1969).

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

Bu çalışmada uygulana Granger nedensellik testlerinin sonuçları Tablo 3'te gösterilmiştir.

**Tablo 3: Granger Nedensellik Test Sonuçları**

<b>Bağımlı Değişken: SF</b>		
<b>Bağımsız Değişkenler</b>	<b>Ki-Kare</b>	<b>Olasılık</b>
<b>TG</b>	2.521528	0.6408
<b>DK</b>	34.49097	0.0000
<b>Hepsi</b>	43.26351	0.0000

<b>Bağımlı Değişken: TG</b>		
<b>Bağımsız Değişkenler</b>	<b>Ki-Kare</b>	<b>Olasılık</b>
<b>SF</b>	4.405154	0.3539
<b>DK</b>	19.26512	0.0007
<b>Hepsi</b>	33.07523	0.0001

Yapılan Granger nedensellik testleri sonucunda döviz kurunun sağlık hizmetleri fiyatlarının artmasının nedeni olduğu anlaşılmaktadır. Artan sağlık turizm gelirinin ise sağlık hizmetleri fiyatlarının nedeni olmadığı sonucuna ulaşılmıştır.

Yine döviz kurunun, artan sağlık turizm gelirinin nedeni olduğu yapılan ampirik çalışma ile ortaya konmuştur. Bunun yanında çalışmada sağlık hizmetleri fiyatlarında yaşanan artışın sağlık turizm gelirlerindeki artışın nedeni olmadığı tespit edilmiştir.

#### **SONUÇ**

Sağlık hizmetlerine yatırım yapan ülkeler için özellikle son yıllarda sağlık turizmi önemli bir gelir kaynağı olmaktadır. Gelişmiş ülkelerde artan sağlık hizmetleri fiyatları, gelişmiş ülke vatandaşlarını görece düşük fiyatlı sağlık hizmeti sunan ülkelere yönlendirmektedir. Bu yönelim sonucunda gelişmekte olan ülkeler önemli sağlık turizm geliri elde etme şansı yakalamaktadırlar. Sağlık turizminden gelirin artması bir yandan sağlık sektöründe önemli kazanımlara yol açmakta, bir yandan da bu durum dışsalılık yaratarak farklı turizm alanlarında gelir artışına sebep olmaktadır. Bunun yanında ülkeye giren döviz akışı da ödemeler dengesi açısından avantaj sağlamaktadır.

Türkiye'de de özellikle son yıllarda sağlık turizminde önemli kazanımlar elde etmiş ve sağlık turizminin önemi artmıştır. Bu çalışmada da Türkiye'de önemi artan sağlık turizminde döviz kuru ve sağlık hizmetleri fiyatlarının etkisi test edilmiştir. Granger nedensellik analizinin kullanıldığı bu çalışmanın sonuçlarına göre döviz kurunda yaşanan artışın sağlık hizmetleri fiyatlarında yaşanan değişimin sebebi olduğu anlaşılmıştır. Yine çalışmada sağlık hizmetleri fiyatlarında ortaya çıkan artışta döviz kurunun etkili olduğu, sağlık turizm gelirinin ise etkili olmadığı tespit edilmiştir. Bu anlamda sağlık turizmi

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

sonucunda artan talebin fiyatlara yansımadağı görülmektedir. Bu açıdan sağlık turizm gelirinin yurtiçi tüketicilere zarar vermediğı söylenebilir. Bunun yanında döviz kuru artışının sağlık turizminde talebi artırdığı fakat döviz kurundaki bu artışın yerli tüketiciler için sağlık hizmetleri fiyatlarını da artırdığı görülmektedir. Bu durum dikkate alındığında Türkiye'nin yerli tüketiciyi de koruyacak sürdürülebilir sağlık turizmine sahip olması için döviz kuru dışında farklı politikalar üretmesi gerektiğı söylenebilir.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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OXIDATIVE STRESS AND ANTIOXIDANTS ROLE IN DIABETES  
DİYABETTE OKSİDATİF STRES VE ANTİOKSİDANLARIN ROLÜ

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**ABSTRACT**

Diabetes mellitus is a chronic metabolic disorder characterized by poor glycemic control that is becoming more common worldwide. Increased blood glucose levels produce increased oxidative stress, which leads to the development and exacerbation of diabetic complications. For many years, scientists have debated the harmful impact of free oxygen radicals in diabetes and other chronic illnesses. Numerous experimental and clinical investigations suggest that the formation of free oxygen radicals is enhanced in both forms of diabetes and that the beginning of diabetes is directly associated to oxidative stress.

In normal healthy persons, free radicals and antioxidants are in equilibrium; however, in diabetes, this balance is shifted in favor of free radicals. Diabetes problems can be avoided if antioxidant mechanisms are activated or if the poor balance is shifted in favor of antioxidants. Various animal experiments in which antioxidants are utilized as protective agents are conducted all over the world. Among these studies, investigations using different antioxidants in diabetes play an essential role. Experimental diabetic animal research have indicated that using antioxidant medications can help avoid oxidative damage and diabetes consequences. Studies into the mechanics underlying the link between oxidative stress and diabetes-related problems in diabetes are becoming more common. According to these research, free radical creation rises as oxidative stress increases in diabetes, whereas antioxidant production declines. The use of antioxidants such as vitamins A, E, and C is thought to be a useful treatment method for lowering diabetes problems.

Diabetes that is uncontrolled is frequently accompanied with nutritional deficits. Clinical research have revealed that traditional antioxidants have little impact in diabetic people. It is possible that a single vitamin can prevent one or more issues as an antioxidant in the treatment of diabetes, but the combination of many vitamins, such as those found in meals, may be more useful in establishing the overall oxidant status.

As a result, it is advised to eat a well-balanced diet rich in antioxidant vitamins and minerals. Diabetics should get their vitamins and minerals from natural foods and a well-balanced diet.

**Keywords:** Diabetes mellitus, Oxidative stress, Antioxidants

**ÖZET**

Diabetes mellitus, dünyada görülme sıklığı giderek artan, kötü glisemik kontrol ile karakterize kronik ve metabolik bir hastalıktır. Kan glukoz düzeylerindeki artış, diyabetin komplikasyonlarının gelişmesine ve kötüleşmesine yol açan oksidatif stresin artmasına neden olmaktadır. Serbest oksijen radikallerinin, diyabette ve diğer kronik hastalıklarda neden olduğu patolojik etkileri uzun yıllardan beri tartışılmaktadır. Diyabetin her iki türünde de serbest oksijen radikallerinin üretiminin arttığına ve diyabetin başlangıcının oksidatif stresle yakından ilişkili olduğuna dair çok sayıda deneysel ve klinik çalışma vardır.

Normal sağlıklı kişilerde serbest radikaller ve antioksidanlar denge halindeyken, diyabette bu denge serbest radikaller lehine bozulmuştur. Antioksidan mekanizmalar daha aktif hale getirildiğinde veya bozulmuş olan bu denge antioksidanlar lehine artırıldığında, diyabetin komplikasyonlarıyla başa

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

çıkılabilmektedir. Diyabet hastalarının hem oksidatif stres göstergelerinde, hem de antioksidan savunma düzeylerinde de azalma gözlenmektedir.

Dünya genelinde antioksidanların koruyucu ajan olarak kullanıldığı çeşitli deneysel hayvan çalışmaları yapılmıştır ve yapılmaya da devam edilmektedir. Bu çalışmalar içerisinde diyabette çeşitli antioksidanlar kullanılarak yapılan araştırmalar önemli oranda yer almaktadır. Yapılan deneysel diyabetik hayvan çalışmalarının sonuçları antioksidan ajanların kullanımının diyabette oluşan oksidatif hasar ve diyabetin komplikasyonlarını önlemede yararlı etkileri olduğunu göstermiştir.

Diyabette oksidatif stres, diyabet ve diyabete bağlı gelişen komplikasyonlar arasındaki ilişkilerin mekanizmalarını araştıran çalışmalar gün geçtikçe artarak devam etmektedir, Bu çalışmalarda diyabette oksidatif stresin artışı ile serbest radikal oluşumu artarken, antioksidan üretiminin ise azaldığı gösterilmiştir. A, E ve C vitamini gibi çeşitli antioksidanların kullanımı, diyabetik komplikasyonların azaltılmasında etkili bir terapötik strateji olarak görülmektedir.

Kontrolsüz diyabet, çoğu zaman mikro besin ögesi yetersizlikleriyle ilişkilidir. Klinik çalışmalarda diyabetik hastalarda geleneksel antioksidanların kullanımının sınırlı etkiye sahip olduğu görülmüştür. Diyabet tedavisinde tek bir vitaminin, antioksidan olarak bir ya da daha fazla komplikasyonu önleyebilmesi olasıdır ancak, besinlerde olduğu gibi birden fazla vitaminin bir arada bulunması toplam oksidan durumun belirlenmesinde daha etkili olabilmektedir. Bu nedenle tedavide tüm antioksidan vitamin ve mineralleri bir arada içeren dengeli ve yeterli bir diyetin tüketilmesi önerilmektedir. Diyabetli bireyler günlük vitamin ve mineral gereksinimlerini doğal besin kaynaklarından ve dengeli bir diyetten karşılamalıdır.

Sonuç olarak; Antioksidan tedavi mutlaka diğer medikal tedavilerle birlikte uygulanmalıdır. Vitamin düzeyleri değerlendirilmeli ve eğer ölçülen değerler düşükse mümkün olduğunca sebze ve meyve tüketiminin artırılması ile eğer değilse besin destekleri ile kişi desteklenmelidir

**Anahtar kelimeler:** Diabetes mellitus, Oksidatif stres, Antioksidanlar

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## DAVRANIŞSAL HALKLA İLİŞKİLER MODELİNİN KAMUDA FARKINDALIK OLUŞTURMAK AMACIYLA KULLANIMI: TÜTÜN KONTROLÜ KAPSAMINDA YÜRÜTÜLEN FAALİYETLER

### USAGE OF BEHAVIORAL PUBLIC RELATIONS MODEL TO RAISE PUBLIC AWARENESS: ACTIVITIES CONDUCTED WITHIN THE SCOPE OF TOBACCO CONTROL

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#### ÖZET

Küresel iklim değişikliğinin oluşturduğu risklerin en aza indirilmesi ve kamuların bilgilendirilmesi, su/enerji vb. kaynakların korunması ve sürdürülebilirliklerinin sağlanması, eğitimin geliştirilmesi, sağlığın geliştirilmesi ve korunması gibi pek çok konunun ve bu konulardaki bilgi eksikliklerinden kaynaklı sorunların çözümü kapsamında yürütülen faaliyetlerde davranış bilimlerinden yararlanmak daha etkili sonuçlara ulaşmak anlamına gelmektedir. Devletler açısından bakıldığında, kamu politikalarının oluşturulması çerçevesinde ele alınan konuların ve sorunların çözümü için yasal düzenlemeler gerekliyken; bireyler ve tüm kamu açısından bakıldığında, oluşturulan politikaların ve gerçekleştirilen yasal düzenlemelerin kabulü için kamulara yönelik olarak yürütülen çeşitli faaliyetlerden yararlanmak gerekmektedir. Oluşturulan politikaların ve gerçekleştirilen yasal düzenlemelerin kamularda kabul görebilmesi açısından farkındalık oluşturmak, karar verme aşamasında etkili olan temel motivasyonları yönlendiren etmenleri ortaya koymak, davranış değişikliğinin sürdürülebilirliğini sağlamak amacıyla çeşitli faaliyetlerden yararlanmak, doğru tasarlanmış bilgilendirme süreciyle bilinç oluşturmak, ikna edici iletişim faaliyetlerini tasarlayıp uygulamak önem taşımaktadır. Tüm bunlar çerçevesinde kamu kurumları; kamusal sorunlara dikkat çekmek, bireylerin ve tüm kamunun konuyla ilgili farkındalıklarını oluşturup davranış değişikliğini sağlamak amacıyla halkla ilişkiler uygulamalarından yararlanmaktadırlar. Yürütülen faaliyetler, kamularda tutum değişikliğinin gelişmesine ve olumlu davranışın benimsenmesine katkı sağlamaktadır. Aynı zamanda da kamusal bilincin oluşumuna yardımcı olarak davranışların sürdürülebilirliği açısından etkili olmaktadır. Kamu kurumlarının kamuları bilgilendirmek ve bilinç oluşturmak amacıyla yürüttükeleri halkla ilişkiler uygulamalarında, amaç doğrultusunda alanda kullanılan model ve kuramlardan yararlanmaları bu uygulamaların kabul görmesini, etkinliğini ve sürdürülebilirliğini artıracaktır. Halkla ilişkilerin kamusal sorunlara veya konulara odaklanarak çözüm üretip ilgili konu çerçevesinde davranış değişikliği yaratma konusundaki çabalarını kapsayan *Davranışsal Halkla İlişkiler Modeli*, bu çerçevede kullanılan modellerden biridir. Patrick Jackson davranış değişikliğine odaklanan *Davranışsal Halkla İlişkiler Modelinin*; farkındalık oluşması, bireylerin edindikleri bilgiler üzerinde düşünmeye başladıkları örtük ilgi süreci, bu ilginin halkla ilişkiler faaliyetleriyle tetiklenmesi, davranış değişikliği öncesinde tutum ve davranışlarda yaşanan değişiklikler ve nihai davranış değişikliğinin gerçekleşmesi olarak beş temel adımın olduğunu aktarmıştır (Balta Peltekoğlu & Akbayır, 2019, s.832). Ulusal ve uluslararası alanda tüm bireyler ve kamular için en önemli sorunlardan biri, tütün ve tütün mamullerinin kullanımının yol açtığı sağlık sonuçlarıyla mücadele etmektir. Bu çerçevede oluşturulan politikalar ve gerçekleştirilen yasal düzenlemelerle birlikte kamularda farkındalık oluşturulması açısından yürütülecek halka ilişkiler uygulamalarının, doğru model ve bilimsel çerçevede tasarlanmış stratejilere oturtulması ve sürdürülmesi gerekmektedir. Tüm dünyada olduğu gibi Türkiye’de de tütün ve tütün mamullerinin kullanılmaya başlanmasının önlenmesi, kullananların bırakmasının sağlanması, pasif içici durumunda bulunanların etkilenimlerinin engellenmesi amacıyla oluşturulan politikalar ve gerçekleştirilen yasal düzenlemelerle halk sağlığının korunması amaçlanmıştır. Sigara içmeye bağlı olarak gerçekleşen sağlık riskleri bilinmesine rağmen, hedef kitlelerde kalıcı davranış değişikliğinin oluşmadığı gözlemlenmektedir. Bireysel düzeydeki davranışları değiştirmeye yönelik gerçekleştirilecek

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

uygulamalarla birlikte, sosyal ve kültürel çevreyi de değiştirmeyi hedefleyen bütüncül politikaların oluşturulması ve yasal düzenlemelerin gerçekleştirilmesi bir gereklilik olarak karşımıza çıkmaktadır. Türkiye’de tütünle mücadele kapsamındaki çalışmaların başlangıcını, 7 Kasım 1996 tarihli ve 4207 sayılı *Tütün Mamullerinin Zararlarının Önlenmesine Dair Kanun* oluşturmaktadır. Sonraki süreçlerde konuyla ilgili birçok politika oluşturulmuş, yasal düzenlemeler gerçekleştirilmiş, sahada kampanyalar uygulanmış, medya araçlarında kamu spotları yayınlanmıştır.

2018 tarihinde T.C. Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü Tütün ve Madde Bağımlılığı ile Mücadele Dairesi Başkanlığı koordinatörlüğünde ilgili kurumlar, üniversiteler, sivil toplum örgütleri, medya temsilcilerinin de iş birliğiyle 2018-2023 dönemini kapsayacak *Tütün Kontrolü Strateji Belgesi ve Eylem Planı* hazırlanmıştır. Bu planla amaç; tütünle mücadele etmek, tüm kamuyu özellikle çocukları ve gençleri tütün kullanımından korumaktır. Bu çalışmada; tüm Dünya’da olduğu gibi Türkiye’de de tüm bireyler ve kamular için en büyük sağlık tehditlerinden biri olan tütün ve tütün mamullerinin kontrolüne yönelik hazırlanan ve ulusal olarak kamularda bilinç oluşturulup davranış değişikliğinin sürekliliğinin sağlanması, oluşturulan politikaların güçlendirilmesi kapsamında hazırlanan *Tütün Kontrolü Strateji Belgesi ve Eylem Planı (2018-2023)* çerçevesinde gerçekleştirilen iletişim faaliyetlerinin *Davranışsal Halkla İlişkiler Modeli* açısından irdelenmesi amaçlanmıştır. Örneklem olarak belirlenen *Tütün Kontrolü Strateji Belgesi ve Eylem Planı* kapsamında gerçekleştirilen iletişim çalışmaları, davranışsal halkla ilişkilerin kullanımı açısından irdelenip değerlendirilmiştir. Bu çalışma kapsamında gerçekleştirilecek olan çözümlenme ve değerlendirmeler, konuyla ilgili oluşturulacak sonraki süreçteki eylem planlarının iletişim stratejilerinin oluşturulmasında rehberlik edeceği bakımından da önem taşımaktadır.

**Anahtar Kelimeler:** Davranışsal Halkla İlişkiler Modeli, Tütünle Mücadele, Kamu Kurumları, Tütün Kontrolü Eylem Planı.

## ABSTRACT

About minimizing the risks posed by global climate change and informing the public, water/energy etc., using behavioral sciences in activities carried out within the scope of solving many issues such as protecting resources and ensuring their sustainability, improving education, improving and protecting health, and problems arising from lack of knowledge on these issues means achieving more effective results. From the perspective of states, while legal regulations are necessary to solve the issues and problems addressed within the framework of creating public policies; from the perspective of individuals and the entire public, it is necessary to benefit from various activities carried out for the public in order to accept the policies created and the legal regulations made. It is important to raise awareness, to reveal the factors that direct the basic motivations that are effective in the decision-making stage, to benefit from various activities to ensure the sustainability of behavioral change, to raise awareness through a properly designed information process, and to design and implement persuasive communication activities in order for the policies and legal regulations to be accepted by the public, Public institutions use public relations practices to draw attention to public problems, to raise awareness of individuals and the entire public on the issue and to ensure behavioral change within the framework of all these. The activities carried out contribute to the development of attitude change in publics and the adoption of positive behavior. At the same time, it is effective in terms of sustainability of behavior help to create public consciousness about these policies. In the public relations practices carried out by public institutions to inform the public and raise consciousness, the use of models and theories used in the field in line with the purpose will increase the acceptance of effectiveness and sustainability of these practices. *Behavioral Public Relations Model*, which covers the efforts of public relations to produce solutions by focusing on public problems or issues and to create behavioral change within the framework of the relevant issue, is one of the models used in this framework. Patrick Jackson stated that in *Behavioral Public Relations Model* which focused on behavioral change; there are five basic steps: raising awareness, the implicit interest process in which individuals begin to think about the information they have acquired, triggering this interest with public relations activities, changes in attitudes and behaviors before behavioral change, and the realization of the final behavioral change (Balta Peltekoğlu & Akbayır, 2019, s.832). One of the most important problems for all individuals and publics, nationally

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

and internationally, is to struggle against the health consequences caused by the use of tobacco and tobacco products. Public relations practices to be carried out in order to raise awareness in the public should be based on strategies designed in the correct model and scientific framework together with the policies and legal regulations made should be continued within this context. In Turkey, as in the rest of the world, it is aimed to protect public health through policies and legal regulations designed to prevent the use of tobacco and tobacco products, to ensure that users quit, and to prevent exposure to passive smokers. It is observed that there is no permanent behavioral change in the target groups although the health risks associated with smoking are known. It is a necessity to create holistic policies and implement legal regulations that aim to change the social and cultural environment. Along with the practices to be carried out to change behaviors at the individual level. The beginning of the efforts within the scope of the struggle against tobacco in Turkey is the *Law on the Prevention of Harmful Effects of Tobacco Products* dated 7 November 1996 and numbered 4207. In the following processes, many policies on the subject were created, legal regulations were implemented, campaigns were implemented in the field, and public service announcements were broadcast in media.

In 2018, T.R. *Tobacco Control Strategy Document and Action Plan* covering the period 2018-2023 has been prepared under the coordination of the Department of Struggle Tobacco and Substance Abuse Addiction of the Ministry of Health, General Directorate of Public Health, in cooperation with relevant institutions, universities, non-governmental organizations and media representatives. The aim with this plan is; struggle against tobacco for protecting the entire public, especially children and young people, from the usage of tobacco. In this study, *Tobacco Control Strategy Document and Action*, prepared for the control of tobacco and tobacco products, which are one of the biggest health threats for all individuals and publics in Turkey, as well as all over the world, and within the scope of raising public consciousness nationally for ensuring the continuity of behavioral change and strengthening the policies created. It is aimed to examine the communication activities carried out within the framework of the *Plan (2018-2023)* in terms of the *Behavioral Public Relations Model*. The communication studies carried out within the scope of the *Tobacco Control Strategy Document and Action Plan*, which were determined as a sample, were examined and evaluated in terms of the use of behavioral public relations. The analyzes and evaluations to be carried out within the scope of this study are also important in that they will guide the creation of communication strategies and action plans in the next process.

**Keywords:** Behavioral Public Relations Model, Struggle Against Tobacco, Public Institutions, Tobacco Control Action Plan.

## KAYNAKÇA

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LSTM-TABANLI GÜNEŞ ENERJİ TAHMİNLEMESİ

LSTM-BASED SOLAR POWER FORECASTING

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**ÖZET**

Her geçen gün artan dünya nüfusu, ülkelerin enerji ihtiyaçlarının da artmasına neden olmaktadır. Enerji talebindeki bu yükseliş, özellikle gelişmekte olan ülkeleri enerji üretiminde kullanmak üzere farklı enerji kaynakları arayışına yöneltmiştir. %70'lik kısmı fosil yakıt kullanımıyla sağlanan enerji üretiminden kaynaklanan sera gazı emisyonları ve zararlı gazlar, ozon tabakasının kalınlaşmasına sebep olmakta ve bu da küresel ısınmayı hızlandırmaktadır. Gerek enerji ihtiyacına çözüm bulmak gerekse küresel ısınmanın bir nebze de olsa önüne geçebilmek amacıyla daha çevreci enerji kaynaklarına yönelim gün geçtikçe artmaktadır. Aynı zamanda güneş ve rüzgâr gibi doğal kaynakların enerji üretimi için kullanılması, ülkelerin enerjide bağımsız olmalarını da sağlamaktadır. Fakat geleneksel enerji kaynaklarına kıyasla yenilenebilir enerji kaynaklarının değişken yapılı olması, bu kaynaklarının enerji üretiminde kullanılabilme maliyetini arttırmaktadır. Günümüzde, bu dezavantajların önüne geçmek, gelişen teknolojiyle çok daha ekonomik bir hal almıştır. Artık, sayısız verinin toplanıp saklanabiliyor olması, insan beynini taklit ederek öğrenen algoritmalar olan Makine Öğrenimi algoritmalarının çalışma alanlarının giderek yaygınlaşmasını sağlamıştır. Bu çalışmanın ana motivasyonu, Yenilenebilir enerji kaynaklarından olan güneş enerjisinin kullanımının artması amacıyla, Güneş Enerji Sistemleri kurulumları için gereken hesaplamaların makine öğrenimi algoritmaları yardımıyla kapsamlı ve ekonomik yapılabilmesi olmuştur. Bu bağlamda, çalışmada sahip olunan güneş enerji sistemi üretim verileri kümesi, oluşturulan derin öğrenme modelleri yardımıyla gelecek zaman tahminlerinde kullanılmıştır. Yapılan tahminler farklı istatistiksel hesaplamalar ve grafikler yardımıyla kıyaslanarak en iyi tahmin yapan model keşfedilmiştir.

**Anahtar Kelimeler:** Yenilenebilir Enerji, Güneş enerji sistemleri, Makine Öğrenimi, Derin Öğrenme.

**ABSTRACT**

The world population, which is increasing day by day, causes the energy needs of countries to increase. This increase in energy demand has led especially developing countries to seek different energy sources to use in energy production. Greenhouse gas emissions and harmful gases resulting from energy production, 70% of which is provided by the use of fossil fuels, cause the ozone layer to thicken, which accelerates global warming. In order to find solutions to energy needs and to prevent global warming to some extent, the trend towards more environmentally friendly energy sources is increasing day by day. At the same time, the use of natural resources such as sun and wind for energy production enables countries to become energy independent. However, the variable structure of renewable energy sources compared to traditional energy sources increases the cost of using these resources in energy production.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

Nowadays, avoiding these disadvantages has become much more economical with developing technology. Nowadays, the ability to collect and store countless data has enabled the study areas of Machine Learning algorithms, which are algorithms that learn by imitating the human brain, to become increasingly widespread. The main motivation of this study is to make the calculations required for Solar Energy Systems installations comprehensive and economical with the help of machine learning algorithms, in order to increase the use of solar energy, which is one of the renewable energy sources. In this context, the solar energy system production data set in the study was used in future time predictions with the help of deep learning models. The predictions made were compared with the help of different statistical calculations and graphs and the model that made the best prediction was discovered.

**Keywords:** Renewable Energy, Solar Power Systems, Machine Learning, Deep Learning.

DIYABET İLE OMEGA YAĞ ASİTLERİ İLİŞKİSİ: OMEGA 3/ OMEGA 6 DENGESİ  
ÖNEMLİ MİDİR?

RELATIONSHIP BETWEEN DIABETES AND OMEGA FATTY ACIDS: IS OMEGA  
3/OMEGA 6 BALANCE IMPORTANT?

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**ÖZET**

Diyabet (DM) insülin eksikliği veya insülin etkisindeki bozukluklar sonucu, organizmanın makro besin öğelerinden yeterince yararlanamadığı kronik metabolizma bozukluğudur. Yaşam kalitesini bozan ve çoğu kez yeti yitimi yapacak kadar kalıcı hasar bırakan ciddi komplikasyonlar oluşturduğu için, oldukça önemli bir hastalıktır ve önlem alınması gerekir; oysa dünyada yetişkin nüfusun %10,5'inden fazlası diyabetlidir, ülkemizde ise Tip 2 DM sıklığı %13.7'ye ulaşmıştır. Diyabetteki bu küresel artışın sebebi, hareketsizliğe, artan vücut yağı ve yanlış beslenmeye atfedilmektedir; dolayısıyla vücut ağırlığının kontrolü ve doğru beslenme DM'nin önlenmesinde ve tedavisinde anahtar rolündedir. Diyabetli/Prediyabetli yetişkinlere yönelik kişiselleştirilmiş tedavi kapsamında; glisemik hedeflerin iyileşmesi için kilo kontrolü ve beslenme danışmanlığı önerilmektedir. Rehberler, yetişkinler için toplam tüketilen yağ miktarının, günlük alınan kalorinin %20-35'i olmasını önermektedir; ancak, beslenmede toplam tüketilen yağ miktarından ziyade, yağın kalitesi ve türü önemlidir. Yapılan çalışmalarda, Çoklu Doymamış Yağ Asidi (ÇDYA) tüketiminin düşük diyabet riski ile ilişkili olduğu saptanmıştır. Omega 3 ve Omega 6; ÇDYA grubu içerisinde yer alan ve metabolizma için gerekli olan yağ asitleridir fakat organizma tarafından sentezlenemedikleri için; besinler veya takviye edici ürünler ile alınması gerekmektedir. Omega 3 yağ asitleri özellikle yağlı balıklarda,ceviz,keten tohumu ve chia tohumu gibi bazı bitkisel besinlerde bulunmaktadır. Omega 3 yağ asitlerinin adipositokinlerin üretimini artmasına sebep olduğu, dolayısıyla insülin duyarlılığını arttırdığı ve DM gelişiminin altında yatan metabolik anormallikleri iyileştirdiği düşünülmektedir. Omega 6'nın temel kaynağı ise, mısır özü ve ay çiçek yağı başta olmak üzere, bitkisel yağlardır. Günümüz beslenmesinde, Omega 6 açısından zengin bitkisel yağların tüketiminin artması ve Omega 3 içeren besinlerin tüketiminin azalması; Omega 3/Omega 6 arasında dengesizliğe yol açmıştır. Bu dengesizlik, özellikle Eikosapentaenoik (EPA)/Araşidonik Asit (AA) oranının azalması, diyabet gibi metabolik hastalıkların gelişimiyle ilişkili olan düzensizliğin sebebi olabilir. Omega 3/ Omega 6 arasındaki dengenin glukoz metabolizması üzerindeki etkileri göz ardı edilmemelidir. Omega 3/Omega 6 arasındaki dengenin ve DM ile ilişkisinin anlaşılması; DM tıbbi beslenme tedavisinde yeni yaklaşımların geliştirilmesi açısından önemlidir.

**Anahtar Kelimeler:** Diyabet, Omega 3, Omega 6

**ABSTRACT**

Diabetes is a chronic condition caused by defects in the action of insulin. It is an important disease because it causes serious complications. More than 10.5% of the adult population in the world has diabetes, while the prevalence of Type 2 DM has reached 13.7% in our country. This global increase in diabetes is attributed to inactivity and malnutrition. Therefore, body weight control and proper nutrition are very important in the treatment of diabetes. Within the scope of treatment, weight control and nutritional counseling are recommended to improve glycemic targets. Guidelines recommend that the

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

total amount of fat consumed for adults should be 20-35% of daily calories; however, the quality and type of fat is more important than the total amount of fat consumed in the diet. Studies have found that Polyunsaturated Fatty Acid (PUFA) consumption is associated with a lower risk of diabetes. Omega 3 and Omega 6 are fatty acids in the PUFA group and are essential for metabolism, but since they cannot be synthesized by the organism; they must be taken from foods or supplements. Omega 3 fatty acids are found in oily fish and some plant foods. Omega 3 fatty acids are thought to increase the production of adipocytokines, thereby improving insulin sensitivity and ameliorating the metabolic abnormalities underlying the development of DM. The main source of Omega 6 is vegetable oils. Today, the increase in omega 6 consumption and the decrease in omega 3 consumption have disturbed the balance between the two. The imbalance between omega 3/Omega 6 may be the cause of diabetes. This imbalance, especially a decrease in the ratio of Eicosapentaenoic (EPA)/Arachidonic Acid (AA), can lead to diabetes. Understanding the balance between Omega 3/Omega 6 and its relationship with DM is important for new approaches in the medical nutrition therapy of DM.

**Keywords:** Diabetes, Omega 3, Omega 6

İŞTEN AYRILMA NİYETİNİN KUŞAKLARA GÖRE DEĞERLENDİRİLMESİ: X, Y VE Z  
KUŞAKLARI İLE BİR ÇALIŞMA

ASSESSMENT OF QUITTER INTENTION BY GENERATIONS: A STUDY WITH  
GENERATIONS X, Y AND Z

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**ÖZET**

Bu çalışmada X, Y ve Z kuşaklarının işten ayrılma niyetlerinin araştırılması amaçlanmıştır. Bu amaç doğrultusunda araştırmanın örnekleme doğum yılları 1965 – 2004 arasında yer alan ve Isparta ili merkezi perakende sektöründe çalışmakta olan 384 özel sektör çalışanından oluşmaktadır. Araştırmada nicel araştırma yöntemlerinden ilişkisel tarama modeli kullanılmıştır. Veriler kolayda örnekleme yöntemi ile toplanmıştır. Örneklemin kuşaklara yönelik dağılımı incelendiğinde 1965-1979 doğumlu 79 kişi X kuşağı, 1980-1999 doğumlu 239 kişi Y kuşağı ve 2000 ve sonrası doğumlu 63 kişi Z kuşağında yer almaktadır. Verilerin toplanmasında İşten Ayrılma Niyeti Ölçeği ve Kişisel Bilgi Formu kullanılmıştır. Araştırmada hipotezlerini test etmek amacıyla SPSS paket programı ve Doğrulayıcı Faktör Analizi, t testi ve One-Way ANOVA testleri kullanılmıştır. Araştırma sonuçlarına göre katılımcıların işten ayrılma niyetlerinin kuşaklara göre farklılık gösterdiği tespit edilmiştir. Z kuşağında yer alan katılımcıların işten ayrılma niyetlerinin, X ve Y kuşağında yer alan katılımcılara göre daha yüksek olduğu tespit edilmiştir. Diğer kuşaklar arasında ise istatistiksel olarak anlamlı bir fark bulunmamıştır. Kuşakların işten ayrılma niyetlerine dair ortalamaları  $X_{ortalama} = 2.53$ ,  $Y_{ortalama} = 2.81$  ve  $Z_{ortalama} = 3.19$  şeklindedir. Ortalamalar yaş arttıkça işten ayrılma niyetinde azaldığını gösterdiğinden katılımcıların yaşları ile işten ayrılma niyetleri arasında korelasyon analizi yapılmış ve negatif yönlü bir ilişki tespit edilmiştir. Bu sonuca göre yaş arttıkça işten ayrılma niyeti azalmaktadır. Katılımcıların diğer demografik özellikleri ile işten ayrılma niyetleri arasındaki ilişkiler incelendiğinde ise işten ayrılma niyetlerinin cinsiyetlerine göre farklılık göstermediği tespit edilmiştir. Ayrıca katılımcılara aylık gelirleri sorulmuş ve verilen cevaplara göre düşük, orta ve yüksek gelir düzeyi şeklinde üç grup oluşturulmuştur. Oluşturulan grupların işten ayrılma niyeti düzeyleri karşılaştırıldığında gelir düzeyi düşük olan grupta yer alan katılımcıların işten ayrılma niyetleri, orta ve yüksek olan grupta yer alan katılımcılara göre daha yüksek olduğu tespit edilmiştir. Benzer şekilde orta gelir düzeyi grubunda yer alan katılımcıların işten ayrılma niyetleri, yüksek gelir düzeyi olan gruptaki katılımcılara oranla daha yüksek olduğu tespit edilmiştir. Bu sonuçlara göre gelir düzeyi ile işten ayrılma niyeti arasında negatif bir ilişkinin olduğu görülmektedir. Son olarak katılımcıların işten ayrılma niyetleri ile eğitim seviyeleri arasındaki ilişkiler incelendiğinde gruplar arası bir farklılığa rastlanılmamıştır.

**Anahtar Kelimeler:** İşten Ayrılma Niyeti, Kuşaklar, Gelir Düzeyi

**ABSTRACT**

This study aimed to investigate the turnover intentions of generations X, Y and Z. For this purpose, the sample of the research consists of 384 private sector employees whose birth years are between 1965 and 2004 and who work in the retail sector in the central city of Isparta. The relational screening model, one of the quantitative research methods, was used in the research. Data were collected by convenience sampling method. When the generational distribution of the sample is examined, 79 people born in 1965-1979 are in Generation X, 239 people born in 1980-1999 are in Generation Y, and 63 people born in 2000 and later are in Generation Z. The Intention to Leave Scale and Personal Information Form were used to collect data. In order to test the hypotheses in the research, SPSS package program and Confirmatory Factor Analysis, t test and One-Way ANOVA tests were used. According to the research results, it was determined that the participants' intentions to leave their job differed according to

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

generations. It was determined that the intention to leave the job of the participants in Generation Z was higher than the participants in Generation X and Y. There was no statistically significant difference between other generations. The averages of the generations regarding their intention to leave the job are as follows: Xmean = 2.53, Mean = 2.81 and Force = 3.19. Since the averages show that the intention to leave the job decreases as the age increases, a correlation analysis was conducted between the participants' ages and their intention to leave the job and a negative relationship was detected. According to this result, as age increases, the intention to quit decreases. When the relationships between the participants' other demographic characteristics and their intention to leave their job were examined, it was determined that their intention to leave did not differ according to their gender. Additionally, the participants were asked about their monthly income and three groups were created according to the answers: low, medium and high income levels. When the turnover intention levels of the created groups were compared, it was determined that the turnover intentions of the participants in the low income group were higher than the participants in the medium and high income groups. Similarly, it was determined that participants in the middle-income group had higher intentions to leave their job than participants in the high-income group. According to these results, there is a negative relationship between income level and intention to quit. Finally, when the relationships between the participants' intentions to leave their job and their educational attainment were examined, no differences were found between the groups.

**Key Words:** Intention to Quit, Generations, Income Level



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## BÖLGESEL KALKINMADA KADININ ROLÜ VE TÜRKİYE'DE KADIN GİRİŞİMCİLİK UYGULAMALARININ ETKİLERİNİN İNCELENMESİ

### THE ROLE OF WOMEN IN REGIONAL DEVELOPMENT AND INVESTIGATING THE IMPACTS OF WOMEN'S ENTREPRENEURSHIP PRACTICES IN TURKEY

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#### ÖZET

Tarihsel çerçevede kadınlara biçilen en temel roller, ev işleri ve çocuk bakımına yöneliktir. Ancak endüstriyel ilerleme ve demografik dönüşümle birlikte, kadının işgücüne katılımında meydana gelen değişiklikler, kadının hane içerisindeki rolünün de değişmesine neden olmuştur. Bununla birlikte, gelir yetersizliği veya medeni durumun değişmesi gibi hane içi ekonomik ve sosyo-demografik dinamikler de kadının iş hayatına katılımını çoğu durumda zorunlu hale getirmektedir. Kadınların kayıt-dışı veya düşük nitelikli alanlarda çalışma oranları halen yüksek olmakla birlikte, Türkiye'de kadınların işgücüne katılım düzeylerinde önemli düzeyde bir ilerleme kaydedilemediği de bir gerçektir. Türkiye için bugünkü kadın işgücüne katılım oranları yaklaşık olarak otuz yıl önceki değerlere yakın sonuçlar vermektedir ve cinsiyetler arasında işgücüne katılım oranlarında bugün halen yaklaşık %40'lık bir fark bulunmaktadır. Öyle ki, Türkiye'de mevcut kalkınma planında da kadının işgücüne katılımının teşvik edilmesi önemli bir politika olarak yer almaktadır. Çünkü toplumun güçlendirilmesinin temel koşullarından biri, kadının güçlendirilmesinde yatar. Kadınların sosyal hayata katılmaları ve daha fazla sorumluluk almaları da, gerçek anlamda özgürlüklerini genişletmelerine neden olur. Bu bağlamda son yıllarda kadınların, özellikle bölgesel girişimcilik uygulamaları ile iktisadi aktivitede yer alma düzeylerinde artışlar söz konusudur. Bu tür uygulamaların, bölgeler arasındaki dengesizliklerin azaltılmasına katkı sağlaması da mümkündür. Bazı bölgelerin diğer bölgelere göre üstünlüğe sahip oldukları sektörlerin veya alanların tespit edilmesi ve buna yönelik politikalarla bu alanların geliştirilmesi oldukça önemlidir. Bu çalışmanın amacı, kadının güçlendirilmesinin kalkınma çabalarına ne tür etkiler sağlayabileceğini görmektir. Bunun yanında kadın girişimciliğini içeren uygulamaların elde ettikleri bulguların incelenerek, bu uygulamaların bölgesel kalkınmaya ne tür katkılar sağlayabileceğinin anlaşılması da hedeflenmektedir. Türkiye'de son dönemde farklı kadın girişimciler tarafından yönetilen farklı bölgesel kalkınma uygulamaları söz konusudur. Bu uygulamaların büyük çoğunluğunun genellikle önemli düzeyde olumlu sonuçlar gösterdiği ve bölgeye ciddi katkılar sağladığı görülmektedir. Ayrıca başarıya ulaşan bu tür uygulamaların, işgücüne katılma konusunda çekinceleri olan kadınlar için cesaretlendirici ve yol gösterici olduğu da bir gerçektir.

**Anahtar Kelimeler:** bölgesel kalkınma, kadın, kadın girişimciliği, işgücüne katılım

#### ABSTRACT

Historically, domestic work and child care were two of the most fundamental roles assigned to women. However, women's positions within the household have changed as a result of changes in women's participation in the labor market as a result of industrial development and demographic transformation. In the majority of instances, household economic and socio-demographic dynamics such as insufficient income or changes in marital status also force women to work. Besides the numbers of women working in unregistered or low-skilled jobs are still high, there has been also no significant progress in women's rates of labor force participation in Turkey. Indeed, Turkey's female labor force participation rate presently is nearly identical to what it was thirty years ago and there is still a gap in labor force participation between both genders of about 40% today. Thus, Turkey's current development plan prioritizes promoting women's participation in the labor force as one of its key policies. The empowerment of women is one of the fundamental requirements for the strengthening of society, and

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

---

women's involvement in social life and increased responsibility lead them to expand their actual freedom. In this context, women have become more involved in economic activity, particularly in recent years, especially through regional entrepreneurship practices which may contribute to the reduction of regional imbalances. In order to develop these regions with appropriate policies, it is crucial to identify the sectors or areas in which some regions have an advantage over other regions. The purpose of this study is to investigate the potential impacts of women's empowerment on efforts to promote development. Additionally, it aims to understand what kinds of contributions these practices can make to regional development by considering the findings of practices involving women entrepreneurs. Different regional development practices have recently been employed in Turkey which were led by various women entrepreneurs. It is evident that the majority of these practices produce notable gains and have a significant impact on the region. It is also a fact that these successful practices support and mentor women who are hesitant about joining the labor market.

**Keywords:** regional development, women, women's entrepreneurship, labor force participation

ÇALIŞMA HAYATINDA GÜVENCESİZLİĞİN YARATTIĞI YENİ DAVRANIŞ BİÇİMİ:  
SESSİZ İSTİFA

A NEW FORM OF BEHAVIOUR CREATED BY INSECURITY IN WORKING LIFE: QUIET  
QUITTING

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**ÖZET**

Çalışma ilişkilerinde güvencesizlik olgusuna odaklanarak sessiz istifa konusunu ele alan bu çalışma, günümüz çalışma hayatının belirsiz, güvencesiz ortamında çalışanların sahip olduğu duygu durumunun nasıl sonuçlar yarattığını ortaya koymaya çalışmaktadır. Uzunca bir zamandır neoliberal politikaların çalışma ilişkilerinde güvencesizleştirme adına her türlü uygulamayı hayata geçirmesi en çok emeği ile varlığını sürdüren çalışanları etkilemiştir. Güvencesiz çalışma, çalışmanın niteliğinin belirsizleştiği, esnek çalışma biçimlerinin hakim olduğu, iş güvencesinin olmadığı bir düzeni anlatmaktadır. Bu düzen, belirsizliğin, ücret ve çalışma koşullarındaki gerilemenin ve güvencesizliğin getirdiği sorunlarla mücadele etmek zorunda kalan çalışanlarda ciddi kaygılara neden olmaktadır. Aşırı çalışma, belirsizlik, tükenmişlik, stres, iş güvencesizliği sonucu işsizlik kaygısı gibi durumların sonucu işyerinde çalışanların bir tepki olarak iş davranışlarında değişiklik göstermesi olarak tanımlanan sessiz istifa kavramı ilk defa 2009 yılında Mark Boldger tarafından ortaya atılmış; 2022 yılında bir TikTok videosuyla popülerliğini artırmış ve Z kuşağının bir davranış biçimi olarak ele alınmıştır. Sessiz istifa davranışı bu konuyla ilgili yapılan çalışmalarda büyük ölçüde aşırı çalışma kültürünün yarattığı psikolojik bir durum olarak değerlendirilmiş, bireysel ve örgütsel sonuçları bakımından tartışılmıştır. Ancak davranışın arka planını ortaya koymak sessiz istifa davranışını neoliberal düzenin inşa ettiği güvencesiz çalışma ilişkilerinin bir sonucu olarak görmek ve bu kapsamda ele almak günümüz çalışma ilişkilerini anlamlandırmak açısından önemlidir. Güvencesiz çalışma koşullarının çalışanlar üzerinde yarattığı psikolojik etkinin bir sonucu olarak sessiz istifa konusunu tanımlamak ve sorgulamak için zemin oluşturmak çalışmanın temel amacıdır.

**Anahtar Kelimeler:** Güvencesiz çalışma, esneklik, iş güvencesizliği, işsizlik kaygısı, sessiz istifa.

**ABSTRACT**

This study, which focuses on the issue of quiet quitting by focusing on the phenomenon of precariousness in labour relations, tries to reveal how the emotional state of employees in the uncertain, precarious environment of today's working life creates results. For a long time, neoliberal policies have been implementing all kinds of practices in the name of precariousness in labour relations, which has affected the employees who survive with their labour the most. Precarious work refers to a system in which the nature of work is uncertain, flexible forms of work prevail and there is no job security. This system causes serious concerns among workers who have to struggle with the problems of uncertainty, decline in wages and working conditions and precariousness. The concept of quiet quitting, which is defined as a change in work behaviour as a reaction to situations such as overwork, uncertainty, burnout, stress, unemployment anxiety as a result of job insecurity, was first introduced by Mark Boldger in 2009; it increased its popularity with a TikTok video in 2022 and was considered as a form of behaviour of Generation Z. Quiet quitting behaviour has been largely evaluated as a psychological situation created by the culture of overwork and discussed in terms of its individual and organisational consequences. However, it is important to reveal the background of the behaviour, to see quiet quitting behaviour as a result of precarious working relations built by the neoliberal order and to address it in this context in order to make sense of today's labour relations. The main purpose of this study is to define the quiet

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

---

quitting as a result of the psychological impact of precarious working conditions on employees and to create a basis for questioning.

**Keywords:** Precarious work, flexibility, job insecurity, unemployment anxiety, quiet quitting.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

SOSYAL MEDYANIN 'İMAJ' YÜZÜ ÖZÇEKİM'LE KİMLİĞİ İNŞA EDERKEN YAŞANAN  
ÖLÜMLER

DEATHS WHILE CONSTRUCTING IDENTITY WITH SELFIE, THE 'IMAGE' FACE OF  
SOCIAL MEDIA

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## ÖZET

Geleneksel kitle iletişim araçları gazete, radyo, televizyon, sinema vb. aygıtlarda pasif konumda bulunan hedef kitle, içerisinde bulunduğumuz dijital çağda internetin sağladığı katılımcı olma ve içerik üretme fırsatından dolayı sosyal ağ platformları üzerinden görünür olma imkânı bulmuştur. Amerika Birleşik Devletleri'nden film yapımcısı, ressam ve yayıncı Andy Warhol'un "Bir gün herkes 15 dakikalığına ünlü olacak" sözü, günümüz postmodern yaşamında bireylerin kendilerine ait her türlü bilgi ve belgeleri yeni medyanın önemli unsurlarından olan sosyal medya platformları aracılığıyla gözler önüne sermesi ile doğrulanır hale gelmiştir. Sosyal medya uygulamaları aracılığıyla ait olduğu sosyal dokuya, aile ve akraba ilişkilerine, tüketimle ilgili tutumlarına dair verileri belirlediği tarzda biçimlendiren insanlar, daha önce etkileşime girmedikleri kişilerle oluşturdukları yeni kimlikle etkileşime girmeyi tercih etmeye başlamıştır. Günümüzde sosyal medyada çokça paylaşılan özçekim (selfie) fotoğraf ve videolar, bireylerin kimliklerini yeniden inşa etmede önemli bir araca dönüşmüş durumdadır. İnsanlar, sosyal medyada yaptıkları etkinliklerde muhataplarının dikkatini çekebileceklerini düşündükleri ya da tespit ettikleri özçekim içeriklere paylaşımda öncelik vermekte, bunu yaparken de beğeni oranının yüksek olacağını düşündükleri fotoğraf ve videoları paylaşmaktadır. Sosyal medya üzerinden yapılan beğenilme ve dolayısıyla yeni kimlikle var olma odaklı paylaşımlar, zaman zaman sonu ölümle ya da yaralanmayla biten kazalara neden olabilmektedir. Bu çalışmada, sosyal medya aracılığıyla oluşturduğu kimliği yaptığı özçekimle (selfie) ile insanların beğenisine sunarken karşılaştıkları tehlikeli durumların medyaya yansımaları irdelenmiştir. Yapılan incelemede, insanların, hayatın olağan akışı içerisinde yapmayacakları düşünülen tehlikeli davranışları daha fazla beğeni alabilmek için düşünmeden gerçekleştirdikleri, bunun sonucunda da hayatlarını kaybettikleri ya da yaralandıkları tespit edilmiştir.

**Anahtar Kelimeler:** Özçekim, Sosyal Medya, Yeni Kimlik, Fotoğraf ve Video.

## ABSTRACT

The target audience, which is passive in traditional mass media such as newspapers, radio, television, cinema, etc., has found the opportunity to become visible through social networking platforms due to the opportunity to participate and produce content provided by the internet in the digital age we are in. The words of Andy Warhol, a filmmaker, painter and publisher from the United States of America, "One day everyone will be famous for 15 minutes," have become true in today's postmodern life with individuals revealing all kinds of information and documents about themselves through social media platforms, one of the important elements of new media. Through social media applications, people who shape the data on the social fabric they belong to, their family and relative relations, and their attitudes towards consumption in the way they determine, have started to prefer to interact with people they have

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

---

not interacted with before with the new identity they have created. Today, selfie photos and videos, which are widely shared on social media, have become an important tool for individuals to reconstruct their identities. People prioritise sharing selfie content that they think they can attract the attention of their interlocutors in their activities on social media, and in doing so, they share photos and videos that they think will be highly appreciated. Social media posts focused on being liked and therefore existing with a new identity can sometimes cause accidents that end in death or injury. In this study, the reflection of the dangerous situations they face while presenting the identity they have created through social media to people's liking with selfies (selfie) is analysed. In the investigation, it has been determined that people perform dangerous behaviours that they would not do in the ordinary course of life without thinking in order to get more likes, and as a result, they lose their lives or get injured.

**Keywords:** Selfie, Social Media, New Identity, Photo and Video.



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## ŞÂRÎ'İN SÜKÛTU: MAKÂSİDÜ'Ş-ŞERÎAYI KEŞF YOLU ÜZERİNE BİR İNCELEME SILENCE OF SHARİ'AH: A STUDY ON MAQASID AL-SHARİ'AH THROUGH KASHF

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### ÖZET

Öz olarak “kulların maslahatını gerçekleştirmek için şeriatın vazettiği gayeler” şeklinde tanımlanan makâsîdü’ş-şerîa’nın hangi yollarla gerçekleştiğinin bilinmesi fıkıh usûlünde makâsîd disiplininin müstakil bir sahasını teşkil etmektedir. Tebliğimiz; Şâtîbî (ö. 790/1388) tarafından ibtidâî (kendisiyle başkası kastedilmeyen) ve tasrîhî (zımnî olmayan) mücerred/salt emir ve nehiyeler, emrin ve nehyin illetleri, âdete ve ibadete dayalı hükümlerin teşriinde asıl ve ona tabi maksatların birlikteliği ve şârî’in sükûtu olmak üzere dört kısımda, Tâhir b. Âşûr (1973) tarafından ise istikrâ (tümevarım), Kur’ân’ın apaçık delilleri ve mütevatir sünnet olmak üzere üç kısımda ele alınan makâsîdü’ş-şerîa’yı keşf/tespit yollarından şârî’in sükûtuna dair derinlikli bir incelemeye dayanmaktadır. Lugatte nutk’un/konuşmanın zıddı olan sükût, fıkıh usûlü ıstılahında şârî’in bir işin hükmünü -onu iktiza eden mucibi var olduğu halde (mushaf’ın tedvini gibi)- vazetmeyip sükût etmesidir. Bundan kastedilen, susmanın kendisinde gerçekleştiği bu işin nass gibi kabul edilmesidir ve şârî’in bu husustaki kastının ona herhangi bir ekleme veya ondan herhangi bir çıkarma yapmamak olduğunun bilinmesidir. Buna göre meskûtün ‘anh’a/kendisi hakkında susmanın gerçekleştiği işe yönelik olarak şârî’in sükûtunu temelde üç kategoride ele almak mümkündür. Birincisi, hükmün ortaya konulmasına yönelik sebeplerin var olması halinde şârî’in susmasıdır ki Hz. Peygamber’in (s.a.s.); huzurunda veya kendisine nakledilmek üzere gıyabında söylenen bir söze veya meydana gelen bir olaya karşı susması, bilgisi dahilinde olduğu halde insanlar arasında yaygın olarak meydana gelen işlere karşı susması ve bir kısım meselenin hükmünde cüzlere dayanan tafsilatları terk etmesi olmak üzere üç kısımdır. İkincisi, hükmün ortaya konulmasına yönelik sebeplerin var olmaması halinde şârî’in susmasıdır ki Hz. Peygamber’in (s.a.s.), kendi zamanında meydana gelmediği veya başka bir çevrede meydana gelip de müttâli olmadığı olaylara karşı susması ve Onun, hükmü şer’î nass ile bilinen konularda susması olmak üzere iki kısımdır. Üçüncüsü de şârî’in bir mâniden dolayı -vahyi beklemesi gibi- susmasıdır. Şârî’in sükûtunun ibadât ile muamelât alanları arasındaki farklılığı ve af mertebesiyle ilişkisi gibi bir kısım konuların da incelendiği bu tebliğimizde ele aldığımız konu, şârî’in kastını bilmeye yönelik özel bir sahayı teşkil etmesi ve ayrıca bidat türünden yeni şeylerin dinde uydurulmasına reddiye niteliğini taşıması yönüyle önem arz etmektedir. Zira bilinmelidir ki “aslı makâsîdü’ş-şerîa’nın kendisine dayandığı her şey şer’an maksuttur.”

**Anahtar Kelimeler:** Fıkıh Usûlü, Makâsîd, Gaye, Şârî, Sükût, Şâtîbî.

### ABSTRACT

In essence, knowing the ways in which maqasid al-shari'ah, which is defined as "the goals set by the shari'ah to ensure servants' improvement", constitutes an independent field of the discipline of maqasid in the usul al-fiqh. Our paper is based on a comprehensive analysis of the silence of shari'ah, which is one of the ways of kashf for maqasid al-shari'ah, which Shatibi (d. 790/1388) deals with in four parts as ibtida'i and tasrihi commandments and prohibitions, the causes of the commandments and the prohibitions, the unity of the main and subordinate purposes and the silence of the shari'ah in the legislation of the rulings based on custom and worship, and Tahir ibn Ashur deals with in three parts as istiqra, the clear evidences of the Qur'an, and the mutawatir sunnah. Suqut (silence), which is the antonym of nutq (speech) in dictionary, is, in fiqh, the silence of the shari'ah in not stating the ruling of a matter, even though there is a reason that necessitates it (such as the revision of the mushaf). What is

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

---

meant by this is that this matter, in which the silence is maintained, is accepted as a dogma, and it is known that the intention of the shari'ah in this matter is not to add to it or subtract from it. Accordingly, it is possible to categorize the silence of shari'ah on the matter about which the silence is maintained in basically three categories. The first is the silence of the shari'ah when there are reasons for the judgment to be revealed, which is in three parts: the Prophet's (saw) silence in his presence or in absentia to be transmitted to him, his silence in the face of a word spoken in his presence or an event that occurred, his silence in the face of what commonly occurs among the people even though it is within his knowledge, and his abandonment of the elaborations based on the parts in the judgment of some issues. The second is the silence of shari'ah in the absence of the reasons for the judgment, which is divided into two parts: the Prophet's (saw) silence on events that did not occur in his time or in another environment and he was not involved in them, and his silence on matters whose judgment is known as religious dogma. The third is the silence due to an obstacle, such as waiting for a revelation. In this paper, in which some issues such as the difference of the silence of shari'ah between the fields of worship and transactions and its relation with the level of forgiveness are also examined, the subject we have dealt with is important in that it constitutes a special field for knowing the intention of shari'ah and also has the quality of a refutation to the inventions in religion. This is because it should be known that "everything whose nature is based on maqasid al-shari'ah is the actual intention of religion."

**Keywords:** Usul al-Fiqh, Maqasid, Purpose, Shari', Silence, Shatibi.

SARS-CoV-2 RT-qPCR KAPASİTESİNİ ARTTIRMAK İÇİN ÖRNEKLERİN HAVUZLAMA  
YÖNTEMİYLE ÇALIŞILMASI

POOLING SAMPLES TO INCREASE SARS-CoV-2 RT-qPCR CAPACITY

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**ÖZET**

**Giriş:** Dünya genelinde pandemisi devam eden şiddetli akut solunum yolu sendromu koronavirüsü 2 (SARS-CoV-2) salgınının kontrol altına alınması için moleküler tanı testlerinin yaygın ve etkin kullanımı vazgeçilmezdir. Pandeminin üzerinden 3 yılı aşkın bir süre geçtikten sonra, kaynaklar tükenme noktasına ulaştığından, örnekleri belirli büyüklükteki havuzlarda gruplamak, ek eğitim, ekipman veya malzeme gerektirmeden hem maliyetleri hem de işlem süresini azaltmak için makul bir yöntem gibi görünmektedir.

**Amaç:** Bu çalışmada, SARS-CoV-2 tanısında test kapasitesini artırmak amacıyla örnek havuzlanması, ardından gerçek zamanlı ters transkriptaz-polimeraz zincir reaksiyonunun (RTqPCR) kullanılması potansiyeli araştırılmıştır.

**Materyal ve Metod:** Bu çalışma 1 Mart-30 Nisan 2022 tarihleri arasında Ankara Halk Sağlığı Moleküler Tanı Laboratuvarı'na SARS-CoV-2 varlığı açısından test edilmek üzere gönderilen ve sonuçlandırılmış 4475 geçmişe yönelik örnek ile gerçekleştirmiştir. Örnekler, Bio-Speedy™ SARS-CoV-2 Double Gene™ RT-qPCR kiti (Bioeksen, Türkiye) ve Coronex® COVID-19 (Ver.2.0) Multipleks RT-qPCR Diagnosis Kiti (DS Bio and Nano Technology, Ankara, Türkiye) kullanılarak örneklerden sırayla alınan 100 µl'lik beş havuzda ayrı ayrı BioRAD CFX96™ Touch (Bio-Rad Laboratories Inc., Hercules, CA, ABD) platformu üzerinde incelenmiştir.

**Sonuç:** SARS-CoV-2 RNA pozitif 4475 örnekten hazırlanan seri dilüsyonların RT-PCR'nin standart eğrileri analiz edildi. Verimlilik değerleri karşılaştırıldığında, 2 kitin tümü yüksek duyarlılık ve benzer sonuçlar göstermiştir; En yüksek seviye Coronex® kiti ile nükleokapsid (N) geninde (Verimlilik: %114) tespit edilirken, en düşük seviye ise Bio-Speedy™ kiti ile N ve ORF 1ab genlerinde tespit edilmiştir (Verimlilik: %95). Çalışmaya dahil edilen örneklerden viral yükü düşük olan sadece 3 pozitif örneğin havuzlanarak incelendiğinde negatif olduğu görülmüştür. Havuzlama stratejisi, COVID-19 salgınının belirli dönemlerinde mevcut olan sınırlı test kaynaklarının ve reaktiflerin etkisini genişletmek için etkili bir yaklaşımdır. Örneklerin havuzlanması yoluyla test yapılması, düşük pozitif ögelerin kaçırılmasını önlemek için RNA ekstraksiyon yöntemlerinin iyileştirilmesini ve RT-PCR test duyarlılığının dikkatli bir şekilde izlenmesini gerektirir. Bu nedenle laboratuvarlar, kendi bölgelerindeki COVID-19 prevalansına bağlı olarak, kullandıkları moleküler yöntemleri. İyi tanımlamalıdır.

**Anahtar Kelimeler:** COVID-19, SARS-CoV-2, Test kapasitesi, Örnek havuzlama.

**ABSTRACT**

**Background:** Widespread and effective use of molecular diagnostic tests is indispensable to control the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) epidemic, which continues to be a worldwide pandemic. More than 3 year into the pandemic, as resources have reached a point of depletion, grouping samples in pools of certain sizes appears to be a reasonable method to reduce both the costs and the processing time without necessitating additional training, equipment, or materials.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

**Aims:** This study investigated the potential to use sample pooling, followed by onestep retrotranscription and real-time quantitative reverse transcription polymerase chain reaction (RTqPCR) to increase testing capacity for severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2).

**Methods:** This prospective study was conducted with 4475 samples, sent to the coronavirus disease 2019 (COVID-19) of our laboratory between March 1 and 30 April, 2022, to be tested for the presence of SARS-CoV-2. The samples were examined individually and in pools of five 100 µl taken from each sequential sample, using SARS-CoV-2 RT-qPCR kits, Bio-Speedy™ SARS-CoV-2 Double Gene™ RT-qPCR kit (Bioeksen, Turkiye) and Coronex® COVID-19 (Ver.2.0) Multipleks RT-qPCR Diagnosis Kiti (DS Bio and Nano Technology, Ankara, Turkiye )on the BioRAD CFX96™ Touch (Bio-Rad Laboratories Inc., Hercules, CA, USA) platform available in our laboratory.

**Results:** Following the extraction of serial dilutions prepared from the SARS-CoV-2 RNA positive sample, the standard curves of RT-PCR were analyzed. By evaluating the efficiency values, all 2 kits showed high sensitivity and similar results; while the highest level was detected with the Coronex®kit in the nucleocapsid (N) gene (Efficiency: 114%), the lowest was detected with the Double Gene™ RT-qPCR kit in the N and ORF 1ab genes (Efficiency: 95%). Of the samples included in the study, only 3 positive sample with low viral load was found to be negative when studied by pooling.

**Conclusion:** The pooling strategy is an effective approach to extend the impact of limited testing resources and reagents available in certain periods of the COVID-19 pandemic. Testing by pooling samples requires improvement of RNA extraction methods and careful monitoring of RT-PCR test sensitivity to avoid missing low-positive entities. Therefore, based on the prevalence of COVID-19 in their regions, laboratories should conduct their own validation of pooling studies for RNA extraction and amplification methods they use.

**Keywords** COVID-19, SARS-CoV-2, Testing capacity, Sample pooling

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

KENAN VE NALAN NEDEN VE NASIL DEĞİŞTİ?: KERİME NADİR'İN 'HIÇKIRIK'ININ  
SİNEMA UYARLAMALARI ÜZERİNE

WHY AND HOW KENAN AND NALAN CHANGED?: ON THE CINEMA ADAPTATIONS  
OF KERİME NADİR'S 'HIÇKIRIK'

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## ÖZET

Gelişim gösterdiği 1900'lü yılların başından itibaren başvurduğu en önemli kaynaklar edebi eserler olması sebebiyle sinema, en kuvvetli bağımlı edebiyat ile kurmuştur. İnsanların hayatına önceleri 'eğlencelik' bir araç olarak giren sinemanın, toplumsal ilişkilerdeki önemi ise zamanla değişmiştir. Bu değişikliğinin oluşmasında, toplumun alışık olduğu edebi eserlerin yeri büyüktür. Zira belirli bir alıcı kitlesi halihazırda var olan eserlerin sinemaya kazandırılması izleyicisinin bulunması açısından önem arz etmektedir. Buna bağlı olarak dünya sinemasında da Türk sinemasında da edebi eserlerden ziyadesiyle faydalanılmıştır. Türkiye'de özellikle Kerime Nadir'in eserleri Türk ve Yeşilçam sinemasının oluşmasında önemli bir yere sahiptir. Kerime Nadir'in işlemiş olduğu konular arasında aşıkların kavuşamaması, anne-baba-çocuk ilişkileri, kadın ve erkeğin toplumsal konumu gibi dönemin toplumunu yansıtan önemli meseleler yer almaktadır. Popüler ve klasik aşk romanlarının bir temsilcisi haline gelen Nadir'in eserlerinin edebiyat dünyasında yakalamış olduğu başarı, yönetmen ve film yapımcılarının dikkatini çekmiş ve onların bunlara yönelmelerini sağlamıştır. Buna bağlı olarak bu çalışmada Kerime Nadir'in *Hıçkırık* (1938) isimli romanının sinema uyarlanmaları incelenmektedir. İki farklı yönetmen (Atıf Yılmaz ve Orhan Aksoy) tarafından iki farklı dönemde (1953 ve 1965) çekilen filmler, edebi esere bağlı kalmakla birlikte, araştırmada edebiyat ve sinemanın tür farklılıkları ve döneme bağlı toplumsal farklılıklar olduğu ortaya çıkmıştır. Bu farklılıklar; zaman, mekan, karakterler, uyarlama sadakati başlıkları altında incelenmiş ve toplumsal ilişkilerin dönemsel farklılıkları göz önünde bulundurularak toplumsal cinsiyet ilişkileri bağlamında analize tabi tutulmuştur. Her iki filmde de zaman ve mekan değişikliği yapılmış ve karakterlerin özellikleri aktör/aktris etkisi ile değişime uğramıştır. 1960'lı yıllarla birlikte altın çağını yaşayan Yeşilçam Sinemasının etkileri Orhan Aksoy'un filminde daha keskin bir şekilde görülmüş, yıldız oyuncuların görünür olmasıyla birlikte, edebi eserin niteliği ve içeriği değişmiş, hem eser hem de karakterler erozyona uğramıştır. Sonuç olarak; sinemanın ilk yılları da dahil olmak üzere edebiyattan beslendiği ancak kendine özgü özellikleri ve dili ile ön plana çıktığı görülmektedir.

**Anahtar Kelimeler:** Türk sineması, Türk edebiyatı, Kerime Nadir, *Hıçkırık*, Atıf Yılmaz, Orhan Aksoy, uyarlama sadakati

## ABSTRACT

Since the most important sources it has used from the early 1900s, cinema has established its strongest bond with literature. The importance of cinema, which first entered people's lives as an 'entertainment' tool, in social relations has changed over time. The literature works that the society is accustomed to are among the important reasons for this change. Because bringing works that already have a certain target base to the cinema is important in terms of finding an audience. Accordingly, literature works have been greatly benefited from in both world cinema and Turkish cinema. In Turkey, especially the works of Kerime Nadir have an important place in the formation of Turkish and Yeşilçam cinema. Among the topics covered by Kerime Nadir are important issues that reflect the society of the period, such as lovers not being able to reunite, parent-child relationships, and the social position of men and women. The success of Nadir's works in the literary world, which has become a representative of popular and classic

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

romance novels, attracted the attention of directors and filmmakers and made them turn to them. In parallel with this, The success of Nadir's works in the literary world, which has become a representative of popular and classic romance novels, attracted the attention of directors and filmmakers and made them turn to them. Although the films, shot in two different periods (1953 and 1965) by two different directors (Atf Yılmaz and Orhan Aksoy), remained loyal to literary works, the research revealed that literature and cinema had genre differences and social differences depending on the period. These differences were examined under the topics of time, place, characters, adaptation fidelity and were analyzed in the context of gender relations, taking into account the periodic differences of social relations. In both films, time and place were changed and the characteristics of the characters changed under the influence of the actor/actress. The effects of Yeşilçam Cinema, which experienced its golden age in the 1960s, were seen more clearly in Orhan Aksoy's film as the star actors becoming visible, the quality and content of the literary work changed, and both the work and the characters eroded. In conclusion; It is seen that cinema was nourished by literature, including its early years, but it stands out with its unique features and language.

**Keywords:** Turkish cinema, Turkish literature, Kerime Nadir, Hıçkırık, Atf Yılmaz, Orhan Aksoy, adaptation loyalty



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## PROGRAMMING WATER USE OF GRAIN CORN IN THE COLD STEPPE ZONE USING INFORMATION TECHNOLOGIES

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**Objectives.** The purpose of the study was to assess the possibilities for grain corn water use programming in the cold steppe zone (BSk) by the means of CROPWAT 8.0 software. The results of the programming will be calibrated through regression and neural network approaches to enhance the model performance.

**Methods.** The study was carried out in 2019-2021 with two hybrids of grain corn, cultivated in the cold steppe zone (BSk) of Ukraine (Kherson region). The real water use was estimated in the field conditions, and CROPWAT 8.0 software was applied to simulate the crop growth and water use. The simulation results were compared to the real ones, and then calibrated using regression and neural network modeling approaches.

**Results.** The results of the investigation testify about low reliability of pure CROPWAT 8.0 estimation of grain corn water use (mean absolute percentage error of the computation is 26.00%). Linear regression model enhances the productivity and reliability of the estimation greatly, decreasing the mean absolute percentage error to 6.42%. The neural network, developed using Tiberius software, resulted in even higher decrease of the statistical indicator – to 5.65%. The drawback of the neural network approach is that it is impossible to point out the equation for the model calibration. The combined regression-network model provided much worse results and should be avoided.

**Conclusions.** CROPWAT 8.0 in its pure state is not recommended for grain corn water use programming. Additional calibration of the CROPWAT 8.0 model through the regression analysis approach improved the reliability of the crop water use prediction.

**Keywords:** environmental modeling, neural network, productivity, regression.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## BERLİN ÜZERİNDE GÖKYÜZÜ (DER HIMMEL ÜBER BERLIN, 1987) FİLMİNDE KENTİN ŞİİRSEL TEMSİLLERİ

### POETIC REPRESENTATIONS OF THE CITY IN *WINGS OF DESIRE* (DER HIMMEL ÜBER BERLIN, 1987)

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#### ÖZET

Kentler çoklu anlatıların iç içe geçtiği katmanlı mekanlardır. Kentlerin tarihi modernite kavramıyla da yan yana ilerleyerek 20. yüzyılın politik, ekonomik, toplumsal ve teknik gelişmeleriyle kent yaşamı birlikte şekillenmiştir. Savaş sonrası kapitalizm ve modernleşme etkileri de kentler üzerinden incelenip yorumlanabilir. Sinemada 1. Dünya Savaşı sonrası Berlin Avrupa’da kozmopolit bir simge haline gelmişken, 2. Dünya Savaşı sonrası yıkım ve yeniden yapılanma öykülerinin önemli bir parçasıdır. 1950 ve 1960lı yıllarda Avrupa kentleri üzerinden sıklıkla savaş sonrası kent mekânı üzerine kayıp, bellek, ulusal kimlik ve kentlilik temalı anlatılar kurulmuştur. Berlin 1961’den 1989’a kadar Doğu ve Batı olmak üzere iki ayrı kent halinde çift kutuplu bir yapıdadır. 9 Kasım 1989’da duvarın yıkılmasıyla Almanya Demokratik Cumhuriyeti son bulur. *Berlin Üzerinde Gökyüzü* bundan hemen birkaç yıl önce çekilmiş önemli bir kent filmi olarak döneme tanıklık etmiş bir yapıdır. Şiirsel ve masalsi yapısı bir kolaja benzeyen filmin öyküsü, tıpkı Berlin’in öyküsü gibi kolay anlatılabilen bir öykü değildir. Filmde bölünmüşlüğü, kimlik ve aidiyet kavramlarının kaybının şiirsel ifadeleri bulunmaktadır.

Filmde sadece çocukların görebildiği iki melek Damiel ve Cassiel’in öyküsü anlatılmaktadır. Bu melekler gökyüzünden insanları izler, onların duygu ve düşüncelerini öğrenir fakat yaşamlarına müdahale edemezler. Melekler, izleyicinin Doğu ve Batı Berlin’deki insanların yaşantılarını öğrenebilmelerinin aracı olur. Marion adlı bir trapezciye aşık olan melek Damiel, aşk uğruna ölümlü bir insana dönüşerek gündelik hayata karışır. Aslında başrolde iki melekten çok Berlin kentinin olduğu, şiirsel bir anlatıya sahip *Berlin Üzerinde Gökyüzü* filminde yer alan kent temsilleri, filmin anlatı yapısında kurulan ikilikler/karşılaştırmalar üzerinden değerlendirilerek içerik analizi yöntemiyle incelenecektir. Wim Wenders kurduğu filmsel karşılaştırmaları Berlin’in 1980ler sonundaki bölünmüş yapısı ile özdeşleştirirken özgün bir yol izlemiş, metaforik ve şiirsel bir anlatım oluşturmuştur.

**Anahtar Kelimeler:** Kent, Wim Wenders, Berlin Üzerinde Gökyüzü, temsil

#### ABSTRACT

Cities are layered spaces where multiple narratives intertwine. The history of cities goes hand in hand with the concept of modernity, and urban life has been shaped together with the political, economic, social, and technical developments of the 20th century. The effects of post-war capitalism and modernization can also be analyzed and interpreted through cities. In cinema, while Berlin became a cosmopolitan symbol in Europe after World War I, it is an important part of the stories of destruction and reconstruction after World War II. In the 1950s and 1960s, narratives of loss, memory, national identity, and urbanity were frequently constructed on post-war urban space through European cities. From 1961 to 1989, Berlin was divided into two separate cities, East and West. On November 9, 1989, with the fall of the wall, the German Democratic Republic came to an end. *Wings of Desire* witnessed the period as an important city film made just a few years before this. The story of the film, with poetic and fairytale-like structure resembles a collage, is not an easy story to tell, just like the story of Berlin. There are poetic expressions of division and loss of identity and belonging in the film.

**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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It tells the story of Damiel and Cassiel, two angels that only children can see. These angels watch people from the sky, learn their thoughts and feelings, but cannot interfere. The angels let the audience learn about the lives of people in East and West Berlin. The angel Damiel, who falls in love with trapeze artist Marion, becomes a mortal human being for the sake of love. In fact, the city representations in *Wings of Desire*, a film with a poetic narrative in which the city of Berlin, rather than the two angels, plays the leading role, will be analyzed through content analysis method by evaluating the dichotomies / comparisons established in its narrative structure. While Wim Wenders identifies the filmic comparisons with the divided structure of Berlin at the end of the 1980s, he has followed a unique path and created a metaphorical and poetic narrative.

**Keywords:** City, Wim Wenders, *Wings of Desire*, representation

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## AN EXPLICIT SURVEY ON THE EFFICACY OF DIGITAL SIGNATURE VERIFICATION SYSTEM (DSVS) AND ITS IMPORTANCE TO BANKING INDUSTRY

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### ABSTRACT

Today the quest for fast money has driven many people to carry out different illegal acts and signature counterfeiting is identifiable among these acts. Financial institutions including banks also fall victim because of lack of effective technology to verify signatures. Digital signature has been used over the past years in several industries to ensure authentication, non-repudiation, data integrity and reduce the risk of fraudulent transaction. The term digital signature is synonymous to electronic signature (e-signature). According to Sur & Roy (2011), digital signature has the potential that can safeguard valuable information over differing types of networks. This paper presents digital signature verification system as a means to enhance customers' information security in banking industry. The paper discussed the basic concept and characteristic features of digital signature. Some of the advantages and challenges of using digital signature in the banking sector were also highlighted in the paper work. In order to collect important information for the paper write-up, online Google form questionnaire instrument was used to collect vital information from respondents. The data retrieved were collated and subjected to reliability analysis. Conclusively, the paper inferred that digital signature is based on encryption methods that create a unique signature for each user. The technology ensures the security of the documents in the digital environment, guaranteeing their authenticity and integrity.

**Keyword:** Digital Signature Verification System, DSVS, Banking Industry.

### INTRODUCTION

Financial institutions including banks are facing a lot of challenges in fighting numerous malicious acts within its spectrum including signature counterfeiting. Signature has been accepted worldwide as a means of official verification or authentication for legal documents, tellers, bank drafts, deposit slips, withdrawal slips, receipts, cheques and other valuable documents. The traditional modes for attesting signature in banks have been abused thereby causing lots of damages and losses to individuals as well as banks, times without number; and have therefore been queried, especially in cases such as forgery, impersonation and identity manipulation. Today, the use of digital signatures have been introduced into banks to ensure authentication, non-repudiation, data integrity and limit of the risk of fraudulent transaction. This paper presents digital signatures as means of enhancing customers' information security and improving staff- customer relationship within banking domain.

## **RELATED LITERATURE**

The study of Schukat & Cortijo (2015) pointed that there are enormous problem of information insecurity and therefore suggest the enforcement of E-Governance security using digital signature schemes. According to Daniel (2000), the introduction of electronic document in Global and National Commerce Act (ESIGN) validates the use of electronic signatures. Erfaneh, et al. (2011) proposes simple and fast algorithms for generating digital signature. Rebecca (2004) reveals that the implementation of electronic signature offer greater security with the use of password. Imem (2015) emphasize that digital signatures algorithms are characterized by their high level of security and fast speed for encrypting and decrypting of data. Ravneet & Amandeep (2012) noted that digital Signatures ensure privacy, authentication, integrity and non-repudiation. Chang, (2007) observed that the use of electronic signature is increasingly becoming important as banking is transiting from geographic commerce to electronic commerce.

### **Applications of Digital signature in banking sectors**

Many banks are implementing digital signature solutions as a way to secure financial transaction. The major uses of digital signature in banking sectors include:-

1. Account Opening:

Signing paperless document when opening new account with banks involve the use of digital signature. Banks use digital signature to implement an end-to-end digital process whereby customers are able to choose where and when they transact with the bank.

2. Lending:

Digital signature is used online for signing finance contracts or loan applications as well as delivering the paper work electronically. This has helped eliminate the risks associated with errors of documentation. It has also helped remove the painful effort and poor customer experiences.

3. Treasury Management:

The use of digital signature has made it easier to seal up business contracts with customers far away from the banking branch. Digital signature are used to reduce the time it takes for customers to sign up for treasury management services.

4. Wealth Management:

Using Digital signature is increasingly becoming an excellent strategy for wealth management in banking sector. The goal is to help shorten the long processes involving multiple meetings where paperwork is processed.

5. Residential Mortgage:

Using Digital signature to seal up agreement on mortgage business is gaining momentum in banks. Digital signature has become the ideal solution that is bringing convenient, secured and compliant experiences into the home of customers.

### **Benefits of using Digital signature in banking sector**



**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

The benefits of digital signature in banking sector include:-

1. Easy Accessibility:

Regardless of the location of the signees, they can attest their signature whenever there is a need for it.

2. Security:

Digital signature is very secure when correctly implemented.

3. Enable process automation:

Digital signature has become part of a streamlined digital process for many banks. Once the signature is available, it can be attested automatically.

4. Improved records management:

Once a document is signed, parties involved can save a local copy in their records which can readily be referenced and used when need be.

5. Fast and easy to use:

Digital signature is very fast and easy to use. When a document is received by parties required to sign, it is easy for them to attest their signature electronically.

**Challenges of using Digital signature in banking sector**

There are a number of challenges using digital signature in banking sector. Viz:-

1. May require advanced technology:

Digital signature technology is wide spread. Using digital signature tools require the signees to have a fore knowledge of the skill which may not even address every scenario.

2. Trust:

Many individuals and banks are not fully convinced of the technology, so they feel reluctant to accommodate and implement its usage.

3. Resistance to change:

A lot of people are fully aware of the technology but still resist using it. Many individuals and banks still seek to reestablish the old process of manual signing.

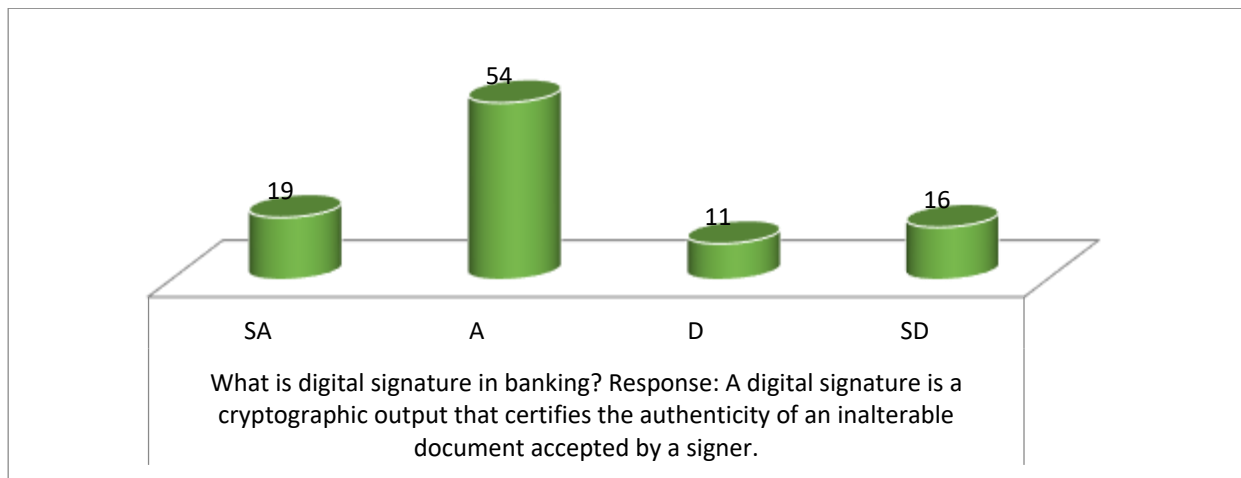
**MATERIALS AND METHODS**

This paper is a descriptive review on the basic concept of digital signature verification system (DSVS). The paper adopted simple random techniques for selecting IT professionals and bank workers that were interviewed. Relevant and reliable information were gathered through carefully formulated questionnaire. In order to collect information centered on digital signature, drafted copies of questionnaires were administered to respondents using online Google form questionnaire instrument. The responses gathered were collated and subjected to Cronbach's alpha reliability analysis. The result of 0.87 gave a good reliability index of the instrument. The entire exercise took place within two and half weeks before completion.



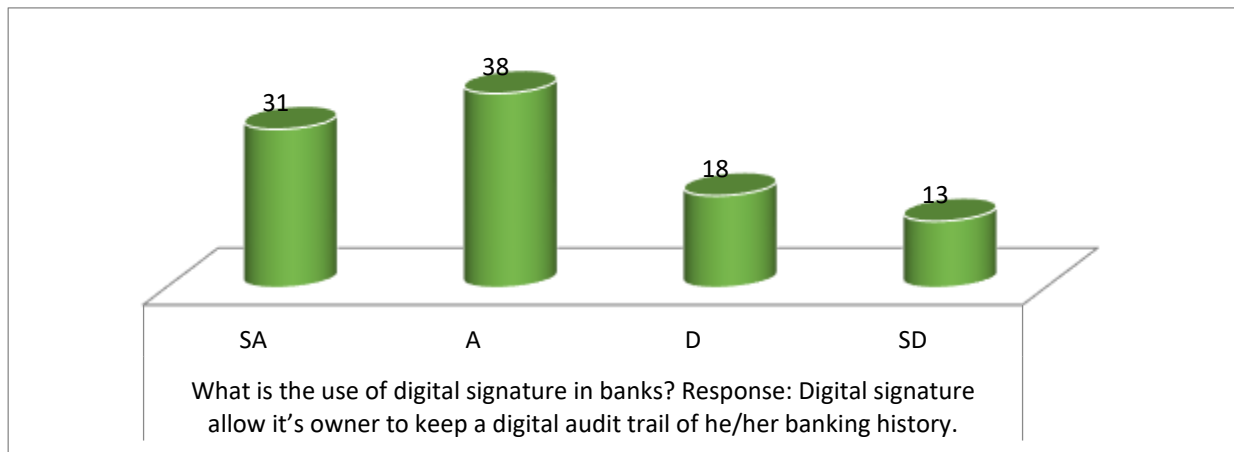
RESULT AND DISCUSSION

Fig.1: Chat Analysis



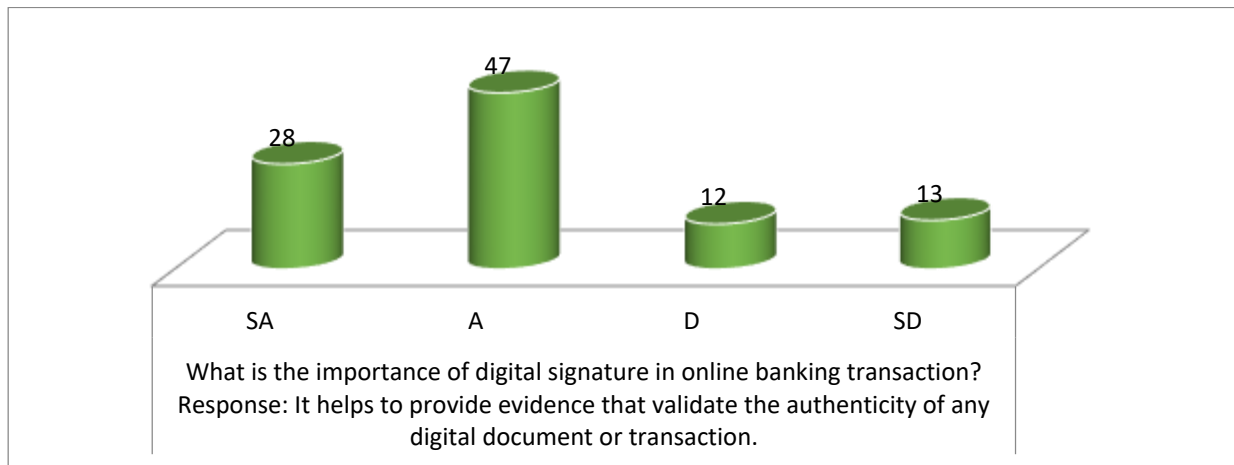
The graph plotted in figure 1 signifies that the respondents have a clear knowledge of what digital signature means. Majority of the respondents see digital signature as a cryptographic output (scripted with algorithms) accepted by a signer that certifies the authenticity of a document. The respondents further clarifies that digital signature is mainly an encrypted, electronic stamp of authentication on digital information which may include macros, email messages or electronic documents. The respondents inherently noted that the digital signature confirms that the information that originates from the signer is invariably unaltered.

Fig.2: Chat Analysis



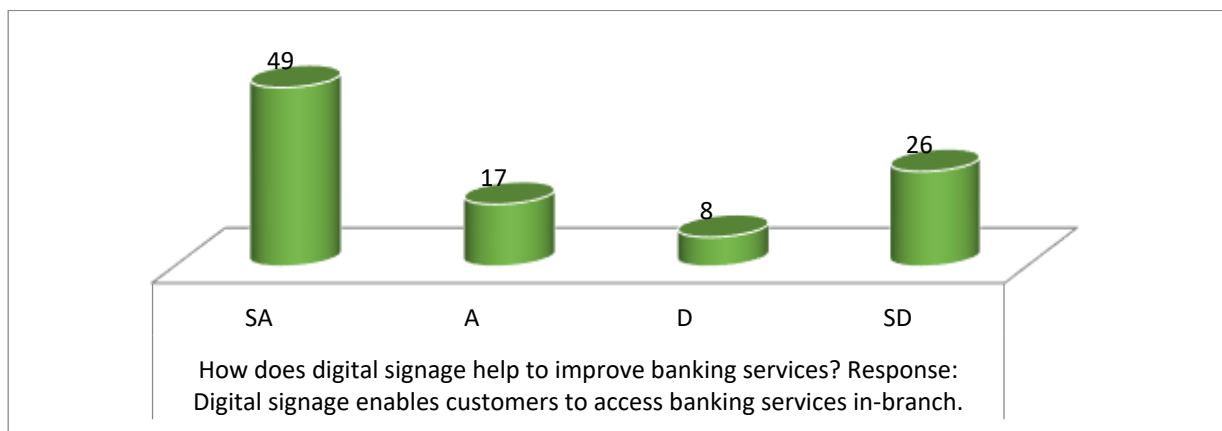
The chat analysis shown in figure 2 explains the respondents' perception of the use of digital signature. A greater number of the respondents outlined that digital signature allow its owner to keep a digital audit trail of he/her banking history. According to the respondents, the digitally signed agreements or documents are ultimately kept unalterable and ultimately secured.

Fig.3: Chat Analysis



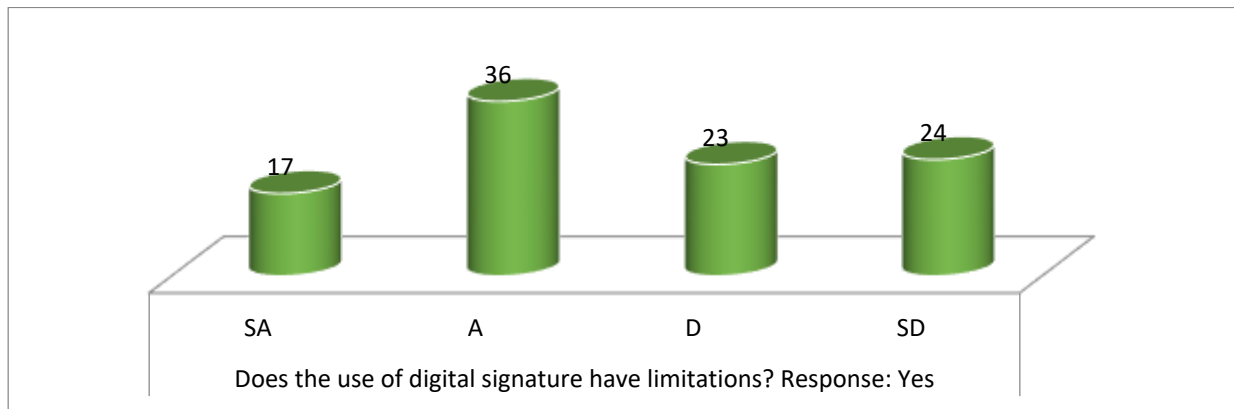
The chat analysis seen in figure 3 depicts that most of the respondents concur that the use of digital signature is very essential in banking industry. According to the respondents, digital signature helps to provide evidence that validate the authenticity of any digital document or financial transaction. The respondents further explain that in e-banking, digital signature is significantly useful in ensuring the security of the online transaction.

Fig.4: Chat Analysis



The graph plotted in figure 4 indicates that a greater number of the respondents agree with the statement that digital signage enables customers to access banking services in-branch. According to the respondents, many bank customers are able to access the banking your services online, and therefore the customers deploy self-service kiosks in branch to allow them to independently carry out transactions. This is kudos to digital signature verification system (DSVS) as it allow for the verification of the authentic of the online banking transactions.

**Fig.5: Chat Analysis**



The graph plotted in figure 5 shows that there are a number of challenges that comes with the use of digital signature verification system. The respondents stated that the primary drawback of digital signature is that it is limited to a single digital document. According to the respondents, each digital signature is bided to specific online document. The respondents further highlighted other challenges to include: high cost of implementation, lots of effort required and the legality involved sing digital Signatures.

### **CONCLUSION**

This paper is focused on digital signature verification system. The basic concept and feature of digital signatures were discussed in the paper work. The paper highlighted some of the advantage and challenges of using digital signatures in banking sector. The paper write-up queried the traditional methods of appending signatures as being abusive and disadvantageous to individuals and also to banks. The paper write-up also asserts that the introductions of digital signatures have help to ensure authentication, non-repudiation, data integrity and reduce the risk of fraudulent transaction. The paper write-up therefore presents digital signatures as effective means of enhancing information security and improved staff-customer relationship. Finally, the paper write-up affirmed that digital signature technology has the potentials that guarantee the authentication and integrity of transactions between customers and their banks.

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ULUSLARARASI ALANDA ARTAN KORUMACILIK

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**ÖZET**

Korumacılık ve serbest ticaret politikaları belirli ekonomik durumlara göre değiştirilmektedir. Son on yılda ülkeler arasındaki ticaret engelleri azalsa da pandemi sonrası ortaya çıkan ekonomik yavaşlama ülkelerin ekonomi ve istihdamı desteklemek için korumacılığa yönlendirmiştir. Tarifeleri kullanarak serbest ticaretin dolaylı olarak engellenmesi korumacılığın en etkili halidir. İç pazar ve istihdamın korunması için korumacılık tedbirleri ülkeler için kaçınılmaz hale gelmiştir. Özellikle krizlerde görülmektedir ki tarih boyunca ambargolar, tarifeler ve kotalar ile ülkelerini korumak isterken bunun uzun vade etkilerinin bir çok perspektiften analizi yapılmalıdır.

**Anahtar Kelimeler:** Korumacılık, Tarifeler, Kotalar

**ABSTRACT**

Protectionism and free trade policies are changed according to certain economic situations. Although trade barriers between countries have decreased in the last decade, the economic slowdown that emerged after the pandemic has led countries to protectionism to support the economy and employment. The indirect prevention of free trade by using tariffs is the most effective form of protectionism. Protectionist measures have become inevitable for countries to protect the internal market and employment. Especially in crises, it is seen that while they want to protect their countries with embargoes, tariffs and quotas throughout history, the long-term effects of this should be analyzed from many perspectives.

**Keywords:** Protectionism, Tariffs, Quotas, Domestic violence, Exploitation

**1.GİRİŞ**

Ticaret gelişiminin tarihi, korumacılık ve serbest ticaret politikalarının, dünyadaki belirli bir ekonomik duruma karşılık gelecek şekilde değiştirildiğini göstermektedir. Bununla birlikte, son birkaç on yılda ülkeler arasında açık pazarlara, ticaret engellerinin azalmasına ve uluslararası işbirliğine belirgin bir geçiş olmuştur. Bütün bunlarla birlikte, son zamanlardaki ekonomik yavaşlamanın etkisi, birçok ülkeyi yerel ekonomileri ve istihdamı desteklemek için serbest ticaret anlaşmalarından uzaklaşmaya itmiştir (Güzelsarı, 2008). Sonuç olarak, günümüzde hâkim olan anlayış, tarifeleri kullanarak bir ticaret savaşının açık bir beyanı olmayan korumacılık olarak değerlendirilebilir. Bu mecazi silahlar başta gelişmiş ülkeler olmak üzere birçok Avrupa ülkesi tarafından kullanılmaktadır. İşgücü ve iç pazarın korunmasına yönelik talepler, Avrupalı liderler için bir sorun teşkil etmektedir (Kazgan, 2002).

Modern iktisat tarihine bakıldığında da büyük etkilere sahip olan krizlerin ülkeleri korumacı politikalara yönelttiği görülmektedir. Hükümetler uluslararası ilişkilerdeki realist mantığa yönelerek hem ülkelerini izole edip korumayı hem de iç politikalarında yükselen kamu baskısını milli söylemlerle bastırmayı seçmiştir (Çoban, 2002). İktisadi anlamda korumacı olarak görülen bu politikalar liberal iktisadi mantığa zarar vermiş olsa da kriz sonrası dönemlerde özellikle ABD hegemonyası altında ülkeler yeniden liberalizme yönelmiştir.

Bu çalışmada da özellikle küresel güçler arasındaki korumacı politikalar incelenmektedir. Bu bağlamda, ülkelerin ambargolardan yapay zekaya uzanan korumacı politikaları küresel krizler zemininde ayrı ayrı ortaya konulmakta ve konuya güncel bir bakış açısı sunulmaktadır.

### 2.KORUMACILIK KAVRAMI

Korumacılık, yerli üreticilere avantajlar sağlayarak veya dış rekabeti dezavantajlı hale getirecek ticaret engelleri koyarak yerli sanayileri ve GSYİH'i artırmayı amaçlayan bir ticaret politikası veya ticaret politikaları toplamıdır (Öz, 2009). Korumacı perspektif, yerel ekonomiyi, küresel ekonomideki diğerleriyle sürekli bir rekabet durumu olarak görür. Bir ekonomi politikasının parçası olarak korumacı önlemlerin amacı, yerli üreticilere dünya ekonomisinde karşılaştırmalı bir avantaj sağlayarak yerel ekonomiyi desteklemektir. Bu politikaların savunucuları, yabancı rakiplerin yerli sanayilerin başarısını tehdit ettiği mantığıyla, en azından bazı ticaret ortaklarıyla genel olarak serbest ticarete karşı çıkmaktadır (Öz, 2009). Bu nedenle, küresel ticareti yerli üretim lehine yönlendirmek hükümetin görevidir.

Ticaret korumacılığı, bir ulus veya bazen bir ticaret bloğu olarak birlikte çalışan ve ekonomisini uluslararası ticaretin olası tehlikelerinden korumak için özel hedefle ticaret engelleri oluşturan bir grup ulus politikası olarak tanımlanır. Bu, bir hükümetin vatandaşlarına herhangi bir hükümet kısıtlaması, müdahalesi veya engellemesi olmaksızın diğer ülkelerden mal ve hizmet satın almasına veya mal ve hizmetlerini başka pazarlara satmasına izin verdiği serbest ticaretin tam tersidir (Donnan, 2016). Ticaret korumacılığının amacı, bir ulusun kilit endüstrileri, emtiaları ve işçi istihdamı gibi hayati ekonomik çıkarlarını korumaktır. Amacı bir ulusun ekonomik refahını korumak olan çeşitli ticari korumacılık yöntemleri vardır. Bunlar şunları içerir (Ünay ve Dilek, 2018):

- **Tarifeler:** Tarife uygulayan hükümet, yabancı mal ve hizmet ithalatını kısıtlamak, kendi sektörlerini ve bu ürünleri üreten şirketleri korumak ve vergi gelirlerini artırmak ister. Tarifeler, bir ülkeye getirilen her bir ürün veya emtia birimi için sabit bir vergi oranı veya ücreti olan spesifik olabilir. İthal edilen ürünün değerine göre belirlenen oransal tarifeler de bulunur.
- **Kotalar:** Kotalar, bir ülkeye ithal edilmesine izin verilen belirli malların, ürünlerin ve emtiaların sayısı üzerinde doğrudan bir kısıtlamadır. Kota, genellikle belirli bir grup kişi veya şirkete ithalat lisansı verilmesiyle uygulanır. İhracatçı bir ülke tarafından uygulanan bir ticaret kotası görevi gören gönüllü ihracat kısıtlaması da vardır. Bunlar mal veya emtia ihracatını durdurmak için başka bir ülke tarafından bir ulus üzerinde siyasi baskı şeklinde de gelebilir.
- **Sübvansiyonlar:** Sübvansiyonlar, devletin yerli üreticilere yaptığı ödemelerdir. Bu, nakit ödemeler, düşük faizli krediler, vergi indirimleri ve yerli şirketlerde adi hisse senetlerinin devlet mülkiyeti şeklinde olabilir. Sübvansiyonlar, mal üretimi için ekstra nakit sağlayarak yerli üreticilere yardımcı olur. Böylece üretim maliyetlerini düşürür ve şirketlerin dış pazarlar kazanmasını sağlar.
- **İdari Politikalar:** İdari ticaret politikaları, belirli bir ülkeye mal veya emtia ithalatçısı için ciddi zorluklar yaratmak üzere tasarlanmış bürokratik kurallar, yasalar ve düzenlemelerden oluşur. Bu resmi ticaret engelleri, külfetli kurallar, düzenlemeler, idari gereklilikler ve tamamlanması gereken evraklar şeklinde olabilir. Resmi olmayan ticaret engelleri, hastalık veya şüpheli içeriği kontrol etmek için bir ülkeye giren her ürün, mal ve emtianın denetlenmesini içerir. Bu zaman ve çaba gerektirebilir ve genellikle incelenen ögeye ciddi şekilde zarar verebilir. İdari politikalar, aynı zamanda, yabancı üreticiler için üst düzey sağlık ve güvenlik standartları, elde edilmesi zor ithalat lisansları belirlemeyi içerebilir.
- **Anti-Damping Politikaları:** Anti-damping politikaları, bir ülkenin dış pazarda üretim maliyetlerinin çok altında bir fiyatla mal satmasını engellemek ve o ülke pazarından önemli bir pay elde etmek için o ülke tarafından çıkarılmaktadır. Anti-damping kuralları, adil piyasa değerinin altında mal, ürün veya emtia satışını yasaklayan düzenlemeleri de içerebilir.
- **Kur Kontrolleri:** Döviz kuru kontrolleri, bir ülkenin para biriminin döviz piyasalarındaki değerini düşürerek yurtdışında daha ucuza mal olmasını sağlamak için kullanılabilir. Buradaki öncül, bir ulusun para birimini diğer para birimlerine karşı değer kaybettiği noktaya kadar döviz piyasalarında satabilmesidir. Bu, ihracatın maliyetini düşürürken ithalatın fiyatının artmasına neden olur. Bu, gelişmiş veya gelişmekte olan bir ulusun ürünlerini dış pazarlarda satma fırsatını artırmasına yardımcı olur.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Son yıllarda, sanayileşmiş ekonomilerde vasıfsız işçilere olan talep, beceri odaklı teknolojik değişim, emek yoğun işlerin dış kaynak kullanımı ve yerel üretimin gelişen piyasalardan daha ucuz ithalatta ikame edilmesi nedeniyle istikrarlı bir şekilde azalmıştır (Özsümer, 2019). Bu eğilim, özellikle 2008 küresel mali krizinden bu yana, gelişmiş ekonomilerdeki düşük ve orta gelirli için ücretleri baskı altına almıştır. Sonuç olarak, genel refah faydaları ölçülemez, uzak ve yaygın iken, küreselleşmenin maliyetleri, yerinden edilmelerden zarar görmüş belirli topluluklarda, endüstrilerde veya coğrafyalarda yoğunlaşmıştır.

Aynı zamanda, sermaye rekabeti sırasında emeğin metalaşması, özellikle az gelişmiş ekonomilerde eşitsizliği şiddetlendirmiştir. Küreselleşme, teknoloji ve ticaret anlaşmalarının sermaye ve daha geniş finansal topluluk lehine artan etkisiyle canlanmış, emek pahasına geliri sermayeye doğru yeniden dağıtmıştır (Atıl ve diğ., 2017). Sonuç olarak, sermayenin toplam gelir ve kârdaki payı istikrarlı bir şekilde büyürken, sermaye veya mallara göre hareketsizliği nedeniyle kaçınılmaz olarak orantısız bir ekonomik risk taşıyan emek için koşullar giderek daha güvencesiz hale gelmiştir. Bu resmin, yaygın siyasi güvensizlik ve dolayısıyla demokratik kurumların daha düşük algılanan etkinliği şeklinde önemli sonuçları olmuştur.

Buna karşılık, Çin hariç en iyi performans gösteren gelişmekte olan ülkeler bile, nüfuslarını yoksulluktan kurtarmak için ciddi zorluklarla karşı karşıyadır. Gelişmekte olan ülkeler, teknolojik dezavantajlarını dengelemek veya ileri bağlantılara ve daha yüksek katma değerli ticarete doğru ilerlemek için işgücü maliyeti avantajlarını kullanmak için giderek daha sınırlı fırsatlarla, küresel değer zincirlerine daha erken aşamalarda katılmıştır (Atıl ve diğ., 2017). Küresel değer zincirleri daha fazla bilgi yoğun hale geldikçe, kalifiye bir işgücüne ve diğer ilgili yeteneklere sınırlı erişimi olan gelişmekte olan ekonomilerin bir pazar payını elinde tutması her zamankinden daha zor olmuştur.

Daha düşük üretkenliğe sahip orta gelirli ekonomiler için, küresel imalat gücü olarak Çin'in yükselişi, üretimin ayrıştırılmasını bir fırsattan erken sanayisizleşme riskine dönüştürmüştür. 2016'da Doğu Asya, gelişmekte olan dünyanın imalat ihracatından kazandığı her 10 doların 7 dolarını hanesine yazdırmıştır (Einhorn, 2016). Çoğu gelişmekte olan ülke için, otomasyon hızı, yapısal reformların eksikliği ve düşük değerli bir tuzağa düşme riski, büyüme beklentilerinin düzenini ve gücünü azaltmıştır. Bu faktörler, aynı zamanda, toplu istihdam kazanımları veya büyük ölçekli becerilerin yükseltilmesi gibi küresel değer zincirlerine katılmanın olumlu dışsallıklarını da azaltmıştır.

Daha az gelişmiş ekonomiler için ihracat fırsatları, gelişmiş ülkeler tarafından sürdürülen kotalar, sübvansiyonlar ve ticaret engelleri tarafından daha da boğulmuştur. Bu, özellikle, birçok gelişmekte olan ülkede büyük nüfuslar için birincil gelir kaynağı olmasına rağmen, küresel olarak en çok korunan sektörler arasında yer alan ve ayrıca sektörde karşılaştırmalı üstünlüğe sahip olan tarım için geçerlidir. Bu nedenle yukarı doğru hareketliliğin dinamizmi kaybolmuştur (Kutlina-Dimitrova ve Lakatos, 2017). Bu arada, engelsiz finansal küreselleşme, gelişmekte olan ekonomilerde yıkıcı borç krizlerini beslemiştir. Uluslararası finans kurumlarından çok ihtiyaç duyulan yardım, çoğu zaman kemer sıkma ve maliyetli yapısal uyum programları şeklinde iliştilenmiş programlarla gelmiştir.

Bir başka temel sorun, egemen devletlerin ulusal özerkliğine müdahalelerde, başka bir deyişle, ülkelerin kendi benzersiz koşullarına en uygun politikaları izlemelerini engelleyen politika alanlarındaki kısıtlamalarda odaklanmaktadır. Küreselleşme, belirli bir düzeyde siyasi otoriteyi uluslararası varlıklara devretmek için işlevsel bir ihtiyaç gerektirmiş, ancak bu aktarım kaçınılmaz olarak küresel yönetişimin siyasallaşmasını ve çekişmesini körüklemiştir. Soru, ekonomik küreselleşmenin devletler içinde ve devletler tarafından yapılan meşru seçimleri tehdit edip etmediği veya gereğinden fazla kısıtlayıcı kısıtlamadığıdır (Atıl ve diğ., 2017).

Bir yandan, küreselleşmenin mevcut biçimi, kendi itici güçlerini (yatırımcılar, bankalar, çok uluslu şirketler) ulusal hükümetler karşısında orantısız bir şekilde güçlendiren yapısal değişiklikleri ve normları beraberinde getirmiştir. Sermaye sahipleri, esaslı pazarlık gücünü, devletlerin sermayeye yapısal bağımlılığından, yatırım anlaşmalarında yerleşik korumalardan ve engellenmemiş sermaye hareketliliğinden almaktadır (Atıl ve diğ., 2017). Özellikle, çok uluslu şirketler bir ülkenin küresel değer zincirlerine nasıl bağlandığını belirlemektedir. Bunun da, sektördeki ve bir bütün olarak ekonomideki kazanımların gücü ve yönü üzerinde büyük etkileri vardır. Yer değiştirme riski, düzenlemelerde ve vergilendirmede indirimler açısından dibe doğru bir yarışın yarattığı statükonun önemli ölçüde



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

bozulmasını engellemektedir (Lin ve Wang, 2018). Bütçe açığını kısmaya çalışan bir hükümetin, yatırımcıların iç piyasadan çıkmaları endişesiyle kurumlar vergisini artırmamak için güçlü teşvikleri vardır. Geniş kaynaklara sahip firmalar, iş yapma maliyetlerini azaltan sonuçları güvence altına almak için kritik zamanlarda politika yapımcılarla lobi yapabilmektedir.

Öte yandan, küresel entegrasyona eşlik eden kurumlar ve yasal çerçeveler, hükümetlerin iç hedefleri takip etmek veya yabancı meslektaşlarının uygulamalarına yanıt vermek için kullanabileceği strateji ve araçları sınırlandırmaktadır. Daha derin entegrasyon, uyumu sürdürmek ve birbirine bağlı olmaktan kaynaklanan sistemik riskleri ele almak için giderek artan sayıda alanda küresel kural koyma ve yönetim gerektirmektedir. Küreselleşme, devletlerin çıkarları veya öncelikleri ile uyumlu olmasalar bile, devletlerden uluslararası kurallara uymalarını istemekte ve böylece hükümetlerin kendi nüfuslarını ilk sıraya koyma güdülerini olumsuz etkilemektedir.

Bu nedenle, çevresel emellerini artırmak veya sıkı tüketici sağlığı düzenlemeleri benimsemek isteyen hükümetler, benzer ürünler arasında ayrımcılığı yasaklayan Dünya Ticaret Örgütü (DTÖ) kurallarına rastlamaktadır. DTÖ üyelerinin piyasayı bozan uygulamalarına karşı misilleme yapmak isteyenler, kuruluşun ihtilaf çözüm mekanizması kendi takdirlerini geçerli kılmazsa yenilgiyi kabul etmektedir. Gelişmekte olan ülkeler, haksız ticaret uygulamaları olarak sorgulanmalarını önlemek için sanayi politikalarını titizlikle tasarlamak zorunda kalmaktadır (Atıl ve diğ., 2017).

O zaman temel sorular şudur: Kuralları kim koymaktadır? Meşruiyetlerini ne desteklemektedir? Tatmin edici bir gözetim, şeffaflık ve hesap verebilirlik mekanizmalarına tabiler midir? Bu bağlamda önemli bir husus, küresel yönetişimin çekirdek organlarında çıkarların dengesiz temsilidir. Kural koymanın şimdiye kadar zengin ulusları ve özel alacaklıları geliştirmekte olan ülkeler pahasına kayırdığına dair kanıtlar vardır. İkincisi, kendileri için muazzam sonuçlar doğuran tartışmalarda güçlü bir sesi olmayan kural koyucuların konumunu çok sık işgal etmektedir (Lin ve Wang, 2018). Bu milletler daha sonra, esas olarak olgun ekonomiler için veya iş kolaylaştırma ve yatırımcı koruması göz önünde bulundurularak tasarlanmış düzenlemeleri uygulamaya veya anlaşmaları onaylamaya zorlanmaktadır.

Kapsamlı çok paydaşlı süreçler olmadan düzenlenen her yeni alan için küreselleşme, zengin ve fakir arasındaki uçurumu genişleten sistemik eşitsizlikleri sürdürme etkisine sahiptir. Bu bağlamda önemli bir faktör, fikri mülkiyetin korunmasına yönelik küresel rejimdir. Teknolojik değişimin hızı ve dijital ekonomide değer yaratmanın doğası göz önüne alındığında, küresel fikri mülkiyet hakları, teknoloji üreten bir merkez ile ithalatçı bir çevre arasında yeni bir bağımlılığı teşvik ederek, öngörülebilir gelecekte aralarındaki gelir eşitsizliklerini sağlamlaştırmaktadır (Ünay ve Dilek, 2018).

Yeterli gözetim mekanizmalarının yokluğunda, küreselleşmenin sistemik riskleri, dünya çapında olumsuz yansımaları olan krizlere dönüşmektedir. Kontrolsüz küreselleşme, yalnızca kısa vadeli sermaye akışlarından ve hiperfinansallaşmadan kaynaklanan oynaklığı beslemekle kalmaz, aynı zamanda hem iyi hem de kötü etkileri her zamankinden daha hızlı ve daha geniş bir alana yaymaktadır. Büyüme, ticaret, tasarruf ve tüketim modellerinde ülkeler arasındaki dengesizlikler alakasız görünebilir, ancak birçok yönden bunlar yakından bağlantılıdır (Ünay ve Dilek, 2018). 2008 küresel mali krizi buna bir örnek teşkil etmektedir. Krizin başlamasıyla birlikte gelişen sınır ötesi finansal ticaret, gerilemenin ilk aşamasının merkezinde yer alan kredi piyasalarında aşırı büyümenin desteklenmesine yardımcı olmuştur. Önceki krizlerden farklı olarak, 2008 krizi her türden ülkeyi etkilemiştir (Ünay ve Dilek, 2018)

Son çekince ise hiper küreselleşmenin Dünya'nın ekolojik altyapısı üzerindeki zararlarıdır. Endüstriyel aktivitedeki artış, ulaşım ağlarının genişlemesi ve arazi kullanımındaki değişiklikler, çevreyi ciddi şekilde bozmuş ve hayati kaynakları tüketmiştir (Atıl ve diğ., 2017). Bu çekinceler, başlangıçta, devletlerin çok taraflı kuralların ötesine geçme ve daha iddialı standartlar benimseme konusundaki özerkliği üzerindeki kısıtlamaları hedef almıştır. Günümüzde mücadele, giderek katılaştıran çevre, sağlık ve güvenlik standartlarını, bu standartları görmezden gelen veya onları diğer politika hedeflerine tabi kılan uluslararası rejimlere entegre etmektir.

### 3.KÜRESEL KRİZLER VE KORUMACILIK

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Küresel ekonomi, 2008'in ikinci yarısında, ABD'de mortgage temerrütlerinde ve hacizlerde dramatik bir artışın neden olduğu finansal krizin dünyanın geri kalanına bulaşmasıyla keskin bir şekilde daralmaya başlamıştır. Hızlı hareket eden çalkantı, diğer ülkelere esas olarak iki kanaldan yayılmıştır: finansal piyasalar ve dış ticaret (Berberoğlu, 2011). ABD'de kredi sıkılaştırması şeklinde yaşanan finansal kriz, diğer ülkelerde de benzer bir duruma yol açarak ekonomik yavaşlamaya neden olmuştur.

Mali piyasaların çöküşü Avrupa'da hızla hissedilmiştir. Hatta, bu çöküşün etkileri 1997-1998 Asya Krizi'nden ders çıkararak ve krizden etkilenmeyeceği düşünülen Asya ülkelerini dahi derinden etkilemiştir. Bu daralma ve ticaretin çöküşü, Büyük Buhran benzeri ekonomik koşullara ve yeni ticaret engellerine başvurmak da dahil, otarşik hükümet politikalarına dönüş hususunda endişeleri artırmıştır.

Kriz başlayınca, ekonomik aktivite çöktüğü ve işsizlik arttığı için korumacılık riskleri yoğunlaşmıştır. Birçok ülke, teşvik paketlerinde milli hükümlere başvurmuş ve diğer ticaret engellerinin yanı sıra ticari savunma önlemlerini, tarife önlemlerini ve ihracat vergilerini artırmıştır. En yaygın olarak kullanılan korumacı önlemler, kurtarma / devlet yardımı önlemleri, ticaret savunma önlemleri, tarife önlemleri, ihracat vergileri veya kısıtlamaları ve tarife dışı engellerdir.

Küresel krizin ardından, sözde korumacılık (bazıları tarafından adil ticaret olarak adlandırılır) argümanı, yabancı malları dışarıda tutmanın işleri kurtaracağı ve mücadele eden yerli endüstrilere toparlanma fırsatı vereceği öncülüğüne dayanarak ses kazanmıştır (Berberoğlu, 2011). Politik olarak, bu tür hızlı düzeltmeler popülerdir ve bu şiddetli ekonomik sıkıntı dönemlerinde yapılması gereken mantıklı eylem gibi görünmektedir.

2008-2009'daki keskin küresel ekonomik gerileme ve küresel ekonomik daralmanın uzun süredir devam eden etkisi, hükümetlerin ekonomilerini dış rekabetten koruyarak desteklemek için ticaret korumacılığına başvurabileceğine dair korkuları beslemeye sürekli devam etmiştir. Kriz öncesi dönemde, ekonomiler resesyon ve/veya rekabet kaybı yaşadığında devletlerin ticaret bariyerleri kurma olasılıklarının yüksek olduğunu gösteren güçlü ampirik kanıtlar göz önüne alınarak, korumacılıktaki artış korkusunun sağlam temellere dayandığı söylenebilir (Bown ve diğ., 2008).

Ocak 2008'den bu yana en korumacı önlemleri azalan sırayla uygulayan ülkeler Rusya Federasyonu, Arjantin, Hindistan, Çin ve Brezilya'dır. Ocak 2008'den bu yana korumacı önlemlerden en çok etkilenen ülkeler Çin, ABD, Almanya, Fransa ve Birleşik Krallık'tır (Berberoğlu, 2011). Dolayısıyla, korumacı önlemleri uygulayan ülkeler, korumacı önlemlerden en fazla etkilenen ülkeler olmayabilir. Bu, misillemenin en önemli konu olmayabileceğini göstermektedir.

1990'larda ve 2000'lerin başında yaşanan neredeyse sınırsız bir küreselleşme döneminden sonra, ulusal ekonomiler, özellikle Batı'da, korumacı ticaret politikalarına geri dönmüş ve ekonomik ayrımcılığı teşvik etmiştir. Brexit ve Donald Trump, bu yörüngenin en görünür fenomenleridir. Ekonomistler iki önemli faktöre atıfta bulunmaktadır. Birincisi, ABD'nin Çin'den ithalata maruz kalan bölgelerinde sağcı ve korumacı hiziplerin oy oranlarında belirgin bir dalgalanma mevcuttur (Berberoğlu, 2011). Bu, farklı Avrupa bölgeleri ve ana ticaret ortakları için benzer bulguları doğrulayan bir dizi araştırmayı tetiklemiştir. İkincisi, mali krizler, siyasi yelpazenin kutuplaşmasına doğru itici güçler olarak tanımlanmıştır (Krugman, 2010). 2008 mali krizinin yanı sıra Büyük Buhran için de akademisyenler, sonunda siyaseti korumacılığa doğru iten sağcı tutumlara doğru belirgin bir dönüşü vurgu yapmaktadır (Patır ve diğ., 2009).

Ekonomik milliyetçilik kavramı, savaş öncesi dönemin standart tarife temelli koruyuculuğu veya merkantilizminin paralelinde para politikaları ve yabancı mülkiyete doğrudan müdahale olduğu Birinci Dünya Savaşı'ndan miras alınmıştır (Kibritçioğlu, 2010). Bu politikaların en parlak dönemi, hem ticaret hem de sermaye için dış ekonomik değiş tokuşun ülkeler arasında yüksek düzeyde düzenlendiği 1930'lardır. Bu tarihsel derslerden hareketle, analitik bir kavram olarak ekonomik milliyetçilik, basit korumacı ticaret politikalarının ve külçe birikiminin ötesine geçmektedir. İki savaş arası dönemde sanayinin ulusallaştırılması, yabancı sermayenin kamulaştırılması, sermaye kontrolleri ve para politikası gibi yöntemler de korumacılığın zemini oluşturmaktadır (Berberoğlu, 2011).

Büyük Buhran yalnızca tüm finansal krizlerin anası değil, aynı zamanda finansal krizler ile dünya ticaretinin dramatik çöküşleri arasındaki bağlantı için bir modeldir. Savaşlar arası ekonomideki geniş yapısal sorunlar, kriz için birçok potansiyel yol sağlasa da, Büyük Buhran'ın çıkış sebebi finansaldır.

Kriz ile küresel borç verme aniden durmuş; bu Almanya ve Büyük Britanya gibi yüksek borçlu ülkelerdeki ulusal yatırımları durma noktasına getirmiştir (Krugman, 2010). Almanya’da sermaye kontrolleri ve Büyük Britanya’da altın standardının askıya alınmasıyla birlikte yabancı sermayenin büyük ölçüde geri çekilmesiyle mücadele edilmiştir. Finansal kriz, üretim ve talepteki düşüşler nedeniyle küresel ticareti doğrudan etkilemiş; aynı zamanda korumacı politikaları da tetiklemiştir. 1931’deki para devalüasyonundan sonra İngiliz ihracatının fiyatları %30 düşmüştür (Kibritçioğlu, 2010). Para birimi devalüasyonu ve tarife artışları, ulusların dünya pazarındaki konumunu iyileştirmek için krizler sırasında hem alternatif olarak hem de birlikte kullanılmıştır. Para birimini erken devalüe eden ülkeler nispeten mütevazı tarifeler uygularken, altın standardında kalan ülkeler devalüe ülkelerden ucuz ithalat girişini önlemek için yüksek tarifeler uygulamak zorunda kalmıştır. Sonuç Sterlin, ABD doları ve Altın çevresinde ticaret bloklarının kurulması olmuştur. Fransa baskın ekonomi olurken, Alman para birimi Doğu ve Güneydoğu Avrupa’nın çoğuna egemen olmuştur (Krugman, 2010). Ticaret maliyetleri çarpıcı biçimde artmış ve küresel bir iş bölümünün avantajları ortadan kalkmıştır.

Bununla birlikte, korumacı ticaret siyaseti ve para birimi devalüasyonu, her ikisi de devlet siyaseti etrafında merkezlenen ekonomik milliyetçiliğin sadece iki yönüdür. 1920’lerde devletin ötesindeki aktörler de etkilenmiş ve küreselleşme karşısındaki tutumlarını değiştirmiştir (Kibritçioğlu, 2010). Finansal krizlerin tüm sosyal grupları aynı şekilde etkilemediğini anlamak önemlidir. Çoğu durumda, finansal krizler, yüklerin ve kârların ani bir yeniden dağılımını tetiklemektedir. 1930’ların kemer sıkma politikası, yerli emek güçlerine yük bindirmesiyle birlikte, birçok ülkede doğrudan sağ oyların artmasına neden olmuştur (Krugman, 2010).

Geleneksel ticaret koruma teorisi, değer zincirinin üst düzey liderleri olarak gelişmiş ülkelerin ticaret davranışında olumlu olduğunu savunmaktadır (Berberoğlu, 2011). Değer zincirindeki alt uç ülkelerle karşılaştırıldığında, kendi çıkarlarını korumak için ticaret engelleri oluşturma eğilimindedirler. Bununla birlikte, 2008’in sonundan 2018’e kadar 340 binden fazla ticari koruma önleminin istatistiklerine göre, ABD dışında en fazla ticari korumayı başlatan on ülke arasında AB ülkelerinin önemli bir bölümü bulunmaktadır (Kızıldere, 2018).

### **3.1.2008 Sonrası Korumacılığın Hedefi: Çin**

Finansal krizin başlamasından önce dünya ticareti hızlı bir gelişme dönemi yaşamıştır. 2008’in ikinci yarısından itibaren ise krizin yayılması ve dünya ekonomisinin yavaşlamaya girmesiyle birlikte küresel ticaretteki büyüme hızı gerilemeye tanık olmuş, hatta dördüncü çeyrekte nadir görülen bir daralma yaşamıştır. DTÖ verilerine göre, 2008’in tamamı için dünya ticareti, 2007’de görülen %6’lık büyümenin çok altında kalarak yalnızca %2 artmıştır (Özsümer, 2019).

Birçok ekonomist, global ölçekte azalan talep, ticaret finansmanı sıkıntısı, ürün içi dünya ticaret kalıpları ve ticari korumacılık gibi daralmanın nedenlerinden bahsetmiştir. Ekonomilerin yıllar içinde ticarete bağımlılıklarını artırdığı bir dünyada, korumacılığın dünya ticaret ortamında bozulmaya yol açacak bir bulaşıcı etkiye sahip olma olasılığı tüm yıkıcılığıyla hissedilmiştir (Özsümer, 2019).

Dünya Bankası 2009 yılının Mart ayında, G-20 grubunun Kasım 2008’de korumacı önlemlerden kaçınma sözü vermelerine rağmen bu ülkelerin 17’si de dahil olmak üzere çeşitli ülkelerin en az 47 ticareti kısıtlayıcı önlem uyguladığını bildirmiştir (Palacıoğlu, 2018). DTÖ de korumacılık vakalarında artış olduğunu bildirmiştir (Özsümer, 2019). Bu eğilimi gösteren gerçek sayılar önemli olmasa da korumacı önlemlerin kendisi önemlidir. Korumacılığın yükselişinin birkaç nedeni bulunmaktadır (Özsümer, 2019):

- Ticaret korumasına başvurmak, sıklıkla ekonomik durgunluğa eşlik eder. Hükümetler, ithalatı engelleyerek veya azaltarak ekonomik toparlanmayı hızlandırmayı ve istihdamı istikrara kavuşturmayı umarak, iç siyasi baskı karşısında korumacı önlemler almaya ikna edilmektedir.
- Yabancı mallar bir iç pazarda rekabet ettiği için, ticaret korumacılığı, uluslararası ticaret de zaten gizli bir iç siyasi meseledir. Korumacılık sadece özel çıkar gruplarını desteklemekle kalmaz, aynı zamanda daha geniş halktan siyasi destek de (özellikle milliyetçi-sağ kesim) alabilir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

- Mevcut DTÖ kural ve düzenlemelerinde bazı istisnalar vardır ve bunlar suistimal edilme eğilimindedir.

2010 GTA veri tabanında sayılan 20 ayrımcı ticaret koruma önleminin tamamı (ithalat tarifesi, devlet yardımı, kamu alımları, ihracat vergileri veya kısıtlama, ihracat teşviki, taşıma ölçüsü, tarife dışı tedbir, ticaret savunma önlemleri, ticaret finansı, kota, yerelleştirme desteği, ithalat yasağı, yatırım ölçütü, ithalat sübvansiyonu, rekabetçi devalüasyon, sıhhi ve bitki sağlığı önlemleri, tüketim desteği, fikri mülkiyet koruması) Çin hedefli olarak uygulanmaktadır (Palacioğlu, 2018).

Kendisine uygulanan korumacı önlemlerin sayısına bakıldığında Çin, dünyada dördüncü sıradadır. Ancak bu sadece Çin karşıtı politikalardan ötürü değildir. Zira büyük ticaret hacminin olması, birçok ticaret ortağının bulunması, küresel değer zincirine katılımının çok yoğun olması da önemli bir etkidir. Kendi çıkarlarını korumaya yönelik tedbirlerin ise Çin'in diğer ülkelerin çıkarlarına zarar veren tedbirleri; tüm tedbirlerin sadece %47,6'sını oluşturmaktadır. Aksine, ABD ve Hindistan'ın aldığı korumacı önlemler %69,5 ve %68,9 ile Çin'in tam tersini oluşturmaktadır.

On yıllık verilere göre, gelişmiş ülkeler hem ticaretin korunmasında liderdir hem de bu önlemlerin uygulanmasındaki ana hedeflerdir. Ancak Çin, ticari koruma önlemlerinin hedef aldığı 10 ülke arasında 8.118 önlemlerle ABD ve diğer ülkelerin önünde yer almaktadır (Özsümer, 2019). Dolayısıyla Çin'in ticari korumacılığın en büyük kurbanı olduğu ve ticari çıkarlarının ciddi şekilde zarar gördüğünü söyleyebiliriz.

Çin diğer ülkelerden çok daha fazla ve ekonomik çıkarları ihlal eden önlemlerin hedefidir. Mali kriz sonrası ekonomik toparlanmanın ilk yılı olan 2009'da Çin, en ciddi ticaret korumasına maruz kalmış ve bu durum 2016 yılına kadar devam etmiştir (Özsümer, 2019). Bundan sonra ticaret korumasıyla karşılaşmaya yönelik tedbirlerin sayısı önemli ölçüde azalmaya başlamıştır. Kasım 2008'den Aralık 2018'e kadar Çin, dünya çapında 142 ülkeden toplam 11.277 ayrımcı ticari koruma önlemine maruz kalmıştır. Gelişmekte olan ülkeler, Çin'deki ayrımcı ticari koruma önlemlerinin ana kaynağıdır ve yaklaşık %65'ini oluşturan yaklaşık 8000 proje uygulanmıştır. Bunlar arasında en önemli kaynak Çin'in BRICS ülkeleri ile diğer ülkeler, Brezilya, Rusya ve Hindistan'dır. Buna karşılık, gelişmiş ülkeler tarafından başlatılan önlemler sadece yaklaşık %35'e tekabül etmektedir. ABD'nin mutlak hakim konumuna ek olarak, kaynak ülkeler ağırlıklı olarak AB ülkelerinde yoğunlaşmaktadır ve en çok uygulanan önlemler Almanya'dır (Kızıldere, 2018).

Çin, 2001 yılının sonlarında DTÖ'ye katılmasından sonra hızlı bir ticaret büyümesi gerçekleştirmiş, ancak krizden sonra ticaret performansında dramatik bir düşüş yaşamıştır. Öyle ki 2008'den önce, ithalat ve ihracat yıllık %20'nin üzerinde bir oranda büyümüştür. 2002'den 2008'e kadar Çin, yıllık ortalama %25,1 büyüme oranıyla dünyadan kümülatif 4,8 trilyon ABD Doları tutarında ithalata ulaşmıştır (Palacioğlu, 2018). Bu, dünyanın artan ithalatının %9'unu oluşturmaktadır. 2008'den sonra ise küresel ekonomik gerileme Çin'in ticaretini sert bir şekilde etkilemiştir. Çin'in ihracat ve ithalatının büyüme oranı 2008'in ilk 10 ayında görece sabit kalırken - sırasıyla %21,9 ve %27,6 - Kasım ayında sırasıyla %2,2 ve %17,9 daralma görülmüştür (Yang, 2019). O zamandan sonra Çin ticareti aşağı yönlü bir sarmal üzerinde olmuştur. 2009 yılının ilk yarısında ülkenin ihracatı %21,8, ithalatı ise %25,4 daralmıştır. Çin'in en büyük 10 ithalatçısı ve ihracatçısıyla olan ticareti, neredeyse tamamı çift haneli olmak üzere keskin düşüslere tanık olmuştur (Yang, 2019).

Bunlara ek olarak, ithalat ihracat bağlantısını göz önünde tutmakta fayda bulunmaktadır. Zira Çin'in ihracatı, ithalatıyla yüksek oranda bağlantılıdır. İhracat düşerse, ithalat da buna göre düşmektedir. Çin'in ithalatı 2009'un ilk yarısında azalırken, bu Çin korumacılığından değil, Çin'in kendine özgü ticaret özelliklerinden kaynaklanmıştır. Çin'e genellikle dünyanın fabrikası denmektedir. Çin'in işleme ticareti gerçekten de ihracatının yarısını oluşturmaktadır (Palacioğlu, 2018). Çin'in ithalatının %30'dan fazlası ticaretin işlenmesi için kullanılmaktadır. Sonuç olarak, diğer ülkelerdeki ticaret kısıtlamaları nedeniyle Çin'in ihracatında bir düşüş yaşarsa, dünyanın geri kalanından ithalatı da buna bağlı olarak düşecektir. Diğer bir deyişle, Çin'e yönelik ticari korumacılık, Çin'i de olumsuz etkileyecektir. Özellikle resesyondan çıkmak isteyen ülkeler için ihracatın çok önemli hale geldiği göz önüne alındığında, Çin ithalatına ticaret engelleri koymanın dünyaya hiçbir fayda sağlamayacağı açıktır.



### 3.2. Asya'nın Korumacılığa Cevabı: Afrika ile İlişkiler

2008 mali krizinden sonra Çin, Afrika ülkelerine mal ihracatında ve kaynakları bol olan Afrika'dan ithalatta Hindistan'a karşı avantajını artırmıştır. Çin-Afrika ve Hindistan-Afrika ticari ilişkileri kazan-kazan ilişkileridir. Ancak Afrika ülkeleri Çin ekonomisinin durumuna zaman geçtikçe daha fazla bağımlı hale gelmektedir. Artık Çin ihracatına kıyasla, Hintliler daha az Afrika pazarını egale etmektedir (Yang, 2019).

21. yüzyılın başından beri Çin ve Hindistan, Afrika ülkeleriyle ticari ilişkilerini yoğun bir şekilde geliştirmektedir. Ancak Çin-Afrika ticari ilişkileri son zamanlarda Çin lehine kazan-kaybet ilişkisine dönüşmüştür. Çin için Afrika, istikrarlı bir şekilde bir ithalat pazarından çok bir ihracat pazarı haline gelmiştir. Ayrıca Çin mallarının genişlemesi, Afrika ürünlerinin yerel pazarlardan uzaklaşmasına neden olmaktadır (Yang, 2019). Ayrıca Çin, Afrika ülkeleri için bir ithalat kaynağı olarak önemini önemli ölçüde artırmıştır. Afrika'daki bazı ülkeler ticarete Çin'e bağımlıdır. Çin'in aksine Hindistan, 2008-2017 yıllarında Afrika ile mal ticaretinde negatif bir ticaret dengesi kaydetmiştir (Palacıoğlu, 2018). Çin 2008 mali krizinden sonra, zengin Afrika ülkelerine mal ihracatında ve kaynakları bol Afrika'nın en az gelişmiş ülkelerinden mal ithalatında Hindistan'a karşı avantajını artırmıştır (Yang, 2019).

Çin-Afrika ticari ilişkilerinin gelişimindeki kilit tarihler 2000, 2003, 2006 ve 2010'dur. Bu yüzyılın başında Çin, Afrika'nın ağır borçlu yoksul ülkeleri ve en az gelişmiş ülkeleri tarafından tahakkuk ettirilen 10 milyar RMB'lik borcu iptal etmiştir. Ayrıca Pekin'deki bakanlar konferansında Çin-Afrika İşbirliği Forumu (FOCAC) kurulmuştur. 2003 yılında düzenlenen 2. FOCAC Bakanlar Konferansı sırasında Çin, Afrika'ya yönelik kalkınma yardımında daha fazla artış ve bazı Afrika şirketlerinin Çin'e ihraç ettiği ürünlere sıfır tarife muamelesi ilan etmiştir (Palacıoğlu, 2018). Ayrıca altyapıyı geliştirmek, gümrük prosedürlerini iyileştirmek ve yatırımın önündeki engellerin üstesinden gelmek için Afrika'da özel ekonomik bölgeler inşa etmeye başlamıştır (Yang, 2019).

2006'da, resmi Çin-Afrika diplomatik ilişkilerinin kurulmasının yıldönümünde Çin, Afrika ile siyasi eşitlik ve karşılıklı güven, kazan-kazan ekonomik işbirliği ve kültürel alışverişi içeren yeni bir tür stratejik ortaklık geliştirmeye karar vermiştir. Dahası, Çin-Afrika Kalkınma Fonu kurulmuştur. 2006'nın sonunda Çinli liderler, Çin İhracat-İthalat Bankası'nın 2007'den 2009'a kadar olan dönemde Afrika ülkelerine 2 milyar ABD Doları tutarında ayrıcalıklı kredi ve 3 milyar ABD Doları tutarında tercihli ihracat kredisi sağlayacağını açıklamıştır. FOCAC'ın 2009 ve 2013'teki Bakanlar Konferansları sırasında Çin, 2010-2012 yıllarında Afrika'ya 10 milyar ABD Doları tutarında tercihli kredi ve 2013'ten 2015'e kadar 20 milyar ABD Doları tutarında kredi sağlayacağını da ilan etmiştir. Dolayısıyla Bakanlar Konferansı'nın ana sonucu, Çin'in 2016-2018 yıllarında Afrika ülkeleri için 60 milyar ABD Doları tutarında ek yardım beyanı olmuştur.

2010 yılında Çin, en az gelişmiş ülkeler için gümrüksüz, kotasız (DFQF) bir pazara erişim programı uygulamıştır. Çin toplam tarife hatlarının yaklaşık %60'ına sıfır tarife muamelesi yapmıştır. Genel olarak, rekabetçi siyasi avantaj, ekonomik diplomasi ve kalkınma yardımı, 21. yüzyılda Çin-Afrika ticaret ve ekonomik işbirliğinin yapı taşları olmuştur. Çin, demokratik olmamalarına ve insan haklarına saygı duymamalarına rağmen Afrika ülkeleriyle işbirliği yapmıştır. Çin hükümeti, Afrika'daki prestij projelerini diplomatik olarak desteklemiş ve Çin'in ticaret ortaklarına düşük faizli krediler sunmuştur (Kızıldere, 2018).

Çin'in Afrika'ya yaptığı mal ihracatının değeri 2008'de 49,2 milyar ABD Dolarından 2015'te 107,7 milyar ABD Dolarına yükselmiş ve ardından 2017'de 93,3 milyar ABD Dolarına gerilemiştir. Çin'in mal ithalatı da 2008'de 49,6 milyar ABD Dolarından 2013'te 117,7 milyar ABD Dolarına yükselmiş ve ardından 79,2 milyar ABD Dolarına gerilemiştir. Çin'in Afrika'ya ihracatının yıllık ortalama büyüme hızı, ithalatındaki büyüme oranından daha büyüktür. 2009 ve 2015-2017 yıllarında Çin, Afrika ile mal ticaretinde pozitif bir ticaret dengesi yaşamıştır. 2008-2017 döneminde Afrika'ya ihraç edilen Çin mallarının değerinin, Çin'in Afrika ülkelerinden ithal ettiği malların değerini yaklaşık 10 milyar ABD Dolarını aştığını belirtmekte fayda vardır (Kızıldere, 2018). Dolayısıyla Batının korumacı engellerine takılan Çin Afrika'da kurduğu sağlam bağlarla nefes almıştır.

Son yıllarda Çin, Afrika ülkeleri için bir ithalat kaynağı olarak önemini önemli ölçüde artırmıştır. 2015-2017 yıllarında Çin, Kenya, Sudan, Togo, Tanzanya, Güney Afrika, Uganda, Kamerun, Mısır, Etiyopya,

Ruanda, Gana, Burundi, Burkina Faso, Angola, Cezayir ve Gine için en büyük ithalat pazarı olurken; Mauritius, Mali, Senegal, Nijerya, Nijer ve Malavi için ikinci büyük Pazar olmuştur.

Çin ile ticaret Afrika ülkelerine fayda sağlamaktadır; ancak bu onları Çin ekonomisinin durumuna giderek daha fazla bağımlı hale getirmektedir. Ayrıca Çin mallarının genişlemesi, Afrika ürünlerinin yerel pazarlardan uzaklaşmasına neden olmaktadır. Dolayısıyla kısa vadede Afrika ülkeleri için durum olumlu olsa da; uzun vadede yıkıcı bir etkiye sahiptir.

### **3.3.Trump Dönemi ve Ticaret Savaşı**

Çin ve ABD arasındaki ticaret savaşı sırasında, Çin, uluslararası ticarete daha düşük tarifeleri teşvik etmeye çalışmaktadır. Çin şu anda yeni ticaret ortakları bulmak ve mevcut olanlarla ilişkilerini geliştirmek için diğer ülkelere yönelik tarifeleri düşürmektedir.

Ticaret engelleri koymak, tarihsel olarak yerel ekonomiye hükümetten çok ihtiyaç duyulan yardımı sağlamada etkili olmuştur. Ayrıca, rekabetin olmaması nedeniyle gelişmekte olan ülkelerde bazı endüstriler sıfırdan yaratılmıştır. Bu nedenle, merkantilizmden hızlı sanayileşmeye kadar bazı durumlarda ve bazı yaklaşımlarda rekabetten yoksun ideal koşulların yaratılması haklı görülebilir. Bununla birlikte, Chandra (2016), ülkenin küresel pazarda başarılı bir şekilde rekabet edebilecek bazı endüstriler geliştirdiğinde ihracatını artırmaya çalıştığını gözlemlemektedir. Çinliler, bir noktada yabancı şirketleri, Çin’de faaliyet göstermesine izin verilecek yüksek teknoloji ürünlerin üretimi için gereken teknolojilerin çoğunu paylaşmaya ikna etmeyi başarmıştır. Birkaç on yıllık hızlı ekonomik büyümeden sonra, kendi araştırma merkezlerini geliştiren Çin, şimdi çoğu türde ekipman, makine, araba ve elektronik teçhizat üretebilmektedir.

Bununla birlikte, Çin, resmi olarak ilan edilen varlıklı bir orta sınıf toplumu olma hedefine henüz ulaşmış değildir. Bu nedenle, hükümetin temel amacı, uzun vadede yüksek gelir sağlamak için agresif ihracat stratejilerini teşvik etmektir. Çin, hedefe ulaşmak için mümkün olan her yolu kullanmaya çalışmaktadır. Modern standartlara göre müreffeh bir toplum olmamasına rağmen, Çin bankaları gelişmekte olan ülkelerdeki altyapı projelerini ve Çin’den yapılacak mal ve hizmet alımlarını aktif olarak desteklemektedir. Cai’ye (2017) göre Çin, Kuşak ve Yol Girişiminin bir parçası olarak çok sayıda gelişmekte olan ülke ile faydalı ilişkiler kurmayı başarmıştır. Öyleyse, her türlü endüstriyi yaratmayı başaran bu büyük ülkenin, kur manipülasyonları, düşük tarifeler ve etkin ihracat stratejileri sayesinde ihracat kalitesini ve hacmini şu anda artırdığı ortaya çıkmaktadır. Üstelik bu faaliyetler, ithal malları satın alma olanağı sağlamaktan daha önemli hale gelmiştir.

Donald Trump tarafından başlatılan ticaret savaşı, ABD sanayisini yeniden ısıtmaya ve Çin’e verilen ticaret açığını azaltmaya yönelik stratejinin bir ürünüdür. Çin’den ABD’ye imalat işlerini geri getirmenin, sürdürülebilir ekonomik büyümenin ve jeopolitik stratejilerin başarılı bir şekilde uygulanmasında etkili olduğu defalarca iddia edilmiştir. Bununla birlikte, Trump’un kullandığı strateji ve basit araçların buna değip değmeyeceği henüz belli değildir. Trump, ABD’nin diğer ülkelerle yaptığı sayısız ticaret anlaşmasını gözden geçirme hususunda kararlı olmuştur. Bu dünya çapında politikalarına karşı artan hoşnutsuzluğa yol açmış ve hem ABD rakiplerini hem de müttefiklerini bir araya getiren yeni tür işbirliği ve uzlaşmaları teşvik etmiştir. ABD ürünlerine uygulanan ortalama Çin tarifesi şimdiden %20’yi aşmıştır. Aynı zamanda, Çinliler tarafından diğer ülkelere ithal edilen rakip mallar üzerindeki ortalama tarife yaklaşık %7’ye düşürülmüştür (Bown ve diğ., 2019). Tüm bu faktörler, korumacı politikaların tartışmalı yapısını ortaya koymaktadır.

ABD yönetiminin Ocak 2018’de güneş panelleri ve çamaşır makinelerine uygulanan tarifeler ilk sırada yer almış, ardından Mart 2018’de çok çeşitli ülkeler için çelik ithalatına %25 ve alüminyum ithalatına %10 tarife uygulanmıştır. Haziran 2018’de ilk muafiyet, çelik ve alüminyum tarifeleri Kanada, Meksika ve AB’ye de uygulanmış ve bu da bir dizi misilleme önlemiyle sonuçlanmıştır. AB, aynı ay yürürlüğe giren 3,2 milyar ABD Doları değerindeki ABD ürünlerine %25 oranında vergi uygulamıştır (Kızıldere, 2018). Buna karşılık ABD, ulusal güvenlik üzerindeki etkilerini belirlemek için otomobil ve otomobil parçaları ithalatına ilişkin yeni bir soruşturma başlatmış, %20-25’lik bir tarife artışını ima etmiştir (Kızıldere, 2018).

Çin ile gerginlikler 2018’in ikinci yarısında tırmanmıştır. ABD yetkilileri tarafından Çin’in fikri mülkiyet uygulamalarına yönelik yürütülen ve Çin’in zorunlu teknoloji transferi politikasına sahip



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

olduğu sonucuna varılan bir soruşturmanın ardından, ABD Çin'e karşı ticaret eylemi başlatmıştır. Temmuz 2018'de uygulamaya konulan önlemler arasında, Çin'den ithal edilen ve yıllık ithalat değeri 50 milyar ABD Dolarına eşdeğer 1.300 ürün tipine %25 oranında nispi vergiler dahildir. Eylül 2018'de ABD Yönetimi, 200 milyar ABD Doları tutarındaki Çin ihracatını hedefleyen yeni bir tarife dalgası duyurmuştur (Kızıldere, 2018). Çin, ABD'den yapılan 60 milyar ABD doları değerindeki ihracata tarife uygulayarak yanıt vermiştir.

Aynı zamanda, diğer cephelerde ticaret gerilimlerinde bir miktar azalma olmuştur. ABD ile AB arasındaki gerginliğe ilişkin endişeler Temmuz 2018'de yapılan zirvenin ardından hafiflemiştir. Ayrıca Kanada, Meksika ve ABD, Kuzey Amerika Serbest Ticaret Anlaşması'nı ABD-Meksika-Kanada Anlaşması ile değiştirmek için anlaşmaya varmıştır. Çin ile ABD arasında 1 Aralık 2018'de kabul edilen ve 200 milyar ABD doları tutarındaki Çin ithalatına uygulanan tarifelerin daha önce açıklandığı gibi %25'e yükseltilecek yerine %10'da kalacağı bir ateşkes, ABD-Çin ticaret gerilimlerini geçici olarak yatıştırmıştır (Kızıldere, 2018).

ABD'nin Çin'e yönelik tarifeleri, özellikle elektronik ve makine sektörlerini hedeflemektedir. Çin'e uygulanan tarifeler, toplam nominal değeri 217 milyar ABD Doları veya Çin nominal katma değerinin %2'si olan çok çeşitli endüstrileri etkilemektedir. En çok etkilenen sektörler, tümü Çin hükümetinin Made in China 2025 endüstriyel planında yer alan elektronik bileşenler, elektrikli ekipman ve makinelerdir (Kızıldere, 2018).

ABD'nin ticaret ortaklarının, özellikle Çin'in misilleme tepkileri, çok çeşitli endüstriler ve sektörlerde ABD ithalatını da hedef almıştır. Gıda, kimya ve otomobil endüstrileri, Çin'in misillemesinden en çok etkilenen sektörler olmuştur. AB misilleme önlemleri çok daha küçüktür ve metalik olmayan mineralleri, elektrikli ekipmanları, tekstilleri, mobilyaları, gıda ürünlerini, diğer ulaşım ekipmanlarını (motosikletler gibi hafif araçlar dahil) ve kimyasalları hedef almaktadır (Wang ve diğ., 2020).

Çin'e uygulanan son ABD tarifeleri, iki ülkenin ikili ticaretinin önemli bir bölümünü hedef alırken, Euro bölgesi ve küresel ticaretin doğrudan etkilenen payı hala sınırlıdır. ABD ve ticaret ortakları tarafından 2018'in ilk yarısında açıklanan tarifelerin hedeflediği ürünler, ABD (%2), Euro bölgesi (%0,2), Çin (%2)'nin nispeten küçük paylarını etkilemektedir. Buna karşılık, ABD tarifelerinin son turu, Çin'in Eylül 2018'deki misilleme önlemleriyle birleştiğinde, Çin'in ABD ile olan ikili ticaretinin neredeyse yarısını hedeflemektedir. Sonuç olarak, toplam ABD'nin yaklaşık %12'si ve toplam Çin mal ticaretinin %8'i etkilenmektedir (Wang ve diğ., 2020). Kısa vadede, bu tarifeler ABD ve Çin'deki faaliyetler üzerinde baskı oluşturabilir ve tedarik zincirlerinde üretim organizasyonu olumsuz etkileri daha da artırabilir.

Zengin ülkelerdeki Trump gibi ticari geçmişi olan çok sayıda politikacı, işçi sınıfının gelir artışını artırmak için gerekli olan yeniden sanayileşme sürecinin de bu yaklaşıma dayanması gerektiğini iddia etme eğilimindedir. Örneğin ABD, uzun süredir imalat sektöründeki durumu iyileştirmeye çalışmaktadır. Dış kaynak kullanımı ve fabrika kapanışları, otomasyon ve hızla artan fiyatların neden olduğu mevcut sosyal sorunlar, durumu daha da kötüleştirmektedir. Üniversite diplomasına sahip olmayan milyonlarca ABD'li, olağan yaşam tarzlarını sürdürmelerine yardımcı olabilecek herhangi bir iş teklifi alamamış durumdadır. Sanayileşme de dahil olmak üzere küreselleşme süreçlerinden doğrudan etkilenen insan sayısı, 2016'dan önce benzeri görülmemiş bir hızla artmıştır (Kızıldere, 2018).

Son derece yüksek bir ulusal asgari ücrete sahip bir ilçede yeni ticaret engelleri koymak, artık ucuz yabancı malları karşılayamadığı için genellikle nüfusa zarar vermektedir. Ayrıca, çoğu durumda, ülkeler tarifelere karşılık olarak vergileri artırma eğilimindedir. Bunun yerine Latin Amerika ve Avrupa'ya yönelerek Amerikan tarım ürünlerine bile ikame bulmayı başaran Çin'in başına gelen budur. Ayrıca Çin, çoğu elektronik, araba ve makine türünü kendi başına üretebilir, bu da yüksek vergilerin istenen etkisini de ortadan kaldırır. Bu nedenle, bu dış politika aracı, modern dünyada pek başarılı bir sonuca yol açamaz ve uluslararası arenada kas esnetme olarak değerlendirilmelidir. Chandra (2016), Çin'in malları için şaşırtıcı derecede düşük fiyatlarla yeni ticaret ortaklarını cezbetmenin her zaman bir yolunu bulunduğunu belirtmektedir.

Zengin devletler, tarifeler ve ticaret savaşları söz konusu olduğunda, bu tür eylemler gelecekteki işbirliğini baltalayacağından, günümüzde gerçekten manevra alanına sahip olamamaktadır. Ayrıca, gelişmekte olan ülkeleri zengin ülkelere bağımlılıkları yerine Güney-Güney işbirliğine daha fazla

güvenmeye teşvik etmekte ve Batı için (özellikle bu ülkelerdeki orta ve yoksul sınıf) yıkıcı etkiler ortaya çıkarmaktadır. Dolayısıyla gelecekteki belirsiz küreselleşme yüzlerine rağmen, zengin devletler, bir bütün olarak bir ulusun gelecekteki refahını hala belirledikleri için, kârlı yüksek teknoloji endüstrilerinin ve serbest ticaretin gelişimini hala vurgulamalıdır.

#### **4.SONUÇ**

Yükselen korumacılık, ekonomik aktiviteyi birkaç kanaldan etkileyebilir. Yüksek ithalat vergileri, ticareti yapılan malların hem miktarını hem de fiyatını değiştirebilir. Karmaşık küresel üretim tedarik zincirlerinin varlığı bu etkiyi artırabilir. Ayrıca, yüksek ticaret maliyetleri finansal akışları ve kredi koşullarını etkileyebilir. Bu, gelecekteki ticaret politikası üzerindeki artan belirsizliğin finansal strese ve geniş bir risk priminin yeniden değerlendirilmesine yol açması durumunda ortaya çıkabilir. Bir ticaret anlaşmazlığında farklı kanalların ortaya çıkma şekli ve bunun ekonomik faaliyet üzerindeki etkisi, ticaret ortaklarının misilleme yapıp yapmaması ve anlaşmazlığın bir ticaret anlaşmazlığına dönüşmek yerine az sayıda ülke ile sınırlı kalması gibi çeşitli faktörlere bağlıdır.

Tarife uygulayan ülkedeki ekonomik faaliyet üzerindeki etki, ithal edilen malların yerli üretimle ikame edilip edilemeyeceğine ve ticaret ortaklarının misilleme yapıp yapmayacağına bağlıdır. Yüksek tarifelerin getirdiği yüksek ticaret maliyetleri, üreticiler için daha düşük kar marjlarında emilmediği sürece, ithalat fiyatları yükselir ve göreceli fiyatlar değişir. Daha yüksek ithalat fiyatları, yerli firmaların üretim maliyetlerini ve yurt içi enflasyonu yukarı çekerek, hanehalkının gerçek harcanabilir gelirini düşürür. Ayrıca tüketim, yatırım ve istihdam üzerinde olumsuz etkiler görülür. Bununla birlikte, ithal mallarının yüksek fiyatları, yerli müşterileri ithal mallardan yerli üretim mallara geçmeye de teşvik edebilir. Bu iki hususun göreceli önemi ve ekonomik büyüme üzerindeki net etkisi, yurt içinde üretilen mallar ile ithal edilen mallar arasındaki ikame edilebilirlik derecesine bağlıdır.

İki ülkenin karıştığı bir ticaret anlaşmazlığında, üçüncü ülkeler geçici olarak artan korumacılıktan yararlanabilir. Spesifik olarak, üçüncü ülkeler tarifelerin yükseldiği ülkelerde pazar payı kazanabilirler. Örneğin, münhasıran ABD ve Çin'i ilgilendiren bir ticaret anlaşmazlığında, AB malları, Çin'deki ABD malları ve ABD'deki Çin malları karşısında rekabet gücü kazanacaktır. Bunun nedeni, daha yüksek tarifelerin ABD mallarını Çin'de daha pahalı hale getirmesi ve Çin mallarını ABD'de daha pahalı hale getirmesi ve ikisi arasındaki ikili ticaret akışlarının nihayetinde azalması gerçeğinden kaynaklanmaktadır. Üçüncü ülkelerin bu ticaret saptırmasından ne ölçüde yararlanacağı, bir ülkenin farklı ülkelere ithal edilen ürünleri ne kadar kolay ikame edebileceğine bağlıdır. Daha yüksek ikame edilebilirlik, daha fazla ticari saptırma anlamına gelir.

Finansal stresle birleşen belirsizlikteki artış, artan korumacılığın ekonomik faaliyet üzerindeki etkisini de artırabilir. Gelecekteki ticaret politikalarına ilişkin artan belirsizliğin talebi azaltılmasının birkaç yolu vardır. Örneğin, ekonomik beklentiler daha belirsiz hale geldiğinde hanehalkları harcamaları erteleyebilir. Ayrıca firmalar, artan belirsizlik, bekle ve gör yaklaşımını benimseyerek ve yatırımları erteleyerek ekonomik beklentilerini yeniden değerlendirebilir. Belirsizlik şoklarına yanıt olarak firmalar, uluslararası ticaret akışları üzerinde orantısız bir etkiyle, dış ara mal siparişlerini orantısız bir şekilde keserek envanter politikalarını da ayarlayabilir. Belirsiz bir ticaret politikası görünümü, firmalara dış pazara girmeyi veya teknolojilerini yükseltmeyi ertelemeleri için bir neden verebilir. Son olarak, yatırımcılar kendilerini gelecekteki risklere karşı korumak için daha fazla tazminat talep ettiğinden, artan belirsizlik hane halkı ve firmalar için borçlanma maliyetlerini artırabilir. Ticaret savaşı gibi küresel bir belirsizlik şokunun gerçekleşmesi, yatırımcıları portföylerini güvenli liman para birimlerine kaydırmaya ve ülkeler arasında sermaye akışlarının tahsisi üzerinde etkileri olmaya itebilir.

Daha yüksek ticaret maliyetleri de üretkenliğe ağırlık verebilir. Artan belirsizlikle bağlantılı daha sıkı finansman koşulları, tarifelerden etkilenen ülkelerde üretkenlik artışını engelleyebilecek yatırımlar üzerinde olumsuz bir etki ile sermaye maliyetini artırabilir. Ticaret engelleri, firmalar ve ülkeler arasında üretim faktörlerinin yanlış tahsis edilmesine de yol açabilir. Daha az açık pazarlar küresel rekabeti azaltır, böylece yenilik ve teknolojik ilerlemeler için teşvikleri azaltır ve daha az üretken firmaları pazarda tutar. Sonuç olarak, toplam verimlilik düşebilir.

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Bu sebeple, korumacılık tedbirleri alınırken çok boyutlu bir perspektiften analizler yapılmalı ve hem yerel hem de küresel düzeydeki etkiler değerlendirilmelidir. Küreselleşme ile birlikte artan uluslararası ticaret hacmi her ne kadar özellikle geçtiğimiz 40 yıllık süreçte global olarak refah artışına sebebiyet verse de pandemi ile birlikte yerel üretimin önemi bir kez daha anlaşılmıştır. Bu sebeple ülkeler, stratejik olarak önem atfettikleri alanlarda yerli üretimi teşvik edici unsurlara başvurabilir. Ancak bunun kısa vadeli çözüm olduğunun ve uzun vadede hem yerel hem de küresel refah kaybının kaçınılmaz olduğunun altı çizilmelidir.

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October 13-14, 2023

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

ARTVİN YUSUFELİ BARAJININ TÜRKİYE EKONOMİSİNE MUHTEMEL

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## ÖZET

Yusufeli barajı ülke ekonomisine oldukça önemli ölçüde katkı sağlamıştır. Yapımı tamamlanan ve su tutmaya başlayan baraj tam kapasite dolduğunda enerji üretimi yanı sıra turizm, hayvancılık ve tarımsal anlamlarda da bölge halkına ve ülke ekonomisine çok büyük ölçüde katkı sağlayacaktır. Yusufeli barajı 1,5 yıl enerjiyi temin edebilecek kadar üretim yapabilmektedir. 2,3 milyar metreküp su depolama yapılacaktır. Su depolama tamamlandıktan sonra Çoruh nehri üzerinde kurulan Muratlı, Borçka, Deriner ve Artvin barajlarına hem su kaynağı olacağı için enerji üretim kapasiteleri de artacaktır.

Erzurum ve Artvin illeri arasında ki Çoruh nehri üzerine kurulmuş olan Yusufeli Barajı 275 Gövde yüksekliği ile bu türde yapılan barajlar içerisinde Türkiye de birinci, Dünyada ise beşinci sırada yerini almıştır. Yusufeli barajı su bırakması nedeniyle bölgede yapılan diğer barajları da besleyerek daha çok enerji üretilmesini sağlayacaktır. Yusufeli barajı Hidro Elektrik Santral olup ülke genelindeki yapılan enerji üretimleri için yapılan enerji kaynakları içerisinde önemli bir yere sahiptir. Hidro Elektrik Santrallerin (HES) bakım ve onarımı kolay olduğu için diğer enerji kaynaklarına göre daha fazla yapımı konusunda tercih edilir olup Yusufeli Barajı da sadece enerji üretimi için yapılmıştır. Yusufeli barajı mimari yapısıyla da bizim mühendislerimiz tarafından yapılan mühendislik harikasıdır.

**Anahtar Kelimeler:** Baraj, Ekonomi, Yusufeli

## ABSTRACT

Yusufeli dam has contributed significantly to the country's economy. When the dam, the construction of which has been completed and started to hold water, is full, it will contribute greatly to the local people and the country's economy in terms of tourism, animal husbandry and agriculture, as well as energy production. Yusufeli dam can produce enough to supply energy for 1.5 years. 2.3 billion cubic meters of water will be stored. After the water storage is completed, the Muratlı, Borçka, Deriner and Artvin dams built on the Coruh river will be a source of water, so their energy production capacity will also increase.

Yusufeli Dam, which was built on the Çoruh river between Erzurum and Artvin provinces, is the first in Turkey and the fifth in the world with its 275 body height. Yusufeli dam is a Hydroelectric Power Plant and has an important place among the energy sources for energy production throughout the country. Hydro Electric Power Plants (HEPPs) are easier to maintain and repair, so they are preferred over other energy sources, and Yusufeli Dam was built only for energy production. Yusufeli dam, with its architectural structure, is an engineering marvel made by our engineers.

**Keywords:** Barrage, Economy. Yusufeli

## 1.GİRİŞ

Artvin Yusufeli Barajının ekonomiye katkısını anlatırken Artvin ili ve Yusufeli ilçesinin kısaca tarihi ve coğrafi durumundan söz etmekte önemlidir.

İlin ve İlçelerinin geçim kaynakları turizm, tarım hayvancılık, ormancılık ve barajlar yapıldıktan sonrada kafes balıkçılığıdır. Halkın geçim seviyesini yükseltmek için yapılan çeşitli projeler DOKAP tarafından desteklenmektedir. Son zamanlarda arıcılık arı ve arı ürünleri de çok önemli bir yer tutmuştur. Sosyal



etkinliklerde ekonomik anlamda çok yer tutmuş bölgede çok sayıda geleneksel ve ulusal anlamda festival, şenlik ve pancarcı yapılmaktadır.

Yusufeli barajı yapım kararı alınırken bölgede bu barajın yapılmaması için çok önemli tepkiler oluşturulmuş ve bunların hepsini bu makalede bulmanız mümkün olacaktır. Yusufeli barajı mimarı yapısından yapılaş şekillerine, gövde büyüklüğü, yüksekliğine kadar çok önemli rekorları ve yeni bazı siteleri de beraberinde getirmiştir.

Barajın ülke ekonomisine katkısı birçok kaynaklardan alınarak en gerçekçi bir şekilde bu makale içerisinde bulunacak olup, yazılan makaleler ve çeşitli bilgiler eski kaynaklara dayalı olduğu için genelde barajın yapılaş ve tamamlanmadan önceki bilgiler var olup bu bilgilere barajın tamamlandıktan sonraki bilgileri de eklenerek kayıplar ve karlar çok ciddi bir şekilde ele alınmıştır.

Yapılışı ile bir mühendislik harikası olan Yusufeli barajı ülke ekonomisine katkısı sadece enerji kaynaklı olmayıp, turizm, hayvancılık ve tarımsal anlamlarda da bölge halkına ve ülke ekonomisine çok büyük ölçüde katkı sağlamaktadır.

Yusufeli barajı Cumhurbaşkanı Recep Tayyip Erdoğan tarafından açılarak hizmete girerek baraj kapakları kapatılıp su tutmaya başlamıştır. Baraj su tutmaya başladıktan sonra şu ana kadar su seviyesi 50 metre yüksekliğe ulaşmış, yerel halk yeni Yusufeli'ne taşınmıştır. Baraj suları altında kalacak olan yüzlerce ağaç bölgeden sökülerek yeni Yusufeli yakınında oluşturulan alanlara dikilmiş ve yaşanabilecek kaybın önüne geçilmiş, bunun yanında çok sayıda yeni fidanlar dikilmiştir. Bölgedeki, bütün yol, köprü ve viyadükler yeni Yusufeli yapıldıktan sonra yapımları tamamlanarak hizmete girmiştir.

Yusufeli barajı ülkemiz ekonomiye 5 Milyar lira katkı sağlamış olup, 1 Milyar 900 Kw saat enerji üretimi sağlayacaktır. Erzurum ve Artvin illeri arasında ki Çoruh nehri üzerine kurulmuş olan Yusufeli Barajı 275 Gövde yüksekliği ile bu türde yapılan barajlar içerisinde Türkiye de birinci, Dünyada ise beşinci sırada yerini almıştır. Yusufeli barajı su bırakması nedeniyle bölgede yapılan diğer barajları da besleyerek daha çok enerji üretilmesini sağlayacaktır.

## **2. YUSUFELİ'NİN SOSYAL VE EKONOMİK YAPISI**

Hemen bugün sular altında kalmaya başlayan Yusufeli yani artık biz buradan sonra buna eski Yusufeli desek daha doğru olacak Çoruh Nehri ve Barhal Çayı'nın birleştiği bir alanda kurulmuş yeni Yusufeli ise yine aynı bölgeye yakın Güney Batı istikametinde bir alana yerleştirilmiştir. Artvin'in en büyük yüzölçümüne sahip bir ilçesi olan Yusufeli arazisinin büyük bir bölümü artık sular altında kalmaya başlamıştır. Artvin il merkezine 85 kilometre uzaklıkta olan Yusufeli ilçesi Erzurum ve Rize'nin arasındaki bölgede yer almaktadır. Bu her iki arasında adeta bir köprü görevi gören Yusufeli çok önemli bir merkez konumundadır. Kaçkar Dağı ile Rize il sınırını oluşturan Altıparmak Dağları arasındadır. Şu ana kadar yazılı kaynaklarında askıda kaldığı bugünlerde yeni Yusufeli barajın büyük bir bölümünü görebilecek şekilde bir yere yerleştirilmiştir. Tarım arazilerinin oldukça az olduğu Yusufeli'nde barajların tamamlanması ve su tutmaya başlaması ile oldukça azalmıştır ( Dama ve Yılmaz, a. s.27).

Dağlık yapıya ve akarsularının oldukça bol olduğu ilçe karma bir iklim oluşmakta baraj sularının yükseldiği bu günlerde bu durum biraz daha ılıman iklime doğru şekilleneceği gerçeği yeni Yusufeli'ni beklemektedir ( Dama ve Yılmaz, b. s.27).

Yusufeli ilçe merkezi ve köylerinde şu ana kadar Karadeniz iklimi ve karasal iklim arasında değişkenlik göstermesine rağmen baraj sularının tamamen dolduğu ve çok büyük bir alanın sular altında kalması nedeniyle Akdeniz ikliminin oluşması kesin gözüyle bakılmaktadır. Bu durum bölgede yetişen bazı ürünleri olumlu veya olumsuz etkileyeceği de tereddütler arasında mevcuttur.

Şu ana kadar Yusufeli ilçesinde değişken iklimlerin olması nedeniyle oldukça fazla çeşit tarımsal ürünlerin yetişmekteydi, Yeni Yusufeli'nde ise bu iklim daha da ılıman olacağı için birçok farklı ürünlerinde yetişmesine imkan sağlayacaktır. Belki de değişen iklimden dolayı daha önce bölgede yetişen bazı tarımsal ürünler yetişmeyecek yerlerini başka ürünlere bırakacaktır.

Toprağın oldukça verimli ve iklimin elverişli yapısı, tarımsal üretimde verimliliği artırırken baraj sularının tam dolmasıyla bu verimliliğin daha da artacağı beklenmektedir. 1993 Yılında başlayan seracılık faaliyetleri daha da artacağı beklenmektedir. Bu konuda desteklerin artırılarak bu bölgenin

gelirinin düşmemesi için yeni bir gelir kapısı olarak barajlarda ki kafes balıkçılığı olabileceğimde beklenmektedir. Bölgenin seracılık ve tarımsal ürünlerin üretimlerinin desteklenmesi ve kafes balıkçılığının gelişmesine imkan sağlanması bölgenin göç etmesinin önüne geçilmiş olur.

Sanayi anlamında da gelişmemiş olan Yusufeli’nde Turizm açısından zengin kaynaklarının ve Baraj sularının değerlendirilmesi bölgeyi rahatlatacaktır. Yusufeli’nde ekonomiye katkı sağlayabilecek birçok değerler vardır. Bu tarihi ve turistik değerlerden Dağcılık, kampçılık, trekking, avcılık, rafting, vb. nehir ve dağ sporlarıdır. Yusufeli ilçesinin yaklaşık yüzde 32’si ormanlık alana sahiptir. Yusufeli Barajı’ndan sonra ilçeye ekonomik fayda sağlayacak en önemli sektörlerden birisi turizm potansiyeli ve tarımsal üretimin iklim değişikliği ile daha iyileşmesi yanı sıra baraj suları çeşitli şekillerde değerlendirilecektir. Oldukça fazla bir alanı kaplayan baraj sularının oluşturacağı iklim farklılığı bölgede yetiştirilen meyve çeşitliliğini de artıracak ve hatta şu ana kadar yetişmeyen birçok sebze ve meyvenin yetişmesine imkan sağlanmış olacak. Bu durum ilçe merkezi ve köylerini olumlu yönde etkileyecektir. Sanayinin olmadığı bu bölgede tarımsal üretimde çeşitli iyileştirme çalışmaları ve bu konuda eğitim ve projeler ile desteklenerek önemli bir ölçüde gelir elde edilebilir ( Dama ve Yılmaz, c. s.28).

Organik tarım ve doğal ürünlere yerel halkı yönlendirerek ve bu konuda iyi bir planlama yapılması bölge ekonomisini daha güçlü kılacaktır. Bölgede yetişen ve baraj suları altında kalacak olan birçok meyve ağaçları korunması için çok önemli bir çalışma yapılarak bu meyveler sökülerek başka bir bölgeye nakledilmiş olması da oldukça önemlidir. Tıbbi ve aromatik bitkiler yanı sıra baharat bitkileri yetiştiriciliği ve meyvesi yenen ağaçlandırma çalışmaları önemli olacaktır ( Dama ve Yılmaz, ç. s.29).

Dünya Gıda ve Tarım Teşkilatı (FAO) ve Tarım ve Orman Bakanlığı tarafından bölgedeki yerel halka verilen desteklemeler hemen hemen birbirlerine yakın şeyler olup, aile çiftçiliğinin devamının sağlanması için oldukça önemlidir. Yapılabilecek yeni projeler ve eğitim faaliyetleri bölge halkını ekonomik anlamda güçlü kılacaktır ( Dama ve Yılmaz, d. s.29).

Yusufeli ilçesi ve köylerinde yapılan sosyo-kültürel etkinliklerin başında festivaller gelirirken yapılan barajında bu anlamda yeni bir etkinlikler yapma imkanı sağlayacaktır. Baraj sularında yapılacak olan su sporları ve kültür etkinlikleri daha da önemli bir hale gelebilir. Yıllardır geleneksel halde Yusufeli ilçesi ve köylerinde yapılmakta olan boğa güreşleri, yayla festivalleri, turizm ve spor festivalleri kapsamında birçok etkinlik düzenlenmektedir. Yusufeli İlçe sakinlerinin sosyal anlamda birbiriyle iletişim kurması için önemli bir değer olan ve bayram havasında geçen bu festivaller, geçmişten günümüze kadar geleneksel bir halde yapılmaktadır. Yusufeli’nin kimliğini belirleyen en önemli özellik devlete bağlılığı ve çalışkanlığıdır. Bu durum Yusufeli’nde yaşamakta olan halk yalnız bırakılmayacak kendilerinin bu durumu kendilerine referans olabilecek en önemli bir değerdir ( Dama ve Yılmaz, e. s.29).

Yusufeli ilçesinde yerel halkın en önemli geçim kaynağı ticaret olması nedeniyle ilçede esnaf sayısı artmaktadır. Bölge esnafını en iyi destekleyen şeylerden birisi Kamu hizmeti için o bölgede görev yapan personel ve bunun yanında tarım ile hayvancılık da geçim kaynakları arasında görülebilir. Yusufeli’nde iş alanlarının az olması, ilçenin emekli ve memurlar için bir yerleşim yeri durumuna gelmesini sağlamıştır ( Dama ve Yılmaz, f. s.30).

### **3. YUSUFELİ BARAJININ GENEL TANITIMI**

Orman ve Su İşleri Bakanlığı ve DSİ Genel Müdürlüğü tarafından yapılan Yusufeli Barajı ve Hidroelektrik Santrali (HES),dir. 26 Şubat 2013 tarihinde temeli atılan DSİ Genel Müdürlüğü’nün Çoruh Nehri üzerinde gerçekleştireceği bir proje olup, Barajı temelden 275 m yüksekliğindedir. Yapımı tamamlanan Yusufeli barajı ile dünyanın en yüksek kaya dolgu barajlarından biridir. 2.5 Milyon kişinin elektrik ihtiyacını karşılayacak olan Yusufeli barajı Tesisin Türkiye enerji üretimine 540 MW’lık (3 x 180 MW) kurulu güç ile katkıda bulunacaktır. 2 Milyar 130 metreküp su depolama hacmine sahip ve yapımı tamamlanarak 22-11-2022 günü Cumhurbaşkanı Recep Tayyip Erdoğan tarafından açılışı yapılan Yusufeli barajı Türkiye’nin en büyük dünyanın ise beşinci yüksek barajı olması nedeniyle yıllık elektrik üretimi (1,705 GWh/yıl) ile ülkemiz yıllık enerji ihtiyacının % 0.6’sını karşılayacak ve Türkiye’nin uzun vadeli enerji hedefleri çerçevesinde önemli bir yere sahip olacaktır ( Küçükbaşol, 2015, a. s.143).

Eyfel kulesinden sadece 25 metre kısa olan ve Orta Çoruh havzasında inşa edilen barajın İnşasına 21 Aralık 2012 tarihinde başlanan Yusufeli barajı Doğu Karadeniz Bölgesi'nde, Çoruh Nehri üzerinde Artvin ili Yusufeli ilçesinde yer almakta ve aynı ismi taşımaktadır. DSİ Genel Müdürlüğü'nün Çoruh nehri üzerinde gerçekleştireceği önemli projelerden biri olan Yusufeli barajı Türkiye'nin toplam enerji üretiminin yaklaşık % 8'ini, hidroelektrik santrallerinden elde edilen toplam enerjinin ise, yaklaşık % 34'ünü oluşturan bir proje olup 558 megavat kurulu gücüyle ülke ekonomisine bir yılda 4,1 Milyar liralık katkı sağlayacak olan bir Hidro Elektrik Santraldir ( Süme ve Türüt, 2018, s.16).

#### **4. YUSUFELİ BARAJININ EKONOMİYE MUHTEMEL KATKILARI**

Açılışı yapılan Yusufeli Barajı gerek ülke ekonomisine gerekse bölge ekonomisine oldukça önemli katkılar sağlamıştır. Daha öncede baraj inşaatı bölge halkının yaşam koşullarını değiştireceği ABD de toplanan baraj komisyonu tarafından açıklanmıştır.

1.5 Milyon metrekare alanda 10 Milyon metreküp dolgu ile Artvin ili Erzurum arasında Çoruh nehri üzerinde yapılarak 19 Kasım 2022 de Cumhurbaşkanı Recep Tayyip Erdoğan himayelerinde Tarım ve Orman Bakanı Vahit Kirişçi'nin katılımıyla açılışı yapılan Yusufeli barajı yapım aşamasında bile bölge ekonomisine oldukça önemli ölçüde katkı sağlamıştır. Özellikle istihdamın sağlanması bölgede yaşanan göçün tersine dönerek gerçekleşmesini sağlamış ve o süreçte Artvin ilinde kişi başına düşen millî gelirdede büyük bir artış sağlanmıştır.

Yapım aşamasında 5-6 bin civarında kişinin bu bölgede çalışması bölge ekonomisinin önemli bir ölçüde gelişmesini sağlamıştır. Yapılan baraj inşaatları bölge halkının buradan çalışarak gelir elde etmesi yaşanarak görülen bir durum olmuştur. Ülkeye sağlayacağı enerji yanı sıra içilebilir su kaynakları da bölgede oluşacak nem oranı ve yağış seviyesinin artması nedeniyle artacaktır. Su kaynakları ihtiyacının yanında endüstriyel su temini, enerji üretimi, tesislerinin hazırlanması yapılan ve şu an açılışı yapılmış olan barajların ömrünün uzanması konusunda büyük bir fayda sağlayacaktır. Yapılan barajın dik yamaçlar arasında olması çok yağış alan bir bölge olacak olması ve bu yağışların dik yamaçlardan sürükleyeceği toprak ve daha değişik kum çakıl vs barajın dolmasına neden olacağı için baraj etrafında yapılan çeşitli tesisler çok önemli olacaktır. Açıklanan Dünya Bankası raporları yapılan barajlar olmasa ve nehirlerin barajlar ile kullanılması sağlanmasa dünya genelinde sellere ve kuraklıklara neden olacağı belirtilmiştir. Barajlar yapılmasa büyük nehirler ve havzaları insanlar pek fazla çalışma imkanı bulamayacak ve ekonomide da daha az sayıda insana yaşanabilecek yerleşim yeri sağlanmış olacaktır.

Dünya da ihtiyaç duyulan elektriğinin beşte biri bu barajlardan sağlanmaktadır. Artvin genelindeki barajların tamamı ve dünya üzerindeki barajların büyük bir çoğunluğu hidroelektrik santraller (HES) enerji üretimi için yapılmıştır. Yapılan bu barajların bu amaçla kullanılmasına 1890'lara kadar gitmektedir ( Altınbilek, a. s.6).

Artvin genelinde yapılan bütün barajlar ve Yusufeli barajı da dahil olmak üzere hepsi enerji üretimi içindir. Bu HES lerin en önemli faydası da elektrik üretimidir. Hidroelektrik santraller (HES) temiz enerji üretirken yapılan bu barajlar hava kirliliğinin de önüne geçmek için önemli bir faktördür. HES ler oldukça bereketli ve oldukça verimli yenilenebilir enerji kaynağı olarak, bütün dünyadaki yenilenebilir enerjinin önemli bir bölümünü teşkil eder. Amerika Birleşik Devletlerinde büyük barajlar komisyonu tarafından yapılan çalışmada hidroelektrik santrallerinin verimliliğinin % 90 i aştığını ve termal santrallerinin veriminden 2 kat daha fazla olduğunu göstermiştir ( Altınbilek, b. s.6).

Enerji bütün modern toplumlarda ekonomik gelişim için ve fiziksel ihtiyaçları için en önemli araçtır. Enerji ihtiyaçları sürekli artmaktadır. Teknolojinin gelişmesi ve daha değişik etkenler elektrik enerjisine olan talebi artırmaktadır. Uluslararası Enerji Kurumunun Mart 1999 yılında yayınlamış olduğu raporuna göre dünya üzerindeki hidroelektrik santraller dünyada ihtiyaç duyulan elektrik enerjisinin beşte birini sağlamaktadır ( Altınbilek, c. s.6-7).

Hidroelektrik santrallerin verimleri çok yüksek olup, güç üretiminin yanında çoğu zaman görmezlikten gelinen sel, erozyon ve taşkın kontrolü gibi avantajları da vardır. Ayrıca su temiz kalır tekrar kullanılabilir ve fosil yakıtlarından kaçınılmış olunur ( Altınbilek, ç. s.7).

Ulusal bir kaynak olan su, gelişmekte olan ülkelerin hükümetleri ve kuruluşları elektrik üretimi için hidroelektrik santralleri kurma mecburiyetleri vardır. Bunu yapamayanlar genelde ithal edecekleri fosil yakıtlarına tercih ediyorlar. Milyonlarca yıl kayalar ve toprak altında kalarak fosilleşen hayvanlardan

# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

biriken bir enerjidir. Bu yakıtlar milyonlarca yıl toprak altında kalan bitki ve hayvanların fosilleşmesinden oluştuğu için bunu her yerde bulmak ve faydalanmakta mümkün değildir. Onun için Yusufeli barajı ve bu barajlar gibi Hidro Elektrik santraller yaparak enerji üretimi elde etmek gelecek için ve ülke ekonomisi için en önemli olanlarındandır. Fosil yakıt kaynakları olanlar ise bunlardan ihraç yolu ile gelir elde etmeyi tercih ediyorlar ( Altınbilek, d. s.7).

Ayrıca Hidroelektrik santralleri termal santrallere göre hem işletilmesi daha kolay ve bakım masrafları da oldukça az olduğu için ekonomik açıdan ülke için çok önemlidir. ( Altınbilek, e. s.7). Bölgede çevre etkileri ve çevreye vermiş olduğu zararları fazla gibi gözükse de yapım aşamasında ve işin bitiminde bunun böyle olmadığı görülmüştür. Bunun en belirgin örneği de Yusufeli barajı ve Artvin bölgesinde yapılan HES lerdir. Yapılan HES de bozulan çevre HES etrafı tekrar yeşillendirilip ve barajın vermiş olduğu nem ve yağış ile bu daha da kolay olduğu görülmüştür. Hidro Elektrik santrallerin işletilmesi de termal santrallere göre daha kolay ve masrafsız olduğu için bu tür barajların yapımı ülke ekonomisi için büyük bir gelir kaynağı olacaktır.

275 metre gövde yüksekliği ile bu türde yapılan barajlar içerisinde Türkiye de birinci Dünya da beşinci olan Yusufeli barajı 1,9 Milyar kilovatsaatlik elektrik üretimi ile ülkemiz ekonomisine 5 Milyar liralık bir katkı sağlayacaktır. Buda daha değişik iş kollarının da ülke ekonomisine katkı paylarını arttıracaktır. Çoruh nehri üzerinde kurulan Yusufeli barajı 2,5 milyon kişinin enerji ihtiyacını karşılayacak. Türkiye ekonomisine sağlayacağı katkılarının yanı sıra gövdesi ve yüksekliği ile birçok rekorların sahibi olan Yusufeli Barajı, diğer barajları da rüsubattan koruyacak ve ekonomik ömürlerini uzatacaktır. Ayrıca bu rekorlar sahibi baraj enerji üretimi yanında bölgede tarımsal üretimi arttıracak, turizmin canlanmasına katkı sağlayarak bölge ekonomisine de büyük katkı sağlayacaktır ( <https://www.hurriyet.com.tr/ekonomi/iste-yusufeli-barajinin-ozellikleri-42175096> ).

Kendi sınıfında Türkiye birincisi ve dünya beşincisi ve HES enerjiden ulaşım, tarım ve turizme, pek çok sektörü etkileyecektir.

Orta Çoruh havzasında inşa edilen Yusufeli barajı 34 milyar lira yatırım bedeliyle inşa edilmiş olup, ülke ekonomisine yıllık en az 5 milyar liralık katkı sağlayacaktır ( <https://www.hurriyet.com.tr/ekonomi/iste-yusufeli-barajinin-ozellikleri-42175096> ).

Tarım ve Orman Bakanlığının verilerine göre 2012 yılında başlanan Yusufeli Barajı Talvegden 220 metre temelden 275 metre yükseklikte 2,1 milyar metreküp su depolama hacmine sahiptir. Bu kadar suyu tutabilmesi içinde Baraj gövdesi düşey ve yatay düzlemde kavisli şekilde tasarlanarak suyun yapacağı baskıyı kenarlara verilmesi ön gövdeye olan baskıyı azaltacaktır.

Yusufeli barajının ülke ekonomisine katkısını kısa bir genelleme yaparsak Antalya ilimizin bir yılda harcadığı elektrik miktarı kadar elektriği üretecektir. 2 Milyar 130 Milyon su depolama hacmine sahip olan Yusufeli barajı Borçka, Artvin, Deriner ve Muratlı barajlarına regüle edilmiş su bırakacağı için bu barajların enerji üretimine de çok büyük bir katkı sağlayacaktır ( <https://www.aa.com.tr/tr/ekonomi/yusufeli-barajı-ve-hes-enerji-uretimine-buyuk-katki-verecek/2743156#> ).

Baraj suları altında kaçak olan meyve ve daha değişik ağaçların su altında kalacağı ve bunun bir ekonomik kayıp olduğunu söyleyenlerin bölgede yapılan barajın yapımını ve inşaat dönemindeki çalışmaları bilmemekle alakalı olup hiçbir doğruluk payı yoktur. Çünkü baraj nedeni ile su altında kalacak bölgeden 5 bin 844 adet zeytin ve toplamda 6 bin den fazla dut, nar, ceviz ve daha değişik ağaçlar en düzgün bir şekilde sökülerek yeni Yusufeli'nde ki 300 dönümlük bir araziye dikilmiş o tür bir ekonomik kayıp söz konusu değildir. Ayrıca baraj çevresi ve yeni Yusufeli'ne 76 bin 788 adet ağaç fidanı dikilmiştir. Bu dikilen ağaçlar baraj içerisinde erozyon ile erken dolmaması ve bölgede sel baskını ve erozyonun önlenmesi amaçlanmıştır. Bütün bunların yanı sıra alanda yürütülen taş kordon teras ta galvanizli kafes, tel teras ve örme çift teras çalışmaları da baraj inşaatının bitimi ile tamamlanmıştır.

Yusufeli barajında ki yeni uygulamalar ile dünya baraj literatürüne de çok önemli bir şekilde katkı sağlamış ve adeta dünyanın gözünü bu bölgeye ve bu baraja çevirmiştir. 2.5 Milyon vatandaşın elektriğini karşılayacak olan Yusufeli Barajı yıllık ortalama olarak 1 milyon 888 milyon Kilovatsaat üretim yapacak ( <https://www.hurriyet.com.tr/ekonomi/iste-yusufeli-barajinin-ozellikleri-42175096> ).



# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Ekonomiye 5 Milyar lira katma değer sağlayacak olan Yusufeli Barajı üretilen 1 milyar 900 kw saat enerji üretimi yapacak ( <https://www.hurriyet.com.tr/ekonomi/iste-yusufeli-barajinin-ozellikleri-42175096> ).

Enerji sıkıntısı olsa bile sadece Yusufeli barajı 1,5 yıl enerjiyi temin edebilecek kadar üretim yapabilmektedir. 2,3 milyar metreküp su depolama kapasitesi olan Yusufeli Barajı'nın enerji üretim kapasitesi ise 2,5 milyon konutun ya da 750 bin Togg otomobilinin enerji ihtiyacını tek başına karşılayacak durumdadır ( <https://www.hurriyet.com.tr/ekonomi/iste-yusufeli-barajinin-ozellikleri-42175096> ).

Yusufeli barajı yapım aşamasında çalışan kişi sayısı olarak da büyük bir rakama ulaşarak 7 bin kişinin üzerinde bir çalışanı ile yapımı tamamlanan Yusufeli barajı Rezervuarında 2 milyar 130 milyon metreküp su depolama hacmine sahiptir. Yusufeli Barajı, kendisinin çok büyük bir elektrik üretimine sahip olması nedeniyle baraj sularının bırakılacak olması sebebiyle Çoruh Nehri üzerinde kurulan diğer Muratlı, Borçka, Deriner ve Artvin barajlarına hem su kaynağı olacak hem de nehrin getireceği rüsubatı önemli ölçüde tutarak taşkın riskini önemli ölçüde azaltacaktır.

Yusufeli barajının yapılmaya başlaması ile birlikte Karayolları Genel Müdürlüğüne bağlı ve diğer yolların yapımına da başlandı. Şu an hizmete girmiş olan Yusufeli barajı ile birlikte yapılması gereken bütün yollarda yapımı tamamlanarak hizmete girdi. Baraj projesi ile birlikte toplamda 69.2 km lik yeni karayolu ağı ve beraberinde 39 tünel, 19 da köprü yapıldı. Yeni Yusufeli için yeni yol ağında dengeli konsol köprü olarak inşa edilen "Şilenkar", "Tekkale", "Baraj" ve "Yusufeli Merkez" viyadükleri 'teknoloji harikası' özel tasarım köprüler olarak yapılarak hizmete girdi ( <https://www.aa.com.tr/tr/ekonomi/yusufeli-barajı-ve-hes-enerji-uretimine-buyuk-katki-verecek/2743156#> ).

Şu ana kadar ki kaynaklarda bu köprü ve viyadüklerin yapımı devam ettiği gibi yazılar varsa da Yusufeli barajının tamamlanması ile birlikte bu yol, tünel, köprü ve viyadük yanında diğer gerekli sanatsal yapılar yapımı tamamlanarak hizmete girdi. Ayrıca Yusufeli Merkez viyadüğü de yapımı tamamlanarak barajın su tutmaya başlaması ile birlikte hizmete girdi.

Yapımı tamamlanarak 22 Kasım 2022 tarihinde su tutmaya başlayan Yusufeli barajı şu ana kadar su seviyesi 50 metreyi geçti. 22 Kasım 2022 günü Cumhurbaşkanı Recep Tayyip Erdoğan'ın da katılımı ile gerçekleşen baraj açılışı derivasyon tüneli kapaklarının indirilerek su tutmaya başlaması sonrası şu an birçok köyleri su altında kalırken Yusufeli şehir merkezinde bugünlerde su tutmaya başladı ve eski Yusufeli'ni son kez görmek isteyenlerinde akınına uğradı. Baraj sularının tam dolarak üretime geçtikten sonra tır. Üreteceği elektrikle Adana, Antalya, Konya, Şanlıurfa gibi 2,5 milyonluk bir şehrin enerjisini tek başına karşılayacak. Yusufeli barajı 550 megavatlık kurulu gücü ile toplam HES Kurulu gücümüzün yüzde 1,7'sini karşılıyor ( <https://www.trthaber.com/haber/gundem/bakan-donmez-yusufeli-barajı-ekonomimize-yaklasik-5-milyar-liralik-katki-saglayacak-725278.html> ).

Yusufeli barajında su seviyesi gerekli yüksekliğe ulaştıktan sonra üreteceği 1 milyar 888 milyon kilovatsaat elektrik üretimi ile ülke ekonomimize çok önemli bir katkı sağlayarak yaklaşık olarak 5 milyar liralık bir üretim gerçekleştirecek olacak ( <https://www.trthaber.com/haber/gundem/bakan-donmez-yusufeli-barajı-ekonomimize-yaklasik-5-milyar-liralik-katki-saglayacak-725278.html> ).

Ülkemizin bütün elektrik üretiminin % 20'sini ülkemizin her tarafına dağılan 750 Hidro elektrik santrallerinden karşılamaktayız. Türkiye bugünkü Hidro elektrik santral kurulu gücü HES Kurulu gücü ile Avrupa'da Hidro elektrik santral gücünde ikinci, dünyada dokuzunda sıradadır. Bölgede bu nehirler ve irili ufaklı çaylar derelere doğru akarken buna ithafen Sayın Cumhurbaşkanımızın defaatle ifade ettiği gibi, 'Su akar Türk bakar.' devri kapandı, 'Su akar Türk yapar.' devri başladı şeklinde ifade edilmiş olması da çok önemlidir. Hidro elektrik santralleri sadece inşaatında değil, bu barajın yapımında kullanılan teknolojilerin yerleştirilmesinde de büyük bir aşama göstererek büyük bir örnek olmuştur. Hidro elektrik santralleri üretimi için en önemli bir parçası olan jeneratör, türbin ve elektrik otomasyon sistemleri artık ülkemizde elektrik üretim anonim şirketi (EÜAŞ) mühendisleri tarafından yapılarak hizmete sunulmaktadır. Sadece Hidro elektrik santraller için değil, sürdürülebilir ve yenilenebilir enerjinin diğer aşamalarında da daha önce yurt dışından ithal ettiğimiz pek çok ürünü artık yerli imkânlarla üretim yaparak kendi mühendislerimiz ile bu ihtiyaçlarımızın büyük bir çoğunluğu karşılanmaktadır. Artık bu ve benzeri hizmetlerin büyük bir çoğunluğunu kendi mühendislerimizden alıyoruz. Bu durum ülke

ekonomisi için birçok hizmetleri kendi ülkemizde daha ucuza mal etme imkanı bunun yanında sermayeyi ülkemizde büyütme imkanı yaratıyor. Yenilenebilir enerji kaynakları ve bunların elde edilmesinde kendi mühendislerimizin başarıları ile büyümeye ve gelişmeye devam edeceğiz." Şeklinde ifade edildi. Bu durum gelecekte ve şu an da da ekonomimiz olumlu yönde etkilemektedir. Kendi öz kaynaklarımızı kullanmak bizleri başarıya götürecektir ve ülkenin gelişmişlik seviyesini daha hızlı bir şekilde sağlanmasına katkı sağlayacaktır ( <https://www.trthaber.com/haber/gundem/bakan-donmez-yusufeli-baraji-ekonomimize-yaklasik-5-milyar-liralik-katki-saglayacak-725278.html> ).

## **5.SONUÇ**

Yusufeli Barajının ülkemiz ekonomisine katkıları oldukça önemli ölçüdedir. Bu barajın yapımına karşı ki yapılan tepkiler askıda kaldığı görülmüştür.

Barajların ülke ekonomisine katkıları kesinlikle tartışılmazdır. Bölge halkının çevre etkilerini ön sürmesi ve özellikle bir ilçe merkezi ile 3 köyün yer değiştirdiğine göre bölge halkının duygusallığı ön plana çıkmış fakat ekonomik anlamda her hangi bir kayıp yaşamamışlardır. Bütün yollarının köprülerinin viyadüklerinin ve yerleşim yerlerinin yapılarak, Yusufeli ilçesi adeta yenilenmiştir.

Ülke ekonomisine çok önemli bir katkı sağlayacak olan Yusufeli barajı yapımı başlanırken neden Hidro Elektrik santraller soruları sorulurken yapıldıktan sonra ki mühendislik harikası ve kendi sınıfında Türkiye de birinci dünyada beşinci olması bu tür barajların enerji üretimi için daha elverişli olduğu gerçeğini ortaya koymuştur. Barajların bir parçası olan jeneratör, türbin ve elektrik otomasyon sistemleri artık ülkemizde elektrik üretim anonim şirketi (EÜAŞ) mühendisleri tarafından yapılmasının önemi de çok değerli olmuştur.

Enerji üretiminde Termik santraller ve nükleer santrallere oranla Hidroelektrik santrallerin verimleri çok daha yüksek olup, temiz enerji üretiminde, hava kirliliğinin de önüne geçmek için de çok önemli bir faktördür. Ayrıca Hidro Elektrik santrallerinin verimliliğinin % 90 i aştığını ve termal santrallerinin veriminden 2 kat daha fazla olması nedeniyle de bu tür barajların ekonomiye çok büyük katkı sağladığı gerçeğini ortaya koymuştur. .

1.5 Milyon metrekare alanda 10 Milyon metreküp dolgu ile yapılan Yusufeli Barajı 2 Milyar 130 Milyon su depolama hacmine sahip, 2.5 Milyon kişinin elektrik ihtiyacını karşılayacaktır. Yusufeli barajı Tesisin Türkiye enerji üretimine 540 MW'lık Kurulu güç ile katkıda bulunacaktır. Çoruh havzası üzerinde yapılan Artvin Barajı, Muratlı Barajı ve Borçka Barajları da Yusufeli barajından gelecek olan su ile beslenerek daha çok enerji üretimi yapmalarına neden olacağı da böylece ortaya çıkmış olmaktadır. Yusufeli barajı 34 milyar lira yatırım bedeliyle inşa edilmiş olup, ülke ekonomisine yıllık en az 5 milyar liralık katkı sağlayacaktır.

HES enerjiden ulaşım, tarım ve turizme, pek çok sektörü etkileyecek olup yeni iş kollarını da ortaya çıkararak göçün önlenmesi açısından önemli olacak kafes balıkçılığı bölge halkının yeni bir iş kolu olacağı noktasında düşünceler ön plana çıkmaktadır. Bu bağlamda yapılacak olan projelerde en iyi bir şekilde desteklenerek ülke ekonomisi için çok büyük fayda sağlayan Yusufeli Barajı bölge halkının ekonomik sıkıntılarını da azaltacak iş kolları ile gündeme gelecektir.

Bu makalenin yazılmasına başlandığında yapım aşaması tamamlanmış ve 22 Kasım 2022 de Cumhurbaşkanı Recep Tayyip Erdoğan tarafından açılışı yapılarak su tutmaya başlamıştır. Makalemizin bir bölümünün yazıldığı su seviyesi 30 metreye çıkmıştır. Makalemizi bitirmiş olduğumuz 03-01-2023 günü (Bugün) Artvin Valiliği tarafından yapılan açıklamada su seviyesinin 58.6 metreye ulaştığı su miktarı ise 40 Milyon metreküpe geçti. 2023 Ocak ayı

Sonunda ise su seviyesinin ilçe merkezine ulaşacağı ifade edilerek, yerel halkında % 97 oranında taşınmış olduğu, iki köyün tamamen sular altında kaldığı bildirildi.

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

Dama, N. ve Yılmaz, M. Yusufeli Barajı'nın Sosyal Politika Perspektifi: Sorunlar, Fırsatlar ve Beklentiler. 19

Dama, N. ve Yılmaz, M. Yusufeli Barajı'nın Sosyal Politika Perspektifi: Sorunlar, Fırsatlar ve Beklentiler. 27

Dama, N. ve Yılmaz, M. Yusufeli Barajı'nın Sosyal Politika Perspektifi: Sorunlar, Fırsatlar ve Beklentiler. 28

Dama, N. ve Yılmaz, M. Yusufeli Barajı'nın Sosyal Politika Perspektifi: Sorunlar, Fırsatlar ve Beklentiler. 29

Dama, N. ve Yılmaz, M. Yusufeli Barajı'nın Sosyal Politika Perspektifi: Sorunlar, Fırsatlar ve Beklentiler. 30

Dama, N. ve Yılmaz, M. Yusufeli Barajı'nın Sosyal Politika Perspektifi: Sorunlar, Fırsatlar ve Beklentiler. 34

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
October 13-14, 2023**

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# INTERNATIONAL ANKARA CONGRESS ON MULTIDISCIPLINARY STUDIES-VI

October 13-14, 2023

## TEKNOLOJİK GELİŞMELERİN, KÜRESELLEŞME BOYUTU, SOSYAL VE EKONOMİK ETKİLERİ

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### ÖZET

Teknolojik gelişme dediğimizde ilk akla gelen, son yıllarda içinde bulunduğumuz küreselleşme kavramını ve entegre olduğumuz sosyal yaşam alanımızı ifade etmektedir. Ekonomik anlamda, en büyük pazardaki dünyayı etkileyen, bilgi, iletişim, popüler kültür yapısı ve gelişmişlik ifadesi sayılan değerler bütünü olarak karşımıza çıkmaktadır. Bu çalışmada amaçlanan, hayatımıza giren teknolojik olgunun, sosyal ve ekonomik yapı üzerindeki aktif rollerini ortaya çıkarmak ve çözüm bulmaya çalışmak faaliyetini kapsamaktadır. Başka bir anlamda da modernizm olarak ifade edilebilen bu olgu, hem araç, hem de amaç olarak en önemli etken olarak şekillenmektedir. Teknoloji olgusunun sistemimizdeki yeri, teknolojik ilerlemenin ekonomik anlamı ve ekonomik etkisinin daha da önemli olduğu vurgulanacak, sosyal hareketin yönünde de daha aktif rol oynayacağı görülecektir.

Teknolojik gelişmeler, Arge ve pazarlama faaliyetleri çerçevesinde, üretici firmalara, sadık müşteri algısı yaratma fırsatı vermektedir. Ancak bu algıyı yaratabilen işletmeler vazgeçilmez ve başarılı olabilir. Aksi takdirde, bir süre sonra, silinip kaybolma tehlikesi yaşanabilir. Tüketim ihtiyacı, küreselleşme ve çağın gereklerine göre, artık; bizi tüketim toplumu haline getirmiş, ihtiyacı karşılama güdüsünden çok farklı noktalara sürüklemiştir. Şirketler için tüketim odaklı değil, tükettirme odaklı bir yaşam ve pazarlama faaliyeti olarak şekillenmiştir. Bu çalışmada kişilerin alışveriş ihtiyacının, nasıl harcama tutkusuna dönüştüğünün anlatılması, şirketlerin bu yöndeki çalışmalarında etki-tepki sonuçlarının araştırılması amaçlanmaktadır.

**Anahtar Kelimeler:** Teknoloji, Ekonomi, Sosyal Statü, Sosyal Yaşam, Bilgi Toplumu, Yeni Ekonomi

### ABSTRACT

When we say technological development, the first thing that comes to mind is the concept of globalization that we have been in in recent years and our social life area in which we are integrated. In economic terms, it appears as a set of values that affect the world in the largest market, information, communication, popular culture structure and the expression of development. The aim of this study is to reveal the active roles of the technological phenomenon that has entered our lives on the social and economic structure and to try to find a solution. This phenomenon, which can be expressed as modernism in another sense, is shaped as the most important factor both as a means and as a goal. It will be emphasized that the place of technology in our system, the economic meaning and economic impact of technological progress is even more important, and it will be seen that it will play a more active role in the direction of social movement.

Technological developments, within the framework of R&D and marketing activities, give manufacturers the opportunity to create a perception of loyal customers. However, businesses that can create this perception can be indispensable and successful. Otherwise, after a while, there may be a danger of being erased and lost. According to the consumption need, globalization and the requirements of the age, now; It has made us a consumer society and dragged us to different points from the motive of meeting the need. It has been shaped as a consumption-oriented life and marketing activity for companies, not consumption-oriented. In this study, it is aimed to explain how people's need for shopping turns into a passion for spending, and to investigate the effect-reaction results of companies' work in this direction.

**Keywords:** Technology, Economy, Social Status, Social Life, Information Society, New Economy

### 1.GİRİŞ

Teknoloji alanında yaşanan hızlı değişim ve bu değişime uyum sağlamadaki olumlu korelasyon dikkate değer olarak ifade edilebilir. Bilgi çağı kültürü dediğimiz ve hızlıca geçişini yaptığımız, sosyal yaşam ve sosyal hareketlilikle ekonomik alanda da farklılıklara yol açmıştır. Tüketim, üretim, kazanma, harcama, sosyal hareketlilik yaratan ve ona yön veren, en önemli değişken olarak, daima yenilenmeye karşı hazır, dinamik bir yapı olarak karşımıza çıkmaktadır. Teknolojik gelişmeler, ürün kalitesi ve hizmet faaliyetlerinde, miktar ve gelir hacmini de artırıcı etki yaratmaktadır. Birbirine bağlı zincirin halkaları gibi etki sürecinde, toplumsal refah seviyesi, harcama ve tasarruf eğilimine yön veren bir yapıya dönüşmektedir. Ülkelerin gelişmişlik seviye ve kriterlerini etkileyen ve şekillendiren, yeniden yapılandıran bu süreç, tüm eko dengeyi de yüksek derece etkileme gücüne sahip olarak görülmektedir (Güven, 2009: 72).

### 2.KÜRESELLEŞME KAVRAMI

Teknolojik gelişmeler, dünyayı tümüyle içine alan ve yeni bir yaşam tarzını oluşturan akım doğurmuştur. İnsanların, siyasi, ekonomik, iletişim ve sosyal açıdan bir bütünlük içinde hareket etmesine kısaca küreselleşme adını vermekteyiz. Sürekli gelişim ve değişim halindeki teknolojik faaliyetler ile küreselleşme de hız kazanmıştır.

Küreselleşme üzerine tam bir net anlam verilememiş olup, farklı tanımlamalar mevcuttur. Sınırlı kaynaklar ve sınırsız ihtiyaçlar, sermayenin artan hareketliliği ile ekonomik anlamda bütünlük ve dünya piyasalarına dahil olma süreci içinde, farklı toplumlar arasındaki kuvvetli etkileşim olarak ifade edilebilir. Küreselleşme, birçok araştırma sonuçlarında, ekonomik bir kavram olarak görülmekte ve incelenmektedir. Aslında, tek taraftan bakılan bu açı, eksiktir. Çünkü, küreselleşme sadece ekonomik bir süreç değil, sosyal, kültürel ve politik yönleri de ciddi önem derecesindedir (Gönül, 2004: 12).

### 3.TEKNOLOJİK GELİŞMELERİN KÜRESELLEŞME BOYUTU

1970'li yıllarda, artan küreselleşmenin sebeplerinden en önemlisi teknolojik gelişmelerdir. Artan teknoloji kullanımları ile üretim ve tüketim piyasaları etkileşimi artmış, artan ihtiyaçlar ile istekler farklılaşmış, sosyal dengenin de değişmesi, tüm ekonomik etkileşimi değiştirmiştir. Ekonomik hareketin yönü, sosyal hareketlilikten geçmeye başlamıştır (Aslan, 2005: 5).

1980 sonrası küreselleşme birçok gelişmeye sebep olmuş ve belirgin hale gelmiştir. Sanayileşme alanında firma faaliyetleri yoğunlaşmış, pazarlarda ürünler ve üretim teknolojisindeki değişimler rekabeti, sert hesaplaşma seviyesine kadar kızıştırmıştır. Özellikle 1980-1990 yıllarından sonra teknolojinin ilerlemesi sonucu daha da etkinleşen küreselleşme hareketi, bilgi çağı olarak da adlandırabileceğimiz, yeni akımın başlangıç zamanları olarak düşünülebilir (Oran, 2001: 9).

Ekonomi sosyolojisi ya da sosyo-ekonomik adıyla; ekonomik olay, maddi çıkarlar ve maddi olguları, teknolojik örgütlenme ve ilişkilerle inceleyen bilimdir. Weber ve Durkheim' a göre; asıl konu, sosyolojik yaklaşımların ekonomi ile ilişkilendirilmesidir. Her sosyal olayın ekonomik yönü vardır. Ekonomi bilimi, bireyi incelerken aktörler birbirinden bağımsız ve etkileşim olamamasına karşılık; ekonomi sosyolojisinde ise, aktörler birbirine bağımlı ve birbirlerini etkilemektedir. Aktif yaşam sürecindeki empirik (gözlenen) ekonomik süreci, sosyal ilişkiyi, toplumsal boyutları açısından inceleyip, ortaya çıkan davranış hareketlerini inceler. Politik, kültürel ve sosyal yapı bağımsız hareket sergilemektedir. Küreselleşme ile birlikte, teknoloji bağımsız değişkeninden etkilenmektedir. Ekonomik olay ve olgular ilişkisinin temelinde teknoloji etkisi ana unsurdur. Teknolojinin etkilediği ortamda, ekonomik faaliyet, sosyal ilişkileri etkileyerek gerçekleşir. Sonucunda, sosyal grubun faaliyeti, genel davranış biçimi olarak karşımıza çıkar (Erkan, Güneş vd. 2013: 4, 5).

### 4. TEKNOLOJİ İLE TÜKETİM ALIŞKANLIKLARI ARASINDAKİ İLİŞKİ

Teknoloji çağını yaşadığımız bu dönemde, verimlilik artışı da kaçınılmaz olumlu sonuçlardandır. İnsan faktörü artık azalmaya, sermaye yoğun faktör artmaya başlamış olup, kas gücüne dayalı üretimden, makine gücüne dayalı bir sisteme doğru kayış yaşanmaktadır. Daha az emek ve insan gücü ile, daha çok

üretme, gelirden artma, verimlilikte maksimum fayda sağlanmaya çalışılmaktadır. Ekonomik anlamda daha az maliyetle, daha fazla fayda sağlanmakta, daha rahat ve güvenli, kontrol gücü yüksek üretim tarzına dönüşüm gözlenmektedir (Oran, 2001: 9).

Yaşamın sürdürülebilirliği için birşeyleri tüketmek zorundayız. Bu noktada tüketim, sadece beslenme, barınma gibi temel karşılanması gerekli olan ihtiyaçlar dışında, gelişen ve sürekli yenilenen, internet çağı da dediğimiz aslında yaşamın bir parçası olan, küreselleşme ile farklı farklı alanda ve ürünlerde ihtiyacın duyulduğu görülmektedir. Temel yaşam ihtiyaçlarımız haricinde, değişen ekonomik koşullara göre, ürün ve ihtiyaçlardaki farklılık, daha iyiye ve en son çıkan ürüne olan merak duygusu, toplumu bir tüketim alışkanlığından, başka bir tüketim alışkanlığı oluşturup, bağımlılık ve bağımlılık yaratma yönünde etkilemenin amaçlandığı bir tüketim toplumuna dönüştürmüştür. Buradaki amaç sınırsız ve nedeni olmayan bir tüketim eğilimi yaratmaktır (Yanıklar, 2006: 57-62).

Hayatın her evresinde tüketim mevcuttur. Üretim ve tüketimin dengede tutunması için gerekli olan, üretimin artması ve bu dengenin bozulmamasıdır. Bu durumda yapılması gereken, üretimi artırırken, ihtiyaçların şekillendirilip, yeni ihtiyaçların oluşturulması ve ilgi duyulmasının sağlanmasının gerekliliğidir. Bu durumdaki ekonomik denge, harcamaya eğilimli sosyal hareketi tetiklemekte, aynı zamanda da çarkın dönmesini sağlamaktadır.

### 5. BİLGİ TOPLUMU VE YENİ EKONOMİ

1970'li yıllarda, en çok konuşulan konulardan biri, bilgisayar ve iletişim teknolojilerinin kullanılması, insanlık tarihinde olabilecek en köklü değişimlere zemin hazırlayacak şekilde kurgulanmaktaydı. İnsanlığın yararına olabilecek siyasal, ekonomik ve toplumsal bir hareket tarzına dönüşeceği öngörülmekteydi. Köklü değişimin başında gelen düşüncelerden "fabrika var işçi yok", "ofis var, mekan yok", "elektronik evler ve sistemler"...vs makine ağırlıklı bir yaşam ortamından bahsediliyordu. Günümüzde, geriye dönüp bakıldığında, ne kadar da gerçekçi öngörüler olduğu kaçınılmaz sonuçlardır. Emek yoğun sistemden, sermaye yoğun bir sisteme geçilmiştir (Forester 1996: 101).

Bilgisayar ve teknoloji alanındaki gelişmeler, günlük faaliyetler ve yaşam alanımızı etkilemekle kalmayıp, ekonomik anlamda da etki altına almıştır. Üretim ve verimlilik artmış, tüketiciler piyasadaki varlığını ve etki alanını artırmış, sermaye hareketliliği artmış, bilgi ağı ve bilgiye dayalı yeni ekonominin özellikleri yüksek bağımlılıkla etkilemektedir. Bilgi ve iletişim alanındaki gelişmeler, küreselleşme kavramının daha çok hayatımıza işlemiş, maliyetler değişmiş ve yeni bir ekonomik modeli oluşturmuştur (Emiroğlu, 2007: 335).

### 6. TEKNOLOJİK GELİŞMENİN EKONOMİK ETKİLERİ

Teknolojik gelişme sayesinde;

- Bilgi, artık üretim faaliyetleri arasında görülmektedir
- Esnek üretim sistemi yapısı yaygınlaşmıştır
- Uluslararası ticaret artmıştır
- Arge çalışmaları daha da önemli hale gelmiştir
- Maliyet ve işgücü kullanım yapıları değişmiştir

Yeni ekonomi olarak ifade ettiğimiz modelin sebebi, teknolojik alandaki değişim ve gelişim sürecinin aktifliği ve üstünlüğüdür. Ülkeler ve milletler arasındaki kolay iletişim sağlama süreci, finansal hizmetlerin yapısında da köklü bir değişim yaratmıştır. İnternet altyapılı yeni pazarlar, ürün çeşitliliği, maliyet değişimi, bilgiye ve ürüne kolay ulaşım sağlanması gibi daha basitleştirilmiş sistem aynı zamanda maliyetleri, ekonomideki paranın akış yönü ve gücünü de önemli derecede etkilemiştir. Gelişmiş ülkelerden daha ziyade, günümüzde gelişmekte olan piyasaların, daha etkinliğini ve etki alanına girildiğini görmekteyiz (Akın 2001: 5-7).

Teknolojik gelişmeler hızlandıkça, ekonomik ve sosyal yönden birbiri ile çok yakın ilişki içinde olduğu görülmektedir. Küreselleşme diye adını verdiğimiz yeni bir yaşam, harcama ve tasarruf tarzını da aslında ortaya çıkarmıştır. Bu örgütlenmiş yapı içinde, tüm sosyal ve ekonomik yapı da aynı hızda değişime

ayak uydurmak durumundadır. Modernleşme kavramının da gözleendiği bu yapıda, kurumsallaşma, sanayileşme ve makinalaşmaya doğru bir üretim hareketliliği gözlenmektedir (Emiroğlu, 2007: 340).

### **7. EKONOMİK GELİŞMEDE TEKNOLOJİNİN ROLÜ**

Son dönemde, ekonomideki teknolojik ve toplumsal değişimler, yeni ekonomik düzeni oluşturmuştur. Birbirleri ile sıkı sıkıya bağlı bu düzende, her obje birbirini etkileyen ve birbirinden etkilenen bağımlı bir yapı halinde aktif olarak, aynı zamanda da kendini sürekli geliştiren ve değiştiren faal bir ortamdır. Bilgi toplumu dediğimiz bu teknolojik süreçte, oluşu sağlayan ve sanayileşme yapısını değiştiren bir akım olarak karşımıza çıkmaktadır. Bilginin, genelden özele doğru yayılması akımı sonucunda toplumsal ve bireysel bilinçlenme sayesinde, sosyal ekonomik denge ve buna bağlı olan ekonomik akış yönü de değişmektedir. Bu yönüyle bilgi, daha önce benzeri görülmedik ölçüde teknik açıdan yenilenmeyi ve ekonomik büyümeyi sadece yönetmekle kalmamakta, kendisi de hızla ekonominin temel faaliyeti ve mesleki değişimin temel belirleyicisi haline gelmektedir (Kumar, 1999: 24).

Ülkelerin gelişmişlik düzeylerine bakıldığında, ölçülen değerler ve ölçüm kriterleri de teknoloji bağlamında, fiziksel ölçümlerden ziyade, farklı kriterlere göre yapılmakta, işlenen, ölçülen ve saklanan bilgi kriterleri gibi farklı hesaplamalara göre yapılmaktadır. Sanayi toplumlarında gerçekleşmiş olan maddi üretim yerini, bilgi toplumlarında bilişim teknolojilerine dayalı üretim tarzına dönüşmüştür. İnsan gücünü geride bırakan bu yapıda, daha üretken ve insan gücünün çok üzerinde, sürekli yeniliğe açık, esnek ve aktif bir üretim sistemi devreye girmiştir. Esnek üretim sayesinde de aktif pazarlarda Pazar payı, rekabet gücü ve gelişme olanaklarına meydan verdiği görülmektedir. Tüm ekonomik düzeni değiştiren yeni sisteme, sosyal ve ekonominin iç içe geçmiş, sosyal hareketlilik akımı gözüyle bakılabilir (Akın, 2001: 64).

İnternet, üretici ve tüketiciye fiyat avantajı, bilgiye ulaşma kolaylığı, bilgi zenginliği sağlayarak, her türlü maliyette avantaj sağlamaktadır. Tüketicilere sağladığı bilgiye ulaşmada sağladığı maliyet avantajı, iktisadi anlamda da verimlilik artışına olanak tanımaktadır (Bayraç,- 2003: 41- 62).

### **8. SOSYAL HAREKETLİLİK VE EKONOMİK DENGE ARASINDAKİ İLİŞKİ**

Dünyada yaşanan köklü değişim ve gelişim, ekonomik, sosyal ve politik tüm yapının değişmesine yol açmaktadır. 20. Yüzyılın başından itibaren, sanayileşmede görülen hızlanma, kentleşmenin artması, modernleşme gibi yaşanan gelişmelere, küreselleşme kavramının da eklenmesi ile toplumlarda görülen değişiklikleri, hem ortaya çıktığı coğrafyada etkisini göstermekte hem de yaygın iletişim kanalları ile kıtalar ötesine etki edebilmektedir. Sosyal ihtiyaçların, piyasa ile etkileşimi sayesinde toplumsal yaşam da etki alanına çekilmiştir (Mouffe, 1984: 202).

Günümüzde, teknolojik yaşamla özdeşleşmiş ekonomik denge unsurunu korumak için, özel yaşam ve teknolojinin, birbirlerine olan katkılarına bakmak gerekir. Aradaki uyum ne kadar pozitif ise, etkisi de o kadar yüksek olur. Ekonomik gelişmenin, gelir düzeyi ve serveti artırıcı gibi katkıları göz önünde bulundurulursa, iki olguyu, bir sistemin parçaları gibi düşünmek daha doğru görülmektedir. Küreselleşme boyutuna bakıldığında, toplumsal ilişkilerin zaman ve mekan oluşumunda genişlik, derinlik, küçülme ve hareketlenme yaratmaktadır. Bu yönüyle küreselleşme; değişimi, bu değişime karşı olumlu ya da olumsuz tepkileri, dolayısıyla hem aktörler, hem kurumlar hem de zihniyet düzeylerinde yenilikleri gerekli kılmaktadır. (Eraydın, 2001: 67).

### **9. TEKNOLOJİ, KÜRESELLEŞME VE EKONOMİK ETKİLEŞİMİ**

Teknolojik ilerleme sonucunun bir görüntüsü olarak adlandırdığımız, küreselleşen dünyada, ekonominin de küreselleşmesi, serbest hale gelmesi, aynı zamanda dünyayı en büyük pazar alanı haline dönüştürmüştür. Ekonomide serbestleşme ve küreselleşme ile beraber Dünya dış ticaret hacminde de fark edilir ilerleme kaydedilmiş, sermaye akışkanlıkları hızlanmış, bu düzeni sağlayan çeşitli kurum ve kuruluşlar da oluşmaya başlamıştır (Aytekin, 2013: 123-130).

Ekonominin küreselleşmesi, kapitalist serbest piyasa ekonomisinin, rekabetin, üretim ve tüketim ilişkilerinin uluslararası konuma gelmesidir. Ekonomik ilişkilerin Uluslararası hale gelmesi ise küreselleşmeyi ifade etmek için bir başına yeterli olmamaktadır. Ekonominin neden uluslararası hale geldiği sorusunun cevabı yerel üretimin yeterli olmaması, uluslararası fiyat farklılıkları ve mal farklılaşması gibi faktörlerde saklıdır. Yerel üretimin yetersiz kalmasının sebepleri kaynak dağılımının



dengelessiđi, teknik eleman eksikliđi ve farklı geliřmiřlik seviyelerinin var olduđundandır. Fiyat farklılařmalarının sebebi ise maliyetlerin farklı olmasıdır. Mal farklılařması ise bireysel tatmin ile ilgili bir konudur. Bu nedenlerden dolayı ekonomik iliřkiler uluslararası hale gelmiř ve uluslararası ticaret dođmuřtur (Dikkaya, Deniz, 2006: 164).

#### **10. KÜRESELLEŐME VE TÜRKİYE**

Son dönemde, en çok konuřulan ve tartiřılan kavramlardan biri olan ‘‘ küreselleřme’’, sosyal ve ekonomik alanlarda da açıklanması gereken olayların odađında bulunmaktadır. Çözüm bulunacak ve açıklanacak tüm problem ya da süreçte, küreselleřme kavramına değinilmekte ve çözümün odađına dahil edilmektedir. Kullanım yeri, ihtiyacı ve gereklilik durumlarına göre, tanımı da farklılık gösterebilmektedir.

Teknolojik geliřme ve küreselleřme sürecinde Türkiye üzerinde de etkilerine bakıldıđında, aynı zamanda geliřmiř ülkelere ortak bir pazar konumunda olması, etkilenme ve ortama ayak uydurma potansiyelini yükseltmiř, ürün, hizmet, iřleyiř, harcama, tasarruf...vs birçok konuda belirgin etkilenmelere yol açmıřtır. Jeolojik bakımdan da önemli konumu, sürece dahil olmasını imkansız hale getirmiřtir (Güven, 2009: 70).

Toplumsal bađlamda yařanan deđiřim, toplumsal alanda sınırlı olarak bırakılmadıđı sürece, politik ve ekonomik düzeni de etkilemektedir. Küreselleřme ortamına en çok maruz kaldıđımız bu dönemde toplum olarak yařam ve yüksek derecede etkilenme durumunda kaldıđımız bu dönemde, yeni direnç ve tepkilerle de karřılařmamız olası görölmektedir (Kaya, 2007: 260-265).

Ekonomik açıdan küreselleřme ile genel anlayiřla, ülkelerin ekonomik düzeninin, dünya ekonomik düzenine ayak uydurmaya çalıřma çabası olarak da görölmektedir. Geliřmiřlik seviyesine göre, dünya pazarında etkileřim halinde olmaya çalıřma çabasında, kendine yetme ve yer bulma çabası, tüm eko dengeyi de etkiler durumdadır. Sermaye, mal ve hizmet uyumunun sađlanmaya çalıřılması, maksimum doyuma ulařılmasıdır (Aydemir, Kaya, 2007: 268).

#### **11. SONUÇ**

Bilgi toplumu dediđimiz, teknoloji çağında, bilgiyi üretme, dođru yerde ve dođru zamanda kullanma kabiliyeti, rekabetçiliđi artırması ve sürdürülebilir kılmaları yüksek öneme sahiptir. Emek yođun ve daha basit sosyal hareketlilik akımı, yerini bilgi, yenilik ve sermaye verimliliđi, tüm toplumu etkisi altına alan bir yapıya dönüřtürmüřtür. Emek yođun bir sistemden, sermaye yođun bir sisteme geçildiđi görölmektedir. Bilgi teknolojisi sayesinde; bilgiye hızlı ve daha kolay eriřim sađlanmakta, verimlilik artışı yařanmakta, zaman ve maliyet tasarrufu sađlanmakta, iletiřim ve güvenliđi artırmaktadır.

Tüketim hayatımızın bir parçası haline gelmiř olup, hayatımızın her evresinde bu eylemi gerçekleřtirme gayreti devam etmektedir. Adı istek ya da ihtiyaç olsun, nihayetinde tüketme eylemi ile son bulmaktadır. Küreselleřen dünyada, iřletmelerin bu eyleme ulařma hedefi, kiřinin, o üründen aldıđı haz ve devamında istek duygusu yaratmaya bađlanmıřtır. Tüketicinin duygusuna hitap ettiđinizde, artık onu ele geçirmiř olmak, satıř başarısını, firmanın bađlılıđını ve devamlılıđını etkileyen ana unsur olmuřtur. Teknolojik geliřme, alıř-veriř bađımlılıđının, yegane hedefi olan satıřlarını artırma gayreti, ihtiyaç olmayan, istek uyandıran dürtü ile řirket başarısının odak noktasıdır. Yaratılan sosyal tüketici kitlesi olarak adlandırdıđımız bu sistem sayesinde, firmaların birbirleri ile kıyasıya rekabet ortamı olmuřtur. Toplumsal tüketme hareketleri, insan iradesi dıřında, bađımlılıkla istenilen řekilde yönlendirilmeye çalıřılmıřtır.

Yeni ekonomik düzen, sınırsız sayıda seçeneđi sunabilen, sisteme dahil olduđuça genişleyen ve geliřen, dinamik bir yapıdır. Temelinde internet olan bu olgu, toplumsal yařamdan başlayıp, iř yapma düzenine kadar tüm yapıyı etkilemektedir. Çađa ayak uydurmak dediđimiz bu ortam, aktif yařamda hep içine dahil olacađımız bir deđiřim süreci olup, gerisinde kalmamak eko-denge bakımından büyük önem arz etmektedir.

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**INTERNATIONAL ANKARA CONGRESS ON  
MULTIDISCIPLINARY STUDIES-VI  
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