



I. BİLSEL ULUSLARARASI KORYKOS BİLİMSEL ARAŞTIRMALAR VE İNOVASYON KONGRESİ

KONGRE KİTABI

27-28 OCAK 2024



BİSEL
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1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

CONGRESS ID
CONGRESS TITLE

**1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND
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DATE and PLACE
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University of Tunis El Manar-Tunisia



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

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NUMBER OF INTERNATIONAL PARTICIPANTS: 81

NUMBER OF TURKEY PARTICIPANTS: 78

TOTAL NUMBER: 159



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

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- ◆ Make sure your computer has a microphone and is working.
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- ◆ Kongremizde Yazım Kurallarına uygun gönderilmiş ve bilim kurulundan geçen bildirimler için online (video konferans sistemi üzerinden) sunum imkanı sağlanmıştır.
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- ◆ Bilgisayarınızda çalışır durumda mikrofon bulunmalıdır.
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1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

27.01.2024

TURKEY Local Time: 12:30-14:15

HEAD OF SESSION: Prof. Dr. Gülsüm YALDIZ

SESSION-1 HALL-1

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Dr. Öğr. Üyesi, Burak Şen</i>	<i>Niğde Ömer Halisdemir Üniversitesi,</i>	<i>Niğde’de Yağışlarda Eğilimler Ve Değişkenlik: Çok Yöntemli Bir İstatistiksel Analiz</i>
<i>Dr. Öğr. Üyesi, Burak Şen</i>	<i>Niğde Ömer Halisdemir Üniversitesi,</i>	<i>Niğde İli Kar Yağışlı Gün Sayısı Verisinin İklim Değişikliği Açısından Analizi</i>
<i>Doktora Öğrencisi Lebriz ÇINAR Prof. Dr. Korkmaz BELLİTÜRK</i>	<i>Süleymanpaşa Belediyesi, Tekirdağ Namık Kemal Üniversitesi,</i>	<i>Batı Karadeniz Bölgesi Tarım Topraklarının Verimlilik Açısından Değerlendirilmesi: Sakarya İli Örneği</i>
<i>Ahmet Kırbıyık Kenan Sönmez</i>	<i>Osmangazi University,</i>	<i>Eskişehir Koşullarında Bitki Gelişimini Teşvik Eden Bazı Kök Bakterilerinin Demre Sivri Biberinin (Capsicum Annuum L.) Kalite Ve Verimi Üzerine Etkileri</i>
<i>Dr. Öğr. Üyesi Mahmut ÇAMLICA Prof. Dr. Gülsüm YALDIZ</i>	<i>Bolu Abant İzzet Baysal Üniversitesi,</i>	<i>Biyokömürün Tıbbi Ve Aromatik Bitkilerin Üretimi Ve Kalite Özellikleri Üzerindeki Olası Faydaları</i>
<i>Prof. Dr. Gülsüm YALDIZ Dr. Öğr. Üyesi Mahmut ÇAMLICA</i>		<i>Kitosanın Tıbbi Ve Aromatik Bitkilerin Morfolojisi, Verim Ve Kalite Özellikleri Üzerindeki Biyosimüle Edici Etkileri</i>
<i>Öğr.Grv. Samiye Adal Doç.Dr. Nazlı Savlak</i>	<i>Afyon Kocatepe University, Manisa Celal Bayar University</i>	<i>Some Rheological And Textural Properties Of Bread Fortified With Eggshell Powder</i>



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

27.01.2024

TURKEY Local Time: 12:30-14:45

HEAD OF SESSION: Doktor Öğretim Üyesi Taner AKARSU

SESSION-1 HALL-2

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Dr. Öğr. Üyesi İlnur Kaba Doç. Dr. Fatmagül Başarslan</i>	<i>Hitit Üniversitesi</i>	<i>Nadir Görülen Bir Komplikasyon: Periferik Yolla Takılan Santral Venöz Kateter Düğümlemesibir Olgu Sunumu</i>
<i>Uzman Dr. Burcu Güneydaş Yıldırım</i>	<i>Kırklareli Eğitim ve Araştırma Hastanesi,</i>	<i>Çocuklarda Zihin Kurami Ve Otizm</i>
<i>Uzm. Dr. Tahir Burak Sarıtaş</i>	<i>Tuzla Devlet Hastanesi,</i>	<i>Sütür Atma Teknikleri</i>
<i>Dr. Öğr. Üyesi Hikmet KOCAMAN Dr. Öğr. Üyesi Nazım Tolgahan YILDIZ Öğretim Görevlisi Mehmet CANLI</i>	<i>Karamanoğlu Mehmetbey Üniversitesi, Kırşehir Ahi Evran Üniversitesi,</i>	<i>Rehabilitasyon Hizmetlerinde Yapay Zekâ Uygulamalarının Kullanımı</i>
<i>Dr. Öğr. Üyesi Hikmet KOCAMAN Öğretim Görevlisi Mehmet CANLI Dr. Öğr. Üyesi Nazım Tolgahan YILDIZ</i>	<i>Dr. Öğr. Üyesi Nazım Tolgahan YILDIZ Kırşehir Ahi Evran Üniversitesi,</i>	<i>Fizyoterapi Ve Rehabilitasyon Alanında Telerehabilitasyon Uygulamalarının İncelenmesi</i>
<i>Uzm. Dr. Burak Yıldırım</i>	<i>Kırklareli Eğitim ve Araştırma Hastanesi,</i>	<i>Tırnak Batması Ve Güncel Tedavi Seçenekleri</i>
<i>Doç. Dr. İlker KARA</i>	<i>Çankırı Karatekin Üniversitesi</i>	<i>Artificial Intelligence In Medical Image Analysis And Diagnosis: Its Role And Evaluation</i>
<i>Doç. Dr. İlker KARA</i>	<i>Çankırı Karatekin Üniversitesi</i>	<i>Data Mining-Supported E-Learning Approaches To Student Modeling And Activity Analyses</i>
<i>Dyt. Elifnaz AKTAŞ Doç. Dr. Lale Sariye AKAN</i>	<i>Ankara Yıldırım Beyazıt Üniversitesi</i>	<i>Ailesel Hiperkolesterolemili Çocuklarda Akdeniz Diyetine Uyum İle Beslenme Durumunun Değerlendirilmesi</i>
<i>Doktor Öğretim Üyesi Taner AKARSU</i>	<i>Çankırı Karatekin Üniversitesi</i>	<i>Yaşlı Bireyler Ve Polifarmasi</i>



27.01.2024

TURKEY Local Time: 12:30-14:45

HEAD OF SESSION: Emil Raul oğlu Ağayev

SESSION-1 HALL-3

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Emil Raul oğlu Ağayev</i>	<i>Azerbaijan State Pedagogical College under the Azerbaijan State Pedagogical University</i>	<i>Methodology Of Teaching The Art Of Foreign Countries In The Subject Of Fine Arts To Inclusive Students Of Class Vii</i>
<i>Aynur Murad gizi Namazova</i>	<i>ASPU,</i>	<i>From The Research History Of The Phraseology Of The Oghuz Group Of Turkic Languages</i>
<i>Arzu Aslan qızı Sadiyeva</i>	<i>Azerbaijan State Pedagogical College under the Azerbaijan State Pedagogical University</i>	<i>Gözəllik, Ləyaqət, İncəlik Rəmzi- Azərbaycan Kəlağayısı.</i>
<i>Moses Adeolu AGOI Oluwakemi Racheal OSHINOWO Solomon Abraham UKPANAHA Oluwanifemi Opeyemi AGOI</i>	<i>Lagos State University</i>	<i>The Efficacy, Deployment And Use Of Augmented Reality I Learning Fields: An Explicit Study On Revolutionizing Developments In Education Sector</i>
<i>Konul Israfil gizi Hasanova</i>	<i>ASPU,</i>	<i>The Issue Of Structural-Semantic And Communicative Organization Of The Text In Linguistics</i>
<i>Абдрашева Бану Жолдыбекқызы</i>	<i>Е.А.Бөкетов атындағы Қарағанды университеті</i>	<i>Бала тәрбиесі - ұлт болашағы</i>
<i>Ж.М.Байгожина, Б.Ж.Абдрашева,</i>	<i>Әлкей Марғұлан атындағы Павлодар педогогикалық университеті,</i>	<i>Америка Құрама Штаттарында Білім Беру Жүйесі: Құрылымы Мен Ерекшеліктері</i>
<i>Mohammad Jafar Chamankar, Galia Haghparast</i>	<i>Orumieh university, Iran.</i>	<i>The Development Of Education In Iran Over Time</i>
<i>Phd, Docent, Babayeva Malahat Ramiz gizi</i>	<i>ASPU, Department of Literatura</i>	<i>Alpine Woman Type In The Manas Epic</i>
<i>Səfəraliyeva Fəridə Akif</i>	<i>Azərbaycan Dövlət Pedaqoji Universiteti,</i>	<i>Şagirdlərdə Orfoepik Və Orfoqrafik Biliklərin Formalaşdırılması İmkanları</i>
<i>Səfəraliyeva Fəridə Akif</i>	<i>Azərbaycan Dövlət Pedaqoji Universiteti,</i>	<i>Yazılışı Çətin Sözlər Üzərində İşin Təşkili</i>



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TURKEY Local Time: 13:30-15:30

HEAD OF SESSION: Prof. Dr. Hassan ZARIOUH

SESSION-2 HALL-5

AUTHORS	AFFILIATION	TOPIC TITLE
<i>AHLEM ALOUANI</i>	<i>University of M'sila, Algeria</i>	<i>Factorable Strongly P-Nuclear M-Homogeneous Polynomials</i>
<i>Ali Farajzadeh Mahtab Delfani</i>	<i>Razi University, Iran</i>	<i>Fixed Points For Mappings Of Asymptotically Nonexpansive Type</i>
<i>Ali Farajzadeh Mahtab Delfani</i>	<i>Razi University, Iran</i>	<i>A New Version Of Ekeland's Variational Principle And Its Applications</i>
<i>Hassan ZARIOUH Zakariae AZNAY Abdelkader Smaili Ahmad Azabi Yassine Mbitil</i>	<i>Mohammed I University,</i>	<i>Approximations Of The Polar Factor Of An Operator Acting On A Hilbert Space</i>
<i>Hassan ZARIOUH Zakariae AZNAY Abdelkader Smaili Ahmad Azabi Yassine Mbitil</i>	<i>Mohammed I University,</i>	<i>Besov-Type Estimates For Solutions Of Linear Elliptic Degenerate Boundary Value Problems</i>
<i>Гамидов Эльшад Гамид оглы.</i>	<i>Азербайджанский Государственный Педагогический Университет</i>	<i>On A Boundary Value Problem For Second Order Operator- Differential Equations.</i>
<i>Beloufa Nabil , ZEGADI Chewki and Bouhenna Abdelkader</i>	<i>Hydrometeorological Institute for Training and Research IHFR,</i>	<i>STRUCTURAL AND OPTOELECTRONIC PROPERTIES OF Sn 1-x Sc x O 2 FOR PHOTOVOLTAIC CELLS</i>

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HEAD OF SESSION: Dr. Sándor FÖLDVÁRI

SESSION-2 HALL-6

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Siarhei Marozau</i>	<i>Independent researcher,</i>	<i>Belarusian Boom Of Youtube Channels With Historical Content</i>
<i>Belinda HALILAJ</i>	<i>“Ismail Qemali” University,</i>	<i>Housing Of Roma Families According The Article 20 Of Albania Constitution.</i>
<i>Sándor FÖLDVÁRI, dr.</i>	<i>Debrecen University, Hungary</i>	<i>Paradigms Of Early Modern Hungarian History In The 16 Th -17 Th Centuries</i>
<i>Le Thi Minh</i>	<i>Thu Dau Mot University,</i>	<i>Legal Implication Of Voluntary Carbon Credits: International Experience And Recommendation For Vietnam</i>
<i>Dr. Oljana Hoxhaj</i>	<i>Ismail Qemali University of Vlora, Albania</i>	<i>Perspectives And Current Challenges Towards Achieving Gender Equality In Albania In The Legal And Social Framework</i>
<i>Dr. Mohammad Jafar Chamankar Sakine Babaei</i>	<i>Urmia University,</i>	<i>The Effects Of The First World War On The Region Of Azerbaijan And Northwestern Iran And The Formation Of The Provisional National Government</i>
<i>Dr. Mohammad Jafar Chamankar Mojtaba Mohammadi</i>	<i>Urmia university</i>	<i>The Persian Gulf In The Era Of Shah Ismail I</i>

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TURKEY Local Time: 13:30-15:30



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HEAD OF SESSION: Associate Professor Dr. Rozina Khattak

SESSION-2 HALL-7

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Fatma Mellal Hassen Ait Atmane NEBAB Mokhtar</i>	<i>DjilaliBounaama University, Algeria.</i>	<i>Study Of The Wave Dispersion Characteristics Of Porous Fg Plates Resting On Elastic Foundations Via A Quasi-3d Hsdt</i>
<i>Associate Professor Dr. Rozina Khattak</i>	<i>Shaheed Benazir Bhutto Women University,</i>	<i>Ferricyphen As An Oxidant For Aqueous Dssc</i>
<i>Associate Professor Dr. Rozina Khattak</i>	<i>Shaheed Benazir Bhutto Women University,</i>	<i>Ferricypyr As An Oxidant In Tert-Butanol/Aqueous Media</i>
<i>El Mouftari Moulouda, Houmani Safa , Kzaiber Fouzia , Boutoial Khalid, Souhasou Said, Mahjoubi Fatima Zahra , Oussama Abdelkhalek</i>	<i>Sultan Moulay Slimane University, Morocco.</i>	<i>The Modeling Approach Ftr Coupled With Chemometrics For Evaluate And Determine The Falsification Of Walnut Oil</i>
<i>Shehu Jibril</i>	<i>Aminu Saleh College of Education,</i>	<i>Coordination Of Fe (Ii) Metal With Paracetamol (As Ligand) Using Solid-State Method And Their Antibacterial Evaluation</i>
<i>Chaimaa Elkahlaoui and Chaimaa</i>	<i>UniversityAin CHOK,</i>	<i>The Evolution Of The Nutritional Quality Of A Biscuit</i>
<i>Soufiane Drioua Otman El-Gouurrami Mouna Ameggouz</i>	<i>Mohammed V University</i>	<i>Phytochemical Study, Antioxidant, And Antidiabetic Activity Of Chenopodium Ambrosioides (L.).</i>
<i>Balabekova Sholpan,</i>	<i>Kh.Dosmukhamedov Atyrau University, Kazakhstan</i>	<i>Morphology Of Grouse And Their Importance In Farmung</i>
<i>YASLAM Saleh Gamal Saleh BESTANI Benaouda Cherfi Maamar BENABBOU Asmae</i>	<i>University of Mostaganem</i>	<i>Enhancing Anionic Dye Removal With Porous Activated Carbon: An Investigation In Simulated Media.</i>
<i>Bainah Sari Dewi Shafa Fauzia Ranti Gunardi Djoko Winarno Sugeng P. Harianto Ismanto Eny Puspasari</i>	<i>Universitas Lampung, Indonesia</i>	<i>Dung Beetles In Cow Feces Traps With Rich Index Diversity Index And Evenness Index In Indonesia</i>
<i>Sugeng P. HARIANTO Annisa Maretya NINGRUM Bainah Sari DEWI Gunardi Djoko WINARNO</i>	<i>Universitas Lampung, Indonesia</i>	<i>Potential Natural Beauty and Recreational Activities of New Pearl Beach in Indonesia</i>
<i>Bainah Sari DEWI Arum Candani KINASIH Gunardi Djoko WINARNO Trio SANTOSO Retno Noviana DAMAYANTI</i>	<i>Universitas Lampung, Indonesia</i>	<i>Conservation Efforts Based On The Perceptions Of The Community In Way Lalaan Waterfall Indonesia</i>



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TURKEY Local Time: 13:30-15:30

HEAD OF SESSION: Dr. Chems Eddine BOUKHEDIMI

SESSION-2 HALL-8

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Kristína Šambronská</i>	<i>University of Presov, Slovakia</i>	<i>How Visitors Perceive The Logo Of A Tourist Product - A Case Study Of The Slovak Royal Cities</i>
<i>Dr. Chems Eddine BOUKHEDIMI</i>	<i>University of Tizi Ouzou,-</i>	<i>Assessing Perceived Risks In The Algerian Tourism Industry: A Local Tourists-Based Survey</i>
<i>AYOK Simon Cyrus, Dr. Muhammad Umar Bello, Dr. Maryam Salihu Muhammad</i>	<i>Abubakar Tafawa Balewa University, NIGERIA.</i>	<i>Real Estate Investment Strategies Performance In Abuja, Nigeria</i>
<i>Bojan Kitanovikj, MSc</i>	<i>University Ss. Cyril and Methodius in Skopje,</i>	<i>The Impact Of Generative Artificial Intelligence On Operations Management: A Conversation With Chatgpt</i>
<i>Dr. Muhammad Umar Bello SAKARIYAU Jamiu Kayode Rukayya Abdulrazak</i>	<i>Abubakar Tafawa Balewa University,</i>	<i>Effects Of Environmental Disaster On Residential Properties Value In River Bank Areas Of Bauchi State</i>
<i>Diaconu (Maxim), Laura</i>	<i>“Alexandru Ioan Cuza” University of Iasi, Romania</i>	<i>Determinants And Structural Change Of Fdi In Romania During The Last Two Decades</i>
<i>Professor Valentina Marinescu Lecturer Ramona Marinache</i>	<i>University of Bucharest, Romania</i>	<i>Framing Migrant’s Crime In British Media</i>
<i>Professor Valentina Marinescu Assistant Professor Anda Rodideal Lecturer Ramona Marinache</i>	<i>University of Bucharest, Romania</i>	<i>Representation Of Nuclear War In Hollywood Movies</i>
<i>Ananda Majumdar</i>	<i>University of Alberta, Canada</i>	<i>Innovations For Entrepreneurial Knowledge And Development</i>
<i>Assoc. Prof., Ihor Ponomarenko PhD Stud., Dmytro Ponomarenko</i>	<i>State University of Trade and Economics,</i>	<i>Web Scraping For Digital Marketing Optimization</i>
<i>Ezekiel P.N</i>	<i>Federal Universities of Technology, Minna</i>	<i>An Assessment Of Problems Encountered By Pre-Service Teachers During Teaching Practices Exercise In Taraba State, Nigeria</i>



1. BILSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

27.01.2024

TURKEY Local Time: 13:30-15:30

HEAD OF SESSION: Dr. Naseem Akhter

SESSION-2 HALL-9

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Irina-Ana DROBOT</i>	<i>Technical University of Civil Engineering Bucharest,</i>	<i>Consequences Of The Relationships Between The European Union And Korea</i>
<i>Prof. Habil. Diaconu Prof. Habil. Cristian C. POPESCU, Assoc. Prof. Habil. Mihai-Bogdan PETRISOR,</i>	<i>“Alexandru Ioan Cuza” University of Iasi, Romania</i>	<i>Empirical Investigation Of The Impact Of Brain Drain On Economic Growth In Developing Countries</i>
<i>Irina-Ana DROBOT</i>	<i>Technical University of Civil Engineering Bucharest,</i>	<i>The Appeal Of Floating Markets</i>
<i>Irina-Ana DROBOT</i>	<i>Technical University of Civil Engineering Bucharest,</i>	<i>Understanding Japanese Hospitality Through The Concept Of Omotenashi</i>
<i>Prof. ass. dr. Agim BERISHA</i>	<i>College of Business,</i>	<i>The Labor Market And Unemployment Rate In Kosovo</i>
<i>Dr. Naseem Akhter</i>	<i>Shaheed Benazir Bhutto Women University,</i>	<i>Entrepreneurial Skills Are Necessary To Empowering Women (From Islamic Perspective)</i>
<i>Dr. Naseem Akhter</i>	<i>Shaheed Benazir Bhutto Women University,</i>	<i>Innovative Approaches To Interfaith Dialogue (A Research Review)</i>
<i>Radoslav Baltezarević</i>	<i>Institute of International Politics and Economics, Belgrade, Serbia</i>	<i>Green Innovations As A Path Towards A More Sustainable Global Economy</i>
<i>SAMIA Mosteghanemi Dr. FETHI Hamzaoui Dr. NESRINE El Houari</i>	<i>University of Abou Bekr Belkaid</i>	<i>Revolutionizing Construction Management: The Role Of Drones In Enhancing Efficiency And Safety</i>



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27.01.2024

TURKEY Local Time: 13:30-15:30

HEAD OF SESSION: Dr. Ghanshyam Barman

SESSION-2 HALL-10

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Musa Dima Genemo</i>	<i>University of Stirling, RAK/UAE</i>	<i>Federated Learning For Bronchus Cancer Detection Using Tiny Machine Learning Edge Devices</i>
<i>Wilson, Emmanuel Okon Ukut, Akanimo aiasong</i>	<i>Akwa Ibom State Polytechnic, Ikot Osurua,</i>	<i>Maintenance Management Practices In The Oil And Gas Industry: A Practical Review</i>
<i>Matej Babič,</i>	<i>Faculty of information studies, Novo mesto, Slovenia</i>	<i>Topography Of Selective Laser Melting</i>
<i>Balasubramani G L, Rinky Rajput , Manish Gupta , Pradeep Dahiya, Jitendra K Thakur, Rakesh Bhatnagar and Abhinav Grover</i>	<i>Nehru University,</i>	<i>Structure-Based Drug Repurposing To Inhibit The Dna Gyrase Of Mycobacterium Tuberculosis</i>
<i>Abdelrahman SALMAN</i>	<i>Tomsk Polytechnic Univeristy, Russia</i>	<i>Advanced Coatings For Corrosion Prevention In Fast Reactor Materials: A Promising Pathway For Enhanced Performance</i>
<i>Abdelrahman SALMAN</i>	<i>Tomsk Polytechnic Univeristy, Russia</i>	<i>Electrical Characterization Of Materials Using High Frequency Methods</i>
<i>Mohammed BENTAHAR, Nouredine MAHMOUDI , Abdelkader FEDLAOUI Abdelkader ALLOU</i>	<i>University Tahar Moulay University,</i>	<i>Experimental Study Of Force Application In A Simple Three-State Trellis</i>
<i>CHERFI Maamar Allal mohamed YASLAM Saleh Gamal Saleh BENABBOU Asmae TERMOUL Mourad</i>	<i>University Abdelhamid Ibn Badis Mostaganem</i>	<i>Preparation And Characterization Of Nanoadsorbents By Synthesis Of Metal Nanoparticles On A Porous Support</i>
<i>Dr. Ghanshyam Barman</i>	<i>UkaTarsadia University, India</i>	<i>Sweetening Processes For Crude Oil</i>
<i>Dr. Ghanshyam Barman</i>	<i>UkaTarsadia University, India</i>	<i>Hydrostatic Equilibrium In Gravitational And Centrifugal Fields</i>



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HEAD OF SESSION: Academimician prof. Dr Ivan Pavlovic

SESSION-2 HALL-11

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Academimician prof. Dr Ivan Pavlovic</i>	<i>Scientific Institute of Veterinary Medicine of Serbia,</i>	<i>Lices Of Domestic Pigeons (Columba Livia Domestica) Breed In Spread Belgrade Area</i>
<i>Gjylai ALIJA ,Zehra HAJRULLAI-MUSLIU, Merita DAUTI , Sihana AHMETI- LIKA, Drita HAVZIU , Arlinda HAXHIU-ZAJMI , Edita ALILI-IDRIZI , Lulzime BALLAZHI</i>	<i>State University of Tetova, N. Macedonia</i>	<i>A Review Of Antimicrobial Drug Residues In Milk: Its Risk Factors And Potencial Effects On Public Health</i>
<i>SM Gamde , SO Opkajobi , BD Oladapo K Hauwa</i>	<i>Bingham University</i>	<i>Challenges And Strategies For Improving Cervical Cancer Screening In Nigeria</i>
<i>Abakar Haggar Yassine Mouniane Fousseyni Makadji Said Boujraf</i>	<i>Sidi Mohamed Ben Abdallah University, Morocco</i>	<i>The Role Of Alpha Synuclein In The Onset And Diagnosis Of Parkinson's Disease</i>
<i>Meral Rexhepi Majlinda Azemi Sani Bajrami Levent Ismaili</i>	<i>Clinical Hospital University of Tetova, International Balkan University North Macedonia</i>	<i>Low Molecular Weight Heparin With Or Without Aspirin In Prevention Of Maternal And Perinatal Complications In Risk Pregnancy</i>
<i>Abhishek Rohilla Vinod Kumar</i>	<i>Goenka University,</i>	<i>Use Of Antibiotics In Respiratory Viral Infections</i>
<i>Neha Pathak Vinod Kumar</i>	<i>Goenka University,</i>	<i>DRUG REPURPOSING: AN ADVANCE WAY TO TRADITIONAL DRUG DISCOVERY</i>
<i>Major Gheorghe Giurgiu Prof. dr. Manole Cojocararu</i>	<i>Deniplant-Aide Sante Medical Center, Titu Maiorescu University,</i>	<i>The Gut-Brain-Skin Axis In Acne: Impact Of Polenoderm</i>



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HEAD OF SESSION: Dr. Muhammad Faisal

SESSION-2 HALL-12

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Nesrine El Houari, Mustapha Henaoui</i>	<i>University of Tlemcen,</i>	<i>Response Of Pile To Tunnelling</i>
<i>Hedvig Szabó</i>	<i>University of Győr Győr, Hungary</i>	<i>Artificial Intelligence: Security Risks At The Dawn Of A New Era</i>
<i>Widad LAIADI Afak MEFTAH Wissam BOUCHAL Chaker LAIADI</i>	<i>University of Biskra,</i>	<i>Zinc Oxide Electron Transport Layer Effect On Perovskite Solar Cells</i>
<i>BENABBOU Asmae GOUAICHE Imane MADJDOUB Aicha YASLAM Saleh, MKAIBS Zohra, ALLAL Mohamed, BESTANI Benaouda, BENDERDOUCHE Nouredine</i>	<i>University of Mostaganem- Algéria</i>	<i>Removal Of A Pharmaceutical Pollutant On An Adsorbent From Vegetable Waste</i>
<i>Muhammad Faisal Alquma Noor Reema Shaheen</i>	<i>Allama Iqbal Open University, Pakistan</i>	<i>Individuals From Metropolitan To Provincial Regions Are Currently Utilizing On The Web Stages To Look For Many Items, From Hardware To Design And Food In Pakistan What Are The Extent Of E- Commerce In Pakistan</i>
<i>Alquma Noor Reema Shaheen Muhammad Faisal</i>	<i>Allama Iqbal Open University, Pakistan</i>	<i>The Most Effective Method To Oversee Low Development Rates, Elevated Degrees Of Obligation, Expansion, Low Efficiency, And Unfortunate Seriousness In Pakistan</i>
<i>Dr. Messaouda BELOUADAH Pro. Zine EL Abidine RAHMOUNI Pro. NadiaTEBBAL</i>	<i>M'sila University,</i>	<i>Ceramic Powder Utilisation In Mortar Production</i>



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HEAD OF SESSION: Öğr. Gör. Dr. Muhammet ATASOY

SESSION-1 HALL-1

AUTHORS	AFFILIATION	TOPIC TITLE
Öğr. Gör. Dr. Muhammet ATASOY	Muğla Sıtkı Koçman Üniversitesi,	Muğla İlinde Üretilen Bazı Sığla Yağı (<i>Styrax Liquidus</i>) Numunelerindeki Kurşun Miktarlarının Platin Kaplı Tungsten Sarmal Atom Tuzak Hidrür Sistemli Atomik Absorpsiyon Spektrometri Yöntemi Kullanılarak Belirlenmesi
Ar.Gör. Tahir Burak BİNKANAT Dr.Öğr. Üyesi Altan ÖZKAN	İzmir Yüksek Teknoloji Enstitüsü,	Spirulina Suşlarının Protein Üretkenliklerinin Fotobiyoreaktör Koşullarında Kultivasyonla Kıyaslanması
Doktora Öğrencisi Gülsüm BATMAZ Doç. Dr. Pınar ARSLAN	Çankırı Karatekin Üniversitesi,	Pirimiphos Methyl'in Tatlı Su Midyelerinde Toplam Hemosit Sayısına Etkisi
Eda AKDAĞ Doktora Öğrencisi Gülsüm BATMAZ Dr. Öğrt. Görevlisi Göktuğ GÜL Doç. Dr. Pınar ARSLAN Prof. Dr. A. Çağlan GÜNAL Prof. Dr. A. Çağlan GÜNAL	Çankırı Karatekin Üniversitesi, Gazi Üniversitesi,	Tatlı Su Midyelerinin Hemolemf Sıvısı Biyokimyasal Değerleri: Pyriproxyfen Maruziyet Örneği
Muna ELMUSA Prof. Dr. Semra MALKOÇ Prof. Dr. Rahmi KASIMOĞULLARI	Elfurat Mühendislik Araştırma ve Geliştirme Limited Şirketi, Ankara, Eskişehir Teknik Üniversitesi, Kütahya Dumlupınar Üniversitesi,	Yeni Kumarin-Pirazol Türevlerinin Sentezi, Karakterizasyonu Ve Antibakteriyel Aktivitesinin İncelenmesi
Çevre Müh., Görkem MACİT, Dr. Öğr. Üyesi, Aşkın BİRGÜL	Bursa Teknik Üniversitesi,	Çimento Fabrikası Çevresinde Yer Alan Çocuk Oyun Parklarından Toplanan Toz Örneklerinde Ağır Metal Konsantrasyon Seviyelerinin Belirlenmesi



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TURKEY Local Time: 13:00-14:30

HEAD OF SESSION: Dr.,M. Emrullah DURAN

SESSION-1 HALL-2

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Doç. Dr. Bora GÖKTAŞ Zeynep Sude AYAR Sefa KORKMAZ</i>	<i>Bayburt Üniversitesi,</i>	<i>Türk İşletmelerinde Yabancı Dil Kullanımının Türk Tüketicileri Üzerindeki İmajına Yönelik Bir Araştırma</i>
<i>Doç. Dr. Bora GÖKTAŞ Yağmur BAYTAŞ Yusuf KESKİN</i>	<i>Bayburt Üniversitesi,</i>	<i>Teknoloji Kullanımının İnsanlar Üzerindeki Sosyal Davranışlarına Etkisi</i>
<i>Muhammet SAYGİDAR Doç. Dr. Ahmet Yavuz KARAFİL</i>	<i>Burdur Mehmet Akif Ersoy Üniversitesi</i>	<i>Futbol Hakemlerinin Video Yardımcı Hakem Sistemine Yönelik Tutumları İle Hakem Öz Yeterliği Arasındaki İlişkinin İncelenmesi</i>
<i>Dr.,M. Emrullah DURAN</i>	<i>Selçuk Üniversitesi,</i>	<i>An Assessment Of The Graduate Theses On Loneliness And Religiousness Produced In Turkey (1998-2023)</i>
<i>Seda Sönmez Prof. Dr. Celaleddin Çelik</i>	<i>Erciyes Üniversitesi</i>	<i>Gündelik Hayatın Sekülerleşmesi: Gençlerde Dini Referansların Değişimi (Gop Üniversitesi Örneği)</i>



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HEAD OF SESSION: Assoc. Prof. .Dr. Mehmet Veysi BABAYİĞİT

SESSION-1 HALL-3

AUTHORS	AFFILIATION	TOPIC TITLE
Özkan ÇOKTAN Assoc. Prof. Dr. Mehmet Veysi BABAYİĞİT	Batman University,	Akran Zorbalığı Üzerine Bir İnceleme: William Golding “Sineklerin Tanrısı” Eser Analizi
Necmiye BABAYİĞİT Assoc. Prof. .Dr. Mehmet Veysi BABAYİĞİT Lecturer Murat ÇELİK	Batman University,	Shakespeare’s Macbeth; Content Analysis Of Some Acts
Emre BUTEKİN Assoc. Prof. Dr. Mehmet Veysi BABAYİĞİT	Batman University,	Emile Zola’nın “Germinal” Kitabında Madenciler: Bir Eser Analizi
Güzide Gökseñ Birol	İstanbul Aydın Üniversitesi,	Learners’ Perception On Academic Writing Skills In Higher Education
Prof. Dr. Oğuzhan SEVİM Öğr. Gör. Ali UZUN	Atatürk Üniversitesi, Kahramanmaraş Sütçü İmam Üniversitesi,	Emojilerle Deyim Öğretimi: Deneysel Bir Çalışma
Öğr. Gör. Ali UZUN Prof. Dr. Oğuzhan SEVİM	Kahramanmaraş Sütçü İmam Üniversitesi, Atatürk Üniversitesi,	Öğretmenlerin İdeal Öğrenme Ve Öğretme Sürecine İlişkin Görüşlerinin İncelenmesi
Gülşah KÖK	Sivas Cumhuriyet Üniversitesi,	İnteraktif Sanat Ve Yeni Medya



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HEAD OF SESSION: Dr. Öğr. Üyesi Ertan KÜÇÜKEFE

SESSION-1 HALL-4

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Prof. Dr. Nazile URAL İnşaat Mühendisi Aykutam AVŞAR</i>	<i>Bilecik Şeyh Edebali Üniversitesi,</i>	<i>“Biga İlçesi Depremselliği”,</i>
<i>Kaan Mert ALTUĞ Dr. Öğr. Üyesi Hakan EROL</i>	<i>Milli Savunma Üniversitesi Rektörlüğü, Eskişehir Osmangazi Üniversitesi,</i>	<i>Öngörülen Betonarme Kirişlerin Darbe Yüğü Etkisi Altındaki Davranışının Sayısal Analizi</i>
<i>Ashcan İHTİYAROĞLU Esra ÇELİK Neslihan MANAV-DEMİR Eyüp DEBİK</i>	<i>Yıldız Technical University,</i>	<i>Treatment Of Domestic Wastewater Using Anaerobic Baffled Dynamic Membrane Bioreactor (Anbdmbr)</i>
<i>Halil İbrahim Demir Doç. Dr. Mehmet Cüneyd DEMİREL</i>	<i>İstanbul Teknik Üniversitesi,</i>	<i>Gr6j Hidrolojik Modelindeki Artık Yağış Ayrıştırma Sabitinin Model Kalibrasyonuna Etkisi</i>
<i>Dr. Öğr. Üyesi Ertan KÜÇÜKEFE</i>	<i>Kafkas Üniversitesi,</i>	<i>Kars Ve Çevresinin Kültürel Miras Bağlamında Önemi</i>



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HEAD OF SESSION: Dr, İnayet Burcu TOPRAK

SESSION-2 HALL-5

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Ahmet Melik YILMAZ, Assoc. Prof. Hikmet ÇİÇEK, R.A. Semih DURAN, R.A. Gökhan GÜLTEN, Prof. Dr. İhsan EFEOĞLU</i>	<i>Erzurum Technical University, Kafkas University, Atatürk University,</i>	<i>Effect Of Different Annealing Temperatures On Mechanical, Tribological, And Adhesion Properties Of Tialniv-(N) High Entropy Alloy Films</i>
<i>Dr, İnayet Burcu TOPRAK</i>	<i>Akdeniz Üniversitesi,</i>	<i>Yeni Bir Teknoloji: Metal Tozu Atomizeri, Ato</i>
<i>Assist Prof. Ertan KÖSEDAĞ</i>	<i>Van Yüzüncü Yıl University,</i>	<i>Experimental Investigation On The Compressive Strength Of Epoxy Composites Reinforced With Graphene Nanotubes</i>
<i>Dr. Öğr. Üyesi Barkın BAKIR Bayram KURU</i>	<i>Marmara University,</i>	<i>The Investigation Of The Corrosion Effect Of Istanbul Seawater Using Inductive Sensors</i>
<i>Barkın BAKIR Murat SEN Oguzhan AYDIN</i>	<i>Marmara University,</i>	<i>Investigation Of The Effects Of Intelligent Machine Features In Cnc Machines Used In High Precision Machining On Form Errors In The Machining Of Freeform Surfaces</i>



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HEAD OF SESSION: Dr.Öğr.Üyesi Mertol Göknelma

SESSION-2 HALL-6

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Makine Mühendisi, Hakkı Osman Necipoğlu Kimya Mühendisi, Sibel Demir Makine Mühendisi, Ömür Alkan</i>	<i>Kord Endüstriyel İp ve İplik San. Ve Tic. AŞ</i>	<i>Silikon Bazlı Polimer Kaplama Prosesi İle Jakar İplerinde Uzun Süreli Dayanıklılık Ve Performans</i>
<i>Araştırmacı, Hüseyin TORUN Danışman, Hüseyin YILDIRIM</i>	<i>Yalova Üniversitesi,</i>	<i>Polipropilen Geri Dönüşümünde Kullanılabilecek Katkı Maddeleri İle Orijinal Hammadde Özelliklerinde Geri Dönüşümlü Polipropilenin Elde Edilmesi</i>
<i>Etkü Gökbel Dr. Öğr. Üyesi İsmail Temiz Arş. Gör. Alper Yıldırım Bora Demirci</i>	<i>Marmara Üniversitesi,</i>	<i>Yenilenebilir Enerji Sistemlerinde Enerji Depolama</i>
<i>Etkü Gökbel Dr. Öğr. Üyesi İsmail Temiz Arş. Gör. Alper Yıldırım Bora Demirci</i>	<i>Marmara Üniversitesi,</i>	<i>Akıllı Şebekelerde Enerji Depolamada Kullanılan Batarya Karakteristiklerinin İrdelenmesi</i>
<i>Samet Canyurt Dr. Salim Çam Dr. Orhan Kalkan</i>	<i>Erzincan Binali Yıldırım Üniversitesi,</i>	<i>Endüstriyel Bir Ürünün Plastik Enjeksiyon Yöntemi İle Üretiminin Mekanik Ve Isıl Analizi</i>
<i>Dr.Öğr.Üyesi Mertol Göknelma</i>	<i>İzmir Yüksek Teknoloji Enstitüsü,</i>	<i>Pirometalurjik Altın Rafinasyonunda Farklı Safsızlık Giderme Mekanizmalarının İncelenmesi</i>



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HEAD OF SESSION: Dr. Öğr. Üyesi, Haluk YILMAZ

SESSION-2 HALL-7

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Faruk ÖZARSLAN Dr. Öğr. Üyesi Dilek KÜÇÜK MATCI</i>	<i>Eskişehir Teknik Üniversitesi,</i>	<i>Lansat-8 Görüntüleri Kullanarak Yanmış Orman Alanı Tespiti: Marmaris Örneği</i>
<i>Muhammed Kerem SUSANBAĞ, Sinem BOZATLI KARTAL, Yavuz ABUT</i>	<i>Yalova University,</i>	<i>Future Trends In Pavement Roughness Diagnosis: Leveraging Smartphone Applications</i>
<i>Sedef KASIRĞA, Sinem BOZATLI KARTAL, Yavuz ABUT</i>	<i>Yalova University,</i>	<i>A Nonlinear Analysis Of Excavation Steps For Natm Type Tunnel With The Finite Element Method</i>
<i>Dr. Öğr. Üyesi, Haluk YILMAZ Dr. Öğr. Üyesi, İbrahim KOCABAŞ</i>	<i>Eskişehir Teknik Üniversitesi,</i>	<i>Merkezi Radyal Yük Altında Elastik Kenar Kısıtlımalı Eğrisel Kabukların Düzlem İçi Burkulması</i>
<i>Hasan EIDO</i>	<i>Istanbul Technical University,</i>	<i>The Use Of Satellite Data Sentinel-3 To Assess The Environmental Impacts Of Offshore Wind Farms: A Case Study Of The Horns1 Rev Offshore Wind Farm</i>
<i>Büşra Nur ŞAHİN</i>	<i>Yalova Üniversitesi</i>	<i>Akıllı Şebekelerde Kayıp-Kaçak Analizi Ve Kontrolü</i>
<i>Doç. Dr. Kemal ADEM Arş. Gör. Esra KAVALCI YILMAZ Dr. Öğr. Üyesi Fatih ÖLMEZ Dr. Öğr. Üyesi Halit BAKIR Kübra ÇELİK</i>	<i>Sivas Bilim ve Teknoloji Üniversitesi,</i>	<i>Buğdayda Sari Pas Hastalığının Tespitine Yönelik Derin Öğrenme Modellerinde Evrişim Katmanı Sayısı Ve Aktivasyon Fonksiyonlarının Sınıflandırma Üzerindeki Etkisinin Araştırılması</i>



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HEAD OF SESSION: Dr. Öğr. Üyesi Tuba BIYIKBEYİ

SESSION-2 HALL-8

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Selin Atış, Doç. Dr., Özlem Kutlu Furtuna</i>	<i>Yıldız Teknik Üniversitesi,</i>	<i>Doğrudan Yabancı Yatırımların Co2 Salınımı Üzerindeki Etkisi</i>
<i>Bilgen Akçay Prof. Dr. Gülfer Bektaş Arş. Gör. Ahmet Can Küçükkurt</i>	<i>Acıbadem Üniversitesi,</i>	<i>Çalışanların Ödüllendirme Sistemleri Algısı İle Yaşam Doyumu Arasındaki İlişkinin İncelenmesi: Özel Bir Vakıf Üniversite Hastanesi Hemşire Çalışan Örneği</i>
<i>Dr. Öğr. Üyesi Tuba BIYIKBEYİ</i>	<i>Kilis 7 Aralık Üniversitesi,</i>	<i>İnovatif Faaliyetlerde Benimsenmiş Ulusal Kültürün Rolü</i>
<i>Yüksek Lisans Öğrencisi, Berken ÖZİPEK Doç. Dr. Mesut ŞÖHRET</i>	<i>Gaziantep Üniversitesi,</i>	<i>Toplumsal Cinsiyet Algısının Siyasete Yansıması Üzerine Bir Değerlendirme</i>
<i>Tuğçe AĞIRBAŞ Öğr. Gör. Nesli KAHRAMAN GEDİK Dr. Öğr. Ü. Zeynep Feride OLCAY</i>	<i>İstanbul Aydın Üniversitesi,</i>	<i>Metro Şantiyelerinde Çalışanlarında İş Güvenliği Performansı, Güvenlik İklimi Ve İşe Bağlılık</i>



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

28.01.2024

TURKEY Local Time: 13:30-15:00

HEAD OF SESSION: Prof. Dr. Orhan ZEYBEK

SESSION-2 HALL-9

AUTHORS	AFFILIATION	TOPIC TITLE
Prof. Dr. Orhan ZEYBEK Prof. Dr. Mehmet BAYIRLI Öğr. Üyesi Dr. Aykut ILGAZ	Balıkesir Üniversitesi,	Karbazol Bileşiklerinin Kompleksleşmeleri Ve Yük-Transfer Komplekslerinin Özellikleri
Prof. Dr. Orhan ZEYBEK Prof. Dr. Mehmet BAYIRLI Öğr. Üyesi Dr. Aykut ILGAZ	Balıkesir Üniversitesi,	Karbazol Türevlerinin Organik Yarıiletken Özelliklerinin İncelenmesi
Zeynep TOPRAK Prof. Dr. Cengiz YÜCEDAĞ Dr. Öğr. Üyesi Nuray ÇİÇEK	Burdur Mehmet Akif Ersoy Üniversitesi, Çankırı Karatekin Üniversitesi,	Diyarbakır Diclekent Bulvarı'nın Odunsu Bitki Envanterinin Çıkarılması Ve Değerlendirilmesi
İshak ERTAŞ Prof. Dr. Cengiz YÜCEDAĞ Dr. Öğr. Üyesi Nuray ÇİÇEK	Burdur Mehmet Akif Ersoy Üniversitesi, Çankırı Karatekin Üniversitesi,	Isparta Milli Park Ve Tabiat Parklarındaki Güneşli Kullanım Alanlarının Ortopedik Engelli Kullanımı Açısından İncelenmesi
Doç. Dr. Mustafa ÇİÇEKLER, Prof. Dr. Ahmet TUTUŞ, Doktora Öğrencisi Ufuk KILLI	Kahramanmaraş Sütçü İmam Üniversitesi,	Buğday Saplarından Üretilen Kağıt Hamurlarının Fluting Kağıt Üretiminde Değerlendirilmesi
Prof. Dr. Ahmet TUTUŞ, Doktora Öğrencisi Ufuk KILLI, Doç. Dr. Mustafa ÇİÇEKLER,	Kahramanmaraş Sütçü İmam Üniversitesi,	Melamin Emdirilmiş Atık Kağıtların Kuşeleme İşlemlerinde Değerlendirilmesi



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

28.01.2024

TURKEY Local Time: 13:30-15:30

HEAD OF SESSION: Prof. Dr. Yasemin BEYHAN

SESSION-2 HALL-10

AUTHORS	AFFILIATION	TOPIC TITLE
<i>Diyetisyen Melike TATAR Prof. Dr. Yasemin BEYHAN</i>	<i>Hasan Kalyoncu Üniversitesi,</i>	<i>Gıdalarda Akıllı Ambalajlama Uygulamaları Ve Gıda Güvenliği</i>
<i>Diyetisyen Buse ŞEKER Prof. Dr. Yasemin BEYHAN</i>	<i>Hasan Kalyoncu Üniversitesi,</i>	<i>Sürdürülebilir Beslenmede Gıda Atık Ve Kayıpları</i>
<i>Öğr. Gör. Dr. Hanife ARDAHANLI Doç. Dr. Mustafa SERTÇELİK</i>	<i>Kafkas Üniversitesi,</i>	<i>Isırgan Otu (Urtica Dioica L.), Acı Kavun (Ecballium Elaterium L.) Ve Dağ Kekığı (Thymus Serpyllum L.) Bitki Ekstrelerinin DLD-1 Kolorektal Kanser Hücrelerinde Sitotoksik Aktivitelerinin Araştırılması</i>
<i>Diyetisyen, Ayça Alat Prof. Dr. Yasemin BEYHAN</i>	<i>Hasan Kalyoncu Üniversitesi,</i>	<i>Sürdürülebilir Beslenme: Su Ayak İzinin Yeri</i>
<i>Diyetisyen Yaren İNCİ Prof. Dr. Yasemin BEYHAN</i>	<i>Hasan Kalyoncu Üniversitesi,</i>	<i>Vejeteryan Beslenmenin Sürdürülebilir Beslenmedeki Yeri</i>
<i>Esra Nur ERDOĞAN Doç. Dr. Lale Sariye AKAN</i>	<i>Ankara Yıldırım Beyazıt University,</i>	<i>Beden Algısının Yeme Bozuklukları Üzerindeki Etkileri</i>
<i>Arş. Gör. Dr. Şemsi Gül Yılmaz Dr. Öğr. Üyesi Murat Altan</i>	<i>Karamanoğlu Mehmetbey Üniversitesi,</i>	<i>Yetişkin Bireylerde Gece Yeme Sendromu, Kronotip Ve Beslenme Alışkanlıklarının Belirlenmesi</i>
<i>Dr. Öğr. Üyesi Murat Altan Arş. Gör. Dr. Şemsi Gül Yılmaz</i>	<i>Karamanoğlu Mehmetbey Üniversitesi,</i>	<i>Sosyal Jetlag Ve Beslenme</i>
<i>Diyetisyen, Goncağül ULCA Y Prof. Dr. Yasemin BEYHAN</i>	<i>Hasan Kalyoncu Üniversitesi,</i>	<i>Çevre Dostu Yeşil Restoran Uygulamaları</i>
<i>Selin GÖRGÜLÜ Prof. Dr. Yasemin BEYHAN</i>	<i>Hasan Kalyoncu Üniversitesi,</i>	<i>Farklı Besin Ve Diyetlerin Karbon Ayak İzi Üzerine Etkileri</i>

PHOTOS FROM OUR CONGRESS



H-3, Moses Adeolu AGOI ekranını görüntüleyorsunuz

Seçenekleri Görüntüle

Giriş yapın Görüntüle

Augmented Reality PPT - Microsoft PowerPoint

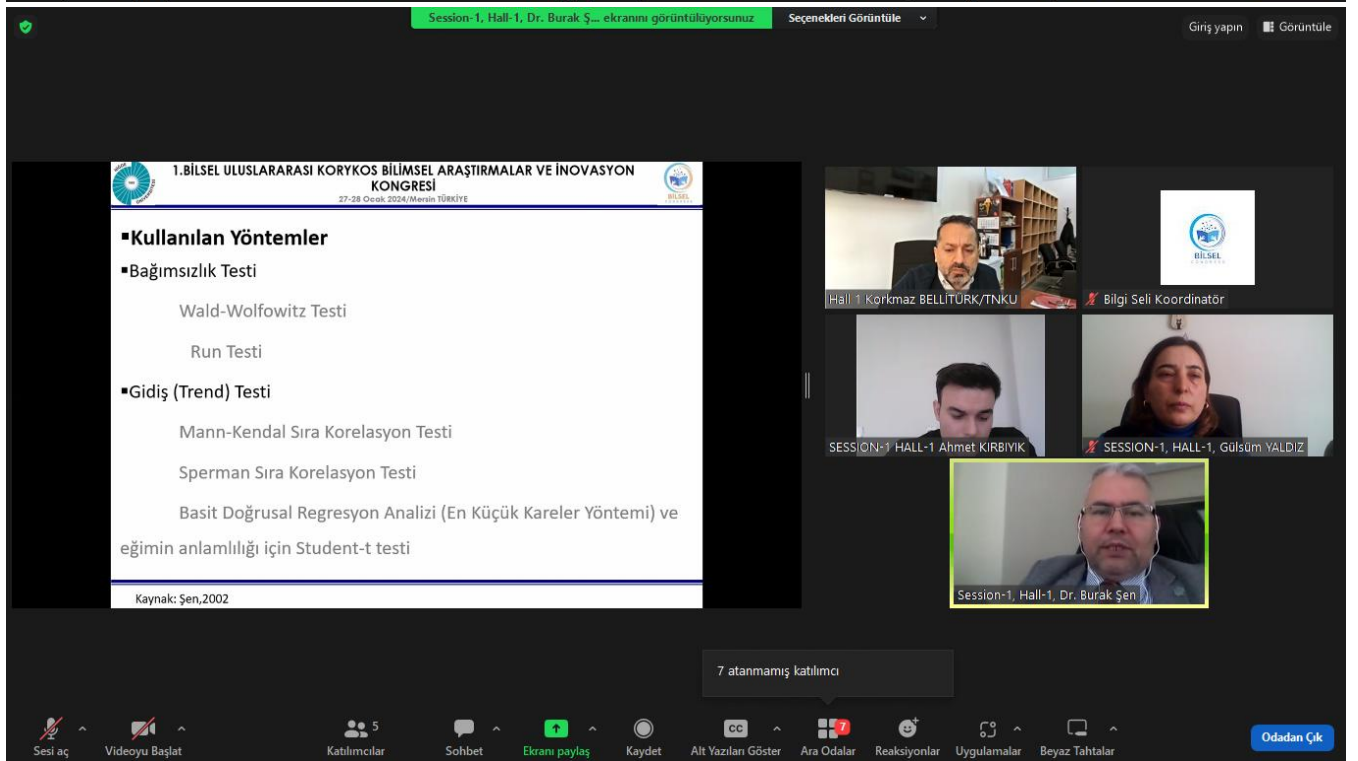
INTRODUCTION

There is are enumerable approaches and technologies being used around the world to support spontaneous developments in modern day education system. Augmented Reality (AR) is the trending technology that is gaining global recognition. According to Yen, Tsai and Wu (2013), Augmented reality (AR) refers to technologies that enhance the sense of reality, allowing the coexistence of digital information and real environments. Azuma (1997) explain that AR allows users to see the real world with superimposed digital information.

Click to add notes

7 atanmamış katılımcı

Sesi aç Videoyu Başlat Katılımcılar Sohbet Ekranı paylaş Kaydet Alt Yazıları Göster Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık



Session-1, Hall-1, Dr. Burak Şen ekranını görüntüleyorsunuz

Seçenekleri Görüntüle

Giriş yapın Görüntüle

1. BİLSEL ULUSLARARASI KORYKOS BİLİMSEL ARAŞTIRMALAR VE İNOVASYON KONGRESİ

27-28 Ocak 2024/Merkez TÜRKİYE

■ Kullanılan Yöntemler

■ Bağımsızlık Testi

Wald-Wolfowitz Testi

Run Testi

■ Gidiş (Trend) Testi

Mann-Kendal Sıra Korelasyon Testi

Sperman Sıra Korelasyon Testi

Basit Doğrusal Regresyon Analizi (En Küçük Kareler Yöntemi) ve eğimin anlamlılığı için Student-t testi


Kaynak: Şen, 2002

7 atanmamış katılımcı

Sesi aç Videoyu Başlat Katılımcılar Sohbet Ekranı paylaş Kaydet Alt Yazıları Göster Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık

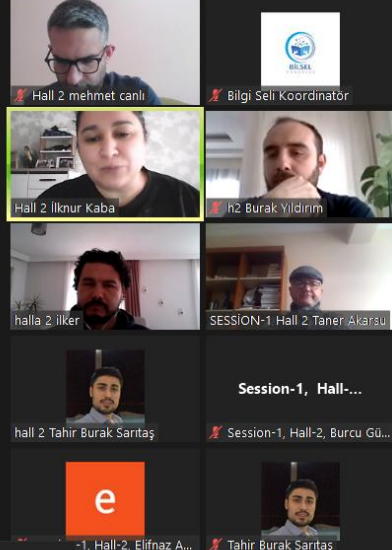
1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

Hall 2 İlkur Kaba ekranını görüntüleyorsunuz Seçenekleri Görüntüle Giriş yapın Görüntüle



Olgu

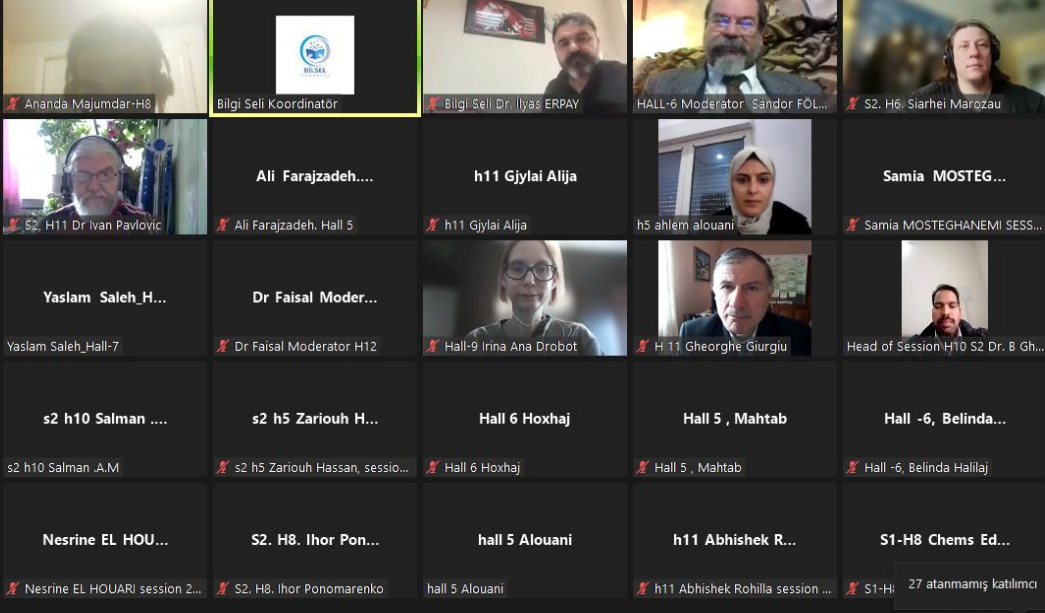
Serebral palsi tanısıyla takipli edilen 5 yaşındaki erkek hasta,
Solunum sıkıntısı ve beslenme güçlüğü şikayetiyle çocuk acil servise başvuran hasta çocuk yoğun bakım ünitesine yatırıldı.
Hastanın altta yatan bir hastalığı olması nedeniyle uzun süreli antibiyotik tedavisi ve parenteral beslenme amacıyla periferik santral venöz kateter takılması planlandı.
4 fr., 2 lümenli (Fornia) kateter kullanıldı. Kılavuz telin çapı 0,48 mm'dir (0,018 inç).



8 atanmamış katılımcı

Sesi aç Videoyu Başlat Katılımcılar 10 Sohbet Ekranı paylaş Kaydet Alt Yazıları Göster Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık

Giriş yapın Görüntüle



27 atanmamış katılımcı

Sessiz al Videoyu Başlat Güvenlik Katılımcılar 28 Sohbet 10 Ekranı paylaş Özet AI Companion Reaksiyonlar Uygulamalar Beyaz Tahtalar Notlar Daha fazla 27 Sonlandır

1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

Zoom meeting grid showing various participants and session titles. The grid includes:

- HALL-6 Moderator Sandor FOL...
- S2. H6: Sjarhei Marozau
- S2. H11 Dr Ivan Pavlovic
- Ali Farajzadeh....
- h11 Gjylai Alija
- h5 ahlem alouani
- Samia MOSTEG...
- Ananda Majumdar-H8
- Hall-9 Irina Ana Drobot
- H 11 Gheorghe Giurgiu
- Head of Session H10 S2 Dr. B. Gh...
- Dr Faisal Moderator H12
- s2 h10 Salman .A.M
- s2 h5 Zariouh Hassan, sessio...
- Hall 6 Hoxhaj
- Hall 5 , Mahtab
- Hall -6, Belinda...
- Nesrine EL HOU...
- S2. H8. Ihor Pon...
- hall 5 Alouani
- h11 Abhishek R...
- S1-H8 Chems Ed...
- h7 Gunardi
- Bojan Kitanovikj_H8
- Naseem Akhter...

Zoom meeting controls at the bottom include: Sessize al, Videoyu Başlat, Güvenlik, Katılımcılar (28), Sohbet, Ekranı paylaş, Özet, AI Companion, Reaksiyonlar, Uygulamalar, Beyaz Tahtalar, Notlar, Daha fazla (27), Sonlandır.

Zoom meeting screen showing a presentation slide titled "PILE GROUP (3X2) RESPONSES TO SINGLE TUNNELLING". The slide displays four graphs showing responses to single tunnelling:

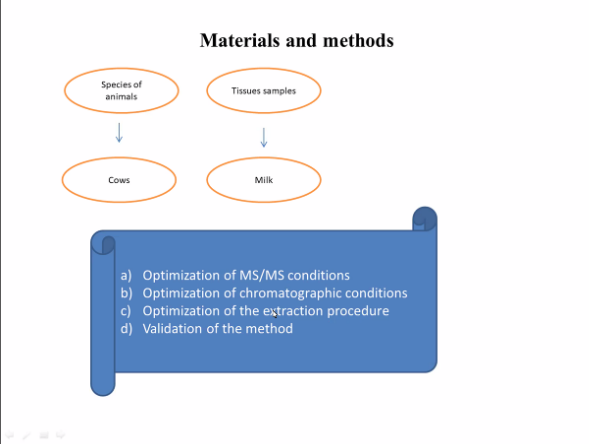
- Vertical Movements pile (mm)
- Lateral Movement pile (mm)
- Bending Moment (KN.m)
- Axial forces (KN)

The graphs show Depth (m) on the y-axis (from -20 to 20) and various response values on the x-axis. The legend indicates four data series: Pieu isolé, pieu 1 groupe de pieux (2x3), pieu 2 groupe de pieux (2x3), and pieu 3 groupe de pieux (2x3). The slide number 17 is visible in the bottom right corner.

Zoom meeting controls at the bottom include: Sesi aç, Videoyu Başlat, Katılımcılar (4), Sohbet, Ekranı paylaş, Kaydet, Alt Yazıları Göster, Ara Odalar (1), Reaksiyonlar, Uygulamalar, Beyaz Tahtalar, Odadan Çık.

h11 Gjylai Alija ekranını görüntüleyorsunuz Seçenekleri Görüntüle Giriş yapın Görüntüle

Materials and methods



- a) Optimization of MS/MS conditions
- b) Optimization of chromatographic conditions
- c) Optimization of the extraction procedure
- d) Validation of the method

H 11 Gheorghe...

H 11 Gheorghe Giurgiu Bilgi Seli Koordinatör

h11 Gjylai Alija S2, H11 Dr Ivan...

h11 Gjylai Alija S2, H11 Dr Ivan Pavlovic

h11 Abhishek Ro...

h11 Abhishek Rohilla session 2, hall 2

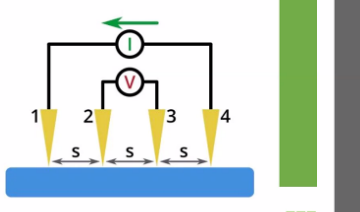
2 atanmamış katılımcı

Sesi aç Videoyu Başlat Katılımcılar 5 Sohbet Ekranı paylaş Kaydet Alt Yazıları Göster Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık

s2 h10 Salman .A.M ekranını görüntüleyorsunuz Seçenekleri Görüntüle Giriş yapın Görüntüle

Abstract

Surface Measuring electrical conductivity through high-frequency current involves applying an alternating current to a material and assessing its electrical response. Typically, within the radio frequency range, from a few kilohertz to several megahertz, this method offers a non-destructive means of characterizing materials such as metals, semiconductors, and insulators. One widely used technique is the four-point probe method. This involves positioning four electrodes on the material, with two acting as a current source and the other two measuring voltage. By applying high-frequency current and gauging the voltage response, the material's electrical conductivity can be determined with precision.



TOMSK POLYTECHNIC UNIVERSITY

Head of Session H10 S2 Dr. B Ghanshyam

Bilgi Seli Koordinatör

s2 h10 Salman

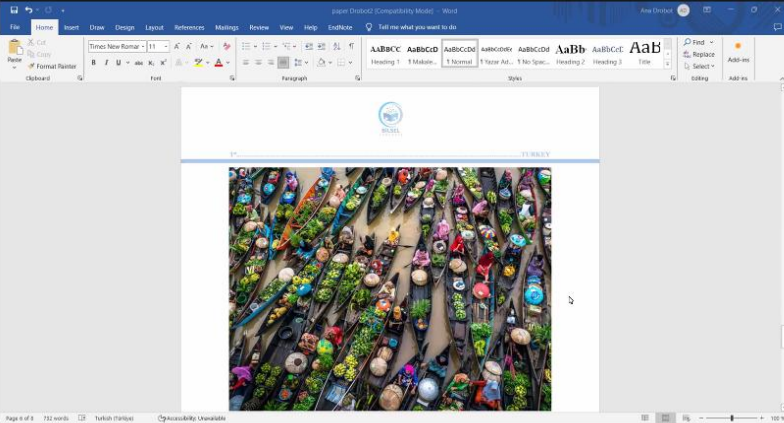
Salman .A.M

2 atanmamış katılımcı

Sesi aç Videoyu Başlat Katılımcılar 3 Sohbet Ekranı paylaş Kaydet Alt Yazıları Göster Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık

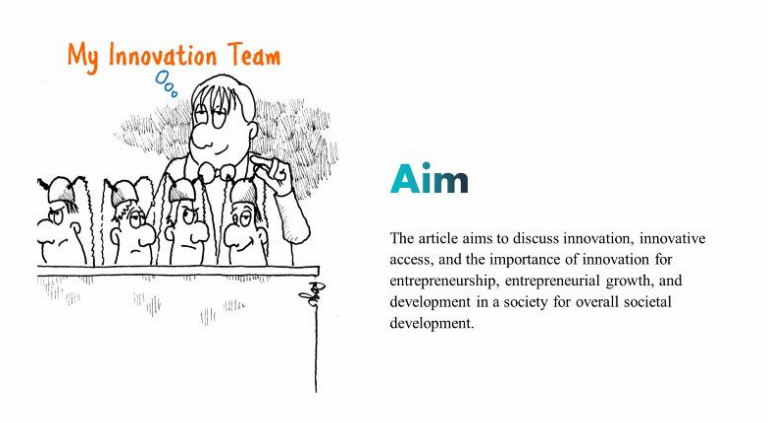
1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

Hall-9 Irina Ana Drobot ekranını görüntülüyorsunuz Seçenekleri Görüntüle Giriş yapın Görüntüle



2 atanmamış katılımcı

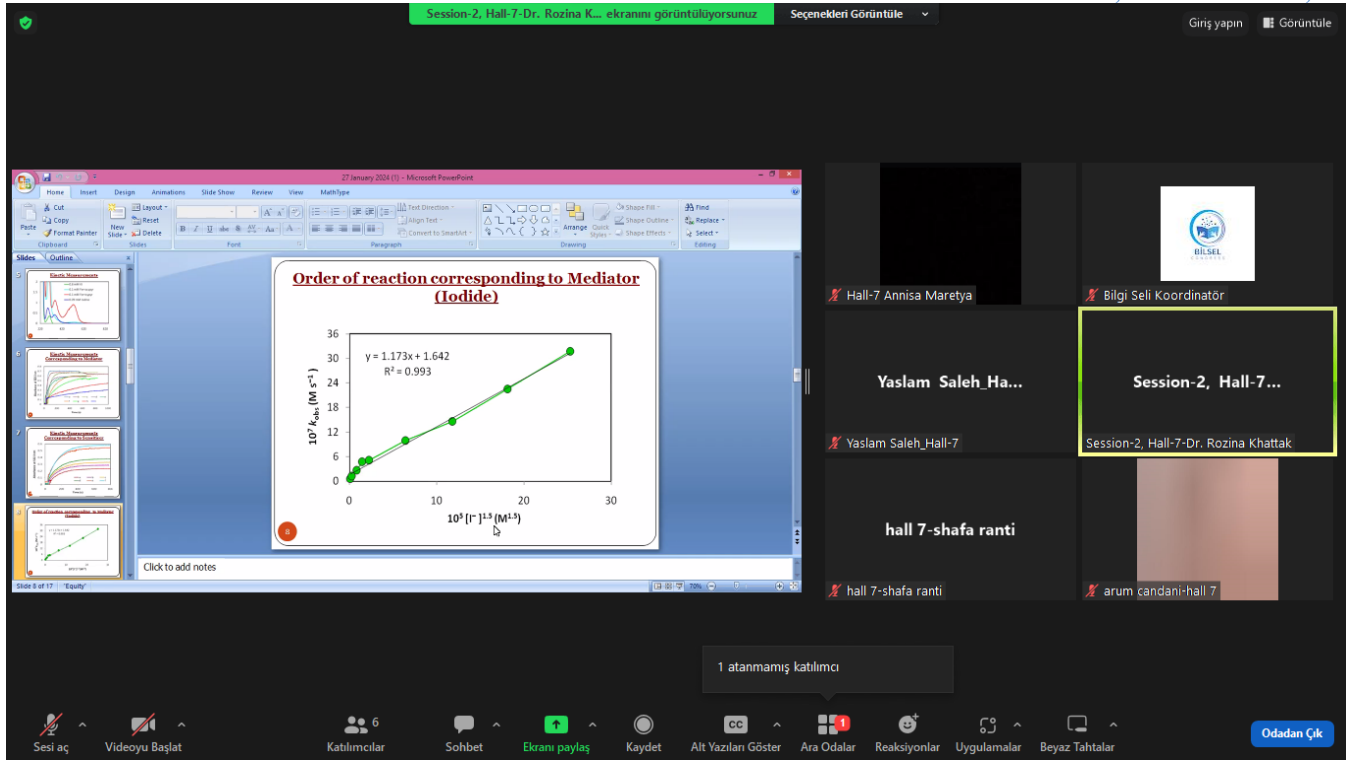
Ananda Majumdar-H8 PowerPoint'ini görüntülüyorsunuz Seçenekleri Görüntüle Giriş yapın Görüntüle



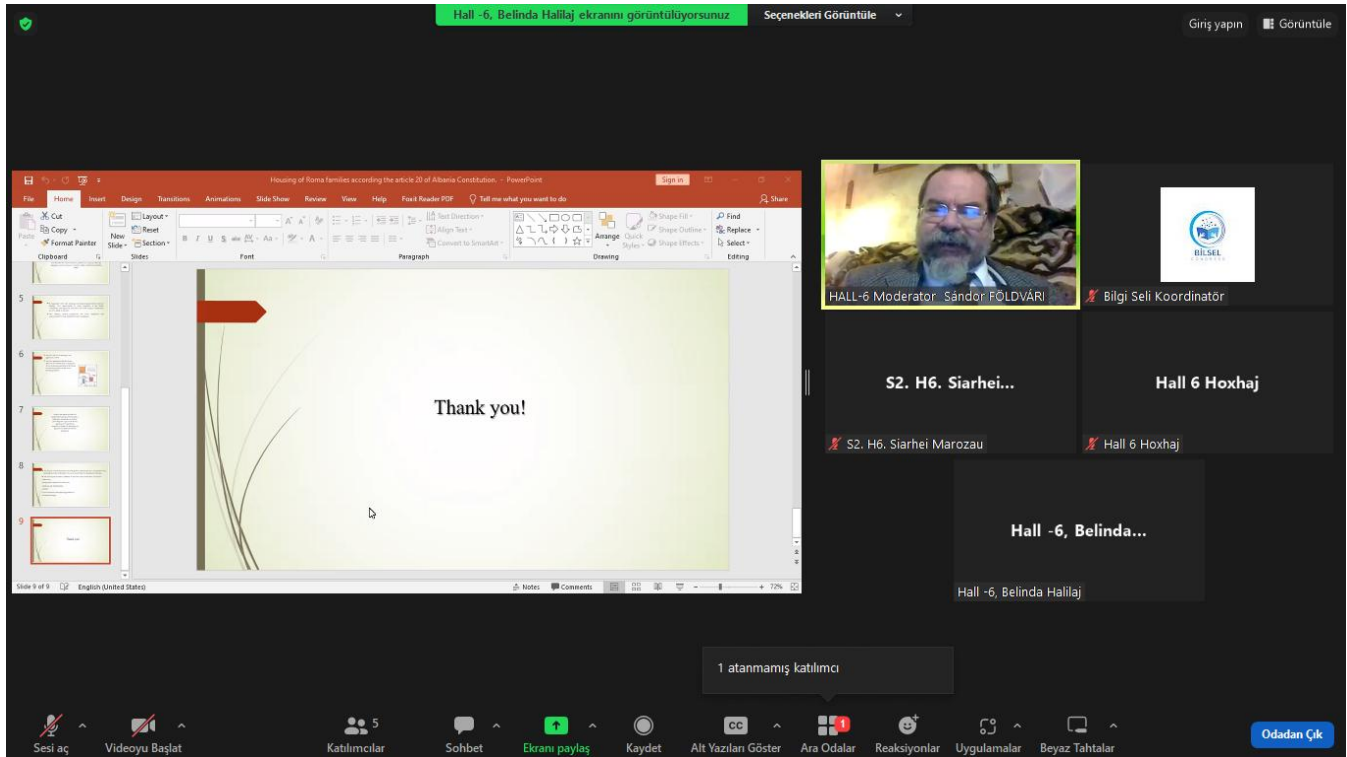
2 atanmamış katılımcı

1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

Session-2, Hall-7-Dr. Rozina K... ekranını görüntüleyorsunuz Seçenekleri Görüntüle Giriş yapın Görüntüle

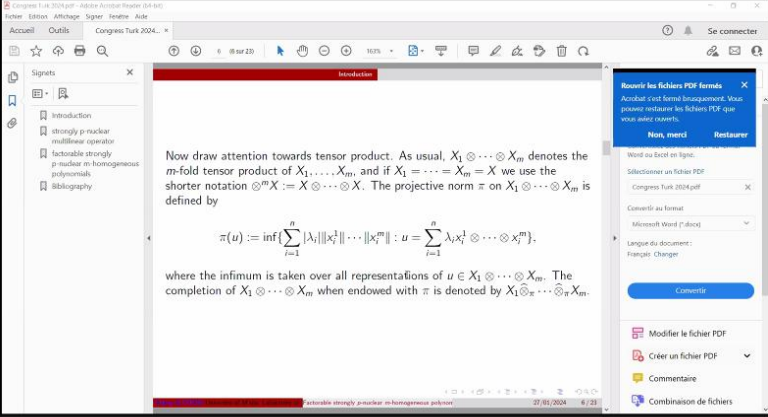


Hall -6, Belinda Hallıaj ekranını görüntüleyorsunuz Seçenekleri Görüntüle Giriş yapın Görüntüle



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

h5 ahlem alouani ekranını görüntüyorsunuz Seçenekleri Görüntüle Giriş yapın Görüntüle



Now draw attention towards tensor product. As usual, $X_1 \otimes \dots \otimes X_m$ denotes the m -fold tensor product of X_1, \dots, X_m , and if $X_1 = \dots = X_m = X$ we use the shorter notation $\otimes^m X := X \otimes \dots \otimes X$. The projective norm π on $X_1 \otimes \dots \otimes X_m$ is defined by

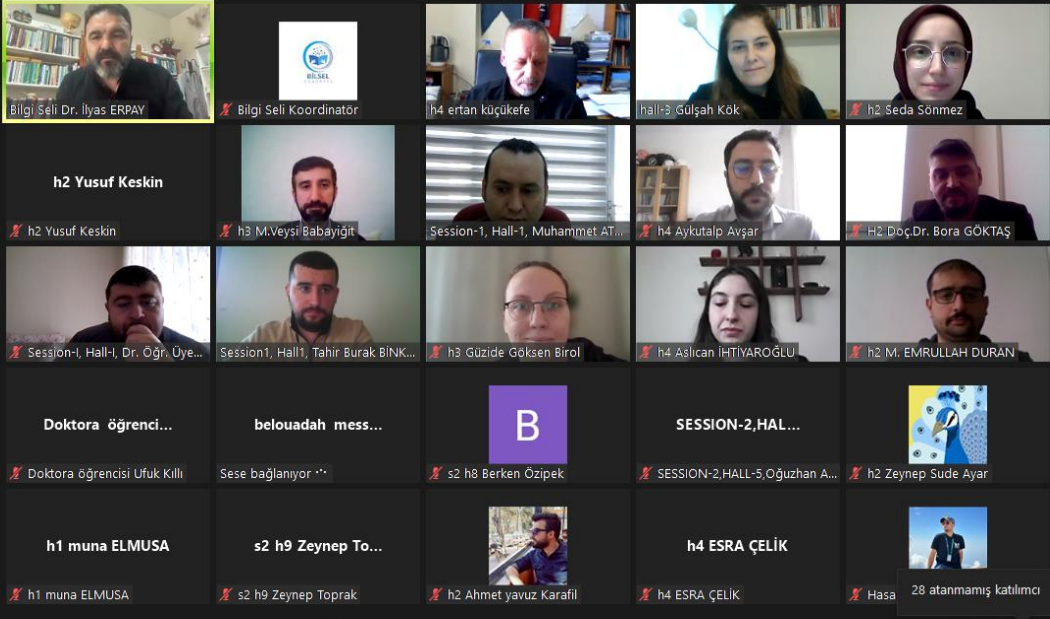
$$\pi(u) := \inf \left\{ \sum_{j=1}^n \|\lambda_j x_j^1\| \dots \|\lambda_j x_j^m\| : u = \sum_{j=1}^n \lambda_j x_j^1 \otimes \dots \otimes x_j^m \right\},$$

where the infimum is taken over all representations of $u \in X_1 \otimes \dots \otimes X_m$. The completion of $X_1 \otimes \dots \otimes X_m$ when endowed with π is denoted by $X_1 \hat{\otimes} \dots \hat{\otimes} X_m$.

2. atanmamış katılımcı

Sesi aç Videoyu Başlat Katılımcılar 5 Sohbet Ekranı paylaş Kaydet Alt Yazıları Göster Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık

Giriş yapın Görüntüle



Doktora öğrencisi... belouadah mess... s2 h8 Berken Özipek SESSION-2,HALL-5,Oğuzhan A... h2 Zeynep Süde Ayar

h1 muna ELMUSA s2 h9 Zeynep To... h2 Ahmet yavuz Karafil h4 ESRA ÇELİK Hasa 28 atanmamış katılımcı

Sesi aç Videoyu Başlat Güvenlik Katılımcılar 30 Sohbet Ekranı paylaş Özet AI Companion Reaksiyonlar Uygulamalar Beyaz Tahtalar Notlar Daha fazla 28 Sonlandır



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

Bilgi Seli Dr. Ilyas ERPAY konuşuyor...

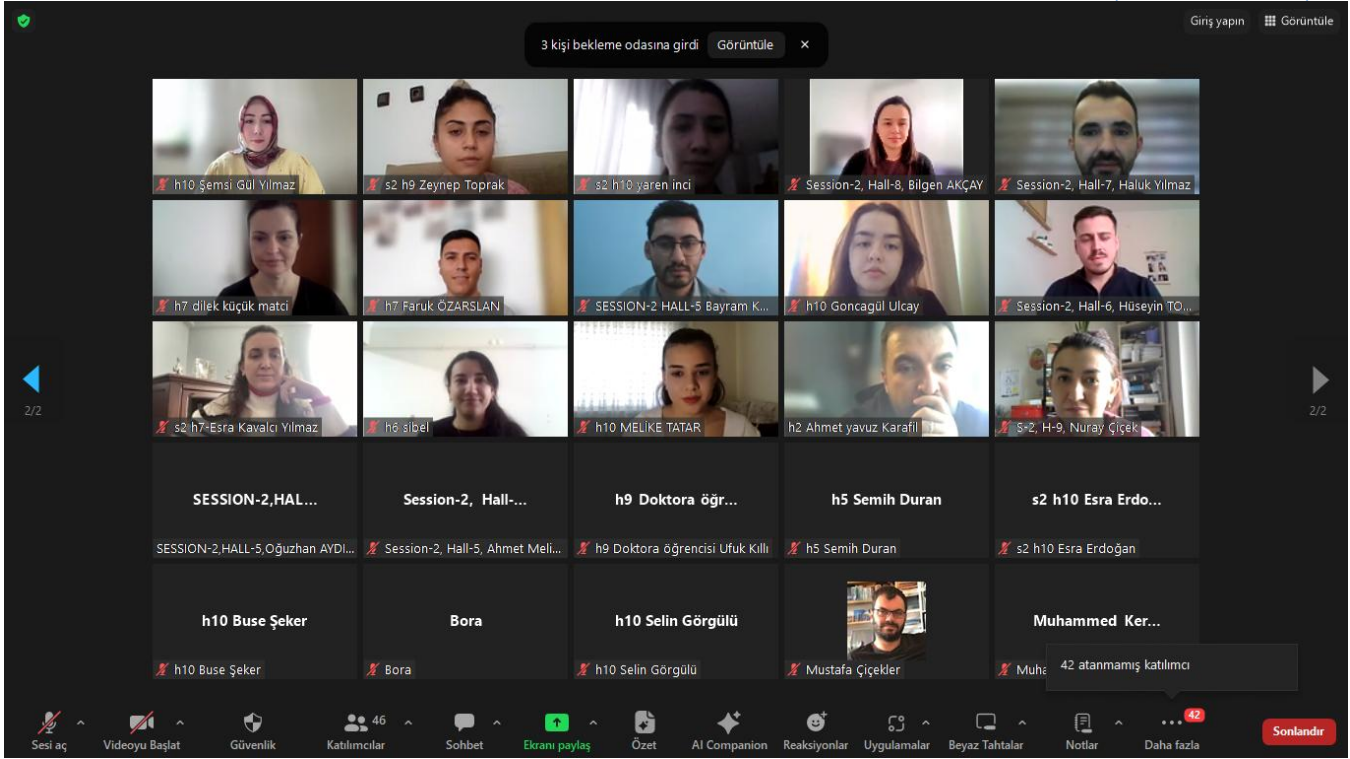
Giriş yapın Görüntüle

Sesi aç Videoyu Başlat Güvenlik Katılımcılar 31 Sohbet 2 Ekranı paylaş Özet AI Companion Reaksiyonlar Uygulamalar Beyaz Tahtalar Notlar 28 Daha fazla Sonlandır

Giriş yapın Görüntüle

Sesi aç Videoyu Başlat Güvenlik Katılımcılar 44 Sohbet Ekranı paylaş Özet AI Companion Reaksiyonlar Uygulamalar Beyaz Tahtalar Notlar 43 Daha fazla Sonlandır

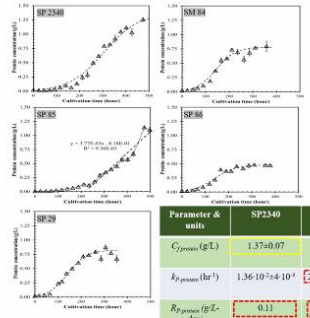
3 kişi bekleme odasına girdi Görüntüle x Giriş yapın Görüntüle



Sesi aç Videoyu Başlat Güvenlik Katılımcılar 46 Sohbet Ekranı paylaş Özet AI Companion Reaksiyonlar Uygulamalar Beyaz Tahtalar Notlar Daha fazla 42 Sonlandır

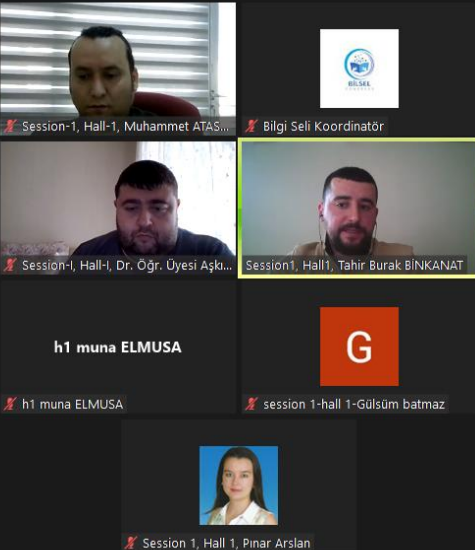
Session1, Hall1, Tahir Burak B... ekranını görüntüyorsunuz Seçenekleri Görüntüle Giriş yapın Görüntüle

RESULTS- PROTEIN PRODUCTIVITY



Parameter & units	SP2340	SMB4	SP85	SP86	SP29
$C_{protein}$ (g/L)	1.37±0.07	0.78±0.03	1.14±0.01	0.48±0.02	0.82±0.04
$k_{protein}$ (hr ⁻¹)	$1.36 \cdot 10^{-5} \pm 4 \cdot 10^{-4}$	$2.50 \cdot 10^{-5} \pm 9 \cdot 10^{-4}$	-	$2.29 \cdot 10^{-5} \pm 1 \cdot 10^{-4}$	$2.50 \cdot 10^{-5} \pm 6 \cdot 10^{-4}$
$R_{protein}$ (g/L-day)	0.11	0.12	0.09	0.07	0.13

15



h1 muna ELMUSA

h1 muna ELMUSA

session 1-hall 1-Gülsüm batmaz

Session 1, Hall 1, Pinar Arslan

Sesi aç Videoyu Başlat Katılımcılar 7 Sohbet Ekranı paylaş Kaydet Alt Yazıları Göster Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık

1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

h2 Seda Sönmez ekranını görüntülüyorsunuz Seçenekleri Görüntüle Giriş yapın Görüntüle

Ölçekler	Dindarlık Tanımlama	n	X̄±Ss	F	p	Fark
Sekülerleşme ve Dini Referansların Değişimi Ölçeği	Çok dindar (a)	21	78,48±11,61	86,752	0,001*	a-b,c
	Dindar(b)	270	73,96±9,64			
	Dinle az ilgili (c)	137	59,6±12,88			
Zaman tutumlarında referans değişimi	Çok dindar (a)	21	25,05±5,47	97,021	0,001*	a-b,c b,c
	Dindar(b)	270	22,32±4,63			
	Dinle az ilgili (c)	137	15,71±5,19			
Aile ve evlilik tutumlarında referans değişimi	Çok dindar (a)	21	32,05±4,85	52,358	0,001*	a,b,c b,c
	Dindar(b)	270	31,23±4,88			
	Dinle az ilgili (c)	137	25,52±6,52			
Medya ve Kitle İletişim boyutunda referans değişimi	Çok dindar (a)	21	9,48±2,81	10,552	0,001*	a,b,c b,c
	Dindar(b)	270	8,88±2,15			
	Dinle az ilgili (c)	137	7,88±2,41			
Popüler dindarlık ve halk inanışlarında referans değişimi	Çok dindar (a)	21	11,91±3	7,482	0,001*	b,c
	Dindar(b)	270	11,54±2,58			
	Dinle az ilgili (c)	137	10,49±2,91			

Sesi aç Videoyu Başlat Katılımcılar 7 Sohbet Ekranı paylaş Kaydet Alt Yazıları Göster Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık

h2 Seda Sönmez Bilgi Seli Koordinatör

hall 2 Ahmet yavuz Karafil H2 Doç.Dr. Bora...

h2 M. EMRULLA... h2 Yusuf Keskin

h2 M. EMRULLAH DURAN h2 Yusuf Keskin

h2 Zeynep Sude Ayar

Giriş yapın

Emre butekin ekledi mi, analiz istedi. [Tık Okunur] - Word

SALTI OKUNUR: Bu belge, dışarıya kimseyle paylaşılabilir. Farklı Kaydet

"Etienne bu cehennem bir dâka immetense yıllarda aç açına dolayınca karar vermiştir: Bu cehennemde olmak parası kazanılmırsa, hemerı geyirir gitmek dâka iydi. Burada çalışmadı. Günün birinde peşlerinden birini rahatça bağlayabileceğini düşünürdü." (Zola, 2005, s.28).

İçlerin çalışma koşullarını betimleyen yukarıdaki metinlerimizde de gördüğümüz gibi işçiler çok düşük ücretlerle çalışmakta bu ücretler kazınlarını bile doyurmayı yetmemektedir. Yazarmı kitapta ücretlerle ilgili verdiğimiz verilerle dönemim kayıtlarına bakıncımızda gerçek rakamları olduğu anlaşılmaktadır. İşçiler günlük olarak 15-17 saat arası çalışmaktadırlar. Çalışma koşulları oldukça sağlıklıdır madenciler madende çalışmaktan dolayı sürekli ağır hastalıklarla karşı karşıya kalmaktadırlar. İş güvenliği yok denince kadar az olan madenlerde işçi ölümünün sıradanlığı görülmektedir. Bu ve bunun gibi onlarca sorunla doğuştan beri çalışma koşulları işçileri çileden çıkararak öngörülerimizin yolumu açacaktır. "Toplumun bir bölümünün ataki bölümüne sömürülmesi." (Marx - Engels- Lenin, 1990, s.58). Madenciler önce yarıdan sanıldığı altında sendikali bir örgütlenme kuracak daha sonra kitabımızın ana konusu olan grevlerle başlayacaktır.

Sonuç

Kitabın yazıldığı dönemde yaşanan Sanayi Devrimi ve Fransız İhtilali toplanmış yazgı

Windows'u etkinleştir Windows'u etkinleştirme için Ayarlar'a gidin

h3 Güzide Gökseñ Birol Bilgi Seli Koordinatör

h3 M.Veysi Babayigit hall-3Özkan Çoñtan

24necmiye baba... 24necmiye babayigit

00 Emre BUTEKİN

hall-3 Gülşah Kök h3 Ali Uzun

Murat ÇELİK-Se... Murat ÇELİK-Session-1, Hal...

Kars ve Çevresinin

- Kars Bölgesi ve civarı günümüzden salt 950 yıl önce Türklerin Anadolu'ya gelmeleriyle birlikte değil bu tarihin çok ötesinde Asyadan Anadolu'ya, Anadoludan Asyaya göç eden toplumların geçiş merkezi olmuştur. Bu anlamda başta Ani ve Kars olmak üzere bölge Anadolu ve Kafkasya arasında adeta bir kapı konumundadır. Bu özelliği sayesinde ki tarihin çok erken dönemlerinden geçtiğimiz yüzyıl başlarına kadar çok sayıda Kültür varlığı yoğun olarak karşımıza çıkmaktadır. Bu kültür varlıkları ki aynı zamanda ülkemiz ve Kars açısından çok değerli kültür mirasımız anlamına gelmektedir.
- Hakkari, Van gibi ağırlıklı olarak Doğu Anadolu Bölgesinde rastlanan ve özellikle de Kars yöresine zenginlik katan kayaüstü resimleri, Kaya panoları kronolojik açıdan erken buluntular olması bakımından öncelikle ele alınacaktır.
- Ancak bu konuda başta Hakkari ve Van Kayaüstü resimleri ile Kars bölgesindeki Kayaüstü resimlerini ayrıntılı olarak araştırıp bir çok eserde yayımlayan sayın Prof.Dr. Oktay BELLİ'nin çalışmaları bölge tarihi açısından oldukça önemlidir.



h4 ertan küçükefe



Bilgi Seli Koordinatör



h4 Aslıcan İHTİYAR...

h4 Aslıcan İHTİYAR...

h4 Aslıcan İHTİYAR...



h4 Aykurtalp Avşar



Mehmet Cüneyd Demirel

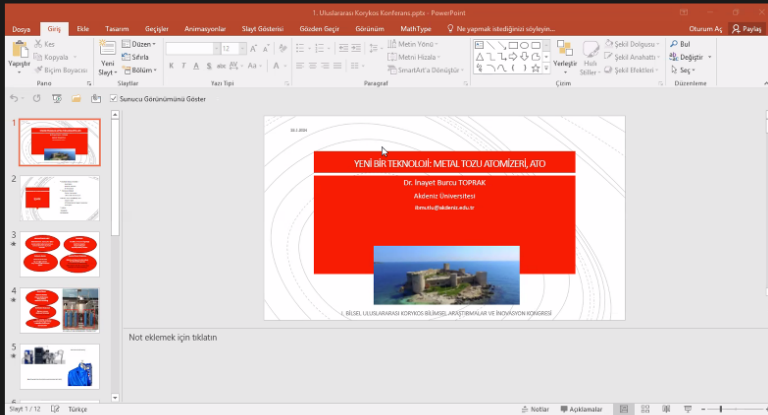
h4 ESRA ÇELİK

h4 ESRA ÇELİK

Session-2, Hall-5, İnanç Burcu... ekranını görüntüleyorsunuz

Seçenekleri Görüntüle

Giriş yapın Görüntüle



h5 Barkın Bakır



Bilgi Seli Koordinatör

h5 Semih Duran

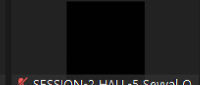
h5 Semih Duran



Session-2, Hall-5, İnanç Burcu...

Session-2, Hall-5, Ahmet M...

Session-2, Hall-5, Ahmet M...



SESSION-2 HALL-5 Şewal O.

SESSION-2 HAL...

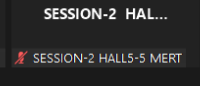
SESSION-2 HALL-5 Bayram...



S-2, H-5, Ertan KOSEDAĞ

SESSION-2, HAL...

SESSION-2, HALL-5, Oğuzha...



SESSION-2 HAL...


SESSION-2 HALL-5 MERT

1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

Session-2, Hall-6, Hüseyin TOR... ekranını görüntülüyorsunuz

Seçenekleri Görüntüle

Giriş yapın Görüntüle



KARIŞIM	KATKI MADDESİ	GERİ DÖNÜŞÜM PP
7. NUMUNE	%3 ÇİLEK KOKUSU	%97
8. NUMUNE	%6 ÇİLEK KOKUSU	%94
9. NUMUNE	%3 MUKAVEMET ARTIRICI	%97
10. NUMUNE	%6 MUKAVEMET ARTIRICI	%94
11. NUMUNE	%3 WAX	%97
12. NUMUNE	%6 WAX	%94

Not eklemek için tıklayın

h6 sibel

h6 Alper YILDIRIM

h6 Mertol Gökelma

h6 İsmail Temiz

h6 İsmail Temiz

hall6 -Kerim Şahin

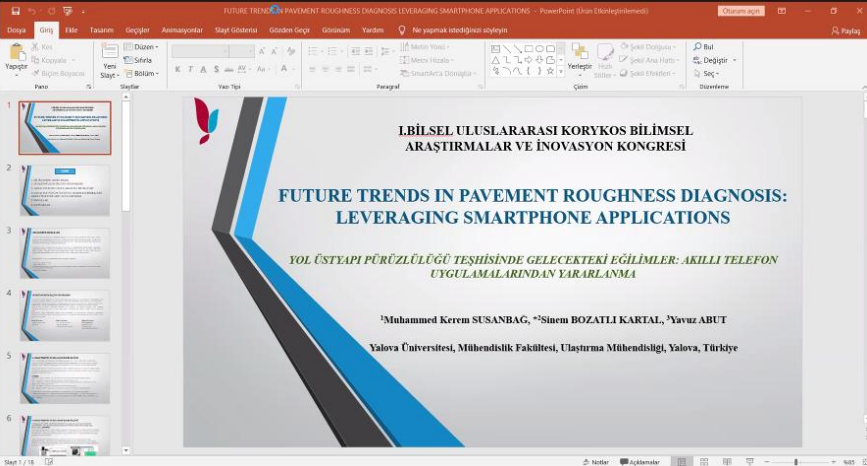
Hall-6, Orhan Kalkan

Sesi aç Videoyu Başlat Katılımcılar 11 Sohbet Ekranı paylaş Kaydet Alt Yazıları Göster Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık

Session 2 Hall 7 Muhammed Kere... ekranını görüntülüyorsunuz

Seçenekleri Görüntüle

Giriş yapın Görüntüle



İBİLSEL ULUSLARARASI KORYKOS BİLSEL ARAŞTIRMALAR VE İNOVASYON KONGRESİ

FUTURE TRENDS IN PAVEMENT ROUGHNESS DIAGNOSIS: LEVERAGING SMARTPHONE APPLICATIONS

YOL ÜSTYAPİ PÜRÜZLÜĞÜ TEŞHİSİNDE GELECEKTEKİ EĞİLMELER: AKILLI TELEFON UYGULAMALARINDAN YARARLANMA

Muhammed Kerem SUSANBAG, Sinem BOZATLI KARTAL, Yavuz ABUT

Yalova Üniversitesi, Mühendislik Fakültesi, Ulaştırma Mühendisliği, Yalova, Türkiye

h7 Faruk ÖZARSLAN

h7 Faruk ÖZARSLAN

h7 Büşra Nur ŞAHİN

h7 İilek küçük matçı

s2 h7-Esra Kavalcı YILMAZ

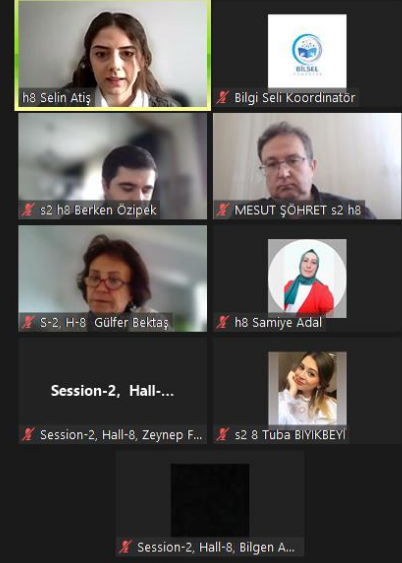
S-2,Hall-7 İbrahim KO...

Sesi aç Videoyu Başlat Katılımcılar 11 Sohbet Ekranı paylaş Kaydet Alt Yazıları Göster Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık

Sonuçlar

Çalışmada 19 ülke için 1996 ve 2022 yılları arasındaki veriler gözlemlenmiştir. Doğrudan yabancı yatırım, kentsel nüfus, ekonomik gelişim endeksi, mal ve enflasyon oranı gibi verilerin CO2 salınımı üzerindeki etkisi araştırılmıştır.

Yapılan testler sonucunda DYY miktarında %1 oranında artış olduğunda, CO2 salınımı %2.8 oranında arttığı gözlemlenmiştir. Yapılan çalışma kirillik sığınağı hipotezini desteklemektedir. Kentsel nüfus oranında da CO2 salınım oranı üzerinde artırıcı etkisi olduğu gözlemlenirken, enflasyon oranındaki artışın CO2 salınım oranı üzerinde azaltıcı etkisi olduğu gözlemlenmiştir.



Session-2, Hall-9, Prof. Dr. O... ekranını görüntüyorsunuz

Seçenekleri Gözetile

Giriş yapın Görüntüle



S-2, H-9, Nuray...

beloudah mess...

1 atanmamış katılımcı

Gesi aç

Videoyu Başlat

Katılımcılar

Sohbet

Ekranı paylas

Kaydet

Alt Yazıları Göster

Ara Odalar

Reaksiyonlar

Uygulamalar


Be Yaz Tahtalar

Odadan Çık

h10 Buse Şeker ekranını görüntüyorsunuz Seçenekleri Görüntüle Giriş yapın Görüntüle

GIDA KAYIPLARI ve GIDA ATIKLARI

- Yapılan bir incelemede, katılımcı işletmelerin;
 - %62,0'sinin atıklarını çöpe attığını,
 - %21,0'inin geri dönüşüme gönderdiğini,
 - %17,0'inin ise farklı bir yöntem olarak sokak hayvanlarını beslediğini ifade etmiştir.
- Besin atıklarının geri dönüşümü, sürdürülebilirliğin bir unsuru olarak kabul edilmektedir ve oldukça önemlidir.



Morillo, J. G., Diaz, J. A. R., Camacho, E., & Mastromeo, P. (2015). Linking water footprint accounting with irrigation management in high value crops. *Journal of Cleaner Production*, 107, 994-1002.

Chen, M., Wang, Y. T., Sun, T. *Food Waste Treatment for Livestock*. Wang, Yung-Tai (Ed.), *Food Waste Treatment in the Food Processing Industry*. New York, ASB, pp. 204-239, 2008.

h10 Buse Şeker Bilgi Seli Koordinatör h10 Goncagül U... h10 MELİKE TAT... h10 Şemsi Gül Y... h10 Selin Görgülü h10 MELİKE TATAR h10 Şemsi Gül Yılmaz h10 Selin Görgülü s2 h10 yaren inci s2 h10 Esra Erdo... aycaalat s2 h10 yaren inci s2 h10 Esra Erdoğan aycaalat h10 Hanife ARD... murat h10 Hanife ARDAHANLI murat

Sesi aç Videoyu Başlat Katılımcılar 11 Sohbet Ekranı paylaş Kaydet Alt Yazıları Göster Ara Odalar Reaksiyonlar Uygulamalar Beyaz Tahtalar Odadan Çık



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1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

AN ASSESSMENT OF PROBLEMS ENCOUNTERED BY PRE-SERVICE TEACHERS DURING TEACHING PRACTICES EXERCISE IN TARABA STATE, NIGERIA..... 975



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

NİĞDE İLİ KAR YAĞIŞLI GÜN SAYISI VERİSİNİN İKLİM DEĞİŞİKLİĞİ AÇISINDAN ANALİZİ

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Özet

Hidrolojik modelleme, iklim değişikliği araştırması, sulama planlaması, su kaynakları yönetimi, taşkın tahmini, su dengesi hesaplaması, tarımsal üretim için toprak nemi modellemesi vb. gibi birçok amaç için yağışın coğrafi dağılımının niceliksel değerlendirmesi gereklidir. Trend analizi, iklim değişikliğinin bölgesel su kaynaklarının mevcudiyetini, kuraklık dağılımını ve sel sıklığını nasıl etkilediğini göstermektedir. Hidrolojik verilerdeki eğilimleri analiz etmek, iklim değişikliğinin etkilerini anlamak ve su yönetimi ve ürün desenleri hakkında bilinçli kararlar vermek için çok önemlidir. Sunulan çalışmanın amacı, 1990'dan 2022'ye kadar Niğde'de kar yağışı gün sayısı eğilimlerini araştırmak, zamansal ve mekansal değişimleri analiz etmek ve potansiyel değişim noktalarını belirlemektir. Olası eğilimleri tespit etmek için Spearman sıra korelasyonu ve Mann-Kendall testleri ve tüm zaman serisi boyunca değişimin büyüklüğünü tahmin etmek için Sen'in eğim testi kullanıldı. Türkiye'nin İç Anadolu Bölgesi'nde yer alan Niğde meteoroloji istasyonunun kar yağışlı gün sayısı verileri yıllık bazda analiz edildi. 1990-2022 yılları arasında Niğde'nin ortalama kar yağışlı gün sayısı 16,2, maksimum ve minimum değerleri ise 35 ve 4 gün olarak tespit edilmiştir. Elde edilen sonuçlardan seride gözlenen azalış eğiliminin anlamlı olmadığı, serinin, eğilim yönünden rastgele olduğu belirlenmiştir.

Anahtar Kelimeler: iklim değişikliği, zaman serileri, hidrometeorolojik seriler, parametrik olmayan istatistiksel analizler.



ANALYSIS OF NIGDE PROVINCE NUMBER OF SNOWY DAYS DATA IN TERMS OF CLIMATE CHANGE

Abstract

For many objectives, such as hydrological modelling, climate change research, irrigation scheduling, water resource management, flood forecasting, water balance calculation, soil moisture modelling for agricultural production, etc., quantitative assessment of the geographical distribution of rainfall is necessary. Trend analysis illustrates how climate change affects regional water resource availability, distribution of droughts, and frequency of floods. Analyzing trends in hydrological data is crucial for understanding the effects of climate change and making informed decisions about water management and crop patterns. The aim of the presented study is to investigate trends in the number of snowfall days in Niğde from 1990 to 2022, analyze temporal and spatial changes and identify potential change points. Spearman rank correlation and Mann-Kendall tests were used to detect possible trends, and Sen's slope test was used to estimate the magnitude of change over the entire time series. Data on the number of snowy days from Niğde meteorology station, located in the Central Anatolia Region of Turkey, were analyzed on an annual basis. Between 1990 and 2022, Niğde's average number of snowy days was determined as 16.2, and its maximum and minimum values were 35 and 4 days. From the results obtained, it was determined that the decreasing trend observed in the series was not significant and the series was random in terms of trend.

Keywords: climate change, time series, hydro-meteorological series, non-parametric statistical analyses

1.Giriş

Sürdürülebilir kalkınma söz konusu olduğunda iklim değişikliğiyle ilgili endişeler en önemli konular arasında yer alıyor; diğer faktörler arasında dünyanın birçok yerinde artan deniz seviyeleri, vahşi orman yangınları, dağlardaki karların erimesi, şiddetli kuraklıklar vb. yer almaktadır (Ali, 2018; Dioha ve Kumar, 2020).

Su, Türkiye'de özellikle tarımsal kullanım açısından en değerli kaynaktır (%74) ve iklim değişikliğinin su kaynaklarında yol açtığı değişiklikler ve bunların tarımsal üretim üzerindeki etkileri, gelecekteki su kaynaklarının planlanması ve sürdürülebilir tarımsal büyüme stratejisi açısından aynı derecede önemlidir. (Pamuk ve diğerleri, 2011; Özkul, 2009). Hidrolojik modelleme, iklim değişikliği araştırması, sulama planlaması, su kaynakları yönetimi, taşkın tahmini, su dengesi hesaplaması, tarımsal üretim için toprak nemi modellemesi vb. gibi birçok amaç için yağışın coğrafi dağılımının niceliksel değerlendirmesi gereklidir (Dubey et al. diğerleri, 2012; Meehl, 2000). Trend analizi, iklim değişikliğinin bölgesel su kaynaklarının mevcudiyetini, kuraklık dağılımını ve sel sıklığını nasıl etkilediğini göstermektedir. Mann-Kendall parametrik olmayan testi, hidro-meteorolojik zaman serilerindeki eğilimlerin önemini değerlendirmek için yaygın olarak kullanılmaktadır (Yue ve Wang, 2002). Zaman serisi modellerini analiz etmek için en popüler iki parametrik olmayan teknik, Mann-Kendall ve Spearman'ın rho testleridir (Lehmann, 1995; Sneyers, 1990). Tek bir açıklayıcı değişken, bağımsız değişken, yanıt değişkeni veya bağımlı değişken, basit bir doğrusal regresyonu oluşturur (Neter 1996; Montgomery ve Runger, 2002). Bu çalışmada, Niğde'nin yıllık toplam kar yağışlı gün sayısı verilerinde önemli zamansal eğilimleri tespit etmek amacıyla parametrik olmayan testler kullanılmıştır.

2.Materyal ve Metod

Bu çalışma coğrafik olarak 37,9587 kuzey enlemi ile 34,6795 doğu boylamında yer alan İç Anadolu bölgesinde karasal iklimin hakim olduğu Niğde ilini kapsamaktadır. Rakım 1211 m olup Niğde iline ait klimatolojik veriler Tablo1 de verilmiştir. Çalışmada yıllık toplam kar yağışlı gün sayısı verisi kullanılmış olup Niğde'nin ortalama kar yağışlı gün sayısı 16,2, maksimum ve minimum değerleri ise 35 ve 4 gün olarak tespit edilmiştir. Bu çalışmada, zamana bağlı eğilimleri tespit etmek amacıyla parametrik olmayan testlerde sıklıkla kullanılan Mann-Kendall sıra korelasyon, Spearman katsayısı, Sen eğilim testi kullanılmıştır.

Tablo1. Niğde ili uzun yıllar ortalama iklim verileri

NIGDE (1935 - 2022)	1	2	3	4	5	6	7	8	9	10	11	12	Yıllık
Tort (°C)	-0.30	1.20	5.00	10.60	15.20	19.20	22.50	22.40	18.10	12.50	6.50	1.90	11.20
Tmax_ort (°C)	4.80	6.50	10.90	16.80	21.50	25.80	29.40	29.60	25.70	19.70	13.00	7.10	17.60
Tmin_ort (°C)	-4.60	-3.40	-0.20	4.40	8.40	11.90	14.80	14.50	10.40	6.00	1.20	-2.50	5.10
Güneşlenme (saat)	3.70	4.90	5.70	6.90	8.40	10.30	11.50	11.10	9.90	7.30	5.40	3.70	7.40
Yağışlı Gün Sayısı	10.92	10.31	11.35	11.06	11.74	6.92	1.78	1.52	2.91	6.41	7.42	10.67	93.00
Toplam Yağış Miktarı (mm)	35.70	33.10	36.00	40.90	48.40	28.50	5.10	6.70	10.60	26.00	31.30	41.00	343.30

(Kaynak: <https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=undefined&m=NIGDE>)

İç Anadolu bölgesinde yer alan illere ait aylık ve yıllık kar yağışlı gün sayısı Şekil1’de verilmiştir. Buna göre Yozgat ili yıllık kar yağışlı gün sayısı 31.23 ile en yüksek ildir. Bölgede Haziran, Temmuz ve Ağustos aylarında hiç kar yağışı görülmemiş olup Mayıs ve Eylül aylarında nadiren kar yağışı görülmüştür. Tüm illerde kar yağışının en çok görüldüğü ay Ocak ayıdır.

METEOROLOJİ		T.C. ÇEVRE, ŞEHİRCİLİK VE İKLİM DEĞİŞİKLİĞİ BAKANLIĞI Meteoroloji Genel Müdürlüğü Aylık Kar Yağışlı Günler Sayısı Ortalaması 1927 - 2022													
Istasyon No	Rasat S. (YIL)	Istasyon Adı	Ocak	Şubat	Mart	Nisan	Mayıs	Haziran	Temmuz	Ağustos	Eylül	Ekim	Kasım	Aralık	YILLIK
17,130	96	ANKARA BÖLGE	7.85	5.64	4.04	0.77	0.03				0.01	0.06	1.18	4.51	24.09
17,126	83	ESKİŞEHİR BÖLGE	6.05	4.77	3.04	0.49						0.06	0.77	3.22	18.40
17,246	66	KARAMAN	4.52	3.88	2.83	0.67	0.03					0.02	0.85	3.02	15.82
17,196	90	KAYSERİ BÖLGE	7.27	5.76	4.76	0.94	0.04					0.08	1.58	4.22	24.65
17,080	79	ÇANKIRI	5.13	3.67	1.94	0.24	0.01					0.03	0.65	2.87	14.54
17,135	60	KIRIKKALE	5.38	3.43	2.22	0.22							0.57	3.00	14.82
17,160	93	KIRŞEHİR	6.20	4.85	3.83	0.61	0.01					0.06	1.00	3.54	20.10
17,245	19	KONYA BÖLGE												0.26	0.26
17,193	64	NEVŞEHİR	4.98	4.25	3.67	0.84	0.06				0.02	0.16	1.39	3.22	18.59
17,250	88	NİĞDE	6.86	6.20	4.49	1.01	0.05					0.10	1.44	4.11	24.26
17,090	94	SİVAS	8.67	7.19	5.27	1.13	0.04				0.01	0.18	1.86	5.26	29.61
17,140	90	YOZGAT	8.56	7.21	5.82	2.01	0.10				0.02	0.26	2.01	5.24	31.23

Şekil1. İç Anadolu Bölgesi illeri aylık kar yağışlı gün sayısı (Kaynak: <https://mgm.gov.tr/>)

Çalışmada kullanılan Niğde İli kar yağışlı günler sayısı Tablo2 de belirtilmiştir. Tablo da belirtildiği gibi Niğde İlinde en çok kar yağışının görüldüğü aylar sırasıyla Ocak (5.1), Şubat (4.1), Aralık (3.7), Mart (3.6) aylarıdır. Mart, Nisan ve Kasım aylarında da yaklaşık ortalama kar yağışlı gün sayısı 2’dir.

Tablo2. Niğde İli kar yağışlı günler sayısı

Yıl/Ay	NİĞDE İli Aylık Kar Yağışlı Günler Sayısı (1990-2022)												
	1	2	3	4	5	6	7	8	9	10	11	12	ORT
1990	3	4	2	2	3						3	2	19
1991	7	3	2								2	8	22
1992	10	5	4									4	23
1993	8	7	5	1							4		25
1994	1	5	1								2	7	16
1995	2										2	4	8
1996	2		6	2									10
1997	3	2	6	4								3	18
1998	4		5										9
1999	3	3	1								1		8
2000	12	4	1									4	21
2001		3									1	2	6
2002	3											3	6
2003	1	5	5								1		12
2004	1	3	1	1							1		7
2005	3	1	2	1	1							2	10
2006	4	4	3								1	1	13
2007	2			1								1	4
2008	4	7	1	1								4	17
2009	5	6	9								2	1	23
2010	5	3	1									2	11
2011	6	1	3	1							2	3	16
2012	10	14	7									4	35
2013	9	6	5									3	23
2014	1		2								3	1	7
2015	4	7	4	3								3	21
2016	5	3	2								2	15	27
2017	5	3	3								3	3	17
2018	8		1								1	5	15
2019	7	3	4	3								4	21
2020	11	7	5										23
2021	5	2	4	3								4	18
2022	9	3	8									4	24
ORT	5.1	4.4	3.6	1.9	2.0						1.9	3.7	22.6

2.1 Eğilim (Trend) Analizleri

Trend analizlerinde Spearman Sıra Korelasyon testi, Kendall Sıra Korelasyon testi ve Sen Eğilim testi yöntemleri kullanılmıştır.

2.1.1. Spearman Sıra Korelasyon Testi

Programda trend analizinde Spearman Sıra Korelasyon testinden yararlanılacaktır. Spearman Sıra Korelasyon katsayısı R_{sp} 'nin hesaplanmasını ve test edilmesini esas alır. R_{sp} şöyle tanımlanır:

$$R_{sp} = 1 - \left[\frac{\sum_{i=1}^n (D_i * D_i)}{[n(n-1)]} \right] \quad (1)$$

Burada;

n = Toplam gözlem sayısını,

i = Kronolojik sıra numarasını,

$D_i = K_{xi} - K_{yi}$; Sıralamalar arasındaki farkı,

$K_{xi} = x$ gözleminin kronolojik gözlem sıra numarasını,

$K_{yi} =$ Gözlemler küçükten büyüğe sıralandığında; elde edilen y_i gözleminin kronolojik gözlem sırasında aldığı i değerini temsil eder.

Eğer gözlenen değişken, gözlem süresince müteakip zamanlarda t defa aynı $x = x$ değerini almışsa ve bu gözlemin sıralanmış haldeki ilk sıra değeri $K_{xi} = k$ ise, bu gözlem için,

$$K_{xi} = \left[\sum_{i=1}^t (k + i - 1) \right] / t \quad (2)$$

R_{sp} hesaplandıktan sonra, gidişin olmadığına ilişkin $H_0 : R_{sp} = 0$ ve alternatif hipotez, $H_1 : R_{sp} \neq 0$ hipotezi kurulur. R_{sp} ; $v = n - 2$ serbestlik dereceli t dağılımı gösterdiğinden;

$$t_{hesap} = R_{sp} * \left[\frac{(n-2)}{(1-R_{sp}^2)} \right]^{1/2} \quad (3)$$

hesaplanarak %5 önem düzeyinde tablo değeri ile kıyaslanarak test gerçekleştirilir. Eğer, $t_{cetvel} \{v, \%2.5\} < t_{hesap} < t_{cetvel} \{v, \%97.5\}$ koşulu gerçekleşirse, H_0 hipotezi kabul edilir ve gözlem serisinde gidişin olmadığına karar verilir. Aksi takdirde Gözlem serisi gidişe sahip olacağından dolayı, veriler frekans analizinde veya modelleme çalışmalarında kullanılamaz.

2.1.2. Mann-Kendal Sıra Korelasyon Testi

Çalışmada trend analizinde kullanılacak diğer bir yöntemde Kendall Sıra Korelasyon testidir. Bu yöntemde göre; X_1, X_2, \dots, X_n olarak tanımlanan bir seride $(X_i, X_j; j > i)$ X'lerin X_1 'leri geçme sayıları toplamına p denilirse, $(i=1, j=2, 3, 4, \dots, n-1, j=n)$ τ nun beklenen değeri ve varyansı denklem (4) ile hesaplanır.

$$V = 4 \left[\frac{p}{n(n-1)} \right] - 1 \quad (4)$$

$$Var(V) = 2 \left[\frac{(2n+5)}{9n(n-1)} \right]$$

Z istatistiği denklem (4) ile tanımlanmaktadır.

$$Z_{\text{hesap}} = \frac{V}{\sqrt{Var(V)}} \quad (5)$$

Z_{hesap} değeri α önem seviyesindeki tablo değerini aşması durumunda gidişin varlığına karar verilir (Kottegoda, 1980).

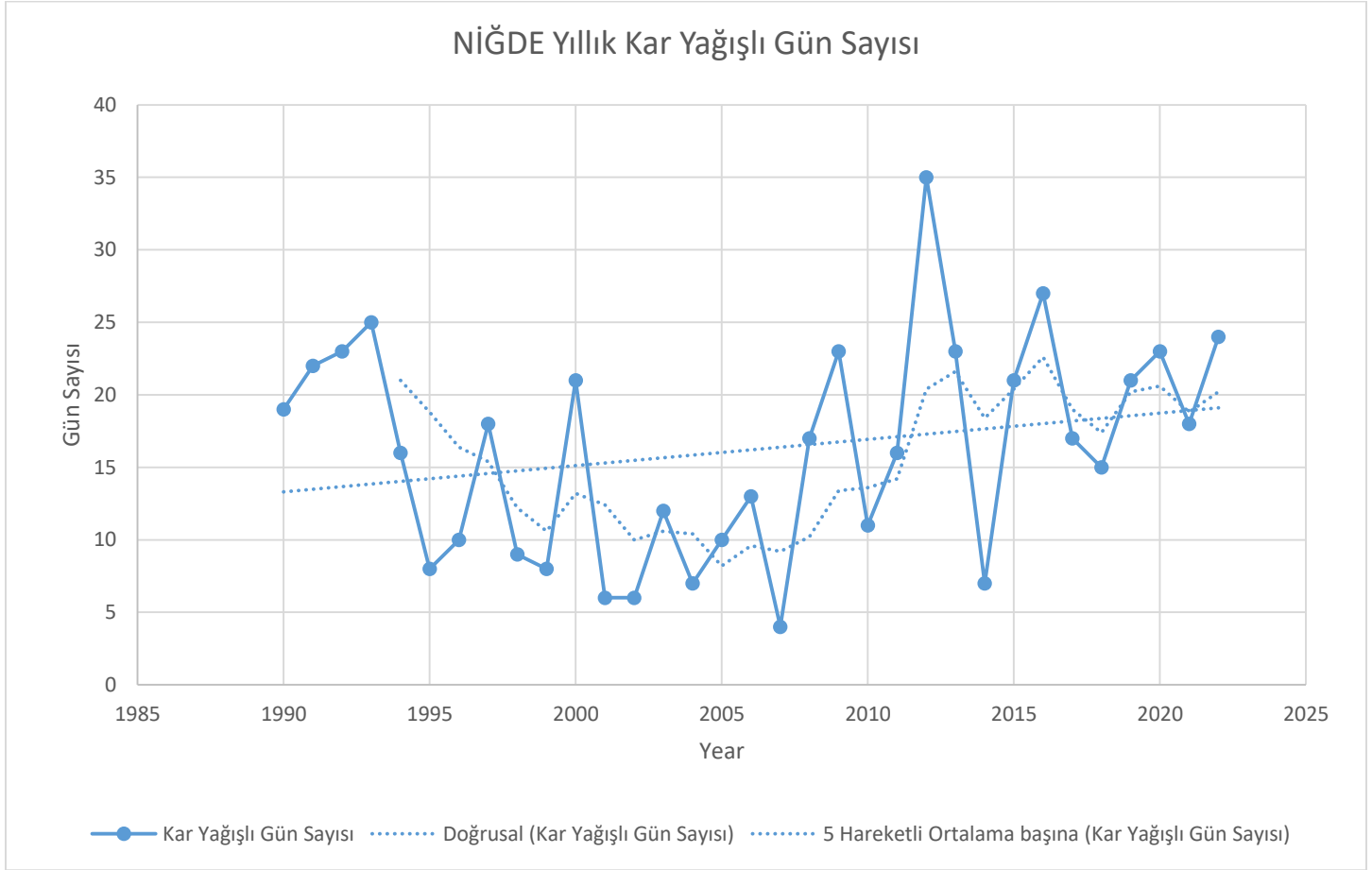
2.1.3. Sen'in Eğim Testi

Trendlerin lineer eğilimlerini belirlenmek için uygulanan Sen'in eğim testi (1968), Hirsch (1982) tarafından önerilen parametrik olmayan bir testtir (Hirsch, Slack & Smith, 1982, 1984, Van Belle and Hughes 1984; Sen 1968). Bu teste aşağıdaki eşitlikten (6) yararlanılır (Partal, 2003).

$$m = \text{median} \left(\frac{x_j - x_k}{j - k} \right), \forall j < i \quad (6)$$

3. Araştırma Bulguları ve Tartışma

Niğde ili yıllık kar yağışlı gün sayısı grafiği Şekil2 de verilmiş olup 1990-2022 dönemi için maksimum değer 2012 yılında 35 gün olduğu ve minimum kar yağışlı gün sayısının ise 2007 yılında 4 gün olduğu görülmektedir. Doğrusal eğri grafiğinde hafif bir artış eğilimi olduğu görülmektedir.



Şekil2. Niğde ili yıllık toplam kar yağışlı gün sayısı grafiği.

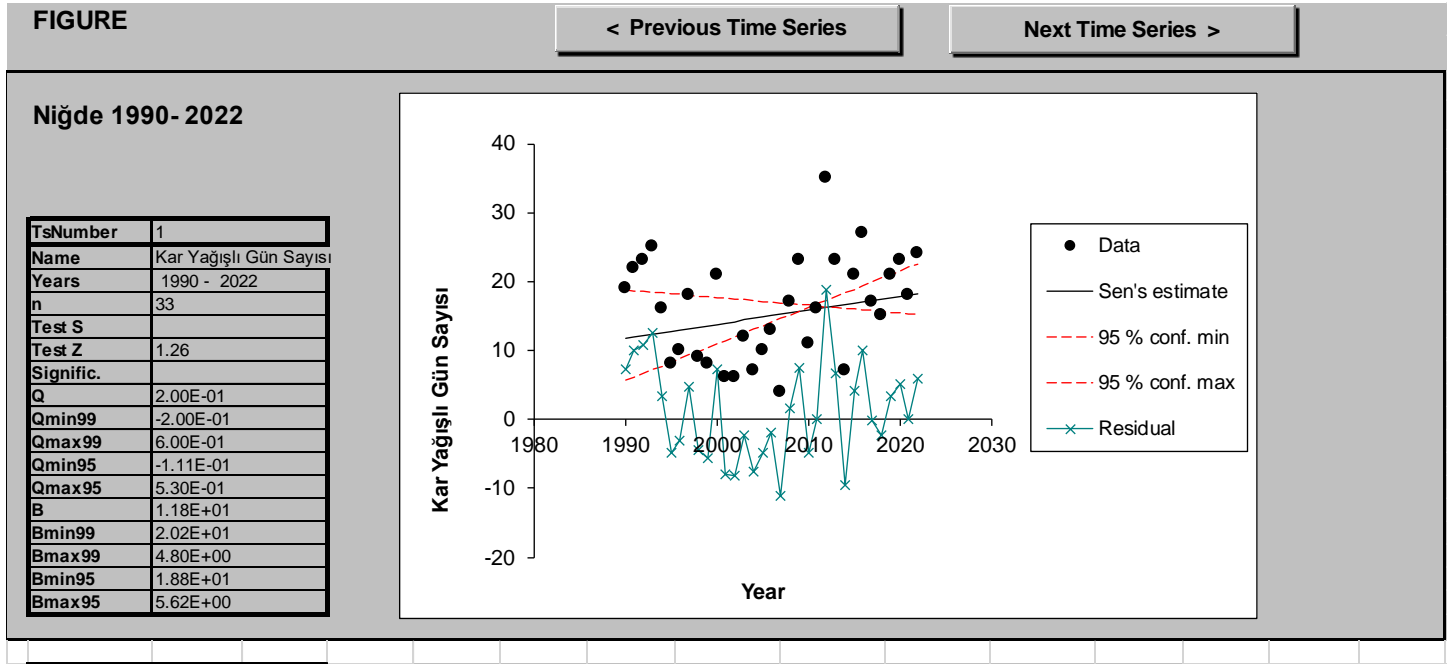
Niğde ili kar yağışlı günler sayısı verilerinin Spearman Sıra Korelasyon Testi hesaplamaları manuel olarak yapılmıştır. Test istatistik sonuçları Tablo3 te verilmiştir. Buna göre kar yağışlı günler sayısında %5 önem düzeyinde herhangi bir eğilim bulunmamaktadır.

Tablo3. Sperman Sıra Korelasyon Testi

N	rs	p	± α	Değerlendirme	Veri
33	0,272	0,126	0,05	p < α0,05 Ho kabul	Yıllık kar yağışlı günler sayısı

Mann-Kendall sıra korelasyon ve Sen eğilim testi hesaplamalarında MAKASENS1.0 yazılımı kullanılmıştır (Anonim, 2002). Bu MSEXcel şablonu, atmosferik kimyanın yıllık değerlerinin zaman serisindeki eğilimi tespit etmek ve tahmin etmek için geliştirilmiştir. Kullanılan istatistiksel yöntemler, monotonik artan veya azalan eğilimin varlığını test etmek için parametrik olmayan Mann-Kendall testi ve doğrusal bir eğilimin eğimini

tahmin etmek için parametrik olmayan Sen yöntemidir. Mann-Kendall testi en az 4 değer gerektirir ve Sen'in eğim tahmini için güven aralıklarının hesaplanması bir zaman serisinde en az 10 değer gerektirir. MAKASENS yazılımında yapılan hesaplama Şekil3 te gösterilmiştir. İstatiksel değerler ise Tablo4 ve Tablo5 te belirtilmiştir. Hesaplana $u(t)$ değeri tablo değerinden küçük olması sebebiyle %5 önem düzeyinde istatistiki açıdan önemli bir eğilim göstermediğine karar verilmiştir. Yine aynı şekilde eğilimin önemliliği % 5 önem dizeyinde Q ve B değerleri maximum ve minimum değerleri arasında olması sebebiyle önemli değildir



Şekil3 MAKASENS1.0 yazılımı ile Niğde yıllık kar yağışlı gün sayısı verisinin Mann-Kendall ve Sen Eğilim analizi.

Tablo4. Mann-Kendal Sıra Korelasyon Testi

N	$u(t)$	$\pm t_{\text{cetvel}}$	Değerlendirme	Veri
33	1,26	1,96	$t_{\text{hesap}} < t_{\text{cetvel}}$ Ho accept	Yıllık kar yağışlı günler sayısı

Tablo5. SEN Eğilim Testi

Q	Qmin95	Qmax95	B	Bmin95	Bmax95	Değerlendirme	Veri
0.200	-0.111	0.530	11.80	18.78	5.62	Ho accept	Yıllık kar yağışlı günler sayısı

Analiz sonuçlarına göre Niğde ilinin yıllık toplam yağış verilerinde non parametrik trend testlerine (Runs, Mann-Kendal ve Spearman sıra korelasyon) göre yağış verilerinde %5 önem düzeyinde anlamlı bir eğilim tespit edilmemiştir. Buna Karşın parametrik trend testi ve eğilimin önemliliğinde (En Küçük Kareler Doğrusal Regresyon (EKKDR) Analizi ve B'nin Anlamlılığı için Student T-Testi) %1 önem seviyesinde anlamlı artış trendi görülmüştür.

4.Sonuçlar ve Öneriler

Analiz edilen 1990-2022 dönemi yıllık toplam kar yağışı gün sayısı değerlerinde; Sperman Sıra Korelasyon Testi, Mann-Kendall ve Sen Eğilim Yöntemlerine göre Niğde ili yıllık kar yağışı gün sayısı değerleri istatistiksel açıdan önemli bir artma veya azalma eğilimi göstermemektedir. Bu sonuçlar literatürde belirtilen diğer çalışmalarla “Niğde için yağış miktarlarında önemli bir değişim/eğilim göstermemesiyle” paralellik göstermektedir. Sonraki çalışmalarda mevsimlik ve aylık bazda ve daha uzun süreli periyodlarla (1960-2022 gibi) yapılması durumunda sonuçlar farklılık gösterebilecektir.

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1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

NİĞDE'DE YAĞIŞLARDA EĞİLİMLER VE DEĞİŞKENLİK: ÇOK YÖNTEMLİ BİR İSTATİSTİKSEL ANALİZ

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Özet

Hidrolojik modelleme, iklim değişikliği araştırması, sulama planlaması, su kaynakları yönetimi, taşkın tahmini, su dengesi hesaplaması, tarımsal üretim için toprak nemi modellemesi vb. gibi birçok amaç için yağışın coğrafi dağılımının niceliksel değerlendirmesi gereklidir. Trend analizi, iklim değişikliğinin bölgesel su kaynaklarının mevcudiyetini, kuraklık dağılımını ve sel sıklığını nasıl etkilediğini göstermektedir. Hidrolojik verilerdeki eğilimleri analiz etmek, iklim değişikliğinin etkilerini anlamak ve su yönetimi ve ürün desenleri hakkında bilinçli kararlar vermek için çok önemlidir. Sunulan çalışmanın amacı, 1960'dan 2021'ye kadar Niğde'de yıllık yağış miktarında ki eğilimlerini araştırmak, zamansal ve mekânsal değişimleri analiz etmek ve potansiyel değişim noktalarını belirlemektir. Bu araştırmada, zamana bağlı eğilimleri tespit etmek amacıyla parametrik ve parametrik olmayan testlerde sıklıkla kullanılan Mann-Kendall trendi, Run testi, Wald-Wolfowitz testi, Spearman katsayısı, En Küçük Kareler Doğrusal Regresyon analizi ve Student t-testi kullanılmıştır. Türkiye'deki Niğde meteoroloji istasyonunun yağış miktarı verileri yıllık bazda analiz edildi. Olası eğilimleri tespit etmek için Spearman sıra korelasyonu ve Mann-Kendall testleri, tüm zaman serisi boyunca değişimin büyüklüğünü tahmin etmek için En Küçük Kareler Doğrusal Regresyon testi kullanıldı. 1960-2021 yılları arasında Niğde ilinin yağış miktarının ortalama, maksimum ve minimum değerleri 1960-2021 yılları arasında 334 mm, 483,3 mm ve 192,9 mm olarak belirlenmiştir. Elde edilen sonuçtan seride gözlenen yukarı yönlü trendin anlamlı olmadığı, serinin trend açısından rastgele kabul edildiği sonucuna varabiliriz.

Anahtar Kelimeler: iklim değişikliği, zaman serileri, hidrometeorolojik seriler, parametrik ve parametrik olmayan istatistiksel analizler,



TRENDS AND VARIABILITY IN PRECIPITATION IN NIĞDE: A MULTIMETHOD STATISTICAL ANALYSIS

Abstract

For many objectives, such as hydrological modelling, climate change research, irrigation scheduling, water resource management, flood forecasting, water balance calculation, soil moisture modelling for agricultural production, etc., quantitative assessment of the geographical distribution of rainfall is necessary. Trend analysis illustrates how climate change affects regional water resource availability, distribution of droughts, and frequency of floods. Analyzing trends in hydrological data is crucial for understanding the effects of climate change and making informed decisions about water management and crop patterns. The objective of the presented study was to investigate precipitation trends, analyze temporal and spatial variations and identify potential change points in Niğde throughout the period from 1960 to 2021. This research employed the Mann-Kendall trend, Run test, Wald-Wolfowitz test, Spearman coefficient, Least Squares Linear Regression analysis, and Student t-test, which are frequently employed for parametric and non-parametric tests to identify significant temporal pattern trend. Precipitation data were analyzed for Niğde meteorological station in Turkey on an annual basis. Spearman rank correlation and Mann-Kendall tests were utilized to detect possible trends and Least Squares Linear Regression to estimate the magnitude of change throughout the entire time series. The average, max and min values of precipitation amount of Niğde was determined 334 mm, 483,3 mm and 192.9 mm between the years 1960 and 2021. From the result obtained, we can conclude that the upward trend observed in the series is not significant, the sequence is considered random in terms of trend here.

Keywords: climate change, time series, hydro-meteorological series, parametric and non-parametric statistical analyses

1.Giriş

Sürdürülebilir kalkınma söz konusu olduğunda iklim değişikliğiyle ilgili endişeler en önemli konular arasında yer alıyor; diğer faktörler arasında dünyanın birçok yerinde artan deniz seviyeleri, vahşi orman yangınları, dağlardaki karların erimesi, şiddetli kuraklıklar vb. yer almaktadır (Ali, 2018; Dioha ve Kumar, 2020).

Hidrolojik modelleme, iklim değişikliği araştırması, sulama planlaması, su kaynakları yönetimi, taşkın tahmini, su dengesi hesaplaması, tarımsal üretim için toprak nemi modellemesi vb. gibi birçok amaç için yağışın coğrafi dağılımının niceliksel değerlendirmesi gereklidir (Dubey et al. diğerleri, 2012; Meehl, 2000). Trend analizi, iklim değişikliğinin bölgesel su kaynaklarının mevcudiyetini, kuraklık dağılımını ve sel sıklığını nasıl etkilediğini göstermektedir. Su, Türkiye'de özellikle tarımsal kullanım açısından en değerli kaynaktır (%74) ve iklim değişikliğinin su kaynaklarında yol açtığı değişiklikler ve bunların tarımsal üretim üzerindeki etkileri, gelecekteki su kaynaklarının planlanması ve sürdürülebilir tarımsal büyüme stratejisi açısından aynı derecede önemlidir. (Pamuk ve diğerleri, 2011; Özkul, 2009). Mann-Kendall parametrik olmayan testi, hidro-meteorolojik zaman serilerindeki eğilimlerin önemini değerlendirmek için yaygın olarak kullanılmaktadır (Yue ve Wang, 2002). Zaman serisi modellerini analiz etmek için en popüler iki parametrik olmayan teknik, Mann-Kendall ve Spearman'ın rho testleridir (Lehmann, 1995; Sneyers, 1990). Tek bir açıklayıcı değişken, bağımsız değişken, yanıt değişkeni veya bağımlı değişken, basit bir doğrusal regresyonu oluşturur (Neter 1996; Montgomery ve Runger, 2002).

Bu çalışmada, Niğde'nin yıllık toplam yağış verilerinde önemli zamansal eğilimleri tespit etmek amacıyla parametrik ve parametrik olmayan testler kullanılmıştır.

2.Materyal ve Metod

Bu çalışma coğrafi olarak 37,9587 kuzey enlemi ile 34,6795 doğu boylamında yer alan İç Anadolu bölgesinde karasal iklimin hakim olduğu Niğde ilini kapsamaktadır. Rakım 1211 m olup Niğde iline ait klimatolojik veriler Tablo1 de verilmiştir. Çalışmada yıllık toplam yağış verisi kullanılmış olup uzun yıllar ortalaması 343.3 mm dir.

Tablo1. Niğde ili uzun yıllar ortalama iklim verileri

NIGDE	Ocak	Şubat	Mart	Nisan	Mayıs	Haziran	Temmuz	Ağustos	Eylül	Ekim	Kasım	Aralık	Yıllık
Ölçüm Periyodu (1935 - 2022)													
Ortalama Sıcaklık (°C)	-0.3	1.2	5.0	10.6	15.2	19.2	22.5	22.4	18.1	12.5	6.5	1.9	11.2
Ortalama En Yüksek Sıcaklık (°C)	4.8	6.5	10.9	16.8	21.5	25.8	29.4	29.6	25.7	19.7	13.0	7.1	17.6
Ortalama En Düşük Sıcaklık (°C)	-4.6	-3.4	-0.2	4.4	8.4	11.9	14.8	14.5	10.4	6.0	1.2	-2.5	5.1
Ortalama Güneşlenme Süresi (saat)	3.7	4.9	5.7	6.9	8.4	10.3	11.5	11.1	9.9	7.3	5.4	3.7	7.4
Ortalama Yağışlı Gün Sayısı	10.92	10.31	11.35	11.06	11.74	6.92	1.78	1.52	2.91	6.41	7.42	10.67	93.0
Aylık Toplam Yağış Miktarı Ortalaması (mm)	35.7	33.1	36.0	40.9	48.4	28.5	5.1	6.7	10.6	26.0	31.3	41.0	343.3
Ölçüm Periyodu (1935 - 2022)													
En Yüksek Sıcaklık (°C)	19.9	20.5	26.4	30.8	33.0	35.0	38.5	38.5	37.3	32.0	25.0	21.2	38.5
En Düşük Sıcaklık (°C)	-25.6	-24.2	-23.9	-6.9	-2.6	3.5	6.6	6.5	-0.7	-6.2	-19.5	-24.0	-25.6

(Kaynak: <https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=undefined&m=NIGDE>)

Bu araştırmada, zamana bağlı eğilimleri tespit etmek amacıyla parametrik ve parametrik olmayan testlerde sıklıkla kullanılan Mann-Kendall trendi, Run testi, Wald-Wolfowitz testi, Spearman katsayısı, En Küçük Kareler Doğrusal Regresyon analizi ve Student t-testi kullanılmıştır. Türkiye'deki Niğde meteoroloji istasyonunun yağış miktarı verileri yıllık bazda analiz edildi. Olası eğilimleri tespit etmek için Spearman sıra korelasyonu ve Mann-Kendall testleri, tüm zaman serisi boyunca değişimin büyüklüğünü tahmin etmek için En Küçük Kareler Doğrusal Regresyon testi eğimin anlamlılığını test için Student t-testi kullanıldı.

2.1 Eğilim (Trend) Analizleri

Trend analizlerinde Gidiş testi, Kendall Sıra Korelasyon testi, Spearman Sıra Korelasyon testi ve En Küçük Kareler yöntemi kullanılacaktır.

2.1.1. Gidiş (Runs) Testi

Genel olarak bu yöntemde, medyan, gözlem dizisi içinde bir sınır değeri olarak alınıp, bu ortancanın altında veya üstünde giden ardışık gözlem gruplarının her biri gidiş (runs) olarak biçimlendirilir ve gidişler R ile gösterilir. Gidişler için, dağılım fonksiyonunun ortalaması ve varyansı sırasıyla,

$$E(R) = \frac{n}{2} + 1 \quad (1)$$

$$\text{Var}(R) = \frac{n-1}{4} \quad (2)$$

formülleri ile hesaplanır.

Burada;

H_0 : Gözlemler tek bir evrenden çekilmiştir;

H_1 : Gözlemler farklı bir evrenden çekilmiştir.

şeklinde olup, H_0 savı altında gidişlerin sayısı R 'nin dağılımı normaldir. Bu nedenle, genellikle tek yanlı olasılık değerleri veya normal dağılım yaklaşımı için standart sınaama örnekleme değeri;

$$z = \frac{R - E(R)}{\sqrt{\text{Var}(R)}} \quad (3)$$

olarak hesaplanır ve boş savı, dağılımın tek yanlı şekline ($z_{1-\alpha}$) göre büyük z değerleri için red edilir.

2.1.2. Kendal Sıra Korelasyon Testi

Çalışmada trend analizinde kullanılacak diğer bir yöntemde Kendall Sıra Korelasyon testidir. Bu yöntemde göre; X_1, X_2, \dots, X_n olarak tanımlanan bir seride ($X_i, X_j; j > i$) X 'lerin X_1 'leri geçme sayıları toplamına p denilirse, ($i=1, j=2, 3, 4, \dots, n-1, j=n$) τ nun beklenen değeri ve varyansı denklem (4) ile hesaplanır.

$$V = 4 \left[\frac{p}{n(n-1)} \right] - 1 \quad (4)$$

$$\text{Var}(V) = 2 \left[\frac{(2n+5)}{9n(n-1)} \right]$$

Z istatistiği denklem (4) ile tanımlanmaktadır.

$$Z_{\text{hesap}} = \frac{V}{\sqrt{\text{Var}(V)}} \quad (5)$$

Z_{hesap} değeri α önem seviyesindeki tablo değerini aşması durumunda gidişin varlığına karar verilir (Kottegoda, 1980).

2.1.3. Spearman Sıra Korelasyon Testi

Programda trend analizinde Spearman Sıra Korelasyon testinden yararlanılacaktır. Spearman Sıra Korelasyon katsayısı R_{sp} 'nin hesaplanmasını ve test edilmesini esas alır. R_{sp} şöyle tanımlanır:

$$R_{sp} = 1 - \left[\frac{\sum_{i=1}^n (D_i^2)}{n(n^2-1)} \right] \quad (6)$$

Burada;

n = Toplam gözlem sayısını,

i = Kronolojik sıra numarasını,

$D_i = K_{xi} - K_{yi}$; Sıralamalar arasındaki farkı,

K_{xi} = x gözleminin kronolojik gözlem sıra numarasını,

K_{yi} = Gözlemler küçükten büyüğe sıralandığında; elde edilen y_i gözleminin kronolojik gözlem sırasında aldığı i değerini temsil eder.

Eğer gözlenen değişken, gözlem süresince müteakip zamanlarda t defa aynı $x = x$ değerini almışsa ve bu gözlemin sıralanmış haldeki ilk sıra değeri $K_{xi} = k$ ise, bu gözlem için,

$$K_{xi} = \left[\sum_{i=1}^t (k + i - 1) \right] / t \quad (7)$$

R_{sp} hesaplandıktan sonra, gidişin olmadığına ilişkin $H_0 : R_{sp} = 0$ ve alternatif hipotez, $H_1 : R_{sp} \neq 0$ hipotezi kurulur. R_{sp} ; $v = n - 2$ serbestlik dereceli t dağılımı gösterdiğinden;

$$t_{hesap} = R_{sp} * \left[\frac{(n-2)}{(1-R_{sp}^2)} \right]^{1/2} \quad (8)$$

hesaplanarak %5 önem düzeyinde tablo değeri ile kıyaslanarak test gerçekleştirilir. Eğer, $t_{cetvel} \{v, \%2.5\} < t_{hesap} < t_{cetvel} \{v, \%97.5\}$ koşulu gerçekleşirse, H_0 hipotezi kabul edilir ve gözlem serisinde gidişin olmadığına karar verilir. Aksi takdirde Gözlem serisi gidişe sahip olacağından dolayı, veriler frekans analizinde veya modelleme çalışmalarında kullanılamaz.

2.2.1. En Küçük Kareler Doğrusal Regresyon (EKKDR) Analizi ve B'nin Anlamlılığı için Student T-Testi

İki rasgele değişkenin aynı gözlem sırasında aldıkları değerleri bir fonksiyonla ifade etmek için en küçük kareler yöntemi kullanılır. Genelde bu ilişki doğrusal bir fonksiyon ile ifade edilir ve katsayıları bu yöntemle belirlenen doğruya regresyon doğrusu denir. İklim ve akım verilerinde zamanla bir değişimin olup olmadığı yani verilerin trendi bu doğru yardımı ile kolay bir şekilde gözlenir.

Aralarında anlamlı bir ilişki bulunan iki rasgele değişkenden y ile gösterilen bağımlı değişkenin (iklim ve akım verileri) değerini x ile gösterilen bağımsız değişkenin (zaman) verilen bir değeri için ifade etmeye yarayan regresyon doğrusunun genel denklemi şu şekildedir (Bayazıt, 1998).

$$y = a + bx \quad (9)$$

bu ifade de a, y değişkeninin başlangıç değeridir, b ise doğrunun eğimidir. “a” ve “b” katsayıları aşağıdaki formüllerle hesaplanır.

$$a = \bar{y} - b\bar{x}$$
$$b = \frac{\sum [(x_i - \bar{x})(y_i - \bar{y})]}{\sum (x_i - \bar{x})^2} \quad (10)$$

EKKDR katsayısı β 'nin anlamlılığına ilişkin student t testi şu şekilde hesaplanır (Türkeş, 2011):

En küçük kareler hesaplamaları için gerekli temel denklemler:

$i = 1, 2, \dots, n$ 'e kadar, X_i ve Y_i , iki değişkene ait diziler olmak üzere:

$$X' = \frac{\sum_{i=1}^n X_i}{n} \quad (11)$$

$$Y' = \frac{\sum_{i=1}^n Y_i}{n} \quad (12)$$

$$a = Y' \quad (13)$$

$$x_i = X_i - X' \quad (14)$$

$$b = \frac{\sum_{i=1}^n x_i * Y_i}{\sum_{i=1}^n x_i ** 2} \quad (15)$$

$$Y' = a + b * x_i \quad (16)$$

$$Y = a + bx \quad (17)$$

β 'nin anlamlılığı için hipotez testi (regresyon veya X katsayısı) (Student t testi):

Öncelikle Y 'in varyansı s^2 , aşağıdaki denklemle tahmin edilir (Denklem 18):

$$s^2 = \frac{1}{n-2} \sum_{i=1}^n (Y_i - Y'_i)^2 \quad (18)$$

Burada, \hat{Y}_i , $\hat{Y}_i = \alpha + \beta x_i$ eşitliği ile kestirilen regresyon çizgisi üzerindeki Y'nin uydurulan değeridir. s^2 'ye, 'residual varyans' da denir; s ise, Y'nin standart hatası olarak adlandırılır.

Sonra β 'nın (eğimin) anlamlılığı için *Student t sınaması* gerçekleştirilir:

$$t = \frac{\beta' - \beta}{\sqrt{s^2 / \sum_{i=1}^n x_i^2}} \quad (19)$$

t , $(n-2)$ bağımsızlık sayısı ile birlikte *Student t* dağılır.

Yukarıda verilen eşitlik yalınlaştırılarak daha kolay yazılabilir:

$$t = \frac{\beta' - \beta}{S_{\beta'}} \quad (20)$$

Burada,

$$S_{\beta'} = \frac{s}{\sqrt{\sum_{i=1}^n x_i^2}} \quad (21)$$

β 'nın standart hatası ya da tahmini standart sapma olarak adlandırılır.

Sınama örneklemdeğeri t , $(n-2)$ bağımsızlık sayısı ile birlikte *Student t* dağılır. "Gözlemler bir eğilim göstermiyor" (ya da Gözlemlerde herhangi bir eğilim yoktur) boş hipotezi, dağılımın iki yanlı şekline göre $|t|$ 'nin büyük değerleri için ($|t| \geq t_{\alpha/2}$) reddedilir.

2.3.1. Bağımsızlık Testleri (Wald-Wolfowitz Testi)

Gözlem serisindeki ardışık elamanların bağımsızlıkları Toplam Bağımsızlık testi (Wald-Wolfowitz teoremi) ile analiz edilecektir. Çalışmada örnek elamanlarını bağımsızlık testinde Wald Wolfowitz teoreminden yararlanılacaktır. Bu teorem gereğince;

$$R = x_i * x_n + \sum_{i=1}^{n-1} (x_i * x_{i+1}) \quad (22)$$

$$M(R) = (s^2_1 - s_2) / n - 1 \quad (23)$$

$$D^2(R) = [(s^2_2 - s_4) / n - 1] + [[(s^4_1 - 4s^2_1s_2 + 4s_1s_3 + s^2_2 - 2s_4) / (n-1)(n-2)] - M^2(R)] \dots\dots\dots (24)$$

Burada:

n: Örnek hacmini,

x_i : Gözlemler azalan sırada (büyükten küçüğe doğru) dizildiğinde i. elemanı,

$$s_j = \sum_{i=1}^n x_i \text{ 'yi gösterir.}$$

$$P_{hesap} = 200[1 - F_{(z)}]; \quad z = |R - M(R)| / D(R) \quad (25)$$

$$F_{(z)} = 2\pi^{-1} \int_{-\infty}^{+z} e^{-\frac{1}{2}z^2} dz \quad (26)$$

3. Araştırma Bulguları ve Tartışma

Manuel olarak yapılan hesaplamaların sonuçları tablo2-6 da gösterilmiştir.

Tablo 2. Runs Testi (Gidişler Testi)

N	R	medyan	E(R)	Var(R)	Z	f(z)	Değerlendirme	Değer
62	33	334,9	32	15,25	0,256	0,6026	H ₀ kabul (Bağımsız)	Yıllık yağış

Tablo 3. Mann-Kendal Sıra Korelasyon Testi

N	u(t)	± t_cetvel	Değerlendirme	Değer
62	0,69	1,96	t_hesap < t_cetvel Ho kabul	Yıllık yağış

Tablo 4. Sperman Sıra Korelasyon Testi

N	rs	t_hesap	± t_cetvel	Değerlendirme	Değer
62	0,104	0,812	2,000	thesap < tcetvel Ho kabul	Yıllık yağış

Tablo 5. Basit Doğrusal Regresyon Analizi (EKKDR) ve Student-t

a	b	S ²	Thesap	± t_cetvel	Y	Sonuç	Değer
333,9	0,752	4999,3	2,984	2,66	333.9 + 0.752* xi	Ho red**	Yıllık yağış

Tablo 6. Wald-Wolfowitz Testi (Bağımsızlık Testi)

N	Yort	S ²	R	r	u(r)	ztablo %5	Değerlendirme	Değer
62	31,5	19855,5	2212,5	0,11	0,987	1,645	Bağımsız	Yıllık yağış

Analiz sonuçlarına göre Niğde ilinin yıllık toplam yağış verilerinde non parametrik trend testlerine (Runs, Mann-Kendall ve Spearman sıra korelasyon) göre yağış verilerinde %5 önem düzeyinde anlamlı bir eğilim tespit edilmemiştir. Buna Karşın parametrik trend testi ve eğilimin önemliliğinde (En Küçük Kareler Doğrusal Regresyon (EKKDR) Analizi ve B'nin Anlamlılığı için Student T-Testi) %1 önem seviyesinde anlamlı artış trendi görülmüştür.

4.Sonuçlar ve Öneriler

Analiz edilen 1960-2021 dönemi yıllık toplam yağış miktarlarında; Mann-Kendall ve Sperman Sıra Korelasyon Testi Yöntemlerine göre Niğde ili Yıllık Yağış Değerleri istatistiksel açıdan önemli bir artma veya azalma eğilimi göstermemektedir. Buna karşın EKKDR Yöntemine göre Niğde ili Yıllık Yağış Değerleri istatistiksel açıdan önemli (%1 önem düzeyinde) bir artış eğilimi vardır. Yağış miktarındaki artış yağış şiddetiyle birlikte olmasından dolayı tarım ve sigorta gibi pek çok alanda olumsuz sonuçları beraberinde getirebilecektir. Kış Yağışlarında kar yağışının azalıp yerini yağmura bırakması toprak neminin korunması, bahar aylarında su kaynaklarının beslenmesi gibi konularda önemli sorunlar çıkarabilecektir.

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BATI KARADENİZ BÖLGESİ TARIM TOPRAKLARININ VERİMLİLİK AÇISINDAN DEĞERLENDİRİLMESİ: SAKARYA İLİ ÖRNEĞİ

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Özet

Bu çalışmada, Sakarya ilinin çeşitli köylerinde bulunan aronya, zeytin, arpa, fındık, yabanmersini, bal kabağı, Trabzon hurması, ceviz, fındık, sebze fideleri, buğday, ayçiçeği, mısır, elma, kivi, kiraz, kuru erik, kuru ceviz, kuru fındık gibi ürünlerin ekim nöbetiyle yoğun tarımsal aktiviteleri ile çalışılan alanlardan toplanan ve toplam 28 adet toprak numunesinin analizleri laboratuvarında gerçekleştirilmiş olup sürdürülebilir verimlilik kapasitelerinin tespit edilmesi hedeflenmiştir. Toplanan numunelerin ortalama pH, toplam tuz, organik madde ve kireç içerikleri sırasıyla 6.82; %0.02; %2.03 ve %13.67 şeklinde saptanmıştır. Alınan toprak numunelerinin çoğunda (18 adet) “killi tın” tekstür sınıfı belirlenmiştir. Aynı şekilde toprak numunelerinin total N içerikleri minimum “%0.06” ve maksimum “%0.15” şeklinde tespit edilmiştir. Toprak numunelerinin ortalama P ve K içeriklerinin 5.62 ppm ve 340.87 ppm olduğu saptanmıştır. Toprak numunelerinin ortalama organik maddesine bakıldığında “orta düzeyde” oldukları saptanmıştır. Söz konusu numunelerin ortalama değerleri hesaplandığında P açısından “az”; K açısından “yeterli” sınıfına girdikleri saptanmıştır. Özetle; aynı standartta devam edebilen bir tarımsal faaliyetin gerçekleştirilmesi ve topraklardan yüksek ve nitelikli randıman alınabilmesi için üreticiler mutlak suretle toprak ve analizlerini yaptırmalı ve gübreleme izlencelerinde sadece kimyevi gübrelemeye önem vermemeli aynı zamanda organik ile organomineral gübrelerin de kullanımı sağlanmalıdır.

Anahtar Kelimeler: Toprak analizi, organik madde, Sakarya

Abstract

In this study, the results of the analyses of a total of 28 soil samples collected from the fields where intensive agricultural activities are carried out with the crop rotation of crops such as aronia, olive, barley, hazelnut, blueberry, pumpkin, persimmon, walnut, hazelnut, vegetable seedlings, wheat, sunflower, corn, apple, kiwi, cherry, prune, dried walnut, dried hazelnut in various villages of Sakarya province were carried out in the laboratory and it was aimed to determine the sustainable productivity capacities. The average pH, total salt, organic matter and lime contents of the collected samples were 6.82, 0.02%, 2.03% and 13.67%, respectively. "Clay loam" texture class was determined in most of the soil samples (18). Similarly, total N contents of the soil samples were determined as minimum "0.06%" and maximum "0.15%". The average P and K contents of the soil samples were 5.62 ppm and 340.87 ppm, respectively. The average organic matter of the soil samples was found to be "medium". When the average values of these samples were calculated, it was found that they were classified as "low" in terms of P and "sufficient" in terms of K. To summarise; in order to carry out an agricultural activity that can continue at the same standard and to obtain high and qualified yields from soils, producers should definitely have soil and soil analyses done and should not only give importance to chemical fertilisers in fertilisation schematics, but also organic and organomineral fertilisers should be used.

Key words: Soil analysis, organic matter, Sakarya

GİRİŞ

Tarım; gıda, geçim, sağlıklı yaşam ve ısınma gibi temel insan ihtiyaçlarını belirleyen en önemli ve hassas sektördür. Üretim yeri, tarım ve topraktır. Tarımın olmazsa olmazlarından olarak görülen toprağın kabul edilmesi ne denli doğru olsa da bu anlama biçimi hakikatin sadece bir kısmını ifade etmektedir. Bitkisel ve hayvansal üretimin başlangıcı hiç kuşkusuz topraktır. Bitkilerin tutunma ve hayvanların beslenme ortamıdır. Özetle toprak, tabiatın ve hayatın doldurulamayacak bir parçasıdır (Anonim, 2014).

Tarımla uğraşanların esas gayesi kaliteli fazla miktarda ürün elde etmek ve kazançlarını yükseltmektir. Bu amaca ulaşmak, bitkilerin doğal büyüme ortamında toprak verimliliğinin korunması ve dayanıklılığının artırılması ile ilgilidir. Devimsel ve değişebilir bir düzende olan toprak, bitkilere su ve besin elementlerini tedarik etmede mahsuldar bir yapıdadır. Bu toprak dayanımı, toprağın bitki büyüme özelliklerini doğrudan veya dolaylı olarak etkileyen fiziksel, kimyasal ve biyolojik miktarlarını olumsuz yönde sınırlamamalıdır. Bitkisel imalat esnasında tarım topraklarının bitki besin elementlerince fakirleşmesi tarım sektöründe oldukça ehemmiyetli bir konudur. Hem verimli hem de yüksek miktarlarda mahsulün elde edilebilmesi söz konusu vaziyetin titizlikle gözlemlenmesine, gerekliliklerin uygulanmasına ve dolayısıyla ihtiyaç olanın yerine getirilmesine bağlıdır (Kacar ve Katkat, 2009).

Tarım, durmadan kalabalıklaşan bir insan kitlesinin daha iyi beslenmesini sağlamasına rağmen bin yıllar içinde, son derece nazik çevre dengelerini ihtiyatsızca bozmuştur. İnsanlık, aldırış edilmeyen veya varlığından habersiz olunan bu dengeleri her ne pahasına olursa olsun, koruma bilincine ancak 20. yüzyılın sonunda varmıştır. İnsanoğlunun tarım çalışmaları, doğal koşullara giderek daha fazla uyum sağlaması ve sürekli geliştirilen teknikler sayesinde yüzyıllar içinde evrime uğramıştır. Ama bugün, bin yıllık geleneklerin mirasçısı olan tarımın evrimini en fazla belirleyen etmen, tarımın sanayileşmeye, biyoteknolojilere ve dünya ekonomisinin büyük akımlarına açılımıdır (Anonim, 1999).

Tarım, bitkileri aracı olarak kullanarak topraktan en yüksek randımanı elde etme sanatı olarak ifade edilebilmektedir. Bu elde etme sanatı esnasında, en yüksek randımanı elde edebilmek için toprak sürekli olarak kullanılmakta ve bu sebeple toprak verimliliğinin en üst düzeyde korunması gerektiği bilinmekte dolayısıyla bunu başarmak için de toprakta çok yönlü bir denge ve düzenin sağlanmasına ihtiyaç vardır (Sağlam, 2012).

Memleketten memlekete, bölgeden bölgeye farklılık göstermesi ile birlikte kimyasalların tüketim miktarları ihtiyaç duyulandan çok çok üzerine çıkmıştır. Süreç ilerledikçe bu tüketimlerin negatif tesirleri bariz bir şekilde toprak, su ve havanın kirlenmesi şeklinde tespit edilmiştir. Türlü ürünlerinin renk, koku, biçim ve lezzetleri ile bu değişkenlerin meydana getirdiği aroma ve tat gittikçe azalan bir eğilim göstermiştir. Özetle; mahsul ölçüsü fazlalaşırken, ürünlerin natürel nicelikleri kaybolmuş yitirmiş ayrıca nitelikleri de eski seviyeden çok uzakta oluşmuştur. Başka bir ehemmiyetli konu ise mücadele ilaçlarının tatbik tarz ve metotlarına olması

gereken itina özenilmediği için ürünlerin üst tabakalarında üzerinde ve muhteviyatında rezidüeller meydana gelmiştir. Bilhassa ihtiyaç duyulandan daha üst seviyelerde tüketilen böcek ilacı, mantar ilacı, nematodlar için kullanılan ilaç, mite kontrol ilacı, ot ilacı vb. ilaçların çevrede meydana getirdikleri ziyanın yanı sıra kansere neden olma nitelikleri sebebiyle insan ve hayvan sıhhati üzerindeki negatif tesirlerinde frekans aralığı yüksek ayrıca kullanıcılar açısından da daha fazla benimsendiği görülmüştür. İnsanlarda çevre şuurunun gittikçe daha da fazlaşması sayesinde, tespit edilen menfiliklerden seri bir iletişim vasıtasıyla dünyanın kısa bir süreçte bilgilendirilmesi, problemler üstünde düşünülmesini ve sorunun çözülmesiyle ulaşılmaya çalışılan neticenin araştırılma safhasının hızının artmasını sağlamıştır. Tarımsal üretim esnasında parasal fon, araç-gereç ve işgücünün kullanımında uygun rehberliğin olmaması ayrıca denetim eksikliğinin bulunması ilaveten çiftçilerin bu hususlarda serbest bırakılması neticesinde meydana gelen yürütümlerin farklı memleketlerde ve farklı bölgelerde çevre kısmındaki negatif tesirlerinin daha görünür hale gelmesine neden olmuştur. Tarımda tatbik edilen kimyasalların kategorilere ayrılması ile ilgili yararıyla tedbirler, kendini geliştirmiş memleketlerde öncelikli olarak değerlendirmeye alınmaya başlanmıştır (Kacar ve Katkat, 2009).

İnsanlar sürekli gözlemler ve kuşaktan kuşağa aktarılan deneyler sayesinde, tarımsal etkinliğin bütün öğelerini oldukça iyi öğrenmiş olmalarına rağmen, bir araya gelerek çevre dediğimiz unsuru oluşturan etmenler bütünü eğer olarak denetim altına alabilmişlerdir. Bu yüzden demografik büyüme ile sonuçlanan aşırı yoğun tarla açmalarına yol açmıştır. Yoğun tarım, toprakların dengesini tehdit etmekte ve hepsinden önemlisi satmak için fazla üreten ülkelerle yaşamaya yetecek kadar üreten ülkeler arasında uçurum derinleşmektedir (Anonim, 1999).

Sentetik gübreler, bakteri ve mantarları tamamen öldürebilir veya bertaraf edebilir. Ancak, natürel gübrelerin içindeki organik yükü bünyelerinde barındırmazlar. Bu iki sebepten dolayı, bitkilere kimyasal gübreler tatbik edilse bile bu durum, toprağın kendi doğal profilini meydana getiremez ve katkısı bile olamaz (Lowenfels, 2021).

Tarımda kimyasalların hiçbir denetim olmadan ürünlere uygulanması ve bu hususta yetiştirici kesimin serbest bırakılması memleketimizde bu konularda yapılmış çalışmalarda anlatılan ehemmiyetli negatif tesirlerin meydana gelmesine neden olmuştur. Kimyasal gübreler tipik olarak asit ve bazların tuzlarıdır, üretimi için yenilenemeyen enerji gerektirir ve bir veya daha fazla bitki besin elementi ihtiva ederler. Bu nicelikleri ile tarım topraklarını bitki besin elementleri bakımından zengin duruma getirir, mahsulün kalite açısından özelliklerini daha iyi hale getirirler. Kimyasal gübreler, hammaddelerine ilaveten imalat masrafları oldukça fazla olan ve memleketimiz gibi pek çok memlekette tarım mahsulü imalatçıların ihtiyacı olan malı uygun kalite seviyesinden uygun fiyatla doğru tedarikçiden ve zamanda doğru miktarda ve de uygun ödeme planı ile temin etme güçlerini zor durumda bırakan gübrelerdir. Tarım topraklarına ihtiyacından daha yüksek

miktarlarda ve şuursuz bir şekilde kimyasal gübre tatbik edilmesi özellikle tarım mahsulü imalatçısını sonrasında aile ekonomisini ayrıca devlet ekonomisini oldukça negatif yönde tesir eder ve çevreye de tamir edilemez boyutlarda hasar verebilmektedir (Kacar ve Katkat, 2009).

Kimyasal bakımından bir toprağın asitliği büyük bir öneme sahiptir. pH'ın bitkilerin mineral beslenmesini kolaylaştırmak için nötre yakın yada daha da iyisi hafif baz olması gerekir. Toprağın asitliğine neden olan kimyasal gübreler kullanımı o kadar çok yaygınlaşmıştır ki toprağın asitliğini gidermek için çiftçiler ekili toprağın yüzeyine pH derecesini arttırmak adına kireç veya magnezyum karbonat(tebeşir, marn, dolomit..vs.) gibi malzemeler yaymaktadırlar. Ancak bu uygulamada yaşanan çeşitli sıkıntılar çiftçileri organik gübre kullanmaya itmiştir (Anonim, 1999).

Organik gübreler ise organik madde açısından doğal olarak zengindir ve hem yüksek kaliteli toprağın hem de sağlıklı, çeşitli toprak besin ağının oluşturulmasını ve korunmasını desteklemektedirler. Bu gübreler yüksek miktarda besin içermektedirler. Dolayısıyla bu tür gübrelerin kullanılması, toprağa yüklü organik madde eklendikçe toprağın kation değişim kapasitesinin de artmasına neden olmaktadır. Organik gübrelerin uygulanması topraktaki nitrojen elementini sabitlemekte, mineralleştirmekte ve bitki besin maddelerini döngüye sokarak tıpkı kimyasal gübrelerin yaptığı gibi besin maddelerini iyonik formda kullanılabilir hale getiren organizmalar için yüksek katlı evler dikmektedir. Ancak, organik gübreler ile kimyasal olanlar arasında ciddi farkların olduğu da unutulmamalıdır (Lowenfels, 2021)

Tisdale ve ark. (1985) tarımsal kimyasalların imalat edilmesinden ve tarımda tatbik edilmesinden önceki periyotta tarımdaki inkişaf hakkında teferruatlı malumat vermişlerdir. Sözün kısası tarımsal kimyasalların imal edilmelerinden ve tarımda tatbik edilmelerinden önceki periyotta çiftçiler tesis içinde temin ettikleri bitkisel ve hayvansal kaynaklı organik malzemeleri toprağa tatbik etmişler ve kıymetlendirmişlerdir. Bahsi geçen süreç ile ilgili tarım uygulamaları, günümüz şartlarında denetimli olarak tatbik edilen organik tarımın dayanak noktasını ve temelini meydana getirir. Çoğalan nüfusun beslenme ihtiyacının çözülebilmesi için ekilebilir arazileri de artan bir yükselişte alanların çoğaltılmasının bir çözüm olmayacağını fakat bu uygulamanın da bir sınırlandırması olduğu araştırılarak öğrenilmiştir. Birim alandan mevcut durumundan daha yüksek miktarlarda tarım mahsulünün elde edilebilmesi için faaliyetler hızlandırılmıştır. Türkiye'de ise kimyasal gübre imalatı diğer ülkelere bakarak çok sonradan yapılmaya başlanmıştır (Kacar ve Katkat, 2009).

Natürel gübrelere organik madde ilave edilmesi, toprakta mikrobiyal aktivite sonucu üretilen karbondioksitin hapsedilmediği bir yapı oluşturabilir. Bu yapı aynı zamanda besin emilimi için çok önemli olan doğru hidrasyon seviyelerinin korunmasını da çok kolaylaştırır (Lowenfels, 2021).

Bilindiği üzere konvansiyonel tarımın dayanak mekanizması birim alandan faydalanılabilecek maksimum düzeydeki mahsulün elde edilmesidir. Bu sebepten teknolojik imkânlardan en üst seviyede faydalanılmakta, her

çeşitte suni tarımsal kimyasallar yanı sıra çok yüksek ölçülerde sulama suyu harcanmakta ve yüksek düzeylerde randımanı tutturabilmek adına ciddi anlamda emek sarf edilmektedir. Şöyle ki, organik tarımın amaçları arasında bitki, hayvan insan sağlığını ve çevreyi muhafaza etmek, toprağın biyolojik strüktürünü muhafaza ederek çölleşme erozyon ve kısmi çölleşmeyi engellemek, tabiatta genler ile ilgili yelpazenin devamını sağlamak, toprak-insan-bitki-hayvan-çevre arasında zarar gören münasebeti yeniden tasarlayarak biçimlendirmek, tarımdan kaynaklanan kirliliği önlemek için, bitkisel ve hayvansal imalatı birlikte gerçekleştirerek müteakabil desteklemeyi yapmak, tarımsal ürün yetiştiricilerine emniyetli bir ortamda çalışma ve yeterli gelire sahip olmak, doğayla uyum içinde çalışmak ve yapay kimyasal hammaddelerin toprak üstü tehlikelerini bertaraf etmek gibi kayda değer hususlar bulunmaktadır. Tarımsal üretimin sosyal, ekonomik ve çevresel boyutunu birlikte düşünmektir (Kacar ve Katkat, 2009).

Sakarya ilinde birçok geniş düzlüğün bulunması, tarımın gelişmesinde önemli bir etken olmuştur. Tahıl türleri arasında birinci sırayı mısır, ikinci sırayı buğday almaktadır. Mısırın ilk sırayı almasında, ilin Karadeniz Bölgesiyle komşu olması rol oynamaktadır (Anonim, 1967).

Sakarya İlinde, 2022 yılında kullanılan toplam gübre miktarı 93.507 tondur. Bunun 3.705 tonu amonyum sülfat gübresi, 7.88 tonu amonyum sülfat-nitrat gübresi, 126.62 tonu azotlu/inhibitörlü/stabilizatörlü gübreler, 93.75 tonu elementel kükürt, 0.29 tonu fosforik asit, 16.033 tonu kalsiyum amonyum nitratlı gübreler, 4.44 tonu kalsiyum magnezyum nitratlı gübreler, 41.81 ton kireçleme materyali ve 103.86 ton mikro bitki besin maddeleri karışımıdır (Anonim, 2023). Azot bitkilerin fazlasıyla ihtiyacı olan fakat toprakların mineral kısmında çok az miktarda bulunan bir elementtir.

Bu çalışmada, oldukça fazla miktarlarda kimyasal gübre kullandığı bilinen Sakarya ilinin çeşitli ilçelerinde bulunan köylere ait tarım topraklarındaki makro elementler incelenerek söz konusu tarım arazilerinin verimliliği değerlendirilmiştir.

MATERYAL VE METOT

Bu araştırmada kullanılan toprak örnekleri ekimden önce son toprak hazırlığı yapıldığında (herhangi bir gübre ve tarım ilacı uygulaması yapılmadan önce) 0-30 cm derinlikten Sakarya ilinin değişik köylerine bağlı mevkilerinden ve özellikle yoğun olarak tarımsal üretim yapılan alanlardan (Çizelge 1) usulüne uygun olarak zig zag yöntemiyle alınmış ve akabinde analiz yapılacak laboratuvara getirildikten sonra, havada kurutulup ardından 2 mm'lik elekten geçirilerek analize hazır hale getirilmiştir (Jackson, 1958). Toprak örneklerinin tekstür sınıfı su ile doymuşluğuna göre; toprak reaksiyonu, Uluslararası Toprak İlmi Derneğinin önerdiği üzere 1:2.5 (toprak:su) oranında toprağın sulandırılarak, cam elektrotlu pH metre ile ölçülerek; tuz içeriği ise EC-metre ile ölçülüp % birimi cinsinden belirlenmiştir (Lindsay ve Norvell 1978, Richards 1954). Kireç miktarlarının belirlenmesi Scheibler Kalsimetresi ile volümetrik olarak yapılmıştır (Ülgen ve Yurtsever 1974).

Topraklarda organik madde, Walkley-Black yöntemi ile belirlenmiştir (Sağlam, 2012). Alınabilir fosfor Spektrofotometre-Olsen metoduna göre yapılmıştır. Yarıyışlı Ca ve Mg ICP-OES (DTPA), Fe, Mn, Cu ve Zn içerikleri ise ICP-OES yöntemi ile yapılmıştır (Linsay ve Norvell 1978). Değişebilir K ise fleymfotometrede (amonyum asetat) belirlenmiştir (Jackson 1958, Sağlam 2012). Toprak analizlerinin değerlendirilmesinde önceki çalışmalarda belirtilen standart değerler kullanılmıştır (Lindsay ve Norwell, 1969; FAO, 1990; TOVEP, 1991; Güneş ve ark., 1996; Güneş ve ark., 2010; Bellitürk, 2013). Toprak örneklerinin alındığı yerlere ait bilgiler aşağıda bulunan Çizelge 1’de gösterilmiştir.

SONUÇLAR VE ÖNERİLER

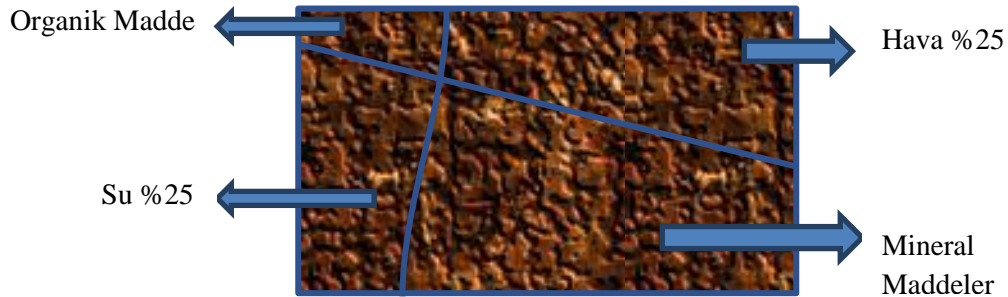
Araştırma bölgesine ait incelenen toprak örneklerinin bazı kimyasal ve fiziksel analiz sonuçları Çizelge 1’de topluca gösterilmiştir.

Çizelge 1. Toprak örneklerine ait bazı fiziksel ve kimyasal analiz sonuçları.

Örnek No	Örnek Alınan Yerlerin Köy-Mevkii Adı	pH (1:2,5)	Topl. Tuz (%)	Org. Mad. (%)	Kireç (%)	Doğunluk (%)	
						(%)	Tekstür Sınıfı
1	Doğantepe Köyü	7.13	0.02	2.35	3.72	58.30	Killi Tın
2	Safibey Köyü	7.90	0.02	3.26	16.64	66.00	Killi Tın
3	Bahadırlı Köyü	6.59	0.04	2.01	1.34	77.00	Killi
4	Y.Çalıcı Köyü	7.05	0.05	2.20	9.37	78.10	Killi
5	Maksudiye Köyü	7.39	0.01	1.94	20.11	53.90	Killi Tın
6	Bediltahirbey Köyü	7.37	0.02	2.33	34.19	73.70	Killi
7	Kayalarmemduhiye Köyü	6.24	0.01	1.45	4.64	52.80	Killi Tın
8	Kayalarmemduhiye Köyü	6.24	0.01	1.45	4.64	52.80	Killi Tın
9	Y.Çağrıkuru Köyü	5.31	0.00	1.52	3.26	55.00	Killi Tın
10	Eşme Köyü	7.05	0.01	2.41	4.60	49.50	Tın
11	Yukarıkirezce Köyü	7.24	0.04	1.62	26.50	80.30	Killi
12	Fevziye Köyü	7.76	0.03	1.30	24.95	62.70	Killi Tın
13	Akçapınar Köyü	7.57	0.03	2.00	34.72	68.20	Killi Tın
14	Akçapınar Köyü	7.45	0.04	2.08	36.02	72.60	Killi
15	Turnadere Köyü	7.53	0.03	3.16	21.70	71.50	Killi
16	Yanık Köyü	7.10	0.01	2.20	1.49	55.00	Killi Tın
17	Yanık Köyü	7.10	0.01	2.20	1.49	55.00	Killi-Tın
18	Karasu İlçesi	5.80	0.01	1.11	2.43	59.40	Killi Tın
19	Bediltahirbey Köyü	7.30	0.02	1.80	22.01	61.60	Killi Tın
20	Bakacak Köyü	5.30	0.02	2.91	2.47	61.60	Killi Tın
21	Akçapınar Köyü	7.03	0.02	1.62	30.00	63.80	Killi Tın
22	Akçapınar Köyü	7.30	0.02	1.39	28.68	59.40	Killi Tın
23	Aşağıdere Köyü	7.03	0.04	2.66	14.8	79.20	Killi
24	Aşağıdere Köyü	7.03	0.04	2.66	14.8	79.20	Killi
25	Aşağıdere Köyü	6.40	0.03	2.55	8.22	66.00	Killi Tın
26	Çağsak Köyü	7.14	0.04	1.31	3.29	69.30	Killi Tın
27	Y.Hüseyinşeyh Köyü	5.73	0.01	1.96	3.29	63.80	Killi Tın
28	Y.Çarığıkuru Köyü	5.31	0.00	1.52	3.26	55.00	Killi Tın
Min.	-	5.30	0.00	1.11	1.34	52.80	
Maks.	-	7.76	0.05	3.26	34.19	79.20	
Ort.	-	6.82	0.02	2.03	13.67	64.31	

Çizelge 1’den de görüldüğü gibi, Sakarya ili köy topraklarının organik madde içerikleri en düşük %1.11 ve en yüksek %3.26 olarak saptanmıştır. Bilindiği üzere organik madde miktarının randımanlı topraklar için %4-5 civarında olması gerekmektedir. Ayrıca, bu çalışmada incelenen toprakların organik madde açısından daha ümit verici olduğu görülmektedir. Top. Güb. Arşt. Enst.’nün 1995 yılında yaptığı bir çalışmada; Türkiye ortalaması organik madde miktarı bakımından “orta” vasıflı topraklar %25.6 olarak bulunmuş olup Karadeniz bölgesinde bu değer % 29.7’e çıkmıştır. Bu çalışmada, 28 örnek kıyaslandığında “orta” sınıfında yer alan toprakların oranı %46.42’dir. Türkiye ortalaması ile mukayese edildiğinde ortalamanın oldukça üstünde olduğu görülür. Tarımsal istihsalde ana gayelerden biri bitkisel üretimde vasıflı ürün elde etmek diğeri ise randımanın yükselişe geçmesini sağlamaktır. Organik gübrelerin kalite kısmındaki tesirleri bu hususta yapılan pek çok çalışmada bildirilmiştir (Bellitürk, 2016; Bellitürk, 2017; Bellitürk ve Goldmann Benardete, 2020; Aslam ve ark., 2023).

Toprağın pH değeri çok yüksek (alkali) veya çok düşük (kuvvetli asit) olduğu durumlarda kimyasal gübrelerden daha çok organik gübrelemenin tesirli durumu söz konusu olur. Bu sebepten toprak ıslah planlamalarda organik gübrelemenin mutlak suretle “gübreleme programlarında” bulunması hem pH düzenleme ve hem de organik madde miktarının artırılmasının yanı sıra tarım topraklarının su tutma kapasitelerinin de artırılması bakımından bir hayli ehemmiyetlidir (Bellitürk ve ark., 2018; Bellitürk, 2019; Bellitürk ve Vardar, 2019). Bilhassa şuursuz bir şekilde toprakların asitleştirmesine neden olabilecek gübrelerin tarımsal aktivitelerde uygulanması sonucunda, toprakların pH değerleri yıl geçtikçe artan bir azalışla değiştiği ve tarımsal üretim değerlerinin de negatif bir şekilde etkilendiği saptanmıştır (Bellitürk, 2019).



Şekil 1. Randımanlı bir toprağı meydana getiren unsurlar.

Görünen o ki, bu ülkemiz şartlarında organik madde miktarını %4-5 civarında olan topraklara rastlamak gün geçtikçe zor bir hale gelmektedir. Tarım mahsulü yetiştiricileri ürün yetiştirme süreci sırasında randımanda azalmayı minimum hale getirme için her seferinde kimyasal gübrelerin kullanım dozlarını yükseltmeyi tercih etmektedirler. Halbuki kimyasal gübrelerin toprağı değil, bitkiye yararı olduğu hakikati de bilinmektedir. Bellitürk (2011) tarafından gerçekleştirilen bir çalışmada 66 adet toprak numunesi tetkik edilmiş ve toprakların

hepsinde organik madde miktarının yeterli miktarda olmadığı kanaatine varılmıştır. Organik maddenin bölge açısından yeterli olmadığına ilişkin pek çok akademik çalışma bulunmaktadır (Bellitürk, 2011; Bellitürk, 2013; Açıkbaş ve Bellitürk, 2016; Bellitürk ve ark., 2018; Bellitürk, 2019; Mumcuoğlu ve Bellitürk, 2021). Toprak örneklerinin bazı makro bitki besin element durumları Çizelge 2’de gösterilmiştir.

Çizelge 2. Toprak örneklerine ait bazı makro bitki besin element sonuçları.

Örnek No	Örnek Alınan Yerlerin Köy-Mevkii Adı	N	P	K
		%	ppm	
1	Doğantepe Köyü	0.12	0.10	152.37
2	Safibey Köyü	0.16	8.70	443.15
3	Bahadırlı Köyü	0.10	4.59	398.34
4	Y.Çalıcı Köyü	0.10	0.30	390.37
5	Maksudiye Köyü	0.10	7.70	312.70
6	Bediltahirbey Köyü	0.12	3.20	509.88
7	Kayalarmemduhiye Köyü	0.07	10.20	133.44
8	Kayalarmemduhiye Köyü	0.07	10.20	133.44
9	Y.Çağrıkuru Köyü	0.08	6.50	81.66
10	Eşme Köyü	0.12	13.61	531.78
11	Yukarıkirezce Köyü	0.08	0.91	539.75
12	Fevziye Köyü	0.07	5.00	415.27
13	Akçapınar Köyü	0.10	1.50	424.23
14	Akçapınar Köyü	0.10	1.61	390.37
15	Turnadere Köyü	0.16	7.49	449.13
16	Yanık Köyü	0.11	5.10	146.39
17	Yanık Köyü	0.11	5.10	146.39
18	Karasu İlçesi Merkez Köyü	0.06	2.50	304.73
19	Bediltahirbey Köyü	0.09	5.61	201.16
20	Bakacak Köyü	0.15	9.40	423.24
21	Akçapınar Köyü	0.08	2.79	514.85
22	Akçapınar Köyü	0.07	2.01	416.27
23	Aşağıdere Köyü	0.13	6.10	497.93
24	Aşağıdere Köyü	0.13	6.10	497.93
25	Aşağıdere Köyü	0.13	16.19	497.93
26	Çağşak Köyü	0.07	4.19	364.48
27	Y.Hüseyinşeyh Köyü	0.10	4.30	145.39
28	Y.Çarığıkuru Köyü	0.08	6.50	81.66
Min.	-	0.06	0.10	81.66
Maks.	-	0.15	16.19	539.75
Ort.	-	0.10	5.62	340.87

Yukarıdaki Çizelge 2’den de görüldüğü gibi, Sakarya ili köy topraklarının pH değerleri bakımından en düşük 5.3 (orta asit) ve en yüksek 7.76 (hafif alkalın) olduğu saptanmıştır (Lindsay ve Norwell, 1969; FAO, 1990). Bellitürk (2011) tarafından Sakarya ili ve 28 köyde yapılan çalışmalar neticesinde toprak örneklerinin pek çoğunun nötr ve hafif alkalın olduğu ve bu durumun da bize kimyasal gübre kullanımının çok ileri

seviyede olmadığını göstermektedir. Toprak numunelerinin kireç yüzdeleri mukayese edildiğinde en düşük %1.34 ve en yüksek de %34.19 nispetinde CaCO_3 muhteviyatına sahip olduğu ayrıca toprakların genel anlamda killi-tın (CL) ve kil (C) tekstür sınıfında olduğu görülmüştür. Maksimum tuz oranı %0.05'i geçmediği dolayısıyla tuzluluk açısından bölge topraklarında ciddi bir problemle karşılaşmadığı anlaşılmıştır. Top. Güb. Arşt. Enst.'nün 1995 yılında yaptığı bir çalışmada; Türkiye ortalaması kireç (CaCO_3) yüzdesi bakımından "5-15" oranında bulunan topraklar %23 olarak bulunmuş olup Karadeniz bölgesinde bu değer % 23.2'e çıkmıştır. Bu çalışmada, 28 örnek kıyaslandığında "5-15" aralığında bulunan toprakların oranı %7.14 olup Türkiye ortalaması altında kalmaktadır.

Yine Çizelge 2'ye baktığımızda, Sakarya ili köy topraklarının N yüzdesi bakımından en düşük 0.06 (az) ve en yüksek 0.15 (yeterli) olduğu saptanmıştır (Lindsay ve Norwell, 1969; FAO, 1990). Bununla birlikte, Sakarya ili köy topraklarının P yani fosforu en düşük 0.10 ppm (çok az) ve en yüksek 16.19 ppm (yeterli) olduğu saptanmıştır. Söz konusu toprakların fosfor miktarı açısından ortalaması 5.62 ppm olduğu hesaplanmıştır (Lindsay ve Norwell, 1969; FAO, 1990). Top. Güb. Arşt. Enst.'nün 1995 yılında yaptığı bir çalışmada; Türkiye ortalaması fosfor bakımından "az" niteliğindeki topraklar %35.3 olarak bulunmuş olup Karadeniz bölgesinde bu değer %28.6'ya düşmüştür. Tekirdağ ilinin Hayrabolu ilçesinde yapılan benzer bir çalışmada toprakların büyük bir çoğunluğunun P ve K bakımından yeterli, toplam N bakımından "düşük" sınıfta oldukları bulunmuştur (Bellitürk ve Çelik, 2023).

Bu çalışmada, 28 örnek kıyaslandığında "az" sınıfında yer alan toprakların oranı %17.85'dir. Türkiye ortalaması ile mukayese edildiğinde ortalamanın oldukça altında olduğu görülmektedir. Ayrıca, Sakarya ili köy topraklarının K yani potasyumu en düşük 81.66 ppm (az) ve en yüksek 539.75 ppm (fazla), ortalamasının da 340.87 ppm olduğu saptanmıştır (Lindsay ve Norwell, 1969; FAO, 1990). Top. Güb. Arşt. Enst. (1995)'nün yaptığı bir çalışmada; Türkiye ortalaması potasyum bakımından "yeterli" niteliğindeki topraklar %14.9 olarak bulunmuş olup Karadeniz bölgesinde bu değer %18.6'ya çıkmıştır. Bu çalışmada, 28 örnek kıyaslandığında "yeterli" sınıfında yer alan toprakların oranı %28.57'dir. Türkiye ortalaması ile mukayese edildiğinde ortalamanın oldukça üstünde olduğu görülür.

Tarımsal faaliyet sıklığı açısından oldukça fazla olduğu bilinen Sakarya ilinin muhtelif köylerinden alınan 28 adet toprak numunesine bakıldığında organik madde miktarında ortalama değerde "orta" gibi bir durum söz konusu olduğu anlaşılmaktadır. Ancak, bu değerler tüm topraklarımız için maalesef geçerli değildir. Bilinmektedir ki Sakarya ilinde 2022 yılında kullanılan bu tür gübreler, organik ve organomineral gübrelerce zenginleştirilmiş olsaydı hem topraklar hem de bitkiler bakımından çok daha iyi neticeler oluşacaktı. Bu sebepten dolayı gübreleme izlencelerinde mutlak suretle organik gübreler (vermikompost, kompost, leonardit vb.) olmalıdır (Bellitürk, 2018; Bellitürk, ve Goldmann Benardete, 2020; Bellitürk ve ark., 2022; Çelik ve ark.,

2022; Bellitürk, 2023).

Analizi yapılan toprak numunelerinin bilimsel açıdan değerlendirmesi ve daha önceki çalışmaların da tetkik edilmesi sonucunda; toprak muhteviyatı bilinmediği sürece kesinlikle gübreleme yapılmaması ve gübreleme planlarında mutlak suretle organik gübre diye adlandırılan vermikompost, kompost, yarasa gübresi, çeşitli niteliklerde yeşil gübreler ya da organomineral gübreleri de bünyesinde bulunduracak bir bitki besleme planlamasının uygulanması gerektiği sonucuna varılmıştır. Çiftçilerin ve tarımla uğraşan yetiştiricilerin tarımsal girdi tüketimi hususunda bilhassa gübre denildiğinde öncelikle istikbalini sonrasında ise çevreyi düşünerek akıllı kararlar alınması gerektiği de sonucuna varılmıştır. Çünkü, bilindiği üzere kimyasal gübre olarak nitelendirdiğimiz her türlü gübre hiçbir zaman topraklara fayda sağlamaz, yani toprağın ihtiyacını gidermez. Aksine; kimyasal gübre kullanımı yalnızca bitki ile randımanı düşünülerek imal edilirler. Buna rağmen çevreci bile değildir. Halbuki, organik gübreler hem kullandıkları topraklara hem de üzerinde yetişen bitkilere yarar sağlarlar. Bu bağlamda; çok yönlü bir faydadan bahsetmek mümkündür.

Tarım ve peyzaj üreticileri mutlak surette toprak analizlerini yaptırarak hem gübreleme planlamaları yapmak ve hem de sahip olduğu tarım alanlarının mevcut durumunu bilmek zorunda olduklarını bu şekildeki akademik çalışmalar sayesinde anlamaktadırlar. Rastgele yapılan tarımsal işlerin hatalı sonuçlar doğuracağı açıkça ortadadır (Bellitürk ve Çelik, 2023).

Lowenfels (2021)'e göre; solucanlar yapay gübrelerin mevcut olduğu topraklardan kaçınmaktadır. Yani, ya bu yüksek yoğunluklarda hayat döngülerini devam ettirmede başarılı olmazlar veya besin kaynakları tamamen yok olmaktadır. Doğal gübreler, sadece toprak besin döngüsünde harcanacak kütleyi tedarik etmekle kalmazlar aynı zamanda yalnızca azot, fosfor ve potasyumu gibi makro elementleri değil, çok aşırı fazla besin maddesini de birlikte sağlayabilmektedirler. Dahası, natürel gübrelerin pek çoğu yavaş salınan gübre özelliğindedirler. Bu özellik de yavaş salınan natürel gübrelerin toprakta belli bir zaman aralığında bulduklarından toprak besin döngüsünde yer alan besin maddeleri serbest kalabilmektedir.

Tarım, toprak üzerinde yapılan faaliyetlerin planlı olarak yürütülmesini esas kılmaktadır. Bu amaçla üzerinde tarımsal faaliyet ve peyzaj uygulamaları yapılan alanların mutlak surette mevcut verimlilik kapasitelerinin belirlenmesi ve gelecekteki bitki besleme programlarının oluşturulması amacıyla mutlak surette toprak analizleri ve hatta bitki analizleri yapılmalı ve sonuçları bitki besleme konusunda uzman olan kişiler tarafından değerlendirilerek gerekli çalışmalar yapılmalıdır. Aksi halde verimli olarak bilinen tarım toprakları çoraklaşmaya başlar ve değişen iklim koşullarında bu durum daha da zorlaşabilir. Yerine konulamayan veya oluşması binlerce yıl alan doğal kaynakların başında toprak gelmektedir.

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ESKİŞEHİR KOŞULLARINDA BİTKİ GELİŞİMİNİ TEŞVİK EDEN BAZI KÖK BAKTERİLERİNİN DEMRE SİVRİ BİBERİNİN (*CAPSICUM ANNUUM L.*) KALİTE VE VERİMİ ÜZERİNE ETKİLERİ

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ÖZET

İnsanlığın yeryüzünde var olmasıyla birlikte beslenme ihtiyacı gün geçtikçe artmaktadır. Beslenme ihtiyacını karşılayan tarım ürünlerine olan talep de bu artan ihtiyaca paralel olarak artmaktadır. Artan talebi karşılamak için tarımsal üretimin artırılması için uygulanan yöntemlerin gelecekte yapılacak tarımsal üretimi olumsuz etkileyeceği konvansiyonel tarım olarak adlandırılan bu üretim şeklinin sürdürülebilir olmadığı ortaya çıkmıştır. yoğun kimyasal gübre ve pestisit kullanımının insan ve çevre sağlığı açısından olumsuzlukları her geçen gün yapılan çalışmalar ile ortaya çıkarken bu olumsuzlukları ortadan kaldırmak veya en aza indirmek için de araştırmalar yürütülmektedir. Tarımsal üretimde kullanılan kimyasal gübre ve pestisite alternatif olarak toprakta bitkiler ile yaşayan bazı bakteri ve mantarların bitki gelişimi artırdığı, hastalık ve zararlıların etkilerini azalttığı günümüzde birçok çalışma ile ortaya konmuştur. Bizde bu bilgiler ışığında çalışmamızda ülkemizde ve dünyada tüketimi ve üretimi doğru orantılı şekilde artan Biber (*Capsicum annuum L.*)' Demre Biberi' bitkisine verim ve kalite üzerine etkilerini belirlemek üzere, *Bacillus megaterium*, *Bacillus pumilus*, *Bacillus subtilis*, *Pseudomonas fluorescens*, *Rhodococcus erythropolis*, *Pantoea agglomerans* P. putidabiyotip bakteri strainleri kullanılmıştır. Bakteri uygulamaları fidelerin kök boğazı bölgesine fide dikiminden 5 gün sonra 10 ml olarak yapılmıştır. Çalışma Eskişehir üretici koşullarında ve laboratuvar çalışmaları ESOGÜ Ziraat Fakültesi Bahçe Bitkileri Bölümünde yürütülmüştür.

Elde edilen veriler sonucunda toplam verim gübre uygulamasında en yüksek değere ulaştığı, bu değere en yakın B5 bakteri kombinasyonundan elde edildiği, B1 bakteri kombinasyon uygulamasının ise kontrole yakın bir değer verdiği kaydedildi. Suda çözünebilir kuru madde içeriğinde en yüksek değer B1 bakteri kombinasyonundan elde edilmiştir. Antioksidan kapasite ölçümlerinde ise en yüksek değer B2 bakteri kombinasyonunda bulunmuştur.

Anahtar kelimeler :Biber (*Capsicum annuum L.*), PGPR, bitki gelişimi, veri

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BİYOKÖMÜRÜN TIBBİ VE AROMATİK BİTKİLERİN ÜRETİMİ VE KALİTE ÖZELLİKLERİ ÜZERİNDEKİ OLASI FAYDALARI

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Özet

Biyokömür (biyoçar, biyokarbon), değerli bir organik madde kaynağı olarak toprağın biyolojik özelliklerinin geliştirilmesi, tıbbi ve aromatik bitkiler (TAB)'in büyüme parametrelerinin ve kimyasal özelliklerinin artırılması amacıyla kullanılabilir. Biyokömür son derece gözeneklidir ve ayrışmaya karşı dayanıklıdır. Ayrıca biyokömür, toksik metallerin hareketsiz hale getirilmesine, toprak kalitesinin ve bitki verimliliğinin artırılmasına destek olur. Dolayısıyla kurşun, kadmiyum, krom, bakır ve civa gibi toprak kirliliğine neden olan ağır metallerin, toprak ve bitki sağlığı açısından topraklardan uzaklaştırılması ya da minimize edilmesinde biyokömür ümit verici uygulama olarak düşünülebilir. Bu durumda, biyokömür takviyesi, toksik metallerin veya stres koşullarının zararlı riskini iyileştirerek, toprak kalitesinin artırılmasında önemli katkıları yanı sıra, TAB'in sekonder metabolit içeriklerini artırarak bir kazan-kazan teorisi sağlayabilir. TAB için biyokömür uygulamalarına ilişkin birçok çalışma rapor edilmiştir. Bu çalışmalarda, kimyasal gübre ile birlikte uygulanan biyokömürün bitkilerin taze ve kuru ot verimini artırdığı bildirilmiştir. Ayrıca biyokömürün kimyasal gübre ile kullanımının aksine tek başına kullanılması ile TAB'in uçucu yağ içeriklerini ve uçucu yağ kompozisyonlarını artırdığını bildiren çalışmalarda mevcuttur. Bu çalışmalar sonucunda, ticari ve değerli üretim için biyokömür uygulamalarının ve farklı dozlarının farklı toprak tiplerinde uzun süreli olarak geniş arazi denemelerinde uygulanması gerektiği sonucuna varılmıştır.

Bu derlemede biyokömür kullanımının TAB'in morfolojik ve verim özelliklerine etkisi belirlenmiş, yüksek verim ve kimyasal içerik için biyokömür uygulamalarının en etkin dozları ortaya çıkarılmıştır.

Anahtar Kelimeler: Biyokömür, Verim, Kalite, Tıbbi bitki



POTENTIAL BENEFITS OF BIOCHAR ON PRODUCTION AND QUALITY PROPERTIES OF MEDICINAL AND AROMATIC PLANTS

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Abstract

Biochar (biocarbon) can be used for the develop of soil biological properties, and increase the growth parameters and chemical properties medicinal and aromatic plants (MAPs) as a valuable organic matter resource. Biochar is extremely porous and resistant to decomposition. In addition, biochar supports to immobilize the toxic metals, increase the soil quality and plant productivity. Therefore, biochar can be considered a promising application in removing or minimizing heavy metals such as lead, cadmium, chromium, copper and mercury, which cause soil pollution, from soils in terms of soil and plant health. In this case, biochar supplementation can provide a win-win theory by increasing the secondary metabolite contents of MAPs, as well as making significant contributions to improving soil quality by improving the harmful risk of toxic metals or stress conditions. Many studies have been reported on biochar applications for MAPs. In these studies, it was reported that biochar applied together with chemical fertilizer increased the fresh and dry grass yield of plants. Additionally, there are studies reporting that biochar increases the essential oil contents and essential oil compositions of medicinal and aromatic plants when used alone, as opposed to using it with chemical fertilizers. As a result of these studies, it was concluded that biochar applications and different doses should be applied in long-term large field trials in different soil types for commercial and valuable production.

In this review, the effects of biochar use on the morphological and yield characteristics of MAPs were determined, and the most effective doses of biochar applications for high yield and chemical content were revealed.

Keywords: Biochar, Yield, Quality, Medicinal plant

Giriş

Sürdürülebilir tarım ve çevre yönetimi için ideal bir toprak iyileştirme maddesi olarak kabul edilen biyokömür, karbon açısından zengin bir pirojenik (bakteri, mantar ve virüslerin metabolik ürünleri olup, suda kolaylıkla çözünebilen, filtrelenen, uçucu özelliğe sahip olmayan ve ısıya dayanıklı) maddedir. Tarımsal atıklar, odun atıkları, orman artıkları ve gıda atıkları gibi biyokütle kaynakları, biyokömür hazırlanmasında öncü malzeme olarak daha sık kullanılmaktadır (Saha vd., 2019). Biyokömür sahip olduğu zengin karbon içeriği nedeniyle atmosferdeki azotu toprak bünyesine bağlayarak, uzun yıllar boyunca toprakta kalmasını sağlamaktadır. Böylece hem sera etkisini azaltacağı hem de küresel ısınmayı önleyebileceği bildirilmiştir. Ayrıca tarım uygulamaları yapılan tarla alanlarında sera gazlarına neden olan nitroz oksit ve metan gazlarının yayılımını %70-80 oranlarında önlediği bildirilmiştir (Lehmann ve Joseph, 2009).

Biyokömür, toprak yapısının iyileştirilmesinde, bitki verimliliğinin artırılmasında ve toprak verimliliğinin korunmasında her geçen gün önem kazanan maddedir (Lehmann vd., 2003). Biyokömür sadece normal koşullar altında bitki verimliliğini arttırmakla kalmaz, aynı zamanda tuzluluk ve kuraklık gibi olumsuz koşullar altında da bitki verimini artırır (Thomas vd., 2013; Haider vd., 2014). Ancak, Hussain vd. (2016) verimli topraklara uygulanan biyokömür etkilerinin çok belirgin olmadığını, verimsiz/çorak arazilerde biyokömür ile yetiştirilen bitkilerde ise verimin arttığını belirtmişlerdir. Sadaf vd. (2017) ise kimyasal gübreler ile birlikte uygulanan biyokömürün kimyasal gübreler tarafından sağlanan bitki besin maddelerinin kullanılabilirliğini ve bu besin maddelerinin alımını artırdığı, aynı zamanda besin maddelerinin süzülmesi sonucunda meydana gelen kayıpları önlediğinden kimyasal gübre ihtiyacının en aza indirildiğini rapor etmişlerdir.

Kimyasal gübrelerin çevreye ve toprağa verdiği zararlar nedeniyle bu gübrelere alternatif olarak organik gübreler kullanılmaktadır. Organik gübreler, toprağın mikrobiyal aktivitelerini ve metabolizmalarını teşvik eden ve ekosistem devamlılığını sürdüren veya destekleyen zengin organik madde ve mevcut besin maddeleri içermektedir (Han vd., 2022; Wu vd., 2021). Biyokömürün, organik gübreler ile birlikte kullanılması, toprak verimliliği ve ürün verimliliği kazanımlarının, tekli uygulamalara kıyasla daha fazla olabildiği ve kimyasal gübrelerin yerine alternatif olarak organik gübre ile birlikte kullanılması durumunda doğaya verdiği zararlı etkilerin azaltıldığı belirtilmiştir (Brtnicky vd., 2019; Bai vd., 2022; Liu vd., 2022a; Yan vd., 2023).

Biyokömür uygulamasına ilişkin çalışmaların çoğu toprak verimliliği, bitki büyümesi veya verimi üzerine yoğunlaşmış olup, bitkilerin kalitesinde etkili olan biyoaktif bileşiklere etkileri ihmal edilmiştir. Biyokömür toprak düzenleyici olarak görev yapması dolayısıyla iklim değişikliğinin etkisini hafifletebilmesi bitkinin fizyolojik parametrelerine etkili olacağı görüşü ileriye sürülmüştür (Saha vd., 2019).

Biyokömür uygulamaları, bitkilerin maruz kaldığı biyotik ve abiyotik stres koşullarına karşı dayanıklılıklarını artırmaktadır. Nitekim, biyokömürün ağır metallerle kirlenmiş toprağa uygulanması, tıbbi ve aromatik bitkilerin güvenli bir şekilde yetiştirilmesi için uygun maliyetli ve çevre dostu bir yaklaşım olabileceği bildirilmiştir. Biyokömürün tıbbi ve aromatik bitkilerdeki etkinliği, savunma mekanizması olarak ürettikleri aktif bileşiklerin (sekonder metabolitler) varlığı nedeniyle diğer bitkisel ürünlerden farklılık gösterebilir. Bu nedenle, tıbbi ve aromatik bitkilerde biyokömür uygulamalarının etkileri belirlenirken morfolojik, fizyolojik özellikler ile birlikte biyokimyasal değişikliklerde dikkate alınmalıdır (Nigam vd., 2021).

Bu derlemede tıbbi ve aromatik bitkilerde biyokömür uygulamasının verimliliğe etkileri yanı sıra, tıp, farmakognozi, gıda ve parfümeri sanayisinde kullanılabilen önemli primer ve sekonder metabolit bileşenleri üzerine etkisi de araştırılmıştır. Ayrıca, bu derleme biyokömür uygulamalarının uygun doz oranlarının ve uygulama zamanlarının ortaya çıkarılması amacıyla yapılmıştır.

Biyokömür uygulamalarının tıbbi ve aromatik bitkiler üzerine etkileri

Literatür araştırmaları sonucunda, biyokömürün tıbbi ve aromatik bitkilerin büyümesi ve kalite kriterleri üzerine etkilerini araştıran çalışmaların oldukça az sayıda olduğu görülmüştür. Pandey vd. (2016) farklı biyokömür dozları (0, 1.25 g/kg ve 2.5 g/kg) ve kimyasal gübre dozları (37.5:15:15 g/kg ve 75:30:30 g/kg N:P:K) ile yaptıkları çalışmada biyokömür/kimyasal gübre kombinasyonu uygulamasında fesleğen bitkisinin büyümesini artırdığı, ancak tek başına biyokömür uygulamasının ise bitkinin büyümesini artırmada yeterli olmadığını bildirmişlerdir. Yapılan çalışmada biyokömür ve kimyasal gübrenin birlikte uygulanması, fesleğende iki yıl boyunca bitki herba ve uçucu yağ verimini artırdığı, organik karbon içeriğinin ise hem biyokömür hem de biyokömür/kimyasal gübre kombinasyonunda arttığı belirlenmiştir. Biyokömür ile desteklenmiş fesleğende uçucu yağ bileşenlerinin değişmediği ve biyokömürün kimyasal gübrenin yerine kullanılması, yağın aroma kalitesinden ödün vermeden fesleğende daha yüksek bitki verimliliği ve uçucu yağ verimi elde etmek için uygun bir alternatif strateji olduğunu bildirmişlerdir.

Jain vd. (2017), asidik maden atıklarının bulunduğu topraklarda uygulanan limon otu (*Cymbopogon flexuosus*) atıklarından elde edilen farklı dozda biyokömür (%15-20) uygulamasının tıbbi bir bitki olan bakopa (*Bacopa monnieri* L.)'nın biyokütlesini önemli ölçüde artırdığını ve ayrıca bitki dokularındaki metal birikiminin azaltılmasına yardımcı olduğunu belirtmişlerdir.

Zhaoxiang vd. (2020), sera koşullarında yürüttükleri çalışmada; pirinç kabuğundan elde edilen biyokömür (%5, w/w), biyo-organik gübre (%5, w/w), biyokömür (%5, w/w) + biyo-organik gübre (%5, w/w), kimyasal gübre (%0,5, w/w) ve biyokömür (%5, w/w) + kimyasal gübre (%0,5, w/w) uygulamalarının dar yapraklı sinir otu (*Plantago lanseolate*) bitkisinde kontrole kıyasla kök ve sürgün biyokütlesini artırdığını saptamışlardır.

Jain vd. (2020), asidik toprak/maden atıklarının limon otu (*Cymbopogon flexuosus*) atığından elde edilen biyokömür ile iyileştirilmesi ile birlikte palmarosa (*Cymbopogon martini* (Roxb.) Wats) bitkisinin ekimi yoluyla fitoremediasyon üzerine etkilerini araştırdıkları sera çalışmalarında, biyokömür ve asidik maden atıklarının farklı kombinasyonlarının palmarosanın %54 metal tolerans indeksi (MTI) ile çoklu stresleri etkili bir şekilde tolere ettiğini ve asidik maden atıklarından asit üretimini azaltabildiğini ifade etmişlerdir. Maden atıklarına biyokömür eklenmesinin, asidi kireçleyerek, metalleri hareketsiz hale getirdiği, toprak kalitesini iyileştirdiği ve dolayısıyla da palmarosa biyokütlesi (1.11-3.3 kat) ile birlikte yağ içeriğini de önemli ölçüde artırdığını belirtmişlerdir. Palmarosa ekimi ile birlikte kullanılan biyokömürün, yüksek asitli maden atıklarının fitoremediasyon üzerine olumlu etki yaptığını ve endüstriyel açıdan önemli uçucu yağın üretimi için sürdürülebilir bir teknoloji sunduğunu bildirmişlerdir.

Jaborova vd. (2021 a), biyokömürün fesleğen (*Ocimum basilicum*)'in büyümesi, kök morfolojik özellikleri, bitki biyokimyasal ve fizyolojik özellikleri ile toprak enzimatik aktiviteleri üzerine etkilerini belirledikleri sera koşulları çalışmalarında, siyah kiraz ağacından elde edilen biyokömürün farklı konsantrasyonlarını (%1, 2 ve 3) uygulamışlardır. Elde edilen sonuçlar kontrol ile kıyaslandığında, %2 ve %3'lük biyokömür konsantrasyonlarının bitki boyunu sırasıyla %38 ve %48, yaprak uzunluğunu %15 ve %24, yaprak sayısını %15 ve %27 ve yaprak genişliğini sırasıyla %36 ve %50 artırdığını belirtmişlerdir. Klorofil içeriği, toplam şeker, flavonoidler ve toprak enzim aktiviteleri %2 ve %3'lük biyokömür uygulamalarıyla önemli ölçüde arttığını, toplam kök uzunluğunun ise artan biyokömür seviyeleriyle (%1, %2 ve %3) sırasıyla %30, %46 ve %61 oranında arttığını bildirmişlerdir. %3'lük biyokömür uygulamasının, kontrole göre kök yüzey alanını %47, kök çapını %37 ve kök hacmini %45 oranında önemli ölçüde artırdığını ifade etmişlerdir. Biyokömür uygulamasının bitki morfolojik ve fizyolojik özelliklerinin yanı sıra toprak enzimlerinin aktivitelerini de iyileştirdiğini, böylece fesleğen büyümesi ile verimini ve toprak verimliliğini desteklediğini saptamışlardır.

Biyokömür ve arbüsküler mikoriza mantarlarının (AMF) sinerjik uygulaması hakkında sınırlı bilgi olduğunu belirten Jabborova vd. (2021 b) odunsu malzemelerden (400-500 °C'de) pirolize edilen biyokömür ve AMF'nin çemen otunun (*Trigonella foenum-graecum*) gelişimi, kök hacmi, fizyolojik performansı ve toprak enzimatik aktiviteleri üzerindeki sinerjistik etkisini araştırmışlar. Elde edilen sonuçlara göre biyokömür ve AMF'nin bitki boyu (sırasıyla %53.3 ve %66.6), yaprak sayısı (%22.5 ve %45.1), toplam kök uzunluğu (%19.8 ve %40.1), kök hacmi (32.1-71.4%), klorofil a içeriği (%26.0 ve %17.8), klorofil b içeriği (%50.0 ve %28.9), toplam klorofil içeriği (%30.0 ve %18.1) ve karotenoid içeriği (%60.0 ve %48.0) üzerinde önemli bir etkiye sahip olduğu belirtilmiştir. Biyokömür ve AMF birlikte kullanıldıklarında bitki boyunda %80.9, toplam kök uzunluğu %68.9, kök yüzey alanı %34.4, kök hacmi %78.5, klorofil a içeriği %34.2 oranında önemli bir artış olduğu tespit edilmiştir. Kontrol ile kıyaslandığında klorofil b içeriğinin %68.4, toplam klorofil içeriğinin %44.5 ve karotenoid içeriğinin %84.0 arttığını bildirmişlerdir. Sonuç olarak biyokömür ve AMF kombinasyonunun çemen otu büyümesi, mikrobiyal biyokütle ve toprak enzim aktiviteleri açısından avantajlı olduğunu saptamışlardır.

Üç farklı tıbbi bitki *Bacopa monnieri* (L.), *Andrographis paniculata* (Burm.f.) Nees ve *Withania somnifera* (L.) türü üzerine farklı dozda biyokömür (%2 ve %4) ve farklı ağır metal (düşük dozlarda 32 mg/kg Pb ve 1.5 mg/kg Cd; yüksek dozlarda 320 mg/kg Pb ve 15 mg/kg Cd) uygulamalarının etkilerinin belirlendiği çalışmada Pb ve Cd miktarlarının sırasıyla 3.25-228 ve 1.29-20.2 mg/kg arasında değiştiğini, biyokömür uygulamaları ile bu değerlerin 0.08-18 ve 0.03-6.05 mg/kg düştüğünü belirlemişlerdir. Ayrıca, ağır metal koşullar altında yetiştirilen bitkilerin kontrollere kıyasla biyokütle değerlerinin türlere bağlı olarak %5-50 azaldığı, fotosentetik özellikler ile protein içeriği üzerinde zararlı bir etki yaptığını saptamışlardır. Bununla birlikte, biyokömür uygulamaları bitki biyokütlesini (%21-175) ve ayrıca fotosentez özelliklerini, klorofil ve protein içeriğini önemli ölçüde artırdığı saptanmıştır (Nigam vd., 2021).

Achakzai vd. (2022) koyun ve keçi gübreleri ile bunların odun bazlı veya çiftlik gübresi bazlı biyokömürle karışımının rezene (*Foeniculum vulgare*) ve kimyon (*Cuminum cyminum*)'un büyüme performansı üzerindeki etkisini inceledikleri çalışmada, gübre oranları 1.66, 3.32 ve 6.64 t/ha olarak ayarlanmış ve gübrelerin genel olarak birinci ve ikinci yıllarda bitkilerin verimlerini etkilemediğini bildirmişlerdir. Uygulanan gübrelerin rezeneye göre kimyonda (%126-306.6) daha fazla etki gösterdiği, kontrole göre de rezenede %24.5-48.4 arasında artış gösterdiğini ifade etmişlerdir. Rezenede 6.64 t/ha oranında uygulanan koyun-keçi gübresi ile biyokömürün tüm uygulama dozlarından elde edilen sonuçlar karşılaştırıldığında, tohumlardaki fosforun önemli ölçüde azaldığı bildirilmiştir. Kimyon açısından ise tohumdaki fosfor içeriği bakımından uygulamalar arasında önemli farklılıklar olmadığı bildirilmiştir.

Carril vd. (2023), tatlı kestaneden (*Castanea sativa* Mill.) farklı proseslerle elde edilen iki farklı biyokömür (B1 ve B2) toprağa farklı konsantrasyonlarda (% 0, %5, %10, %25, %50 ve %100 (w/w)) hem katı hem de sıvı olarak karıştırılmış ve fesleğen, marul ve domates tohumlarının çimlenmesi üzerinde etkilerini test etmişlerdir. Üç farklı çimlenme parametresi tohum çimlenme sayısı, kök uzunluğu ve çimlenme indeksi ölçülmüş ve %10'luk B2, fesleğende kök uzunluğu ile çimlenme indeksini sırasıyla %50 ve %70 oranında artırırken, %25'teki B1 uygulamasının domateste bu parametreleri %25 artırdığı belirtilmiştir. Marul için hiçbir etki veya olumsuz etki kaydetmemişlerdir. Sıvı fraksiyonların (L1 ve L2) genel olarak tohum çimlenmesini engellediği, bunun da biyokömürün potansiyel olarak suda çözünebilir fitotoksik bileşiklerin varlığından kaynaklandığını belirtmişlerdir. Bu sonuçlar doğrultusunda, biyokömürün çimlenme substratları için uygun bir bileşen olduğunu ve çimlenme testlerinde hedef ürüne göre en iyi performansı gösteren biyokömür seçilmesinin kritik öneme sahip olduğunu vurgulamışlardır.

Nocentini vd. (2023), turba ortamına farklı dozlarda eklenen odunsu artıklardan elde edilen biyokömür ve organik atıklardan elde edilen kompost uygulamalarının iki farklı fesleğen türünün (*Ocimum basilicum* var. Italiano ve *Ocimum basilicum* var. minimum) verim ve uçucu yağ profili üzerindeki etkilerinin belirlendiği çalışmada, turbanın biyokömür (%100 ve %50 v/v) veya kompost (%100) ile tamamen veya yüksek oranda interaksiyonlarında, muhtemelen yetiştirme ortamının pH'ı ve elektriksel iletkenliğinin çok yüksek olması nedeniyle, uygulamadan birkaç gün sonra fidelerin ölümüyle sonuçlandığını bildirmişlerdir. %10'a kadar uygulanan biyokömürlerin, saf ticari turbayla karşılaştırıldığında bitki büyümesi açısından yüksek performans gösterdiği belirtilmiştir. Bununla birlikte İtalyan fesleğende kompost x biyokömür uygulamasından daha iyi performans elde edildiğini ifade etmişlerdir. Toplam 12 ve 16 aroma bileşenleri tespit etmişler ve turba ortamına uygulanan biyokömürün fesleğende uçucu organik bileşik içeriğini ve bileşimini olumsuz etkilemediğini, kompost uygulamasının ise genel olarak bu bileşiklerin konsantrasyonunu azalttığını belirtmişlerdir. Benzer şekilde, Huang vd. (2019), %90 sert ağaçtan yapılmış biyokömür, %5 tavuk gübresi kompostu ve %5 vermikomposttan oluşan karışımda yetiştirilen (pH'ın yaklaşık %8.5) fesleğen fidelerinin birkaç hafta sonra öldüğü belirtilmiştir. Bitki büyümesi açısından en iyi sonuçların %60 ve %70 biyokömür uygulamalarına %5 tavuk gübresi kompostu ve %5 vermikompost eklenen karışımlardan aldıklarını belirtmişlerdir.

Öte yandan Yu vd. (2019), fesleğen fidelerinin büyümesi üzerine yaptıkları çalışmada %50'ye kadar sert ağaçtan yapılan biyokömür uygulamasında ticari turbada yetiştirilenlere kıyasla aynı düzeyde, hatta daha iyi büyüdüğünü belirtmiştir

Iacomino vd. (2022), volkanik akdeniz topraklarında biyokömür ve kompost uygulaması tek başına veya kombinasyon halinde sebze verimi üzerine etkilerini belirlemişlerdir. Çalışmada, patlıcan (*Solanum melongena*), rezene (*Foeniculum vulgare*), marul (*Lactuca sativa*), soğan (*Allium cepa*), kolza (*Cucurbita pepo*) ve domates (*Lycopersicon esculentum*) sebze çeşitleri materyal olarak kullanılmış ve kompost1 (zeytin fabrikası atıkları+meyve bahçesi budama atıkları) ve kompost2 (zeytin fabrikası atıkları+ hayvan gübresi +yün artıkları)'yi 20 Mg/ha oranında, biyokömür (550 °C'de pirolize edilmiş kayın ağacından yapılmış) ise 30 Mg/ha oranında uygulamışlardır. Biyokömürün tek başına ilk yılda tüm bitkilerin, özellikle de patlıcanın verimini artırdığını, ancak patlıcan ve marul dışında ikinci yılda verimde azalışlar meydana geldiğini bildirmişlerdir. Genel olarak, iki yıl sonra kompost1 ve biyokömür karışımının sırasıyla %39 ve %100 artışla rezene ve kolza bitkisinin büyümesi için en iyi uygulama olduğu, soğanda kompost 2 uygulamasının tek başına %59 ile en yüksek büyümeyi gösterdiği belirtilmiştir.

Noroozi vd. (2023), karbon temelli fıstık kabuğundan elde edilen biyokömürün farklı dozları (0, 1, 2 kg/m²) ve eşzamanlı sulama (bitkinin %50, 85 ve 120'si buharlaşma) uygulamalarının fesleğenin (*Ocimum basilicum* L.) biyokimyasal özellikleri (toplam klorofil, toplam fenol ve toplam çözünür karbonhidratlar) ve morfolojik kriterleri (biyolojik verim, boy, tohum verimi ve hasat indeksi) üzerine etkilerini belirledikleri çalışmada, biyokömür uygulamalarının fesleğenin tüm biyokimyasal özelliklerini azaltırken, morfolojik özelliklerini artırdığını belirlemişlerdir.

Sonuçlar ve Öneriler

Yapılan çalışmalar incelendiğinde; biyokömürün, hammadde ve piroliz koşullarının kontrol edilmesi ile belirli alanlardaki toprakların iyileştirilmesinde ve yönetiminde uygun potansiyele sahip olduğu, doğrudan veya dolaylı olarak yeni ve uygulanabilir bir gübre olabileceği düşünülmektedir. Biyokömürün alternatif organik gübre olarak kullanılması, kimyasal gübre girdi potansiyelinin azalmasına ve uzun vadeli sürdürülebilir tarım için toprak verimliliğinin zenginleşmesine olanak sağlayacaktır. Tıbbi ve aromatik bitkiler üzerine yapılan çalışmalar incelendiğinde; genel olarak sera ve saksı koşullarında çalışmalar yapıldığı, biyokömürün içeriği ve dozuna göre değişiklik gösterdiği belirlenmiştir. Biyokömürün içeriğine bağlı olarak incelenen çalışmalar sonucunda %10'dan fazla, 2 g/kg dan fazla veya 1-2 kg/m² dozlarının uygun olduğu saptanmıştır. Bununla birlikte biyokömür uygulamalarının tarla koşullarında yapılmaması bir eksiklik olarak görülmüştür. İlerleyen yıllarda bu alanlarda araştırmaların yapılması gerekli olup, bu eksikliklerin giderilmesi ile biyokömür önemi daha da artacak ve yeni çalışma alanları belirlenebilecektir.

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1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

KİTOSANIN TIBBİ VE AROMATİK BİTKİLERİN MORFOLOJİSİ, VERİM VE KALİTE ÖZELLİKLERİ ÜZERİNDEKİ BİYOSİMÜLE EDİCİ ETKİLERİ

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Özet

Biyostimülanlar (biyolojik kökenli moleküller), biyotik ve abiyotik stres koşullarına karşı toleransı arttırarak farklı bitkilerin büyüme parametreleri, verim ve kalite özellikleri üzerinde olumlu etkilere sahiptir. Biyostimülanların ayrıca bitki kökleri üzerinde önemli olumlu etkileri yanı sıra, katyon değişimi, hızlı ürün oluşumu, tohum çimlenme oranı, besin alımı, ağır metal etkilerini azaltma, doğal bitki toksinlerini iyileştirme gibi olumlu etkileri de vardır. Kitosan toksik olmaması, biyoyumlu olması, biyolojik olarak parçalanabilmesi nedeniyle tarım alanlarındaki en önemli temel araçlardan ve biyostimülanlardan biridir. Günümüzde tarımsal öneminden dolayı biyopolimer olarak kitosan'a olan talep artmıştır. Sudan, kirleticilerden ve topraktan zararlı olan ağır metalleri ve böcek ilaçlarını absorbe etme özelliğine sahiptir. Kitosan ve kitosan bazlı nano malzemeler tıbbi ve aromatik bitkilerde gübre, bitki hastalıklarının kontrolü, böcek öldürücü ajanlar, toprak düzenleyici madde ve meyve ve tohum kaplamalarında umut verici sonuçlar vermiştir. Kitosan, biyokimyasal modifikasyonu, savunma reaksiyonunu ve fitoaleksinin biyosentezini uyararak sekonder metabolit asimilasyonunu artırabilir. Bu maddenin tıbbi ve aromatik bitkilerde bitki büyümesi, inorganik madde, klorofil içeriği, antioksidan aktivite, antosiyaninler, toplam fenolik ve flavonoid içerikleri ve alkaloidler gibi fitofarmasötik bileşenler üzerinde olumlu önemli etkilere sahiptir ve oksidatif biyobelirteçlerin sayısını azaltır. Kitosanın uygulamalarına ilişkin bu derlemeden elde edilen sonuçlar, kitosan'ın moleküler mekanizması ve daha ileri araştırmalar için umut verici etkiler oluşturabilir.

Bu derlemede kitosan'ın farklı tıbbi ve aromatik bitkilerin büyüme parametreleri, verim ve kalite özellikleri üzerindeki etkinliğinin araştırılması amaçlanmıştır.

Anahtar Kelimeler: Kitosan, Büyüme parametreleri, Kalite, Tıbbi bitki



**BIOSTIMULATING IMPACTS OF CHITOSAN ON THE MORPHOLOGY, YIELD AND QUALITY
PROPERTIES OF MEDICINAL AND AROMATIC PLANTS**

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Abstract

Biostimulants (biological origin molecules) have positive effects on the growth parameters, yield and quality properties of different plants with the improving the tolerances against the biotic and abiotic stress conditions. Biostimulants also have significant positive effects on plant roots, as well as positive effects such as cation exchange, rapid product formation, seed germination rate, nutrient uptake, reducing heavy metal effects, and improving natural plant toxins. Chitosan is one of the most important basic tools and biostimulants in the agricultural areas due to non-toxic, biocompatible, biodegradable. Nowadays, the demand for chitosan as a biopolymer has increased due to its agricultural importance. It has the ability to absorb heavy metals, insecticides and pesticides harmful from the water, pollutants and soils. Chitosan and chitosan based nano materials showed promising results on the medicinal and aromatic plants as fertilizer, control of plant disease, insecticidal agents, soil conditioning substance, and coatings of the fruit and seed. The chitosan can increase the secondary metabolite assimilation by the stimulation of biochemical modification, defensive reaction, phytoalexins biosynthesis. This substance has positive significant effects on plant growth, inorganic matter, chlorophyll content, antioxidant activity, phytopharmaceutical ingredients as anthocyanins, total phenolic and flavonoid contents, and alkaloids and decreasing oxidative biomarkers number in medicinal and aromatic plants. The results obtained from this review regarding the applications of chitosan may create promising implications for the molecular mechanism of chitosan and further research.

This review aimed to explore the efficiency of chitosan on growth parameter, yield and quality properties of different medicinal and aromatic plants.

Keywords: Chitosan, Growth parameters, Quality, Medicinal plant

Giriş

Kitosan, kabuklu hayvanların kabuğunda bulunan kitinin deasetilasyonu (kitinin üzerindeki asetilamino (-NH-CO-CH₃) gruplarının amino (-NH₂) gruplarına dönüştürülmesi işlemi) elde edilen, asidik çözeltilerde çözünen, suda çözünmeyen, açık renkli bir toz elde edilen doğrusal bir aminopolisakkarittir (Malerba ve Cerana, 2016). Bir biyopolimer olarak tarımsal öneme sahip olması nedeniyle kitosan üzerine endüstriyel alanda son zamanlarda talep artmıştır. Abiyotik elisitörü olarak ta sınıflandırılan kitosan, deneysel ölçekte kimyasal bitki büyüme düzenleyicilerine alternatif olarak kullanılmaktadır (Acemi, 2020).

Kitosan ve oligosakkaritleri, farklı nitrojen ve karbon metabolizması enzimlerinin aktivitelerini ve ayrıca fotosentezin karanlık ve aydınlık tepkilerini artırarak fotosentezi artırabilir. Temel fotokimyaı modüle ederek fotosentetik maddelerin uyarılmasında da önemli bir işleve sahiptirler. Aynı zamanda stomaların kısıtlamalarını da yönetebilirler, karanlık reaksiyonlarda karbon sabitleme etkinliğini artırabilirler ve sekonder metabolitlerin sentezini geliştirebilirler. Kitosan ve oligosakkaritlerin sekonder metabolitlerin biyosentezini ve enzimlerin aktivitesini de desteklediği bildirilmiştir (Alamdari vd., 2022). Kitosan türevleri, kitosanla karşılaştırıldığında antifungal aktivitelerinin daha yüksek olduğu görülmüştür (Wei vd., 2021). Kitosan, fizikokimyasal özelliklerinin spesifikliğine, biyolojik olarak parçalanabilirliğine ve biyoyoumluluğuna bağlı olarak farklı amaçlar için kullanılabilir (Landrischina vd., 2015; Desti vd., 2020; Shahrajabian vd., 2020a, b.).

Kitosan ve türevlerinin potansiyel kullanımı arasında antimikrobiyal ve antioksidan ajanlar, ilaç dağıtım sistemi, gen terapisi, gıda teknolojisi, biyo-nanoteknoloji, rejeneratif teknoloji, atık su arıtmaları ve elektrolitlerin yanı sıra kağıt üretimi, kozmetik, emilim artırıcı olarak, fotoğrafçılık, ahşap endüstrileri, çevre koruma, tarım, obezite tedavisi, katalizör araştırması, bağışıklık terapisi, geçirgenlik artırıcı olarak, enerji üretimi ve hücrelerin hareketsizleştirilmesi gibi çeşitli endüstrilerde yer almaktadır (Sun vd., 2023).

Kitosan bitkilerde kitinaz ve glukanaş gibi patogeneşle ilgili genler gibi çeşitli savunma genlerine öncülük etmektedirler (Pichyangkura ve Chadchawan, 2015). Ayrıca reaktif oksijen türleri süpürücü sisteminde süperoksit dismutaz (SOD), peroksidaz ve katalaz gibi çeşitli enzimleri tetikleyebilir (Pichyangkura ve Chadchawan, 2015; Hemmati vd., 2020; Shahrajabian vd., 2022c; Shahrajabian vd., 2022d). Kitosan ve oligosakkaritleri biyopestisit olarak kullanılabilir, patojenlerin çoğalmasını önler ve bitki kalitesini ve verimini artırır (Ahmad vd., 2020; Do vd., 2022; Roshni ve Thambidurai, 2022; Sultan vd., 2023). Kitosanın yaprak spreyi olarak kullanılması bitki büyümesini, iyonlar, klorofil, antioksidan kapasitesi, antosiyaninler, toplam çözünür fenoller ve flavonoidler ile alkaloidler gibi fitofarmasötik bileşenleri önemli ölçüde artırdığı ve aynı zamanda oksidatif biyobelirteçlerin sayısını da azalttığı bildirilmiştir (Sun vd., 2023). Kitosan uygulamalarının tarımsal üretim de birçok faydası vardır (Şekil 1).



Şekil 1. Tarımsal üretimde kitosan uygulamalarının faydaları

Kitosan bitkilerinin ortaya çıkarılması, sekonder metabolizmadaki değişiklikleri teşvik etmesi ve biyoaktif bitki bileşiklerinin elde edilmesi için mükemmel bir stratejidir (Hidangmayum vd., 2019). Bu derlemede kitosan uygulamalarının tıbbi ve aromatik bitkilerin morfolojik ve verim özellikleri ile kalite kriterleri üzerine etkileri belirlenmiş ve stres koşullarında kitosan uygulamalarının pozitif etkileri tartışılmıştır.

Kitosan uygulamalarının tıbbi ve aromatik bitkiler üzerine etkileri

Kitosan ve kitosan bazlı nanopartiküller, gübreler, bitki hastalığı kontrolü ve böcek öldürücü maddeler, toprak düzenleyici maddeler, olgunlaşma süresini artırıcılar ile meyve ve tohum kaplamaları gibi özellikleri ile tıbbi ve aromatik bitkilerde umut verici bulgular göstermektedir. Bu bileşenler, biyokimyasal modifikasyonun, savunma tepkilerinin ve fitoaleksinlerin biyosentezinin uyarılması yoluyla sekonder metabolitlerin asimilasyonunu artırabilir. Kitosan uygulamaları, tıbbi ve aromatik bitkilerin üretiminin artırılmasına katkı sağlarken, bu bitkilerin zararlı mikroorganizmalara karşı savunma mekanizmalarını geliştirmektedir (Sun vd., 2023). Ancak kitosanın bitkilerin savunma mekanizmalarına etkileri uygulama yöntemine ve dozuna bağlı olarak değişmektedir (Fan vd., 2023). Kitosanın kimyasal ve doğal olarak sentezlenen bileşenlerinin güçlü elisitörler ve biyostimulanlar olarak hareket edebildiği ve tıbbi bitkilerin fizikokimyasal özelliklerini değiştirebildiği belirtilmiştir (Bektas vd., 2020; Kaboudi vd., 2023; Yin vd., 2023). Patogenezle ilişkili genlerin ekspresyon

yoluyla savunma genlerinin aktivasyonuna katılırlar ve sekonder metabolitlerin biyosentezini artırarak foto koruma sağlayabilirler (Sun vd., 2023).

Mathew ve Sanker (2012), metil jasmonat (25, 50, 100 ve 150 μ M) ve kitosanın (%5 w/w) *Ocimum basilicum* L., *Ocimum sanctum* L. ve *Ocimum gratissimum* L. hücre süspansiyon kültürlerinin büyüme özellikleri üzerine etkilerini belirlemek amacıyla yürütülen çalışmada; 200 mg/L'lik (24 saat) kitosanın *O. basilicum* için optimal olduğunu *O. sanctum* ve *O. gratissimum* için ise 24 saatte 50 mg/L kitosanın optimal olduğunu bulmuşlardır. Çalışmada, metil jasmonat ve kitosan gibi elisitörlerin hücre biyokütlesini daha kısa sürede etkili bir şekilde artırdığını ve dolayısıyla *O. basilicum* L., *O. sanctum* L. ve *O. gratissimum* L.'de fitokimyasalların etkili bir şekilde uyarılmasında bu elisitörlerin kullanılabileceğini bildirmişlerdir.

Artemisia annua'da %0,01 oranında yapraktan kitosan uygulamasının önemli bir antimalaryal seskiterpen olan artemisinin birikimini teşvik etmiştir (Lei vd., 2011). Fesleğende (*Ocimum basilicum* L.), kitosan uygulamasının β -karyofilen düzeylerini artırdığı; ancak 1,8-sineol, linalool ve limonen konsantrasyonlarındaki yüzde artışların kontrol bitkilerindekine benzer olduğu belirlenmiştir (Antoniazzi ve Deschamps, 2006).

Nanede (*Mentha piperita* L.) en yüksek mentol içeriğinin 400 mg/L kitosan+400 mg/L humik asit+400 mg/L sitrik asit uygulamasından belirlendiği (Pourhadi vd., 2018) ve depolimerize kitosan ve gibberellik asit kombinasyonlarının ise mentol ve menton içeriğinde artış meydana getirdiği belirlenmiştir (Ahmad vd., 2019).

Sami vd. (2022), nanopartiküllerin kullanımının güvenliğini sağlamak amacıyla nano gübrelemenin ve toksisitenin bitki ekstraktı üzerindeki etkilerini belirlemek amacıyla yürütülen çalışmada, kitosan'ın tek başına veya NPK'lı olarak veya NP'ler halinde uygulanmasının fesleğende büyüme, verimi, yağ yüzdesini, yağ verimini, kimyasal yapısını arttırdığını bildirmişlerdir.

Stres koşullarında kitosan uygulamalarının tıbbi ve aromatik bitkiler üzerine etkileri

Kitosan, tarımda kullanılan kimyasal maddelerin miktarını azaltan ve biyotik ve abiyotik stres koşullarına karşı doğal savunma mekanizmalarını teşvik eden bitki toleransı ve direncini uyarıcı bir madde olduğu bildirilmiştir (Sun vd., 2023).

Farklı kitosan uygulamalarının (0, 100 ve 200 mg/L) kuraklık stres koşullarında *Salvia abrotanoides* ve *S. yangii* uçucu yağ bileşenleri üzerine pozitif etki yaptığı ve bileşen miktarlarını artırdığı ifade edilmiştir (Khodadadi vd., 2022).

Farklı sulama seviyelerinde iki fesleğen türünün (*Ocimum ciliatum* ve *Ocimum basilicum*) biyokimyasal ve fizyolojik özellikleri, fenolik içeriği ve antioksidan aktivitesi üzerine farklı ekzojen kitosan uygulamalarının (0,0, 0,2 ve 0,4 g/L) etkilerini belirlemek amacıyla yürütülen çalışmada; kuraklık stresinin bazı morfolojik, fizyolojik ve biyokimyasal özellikler üzerinde önemli etkileri olduğu ve her iki fesleğen türünde de fotosentetik pigment içeriğini ve büyüme parametrelerini azalttığı belirlenmiştir. Kitosanın ekzojen uygulaması (özellikle 0,4 g/L), her

iki fesleğen türünde de stres veya normal koşullarda bitki büyüme parametrelerini, kontrol bitkilerle karşılaştırıldığında artırdığı bildirilmiştir. Ayrıca farklı seviyelerdeki kitosanın, iki türün ekstraktlarının toplam fenol içeriği ve antioksidan aktivitesi üzerinde önemli etkileri olduğunu ve kitosanın su stresinin fesleğen bitkilerinin büyüme parametreleri üzerindeki zararlı etkilerini azaltmak için umut verici bir materyal olabileceği ve bir bütün olarak kitosan uygulamalarının kuraklık stresinin etkisini kısmen hafifletebileceği ileri sürülmüştür (Giglou vd. (2022), nanede kitosan kaplı demir oksit nanopartikülleri ve büyüme uyarıcısı ile kuraklık stresinin azaltılması üzerine yaptıkları çalışmada, üç farklı toprak nemi (%90, %60 ve %30 toprak tarla kapasitesi nemi), üç farklı demir kaplı kitosan seviyesi (kontrol, 5 ve 10 μM) ve üç farklı büyüme uyarıcı seviyesi (kontrol, %0.5 ve 1) uygulanmıştır. Klorofil indeksi ve stoma iletkenliği, kontrol bitkilerinde kuraklık stresine maruz kalanlara göre önemli ölçüde daha düşük olduğu ve %60 tarla kapasiteli nem koşullarında %1 büyüme uyarıcı uygulamalarının klorofil indeksini artırdığını bildirmişlerdir. Maksimum floresans (F_m) ve değişken floresans değerleri %30 toprak nem stresi altında %1 büyüme uyarıcı ve 10 μM demir kaplı kitosan nanopartikül ile muamele edilen bitkilerde gözlemlendiğini ifade etmişlerdir. Sonuç olarak, kuraklık stresi altında nanede uçucu yağ üretimini arttırmak için biyostimülanların ve nanomateryallerin eş zamanlı uygulamalarının tasarlanması gerekliliğini vurgulamışlardır.

Kuraklık stresi (%25 ve %50 tarla kapasitesi) ve farklı kitosan uygulamalarının (0, 200, and 400 $\mu\text{L/L}$) *Thymus daenensis* Celak'ın fizyolojik özellikleri ve uçucu yağ verimi üzerine etkilerini belirlemek amacıyla yürütülen çalışma sonucunda %50 tarla kapasitesinde, 400 $\mu\text{L/L}$ kitosan uygulamasında maksimum uçucu yağ veriminin elde edildiği bildirilmiştir. Kitosanın stres koşullarının kuru madde ve yağ verimi üzerindeki olumsuz etkilerini azaltmadaki telafi edici etkilerinin, temel olarak *Thymus daenensis* yapraklarının hücre zarlarının bütünlüğünü artıran prolin birikimi ve lipit peroksidaz seviyesinin azaltılması yoluyla ozmotik düzenlemenin uyarılmasından kaynaklandığını ifade etmişlerdir (Bistgani vd., 2017).

Farklı salisilik asit (2.5 ve 5.0 mM) ve kitosan (0.5 ve 1.0 g/L) seviyelerinin yapraktan uygulanması, su stresinin zararlı etkilerini *Thymbra spicata* L. bitkisinde uçucu yağ verimini ve karvakrol konsantrasyonu üzerindeki zararlı etkilerini azalttığı bildirilmiştir (Momeni vd., 2020).

Kitosanın ve nanopartiküller (Se-CS NP'ler) olarak konjuge formlarının uygulanması, orta ve şiddetli tuzluluk stresi koşullarında kudret narı bitkisinin biyokimyasal ve morfofizyolojik özelliklerini artırmıştır (Sheikhalipour vd., 2023).

Kitosan-melatonin nanopartikülleri, nanede tuz stresinin etkilerini azaltmak amacıyla yenilikçi bir koruyucu madde olarak kullanılabilirliği bildirilmiştir. Yürütülen çalışmada melatonin ve kitosan-HPMC-melatonin nanopartikül uygulamalarının tuz stresinin olumsuz etkilerini, morfolojik özellikler, prolin, antioksidan enzim aktivitelerin yanı sıra uçucu yağ profilinin ana bileşenlerinin içeriklerini artırarak azaltmıştır. Melatoninin

kitosanla konjuge formunun, Melatoninin tek başına uygulanmasına kıyasla stres etkileriyle mücadelede daha etkili olduğunu belirtilmiştir (Gohari vd., 2023).

Devedikeni (*Silybum marianum*) bitkisinde tuz stresinin etkileri hafifletmek amacıyla kitosan uygulamaları yapılmış ve uygulamalardan sonra bitki büyümesinde ve fizyolojik özelliklerde artışların meydana geldiği bildirilmiştir. %0,01 oranında kitosanın kullanılması klorofil ve toplam klorofil içeriğini artırdığı belirlenmiştir. Kitosan uygulamasının yapraklarda enzimatik aktiviteyi artırdığı, ancak H₂O₂ bileşenlerini azalttığı bildirilmiştir. Sonuç olarak, kitosanın hücre içi iyon bileşenini düzenleyerek ve antioksidan enzim aktivitelerinin kapasitesini artırarak bitkileri tuz stresi hasarından koruyabileceği belirtilmiştir (Safikhan vd., 2018).

Dar vd. (2015), Co-60 gama ile ışınlanmış farklı kitosan dozları (0, 40, 80 ve 120 mg/L) ve fosforlu gübrenin çemenin büyümesi, verimi ve trigonellin içeriği üzerindeki etkisini belirlemek amacıyla yaptıkları çalışmada, nitrat redüktaz aktivitesinin, fotosentetik pigmentlerin ve karbonik anhidraz enzimlerinin içeriklerinin yanı sıra toplam alkaloid verimi, tohum verimini ve trigonelin içeriklerinin Co-60 gama ile ışınlanmış kitosan uygulamasından (40 mg/L) sonra önemli ölçüde arttığını bildirmişlerdir.

Sonuç ve öneriler

Biyo uyumlu, toksik olmayan ve biyolojik olarak parçalanabilen madde olan kitosan, toprak, pestisit ve sudaki ağır metalleri ve insektisitleri absorbe etme özellikleri nedeniyle tarım alanlarında temel araç olarak kullanılabilir. Bu nedenler, kitosanın bitkilerin verim ve kalite özelliklerinin artırılmasına, patojenlerin saldırılarına karşı korunmasına ve stres koşullarına karşı dayanıklılık kazanması gibi özellikleri nedeniyle bitki biyolojisinin farklı alanlarında pratik olarak kullanılabilir olduğunu göstermektedir. Böylece, bitkilerin hastalıklara karşı korunması ve ilerleyen yıllarda tıbbi ve aromatik bitki üretimlerinde kimyasal kaynaklı gübrelerin aşırı kullanımının azaltılması için kitosan uygulanması ve faydaları hakkında yeterli bilgilerin elde edilmesi amacıyla daha fazla araştırmaya ihtiyaç duyulduğu görülmüştür. Ayrıca, önceki çalışmalar incelendiğinde, kitosan uygulamalarında en etkin uygulama dozlarının tıbbi ve aromatik bitkilerin türlerine göre farklılık gösterdiği ve bu alanda yapılan çalışmaların yetersiz olduğu belirlenmiştir.

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SOME RHEOLOGICAL AND TEXTURAL PROPERTIES OF BREAD FORTIFIED WITH EGGHELL POWDER

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Abstract

This study investigates the rheological and textural properties of bread fortified with eggshell powder (ESP) derived from different dietary and growing conditions (industrial, organic, free range, and village). The fortification of ESP resulted in a decrease in water holding capacity, stability, softening degree, maximum resistance, energy, and resistance to extension, but the extensibility value increased. The rheological and physical analysis results obtained from the control and fortified bread samples indicated that the presence of calcium in egg shell powder enhanced the structure of the flour. Furthermore, it did not have any adverse effects on the dough or the process of producing bread, even when used at the highest level of egg shell powder. Through the texture profile analysis, it was determined that the interaction between the type of ESP and the level of ESP has a statistically significant effect on the chewiness value ($p \leq 0.05$). Consistent with the firmness values, the inclusion of higher levels of ESP resulted in increased chewiness values. Chewiness levels shown a direct correlation with firmness values. Increased calcium levels enhanced bread chewiness by resulting in a softer bread crust. The type of ESP was determined to have a significant impact ($p \leq 0.05$) on cohesiveness value. It was found that the elasticity value rose when ESP was added, indicating a positive correlation with increasing Ca levels. The analysis of the fortified bread samples revealed that, the presence of Ca in ESP did not have a negative impact on the bread making properties, even at the maximum amount of ESP. The incorporation of ESP into bread has effectively converted an industrial waste into a functional commodity that is accepted by consumers.

Key words: Eggshell, fortification, rheology, texture



NADİR GÖRÜLEN BİR KOMPLİKASYON: PERİFERİK YOLLA TAKILAN SANTRAL VENÖZ KATETER DÜĞÜMLENMESİ BİR OLGU SUNUMU

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Özet

Kritik hasta çocuklarda; sürekli intravenöz tedavilerin yapılmasında periferik yolla santral venöz uygulaması sıklıkla kullanılan bir yöntemdir. Periferik yolla takılan santral venöz kateterler, daha az invaziv olması nedeniyle santral venöz kateterlere alternatif olmakla birlikte, periferik yolla takılan kateter uygulamalarında da kateter komplikasyonlarına rastlanmaktadır. Zorlayarak geri çekilmesi vasküler hasara neden olabilir. Cerrahi olarak çıkarılması daha uygundur. Biz periferik yolla santral kateter takılması sonrası cilt altında kateter düğümlenmesi olan bir olguyu sunmayı amaçladık. Serebral palsy tanısıyla takip edilen 5 yaşındaki erkek hasta, beslenme güçlüğü, solunum yetersizliği ve pnömoni tanılarıyla yatırıldı. Hastanın altta yatan bir hastalığı olması nedeniyle uzun süreli antibiyotik tedavisi ve parenteral beslenme amacıyla periferik santral venöz kateter takılması planlandı. Kateter ultrason rehberliğinde Seldinger yöntemi ile sağ femoral vene yerleştirilirken kılavuz ilerletilmeye çalışıldı. Kılavuz yaklaşık 2 cm ilerletildikten sonra dirençle karşılaşıldığında kılavuz tel geri çekilmeye çalışıldı. Ancak kılavuz geri çekilmesine rağmen geri çekilemediği için düğümlü olduğu düşünülmüş ve direkt radyografi çekilerek kılavuz telin kıvrılıp düğümlendiği görülmüştür. Kılavuz telin çıkarılması için lokal anestezi altında cerrahi müdahale yapıldı. Kılavuz tel damar yaralanmasına neden olmadan çıkarıldı. Operasyon sırasında ve sonrasında komplikasyon gelişmedi. Sonuç olarak, periferik yolla santral venöz kateter takılması invaziv bir işlemdir. Komplikasyonlarla sık karşılaşılması açısından kateter takılırken dikkatli olunmalı, mutlak radyolojik kontrol yapılmalı ve deneyimli kişilerin gözetiminde işlemin yapılması gerekliliği akılda bulundurulmalıdır.

Anahtar kelimeler: santral venöz kateter, komplikasyon, çocuk

Abstract

In critically ill children; central venous application via peripheral route is a frequently used method in performing continuous intravenous treatments. Although peripherally inserted central venous catheters are an alternative to central venous catheters because they are less invasive, catheter complications are also encountered in peripherally inserted catheter applications. Forcible withdrawal may cause vascular damage. Surgical removal is more appropriate. We aimed to present a case of subcutaneous catheter knotting after peripheral central catheter insertion. A 5-year-old male patient, who was followed up with the diagnosis of cerebral palsy, was hospitalized with the diagnoses of feeding difficulty, respiratory failure and pneumonia. Since the patient had an underlying disease, it was planned to insert a peripheral central venous catheter for long-term antibiotic treatment and parenteral nutrition. While the catheter was being placed into the right femoral vein using the Seldinger method under ultrasound guidance, an attempt was made to advance the guide. After the guide was advanced approximately 2 cm, the guide wire was tried to be withdrawn when resistance was encountered. However, since the guide could not be withdrawn even though it was withdrawn, it was thought to be knotted, and direct radiography was taken and it was seen that the guide wire was twisted and knotted. Surgery was performed under local anesthesia to remove the guidewire. The guidewire was removed without causing vascular injury. No complications developed during and after the operation. As a result, peripheral central venous catheter insertion is an invasive procedure. Because complications are frequently encountered, care should be taken when inserting the catheter, absolute radiological control should be performed, and it should be kept in mind that the procedure should be performed under the supervision of experienced people.

Keywords: central venous catheter, complications, child

Giriş

Periferik yolla santral venöz kateter yoğun bakım ünitesine kabul edilen kritik hastalarda sıvı-elektrolit dengesizliğinin giderilmesi, sürekli veya aralıklı intravenöz ilaç uygulamaları, hastanın beslenmesi veya beslenme sorununun düzeltilmesi, kan ve kan ürünlerinin transfüzyonu ve hastanın günlük sıvı ihtiyacının karşılanması amacıyla periferik olarak yerleştirilen santral kateterler, santral venöz kateter erişimi için alternatif bir seçenek olarak günümüzde kullanılmaktadır (1). Son yıllarda özellikle onkolojik ve kritik hastalarda santral venöz katetere alternatif olarak periferik yolla santral venöz kateter kullanımı, esas olarak daha kolay yerleştirme, güvenlik ve olası maliyet etkinliği avantajları nedeniyle artmıştır (1). Subklavian ven, internal juguler ven ve femoral ven en sık tercih edilen yerlerdir. Periferik damar erişim sorunu olan çocuklarda kateterizasyon için en kolay ve güvenli yer femoral vendir.

Bizim olgumuzda femoral ven kateterizasyonu sırasında kılavuz tel düğümlendi. Literatürde az sayıda olgu olduğu için böyle bir olguyla karşılaşıldığında bu durumun yönetimi açısından olgumuzu sunarak katkı sağlamayı amaçladık.

Olgu Sunumu

Serebral palsy tanısıyla takip edilen 5 yaşındaki erkek hasta, solunum sıkıntısı ve beslenme güçlüğü şikayetiyle çocuk acil servise başvuran hasta çocuk yoğun bakım ünitesine yatırıldı. Hastanın altta yatan bir hastalığı olması nedeniyle uzun süreli antibiyotik tedavisi ve parenteral beslenme amacıyla periferik santral venöz kateter takılması planlandı. 4 fr, 2 lümenli (Fornia) kateter kullanıldı. Kılavuz telin çapı 0,48 mm'dir (0,018 inç). Kateter ultrason eşliğinde Seldinger yöntemiyle sağ femoral vene yerleştirilirken kılavuz ilerletilmeye çalışıldı. Kılavuz yaklaşık 2 cm kadar ilerletildikten sonra dirençle karşılaşıldığında kılavuz tel geri çekilmeye çalışıldı. Ancak kılavuz geri çekilmesine rağmen geri çekilemediği için düğümlü olduğu düşünüldü ve direkt radyografi çekildi (Resim 1). Kılavuz telin çıkarılması için lokal anestezi altında cerrahi müdahale yapıldı. Kılavuz tel damar yaralanmasına neden olmadan çıkarıldı. Operasyon sırasında ve sonrasında komplikasyon gelişmedi.

Tartışma

Periferik santral venöz kateter uygulaması boyun ve göğüs kateteri yerleştirmenin yüksek morbidite ve potansiyel ölümcül komplikasyonlarını ortadan kaldırılması, kateterle ilişkili enfeksiyon ve septisemi potansiyelini azaltması ve daha düşük işlem maliyeti olması yönünden avantajlıdır (1). Ancak periferik santral venöz kateter takılmasına sekonder olarak; kateter giriş yerinin enfeksiyonu ve kateterin uzun süreli kullanımına bağlı tromboz gelişimi gibi birçok komplikasyon sayılabilir (2). Moran ve ark. kateter ilişkili tromboz oranını

%3, mekanik komplikasyon oranını %4, kateter ilişkili enfeksiyon oranını %2 ve selülit oranını %1 olarak bildirmişlerdir (2). Periferik santral venöz kateterizasyonda komplikasyon (malpozisyon, tromboflebit, kateter disfonksiyonu) riski santral venöz kateterle karşılaştırıldığında 2 kat daha fazla bulunmuştur (3).

Kateter takılması sırasında da arteriyel veya venöz yaralanma, kanama, hematoma oluşumu gibi mekanik komplikasyonlar gelişebilir. Ayrıca kateter takılması sırasında kateterde düğümlenme, kılavuz tel kaybı gibi komplikasyonlar da ortaya çıkabilmektedir (4).

Literatürde az sayıda kılavuz düğüm vakası vardır (5,6). Bu gibi durumlarda düğümlenen kılavuz telin geri çekilmesinin damar yaralanmasına yol açabileceği vurgulanmıştır. Bu tür kılavuz düğümlenme durumlarında cerrahi olarak çıkarılması daha uygun olacaktır. Nadir görülen bir komplikasyon olmasına rağmen klinisyenin bu ciddi komplikasyon konusunda bilinçli ve dikkatli olması gerekmektedir. Tedavi için cerrahi olarak çıkarılması daha uygundur.

Hastanın ailesinden bilgilendirilmiş onam alındı.

Sonuç

Periferik yolla santral venöz kateter takılması invaziv bir işlemdir. Komplikasyonlarla sık karşılaşılması açısından kateter takılırken dikkatli olunmalı, mutlak radyolojik kontrol yapılmalı ve deneyimli kişilerin gözetiminde işlemin yapılması gerekliliği akılda bulundurulmalıdır. Nadir görülen bir komplikasyon olmasına rağmen klinisyenlerin kılavuz telin düğümlenebileceğini bilmeleri ve cerrahi müdahale gibi uygun tedavi yöntemleri konusunda bilgi sahibi olmaları önemlidir.

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Resim 1: Direkt radyografi görüntüsü; Periferik santral venöz kateter kılavuz tel düğümlenmesi





ÇOCUKLARDA ZİHİN KURAMI VE OTİZM

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Özet

Zihin kuramı (ZK), diğer insanların duygu, düşünce, istek ve inançlarını fark ederek anlam çıkarabilme; onların ne söyleyeceklerini yorumlayabilme, nasıl davranacaklarını tahmin edebilme ve davranışlarının niyetini anlama becerisidir. Diğer bilişsel becerilerde olduğu gibi ZK becerileri de sıralı bir gelişim göstererek yaklaşık 4-5 yaşlarında edinilir.

Zihin kuramı bozuklukları ilk kez OSB'li çocuklarda tanımlanmıştır. Otizm tanılı çocuklarda, zeka normal olsa bile ‘sosyal ve iletişimsel’ bozulmalar ve ‘kısıtlı ilgi, rutine bağlılık, katı davranış örüntüleri’ gibi işlevselliği bozan problemler görülmektedir. Otizm tanılı çocuklar genellikle geç bebeklik dönemindeki ‘ortak dikkat’ davranışlarını göstermez ve ‘hayali oyun’ kuramazlar. Yanlış inanç testlerinde diğer insanların inançlarını anlamadaki güçlük yaşarlar.

Yüksek işlevli otizm tanılı çocuklar da iletişime uygunsuz başlangıç, basmakalıp dil ve bağlam kullanımı, sözsüz iletişim ve anlatım görevi gibi pragmatik becerilerde tipik gelişim gösterenlere göre daha kötü performans göstermektedir. Bu durum, Otizmlili çocuklarda yapısal dil bileşenlerini güçlendirmenin yanı sıra, gerçek sosyal senaryoların deneyimlenmesi yoluyla oluşturulan müdahale programlarının önemini ortaya koymaktadır.

Anahtar Kelimeler: Çocuk, Zihin kuramı, Otizm



THEORY OF MIND IN CHILDREN AND AUTISM

Abstract

Theory of mind (ToM) is the ability to recognize and make sense of other people's feelings, thoughts, wishes and beliefs; to interpret what they say, to predict how they will behave and to understand the intentions of their behavior. As with other cognitive skills, ToM skills are acquired at around 4-5 years of age, showing a sequential development.

Theory of mind disorders were first identified in children with ASD. Even if intelligence is normal, children diagnosed with autism have "social and communicative" impairments and problems that impair functionality such as "limited interest, adherence to routine, rigid behavior patterns". Children diagnosed with autism usually do not show the "joint attention" behaviors of late infancy and cannot engage in "imaginary play". They have difficulty understanding other people's beliefs in false belief tests.

Children with high-functioning autism also perform worse than typically developing children on pragmatic skills such as inappropriate initiation of communication, use of stereotyped language and context, nonverbal communication and narrative tasks. This suggests the importance of intervention programs designed to strengthen structural language components in children with autism, as well as intervention programs designed to experience real social scenarios.

Keywords: Child, Theory of mind, Autism

Zihin kuramı (ZK), diğer insanların duygu, düşünce, istek ve inançlarını fark ederek anlam çıkarabilme; onların ne söyleyeceklerini yorumlayabilme, nasıl davranacaklarını tahmin edebilme ve davranışlarının niyetini anlama becerisidir (1,2). Diğer bilişsel becerilerde olduğu gibi ZK becerileri de sıralı bir gelişim göstererek yaklaşık 4-5 yaşlarında edinilir. Zihin kuramı gelişimi öncesi iki döneme ayrılır. İlk aşamada yaklaşık 6. ayda canlı cansız nesne hareketini kavrama, 8. ayda bakım verenle duygu paylaşımında bulunma, 8-12. ayda ortak dikkat ile sosyal iletişim başlatma gibi gelişimler görülür (3). İkinci aşama ise yaklaşık 18 ay ile 4 yaş arasındaki süreçtir. Bu dönemde yaklaşık 18. ayda kendisinin diğerlerinden farklı olduğunu anlama, diğer insanların farklı istekleri olabileceğini anlama, gerçek ile zihinsel temsili ayırt edebilme, ikincil temsil gelişimi ile "-mış" gibi oyun kurabilme becerileri gelişir (2,4). 2 yaşlarında kendi istekleri ile diğerinin istek farkını anlama ve "mutlu, üzgün, sinirli, korkmuş" duygularının ifadesi gelişirken, 3 yaşlarında "görme bilmeye neden olur" prensibini anlama ve öz farkındalık içeren "suçluluk, utanç, gurur" duygu ifadelerinin gelişimi ZK öncülleri olarak kabul edilebilir (5).

Zihin kuramı birinci düzey yanlış inanç testi, ikinci düzey yanlış inanç testi, ‘metafor ve ironi’ anlama becerisi, ‘gaf’ tanıma becerileri ile değerlendirilebilir. Birinci düzey yanlış inanç testinde çocuğa, başka bir kişinin oyuncak veya nesnelere ile oynadığı bir hikaye anlatılır. Hikayedeki karakterin bir durum hakkında yanlış bir inancı vardır ve çocuğun o karakterin ne yapacağını tahmin etmesi gerekir. Bu test ile çocuğun, diğer kişilerin etraftaki şeylerin gerçekte nasıl olduğuna göre değil, nasıl olduklarını 'düşündüklerine' göre hareket ettiklerini anlayabildiği görülür. İnsanların dünyayla ilişkisine, zihinsel temsillerinin aracılık ettiği fikrinin anlaşıldığını gösterir (6). Beş altı yaşlarında uygulanan ikinci düzey yanlış inanç testinde ise üçüncü bir kişinin bir düşüncesi hakkında, ikinci bir kişinin düşüncelerini çıkarsama yeteneği değerlendirilebilir. Kişilerin hem dünya hakkında hem de başkalarının zihin içeriği hakkında inançları ve yanlış inançları olabileceğini anlayabildiklerini söyleyebiliriz (3,7). Ayrıca 6 yaş sonrası 2.düzyen ZK gelişimi ile ‘metafor ve ironi’ anlama becerisi gelişirken, kız çocuklarında 9 yaş, erkek çocuklarında ise 11 yaş civarında ‘gaf’ tanıma becerisi gelişmektedir (2).

Günlük hayatta zihin okuma becerisi, kendimiz ve diğer kişilerin davranışlarını açıklamak ve tahmin etmek için ‘sosyal davranış anlamlandırma’ işlevinde, duyduklarımızın ötesini düşünerek, konuşanın zihinsel durumu hakkında hipotez üretebilmek için ‘iletişimi anlamlandırma’ becerisinde, diğer kişinin olayı nasıl yorumladığı ve nasıl hissettiğini anlamak için ‘empati’ işlevinde, kendi zihinsel farkındalığın artışı ile zihinsel kusurları görmek için ‘iç görü’ yeteneğinde ve aldatılma ve aldatılmayı anlama işlevlerinde sıkça kullanılmaktadır.

ZK bozuklukları ilk kez OSB’ li çocuklarda tanımlanmış olup; Dikkat eksikliği hiperaktivite bozukluğu, Özgül öğrenme bozukluğu, Entelektüel yetersizlik, Gelişimsel dil bozuklukları, Tourette sendromu, Sınır kişilik özellikleri, Anoreksiya nevroza, Anksiyete semptomları, Obsesif kompulsif bozukluk, Şizofreni ve Bipolar bozukluk ile de ilişkili olduğu belirtilmiştir (7,9).

Otizm tanılı çocuklarda, zeka normal olsa bile ‘sosyal ve iletişimsel’ bozulmalar ve ‘kısıtlı ilgi, rutine bağlılık, katı davranış örüntüleri’ gibi işlevselliği bozan problemler görülmektedir. Otizm tanısı bazen 2 yaşına kadar gecikse de, bu çocuklar geç bebeklik dönemindeki ‘ortak dikkat’ davranışlarını göstermez ve ‘hayali oyun’ kuramazlar. Okul öncesi yıllarda başkalarının arzularını kısmen anlayabilirler. Yanlış inanç testlerinde diğer insanların inançlarını anlamadaki güçlük yaşarlar. OSB’ li çocukların sadece %20 ila 35’i yanlış inanç görevlerinde başarılı olmaktadır (9).

Otizm tanılı çocuklar, duyguların nedenlerini anlama ve durumlarla eşleştirmede zorluk yaşarlar. Normal gelişim gösteren 3-4 yaş çocuk, belirli durum ve isteklere bağlı olarak gelişebilecek duyguyu anlarken, otizimli çocuklar başarısız olurlar (10). OSB’ li çocuklar ayrıca, aldatma gerektiren ve inanca dayalı duyguları



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anlamayı sağlayan zihin kuramı görevlerinde de başarısız olma eğilimindedirler. ‘‘Para saklama oyunu’’ sırasında normal gelişim gösteren 3 yaş çocuđuna göre daha fazla hata yapmaktadırlar (11).

Yüksek işlevli otizm tanılı çocuklarda da iletişime uygunsuz başlangıç, basmakalıp dil ve bağlam kullanımı, sözsüz iletişim ve anlatım görevi gibi pragmatik becerilerde tipik gelişim gösterenlere göre daha kötü performans göstermiştir. Bu durum, Otizmli çocuklarda yapısal dil bileşenlerini güçlendirmenin yanı sıra, gerçek sosyal senaryoların deneyimlenmesi yoluyla oluşturulan müdahale programlarının önemini ortaya koymaktadır (12).



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ÖZET

Dokuların normal anatomik yapısının bozulması sonrası iyileşme süreci başlar. Yara iyileşmenin hızlı ve sorunsuz olması için suture uygulanmaktadır. Yara iyileşmesi üç evreden oluşur. Bunlar; inflamasyon, proliferasyon ve maturasyon safhasıdır. Yara iyileşme tipleride üç çeşittir. Bunlar; primer yara iyileşmesi, sekonder iyileşme ve tersiyer (gecikmiş primer) iyileşmedir. Suture malzemeleri cerrahi dikiş için olmazsa olmazlardır. Cerrahi el aletleri ve suture materyalleri olarak iki ana gruba ayrılırlar. Portegü, penset ve makas temel el aletleridir. Suture materyalleri iğne ve iplikten oluşmaktadır. İğne ve ipliklerde kendi içlerinde birçok çeşit barındırmaktadır. İğneler; keskin, ters keskin, yuvarlak sivri ve yuvarlak kör olmak üzere özelliklerine göre kategorize edilmişlerdir. İplikler ise doğal ve sentetik olmak üzere iki temel gruptan köken alır. Yine emilen, emilemeyen, monofilaman ve multifilaman olma özelliklerine göre de ayrımları mevcuttur. Cerrahi suture teknikleri geçmişten günümüze kadar gelişerek devam etmiştir. Temel bazı yöntemler pek çok cerrah tarafından sık kullanılmaktadır. En temel ve sık kullanılan yöntemleri şöyledir; basit suture, devamlı epidermal suture, matris suture, köşe suture, subkütan suture ve devamlı derialtı suturedür.

Anahtar Kelimeler: Cerrahi suture, suture teknikleri, yara iyileşmesi



SUMMARY

The healing process begins with the continuation of the normal anatomical structure of the tissues. Ensuring continuity of wound healing so that it is rapid and trouble-free. Wound healing consists of three stages. These; These are the proliferation and maturation stages of treatment. There are three types of wound healing. These; Primary wound healing, secondary healing and tertiary (delayed primary) healing. Suture materials are indispensable for sewing. They are divided into two main groups: maintenance of surgical instruments and operation. Tools, forceps and scissors are basic hand tools. Suture consist of needle and thread. There are many types of needles and threads. Needles; They are categorized according to their features: sharp, reverse sharp, round pointed and round blunt. Yarns originate from two basic groups: natural and synthetic. However, there are distinctions between absorbable, non-absorbable, monofilament and multifilament. Surgical treatment techniques continue to develop from past to present. Some basic transcriptions are frequently used by many surgeons. The most basic and frequently used methods are as follows: simple nutrition, continuous epidermal nutrition, matrix nutrition, corner suture, subcutaneous nutrition and continuity subcutaneous nutrition.

Key Words: Surgical suture, suture techniques, wound healing



SÜTÜR ATMA TEKNİKLERİ

ABSTRACT

Dokuların olağan anatomik yapısının bozulması sonrası iyileşme süreci başlar. Yara iyileşmenin hızlı ve sorunsuz olması için sütürasyon uygulanmaktadır (1,2). Yara iyileşmesi 3 evreden oluşur:

İnflamasyon (1-5 gün) :

İlk cevap olan pıhtılaşma sonrası koagülasyon faktörleri aktive olur.

Fibrin oluşmasıyla trombosit ile oluşan gevşek pıhtı dayanıklı hale gelir.

Vazodilatasyon ile vasküler permeabilite de artar ve hücreler arasında inflamatuvar eksuda toplanır.

Kemotaktik faktörler neticesinde nötrofil, monosit ve makrofajlar aktifleşir.

Nötrofil ve lökositler bakterileri temizlerler.

Monositler makrofaja dönüşerek, bir çok büyüme faktörlerini ve sitokinleri salgırlar.

Proliferasyon ve Skar Gelişimi Safhası (5-14 günler):

Fibroblastlar kollagen liflerini üretirler. Kollagen de yaranın kontraksiyonunu ve gerilme gücünü oluşturur. Bu safhada epitelizasyon ve kontraksiyon gelişir.

Doku hasarı fazlaca doku kaybıyla beraberse rejenerasyon yara kenarlarından başlar. Epitel granülasyon dokusunu üzerinden ilerler.

Migrasyon epitel dokularının uç uca bir araya gelmesine kadar devam eder. Sonraki aşama kontraksiyondur. Yara kontraksiyonuyla yara büyüklüğü azalır. Bu olay sıklıkla miyofibroblastlarca gerçekleşir.

Granülasyon dokusu oluşup epitelizasyon tamamlanınca proliferasyon aşaması sona erer.

Maturasyon Safhası (14. günden sonra):

Proliferasyon safhasının peşinden başlar ve yıllarca sürer.

Maturasyon aşaması kollajen liflerinin yeniden şekillenmesidir (remodeling).

Bu safhada yumuşak ve jelatinöz yapıdaki tip III kollajen vakit geçtikçe daha sıkı olan tip I kollajene dönüşür.

Kontraksiyonun bir kısmı bu safhada gelişir. Yara yaklaşık 6 hafta sonra orjinal gücünün % 95 ini kazanır.

SÜTÜR MALZEMELERİ

- Cerrahi el aletleri (portegü, penset ...)
- Sütürler (İğne, iplik)

İĞNELER

Cerrahi iğneler üç bölümden oluşur (3): Uç, gövde ve sap. Uçlarına bakarak değerlendirildiğinde;

Keskin: Kolay penetrasyon sebebiyle kenarları özel bilenmiş bir iğnedir. İç kısmı kesicidir. Cilt kapatmalarında ve kesici iğne gerektiren uygulamalarda kullanılır.

Ters Keskin: Kolay penetrasyon amacıyla kenarları özel bilenmiş bir iğnedir. Dış kısmı kesicidir. Bu şekil, iğneye uygulanacak çekme hareketine karşı dokuyu koruduğu için düz keskin uca göre avantajlıdır.

Yuvarlak sivri: En sık kullanılan iğne türüdür. İğnenin keskin ucu yuvarlaktır. Dokuyu kesmeden delip geçmektedir. İğne ucuna doğru ilerledikçe sivrileşmektedir.

Yuvarlak kör: Yuvarlak iğnenin sivriliği azaltılmış şeklidir. Dokuyu kesmektense çevredeki yapılarda doku zedelenmesini önlemek sebebiyle parankimatik dokularda tercih edilmektedir.

İğneler çemberin yay parçasına benzer. Yay parçası çemberin ne kadarlık kısmını kaplıyor ise o şekilde isim alır. Örnek verecek olursak yarım çember ise $\frac{1}{2}$ (daha çok iç sütürlerde kullanılır), dörtte biri ise $\frac{1}{4}$ ve 135 derecelik açıyı kapsıyor ise $\frac{3}{8}$ olarak isimlendirilirler.

İPLİKLER

Doğal: Doğadaki materyallerden yapılan sütürlerdir. Emilebilir veya emilmeyen tipleri mevcuttur (4). Dokuda reaksiyon riski yüksektir.

Sentetik: İnsan tarafından üretilen doğal olarak bulunmaz materyallerden yapılan sütürlerdir. Emilebilir veya emilmeyen tipleri vardır. Dokuda reaksiyon oluşturma ihtimali minimumdur ve öngörülebilir emilim süresi vardır.

Emilebilen (absorbabl): Doku içinde yıkıma uğrayan ve gerginlik kuvvetini 60 gün içinde kaybeden sütürlerdir. Sütür öngörülebilir zamanlarda doku desteği sağlar, görevini yapar ve vücut tarafından hidroliz (sentetik)/ enzimatik (doğal) reaksiyonla belli sürelerde emilir.

Emilemeyen (nonabsorbabl) : Vücut enzimlerince sindirilmeyen veya vücut dokusu tarafından hidrolize edilmeyen sütürlerdir. Sürekli doku desteği sağlarlar.

Monofilaman: Tek bir sicimden oluşan, dokudan rahat geçiş niteliğine sahip, non-kapillerite özelliği olan, bakterilerin yerleşeceği boşlukları içermeyen pürüzsüz yapısı olan, düşük sürtünme gücü olan, minimum doku travması ve daha az reaksiyon yapan sütürlerdir. Kontamine ve travmatik yaralar için en uygun sütürlerdir.

Multifilaman: Birden fazla ipliğin bir araya getirilip örülmesinden veya sarılmasından oluşmuştur. Dügüm emniyeti fazla, kullanımı daha kolay, güçlü ve yumuşak, esnek ve bükülgen sütürlerdir. Yıpranmaya karşı dayanıklıdır. Enfekte veya enfeksiyon riski yüksek yaralar için pek uygun değildirler. Dokudan zor geçerler ve yüksek doku hasarı ve reaksiyon yapma riskine sahiptirler.

MARKA	TİPİ	HAMMADDE	TENSİL GÜCÜ	ABSORBSİYONU	DOKU REAKSIYONU	RENGİ
Normal (Plain) Katgüt	Monofilament	Koyun ve inek barsağının submukozası, sığır barsağının serozası	7-10 gün	Proteolitik vücut enzimleri ile 30-60 günde absorbe edilir	Orta	Kahverengi
Kromik Katgüt	Monofilament	Krom tuzlarıyla işleminden geçirilmiş plain katgüt	3-4 hafta	Proteolitik vücut enzimleri ile 60-90 günde absorbe edilir	Orta	Kahverengi
Vicryl	Multiflament	Polyglactin 910 (Glycolic acid polimeri)	30 gün	60-90 günde tamamen absorbe olur	Hafif	Beyaz Koyu Eflatun
Kaplanmış (Koated) Vicryl	Multiflament	Eşit miktar kalsiyum ile kaplanmış Polyglactin 910 (Glycolic acid polimeri)	30 gün	60-90 günde tamamen absorbe olur		Menekşe
Dexon	Multiflament	Polyglycolic acid (Glycolic acid polimeri)	30 gün	Hidroliz ile 90 günde tamamen absorbe olur	Hafif	-
PDS	Monofilament	Polydioxanone	Bir ayda yaklaşık yarısını kaybeder	180 günde hidroliz yoluyla tamamen absorbe olur	Hafif	-
Virgin Silk	Multiflament	İpek böceği kozası (İpek)	Bir yılda kaybolur	Çok yavaşta olsa absorbe olmaktadır	Orta	Siyah
Mersilk	Multiflament	İpek böceği kozası (Kaplanmış ipek)	Bir yılda kaybolur	Çok yavaşta olsa absorbe olmaktadır	Orta	Siyah
Nylon Ethilon	Monofilament	Polyamide polimeri	Bir yılda yaklaşık % 15-20 oranında azalır	Bir yılda % 15-20'si degrade olur	Çok düşük	Siyah
Mersilen	Multiflament	Polyester polyethilene terephthalate	Tam olarak bilinmiyor	Yok	Çok düşük	Yeşil Beyaz
Ethibond	Multiflament	Polybutylate ile kaplanmış polyester polyethilene terephthalate	Tam olarak bilinmiyor	Yok	Çok düşük	Yeşil Beyaz
Prolen	Monofilament	Polypropilene (Propylene filamentin polimeri)	Tam olarak bilinmiyor	Yok	Çok düşük	Koyu Mavi
Monocryl	Monofilament	Poliglecaprone 25 (Kapolactone içeren polyglecaprone)	21 gün	90-120 günde tamamen absorbe olur	Çok düşük	-

TEMEL SÜTÜR TEKNİKLERİ

- İğne, iğne taşıyıcıyla uçları 1/2 ve 3/4 uzaklıkta kavramalıdır (5).
- İğne, giriş yapılan yüzeye dik şekilde yerleştirilmelidir ve kol ile değil bilek döndürülerek iğnenin krvatürü takip edilecek şekilde doku içinden itilir.
- İğneye doku içerisinde kuvvet uygulanmamalıdır. Bu şekilde uygulanırsa eğilebilir ve kırılabilir. İğnenin uç kısmı aletle kavranmamalıdır.



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

- Sütür uçları bir araya getirilmelidir ve sadece yara kenarlarını birleştirecek kadar nazikçe bağlanmalıdır; fazla sıkma doku kenarlarının vaskülaritesini tehlikeye sokacaktır.
- Düğümlerimiz insizyonumuzun üzerinde kalmamalı ve kenarlarında olmalıdır.
- Sütür sayısı sadece yaranın doğru bir şekilde kapanmasına yetecek kadar olmalıdır.

Anahtar Kelimeler: Cerrahi sütür, sütür teknikleri, yara iyileşmesi



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FİZYOTERAPİ VE REHABİLİTASYON ALANINDA TELEREHABİLİTASYON UYGULAMALARININ İNCELENMESİ

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Özet

Telerehabilitasyon uygulamaları, rehabilitasyon hizmetlerinin son yıllarda giderek popülerleşen alt birimlerinden birisidir. Uzaktan yürütülen telerehabilitasyon hizmetleriyle, fizyoterapistler hastalarını kolaylıkla değerlendirmekte, izlemekte ve tedavi programlarına dahil edebilmektedir. Teknolojinin gelişmesiyle birlikte, rehabilitasyon hizmetlerinin uzaktan yürütülebilmesi için çeşitli araç, protokol ve uygulamalar geliştirilmiştir. Son yıllarda web tabanlı sağlık hizmetleri, telerehabilitasyon uygulamalarına devrim niteliğinde bir yenilik kazandırmış olup, sosyal izolasyon ve transfer problemleri nedeniyle sağlık hizmetlerine ulaşmakta sıkıntı çeken hastaların rehabilitasyon süreçlerine katılım sağlamasını oldukça kolaylaştırmıştır. Fizyoterapi ve rehabilitasyonda telerehabilitasyon; ortopedik, nörolojik, pediatrik ve pulmoner hastalıkların rehabilitasyonu gibi çeşitli alanlarda sıklıkla kullanılmaktadır. Bu derlemenin amacı fizyoterapi ve rehabilitasyon alanında yapılan telerehabilitasyon çalışmalarını incelemektir.

Anahtar Kelimeler: Fizyoterapi, Rehabilitasyon, Telerehabilitasyon



EXAMINATION OF TELEREHABILITATION APPLICATIONS IN THE FIELD OF PHYSIOTHERAPY AND REHABILITATION

Abstract

Telerehabilitation applications are one of the increasingly popular subunits of rehabilitation services in recent years. With telerehabilitation services carried out remotely, physiotherapists can easily evaluate, monitor, and include their patients in treatment programs. With the development of technology, various tools, protocols, and applications have been developed for remote rehabilitation services. In recent years, web-based health services have brought a revolutionary innovation to telerehabilitation applications and have made it much easier for patients who have difficulty accessing health services due to social isolation and transfer problems to participate in rehabilitation processes. Telerehabilitation in physiotherapy and rehabilitation is frequently used in various fields, such as the rehabilitation of orthopaedic, neurological, pediatric, and pulmonary diseases. The aim of this review is to examine telerehabilitation studies in physiotherapy and rehabilitation.

Keywords: Physiotherapy, Rehabilitation, Telerehabilitation

GİRİŞ

Tele-tıp, teknolojinin gelişmesiyle birlikte, tedavi müdahalelerinin hastaların tedavi polikliniklerine ve rehabilitasyon merkezlerine gelmeden tedavilerinin uzaktan gerçekleştirilmesine dayanan uygulamalardan oluşmaktadır (Rachas, Farmer, Inzitari, & Shepperd, 2015). Fizyoterapi alanında ise “tele-tıp” kelimesinin karşılığı telerehabilitasyon olmuştur. Telerehabilitasyon, rehabilitasyon hizmetlerinin teknolojik yöntemlerle uzaktan gerçekleştirilmesi olarak ifade edilmiştir (Brennan et al., 2010). Genel olarak telerehabilitasyon, rehabilitasyon hizmetlerinin (değerlendirme, müdahale ve danışmanlık vb.) bazı prosedür ve protokollere bağlı kalınarak uzaktan yürütülmesidir (Özden, Arık, & Tuğay, 2020).

Günümüzde teknolojinin gelişmesi, mobil cihazlarla uyumlu sağlık hizmetleri uygulamalarını ortaya çıkarmış ve yüz yüze tedavi olanakları olmayan hastalar için alternatif ve düşük maliyetli bir rehabilitasyon hizmeti sunmuştur. Telerehabilitasyon hizmetlerinin birçok avantaja sahip olması sebebiyle, telerehabilitasyon hizmetleri araştırmacıların da dikkatini bu alana toplamasına neden olmuştur (Gilbert, Jaggi, & May, 2018). Telerehabilitasyon ve tele-tıp uygulamalarının kullanımı ile hastane başvurularının sayısının azaltılması, hastaların sağlık merkezlerine gelmeden takip edilmesi ve hastanın yaşadığı yerde sağlık hizmetlerinin verilmesi amaçlanmıştır (Rabia & PEHLİVAN). Farklı fizyoterapi ve rehabilitasyon alanındaki telerehabilitasyon uygulamaları aşağıda verilmiştir.

Nörolojik Hastalıklarda Telerehabilitasyon

Nörolojik rehabilitasyonun amacı hastaların fiziksel, fonksiyonel ve günlük yaşam aktivitelerine katılımını artırmanın yanı sıra yaşam kalitesinin artırmaktır. Toplumda nörolojik hastalıkların görülme oranı giderek artmaktadır. Nörolojik rehabilitasyona artan talep ile birlikte telerehabilitasyon uygulamaları nörolojik rehabilitasyon alanında kullanılmaya başlanmıştır (McCue, Fairman, & Pramuka, 2010).

Hüzmeli ve ark. (2017) inmeli hastalarda telerehabilitasyon uygulamasının tedavi etkinliğini incelemiştir. Çalışmada hastalara videokonferans yöntemiyle nörogelişimsel egzersiz programı uygulanmıştır. Çalışma sonucunda, inmeli hastalarda telerehabilitasyon yöntemiyle uygulanan egzersizlerin denge düzeyi üzerine olumlu etkilerinin olduğu sonucuna ulaşılmıştır. Ek olarak, telerehabilitasyonun ucuz ve geleneksel tedavilere alternatif bir yöntem olduğunu belirtmişlerdir (Hüzmeli, Duman, & Yıldırım, 2017). İnmeli hastalarda yapılan başka telerehabilitasyon çalışmalarında da, teknolojinin gelişmesiyle hayatımıza giren telerehabilitasyon uygulamalarının rehabilitasyon hizmetlerine erişimi kolaylaştırdığı belirtilmiştir (Chen et al., 2020; Cramer et al., 2019). Albiol-Pérez ve ark. (2017) Parkinson hastalarında sanal gerçeklik uygulamasının postüral kontrolü geliştirmede etkili olduğu sonucuna ulaşılmıştır (Albiol-Perez et al., 2017). Başka bir çalışmada, Isernia ve ark. (2020) Parkinson hastalarında telerehabilitasyonun sadece yaşam kalitesi üzerinde değil, ayrıca bilişsel ve psikolojik durum üzerinde de etkili olduğu sonucuna ulaşılmıştır (Isernia et al., 2020).

Multiple skleroz (MS); ilerleyici bir hastalıktır ve rehabilitasyon programının başarısı çevre koşulları ile (sıcaklık ve gürültü gibi) sıkı bir ilişki içerisindedir. MS hastaları üzerinde yürütülen bir çalışmada telerehabilitasyon uygulamalarının motor semptomlar üzerinde etkili olduğu belirtilmiştir (Kahraman, 2019). Kahraman ve ark. (2019) MS hastalarında telerehabilitasyon programlarının yürüme, yorgunluk, bilişsel durum ve anksiyete üzerinde etkili olduğunu belirtmişlerdir (Kahraman, 2019).

Spinal kord yaralanmalarında da telerehabilitasyon uygulamaları sıklıkla kullanılmaktadır. Paraplejik hastalarda, tekerlekli sandalye kullanımı ve egzersiz eğitimi üzerine telerehabilitasyon uygulamalarına sıklıkla başvurulmaktadır (Van Straaten et al., 2014). Özellikle COVID-19 pandemisi boyunca spinal patolojisi olan hastalarda telerehabilitasyon uygulamaları kullanılmış olup, bu sayede fiziksel izolasyon sebebiyle tedavi programları kesintiye uğramamıştır (Leochico & Valera, 2020; Van Straaten, Cloud, Morrow, Ludwig, & Zhao, 2014).

Nörolojik problemi olan hastalarda telerehabilitasyon uygulamalarının etkinliği ile ilgili çalışmalar hala devam etmektedir. Ancak yine de literatürde bir eksiklik bulunmakta olup kanıt düzeyi yüksek çalışmalara ihtiyaç duyulmaktadır.

Ortopedik Hastalıklarda Telerehabilitasyon

Dünya genelinde nüfus giderek yaşlanmaktadır. Yaşlanmaya bağlı olarak ortopedik hastalıklarda fizyoterapi ve rehabilitasyona talep giderek artmaktadır. Bu talebi karşılamak için çeşitli rehabilitasyon yöntemleri geliştirilmekte ve uygulanmaktadır. Ortopedik rehabilitasyon alanında telerehabilitasyon uygulamaları ile uzaktan rehabilitasyon programlarının etkinliğini inceleyen çalışmaların sayısı giderek artmaktadır (Özden et al., 2020).

Bu çalışmaların çoğu artroplastisi girişimi olan hastalarda yürütülmüştür. Bettger ve ark. (2020) total diz artroplastisi sonrası hastaları geleneksel bakım ve sanal fizyoterapi ve rehabilitasyon programı olarak iki gruba ayırmışlardır. Çalışma sonunda, hastaların düşme oranının sanal fizyoterapi ve rehabilitasyon uygulanan grupta daha düşük olduğu sonucuna ulaşılmıştır (Bettger et al., 2020). Nelson ve ark. (2020) total kalça artroplastisi sonrası uygulanan telerehabilitasyon programının yaşam kalitesi, kas kuvveti ve denge üzerinde olumlu etkilerinin olduğunu, ayrıca tedavi programına uyumun yüz yüze programa kıyasla daha yüksek olduğu sonucuna ulaşılmıştır (Nelson, Bourke, Crossley, & Russell, 2020). Başka bir çalışmada Mehta ve ark. (2020) telerehabilitasyon programına katılan total diz veya total kalça artroplastisi geçirmiş hastalarda hastaneye yatış oranının anlamlı bir şekilde azaldığını belirtmişlerdir (Mehta et al., 2020).

Sarı ve ark. (2019) diz osteoartritli hastalarda telerehabilitasyon temelli ev egzersiz programının, yüz yüze rehabilitasyon programına benzer şekilde ağrı, denge ve yaşam kalitesi parametreleri üzerinde olumlu etkilerinin olduğunu bildirmişlerdir (Sarı, Aydoğdu, Demirbüken, Yurdalan, & Polat, 2019). Diğer çalışmalarda da telerehabilitasyon programlarının fiziksel işlevleri iyileştirmede etkili olduğu belirtilmiştir (Azma, RezaSoltani, Rezaeimoghaddam, Dadarkhah, & Mohsenolhosseini, 2018).

Non-spesifik bel ağrısı olan bireylerde yürütülen bir çalışmada McKenzie egzersizleri, bir gruba telerehabilitasyon yöntemiyle, diğer gruba ise yüz yüze olarak uygulanmıştır. Çalışma sonuçları incelendiğinde gruplar arasında anlamlı bir fark bulunmazken telerehabilitasyon müdahalesinin maliyeti azalttığı belirtilmiştir (Fatoye et al., 2020). Başka bir çalışmada fibromiyalji hastalarda telerehabilitasyon yöntemiyle uygulanan aerobik egzersizlerin ağrı ve psikolojik durum üzerinde olumlu etkileri olduğu ortaya konmuştur (Hernando-Garijo et al., 2021).

Ortopedik hastalıklarda telerehabilitasyon uygulamaları sıklıkla kullanılmaktadır. Ancak üst ekstremité patolojileri üzerine yürütülen çalışmalara da ihtiyaç vardır.

Pedriatrik Hastalıklarda Telerehabiliteasyon

Pedriatrik rehabiliteasyonda amaç, çocukların fiziksel durumlarını en iyi şekilde kullanmalarını saęlanmaktır. Günümüzde teknolojinin gelişmesiyle pedriatrik rehabiliteasyonda yeni uygulamalar kullanılmaktadır. Bunlar robotik sistemler, telerehabiliteasyon uygulamaları ve sanal gerçeklik uygulamalarıdır (Tarakci, 2015).

Telerehabiliteasyon uygulamaları pedriatrik popülasyonda en sık serebral palsi (SP) hastalığında kullanılmaktadır. SP'li bireylerde telerehabiliteasyon uygulamasının bilişsel ve yürüme fonksiyonları üzerinde geleneksel tedaviler kadar etkili olduğu belirtilmektedir (M. Piovesana et al., 2017). Yapılan bir çalışmada unilateral etkilenimi olan SP'li bireylerde telerehabiliteasyon uygulamalarının geleneksel tedaviye göre ambulatuvar fonksiyon üzerinde daha fazla iyileşmeler sağladığı belirtilmiştir (Surana et al., 2019).

Duchenne Muskuler Distrofi (DMD), pedriatrik rehabiliteasyon alanında en sık karşılaşılan patolojilerden olmasına rağmen DMD'de telerehabiliteasyon uygulamalarının etkinliğini inceleyen çalışma sayısı oldukça azdır. Sobierajska-Rek ve ark. (2021) pandemi döneminde yürüttükleri bir çalışmada, telerehabiliteasyon uygulamalarının DMD tanısı almış çocuklarda olumlu etkilerinin olduğu sonucuna varmışlardır. Ancak pulmoner fizyoterapiye, postüre ve tekerlekli sandalye ergonomisine dikkat edilmesi gerektiğini belirtmişlerdir (Sobierajska-Rek et al., 2021).

Pedriatrik rehabiliteasyonda sık karşılaşılan durumlardan birisi de prematüre doğumdur ki bu bebeklerde erken müdahale önem arz etmektedir. Sgandurra ve ark. (2016) standart tedavi uygulanan prematüre bebeklerle, telerehabiliteasyon müdahaleleri uygulanan bebeklerin, motor ve görsel gelişimleri arasında farklılık olmadığı sonucuna ulaşmışlardır. Bu çalışma sonuçları göz önüne alındığında rehabiliteasyon hizmetlerine erişim zorluğu olan ailelerde, telerehabiliteasyon uygulamalarının geleneksel tedavilere bir alternatif yöntem olarak kullanılabileceği ortaya çıkmaktadır (Sgandurra et al., 2016).

Pedriatrik rehabiliteasyonun bakım verenlere maddi ve manevi anlamda önemli yükler getirmektedir. Telerehabiliteasyon uygulamalarının bakım verenlerde yaşam kalitesi ve ağrı üzerine olumlu etkileri olduğu gösterilmiştir (Nobakht, Rassafiani, Hosseini, & Hosseinzadeh, 2020). Bu sonuçlar umut vadetse de pedriatrik rehabiliteasyon alanında diğer sık karşılaşılan patolojilerde de telerehabiliteasyon uygulamalarının etkinliğini inceleyen başka çalışmalara ihtiyaç vardır.

Pulmoner Hastalıklarda Telerehabiliteasyon

Pulmoner rehabiliteasyon, günlük yaşam aktivitelerine mevcut semptomları sebebiyle katılımı azalmış hastalarda uygulanan özel tedavi programlarıdır. Son yıllarda pulmoner rehabiliteasyon programlarına erişim

sıkıntısı yaşayan hastalar için teknolojik imkanların da gelişmesiyle alternatif yöntemlere başvurulmaktadır. Pulmoner telerehabilitasyon bu yöntemlerden birisidir ve tedavi programları videokonferans ve telekomünikasyon teknolojileri kullanılarak sağlanmaktadır (Cox et al., 2021).

Yürütülen çalışmalarda pulmoner telerehabilitasyon programlarının kronik obstrüktif akciğer hastalığı (KOA) olan bireylerde tedaviye erişim engelini ortadan kaldırdığı ve geleneksel tedaviler kadar etkili olduğu belirtilmiştir. Ayrıca KOA'da telerehabilitasyon programlarıyla uygulanan egzersizlerin fiziksel performansı ve yaşam kalitesini artırdığı bildirilmiştir (Cox et al., 2021). Yapılan bir çalışmada hem KOA hem de bronşektazi tanısı almış hastalarda telerehabilitasyon programlarının yaşam tarzı değişikliği ve egzersiz devamlılığının sağlanmasında etkili olduğu rapor edilmiştir (Liacos, Burge, Cox, & Holland, 2018).

Pulmoner rehabilitasyon kapsamında telerehabilitasyon uygulamalarının kullanıldığı başka bir alan ise akciğer naklidir. Çalışmalarda telerehabilitasyon programlarının bu hastalarda kas kuvveti, aerobik kapasite, denge, esneklik ve fiziksel fonksiyonları iyileştirmede etkili olduğu belirtilmiştir (Ji et al., 2019).

Telerehabilitasyon uygulamalarının etkinliği astımlı bireylerde de incelenmiştir. Buna göre, astımlı bireylerde telerehabilitasyon uygulamalarının hastalık yönetimini kolaylaştırdığı, yaşam kalitesini artırdığı ve ilaç tedavisine uyumu artırdığı bildirilmiştir (McLean et al., 2016; Poowuttikul & Seth, 2020).

Cox ve ark. (2019) kistik fibrozis tanısı almış bir grup hastayı videokonferans yöntemiyle rehabilitasyon programına almışlar, bir gruba ise geleneksel yöntemlerle rehabilitasyon uygulamışlardır. Çalışma sonucunda telerehabilitasyon programının geleneksel yöntemlere benzer şekilde olumlu etkilerinin olduğunu bildirmişlerdir (Cox et al., 2019).

SONUÇ

Teknolojinin gelişmesiyle birlikte hastaların rehabilitasyon hizmetlerine erişimi kolaylaşmıştır. Sosyal izolasyon ve rehabilitasyon hizmetlerine ulaşım problemleri nedeniyle alternatif rehabilitasyon yöntemlerinden olan telerehabilitasyonun kullanımı giderek artmaktadır. Telerehabilitasyon, fizyoterapi ve rehabilitasyonun hemen her alanında uygulanabilmektedir. Bu alanda yürütülen çalışmaların sayısı artırılarak, kanıt düzeyi yüksek randomize kontrollü ve etkinlik çalışmalarına ihtiyaç duyulmaktadır. Literatürdeki yayınlanmış çalışmalarda, fizyoterapi ve rehabilitasyonun hemen her alanında uygulanabilen telerehabilitasyonun etkili bir yöntem olduğuna dair kanıtlar mevcuttur. Bununla birlikte, fizyoterapi ve rehabilitasyonun farklı alanlarında telerehabilitasyonun etkinliğini araştıran kanıt düzeyi yüksek ileri randomize kontrollü çalışmalara ihtiyaç olduğu görülmektedir.

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Özet

Teknoloji sürekli ve hızlı bir gelişim sürecindedir. Teknolojik gelişmelerle birlikte hayatımıza her alanda girmeye başlayan yapay zekâ uygulamaları özellikle de sağlık alanında sıklıkla kullanılmaya başlanmıştır. Güncel çalışmalar bu süreçte sağlığın alt dalı olan rehabilitasyon hizmetlerinde yapay zekânın ne gibi faydalar sağladığına odaklanmaya başlamıştır. Yapılan çalışmalar incelendiğinde rehabilitasyonda yapay zekânın zamansal ve maddi açıdan bir çok fayda sağlamasının yanında sağlık hizmetlerinde kaliteyi ve verimliliği artırdığı gözlenmiştir. Ek olarak, yapay zekâ uygulamaları rehabilitasyon hizmetlerine ulaşımında problem yaşayan hastalar için evde rehabilitasyon ve takip imkanı sunmaktadır. Rehabilitasyon hizmetlerinde yapay zekâ uygulamalarının kullanılması ile fizyoterapist ve hasta için tedavi programlarının zaman, yoğunluk, hız gibi değişkenlerinde esneklik sağlanmış olup, hasta ve fizyoterapistin tükenmişliğinde de bir azalma mümkün olmuştur. Bu çalışmada, rehabilitasyon hizmetlerinde yapay zekâ uygulamalarının kullanımı, hangi amaçla kullanıldığı ve ne gibi faydalar sağladığı incelendi.

Anahtar Kelimeler: Rehabilitasyon, Yapay zeka, Uygulama



USE OF ARTIFICIAL INTELLIGENCE APPLICATIONS IN REHABILITATION SERVICES

Abstract

Technology is in a continuous and rapid development process. Artificial intelligence applications, which have started to enter our lives in every field with technological developments, have started to be used frequently, especially in the field of health. Current studies have started to focus on the benefits of artificial intelligence in rehabilitation services, which is a sub-branch of health in this process. When the studies are analyzed, it is observed that artificial intelligence in rehabilitation provides many temporal and financial benefits, as well as increasing the quality and efficiency of health services. In addition, artificial intelligence applications offer rehabilitation and follow-up at home for patients who have problems accessing rehabilitation services. With the use of artificial intelligence applications in rehabilitation services, flexibility in variables such as time, intensity, and speed of treatment programs for the physiotherapist and the patient has been provided, and a decrease in the burnout of the patient and physiotherapist has been possible. In this study, the use of artificial intelligence applications in rehabilitation services, the purpose for which they are used, and the benefits they provide were examined.

Keywords: Rehabilitation, Artificial intelligence, Application

1. GİRİŞ

Zekâ, insanları diğer canlılardan ayıran özellik olarak düşünülen, bağlantı kurma, algılama ve sonuca varma yeteneğinin bir bütünü olarak ifade edilmektedir. Yapay zekâ ise insanda bulunan özelliklerin makinelere kazandırılmasıdır. Yapay zekâ her ne kadar mühendislik alanıyla ilişkilendirilse de nöroloji, dil bilimi, psikoloji gibi birçok alanı kapsayan multidisipliner bir alandır. Bu, disiplinlerin yapay zekânın bilişsel olarak yapısını oluşturmasından kaynaklanmaktadır. Yapay zekânın bu alanlarla ilişkisi yapay zekânın karakterini oluşturmaktadır. Bu ilişki yapay zekâyı diğer bilgisayarla ilgilenen bilim dallarından ayırıp farklı bir noktaya getirmektedir. Yapay zekânın farklı bilim dallarıyla ilişkisi, onun sağlık alanında da kullanımına olanak tanımış ve bu alanda birçok çalışma yürütülmüştür (Poole, Goebel, & Mackworth, 1998).

Rehabilitasyon Hizmetleri ve Yapay Zekâ

Yapay sinir ağları, insan beyninin işleyişinden esinlenerek verilerin analizinde kullanılabilen bir modeldir (Helmstaedter et al., 2013). Yapay sinir ağları, beyin öğrenme yeteneğini taklit ederek, insanları diğer canlılardan ayırt eden özellikler olan öğrenme, bilgi toplama ve toplanan bilgiler arasında bağlantı kurarak sonuç çıkarımlarında bulunmayı kullanarak yeni veriler üreten bilgisayar yazılımlarıdır. Bu sistemler beklenmedik türdeki problemleri çözmek için uygun çözümler üreten ve temel sorunu ortaya çıkaran sistemlerdir (LeCun, Bengio, & Hinton, 2015). Kayıt altına aldığı veri setlerindeki eksiklikler olduğunda çalışmayı sürdürürebilmeleri, görülmemiş örneklerden bilgi üretebilmeleri, sınıflama yapabilmeleri ve organize olabilmeleri yönüyle günümüzde rehabilitasyon hizmetlerinde de kullanımı giderek artmaktadır (Grossi, 2011).

Yapay sinir ağlarının kullanımı ile birlikte rehabilitasyon hizmetlerinde birçok problemin çözümü oldukça kolaylaşmıştır. Bu ağlar sayesinde klinik ortamlarda yapılan uygulamaların maliyetleri düşmüştür. Bu amaçla yapay sinir ağlarının teşhis, problem çözme, tahmin etme, sınıflandırma, robotik sistemlerin üretilmesi ve akıllı sistemlerin geliştirilmesinde kullanıldığı gözlenmiştir. Fizyoterapi ve rehabilitasyon alanında yapay sinir ağları sıklıkla inme, multiple sklerozis, spinal kord yaralanması, Parkinson gibi rahatsızlıkların sınıflandırılmasında, denge problemlerinin ortaya konmasında ve fonksiyonel sonuçların tahmin edilmesinde kullanılmıştır (Moon et al., 2020).

Denge, günlük yaşam aktivitelerine katılım, fonksiyonellik düzeyi ve elde ince motor becerilerin kullanımı gibi alanlarda yapay zekâ geleneksel tedavilere alternatif bir yöntem olarak umut vadetmektedir. Ayrıca tedavi boyunca hastanın fonksiyonel düzeyinin ne duruma geleceğinin de tahmin etmesiyle rehabilitasyon hizmetlerine büyük avantajlar sağlamaktadır (Krebs et al., 2007). Günümüzde, bu alanda yürütülen çalışmalarla birlikte, hastaların tedaviye katılımlarını arttırmayı amaçlayan çeşitli oyun uygulamaları rehabilitasyon programlarına entegre edilmiştir. Ayrıca sanal gerçeklik ve robotik sistem uygulamaları

rehabilitasyon hizmetlerinde çalışan sağlık profesyonellerinin işlerini kolaylaştırmaktadır. Yapay zekâyı temel alan bu uygulamalarla birlikte hastaların takip ve tedavi süreçleri de kolaylaşmaktadır (Krebs et al., 2007).

İçinde sensörler bulunan yapay zekâ ile geliştirilmiş giyilebilir sistemler de rehabilitasyon hizmetlerinde sıklıkla kullanılmaktadır. Bu teknoloji, veri elde etmenin yanı sıra, hedef oluşturma ve rehabilitasyon programına yol göstermesi açısından büyük bir avantaj sağlamaktadır (Kara, Altuğ, Kavaklıoğlu, & Cavlak, 2020). Ayrıca giyilebilir teknolojilerin esnek bir yapıya sahip olması, nörolojik problemlere sahip olan hastalarda kullanımlarını kolaylaştırmaktadır. Yapay zekâ ile donatılmış giyilebilir teknolojik ürünler kısıtlı tedavi alanlarında, rehabilitasyon uygulamalarının uygulanmasına olanak tanımaktadır. Yapay zekâ uygulamalarının kullanıldığı bir başka alan ise akıllı çevre sistemleridir. Yapay zekâ temelli akıllı çevre sistemi uygulamaları ile birlikte, rehabilitasyon ihtiyacı olan hastaların özellikle de geriatrik hastaların yaşadıkları ortamlarda teşhislerinin koyulmasına ve takiplerinin yapılmasına imkan sağlamaktadır (Geman et al., 2015).

Yapay Zeka Temelli Akıllı Rehabilitasyon Teknikleri

Yapay zekâ, rehabilitasyon hizmetlerinde birçok alanda kullanılmaktadır. Makine öğrenmesi yöntemi, özellikle veri alınabilmesi ve klinikte karar verme desteği sağlaması gibi avantajlarıyla klinikte oldukça değerlidir. Yapay zekâ ile desteklenmiş sistemler kliniklerde; denge, günlük yaşam aktivitelerine katılım, yürüme ve ekstremitelerin fonksiyonelliğini arttırmak amacıyla kullanılmaktadır. Bu kapsamda, aşağıda yapay zekâ ile geliştirilmiş farklı akıllı rehabilitasyon uygulamalarından bahsedilmiştir (Kayıhan, 2018).

-Robot Yardımlı Terapi

Robot yardımcı terapi, tekrarlayan, yoğun ve ölçülebilen fiziksel eğitim sağlayan yenilikçi bir yöntemdir. Özellikle üst ekstremitede fonksiyonel kayba neden olan inme gibi nörolojik problemlerde motor fonksiyon kaybının düzeltilmesinde sıklıkla kullanılmaktadır (Page, Schmid, & Harris, 2012). Robot yardımcı terapi, fonksiyonel hareketlerin tekrarlanmasını sağlayarak yenilikçi bir yaklaşım sunar. Bu yaklaşımda, terapi seansları içerisinde tekrarlanan hareket düzeyleri kolayca değerlendirilebilir. Bazı çalışmalarda, yüksek tekrarlı robot destekli terapinin, düşük tekrarlı robot destekli terapilere oranla motor fonksiyonların iyileştirilmesinde daha etkili olduğu gösterilmiştir (Burgar et al., 2011).

-Beyin Bilgisayar Arayüzleri

Günümüze kadar, kişinin çevresini zihin gücüyle kontrol edebilmesi hayal gibi görünmekteydi. Ancak günümüzde teknolojinin gelişmesiyle yeni bir gerçeklik ortaya çıktı: Günümüzde kişiler, çevreyle etkileşim kurmak, etkilemek veya değiştirmek için beyinden gelen elektrik sinyallerini kullanabilmektedir. Beyin-bilgisayar arayüzleri ile bireyler yapay uzuvlarını istemli bir şekilde kullanabilmekte ve yardımcı cihazlar

yardımıyla istedikleri nesnelere kullanabilmektedir. Kısaca beyin bilgisayar arayüzleri beyin sinyallerini alan, değerlendiren ve istemli eylemi gerçekleştirmeye olanak sağlayan bir sistemdir (Shih, Krusienski, & Wolpaw, 2012).

İnme ve Amyotrofik Lateral Skleroz gibi patolojilere sahip hastalarda motor korteks hasarı sonrası kas zayıflığı gelişir. Bu hastalarda hastalığın ilk evrelerinde fizyoterapi ve rehabilitasyon programlarına ihtiyaç duyulmaktadır. Bu kapsamda beyin bilgisayar arayüzleri beyin felci, sakatlık, kas zayıflığı veya fizyolojik rahatsızlıkların tedavisinde kullanılabilir. Günümüzde teknolojinin gelişmesiyle birlikte rehabilitasyon programlarındaki ihtiyaçlara cevap verebilmesi amacıyla beyin bilgisayar arayüzlerinin kullanımını ve etkinliğini inceleyen çalışmaların sayısı artmaktadır (Jumphoo, Uthansakul, Duangmanee, Khan, & Uthansakul, 2021).

-Ortez ve Protez Teknolojileri

Ortez ve protez uygulamaları yüzyıllardır rehabilitasyon alanında kullanılmaktadır. Ortezler kas-iskelet sistemi problemlerinde ve fonksiyonel bozuklukların tedavisinde yaygın bir şekilde kullanılmaktadır (Akalin & Demirbaş, 2022). Günümüzde fizyoterapi ve rehabilitasyon alanında mobilitayı, fonksiyonelliği ve yaşam kalitesini artırmak amacıyla tasarlanmış giyilebilen robotik cihazlar geliştirilmiştir. Bu robotik cihazlar, ampute bireylerde protez kol-bacak şeklinde kullanılabilirken, parezi gibi patolojilerde güçlendirilmiş dış iskeletler ve ortezler olarak kullanılabilir. Ancak bu teknolojilerin prototiplerinin geliştirilmesi ve günlük yaşama adapte edilmesi; maliyetinin yüksek olması, kullanımının zor olması ve kullanım ömrünün hala tam olarak kestirilememesinden dolayı sınırlıdır (Tonet et al., 2008).

-Telerehabilitasyon Teknolojileri

Telesağlık, rehabilitasyon hizmetlerinin teknolojik gelişmeler ve uygulamalarla yürütülmesidir. Telerehabilitasyon geleneksel rehabilitasyon uygulamalarına kıyasla yeni, gelişmekte olan ve maliyeti düşük bir telesağlık alanıdır. Telerehabilitasyon, yapay zekâ uygulamalarının kullanılması ile teşhis, danışmanlık ve rehabilitasyon hizmetlerinin uygulanmasına hizmet etmektedir. Bu hizmetler, değerlendirme, rehabilitasyon ve danışmanlıkla kısıtlı değildir. Telerehabilitasyon uygulamalarının iki bileşeni bulunmaktadır bunlar: rehabilitasyon ve bilgi teknolojisidir. Bu bileşenler sayesinde hastalarla uzaktan iletişim kurmak, muayene etmek, teşhis koymak ve onları tedavi programlarına dahil etmek mümkün olmaktadır (Sarsak, 2020).

Geleneksel rehabilitasyon programları ile kıyaslandığında telerehabilitasyon uygulamaları tedaviye erişimdeki aksaklıkların üstesinden gelmesi açısından önemlidir. Yürütülen bir sistematik incelemede telerehabilitasyon uygulamalarının engelliler üzerinde %71 oranda başarılı olduğu ortaya konmuştur. Bu

kapsamda geliştirilen telerehabilitasyon uygulamaları ile, hastaların evlerinde reçete edilen egzersizleri yapması, kayıtların tutulması ve fizyoterapistin hastayı takibi mümkün olmuştur (Chae, Kim, Lee, & Park, 2020).

-Sanal Gerçeklik Temelli Uygulamalar

Ortopedik rehabilitasyon alanında, patoloji ve cerrahi sonrası bozulmuş fonksiyonelliği tedavi etmek önem arz etmektedir. Başarılı bir tedavi, fonksiyonelliği artırmak için eklem mobilizasyonunu ve kas kuvvetini arttırmayı içeren uygun egzersizlerin yapılmasına bağlıdır. Rehabilitasyon süreci cerrahi sonrası hastanede hemen başlar ve daha sonra hastanın yaşam ortamında devam eder (Khor et al., 2016). Mevcut rehabilitasyon programları denetimli ve denetimsiz egzersizleri içerir ancak günümüzde teknolojinin gelişmesi ile birlikte bu alanda bazı değişiklikler göze çarpmaktadır. Sanal gerçeklik ve video bazlı oyun sistemleri ortopedik rehabilitasyon alanında sıklıkla kullanılmaya başlanmıştır. Sanal gerçeklik terapisi, alışılmış egzersizlerden farklı olarak, sanal ortam içerisinde gerçekleşmektedir. Bu tedavi yöntemi, günümüzde üst/alt ekstremitte ve yürüme eğitimi gibi alanlarda kullanılmaktadır. Sanal gerçeklik uygulamaları ile eğlenceli ortamlar oluşturularak, hastaların motivasyonlarının üst düzeye çıkarılması ve egzersizlere katılımlarının arttırılması sağlanır (Holden, 2005).

2.SONUÇ

Fizyoterapi ve rehabilitasyon hizmetlerinde, yapay zekâ ile geliştirilmiş akıllı teknolojiler sağlık hizmetlerine birçok fayda sağlayabilmektedir. Bireylere uygun dizayn edilen giyilebilir teknolojiler rehabilitasyon hizmetlerinin maliyetini düşürebilir. Diğer bir yandan, fizyoterapist ve hastalar için zaman, yorgunluk ve hız gibi parametreler açısından tasarruf sağlayabilir. Teknolojinin daha da gelişmesi ile birlikte yapay zekâ uygulamalarının teşhis, tedavi ve danışmanlık dahil olmak üzere sağlık hizmetlerinin bir çok alanını etkileyebileceği öngörülmektedir.

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TIRNAK BATMASI VE GÜNCEL TEDAVİ SEÇENEKLERİ

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ÖZET

Tırnak batması (paronişi) okul çocukları ve genç yetişkinlerde sık görülen bir durumdur ancak hemen hemen her yaşta görülebilir. Önemli ve uzun süren morbiditeye ve oldukça sık olarak ayak parmaklarının ve tırnakların kalıcı olarak bozulmasına neden olabileceği için bunların tedavisi hasta için genellikle zorlu bir süreç gerektirebilir. Etiyopatogenez genellikle geniş, göreceli olarak belirgin şekilde kavisli bir tırnak plakasıdır. Hızlandırıcı faktörler dar sivri uçlu ayakkabılar, dar çoraplar, hiperhidroz, juvenil diyabet ve daha birçok faktördür. Hasta tırnak köşesinin daha fazlasını keserek rahatsızlığı gidermeye çalışır; ancak tırnağı düzgün kesmek için makasın ucunu daha derine sokmak gerekir, bu da kişinin yumuşak dokuya daha fazla zarar vermesi anlamına gelir. Ağrı, ağrıyı gidermeye çalışma, yanlış tırnak kesme ve durumu ağırlaştırma gibi kısır bir döngü başlatılır. Etiyoloji ve tedavi, yaşa ve patolojiye göre değişkenlik gösterebilmektedir. Tartışma, patolojinin etiolojisinden başlar ve düşünülen etiolojinin konservatif tedavi mi yoksa cerrahi tedavi mi olması gerektiğiyle devam eder. Doğal olarak ikincisi tedaviyi yapan kişinin uzmanlığına bağlıdır; Podologlar ve pedikür uzmanları breysler ve benzeri cihazları tercih ederken, bazı dermatologlar diğer invazif olmayan yaklaşımları kullanırlar. Bunlar arasında ilaçlı tedaviler, tamponlama, bantlama, oluk tedavisi vb. tedaviler yer almaktadır. Cerrahi branşlar ise çoğunlukla ameliyat yapma eğilimindedir. Bu derlemedeki amacımız, literatürdeki yayınları tarayarak tırnak batmasında güncel tedavi seçenekleri hakkında bilgileri ortaya koymaktır.

Anahtar Kelimeler: Tırnak, paronişi, cerrahi girişim, konservatif



INGROWN TOENAIL AND CURRENT TREATMENT OPTIONS

ABSTRACT

Paronychia, or ingrown toenails, may occur at any age but appears most commonly in school-aged children and young people. Since they may result in severe and persistent morbidity and, in some cases, irreversible toenail degeneration, their treatment might be difficult for the patient. Typically, etiopathogenesis is characterized by a broad, noticeably curved nail plate. Narrow shoes, tight stockings, hyperhidrosis, juvenile diabetes, and numerous other conditions are known to accelerate the process. The patient tries to relieve the discomfort by cutting more of the nail corner; However, in order to cut the nail properly, it is necessary to insert the tip of the scissors deeper, which means that the person causes more damage to the soft tissue. A vicious cycle of pain, trying to relieve the pain, cutting the nail incorrectly and aggravating the situation is started. Etiology and treatment may vary depending on age and pathology. The debate starts from the etiology of the pathology and continues with whether the considered etiology should be treated conservative or surgical. Naturally, the latter depends on the expertise of the person performing the treatment. While podiatrists prefer braces and similar devices, some dermatologists use other noninvasive approaches. These include medications, tamponade, taping, groove treatment, etc. Surgeons tend to perform surgery mostly. Our aim in this review is to reveal information about current treatment options for ingrown toenails by scanning the publications in the literature.

Keywords: Nail, paronychia, surgical intervention, conservative

GİRİŞ

Tırnak batması, unguis incarnatus veya onikokriptoza olarak tanımlanan bu hastalık (Yunanca hapsolmuş tırnak) tırnak hastalığının sık görülen ve ağrılı bir şeklidir. Sıklıkla yaşamın ikinci ve üçüncü dekadında ergen ve genç yetişkinlerde, yaygın olarak gözlenmektedir. Tırnakta başlayan ağrı en yaygın semptomdur ve tedavi edilmediği takdirde enfeksiyona, akıntı ve yürüme zorluğuna yol açarak kişinin yaşam kalitesini büyük ölçüde etkiler. Teşhisi klinik olarak kolayca konulur. Konservatif tıbbi yaklaşımlardan kapsamlı cerrahi tedavi seçeneklerine kadar çeşitli yaklaşımlar mevcuttur. Batık tırnağın ciddiyeti ve evresine göre tedavi seçeneği belirlenir.

Yanlış tırnak kesimi, tırnak batmasının en yaygın sebebi gibi görünmektedir. Çünkü bu durum, bitişikteki yumuşak dokuyu travmatize eden bir tırnak ucuna yol açabilir (1,2). Tırnak batmasına neden olan diğer faktörler arasında dar ayakkabı kullanımı, ayak hijyeni, aşırı terleme, travma ve bazı ilaçların, özellikle de epidermal büyüme faktörü reseptör inhibitörlerinin (gefitinib, setuksimab) kullanımını yer alır (3).

PATOGENEZ VE ETİYOLOJİ

Patogenezinde yaygın olarak kabul edilen teori, onikokriptozun, tırnak plağı kenarından lateral tırnak kıvrımına ilerlediği, ağrı, enfeksiyon ve granülasyon dokusu oluşumuyla sonuçlandığı şeklindedir (4). Tırnak kenarındaki çıkıntılar penetrasyona neden olmakta ve böylece inflamatuvar tepki tetiklenmektedir. Klinikte en sık etkilenen bölge ayak başparmağı olarak karşımıza çıkmaktadır.

Etiyolojisinde çeşitli teoriler öne sürülmüştür. Bu teoriler, problemin tırnağın kendisi kaynaklı ya da yumuşak doku kaynaklı olabileceği şeklinde sınıflandırılabilir (5-7). Genel olarak kabul gören asıl kusurun tırnakta olduğuna inanılsa da bu konudaki tartışmalar devam etmektedir. Bazı çalışmalar, pincernail (kerpeten tırnak) deformitesinin, geniş tırnak plakalarının, ayak tırnaklarının doğuştan yanlış hizalanmasının ve tırnak plakasının kalınlaşmasının, tırnak batması için olası risk faktörleri olduğunu savunmuşlardır (2,8). Başka bir çalışmada, ayak bileği, ayak veya ayak parmağındaki iç basıncı artıran kemik anomalilerinin, tırnak batmasının gelişiminde rol oynayabileceği belirtilmiştir (9). Chapeskie ye göre asıl problem tırnakta değil tırnağı çevreleyen fazla deri dokusudur (7). Bu altyapıya sahip kişiler, tırnağın medial ve lateral kenarında alışılmadık derecede geniş bir dokuya sahiptir ve yük verildikçe bu doku tırnak çevresinde basınç nekrozuna maruz kalır (7) (8). Güncel yayınlara bakıldığında ise, tırnak batması yakınması olan ve kontrol grubu hastalar arasında anatomik anomaliler açısından anlamlı bir fark olmadığı öne sürülmektedir (10).

SINIFLANDIRMA

Heifetz ve Mogensen, basitleştirilmiş şekilde, tırnak batmasının ciddiyetini belirti ve semptomlarına göre sınıflandırdılar (11,12). Zuber ve Pfenninger bu sınıflandırmaya tedavi seçeneklerini de eklediler (13). Bu sisteme göre; Evre I'de tırnak kıvrımında hafif ödem ve eritem belirtileri vardır ve hafif ağrıya neden olabilir. Bu evredeki hastalara konservatif tedavi önerilmiştir. Evre II, Evre I belirti ve semptomlarını gösterir, ancak drenaj ve enfeksiyon da kaydedilmiştir. Bu aşama konservatif veya cerrahi olarak yönetilebilir. Evre III'te Evre II'nin belirti ve semptomları artar. Evre II ve III'ün cerrahi tedavisi, tırnak kıvrımının ele alınıp alınmaması açısından kafa karıştırıcı olabilir, zira tırnak kıvrımı hipertrofinin ne zaman ele alınacağına dair yol gösterici bir ilke yoktur (14). Bu sınıflandırma sistemlerinde tırnağın labial kıvrımlarının önemine dair herhangi bir açıklama yoktur. Bu önemli ihmal düzeltmek için Mozena Sınıflandırma Sistemi önerilmiştir (Tablo I) (Şekil 1). Evre I'de tırnak labium kıvrımı 3 mm'den azdır ve konservatif olarak tedavi edilebilir. Evre II'de, Mozena Sınıflandırma Sistemi, Evre IIa ve IIb'ye ayrılmasıyla önceki sınıflandırma sistemlerinden farklılaşmaya başlar. Evre IIa'da tırnak kıvrımı 3 mm'den azdır, Evre IIb'de ise tırnak kıvrımı 3 mm veya daha fazladır. Evre IIa konservatif bakım ve/veya matrisektomi gerektirir. Evre IIb'deki tedavi matrisektomi ve tırnak kıvrımlarının azaltılmasını içermelidir (14). Son evre olan evre III, Evre II'nin belirti ve semptomlarını daha şiddetli bir şekilde gösterir. Bu aşamadaki ayak parmağı, granülasyon dokusu ve genişlemiş bir tırnak labium kıvrımı ile kendini gösterir. Evre III tedavisi, hipertrofik tırnak kıvrımının azaltılmasına ve tırnak genişliğinin kalıcı olarak azaltılmasına odaklanmalıdır.

Tablo I: Mozena Sınıflandırma Sistemi (15)

Evre	Belirti	Tedavi
I	Tırnak kıvrımına basınç uygulandığında eritem, hafif ödem ve ağrı	Konservatif
IIa	Evre I semptomlarda artış, drenaj ve enfeksiyon, tırnak kıvrımının 3 mm'den az olması	Hipertrofik tırnak labium kıvrımının düzeltilmesi birlikte konservatif tedavi ve/veya matrisektomi
IIb	Evre I semptomlarda artış, drenaj ve enfeksiyon, tırnak kıvrımının 3 mm veya daha büyük olması	Evre IIa ile aynı
III	İlerlemiş Evre II semptomları, granülasyon dokusunun varlığı ve tırnak kıvrımı hipertrofisi	Hipertrofik tırnak labium kıvrımının alınması ile birlikte matrisektomi



Şekil 1: Tırnak batması evreleri. (a) Evre I. (b) Evre IIa. (c) Evre IIb. (d) Evre III (16)

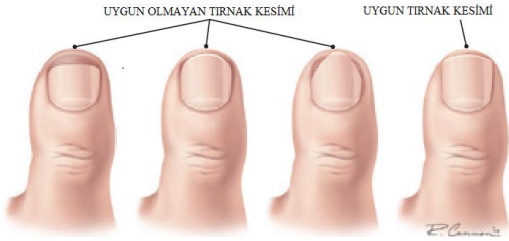
OLASI KOMPLİKASYONLAR

Tırnak kıvrımının paronişi veya sekonder enfeksiyonu yaygındır. Staphylococcus, Psuedomonas, Candida ve yüzeysel dermatofitler enfeksiyona yol açan patojenler olarak sıralanabilir. Tırnak batmasından kaynaklanan veya sonrasında ortaya çıkan ikincil enfeksiyonların tedavi edilmesi önemlidir. Tırnak kıvrımında ve ciltte yara izi ve nadiren selülit ve osteomyelit oluşabilir. Diyabet hastalarında amputasyonlara veya hayatı tehdit eden enfeksiyonlara yol açabilir.

TEDAVİ SEÇENEKLERİ

Tırnak batması tedavisinde çeşitli yöntemler tanımlanmıştır. Hastalığın evresine ve ciddiyetine, cerrahın uzmanlığına ve nüksetme durumunda hastanın önceki tedavisine göre farklı teknikler uygulanmaktadır. Hafif/orta derecede ağrının, hafif eritemin eşlik ettiği ve pürülan akıntının olmadığı hafif ila orta dereceli lezyonlar konservatif tedavi edilebilir. Şiddetli ağrı, ciddi eritem ve pürülan akıntının eşlik ettiği orta ila şiddetli lezyonlar genellikle cerrahi müdahale gerektirir.

Geniş burunlu veya önü açık uygun ayakkabı kullanımı teşvik edilmelidir. Hastaya tırnağını düz kesmesi ve yan kenarları kavisli bir şekilde kesmekten kaçınması talimatı verilmelidir (Şekil 2). Tırnak kenarı, tırnak kıvrımının bittiği seviyeyi geçmelidir. Hiperhidroz ve onikomikoz gibi altta yatan ek faktörler tedavi edilmelidir. Etkilenen parmağını ve ayağı 10 ila 20 dakika boyunca ılık sabunlu suda bekletmek ve ardından topikal antibiyotik kullanmak rahatlama sağlayabilir. Gümüş nitratın granülasyon dokusuna uygulanması inflamasyonu azaltabilir. Hidrojen peroksit ve iyot, özellikle evre I tırnak batmasında temizlik için kullanılabilir.



Şekil 2: Önerilen tırnak kesimi (17)

KONSERVATİF TEDAVİ

Oluk splinti

Uygun şekilde kesilmiş küçük bir vinil serum hortumundan, bir ucunun çapraz olarak kesilmesiyle oluk ateli hazırlanır. Lokal anestezi altında, spikül de dahil olmak üzere tırnak plağının yan kenarına, hazırlanan splint yerleştirilir. Splint, tırnak spikülünü tamamen kapatacak şekilde proksimale doğru itilir. Plastik tüp daha sonra yapışkan bant, siyanoakrilat yapışkan veya yara kapatma şeritleri ile tutturulur (Şekil 3) (17,18). Splintleme sonrası hastalarda ağrının dramatik şekilde hafiflediği görülür. Hastalara ayak parmaklarını 3 veya 4 hafta boyunca günde bir kez povidon-iyotla yıkamaları talimatı verilir. Splintlenen spikül, tırnak kıvrımına zarar vermeden büyür ve granülasyon dokusu azalır.



Şekil 3: Oluklu splint (17)

Pamuk yerleştirilmesi

Bir tırnak kaldıracı alet ile veya küçük bir küret kullanılarak batık yan tırnak kenarının altına pamuk yerleştirilir. Kontrolsüz bir vaka serisinde ortalama 24 haftalık takip süresi boyunca pamuk demetleri kullanılarak %79 oranında semptomatik iyileşme görüldüğü bildirilmiştir (19). Bu yaklaşımın kullanıldığı bir çalışmada, başka ek tedavi uygulanmayan hastaların %50'sinde 24 saatten daha kısa sürede ve %100'ünde 72

saatten önce ağrının düzeldiğini gösterilmiştir (20). Pamuk iki ay sonra, iyileşme sonrası çıkarılabilir veya kendiliğinden düşmesi beklenebilir.

Bant yardımcı metot

Bandın bir ucu granülasyon dokusu boyunca batık tırnağın kenarına yerleştirilir ve geri kalanı ayak parmağı etrafında belli bir açıyla bükülür, ancak yaranın kendisini örtmez (Şekil 4). Prensip, tırnak kıvrımını fiziksel olarak tırnaktan uzaklaştırarak, basıncı azaltmak ve biriken püy drenajını ve yaranın kurumasını hızlandırmaktır. Bu teknikle ilgili kontrollü çalışma bulunmamaktadır.



Şekil 4: Bant yardımcı teknik (16)

Diş ipi tekniği

Bu noninvaziv teknik, tırnak batmasının erken evrelerinde kullanılır. Lokal anestezi yapılmadan, batık tırnak köşesinin altına diş ipi eğik olarak yerleştirilir ve proksimale doğru itilir. Spikül de dahil olmak üzere tırnak plağının yan kenarı ayrılır. Teknik basit, uygulaması kolay ve hasta tarafından kolayca tekrarlanabilen bir teknik olup, tırnak batmasının uzun vadede iyileşmesi için oldukça yüksek bir şans sağlar (21).

Tel ile düzeltme

Bu teknikte tırnak plağının distal serbest kenarında 23-G iğnelerle iki delik açılır. Tırnak plağının açısı 60°nin altına düşene kadar elastik bir tel sokulur. Tel öne doğru bükülür, tırnak ucundan dışarı çıkmayacak şekilde makasla kesilir ve iğnenin açtığı küçük delik etil 2-siyanoakrilat yapıştırıcı madde ile doldurulur. Telin esnekliği batık tırnağın deformasyonunun iyileştirilmesine yardımcı olur. Yapılan bir çalışmada 6 ay içinde nüks bildirilmemiştir (22).

Diğer metotlar

Törpüleme, breys, akrilik yapay tırnak

CERRAHİ TEDAVİ

Tırnak batmasında kullanılan cerrahi tekniklerin hiçbiri öncelikli tercih edilen teknik olarak kendini kanıtlayamamıştır. İdeal cerrahi prosedür hem fonksiyonel hem de estetik açıdan yüksek düzeyde hasta memnuniyeti, normal aktivitelere hızlı dönüş ve düşük nüks oranı ile sonuçlanmalıdır. Herhangi bir tekniğin üstünlüğüne dair bilimsel kanıt olmamasına rağmen, birçok çalışma fenol-alkol tekniğinin diğer tekniklerle karşılaştırıldığında daha fazla başarı gösterdiğini göstermiştir (6,23). Basit tırnak kenarı eksizyonu tek başına %70'e kadar yüksek nüks oranlarına yol açar (24,25).

Spikül eksizyonu ve parsiyel matrisektomi

Tırnak kıvrımında hipertrofi olmayan, tırnak plağını etkileyen Evre I tırnak batması olan bireylerde, doku yenilenme kapasitesinin azaldığı ve tekrarlama ihtimalinin daha düşük olduğu yetişkin hastalarda yapılır. Teknik, ayak tırnağının etkilenen kısmının eksizyonundan ve kısmi matrisektomiden (küret veya neşter ile) oluşur. Persichetti ve ark., (26) matriksin mekanik prosedürler kullanılarak basit eksizyonunun en etkili yöntem olduğunu, daha az komplikasyon ve enfeksiyona yol açtığını ve daha kısa iyileşme süresi sağladığını doğrulamaktadır. Bununla birlikte bazı çalışmalarda, matriksin mekanik rezeksiyonu ile matrisin fenolizasyonu arasında anlamlı bir fark bulunmamış, ancak toksik olduğu için fenolün kullanımından vazgeçilmesi önerilmiştir (27). Matrisektomi için fenol kullanımı doku nekrozuna, ağrıya ve ameliyat sonrası kalıcı eksüdatif drenaja neden olabilir. Nadiren uzun süreli temas nedeniyle karın ağrısı, baş dönmesi, siyanoz, hematoglobüri ve kardiyak aritmileri içeren sistemik toksisite ortaya çıkabilir.

Kimyasal parsiyel matrisektomi – Fenol alkol

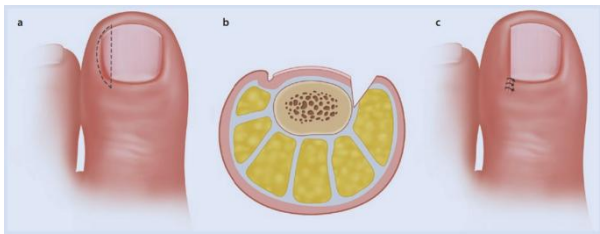
Fenolik ablasyon %90'a varan yüksek bir başarı oranına sahiptir. Matrisin cerrahi eksizyonuna göre daha az ağrılıdır, morbiditesi daha düşüktür ve başarı oranı daha yüksektir. Ameliyat bölgesinde bir dereceye kadar analjezi sağlayan ancak uzun vadede herhangi bir şikâyete yol açmayan bir miktar fenolik sinir hasarı olması muhtemeldir. Fenolik ablasyon evre I/IIa, doku rejenerasyon kapasitesi iyi olan genç veya ergen hastalar ve kontrollü tip 1 veya 2 diyabet hastalarında uygulanabilir. Damarsal riski olmayan ve kontrollü diyabet hastalarında fenol-alkol tekniği güvenlidir (28) (Şekil 5). Nüks oranı düşük (%5) olmasına rağmen ameliyat sonrası iyileşmede gecikme ve akıntı gibi komplikasyonlar daha sık görülür. Sızıntı bazen enfeksiyonla karıştırılabilir. Farklı sürelerdeki fenol uygulamalarını karşılaştıran çalışmalar, tırnak batması tedavisinde germinal matriksin 1 dakikalık fenol koterizasyonunun uzun süreli uygulamalara göre daha iyi bir güvenlik profiline sahip olduğunu ortaya koymuştur (29). Kimyasal matrisektomilerde kullanılacak diğer ajanlar sodyum hidroksit ve trikloroasetik asittir.



Şekil 5: Fenol ablasyon (16)

Kama rezeksiyonu

Bu prosedür estetik rekonstrüksiyon tekniği (26) veya Winograd tekniği ile gerçekleştirilebilir (30). Her iki teknik de çok benzerdir ve evre IIb ve evre III onikokriptoz için endikedir (Şekil – 6). Teknikler, tırnak plağının etkilenen kısmının eksizyonunu, kısmi matrisektomi ve hipertrofik tırnak kıvrımının ve tırnak yatağının kama şeklinde çıkarılmasını içerir. Winograd tekniği, lateral matriksin çıkarılmasına ve lateral tırnak kıvrımının daha iyi korunmasına daha fazla önem verilen bir tür kama eksizyonudur; oysa estetik rekonstrüksiyon tekniğinde amaç, tırnak kıvrımının dışbükey açısını azaltmaktır. Estetik rekonstrüksiyon tekniği, tırnak plağının tamamen çıkarılmasını ve granülomatöz dokunun debridmanını içerir, ardından etkilenen tırnak kıvrımının lateralindeki kama şeklindeki deri ve deri altı doku çıkarılır. Tırnak batması olan 100 hasta üzerinde yapılan karşılaştırmalı bir çalışmada, 50'si Winograd tekniğiyle ve 50'si konservatif oluklu splint yöntemiyle tedavi edilmiştir. Oluklu splint uygulanan yapılan 5 (%10) hastada ve Winograd tekniği uygulanan 6 (%12) hastada nüks gözlenmiştir. Ameliyat sonrası iş gücü kaybı Winograd tekniğinde 2 hafta, oluklu splint yönteminde ise 1.1 hafta olarak saptanmıştır. Bu yazarlar, kısa süre içinde işe dönmeyi planlayan hastalar için oluklu splint yönteminin daha ekonomik ve uygun olduğu sonucuna varmışlardır. Ayrıca daha fazla matriks korunması ile normal bir tırnağın yeniden büyümesine, mükemmel kozmetik sonuçlara ve ağrının anında azalmasına olanak sağladığı belirtilmiştir (31).



Şekil 6: Winograd tekniği (32)

Total matrisektomi

Bu prosedür yetişkin hastalarda evre III onikokriptom, onikogrifo, onikodistrofi ve distal ve lateral kıvrımların kronik hipertrofisi için endikedir. Tırnak eksizyonu ve fenol ile total matrisektomi yapılır (33).

Matrisektomi için CO 2 lazer, radyofrekans ve elektrokoter

CO2 lazer, %50-100 başarı oranıyla etkili bir tedavi yöntemi olarak önerilmiştir (34). CO 2 lazer tekniğinin avantajları, daha az kanama, ameliyat sonrası ağrının azalması, enfekte dokunun anında sterilizasyonu ve çevre dokulara verilen termal hasarın sınırlı olmasıdır (34). Dezavantajı ise sekonder olarak dokuların yeniden epitelizasyonu ve iyileşmesinin 3-6 hafta sürmesidir. Tırnak yatağının elektrokoter ablasyonu daha az akıntı üreten oldukça başarılı bir alternatiftir (Şekil 7). Lazer matrisektomi başka bir seçenektir, ancak ekipman ve bakım maliyetleri yüksektir.



Şekil 7: Elektrokoter ablasyon (35)

Dekompresyon tekniği

Bu prosedür, kalıcı matrisektomi olmaksızın kısmi tırnak plağı eksizyonu tekniği ile birlikte tırnak kıvrımının tek taraflı yumuşak doku rezeksiyonundan oluşur. Tekrarlamalar sık olmasına rağmen matrikste kalıcı bir hasar meydana gelmez (36).

Yumuşak doku tırnak kıvrımı eksizyonu tekniği

Vandenbos ve Bowers'ın yayınladığı prosedür, tırnak batmasının gelişiminde nedensel faktörün tırnak olmadığı varsayımına dayandırılmıştır. Chapeskie bu prosedürü 560'tan fazla hastaya uygulamış ve nüks bildirmemiştir (7). Bu işlemde tırnağa dokunulmaz. Lokal anestezi sonrasında tırnağı saran yumuşak doku eliptik şekilde geniş bir şekilde eksize edilir. Tırnak kenarındaki derinin tamamının alınması önemlidir. İkincil yara kapanması için alan açık bırakılır. Ameliyat sonrası bakım, ayak parmağının günde üç kez 15-20 dakika boyunca ılık suyla ıslatılmasını içerir. Yara 4-6 haftada iyileşir. Bu tekniğin avantajı tırnak ve matriksinin korunması, mükemmel kozmetik sonuçlar, nüks olmaması ve yüksek hasta memnuniyetidir (37). Kutanöz invazyon kaybı nadir de olsa bu işlem sonucu ortaya çıkabilen önemli bir komplikasyondur.

Silikon jel tabaka

Bu basit teknik, granülasyon dokusunu çıkarmadan tırnak plağının lezyonlu tarafının dörtte birinin çıkarılmasını içerir. 24 saat sonra silikon jel tabaka granülasyon dokusuna ve açıkta kalan tırnak yatağına yerleştirilip herhangi bir basınç uygulanmadan gevşek bir şekilde bandajlanır. Silikon jel tabakalar, hipertrofik tırnak kıvrımının kalınlığını azaltmada başarılıdır ve tırnak plağının yeniden büyümesi sırasında nüksü önlemektedir. Yöntemin avantajı tırnak matriksine ve komşu dokuya zarar vermemesidir (38).

ANTİBİYOTİKLER

Oral antibiyotikler, tırnak batması tedavisinde önemli bir bileşen olarak kabul edilmekle birlikte antibiyotik gerekliliği halen tartışmalıdır. Bazı yazarlar, fenol matrisektomi yapılmadan önce veya fenol matrisektomi sırasında oral antibiyotik verilmesinin enfeksiyon riskini azalttığını düşünmektedir (39). Bazı yazarlar ise, işlem sonrası lokalize enfeksiyonun antimikrobiyal ajanlara ihtiyaç duyulmadan çözüleceğini belirtmişlerdir (40). Oral antibiyotiklerle başlayan tedavi matrisektomideki gecikmeden sorumlu olabilir, bu da iyileşme sürelerinin daha da uzamasına yol açar. Ayrıca, eşzamanlı antibiyotik ve matrisektomi uygulanan gruplar ile yalnızca matrisektomi uygulanan grup arasında iyileşme açısından anlamlı bir fark olmadığını belirten çalışmalar mevcuttur (41).

AMELİYAT SONRASI BAKIM VE ANALJEZİKLER

Tipik olarak ameliyat sonrası hastaya 3 gün boyunca ayakkabı giymekten kaçınması tavsiye edilir. Pansuman ameliyattan sonraki gün hasta tarafından çıkarılabilir ve ardından bir hafta boyunca günlük povidin-iyot banyosuyla 10-15 dakika süreyle temizlik yapılır. Banyodan sonra hastaya antibiyotikli merhem ve küçük bir bandaj uygulaması tavsiye edilir. Analjezik gereksinimi, tedavide kullanılan yönteme bağlıdır; genellikle 2-3 gün süreli analjezi yeterlidir. Hasta genellikle 48 saat sonra işine dönebilir.

PROGNOZ

Hangi prosedür uygulanırsa uygulansın tekrarlamalar meydana gelebilir. Bu prosedürlerin ardından nüks etmenin birincil nedeni, matrisin etkisiz veya eksik yok edilmesi ve keratin dokusunun yeniden büyümesidir. Spikül en yaygın olarak proksimal ve lateral tırnak kıvrımlarının birleşim yerinde veya lateral olukta bulunur ve en sık görülen cerrahi başarısızlık semptomudur. Topikal keratolitiklerle veya lokal anestezi altında eksizyon ve fenolizasyonla kolaylıkla tedavi edilebilir.

Basit tırnak kenarı eksizyonu tek başına yüksek nüks oranlarına sahiptir (yaklaşık %70) ve savunulmamaktadır (25). Winograd kama rezeksiyonunun nüks oranının %5-20 arasında olduğu rapor edilmiştir (7). Fenol ile yapılan kimyasal matrisektomi, %5'lik bir nüks oranı ile dermatologlar için iyi bir seçenektir (23).



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

Lazer matrisektomi ile hemen hemen aynı terapötik sonuçlar elde edilmiştir. En iyi kozmetik sonuca sahip en düşük nüks oranları yumuşak doku tırnak kıvrımı eksizyonu tekniğinde görülmesine rağmen bu konuda literatür zenginliği yoktur.

SONUÇLAR

Tırnak batması dünya çapında yaygın bir hastalık kaynağı olmaya devam etmekte ve bireyin yaşam kalitesi üzerinde önemli bir etkiye sahiptir. Onikokriptonun doğru yönetimi, evresinin belirlenmesini ve etkilenen dokuların değerlendirilmesiyle mümkündür. Ağrı, tekrarlayan onikokripton, nüks ve konservatif tedavinin başarısız olduğu durumlarda cerrahi tedavi düşünülmelidir. Hastanın klinik durumuna en uygun cerrahi tekniğin seçilmesi önemlidir. Kanıtlar, fenol kullanımıyla birlikte basit tırnak eksizyonunun, artan enfeksiyon riskine rağmen, tırnak batmasının semptomatik nüksetmesini önlemede daha etkili olduğunu göstermektedir. Sayısız tedavi seçeneğine rağmen, düşük nüks oranı, düşük kesinti süresi ve iyi kozmetik sonucu olan ideal bir teknik konusunda fikir birliği bulunmamaktadır.



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1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

DATA MINING-SUPPORTED E-LEARNING: APPROACHES TO STUDENT MODELING AND ACTIVITY ANALYSES

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Abstract

Approaches to student modeling are crucial for identifying students' needs, determining their learning styles, and monitoring their progress for individual modules. Student modeling approaches are effective tools used to comprehend individual characteristics, learning styles, and strengths/weaknesses of students. These approaches can serve various purposes, including providing personalized content, identifying learning challenges, and predicting student success. Assessments solely based on exam grades or in-class performance may misinterpret students' needs and learning styles. Instead, a more comprehensive classification involving various parameters such as student characteristics, learning history, performance data, and interaction measurements from diverse data sources is required. This study, evaluates data mining techniques and approaches used to analyze students' e-learning data, behaviors, performances, and interactions. As a result, educators can utilize insights gained from data mining approaches to provide personalized content, customize learning paths, and offer recommendations to enhance student achievements. Furthermore, it will contribute to the development of student-centered strategies and enhance the effectiveness of e-learning platforms.

Key Word: Student modeling, Data mining, e-learning



1. Introduction

In today's education sector, a significant transformation is taking place through distance learning models. Distance education is a form of education where students and teachers can meet in virtual environments independent of geographical constraints. This transformation brings along a series of advantages, and these advantages have significant impacts on various levels of the education system. Various distance learning systems (Zoom, Teams, Perculus, Google Meet, vb.) are used in fundamental courses.

The emergence of virtual education has fundamentally transformed the learning experience by providing students with unprecedented flexibility in terms of attendance and study schedules. The availability of virtual live sessions and recorded sessions has allowed students to tailor their learning to their individual preferences and time constraints [4].

One of the advantages offered by virtual education is the flexibility in learning modes and schedules. Students can now participate in virtual live sessions or review recorded sessions as they wish. This flexibility not only embraces the diversity of learning preferences but also enables students to study according to their daily schedules [4].

In the context of virtual education, the recorded data obtained from these sessions can be used to provide valuable insights into students' learning behaviors and preferences. By analyzing the data, educators can distinguish between students who prefer virtual live sessions and those who prefer reviewing recorded sessions. This classification plays a crucial role in understanding various learning styles prevalent among students in the virtual education environment.

Furthermore, the recorded data serves as a rich source for monitoring students' weekly or monthly progress specific to individual modules. This progress tracking extends beyond academic performance and encompasses identifying any patterns or trends in student participation, interaction, and engagement with the virtual learning environment.

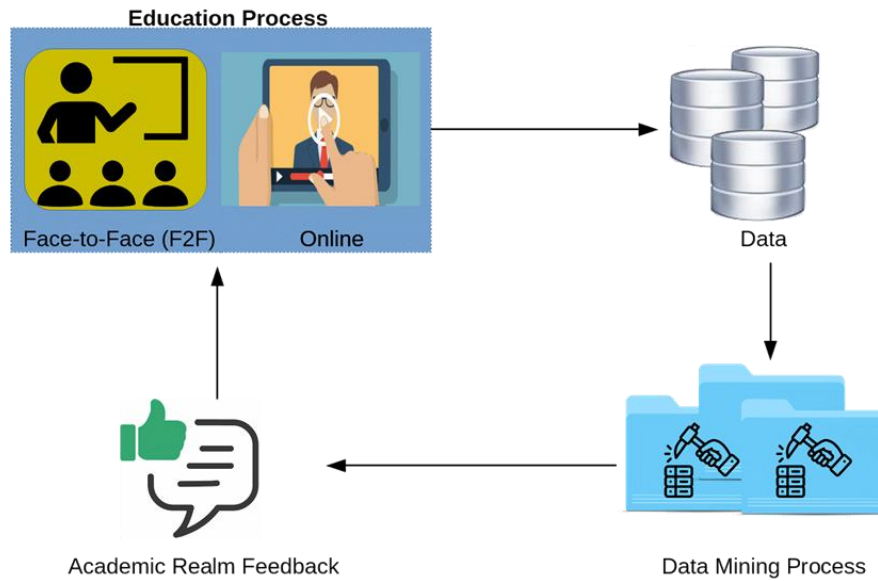


Figure 1. Education process mining framework [4].

The aim of this study is to explore the techniques of data mining for student modeling and activity analysis in e-learning processes. In this context, the application of these techniques on data obtained from e-learning platforms and the potential impacts on student achievement, interaction level, and learning experience have been evaluated. The study seeks to contribute to the personalization and effectiveness of e-learning processes, aiming to provide valuable insights for the future of educational practices.

The application of data mining techniques to student modeling and activity analysis in e-learning processes forms a significant research area in the literature. Various studies in this context offer important perspectives on how data mining can be employed in e-learning environments and understanding the effects of the obtained information on student achievement and learning experience.

2. Related Work

Literature has extensively explored valuable insights into student behaviors and preferences through the analysis of data collected from e-learning platforms. Existing research in this field focuses on understanding the potential of data mining in e-learning processes and developing various methods to optimize student performance. This study aims to contribute to this understanding by exploring insights from the literature regarding student modeling and activity analysis in e-learning processes.

Wang et al. focused on predicting student performance and identifying factors influencing student achievements using data mining techniques in e-learning processes [1]. They developed a comprehensive method, including steps such as creating student profiles, analyzing interaction data, and correlating this data with student performance. Mahmood et al. delved into an in-depth analysis of student interactions to explore methods for improving the user experience in e-learning platforms [2]. They investigated strategies to enhance user experience by examining student interactions on e-learning platforms, particularly focusing on metrics that could be used to increase interaction quality and measure student satisfaction.

Kausar et al. presented a study on integrating data mining techniques to personalize e-learning content, evaluating the effects of providing customized educational materials to students [3]. They explored strategies for creating personalized learning materials based on student preferences and needs by integrating data mining techniques. Moubayed et al. assessed student engagement using data mining methods on e-learning platforms. They analyzed various factors such as interactive content consumption, forum participation, and exam performance to evaluate the quality of student interactions [4].

Sanvitha Kasthuriarachchi examined e-learning data through mining to identify factors influencing student success. In this study, they emphasized creating student profiles and personalizing course content accordingly [5]. Edeh et al. evaluated content recommendation systems proposed to enhance student success on e-learning platforms. The study highlighted that providing personalized learning materials to students could increase student motivation [6].

Jovanovic et al. used data mining methods to better understand student interactions on e-learning platforms and improve student performance. Their research focused on modeling student behaviors and providing personalized feedback based on these models [7]. Moreno et al. analyzed the changes in student interactions over time on e-learning platforms. Their study proposed strategies to enhance student motivation and participation by tracking the evolution of student behaviors [8]. Castro et al. evaluated data mining techniques applied on e-learning platforms and investigated how providing personalized content could enhance the learning experience [9].

Kukkar et al. conducted a study on predicting student performance using data mining techniques on e-learning platforms. Their research evaluated the usability of various attributes, such as student history, interaction level, and course materials, to determine student success [10]. Liang et al. modeled student behaviors by analyzing large datasets from e-learning platforms. Their study examined the effects of updating and personalizing student profiles by considering changes in student interactions over time [11]. Gushchina et al. conducted a study on student interactions using data mining techniques on e-learning platforms. Their research focused on the formation of student groups and the impact of these groups on success by analyzing student interactions through social network analysis [12].

Rabelo et al. utilized data mining methods to identify factors influencing student success on e-learning platforms. Their research focused on predicting student success through student characteristics, course material interaction, and student interaction history [13].

3. Data Mining and its Relationship with e-learning

The field of education has undergone a significant transformation with the advent of digitalization, replacing traditional classroom settings with e-learning platforms. This digital shift generates and manages a wide range of data, from student interactions to learning habits. Data Mining emerges as an effective tool in extracting valuable insights from these extensive datasets.

e-learning is known for providing students with flexibility, easy access, and the potential for personalized learning experiences [12]. However, to leverage these advantages, understanding factors such as student behaviors, learning habits, and performance data becomes crucial. This is where Data Mining comes into play, analyzing the abundance of data to make e-learning processes more effective.

Data Mining is generally the process of discovering patterns and information hidden in large datasets [11]. In the context of e-learning, various data sources, including student interactions, exam results, and activities within learning modules, form the basis of this analytical process. These data mining techniques assist educators and administrators in understanding student behaviors, identifying learning needs, and offering a more personalized education.

4. Student Modeling

Student modeling is the process of using data mining methods to model the needs, learning styles, and performances of students based on the data obtained from e-learning platforms. This enables the development of student-centric educational strategies and the design of personalized learning experiences.

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E-learning environments have significant potential to personalize students' learning experiences, optimize learning processes, and develop more effective educational strategies. The realization of this potential is facilitated through the concept of student modeling. Student modeling is an approach used to understand students' behaviors, preferences, challenges, and strengths.

By utilizing data from e-learning platforms, student modeling creates profiles for individual students. These profiles encompass factors such as students' past performances, areas of interest, and learning speeds. These detailed profiles enable educators to understand each student individually, providing an opportunity to create personalized learning experiences by tailoring content and strategies to meet each student's needs.

Student modeling not only helps in understanding students' learning processes but also empowers educators to develop more effective strategies. Identifying areas where students may need more guidance allows for the provision of personalized support. Additionally, student modeling contributes to the development of group-based learning strategies by identifying similar characteristics and needs among students.

In e-learning processes, student modeling serves as a powerful tool to enhance educational efficiency. The analysis of student data through data mining techniques reveals where students excel, where they face challenges, and how they learn. This information allows for the more effective design and adaptation of educational programs. One of the studies in this field evaluates the student modeling approaches by Colace [14]. The research emphasizes the potential of student modeling to enhance student success by providing personalized learning materials and adapting educational strategies.

Additionally, another study conducted by Rienties, demonstrated that student modeling processes can enrich the learning experience by increasing student motivation and engagement [15].

5. Activity Analyses

Activity analyses aim to understand and optimize the learning experiences by assessing students' interactions and performances on e-learning platforms. These analyses provide strategic insights to educational institutions by examining factors such as student success, participation levels, learning experiences, and interaction patterns.

On the other hand, data mining adds value to the process of modeling and predicting student behaviors by analyzing extensive e-learning datasets. In this context, various data mining techniques delve into student activities and identify the factors that shape the learning curve. For instance, by identifying crucial parameters influencing student success, personalized feedback can be provided to teachers, contributing to the enhancement of educational processes.

Building on previous research, a study conducted by Namoun and Alshantqi, emphasized the effectiveness of data mining techniques in predicting student performance [16]. Additionally, another significant research by Munoz-Organero et al. involved developing a model to enhance student motivation by analyzing interaction patterns on e-learning platforms [17].

In this study, we will delve into contemporary data mining approaches related to student modeling and activity analyses, evaluating the potential to make e-learning processes more efficient and personalized. This assessment will provide crucial insights for educators to guide students more effectively, optimize learning experiences, and enhance efficiency in e-learning platforms.

6. Conclusion and Future Directions

e-learning has become an increasingly important paradigm in modern education systems. This transformation aims to provide students with flexibility, accessibility, and personalized learning experiences. However, to understand student behaviors in e-learning processes and to make learning activities more effective, there is a need for more information. In this context, data mining techniques offer the potential to analyze large datasets obtained from e-learning platforms.

This study focuses on student modeling and activity analysis within the scope of data mining-supported e-learning, aiming to examine the role of these techniques in the field of education. Student modeling is a significant tool used to understand individual characteristics, learning styles, and strengths/weaknesses of students. Activity analysis, on the other hand, aims to assess student interaction, learning progress, and responses to learning materials.

In this context, the integration of data mining techniques into e-learning processes can play a crucial role in the development of student-centered strategies. This study aims to extract valuable information about student behaviors by analyzing datasets obtained from e-learning platforms. The findings obtained can contribute to educators making informed decisions to guide students more effectively, optimize learning materials, and enhance student success.



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1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

ARTIFICIAL INTELLIGENCE IN MEDICAL IMAGE ANALYSIS AND DIAGNOSIS: ITS ROLE AND EVALUATION

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Abstract

Recently, AI technologies are being utilized in the field of Medical Image Analysis and Diagnosis. This method is particularly effective in image content classification. Artificial Intelligence-driven image content classification is a technique used by computer systems to analyze visual data and categorize them into different classes. This method is implemented using machine learning and deep learning algorithms. Deep learning models, especially those based on specific architectures like Convolutional Neural Networks (CNN), have yielded groundbreaking results in image classification applications. The role of AI technology in image content classification has started to be employed to enhance efficiency and solve previously seemingly impossible problems in various fields such as medical imaging, automotive industry, security systems, agriculture, and more. This approach has the potential to achieve higher success rates compared to previous methods by improving the accuracy of image content classification. Therefore, understanding and evaluating the role of AI in Medical Image Analysis and Diagnosis is crucial for shaping future technological solutions. The study conducted in this context aims to emphasize the role of AI in Medical Image Analysis and Diagnosis and highlight its usability in different domains. The study aims to contribute to effective and efficient solutions in relevant fields by showcasing the impact of AI in medical image content classification and its future potential. Consequently, the study will increase awareness regarding the potential and future importance of AI in this field, providing guidance for more effective and efficient solutions.

Key Word: Artificial Intelligence, Medical Image, Deep Learning.

1. Introduction

The rapid developments in technology today, particularly in AI technologies, have triggered their widespread use in various fields. The role of AI in image content classification, especially in areas such as medical imaging, the automotive industry, security systems, and agriculture, has begun to be employed to enhance efficiency and address problems that were previously unsolvable with conventional methods [1]. AI technologies are particularly effective in the field of Medical Image Analysis and Diagnosis. The method, especially in image content classification, proves to be highly effective (Figure 1).

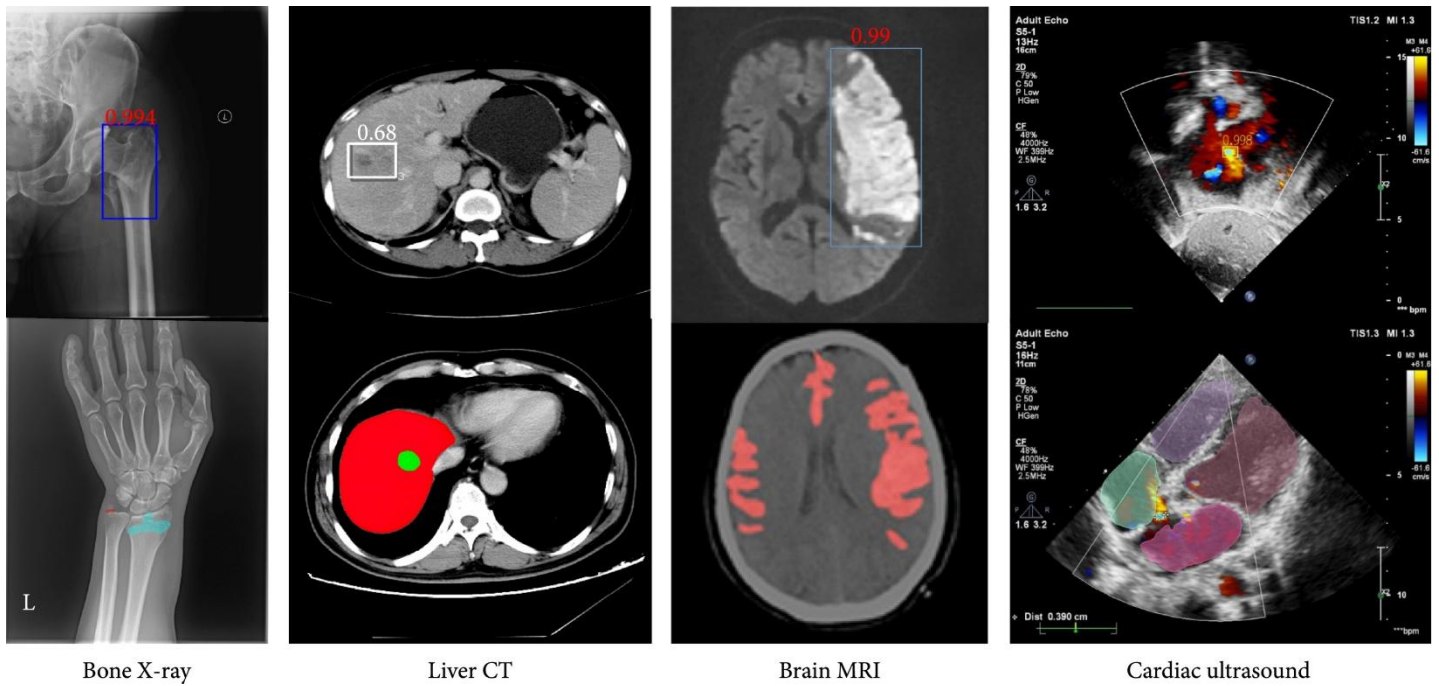


Figure 1. Examples of medical image [2].

AI-supported image content classification is a crucial method that enables computer systems to analyze visual data and categorize them into different classes. This method is implemented using machine learning and deep learning algorithms. Deep learning models, especially those based on specific architectures like Convolutional Neural Networks (CNN), have yielded groundbreaking results in image classification applications [3]. This approach, by increasing the accuracy of image content classification, has the potential to achieve higher success rates compared to previous methods.

Therefore, understanding and evaluating the role of AI in Medical Image Analysis and Diagnosis is crucial for shaping future technological solutions. This study aims to highlight the role of AI in Medical Image Analysis and Diagnosis and demonstrate its usability in different domains. The research aims to contribute to effective and efficient solutions in relevant fields by showcasing the impact of AI in medical image content classification and its future potential. Consequently, the study will increase awareness regarding the potential and future importance of AI in this field, providing guidance for more effective and efficient solutions.

2. Image Content Classification

The rapid development in the fields of digital image processing and AI today has significantly influenced research, particularly in the area of image content classification. Image content classification is defined as the automatic assignment of images in a dataset to different classes or categories.

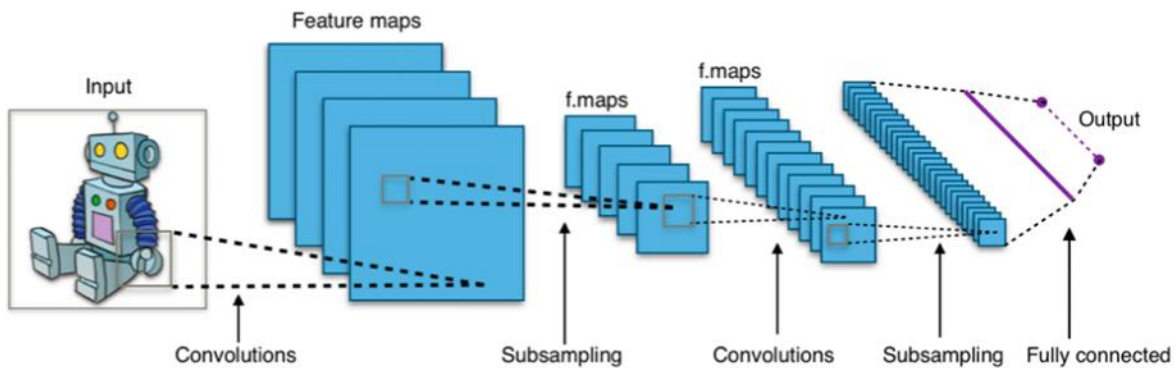


Figure 2. Schematic Representation of Pixel-Based Classification [4].

Image content classification has found a broad range of applications with the advancement of AI technologies. These include critical tasks in medical imaging such as disease diagnosis, screening, and treatment planning. In addition, it plays a significant role in autonomous vehicle technologies by assessing road and traffic conditions. Visual data obtained through cameras are utilized for evaluating security threats in security systems. Furthermore, image content classification is applied in agriculture to diagnose plant diseases, enhance product productivity, and monitor agricultural fields.

2.1 Image Content Classification Methods

Image content classification is a technique that enables computer systems to analyze visual data and categorize them into specific classes. This process is typically performed using machine learning and deep learning algorithms. Image content classification often involves extracting image features and applying classification algorithms. The extraction of image features is commonly achieved through deep learning approaches such as

Convolutional Neural Networks (CNN). CNN is a widely used deep learning algorithm in image content classification, employing a multi-layered architecture for feature extraction and classification processes.

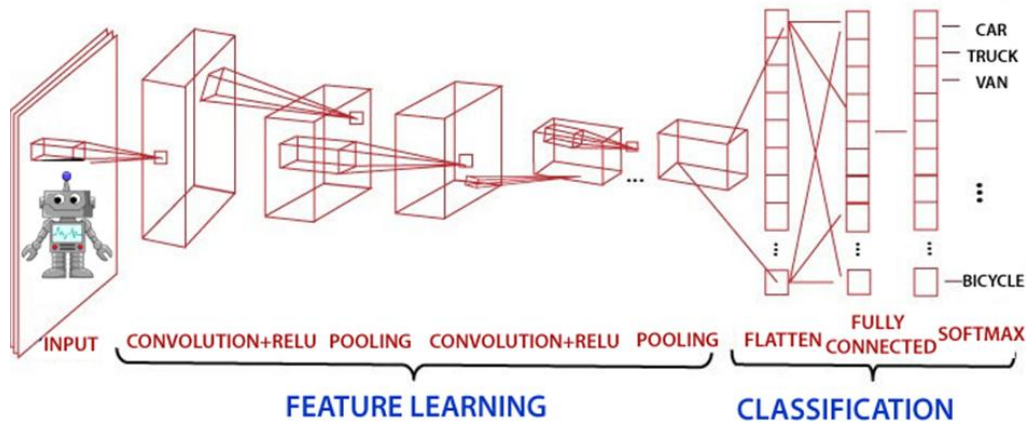


Figure 3. Convolutional Neural Network (CNN) method [5].

Convolutional Neural Networks (CNN) are more complex than traditional structures, particularly possessing the ability to learn hierarchical features of visual data [6].

2.1.1 Basic Principles of CNN

A. Convolutional Layers:

Through convolutional layers, CNN learns to recognize specific features (edges, corners, etc.) on the image. These layers emphasize the local features of visual data [7].

B. Pooling Layers:

Pooling layers summarize convolutional results by reducing their size. This helps the learned features become more resistant to translation and scale changes [8].

C. Fully Connected Layers:

Fully connected layers perform the final classification using the features obtained from the previous layers [9]. CNN is utilized in the medical imaging field to diagnose diseases and classify medical images. In the automotive industry, CNN is used to evaluate the driving condition of vehicles and detect objects. Additionally, in security systems, CNN is effectively employed in tasks such as recognizing individuals, analyzing facial expressions, and detecting objects.

3. The Use of Artificial intelligence in Medical Image Analysis

The rapid technological advancements in the field of medical image analysis today offer significant advantages, such as faster and more accurate disease diagnosis, optimized treatment planning, and improved patient care [10]. Many of these advantages become possible through the successful integration of Artificial AI technologies into the processes of medical image analysis.

Medical image analysis has a wide range of applications, from radiological images to histopathological sections. Medical imaging methods such as Magnetic Resonance Imaging (MRI), Computed Tomography (CT), and X-rays provide valuable information to healthcare professionals in diagnosing diseases and managing treatment processes. However, effectively analyzing and understanding these large datasets can be time-consuming and complex using traditional methods.

The impact of AI on medical image analysis has become more pronounced, particularly with the emphasis on deep learning algorithms. Artificial neural network-based algorithms, especially architectures like Convolutional Neural Networks (CNN), have demonstrated higher success rates and sensitivity in recognizing pathological conditions compared to previous methods.

Convolutional Neural Networks (CNN) play a groundbreaking role in medical image analysis, especially in the learning phase of the process. Trained on examples within a large dataset, CNN enhances its ability to recognize complex patterns. By learning different anatomical structures or pathological conditions in medical images, CNN can diagnose or classify new images based on this acquired knowledge. This method is particularly crucial for the accurate diagnosis and management of complex diseases, providing high accuracy and effectiveness. In applications such as the analysis of radiological images and the classification of histopathological sections, CNN stands out for its ability to recognize previously unseen patterns.

One of the significant advantages of CNN in medical image analysis is its ability to achieve higher accuracy rates compared to previous methods. Focused on the complexity of pathological conditions, CNN can achieve successful results even in challenging areas. This capability ensures accurate diagnoses, optimizing treatment processes, and improving patient care. CNN's success in medical image analysis has garnered attention, and its role could expand further in the future. With the use of large datasets and the design of more complex deep learning models, CNN's role in medical image analysis may continue to grow. This could contribute to a more reliable, accessible, and rapid diagnosis in the healthcare sector.

4. Future Perspectives and Challenges of Artificial Intelligence in Medical Image Analysis

The impact of AI on large datasets in medical image analysis offers significant potential benefits in terms of speed, accuracy, and diagnostic capability [11]. However, along with the widespread use of AI in medical image analysis, certain challenges have emerged. Challenges such as the algorithms producing reliable and accurate results, especially in recognizing rare diseases, ethical issues, and privacy concerns pose obstacles that need to be overcome in AI-supported medical image analysis. Data quality and diversity emerge as crucial factors in AI-supported medical image analysis. Data quality is a fundamental factor in the training of AI models. Accurate labeling, high resolution, and reliability of medical images are critical elements influencing the accuracy of algorithms. Incorrectly labeled or low-quality data can diminish the reliability of the model and lead to erroneous results. Therefore, ensuring the quality of datasets used in AI applications is vital for making accurate diagnoses and treatment plans. Additionally, heterogeneity in datasets can complicate the integration of data obtained from different devices and sources. Moreover, data labeling processes require expertise, and correcting errors in these processes can be time-consuming. Data privacy is a significant concern, especially given the sensitivity of medical data. Furthermore, it becomes problematic due to the focus of AI algorithms solely on local information. Images are often situated within a context, and this context can influence the interpretation of the image's meaning.

These challenges underscore important issues for the future evolution of AI in medical image analysis. The rapid progress of research and the development of new techniques will contribute to further advancements in the field of AI for medical image analysis, expanding its application potential.

5. Conclusion and Future Directions

The role of AI in medical image analysis and diagnosis symbolizes a significant transformation in the healthcare sector. This study was conducted to examine and evaluate the impact of AI on medical image analysis and diagnostic processes.

AI-supported medical image analysis holds significant potential in clinical applications by providing rapid and accurate diagnostic capabilities. Image analysis algorithms, especially deep learning techniques and specifically designed neural networks, have achieved high success in detecting complex pathologies. This can enhance treatment success by enabling early-stage diagnosis and guiding patients to appropriate treatments.

However, there are challenges and limitations in the applicability and reliability of AI in medical image analysis. Factors such as data quality, model generalizability, ethical concerns, and real-world usage scenarios



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in clinical practice may limit the widespread adoption of AI applications. Therefore, overcoming these challenges is crucial in the development of AI-supported medical image analysis systems.

Moreover, ethical and privacy considerations should be taken into account. The security and confidentiality of patients' data are central concerns in the use of AI applications. Therefore, defining ethical rules and implementing appropriate security measures are essential in the use of these technologies.

In conclusion, AI-supported medical image analysis can be a significant auxiliary tool in the diagnostic process. However, for the effective and reliable use of this technology, further research, development, and clinical validation studies are needed.



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AİLESEL HİPERKOLESTEROLEMİLİ ÇOCUKLARDA AKDENİZ DİYETİNE UYUM İLE BESLENME DURUMUNUN DEĞERLENDİRİLMESİ

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Özet

Ailesel hiperkolesterolemi, kolesterolün taşınması ve metabolizmasında bir dizi değişiklik ile karakterize genetik bir hastalık olarak tanımlanmaktadır. Ailesel hiperkolesterolemili çocukların tedavisi yaşam boyu süren bir süreçtir. Beslenme tedavisi ve yaşam değişikliği birinci basamak tedaviler olarak kabul edilmektedir. Akdeniz diyeti kardiyovasküler hastalıklar, metabolik sendrom, diyabet, obezite gibi kronik hastalıklara karşı olumlu etkisi olduğu bilinen bir beslenme modelidir. Bu çalışma 5-18 yaş arası ailesel ve sekonder hiperlipidemili çocuk ve adölesanların mevcut beslenme durumlarını değerlendirmek, Akdeniz diyetine uyumlarını sorgulamak, bu uyumun serum lipid profillerine etkisini incelemek amacıyla planlanmış ve Hacettepe Üniversitesi Çocuk Hastanesi'nden gerekli izinler alınarak yürütülmüştür. Çalışmaya yaşları 5-18 arası değişen, ort. 11,85 yaşında 70 çocuk ve adölesan katılmıştır. Katılımcılar Hacettepe Ü. Çocuk Hastanesi'nden 13'ü heterozigot ailesel hiperkolesterolemi sınıfından Tip IIa, 57'si sekonder hiperlipidemi tanısı almıştır. Katılımcıların antropometrik ölçümleri araştırmacı tarafından ölçülmüştür ve beslenme durumlarının belirlenmesi amacıyla anket formu yüz yüze uygulanmıştır. Çalışmada Akdeniz diyetine uyumun belirlenmesi amacıyla KIDMED indeksi kullanılmıştır. Katılımcıların 12 saatlik açlık kan serum lipid değerleri hastane sisteminden alınmıştır. Araştırmanın istatistiksel analizlerinin tümü SPSS 23.0 programı aracılığıyla yapılmıştır. Çalışma sonucunda ailesel hiperkolesterolemili çocuklarda doymuş yağ alımı arttıkça trigliserid ve total kolesterol/HDL kolesterol düzeylerinin anlamlı düzeyde yükseldiği, fruktoz alımı artışıyla VLDL kolesterol düzeylerinin anlamlı düzeyde yükseldiği, Akdeniz diyetine uyumu yüksek olan katılımcıların VLDL kolesterol düzeylerinin diğerlerine kıyasla anlamlı ölçüde düşük olduğu tespit edilmiştir ($p<0,05$). Bu çalışmanın sonuçları ışığında ailesel hiperkolesterolemili çocuklarda Akdeniz diyetinin serum lipid profilini iyileştirmek amacıyla uygulanabileceği düşünülmektedir.

Anahtar Kelimeler: beslenme, ailesel hiperkolesterolemi, Akdeniz diyeti



EVALUATION OF NUTRITIONAL STATUS AND ADHERENCE TO THE MEDITERRANEAN DIET IN CHILDREN WITH FAMILIAL HYPERCHOLESTEROLEMIA

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Abstract

Familial hypercholesterolemia is defined as a genetic disorder characterized by a series of alterations in the transport and metabolism of cholesterol. Treatment of children with familial hypercholesterolemia is a lifelong process. Nutritional therapy and life modification are recognized as first-line treatments. Mediterranean diet is a nutritional model known to have a positive effect against chronic diseases such as cardiovascular diseases, metabolic syndrome, diabetes and obesity. This study was planned and conducted to evaluate the current nutritional status of children and adolescents aged 5-18 years with familial and secondary hyperlipidemia, to question their compliance with the Mediterranean diet, and to examine the effect of this compliance on serum lipid profiles. The study included 70 children and adolescents aged between 5-18 years, mean. 70 children and adolescents aged 5-18 years with a mean age of 11.85 years participated in the study. The participants were diagnosed as 13 with heterozygous familial hypercholesterolemia type IIa and 57 with secondary hyperlipidemia at Hacettepe University Children's Hospital. Anthropometric measurements of the participants were measured by the researcher and a questionnaire form was applied face to face to determine their nutritional status. In the study, the KIDMED index was used to determine adherence to the Mediterranean diet. Participants 12-hour fasting blood serum lipid values were obtained from the hospital system. All statistical analyses of the study were conducted using SPSS 23.0 program. As a result of the study, it was found that triglyceride and total cholesterol/HDL cholesterol levels increased significantly with increasing saturated fat intake in children with familial hypercholesterolemia, VLDL cholesterol levels increased significantly with increasing fructose intake, and VLDL cholesterol levels of participants with high compliance with the Mediterranean diet were significantly lower compared to the others ($p<0.05$). In the light of the results of this study, it is thought that the Mediterranean diet can be applied to improve serum lipid profile in children with familial hypercholesterolemia.

Keywords: nutrition, familial hypercholesterolemia, Mediterranean diet



YAŞLI BİREYLER VE POLİFARMASI

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Özet

Derlemenin amacı, yaşlı bireyler ve polifarmasi arasındaki etkileşim sürecini değerlendiren ve inceleyen hakemli yayınları araştırmaktır. 20. yüzyıldan itibaren küresel çapta artış gösteren teknolojik gelişmeler sayesinde ortaya çıkan sağlık alanındaki hızlı ilerleyiş toplumda bulaşıcı olan hastalıkların erdike edilmesi sağlarken, zamanla bulaşıcı olmayan hastalıkların ortaya çıkmasına neden olmuştur. Sosyodemografik yapıda meydana gelen değişim ve dönüşüm hareketine bağlı olarak genel nüfus içerisinde yaşlı nüfus oranında artış gözlemlenmiş ve bireylerin yaşam süresi uzamıştır. Kronik hastalıkların görülme sıklığının artması yaşlı bireylerin kullandıkları ilaç sayısında artışa neden olmuştur. Artan yaşın getirdiği yük ve eşlik eden çeşitli hastalıkların varlığı nedeniyle ilaç kullanımının sayısında ortaya çıkan artış beş veya daha fazla ilacın düzenli kullanımı olarak ifade edilen polifarmasiyi tanımlamıştır. Birden fazla ilacın eş zamanlı kullanımı ilaç etkileşimlerinde ve advers reaksiyonlarda değişime neden olurken aynı zamanda yaşlı bireylerin ilaç tedavisine uyumlarının azalmasına, bilişsel fonksiyonlarda gerilemeye ve fonksiyonel kapasitede düşüşe yol açmıştır. Dünya genelinde yaşlı bireylerde polifarmasi oranı hızla artış göstermektedir. Yaşlı bireylerde polifarmasi sürecini cinsiyet, eşlik eden hastalıklar, artan yaş, düşük eğitim düzeyi ve sosyoekonomik durum gibi birçok değişken etkilemektedir.

Bu çalışma, 2015 yılından 2023 yılına kadar yaşlı bireyler ve polifarmasi arasındaki etkileşim ve ilişki düzeyini değerlendiren faktörleri incelemek amacıyla yapılan bilimsel makalelerin bir derlemesidir. “PubMed”, “Science Direct” ve “Google Scholar” literatür taraması için kullanılan başlıca veri tabanlarıdır. Derlemede kullanılan anahtar kelimeler ‘yaşlı birey, ‘polifarmasi’, “yaşlı birey ve polifarmasi”dir. Derleme için altı (6) makale seçilmiştir. Bulgularda, ilaç sayısının klinik faktörlerle ilişkili olduğu, polifarmasinin morbidite ve mortaliteyi etkilediği, yaşlı bireylerde polifarmasi oranının artış gösterdiği, polifarmasinin düşük yaşam kalitesi ile ilişkili olduğu, cinsiyet, yaş ve gelir gibi sosyodemografik değişkenlerin bu süreci etkilediği tespit edilmiştir. Araştırma yaşlı bireyler ve polifarmasi arasındaki ilişki ve etkileşim düzeyinin incelenerek gelecekte yapılacak olan akademik ve bilimsel çalışmalara yol gösterici olması bakımından literatüre olumlu katkı sağlayacaktır.

Anahtar Kelimeler: Polifarmasi, Yaşlı Birey, Yaşlı Birey ve Polifarmasi



ELDERLY INDIVIDUALS AND POLYPHARMACY

Abstract

The review encompasses peer-reviewed publications that evaluate and examine the interaction process between older individuals and polypharmacy. The rapid progress of the health field, which has emerged due to technological developments that have increased globally since the 20th century, has led to the emergence of non-contagious diseases over time while ensuring the eradication of infectious diseases in society. Due to the change and transformation in the sociodemographic structure, an increase in the proportion of the elderly population has been observed in the general population, and the life expectancy of individuals has been extended. The increase in the incidence of chronic diseases has led to an increase in the number of medications used by elderly individuals. The increase in the number of people using medication due to increasing age and the presence of various co-occurring diseases has defined polypharmacy which is expressed as the regular use of five or more medications. While the simultaneous use of more than one medication causes changes in chemical reactions and adverse effects, it also causes elderly individuals to decrease their compliance with medication therapy, decline in cognitive functions, and decrease in functional capacity. The rate of polypharmacy in elderly individuals is rapidly increasing worldwide. Many variables affect the polypharmacy process in elderly individuals, such as gender, comorbidities, increasing age, low education level, and socioeconomic status.

This study is a compilation of scientific articles conducted from 2015 to 2023 to examine the factors that evaluate the level of interaction and relationship between elderly individuals and polypharmacy. “PubMed,” “ScienceDirect,” and “Google Scholar” are the main databases used for literature searches. The keywords used in the compilation are 'elderly individual,' 'polypharmacy,' and 'elderly individual and polypharmacy.' Six (6) articles were selected for the review. In the findings, it was determined that the number of medications was related to clinical factors, polypharmacy affected morbidity and mortality, the rate of polypharmacy increased in elderly individuals, polypharmacy was associated with low quality of life, and sociodemographic variables such as gender, age, and income affected this process. The research will contribute positively to the literature by examining the relationship and interaction level between elderly individuals and polypharmacy and guiding future academic and scientific studies.

Keywords: Polypharmacy, Elderly Individual, Elderly Individual and Polypharmacy

Giriş

Özellikle 20'nci yüzyıldan itibaren teknolojik gelişmelerle birlikte ortaya çıkan hızlı ilerleyiş yaşam koşullarının ve sağlık hizmetlerinin iyileşmesini sağlarken yaşam süresini ve beklentisini de arttırmıştır. Dünya genelinde 65 yaş üstü nüfusun toplam nüfus içerisindeki payının 2050 yılına kadar %16'ya yükseleceği ve dünyada her 6 kişiden birinin 65 yaş üzerinde olacağı tahmin edilmektedir (UN, 2019). Sanayileşme ile başlayan teknolojik gelişmeler sayesinde zamanla sağlık hizmetlerinde birtakım köklü değişimler ve yenilikler yaşanmıştır. Bu süreçte toplumda var olan hastalıkların niteliği yeniden şekillenmiştir. İlerleyen yıllarda bulaşıcı olan hastalıkların yerini bulaşıcı olmayan hastalıklar almıştır. Bulaşıcı olmayan hastalıklar daha çok savunmasız grupta yer alan yaşlı bireyleri etkilemiştir (WHO, 2014). Artan yaşın beraberinde getirdiği yük ve eşlik eden kronik hastalıkların varlığı yaşlı bireylerin tedavi sürecinde daha fazla reçeteye maruz kalmalarına ve ilaç alımının artmasına neden olmuştur. İlaç tüketiminin Dünya Sağlık Örgütü (DSÖ) kriterlerine göre beş ya da daha fazla farklı reçeteli ilacın eş zamanlı kullanımı polifarmasi olarak tanımlanmıştır (WHO, 2004; Wang ve diğerleri, 2015). Yaşlı bireylerde ilaca bağlı zarar küresel çapta en önemli halk sağlığı sorunlarından biridir. Polifarmasi yaşlı yetişkinler için önemli bir endişe kaynağıdır ve ilerleyen süreçte ortaya çıkabilecek birçok olumsuz sağlık sonuçlarıyla ilişkilidir (Patterson ve diğerleri, 2014).

1. Yaşlı Birey ve Polifarmasi

Polifarmasi potansiyel olarak uygunsuz ilaçların kullanımı ve/veya reçeteli ve reçetesiz ilaçlar da dahil olmak üzere birden fazla ilacın eş zamanlı kullanımı olarak çeşitli şekillerde tanımlanan geriatrik bir sendromdur (Wongpakaran ve diğerleri, 2018). Yaşlı nüfustaki demografik hareketliliğin ilerleyen yaşla birlikte görülme sıklığı artan kronik hastalıklarla (hipertansiyon, diyabet, artrit, kronik kalp hastalığı, böbrek hastalığı) ilişkilendirilmesi küresel çapta sağlık otoriteleri için zorlu bir sürecin yönetilmesine neden olmuştur (Dagli ve Sharma, 2014). Aşırı ilaca maruz kalma, istenmeyen ilaç kullanımı ve ilaç miktarının fazlalığı savunmasız grupta yer alan yaşlı bireyleri etkilemeye devam etmektedir (O'Dwyer, Peklar, McCallion, McCarron ve Henman, 2016). Çoklu ilaç kullanımı yaşlı yetişkinler için önemli bir endişe kaynağıdır. Eşlik eden hastalıkları önlemek ve tedavi etmek için birden fazla ilaç kullanmak yaşlı erişkinlerde çok yaygındır ve potansiyel olarak çoklu ilaç kullanımına yol açmaktadır. Polifarmasi, bilişsel bozukluk, deliryum, düşme, kırılganlık, idrar kaçırma ve kilo kaybı gibi geriatrik sendromların gelişimi ile ilişkilidir (Kitaw ve Haile, 2023). Polifarmasi sürecinde ilaçlara klinik olarak endikasyon varsa daha düşük ilaç dozuyla başlanmalı ve gerektiğinde doz artırımı yapılmalıdır. Günde bir veya iki kez verilebilecek ilaçların, günde üç kez verilen ilaçlara göre daha fazla tercih edilmesi gerekir. Farmakoterapi sürecinde sorun çıkarabilme ihtimali olan ilaçların kesilmesinin gerektiği ifade edilmiştir (Dagli ve Sharma, 2014) Polifarmasi ile fiziksel sağlık, morbidite ve mortalite arasında kaçınılmaz bir etkileşimin var olduğu belirtilmiştir (Wongpakaran ve diğerleri, 2018).

Yöntem

1. Amaç

Yaşlı bireyler ve polifarmasi arasındaki ilişki düzeyinin değerlendirilmesi.

2. Arama Stratejisi

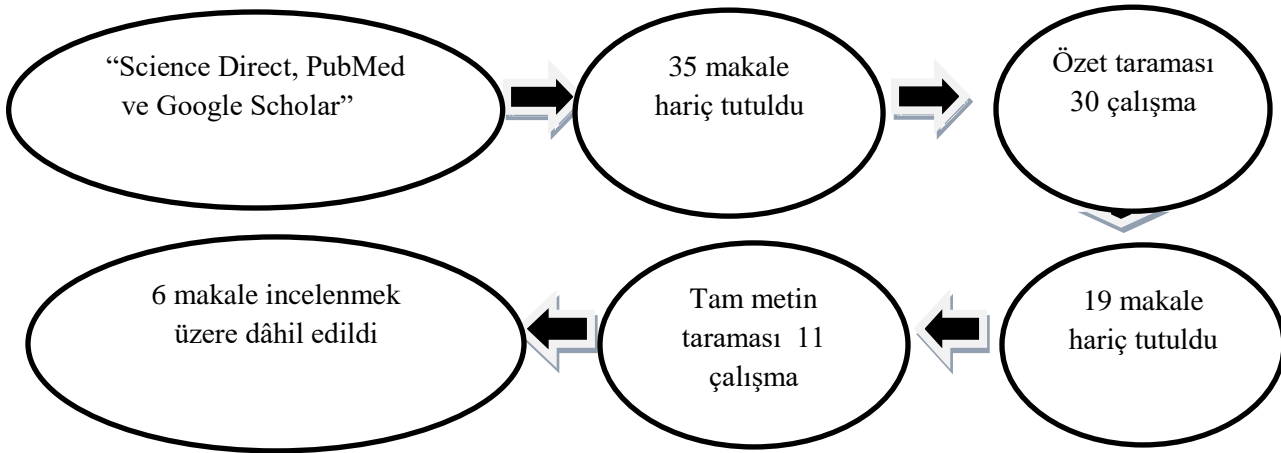
Araştırma konusu ile ilgili çalışmalara yönelik olarak elektronik veri tabanlarında arama yapılmıştır. Literatür taraması için kullanılan birincil veri tabanları “PubMed, Google Scholar ve ScienceDirect” dir. Anahtar kelimeler, "yaşlı birey", "polifarmasi", "yaşlı birey ve polifarmasi", dir.

3. Dâhil Edilme ve Dışlama Kriterleri

Araştırma amacına yönelik olarak yaşlı birey ve polifarmasi sürecinin değerlendirilmesini amaçlayan 2015-2023 tarihleri arasında kapsayan hakemli ve uluslararası yayınlanan makaleler incelenmeye alındı. Yaşlı birey ve polifarmasi sürecinin değerlendirilmesini ölçmeyen makaleler inceleme dışı bırakıldı.

4. Arama Sonuçları

İlk arama sürecinde 65 yayına ulaşıldı. Yayınların başlık ve özetleri incelendikten sonra 35 makalenin çalışmanın hedefleriyle hiçbir ilgisinin olmadığı tespit edildi. Sayı 30'e düştü. Kalan makalelerin tam metin okuması sağlanarak araştırma için uygun görülen altı (6) çalışma ile araştırma sonuçlandı. Araştırma ile ilgili yayınları belirlemek için izlenen süreç Şekil 1'de gösterilmiştir.



Şekil 1. Derlemedeki referansları belirlemek için kullanılan sürecin akış diyagramı

5. Veri Sentezi

Kullanılan ölççeklerin çeşitliliği, örneklem çeşitliliği ve veri toplama yöntemindeki varyanslar nedeniyle verilerin meta-analizi yapılamamıştır. Veri analizleri tematik bir analiz tekniği izlenerek değerlendirilmiştir

(Thomas ve Harden, 2008).Veri çıkarımı arařtırmacı tarafından gerekleřtirilmiřtir. alıřmalardan elde edilen veriler tabloda; yazarlar/yıl, lke, rneklem sayısı, arařtırma amacı ve bulgular řeklinde sıralanmıřtır. alıřmalar yayın yıllarına gre tabloda dzenlenerek sıralanmıřtır.

Bulgular

Bu derlemenin bulgularında, yařlı bireyler ve polifarmasi arasındaki iliřki dzeyinin deęerlendirilerek rapor edildi. İncelenen makalelerin zeti Tablo 1'de sıralanmıřtır. alıřmalar; in (Wang ve dięerleri, 2015), Kba (De Almeida ve dięerleri, 2017), ABD (Schenker ve dięerleri, 2019), Kore (Chang ve dięerleri, 2020), Suudi Arabistan (Aljawadi ve dięerleri, 2022) ve İsrail'de (Orenstein, Chetrit, Goldman, Novikov ve Dankner, 2023) gerekleřtirilmiřtir.

Tablo 1. Yařlı bireyler ve polifarmasiye iliřkin arařtırmalar

Yazar	lke	N	Ama	nemli Bulgular
Wang ve dię. (2015)	in	1562	Polifarmasinin ≥ 80 yař ve st hastalar arasında klinik etkilerini belirlemek	*Yařlı hastalarda polifarmasinin yaygın olduęu (≥ 6 ila) prevalansı %70 *Artan ila sayısı; - advers ila reaksiyonları, - dřme, sakatlık ve mortalite iin risk
De Almeida ve dię. (2017)	Kba	573	Yařlı bireyler arasında polifarmasinin yaygınlıęı ve bununla iliřkili faktrleri doęrulamak	*Polifarmasi yaygınlıęı %10,30 *İlacı eriřimde maddi zorluk eken bireylerde polifarmasi varlıęı daha fazla *Dolařım, endokrin sistem ile beslenme ve metabolik hastalıkları olanlarda polifarmasi varlıęı daha fazla *Bir bařka bireyle veya aile yeleriyle birlikte yařama durumu polifarmasi ile anlamlı
Schenker ve dię. (2019)	ABD	372	İleri, yařamı sınırlayan hastalıęı olan bireylerde polifarmasi, semptom yk ve yařam kalitesi arasındaki iliřkiyi deęerlendirmek	*Yařamı sınırlayan hastalıęı olan eriřkinlerde polifarmasinin daha yksek semptom yk ve daha kt yařam kalitesi ile iliřkili olduęu *Katılımcıların sadece %3'nde 4'den az ila alımı var. *Yksek semptomlar polifarmasi ile iliřkili *Daha dřk toplam yařam kalitesi seviyesi yksek polifarmasi ile iliřkili

Tablo 1. Yaşlı bireyler ve polifarmasiye ilişkin araştırmalar (devamı)

Yazar	Ülke	N	Amaç	Önemli Bulgular
Chang ve diğ. (2020)	Kore	3.007 620	Polifarmasi ile hastaneye yatış ve ölüm riski arasındaki ilişkiyi incelemek	* Polifarmasi yaygınlığı %46,6 *Polifarmasi hastaneye daha fazla yatış ve ölüm riskiyle ilişkili olduğu bulunmuştur
Aljawadi ve diğ. (2022)	Suudi Arabistan	2946	Yaşlı yetişkinlerde ilaç kullanımını, polifarmasi prevalansını ve bununla ilişkili faktörleri tanımlamak	* Polifarmasi yaygınlığı %51,5 *Bölgeler arası polifarmasi düzeyinde farklılık *Güney ve kuzey bölgelerin polifarmasiye sahip olma olasılığı daha düşük * Düşük gelirlilere kıyasla yüksek gelirli olanların polifarmasiye sahip olma olasılığı daha yüksek *Şiddetli bilişsel bozukluk daha düşük polifarmasi riski ile ilişkiliydi
Orenstein ve diğ. (2023)	İsrail	1210	Yaşlı yetişkinler arasında polifarmasinin 20 yıllık mortalite ile genel ve cinsiyete özgü ilişkisinin incelenmesi	* Polifarmasi yaygınlığı %38,3 *Polifarmasi yaşlı kadınlarda erkeklere oranla daha yaygın *Hareketsiz yaşam tarzında polifarmasi riski daha fazla *Polifarmasi sadece kadınlarda mortalite ile ilişkili

Tartışma

Sağlık hizmetlerinde ortaya çıkan değişim ve dönüşüm süreci ile küresel çapta meydana gelen nüfus artışından yaşlı bireylerde etkilenmiştir. Artan yaşın getirdiği yük ve eşlik eden hastalıkların çeşitliliği tedavi aşamasında fazla miktarda ilaç kullanımına yol açmıştır. Elde edilen çalışma bulguları da yaşlı bireylerde polifarmasi prevalansının yaşlı bireylerde yüksek olduğunu ortaya çıkarmıştır. Polifarmasi sosyodemografik özellikler başta olmak üzere fiziksel, ruhsal ve sosyal bakımdan birçok değişken tarafından etkilenen bir süreçtir.

Polifarmasi son yıllarda ilaç tüketiminin artmasıyla birlikte geriatride ilginin arttığı bir sorundur. Artan yaşla birlikte kullanılan ilaç sayısı ve polifarmasi prevalansı artış gösterir (Wang ve diğerleri, 2015).

Polifarmasi ve aşırı polifarmasi ile ilgili faktörleri incelemek amacıyla yapılan bir çalışmada yatılı bir kurumda yaşama, bilişsel fonksiyonlarda bozukluk, nörolojik veya endokrinolojik bir rahatsızlık ile hipertansiyon

hastalığına sahip olmanın polifarmasi ve aşırı polifarmasiye maruz kalma ile ilişkili olduğu ifade edilmiştir (O'Dwyer ve diğerleri, 2016). Yaşlı yetişkinlerin üçte birinden fazlası aynı anda beş veya daha fazla ilaç kullanmaktadır. Bu nedenle akılcı geriatrik farmakoterapiye odaklanan müdahale yöntemlerinin uygulanması gereksiz ilaç yükünün, advers ilaç olaylarının, tıbbi maliyetlerin, geriatrik morbidite ve mortalitenin oranlarının azaltılması bakımından önemlidir (Kitaw ve Haile, 2023).

Yaşlı hastalarda polifarmasi ilaç rejimlerinin görülme sıklığını ve yan etkilerini azaltmak için aylık olarak değerlendirilmelerinin yapılmasının gerekliliği ve eğer tedavide mümkünse birden fazla ilaç yerine tek bir ilacı yazmanın önemli olduğu ifade edilmiştir. İlgili hekim tarafından farklı sağı hizmeti sağlayıcıları tarafından reçete edilen gereksiz ilaçlar belirlenmeli ve ortadan kaldırılmalıdır. Daha güvenli ilaçların daha yüksek riskli ilaçlarla yer değiştirmesi gerektiği belirtilmiştir (Dagli ve Sharma, 2014). Yaşlı bireylerde polifarmasinin belirleyicilerine yönelik yapılan çalışmada, hipertansiyon, anksiyete bozukluğu, hastalık sayısı, depresif bozukluk, diyabet ve dislipidemi gibi hastalıkların polifarmasinin belirleyicileri olduğu ifade edilmiştir. Çalışmada ek ilaca başlamadan önce endikasyonun açıkça belirtilmesinin gerektiği vurgulanmıştır (Wongpakaran, ve diğerleri, 2018). Yaşlı popülasyonda polifarmasiyi önleyecek stratejilerin belirlenmesi, mantıklı ve uygun reçeteleme sitemlerinin acilen uygulanmasının gerekli olduğu vurgulanmıştır (Chang ve diğerleri, 2020). Kore'de yaşlı bireyler üzerinde yapılan bir çalışmada, yaşlı bireylerin %86,4'ünde polifarmasi, %44,9'unda majör polifarmasi ve %3,0'ında aşırı polifarmasi varlığının olduğu tespit edilmiştir. Çalışmada polifarmasi varlığı ile düşük gelir düzeyi arasında anlamlı bir ilişkinin olduğu da ayrıca ifade edilmiştir (Kim, Shin, Kim ve Park, 2014).

Sonuç

Teknolojik gelişmelere bağlı ortaya çıkan değişim sürecinden diğer bireyler gibi yaşlı yetişkinlerde etkilenmişlerdir. Yaşlı nüfus artışı ve artan yaşın getirdiği yük kronik hastalıkların görülme sıklığını arttırmıştır. Bulaşıcı olmayan hastalıkların sayısındaki artış tedavi sürecinde fazla miktarda ilacın kullanılmasına yol açmıştır. 5 veya daha fazla ilacın kullanılması olarak tanımlanan polifarmasi sürecinde etkin bir mücadele edilebilmesi için mevcut ilaçların bir program dahilinde akılcı ilaç kullanımı ile alınmaları sağlanmalıdır. İlaç kullanımında bireylere özgü bir plan ve program düzenlenerek sürdürülmelidir. Sürecin olumsuz ilerlemesine neden olan bireysel sorunların tespit edilerek çözümünün sağlanması için ilgili kurum/kişiler tarafından gerekli girişimlerde bulunulması gerekir. Yaşlı popülasyonda etkin bir farmakoterapi sürecini sağlamak gelecek dönemlerde toplumda farkındalığın artırılması ve hastalıklarla etkin bir mücadelenin sürdürülmesi bakımından oldukça değerlidir. Polifarmasinin belirlenmesi ve önlenmesi, yaşlı hastalarda daha iyi sonuçlara yol açabilir ve



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aynı zamanda yaşam kalitesinin iyileştirilmesine de yardımcı olabilir. Yaşlı hastalarda polifarmasinin neden olabileceği olumsuz etkilerden kaçınmak için farmakoterapik incelemeye gereken önem verilmelidir.

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METHODOLOGY OF TEACHING THE ART OF FOREIGN COUNTRIES IN THE SUBJECT OF FINE ARTS TO INCLUSIVE STUDENTS OF CLASS VIII

VIII SINIF INKLÜZİV ŞAĞIRDLƏRƏ TƏSVİRİ SƏNƏT FƏNNİNDƏ XARICI ÖLKƏLƏRİN INCƏSƏNƏTİNİN TƏDRİSİ METODİKASI

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Abstract

One of the main directions of development of modern world education is programs with inclusive students. One of the tasks of the teacher in teaching fine arts in secondary schools is the assignments with inclusive students. Various theoretical and experimental tasks occupy an important place in the methodology of teaching the art of foreign countries to eighth class inclusive students.

Keywords: fine art, education, inclusive, foreign country, methodology

Müasir dünya təhsilinin əsas inkişaf istiqamətlərindən biri inklüziv şagirdlərlə olan proqramlardır. Orta məktəblərdə təsviri sənət fənninin tədrisində müəllimin vəzifələrindən biri inklüziv şagirdlərlə olan tapşırıqlardır. VIII sinif inklüziv şagirdlərə xarici ölkələrin incəsənətinin tədrisi metodikasında müxtəlif nəzəri və təcrübi tapşırıqlar mühüm yer tutur.

“Təsviri sənətdə batal və tarixi janrlar” mövzusunda inklüziv şagirdlər təqdim edilən əsərləri janrlar üzrə qruplaşdırırlar. Daha sonra isə “Zəfər” mövzusunda şagirdlər albomda rəsm əsəri çəkərək tarixi janrın əsas xüsusiyyətlərini izah etməlidir.



İLL 1.S.Şərifzadə, M.Abdullayev, B.Mirzəzadə “Babəkin yürüşü”

VIII sinif inklüziv şagirdləri “Fransisko Qoyya:rəssamın rəng dünyasına həyat hadisələrinin təsiri” mövzusunda tanınmış ispaniyalı rəssamın “Kral IV Karlın ailəsi” əsərini rəngləyir. Daha sonra “Müharibə fəlakətləri” ofort silsiləsi üzərində müəyyən təhlillər edərək tapşırıqlar yerinə yetirilir.



İLL 2. Fransisko Qoyya “Kral IV Karlın ailəsi”

“Jak Lui David:tarixi obrazlar” mövzusunda VIII sinif inklüziv şagirdləri məşhur fransız rəssamın Nopaleon Bonapartın portretini istədiyi rənglər və çalarları ilə tamamlaya bilirlər. Inklüziv şagirdlərə həmçinin tarix fənnindən Bonapart barəsində bildiyi bilikləri danışmağı da soruşmaq olar.



İLL 3. Jak Lui David “Napoleon Bonapart”

VIII sinif inklüziv şagirdləri “Jan Ogüst Dominik Enqr:xətt incəsənəti” mövzusunda daha çox xətlər vasitəsilə kompozisiyanı işləməlidirlər. Daha sonra isə bu mövzuda Dominik Enqr yaradıcılığını qrafik və rəngkarlıq əsərləri üzrə qruplaşdıraraq müəyyən fikirlər söyləməlidirlər.

“Ejen Delakrua:rəng kontrastının dahi sənətkarı” mövzusunda inklüziv şagirdlər natürmort janrında işlədiyi əsərlərdə rəng kontrastlılığını düzgün formada təqdim etməlidir.

“İmpressionizm:təssüratların poeziyası” mövzusunda inklüziv şagirdlər tezis işləyərək öz fikirlərini bildirməlidirlər.”Oskar Klod Mone:işıq və rəng vurğunluğu” mövzusunda inklüziv şagirdlər rəssamın əsərlərində obyektlər üzərində işıq-kölgəni göstərmək və rəssamın onları günün hansı vaxtında təsvir etdiyini izah etməlidirlər. VIII sinif inklüziv şagirdləri ”Eduard Mane:impressionizmdə natürmort” mətnini oxuyub təhlil edə bilirlər.



İLL 4. Eduard Mane “Yasəmən dəstəsi”

“Ogüst Renuar:İşığa yeni baxış” mövzusunda inklüziv şagirdlər məişət janrında rəsmlər işləməlidir. “Ogüst Roden:heykəltəraşlıqda hərəkət və emosiya” mövzusunda VIII sinif inklüziv şagirdləri Rodenin heykəllərini təhlil edərək tezislər işləyə bilirlər. “Vinsent Van Qoq:rəng, xətt və formaların emosional təsiri” mövzusunda günəbaxanlar çəkib rəngləyib və ya applikasiya texnikasından istifadə edərək öz fikirlərini təqdim edə bilirlər.



İLL 5. Vinsent Van Qoq “On beş günəbaxan ilə güldən”

VIII sinif inklüziv şagirləri “Pol Qogen:rəng və xətlərin sadələşdirilməsi. Simvolizm” mövzusunda məşhur rəssamların əsərlərində simvolları taparaq mənalarını izah etməlidir. “Anri Matis:rəngkarlıqda dekorativlik, forma və rəng” mövzusunda inklüziv şagirdlər deкупaj tenikasından istifadə edərək Matissin əsərlərini hazır eskizlər üzərində yapışdırma bilərlər.

Müəllim VIII sinif inklüziv şagirdlərə təsviri sənət fənnində xarici ölkələrin incəsənəti mövzularını tədris edərkən müxtəlif tapşırıqlarla bu qrupdan olan şagirdləri dərəcə cəlb etməlidir.

ƏDƏBİYYAT SİYAHISI:

1.VIII sinif təsviri incəsənət metodik vəsait. Bakı 2019. 96 s



FROM THE RESEARCH HISTORY OF THE PHRASEOLOGY OF THE OGHUZ GROUP OF TURKIC LANGUAGES

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Özet

In Azerbaijani linguistics, since the 70s of the 20th century, the study of Turkic languages has expanded, as a result, a number of important research works have been published. The publications of F.Zeynalov's "Comparative grammar of Turkish languages" (in 2 volumes), books on the phonetics, morphology and syntax of the Oghuz group of Turkic languages of the Nasimi Institute of Linguistics of AMEA should be considered as the first steps in this field. In the last 10 years, the issues of lexicology of the Oghuz group of Turkic languages, the theoretical problems of the phraseology of these languages have been turned into the object of scientific research and published and presented to the scientific community. So far, the phraseological units of the Azerbaijani language have been studied in a comparative way with the languages belonging to the Indo-European language family, in particular, with English, Russian, and German languages. With the exception of M. Mirzaliyeva's work "Theoretical problems of the phraseology of the Turkic languages of the Oghuz group", the phraseological fund of the Turkic languages has not been studied in comparison with the Azerbaijani language until now. The phraseology of the Turkmen language, one of the Turkic languages of the Oghuz group, was widely studied in the 20th century. K. Babayev conducted a structural-semantic analysis of phraseological units in the Turkmen language. M.Abdurakhmanova studied phraseological units with many components in this language and discovered very interesting facts. Phraseological units of the Turkmen language have also become the object of research from a lexicographic point of view. Phraseological units have been studied mostly in comparison with English and Russian languages. Phraseological units used in the works of Turkmen writers have also been the subject of research by scientists. Turkmen linguists R. Kh. Annayeva and K. M. Musayev studied the phraseological units in the Turkic languages diachronically.

Apparently, the Turkic languages of the Oghuz group have been comparatively studied to some extent. However, today the study of Turkic languages specific to other groups has become a necessity, and the historical-comparative study of Turkic languages has become a leading direction for Azerbaijani linguists. From this point of view, the necessity of comparative study of the phraseology of the Turkic languages of the Kipchak and Oghuz groups has come to light.



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N.M. Shansky writes: "Phraseology is a field of science that studies the phraseological system and its historical development in modern conditions." V. N. Teliya shows that "Phraseology is a science that deals with the expression of current ideas."

Keywords: Azerbaijani language, Turkic languages, Oghuz group, phraseology, research



GÖZƏLLİK, LƏYAQƏT, İNCƏLİK RƏMZİ-AZƏRBAYCAN KƏLAĞAYISI

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Abstract

Kalagayilar has always added a special mystery and enigma to the unique beauty of Azerbaijani women, who are always flirtatious and cheerful. The shy and timid looks, smiles, and beauty features of a woman's face, which poets and lovers sing with pride, are hidden in Kalagayi. A type of women's headdress - kalaya is woven from delicate fibers and threads, differs in material and size. In the past, omperkas made on weaving looms were of different types and colors depending on the age difference and caste affiliation. In the Middle Ages, pancakes produced in Azerbaijan were sold to foreign countries.

Keywords: Kalagayi, decorative-applied art, Azerbaijan, color

Kəlağayı — Azərbaycanca qadınlara məxsus, ipək sapdan toxunmuş dördkünc formalı baş örtüyüdür. Azərbaycanın qərb zonasında kəlağayıya bəzən *çarqat* da deyilir. Kəlağayı istehsalı Azərbaycanda qədimdən məlumdur. Qadınların müasir kəlağayılara bənzər baş örtüyündən istifadəsi eramızdan əvvəl V-VI əsrlərdə İran şahı I Daranın zamanında saray qadınları arasında geniş yayıldığı barədə bəzi mənbələrdə qeyd olunub. X əsrdə yazılan Hüdud əl-ələm coğrafi traktatında, Bərzənd şəhərində baş örtüyünün istehsal olunduğu qeyd edilib. Orta əsrlərdə Azərbaycan ərazilərində kəlağayı istehsal edən kiçik müəssisələr mövcud olub. Tarixçi Mais Cəfərovun fikrincə, kəlağayılar əvvəllər fərdi şəkildə hazırlansa da, sonralar kəlağayı istehsal edən xüsusi müəssisələr fəaliyyət göstərmiş. XIX əsrin sonu – XX əsrin əvvəllərində Azərbaycanın ənənəvi kəlağayıçılıq mərkəzləri müxtəlif siyasi və sosial-iqtisadi səbəblər üzündən, xüsusilə də Rusiyadan daxil olan ucuz fabrik mallarının kустar karxana məhsullarını sıxışdırması nəticəsində mövqeyini dəyişmiş və kəlağayıçılıq tədricən yalnız iki mərkəzdə – Basqal qəsəbəsi və Şəkiddə cəmləşməyə başlamış. 2014-cü ildə kəlağayı UNESCO-nun Qeyri-maddi mədəni irsinin Repräsentativ Siyahısına daxil edilmişdir.



Kəlağaylar hər zaman naz-qəməzli, şux yerişli Azərbaycan qadınlarının bənzərsiz gözəlliyinə xüsusi bir sirr, müəmma qatıb. Kəlağaylarda şairlərin, aşıqların fəxrlə tərənnüm etdikləri utancaq və ürkək baxışlar, təbəssümlər, qadın simasının gözəllik cizgiləri gizlənilib. Qadın baş geyim növü – kəlayağı zərif lif və iplərdən toxunur, materialına və ölçüsünə görə fərqlənir. Əvvəllər toxuculuq dəzgahlarında hazırlanan örpəklər yaş fərqi və zümrə mənsubiyyətinə görə müxtəlif çeşid və rənglərdə olurdu. Orta əsrlərdə Azərbaycanda istehsal edilən örpəklər xarici ölkələrə satılırdı.



Milli xüsusiyyətlərimizin əsas daşıyıcılarından biri olan kələğayımızdan uzaqlaşmağa, ona biganə yanaşmağa haqqımız yoxdur. Çünki onda nənələrimizin nəfəsi, doğmalığ hərərəti var. Məhz buna görə də kələğayımız var olduqca bu nəfəs də duyulacaq, ruhumuz qidalanacaqdır. XX əsrin əvvəllərində örpək kütləvi surətdə məişətə daxil olmuşdur. Azərbaycanda istifadə olunan örpəklərin çoxlu məhəlli-lokal növləri vardır. Belə ki, Şirvanda belə örpəklərin “sərəndaz”, “naz-nazı”, “qaz-qazı”, “bələlə”, “xaralı”, “alafa”, “bənərə”; Lənkəran-Astara bölgəsində “Qaragilə”, “Paxlava”, “Yusif-Züleyxa”, “Zəkiyyə”; Şəki-Zaqatalada “gülbəndi”; Quba-Xaçmazda “Zəkəriyyə”, Naxçıvanda isə “Toksin”, “Zərli örpək”, “Baftalı örpək”, “Bağdatı örpək” kimi növləri geniş istifadədə olmuşdur. Örpək Gürcüstandakı azərbaycanlılar arasında da dəbdə olan baş örtüyü idi. Türkiyədə ümumi adı “baş örtüyü” olsa da, qadınlar örpəyin “yazma”, “böyük bəyaz”, “çevrə” və “çar” kimi növlərini geyim dəstlərinə daxil etmişdilər. Eyni zamanda Basqal kələğayılərəna nəzər salsaq görərik ki, onların özünəməxsus bir neçə xüsusiyyəti var. Bu kələğayılarda yurdumuzun təbii gözəllikləri ilə bərabər, xalq məişətinin bir çox xüsusiyyətləri, milli-mənəvi dünyamızla bağlı mərasim və hadisələri, xalq sənətinin müxtəlif sahələrini təcəssüm etdirən naxış və ornamentlər də öz əksini tapıb: “Yeddi rəng” (ispiray), “Heyratı”, “Bəstəniqar”, “Gəlinlik” (qıraqları yaşıl, ortası qırmızı), “Noxudu”, “Mixəyi”, “Yaşıl-qara”, “Yemişani”, “Zeytuni”, “Ağzəminzanbağı”, “Ağzəmin-qızılı”, “Qızılı” və s. adda kələğayılərin hər biri əslində bir dastan, bir nağıl, bir nəğmədir. Müxtəlif zoomorf, həndəsi və nəbati naxışlarla zəngin olan bu kələğayılərin hər birinin adının və naxışlarının fəlsəfəsi, təyinatı, xalq məişətində özünəməxsus yeri var. Yeri gəlmişkən onu da qeyd

edək ki, XIX əsrdə və XX əsrin əvvəllərində Basqalda Usta Hacı Həmid Talıb oğlu, Kərbəlayi Abdullxaliq Əşrəf oğlu, toxucu Əliabbas Cəbrayıl kimi çox məşhur basmanaxış ustaları fəaliyyət göstərmişlər.



Kəlağayının naxışlanması prosesi bir neçə mərhələdən keçirdi. Əvvəlcə kəlağayının boyanı yaxşı götürməsinə təmin etmək məqsədilə onu qəlyadaşından hazırlanmış “sirab” adlanan məhlulda bişirirdilər. Çünki kəlağayı boyaqxanaya 20 daxil olana qədər uzun istehsal prosesindən keçsə də, onun üzərində selikli yapışqan təbəqəsi hələ də qalırdı və bu da boyama prosesində məmulatın rəngi tam götürməsinə mane olurdu. Buna görə də məmulat tiyanda hazırlanmış məhlulda (sirabda) bişirilib yapışqan təbəqəsindən azad olduqdan sonra sərilib qurudulur, bundan sonra boyama prosesi üçün hazır hesab olunurdu. Kəlağayı üzərindəki naxışlar əsas qruplara ayrılırdı: kəlağayının qıraqları boyunca vurulan və haşiyə əmələ gətirən şəkillər; küncələrə və ortaya vurulan təsvirlər. Bu təsvirlər və ya naxışlar arasında “buta”nın həmişə özünəməxsus yeri olub.



Buta Azərbaycan ornament sənətində ən çox yayılmış bəzək elementlərindən biridir. **Buta** – qönçə, badamabənzər naxış növüdür. Butalar forma etibarlı ilə 4 qrupa bölünür:

Xalça bəzəyində işlədilən butalar ("Muğan-buta", "Salyan-buta", "Xilə-buta", "Bakı-buta", "Sarabi-buta", "Gəncə-buta", "Şirvan-buta");

Ailə həyatını təmsil edən butalar ("bala-buta", "həmlı-buta", "balalı-buta", "evli-buta", "qoşaarvadlı-buta" və s.);

Rəmzi mahiyyət daşıyan butalar ("cıqqa-buta", "lələk-buta", "küsülü-buta", "qovuşan-buta", "yazılı-buta" və s.);

Bu qrupa müxtəlif formalı butalar daxildir: "saya-buta", "əyri-buta", "dilikli-buta", "qıvrım-buta", "şabalıd-buta", "zərxara-buta", "badamı-buta", "qotazlı-buta", "çiçəkli-buta", "yanar-buta" və s. Rəmzi məna daşıyan butalar zaman keçdikcə tədricən müxtəlif məzmunlu və formalı motivlərlə zənginləşmişdir.

Hər bölgəmizin kəlağayısı digərindən əsasən haşiyəsindəki ornamentlərə görə fərqlənir. Şəki və Başqal kəlağayıları içərisində "Şah buta", "Saya buta", və "Xırda buta" çeşnilərindən daha çox istifadə olunur. "Heyratı", "Soğanı", "İstiotu", "Albuxarı", "Abi", "Yeləni", adlı əlvan kəlağayılar da vaxtı ilə Yaxın Şərqi və Qafqaz xalqları arasında böyük şöhrət qazanmışdı. Kəlağayılarımız Azərbaycan qadınlarına bənzərsiz gözəlliyinə xüsusi bir siri, müəmma qatmışdır.



Milli dəyərlərimizin qorunmasına yüksək diqqət və qayğı göstərilən ölkəmizdə kəlağayı sənətinin inkişafı da diqqət mərkəzindədir. Heydər Əliyev Fondunun çoxşaxəli fəaliyyəti nəticəsində kəlağayı sənətinin Azərbaycan xalqının milli-mənəvi dəyərlər sistemində və adət-ənənələrimizdə ən mühüm mədəniyyət nümunəsi olduğu beynəlxalq səviyyədə öz təsdiqini tapıb.



Bu gün Milli Kəlağayı Günüdür. Azərbaycanın qeyri-maddi mədəni irsi olan bu örtük gözəllik, incəlik, ləyaqət, ehtiram, sədaqət rəmzi olmaqla yanaşı, özündə Odlar Yurdu Azərbaycanın qədim tarixini, mədəniyyətini, adət-ənənələrini yaşadır. Birinci vitse-prezident Mehriban Əliyevanın himayəsi ilə 2014-cü ildə Azərbaycanın "Kəlağayı simvolizmi və ənənəvi sənəti" faylı UNESCO-nun Qeyri-maddi mədəni irsi üzrə representativ siyahısına daxil edilib. Milli dəyərlərimizi gənc nəsliyə aşılamaq, onlarda qeyri-maddi mənəvi sərvətlərimizə qarşı sevgi oymaq məqsədi ilə Kəlağayı Günü haqqında maarifləndirmə işləri aparırıq.



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**THE EFFICACY, DEPLOYMENT AND USE OF AUGMENTED REALITY IN LEARNING FIELDS:
AN EXPLICIT STUDY ON REVOLUTIONIZING DEVELOPMENTS IN EDUCATION SECTOR**

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Abstract

The evoking of computing technology and its incorporation into life-long learning fields has immensely brought spontaneous developments into modern day education system. Augmented Reality (AR) is the trending technology where the Real World (RW) is simulated by computer-generated content in order to correlate specific activities at specific locations. According to Billinghurst (2019), augmented reality (AR) is defined as an interactive experience where physical objects are simulated by computer-generated perception across multiple sensory modalities that include visual, auditory, haptic (skin), somato (warmth) sensory and olfactory. In education system, AR applications are increasingly becoming the order, often to help students to comprehend better in complicated subjects. This paper is a content survey of Augmented Reality. The paper examines the applications of AR and its impacts on educational management. In order to enhance the discussion on this paper, online Google form questionnaire instrument was used to collect relevant data from respondents. The responses gathered were subjected to reliability analysis. In conclusion, recommendations were made.

Keyword: Technology, Augmented Reality, Learning Fields, Education Sector.



THE ISSUE OF STRUCTURAL-SEMANTIC AND COMMUNICATIVE ORGANIZATION OF THE TEXT IN LINGUISTICS

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Key words: text, linguistic, structure, semantic, communicative, component, relation, sentence, organize

Anahtar kelimeler: metin, dilsel, yapı, anlamsal, iletişimsel, bileşen, ilişki, cümle, düzenleme

In general, the topic of text in linguistics is one of the controversial topics and is of interest in various aspects. At the same time, there are still no special studies that can describe the entire volume of logical-syntactic means of communication between the components of the text.

It is known that the main feature of each text is characterized by logical and syntactic connection of its content and meaning. The connection of the text, the connection of the elements that make up the sentence, the connection of the latter to a single limit, and the formal connection of highly phrasal compounds, which are both meaningful and formal, are carried out in the sentence by various syntactic and stylistic means.

In modern linguistics, the manifestation of text-speech activity is characterized as a method of providing information in the description of the thinking process. However, every expression of thought, every piece of information is realized by the laws of subordination in the construction of the language and, first of all, in the communicative membership of language units. In the study of the text from the linguistic point of view, first of all, as minimal language units, the linguistic and communicative structure of the sentence, then the meta-phrase units as the expressor of the complex structure of the thought, and finally the study of the text as a whole are in the focus. In the scientific research work, it is intended to study the structural-semantic relations of the components of the text and to interpret the communicative organization of the text. Therefore, first of all, it is necessary to learn the opinions of different linguists about the structure of meaning of the text, compare them and determine the description principles of the research. It is important to study the text as a fact of language and speech, to determine its boundaries. The analysis of the semantic and syntactic structure of the text creates conditions for characterizing the function of the complex syntactic whole, which is its unit. The text is created from the interrelationship of a number of components, sentences built in a certain way. The text includes sentences with different structures, and these syntactic units with different structures dissolve in their own structural-semantic boundaries when they are included in the composition of the text (they perform the function

of components of the text). Microtext is divided into two main types according to the number of components in its composition: 1) two-component text and 2) multi-component text.

Although the sentence, which is the main unit of communication, expresses a finished idea, the exhaustion of the idea expressed by it is relative in nature. A sentence can fully reveal its structural-semantic features in the context of the surrounding sentences. A coherent unity of sentences around a certain idea leads to the creation of a text.

There are fundamental regularities in the creation of the text. The mechanism of text organization, construction technique is related to semantic progression in successive sentences. A comprehensive study of regularities in this area helps to solve a number of language problems, reveals the functional importance of language in more detail. (1, 93)

Text is a group of sentences with strong internal structural-semantic relations. The word text, as a linguistic term, is understood in various senses. Thus, the development of the linguistic theory of the text is one of the general directions of the development of modern linguistics, and text theories are necessary to build a model of the communicative process. There are three types of information transmitted in the text during communicative activity: cognitive, language and communicative.

Cognitive information is knowledge about the world obtained as a result of human activity and expressed in a social form with sign systems. The field of interest is how cognitive information is imagined by a person, transformed into knowledge and its effect on behavior. Cognitive information, first of all, is related to the content of knowledge, it is free from the subjective influence of the sender of the text, and therefore it is useful for effective practical activity.

Language information is information about the world in language units. This information is available in the referential, grammatical and practical units of those units. In language information, the main attention is directed from the content of knowledge to its form. Communicative information is information about the author's opinion expressed in the text, that is, it is not only information about non-linguistic objects in the mind of the text transmitter, but also his conscious personal assessment of the reflected event, as well as his feelings, emotions, etc. contains information about, that is, what the sender of the text considers important to make the subject of communication. The subject of communication or the subject of speech is a text unit that has the form of subjectivity in the dictionary sense. The names of the subject appear in the text in the identification function, which names concrete objects of objective reality, or in the classification function, keeping their generalized semantics. The content of the text is determined by how it is understood and interpreted by those participating in the act of communication. In other words, taking into account their own language and cognitive knowledge

as well as the circumstances in which the act of communication takes place, the issues related to what information they associate in this text come to the fore. (2, 123)

Language units considered in the communicative aspect are evaluated with the highest scale of values. In this case, the purely pragmatic factor prevails over others. Indeed, language as a whole and all its elements convey actual information through conditional signs serves to ensure the fulfillment of a certain social task, such as creating a connection between the members of the social collective through exchange. The analysis of language units in the communicative aspect brings to the fore only one criterion, that is, communicative efficiency. Although the text is not considered as a language unit, it is not an exception in this sense. Any realization of a language code can and should be evaluated in terms of communicative efficiency.

Paying special attention to the relationship between the text and the context, C. Lyonz notes: "Texts are constituent parts of the contexts of which they are products. Contexts, in their turn, are created by means of texts that are the creation of writers in certain situations and are constantly transformed" (5, 24).

N. Enqvist also emphasizes the connection of the text with the surrounding life: "To have meaning, it must exist within a certain real situation" (2, 36). The meaning of the text becomes relevant only due to the interaction of its explicit and implicit nuances with background knowledge. Thus, the regularities of text formation do not depend on strict rules, but on the communicative character of the text itself. In other words, the text is not a static unit, but manifests itself as a mobile communicative unit whose boundaries are determined by the appropriate communicative purpose. G. Kolshanski reviews the text from this point of view: "Currently, it is necessary to acknowledge the fact that, both in real function and in linguistic research, a relatively finished piece of communication during the initial communication act, which carries the cognitive, informational, psychological and social load of communication and has a certain it is a language unit structured and organized according to rules" (2, 89).

In our opinion, the analysis of the works devoted to this aspect shows that the definition given by the authors to the nature of the structural signs in the whole text is controversial. On the one hand, the whole text is considered as a syntactic unit higher than the sentence and different from it according to its characteristics, on the other hand, the structure of the whole text is essentially defined as a simple collection of interrelated sentences.

It can be thought that if the entire text is considered a syntactic unit with its own structure, then first of all, the specifics of that structure, which are characteristic of the entire text and distinguish it from the structure of the sentence as a unit of another level, should be shown. If this specific feature of the whole text is not revealed and determined, then it is not qualitatively a special whole text, but precisely different linguistic units-sentences among themselves. Type will appear as a speech stream connected by syntactic relations. The

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development of text linguistics, especially the fact that we carry out the act of communication through texts, as well as the ideas about the existence of a text consisting of a sentence, suggest the importance of considering the text itself as the next structural unit of the sentence.

An overview of the structure of the text. Some authors note its linear character and define the text as a linear sequence of sentences connected by various means and certain rules. Others emphasize that the text is organized only externally as a linear sequence of sentences and show that this feature is multidimensional. According to them, it is not enough to define the text only as a connected sequence of sentences. Undoubtedly, during the description of the mutual relationship of the components, it is possible to mention the relevant features of the text structure, but it is not shown here what are the necessary conditions for certain sentences to express a sequence of meaning, that is, to be perceived as a text. Such a comprehensive study of the structure of the text partially refutes the idea of the linear nature of the relationship in the text and allows us to conclude that the text is a complex multidimensional combination of interrelated factors and elements.

Observations show that the text consists of a number of parts with a certain set of structural features. In our opinion, the study of the sentence itself on the basis of its constituent parts allows to fully and comprehensively determine the functional-stylistic and compositional features, stylistic potential, and pragmatics of the text. This cannot be done based on the analysis of individual sentences, because their structure and characteristics cannot reveal the specificity of the text in different functional styles and the possibilities of using different stylistic tools within it. As a result, the analysis of the text is based on three main factors - structural (formal), semantic (content) and communicative (functional).



БАЛА ТӘРБИЕСІ - ҰЛТ БОЛАШАҒЫ.

Абдрашева Бану Жолдыбекқызы Е.А.Бөкетов атындаы Қарағанды университетінің қауымдасқан профессоры, әлеуметтану ғылымының кандидаты, Ә.Марғұлан атындағы Павлодар педагогикалық университетінің қауымдасқан профессоры, педагогика ғылымдарының кандидаты Жанар Манатбекқызы Байгожина

Мемлекет басшысы 2023 жылғы Қ.К.Тоқаетың Қазақстан халқына жолдауында: «Біз 2025 жылға дейін 800 мың баланың заманауи мектепте оқуына жағдай жасаймыз. Бұл ауыл және қала мектептерінің айырмашылығын едәуір азайтады және білімді және бірнеше тілді меңгерген ұрпақ болашаққа сеніммен қадам басады. Біздің күшіміз – жастардың білімінде...» деп, білімді негізге ала отырып көптеген мәселелердің шешу жолдарын айқындап берді.

Бала тәрбиесі және оның әлеуметтік мәселелерін шешу, педагогикалық кадрлардың дайындау жөніндегі ел Президентінің үлкен көңіл бөлуі, бұл ұлттық стратегиялық бағыт екендігін айқындайды.

Жалпы көптеген елдерде жас ұрпаққа білім берумен қатар, тәрбие беру мәселесі ауқымды, өзекті мәселе болып отыр.

Қазіргі қоғамдағы әлемдік жаһандану кезеңі адамзаттың барлық болмысын, санасын баулып жедел даму қарқынындауда, біз одан тыс қала алмаймыз, бұл - диалектикалық заңдылық. Дегенмен білім берудің сапасын жолға қою үшін, оған ұлттық рухы берік, ұлттық мәдени және рухани құндылықтармен тәрбиеленген, ізгілік пен кішіпейілділікпен сусындаған бала ғана ұтымды нәтиже бере алады.

Біздің ұлттық идея мен ұлт тәрбиесі айқын болмаған уақытта, табиғи болмысымыздың ассимиляцияға ұшырауы, я болмаса басқа ұлттың сана-сезімінің экспансиясына астарында қалу қаупі бар екенін ескеруіміз керек. Ұрпақтар арасындағы өзара қатынастың алшақтауы, адами жатсыну, рухани құндылықтан гөрі материалдық құндылықтардың басым болып отырғаны, сыртқы жат тәрбиенің белең алуының нәтижесі екенін мойындауымыз қажет.

Ғұлама, ойшыл әл-Фараби «тәрбиесіз берілген білім - адамзаттың қас жауы» деген нақыл сөзі, біздің негізгі қағидамыз болатындығын ұмытпағанымыз жөн. Баланың дамуы мен әлеуметтенуіне негіз болатын әлеуметтік институттардың функцияналдық құндылықтарын зерделегеніміз жөн.

Халықтың өсіп-өркендеуі, өркениеті ел болудағы тілі мен діні, дәстүр мен мәдениет құндылықтарын сақтап, дамытып отыруы қажет.

Аталып отырған ұлттық тәрбие мақсаты – ұлттық мәдени құндылықтар мен жалпыадамзаттық болып табылатын құрал ретінде өзара үйлесіп, көркейіп, еліміздің бүгіні мен келешегіне қызмет етуі.



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Тәуелсіздігімізге дейінгі тарихи деректерді, ұлы тұлғаларды зерттеу арқылы ұлттық идеология саясатын дамыту уақыт күттірмейтін құбылыс.



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АМЕРИКА ҚҰРАМА ШТАТТАРЫНДА БІЛІМ БЕРУ ЖҮЙЕСІ: ҚҰРЫЛЫМЫ МЕН ЕРЕКШЕЛІКТЕРІ

(500 ҒАЛЫМҒА АРНАЛҒАН БОЛАШАҚ БАҒДАРЛАМАСЫ АЯСЫНДА ӨТКЕН ҒЫЛЫМИ
ТАҒЫЛЫМДАМА ТӘЖІРИБЕСІНЕН)

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Қазіргі қоғамдық формациядағы білім беру жүйесі әр елде әр түрлі болғанымен саналы ұрпақ пен білікті маман дайындау барлығымыздың көздеген мақсатымыз. Әлемде өзіндік ерекшелігімен айқындалып отырған АҚШ-тың білім беру жүйесі мен танысу, оның технологияларын зерттеу жұмыстарына талдау жасадық.

АҚШ – тағы білім бері жүйесі Болон процесіне қарағанда еркіндік демократиямен ерекшеленеді: мысалы орта білім беру жүйесіде мектеп оқушыларының өздері пәндерін таңдау құқығына ие болып отыр, оны ауыстыру, қайта қарау мүмкіндіктері қарастырылған, дегенмен қабілеті мен таңдауына байланысты жоғары оқу орнына дайындайтын арнайы мектептерде баршылық. Сондай-ақ университеттердегі студенттер таңдау мамандығына келгенде өз еріктерімен болашақ мамандығын ауыстырып және негізгі қажетті деп танылатын оқу бағдарламаларын өздері құрай алады.

Сонымен қатар Америкада мектепке дейінгі баланы 6 айынан бала бақшаға беруге болады және балалар таңғы 6-дан кешкі 6-ға дейін сол бала бақшада болуға жадай қарастырылған. Қазақстандық бала бақшадан айырмашылығы 12 жасқа дейінгі баланы мектептен кейін бала бақшаға апарып, кешке дейін қалдыруға құқылы. Үш жастан бес жасқа дейінгі балалар үшін «дайындық топтары» жұмыс жасайды. Бұл дайындық топтарының бағдарламасы балалардың жалпы дамуына, әлеуметтенуге және оқу сауаттылығын жетілдіруге, дүниетанымдық көзқарастырын қалыптастыруға бағытталған. Дегенмен балабақша мен мектеп алды даярлық сыныптар факультативті деңгей болып есептеледі. Ал, жалпы білім беру мектептерінде оқу мерзімі 12 жылға созылады. Қазақстандық жалпы білім беру мектептерінен айырмашылығы Америка Құрама Штаттарындағы мектептерде тұтас білім беру жоспары қарастырылмаған. Бас жоспарды мемлекеттік басқару жанындағы білім беру кеңесі құрады, нақтырақ жоспарды белгілі бір мектептің кеңесі анықтайды. Сондай-ақ әр штаттарда өзіндік білім беру жоспарлары мен оқу кестелерінде де айырмашылықтар бар.

АҚШ-та мектеп білім беру жүйесі үш кезеңге бөлінеді:



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- бастауыш (1-5 сыныптар) балалар негізгі міндетті пәндерді оқиды, спортпен және шығармашылықпен айналысады;

- орта мектеп (6-9 сыныптар) бұл буында негізгі және таңдау пәндері пайда болады;

- жоғары мектеп (9-12 сыныптар) міндетті пәндер саны қысқартылады және таңдау пәндеріне барынша еркіндік беріледі. Оқу семестрі басталғаннан кейін оқушылар бір, екі күннің ішінде ұсынылған пәндерін немесе оқитын сыныбын өзгерткісі келсе, онда олар өздеріне қажеттілігі мен ұсынысын көрсете отырып қайта қарауға және қолдауы туралы өтініш білдіре алады. Бұл жүйе оқушылардың өздеріне деген жауапкершілікті сезінулеріне және келешекке деген көзқарастарының анық болуына жетелейді. Барлық штаттарда оқушылар 5-8 жас аралығында мектепке баруға міндетті. Ескере кететін жайт жоғарыда айтылған әр деңгейдің өз ғимараттары бар және ол мүлдем бөлек оқу орны болып табылады. Американдық мектептерде оқу жылы екі семестрден тұрады. Оқу сабақтарының ұзақтығы 5-6 сағат. Түстен кейінгі уақытта көбіне оқушылар әр түрлі үйірмелерге қатысады немесе қоғамдық жұмыстармен айналысады. Метепте білім деңгейін бағалау әріптік жүйемен бағаланады (A,B,C,D,F). Бұл бағалау түрі Қазақстандық 5-2 дейінгі бағалау түрімен сәйкес келеді. Әлемдік деңгейде танымал болған АҚШ-тың жоғарғы білім беру жүйесінің айырмашылығы әртүрлі және мектеп секторларының өзіндік ерекшеліктерімен айқындалады. Атап айтқанда, міндетті пәндердің жиынтығы өте аз. Ол пәндерге математика, жаратылыстану, шет тілдері (испан, француз, неміс тілдері), тарих, өнер, дене тәрбиесі жатады. Екінші жағынан оқушыларда мамандандырылған сыныптардың басқа таңдауларға құқылы. Көптеген мектептерде жоғарғы сынып оқушыларына кеңейтілген оқу бағдарламалары ұсынылады. Ол, ең қабілетті, ынталы оқушылар кейбір пәндерді университет деңгейінде оқи алады. АҚШ-тың жоғары білім беру жүйесіне жеке немесе мемлекеттік колледждермен университеттер кіреді.

Халықаралық рейтингтер бойынша олар әлемдегі ең үздік оқу орындарының қатарында. Еуропалық және Қазақстандық білім беру жүйесінен айырмашылығы, Америкада колледжбен университет арасында өте көп сапалық айырмашылықтар жоқ екенін айта кеткен жөн. Осы орайда, ғылыми тағылымдамадан өтіп жатқан Иллинойс штатындағы Урбане-Шампейн қаласындағы Иллинойс университетінің білім жүйесі әлемдік алдыңғы қатарлы 50 топ университеттерінің қатарына кіреді. АҚШ-ғы үздік университеттер қатарынан орын алған жоғарғы оқу орындарының бірі. Университет өнер және гумманитарлық ғылымдар, техника және технология, өнертану, жаратылыстану, әлеуметтік ғылымдар және менеджмент бойынша әлемдегі ең үздік университеттердің бірі болып табылады.

Университет студенттерге бакалавриат, магистратура және докторантура деңгейлерінде көптеген оқу бағдарламаларын, сондай-ақ әртүрлі кәсіби курстарды ұсынады. Бакалавр мамандықтары бойынша



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80 нен астам бағыттар бойынша оқытылады. Білім беру жүйесі студенттерге білімінің басым бағыттары мен тарауларын таңдап, қажетті бағытта дамытып, білікті мамандарды дайындайды.

Студенттерге, магистранттарға, докторанттарға және әртүрлі ғылыми тағылымдамадан өтетін әлемнің түпкір түкпірінен келген ғалымдарға университеттің білікті ғалымдары мен таңдаулы мамандары дәріс оқып, өздерінің іс тәжірибелерімен бөліседі. Университеттегі білім алушылардың барлығына бірдей жоғары деңгейдегі жағдайлар қарастырылған, олардың спортпен айналысуға, әртүрлі үйірмелерге қатысуларына мүмкіндіктер жасалған. Сондай-ақ әр апта соңында студенттердің бос уақытын өткізуге арналған көптеген іс шаралар университет тарапынан ұйымдастырылып отырады. Аталған іс шараларға университеттің студенттер, магистранттар, докторанттар және оқытушылар қатыса алады. Ұйымдастырылып отырылған іс шаралар университет қаржысымен қамсыздандырылып, барлығы тегін өткізіледі.

Қорытындылай келе Иллинойс университетінің қабырғасында өтіп жатқан ғылыми тағылымдамадан, үйренгеніміз де, үйренерімізде жетерлік. Сонымен қатар әркім өз қалауынша арнайы курстар бойынша білім алып, өз білім деңгейлерін жетілдіруде.



THE DEVELOPMENT OF EDUCATION IN IRAN OVER TIME

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Abstract:

The development of education in Iran can be traced back to ancient times, reflecting the importance that Iranians have always placed on knowledge and wisdom. Historical records show that Iranian society has long recognized the value of education in fostering good qualities and actions, enabling individuals to contribute meaningfully to their communities. Even in ancient times, Iranians sought divine intervention to acquire knowledge and insight, as evident in supplications and rituals. This tradition continued throughout different periods, including the Achaemenid, Seleucid, Ashkanian, and especially the Sasanian era. Notably, the construction of the Jundi Shapur School during the Sasanian period and the establishment of Dar al-Funun school during the Qajar period symbolized the continued emphasis on education. Over the years, schools in Iran have transformed, adapting to the changing times and needs of society. However, the underlying goal of education, to equip individuals with good qualities and ensure their contribution to society, has remained constant.

This research was conducted using library, field and descriptive-analytical study methods and tried to examine the development of the education system in Iran from ancient times to post-Islamic eras.

Key word:

Education, Ancient Iran, School, Sassanid, Jundi Shapur, Dar al-Funun

Introduction:

Throughout history, Iranians have always placed great importance on education and morals as the most valuable qualities of an individual. Initially, education focused on the fundamental principles of life, nature, and the geography of the surrounding environment. However, as time passed and various governments and laws emerged, the methods of education also underwent changes. These shifts and transformations have made education the foundation and essence of a society's culture, allowing the untapped power of thought and creativity within a nation to flourish. In this article, we will briefly explore the history of education in Iran and examine its role and impact during different eras and time periods.

Definition of education:

Education can be defined as a collection of tasks and activities designed to facilitate learning in specific subjects under the guidance of an educational framework. The primary purpose of education is to enhance an individual's skills and abilities, fostering critical thinking and intellectual growth. It revolves around the accomplishment of various objectives, including individual students' goals, broader educational aims, local, regional, and national objectives. Many scholars assert that education is built upon four fundamental elements: the teacher, the student, the subject matter, and the social environment, all of which play significant roles in facilitating effective communication and knowledge acquisition.

History and historical periods of education in Iran:

In ancient times, education in Iran can be traced back to the Aryan people and the reign of Darius I. Archaeological findings in Persepolis reveal evidence of boys being taught to transcribe texts in Persian cuneiform. This signifies the importance placed on knowledge and manners, as Iranians believed that these qualities would lead to virtuous actions. However, this knowledge was limited to a select few scribes who were close to the kings. The education system in Iran is typically classified into three periods: pre-Islamic, Islamic, and modern era. However, this article takes a closer look and divides the historical periods of education in Iran based on the changes and transformations in the system. The four parts we will explore are:

- A) Ancient Era, encompassing the Achaemenid and Sasanian periods.
- B) The emergence of Islam.
- C) The post-Islamic era during Qajar rule.
- D) The modern era of education in Iran.

A- Education in ancient Iran:

The history of education in ancient Iran was characterized by a strong emphasis on knowledge and learning. Rather than raising children instinctively, the ancient Iranians had a specific purpose in mind - to raise individuals who would contribute to society. During this time, the educational goals for children were focused on three main objectives: serving society and the country, assisting the family and fulfilling parental responsibilities, and striving for excellence and superiority over others.

It is worth noting that during ancient times, only a small percentage of the adult male population in Iran (around 20 to 30%, or 10% of the total population) were literate. The most significant advancements in education occurred during the Achaemenid and Sasanian empires. In the following sections, we will delve into the educational developments in each of these periods.

1- Achaemenid era:

During the Achaemenid era, education in ancient Iran underwent significant developments. Children were required to undergo elementary education, focusing on living harmoniously within their families, from birth until the age of 5-7 years. After this stage, from ages 5 to 20, they were prepared for school and received a general education which included horse riding, archery, and a strong emphasis on honesty. Lying was considered a grave sin and the ability to fight and defend oneself was seen as a symbol of masculinity. Teenagers and young people were also taught virtues such as obedience, patience, justice, and discipline.

Originally, education was primarily conducted by Magians and Zoroastrian priests in fire temples. However, Emperor Darius I implemented a significant change by establishing schools to teach a wide range of sciences and military techniques. This marked a progressive step in formal education during that period. It is worth noting that education during this era was only accessible to a specific social stratum and class within ancient Iranian society.

2- Education in Sasanian era:

During the Sasanian era, education followed a trajectory similar to that of the Achaemenid era. Key focuses in education revolved around ethics, self-control, chivalry, and patriotism, which were considered crucial aspects of learning. Additionally, religion, physical education, reading, writing, and arithmetic were included in the curriculum. The education and upbringing of children during this time were structured in a way that allowed parents to select the teacher, while the government provided the necessary resources and guidance to meet the goals and beliefs aligned with the educational system. During the Sassanid era, education and the pursuit of knowledge thrived across Iran, following the teachings of Zoroaster and reflecting the interests of the people. This led to the spread of Iranian culture and way of life to both the eastern and western regions. However, it should be noted that education remained exclusive to the elites and privileged classes, failing to inclusively reach all sectors of society. The Sasanian government introduced various measures to boost education, including the establishment of the renowned "Reha" school in Nusaybin, located in present-day Turkey. Additionally, Jondishapur University, considered the foremost center of education in the ancient world, was established during this period. In the time of Khosrow Anushirvan's rule, one of the most significant events was the establishment of Jondishapur University in the city of the same name. Some mistakenly refer to it as Jundi Shapur. This university was constructed in the northern region of present-day Khuzestan province, near the cities of Shush, Dezful, and Shushtar. In 529 AD, after the closure of the Academy in Athens, Greek scholars and philosophers migrated to Jundishapur, where they were received with great honor and respect by the Sassanian king. Over time, Gandishapur University became a hub for Iranian scientists to collaborate with



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Greek, Indian, and Roman scientists in conducting scientific research activities. Additionally, during this period, valuable books were translated into the Pahlavi language at Jundishapur University, including works like Kalile - Demne, Weis and Ramin, Khodanameh, and Thousand Legends. Concurrently, Khosrow Anoushirvan built a hospital, thereby advancing the education and medical fields.

B- Education in Islam:

The introduction of Islam in Iran led to significant changes in the education system. The Arabic language and script became popular, leading to the translation of Pahlavi books into Arabic. This influenced education until the fifth century of the Islamic calendar, which marked a major turning point. In 459 AH, Khaje Nezam al-Molk established the first school in Baghdad, paving the way for the establishment of other schools across the Islamic world. Teaching took place in various locations such as schools, palaces, scholars' homes, the desert, and mosques.

C- Education in Qajar era:

During the Qajar rule, Iran experienced a decline after losing many parts of its vast territory in wars with Russia. The country's intellectuals identified the lack of modern techniques and knowledge as the root cause for Iran's failures. To address this, the Mardan government sent five students to England in 1231 AH to study and learn science. As a result, one of the students, Mirza Saleh, published Iran's first newspaper called "Kaghz Akhbar" in 1253 AH. Additionally, Mirza Hassan Khan established Rushdieh as the first modern school in 1254 AH. These significant developments were accompanied by the establishment of Dar al-Fonun, which is considered the most important event of this era.

D- Education in contemporary Iran (modern education):

The history of education in its contemporary form began with the establishment of Dar al-Fonun school, marking a new era in education. With the approval of the Law on Compulsory Education in 1290 AH, education became an official right for Iranian children and teenagers. As per this law, the government took responsibility for covering education expenses up to secondary level through the Ministry of Education. In the early 14th century, Iran's education system underwent various changes towards modernization. Traditional home schools were replaced by formal schools, textbooks were updated, and both boys and girls were required to attend school. Subsequently, a dedicated institution for teacher training was established, known as "Teacher Training University." Additionally, Tehran University, the highest-ranking academic institution at the time, began operations, providing an opportunity for both male and female students to pursue higher education after completing high school. Akabar schools were also established to cater to the education of adults. Furthermore,



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in order to cultivate the necessary forces to govern the nation, students were also sent to Europe. The social and economic advancements in 1345 AH led to a restructuring of educational programs and the introduction of new objectives and solutions. These included a focus on literacy and compulsory primary education, the training of skilled and specialized individuals, as well as political and social instruction. Additionally, there was an increased emphasis on ethics and physical education. Over time, significant changes took place within Iran's educational system, resulting in the establishment of elementary, middle, secondary, and pre-university courses. Currently, education in Iran is conducted across four distinct levels, beginning from 1391 AH to the present.

Conclusion:

Based on the progress and advancements made in education in Iran, it is clear that prioritizing the intellectual growth of students to unleash their creative potential is essential. To achieve this, it is necessary to embrace innovative approaches and reshape the way knowledge is conveyed, rather than solely focusing on grades and degrees.



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ALPINE WOMAN TYPE IN THE MANAS EPIC

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Özet

The Manas Epic, which belongs to the Kyrgyz Turks, is the longest epic in the world with 400,000 verses. The first scientific study about the epic was written by Çokan Velihanoğlu in 1861. Then, Wilhelm Radloff compiled a list of Black Kyrgyz people in 1869. He published the Manas Epic with its German translation in 1885. Sagımbay Orazbakoğlu published his compilation, which was the result of his 18-year work, in four volumes in 1930 (Bedelbayev, 1995, p. 38). Emine Gürsoy Naskali was the first to undertake the translation of the epic into Turkish. Following him, Abdülkadir İnan and Naciye Yıldız also translated the Manas Epic into Turkish. There are works of many other researchers about the Epic of Manas. However, in our study, the quotations from the Manas Epic are made by referring to Abdülkadir İnan's translation book.

As Abdülkadir İnan stated in the preface of his book, the core of the Manas Epic dates back to IX. It was formed in the century (İnan, 1992). The Kyrgyz-Kalmuk wars are included in the historical layer of the epic. Around the struggle of four generations (Cakıp Bay, Manas, Semetey, Seytek) to protect their homeland, the mythologies of the Kyrgyz, their oldest religious beliefs, marriage and wedding customs, entertainment, joy, suffering, love and excitement are told. The dominance of Shamanism is still seen in the lives of the Kyrgyz people, whom we know to have converted to Islam at the actual time of the epic, especially in their transition ceremonies.

There is one subject, or rather an ideology, that is dominant in all of these, and that is "freedom". Manas expresses this as follows: "As bad as it is to be afraid of the enemy and run away, it is also despicable to beg him, bow down and stand in front of him... Let's fight... May Manas die rather than see the Kyrgyz in the hands of the enemy!.." (İnan 1992: 16). It is clearly seen that the idea of freedom, which is the starting point of patriotism, is emphasized here.

Anahtar Kelimeler: Alpine woman, folklore, Manas, integrated, literary interests



ŞAĞIRDLƏRDƏ ORFOEPİK VƏ ORFOQRAFİK BİLİKLƏRİN FORMALAŞDIRILMASI İMKANLARI

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Özet

Orfoqrafiya ilə orfoepiya həm linqvistik baxımdan, həm də təlim nöqtəyi-nəzərdən də bir-biri ilə möhkəm əlaqəlidir. Buna görə də orta məktəbdən başlayaraq, tələffüz normalarının öyrədilməsi yazı təlimi ilə paralel olaraq tətbiq olunmalıdır. Bu əlaqə şagirdlərdə orfoepik vərdişlərin aşılmasına, həmçinin orfoqrafik qaydaların şüurlu olaraq mənimsədilməsinə imkan verir.

Orta məktəbdə yazı ilə tələffüzün əlaqəli öyrədilməsində müxtəlif iş formalarından istifadə olunur. Biz orfoepik diktə dedikdə nə başa düşürük? Bu, sözlərin yazılışı və eyni zamanda tələffüzü arasındakı fərqli cəhətlər barədə verilmiş nəzəri biliklərin təcrübə zamanı tətbiq olunması deməkdir. Bu yolla müəllim yazı və düzgün tələffüz vərdişlərini daha da möhkəmləndirir və təkmilləşdirir. Məlum olduğu kimi, imla yazılarında müəllimin diktəsi ilə mətn oxunur, şagirdlər tərəfindən yazılır. Əlbəttə, bu zaman müəllimin nitqi aydın olmalı, o, ədəbi tələffüz normalarına düzgün əməl etməlidir. Bu da şagirdlərdə orfoepik vərdişlərinin inkişafı üçün zəmin yaradır. Diktə zamanı şagird də səs-hərf tərkibi bir-birindən fərqlənən çoxlu sayda söz və ifadələrlə qarşılaşırlar. Bu tip sözləri eşidən şagird ilk olaraq, fikri əməliyyatlar aparır, sözlərin səs və hərf tərkibini müqayisə edir və sonda müəyyən nəticələr çıxarır. Bu imlaların tez-tez aparılması sayəsində, bir cür eşidib başqa cür yazmaq və ya əksinə, yazıldığı şəkildə tələffüz etməmək şagirdlərə asan gəlir.

Hər bir ibtidai sinif müəllimi bilməlidir ki, şagirdlərdə orfoqrafik qaydalar üzrə vərdişləri aşılamaq həm çətin, həm də məsuliyyətlidir. Orfoqrafiyanın tədrisi ilə bağlı qeyd edərdim ki, bir tərəfdən pedaqoji və ümumi metodik prinsiplər, digər tərəfdən də orfoqrafiyanın öz prinsipləri üzərində qurulmalıdır. Bu işdə, əlbəttə ki, mühüm pedaqoji prinsip olaraq tərbiyə ilə təlim arasında əlaqə yaratmaqdır. Orfoqrafiya təlimini dilin qayda və qanunları ilə, yəni qrammatika ilə bağlamaq çox mühüm və vacibdir. Çünki bilirik ki, yazı qaydaları qrammatik qanunlara istinad edir. Qrammatika isə orfoqrafiyaya düzgün və möhkəm bir istiqamət, təkan verir. Şagirdlər yazı qaydalarını mükəmməl öyrənməyə ancaq qrammatikanı dərinləndirərək bilməklə əldə edə bilərlər.

Anahtar Kelimələr: İbtidai sinif, yazı təlimi, orfoepiya, orfoqrafiya



YAZILIŞI ÇƏTİN SÖZLƏR ÜZƏRİNDƏ İŞİN TƏŞKİLİ

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Özet

İbtidai sinifdə təhsil alan şagirdlər üçün tələffüz mədəniyyətinə yiyələnmək praktik baxımdan çox əhəmiyyətlidir. Buradan aydın görünür ki, orfoepik normalara yiyələnməklə şagirdlər öz fikrini hamının anlayacağı bir şəkildə ifadə edir, şivə ilə bağlı tələffüzə öz nitqində yol vermir.

Yazılışı çətin sözlərin xarakteri və mənbələri isə şərait yaradır ki, müəllim şagirdlərin hazırlığına, proqram tələblərinə uyğun sözlər seçsin. Hər bir sözün çətinlik dərəcəsi, fəal lüğətə daxil olub-olmaması, çoxışlək olması, dərslikdə neçə dəfə təkrarlanması nəzərə alınmalıdır. Hər seçilən mövzu ilə əlaqədar şagirdlərə 2-3 sözün öyrədilməsi məsləhətdir. Bu sözlər əvvəlki dərslərdə öyrədilənlərlə mütləq əlaqələndirilməli, onların digər sözlərin oxşar orfoqramları ilə müqayisəsi və təhlili həyata keçirilməlidir.

Məhz ibtidai sinif müəllimi yazılışı çətin hesab edilən sözün müxtəlif cümlələrdə, hətta rabitəli mətndə işlədilməsinə nail olmalıdır. Şagirdin şifahi lüğətinin zənginləşdirilməsi, cümlə quruluşunun yaxşılaşdırılması onun yazılı nitqində də öz əksini tapır. Şifahi dilin fəaliyyət dairəsinin genişləndiyi hazırki dövrdə ədəbi tələffüz normalarını gözləmək önəmli məqamlardan biridir. İbtidai sinif şagirdlərinin çətin sözlər hesab etdiyi qrupa bunları daxil etmək olar: terminlər, neologizmlər, dialektizmlər (şivə sözlər), alınma sözlər (ərəb-fars, rus-Avropa mənşəli), işlək olmayan sözlər, yazılışı tələffüzündən fərqlənən sözlər, frazeoloji ifadələr, arxaizmlər, mənası tanış olmayan yeni sözlər, omonimlər (yazılışı və deyilişi eyni olan, leksik mənalara görə fərqlənən sözlər), paronimlər (tərkibindəki bir hərfə görə fərqlənən sözlər), onomastik vahidlər və s. daxildir. Həmin sözləri tam başa düşmədikcə, onların hər biri “çətin söz” kimi qalaraq, şagirdlərin nitq mədəniyyətinin formalaşması üçün maneələr yaradır.

Orta məktəbdə “yazılışı çətin sözlər” çox vaxt şərti olaraq qiymətləndirilir. Əgər uşağın nitqinin, ümumi zehni inkişafı, nitqinə hansı dialektin təsir göstərməsi, intellektual biliyi, fərdi xüsusiyyətləri nəzərə alınarsa, asan saydığımız bəzi sözlərin isə onlar üçün çətin olması aşkara çıxar.

Proqramın tələbinə uyğun olaraq II-IV siniflərdə oxuyan şagirdlər 400-dək sözün yazılış qaydasını öyrənməlidirlər. Bu isə yuxarı siniflərdə orfoqrafiyanın tədrisi üçün əsaslı dönüş yaradır.

Anahtar Kelimələr: Neologizmlər, paronim, çətin söz, omonimlər



FACTORABLE STRONGLY p -NUCLEAR M -HOMOGENEOUS POLYNOMIALS

AHLEM ALOUANI

Abstract

We characterize in terms of summability the class of homogeneous polynomials whose linearization is p -nuclear. This characterization provides a strong link between the theory of p -nuclear linear operators and the (non linear) homogeneous p -nuclear polynomials that significantly improves former approaches. The deep connection with Grothendieck-integral polynomials is also analyzed.

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Key words and phrases. p -summing operator, multilinear operator, Homogeneous polynomial, factorable Cohen p -nuclear



FIXED POINTS FOR MAPPINGS OF ASYMPTOTICALLY NONEXPANSIVE TYPE

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Abstract. In this paper, we prove the existence of fixed points for mappings which satisfy some asymptotic nonexpansive conditions in Banach spaces which are either nearly uniformly convex or they satisfy that asymptotic centers of bounded sequence are compact. Nominally, we consider pointwise eventually nonexpansive mappings, pointwise asymptotically nonexpansive mappings and asymptotically type nonexpansive mappings. We do not assume the existence of a continuous iterated, solving some long-standing open questions about existence of a fixed point for these mappings in absence of continuity.

Keywords: Fixed point, pointwise nonexpansive mapping, nearly uniform convexity, asymptotic center.

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A NEW VERSION OF EKELAND'S VARIATIONAL PRINCIPLE AND ITS APPLICATIONS

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Abstract

In this paper, a new version of Ekeland's variational principle, by using the concept of τ -distance for bounded from below functions which are not necessarily lower semicontinuous, is provided. This new version of Ekeland's variational principle will be applied to establish existence theorems for a solution of the cyclically monotone and cyclically antimonotone quasi equilibrium problems in the setting of complete metric spaces. Also, we deal with equilibrium problems without convexity assumptions either for the domain or for involved bifunctions. Our approach is based on the concepts of cyclically monotone and cyclically antimonotone for bifunctions.

Keywords: Equilibrium problem, Quasi-equilibrium problem.

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BESOV-TYPE ESTIMATES FOR SOLUTIONS OF LINEAR ELLIPTIC DEGENERATE BOUNDARY VALUE PROBLEMS

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ABSTR ACT

In this work, we prove an a-priori estimates in Besov-type spaces for solutions of boundary value problems involving two class of linear elliptic degenerate higher-order operators. This Work extends some well-known results given in Holder spaces, Sobolev spaces and classical besov spaces to the more general framework of Besov-type spaces. The methods used in this work are mainly based on harmonic analysis techniques, they consist on the one hand, in giving a dyadic characterization of Besov-type spaces thanks to the Littlewood-Paley decomposition, on the other hand, in reducing the problem by means of a partial Fourier transformation to an isomorphism theorem of an ordinary differential equation, which allows us to estimate the ‘‘ almost tangential’’ derivatives of solutions, then using some interpolation inequalities we evaluate the normal derivatives.

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APPROXIMATIONS OF THE POLAR FACTOR OF AN OPERATOR ACTING ON A HILBERT SPACE

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ABSTR ACT

Let H be an infinite-dimensional complex Hilbert space and $B(H)$ the algebra of all bounded linear operators on H . The polar decomposition theorem asserts that every operator $T \in B(H)$ can be written as the product $T = V|T|$ of a partial isometry $V \in B(H)$ having the same kernel as T times $|T| = (T^*T)^{1/2}$. The unique partial isometry V is called the polar factor of T . In this talk, we give several results on the approximations of the polar factor.

ОБ ОДНОЙ КРАЕВОЙ ЗАДАЧЕ ДЛЯ ОПЕРАТОРНО – ДИФФЕРЕНЦИАЛЬНЫХ УРАВНЕНИЙ ВТОРОГО ПОРЯДКА

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Ключевые слова: Гильбертово пространство, операторно-дифференциальных уравнений, гладких решений, вектор- функций, самосопряжённый оператор.

Пусть H - сепарабельное гильбертово пространства, A - положительно определённый самосопряженный оператор в H , а $H_\gamma (\gamma \geq 0)$ шкала гильбертовых пространств порожденный оператором A т.е

$$H_\gamma = D(A^\gamma), (x, y)_\gamma = (A^\gamma x, A^\gamma y), x, y \in H_\gamma$$

Пусть $L_2(R_+; H)$ есть гильбертово пространство вектор – функций $f(t)$ определённых почти всюду в R_+ , со значениями в H , для которых

$$\|f\|_{L_2(R_+; H)} = \left(\int_0^\infty \|f(t)\|^2 dt \right)^{1/2}$$

Следуя монографию [1] определим следующие пространство при натуральных $m \geq 1$:

$$W_2^m(R_+; H) = \{u(t) : u^{(m)}(t) \in L_2(R_+; H), A^m u(t) \in L_2(R_+; H)\}$$

с нормой

$$\|u\|_{W_2^m(R_+; H)} = \left(\|u^{(m)}\|_{L_2(R_+; H)}^2 + \|A^m u\|_{L_2(R_+; H)}^2 \right)^{1/2}.$$

При $m = 3$ введем выводт подпространства в $W_2^3(R_+; H)$

$$W_2^3(R_+; H) = \{u / u \in W_2^3(R_+; H), u(0) = u'(0) = 0\}$$

Аналогично определяются пространства $L_2(R; H)$ и $W_2^m(R; H)$ при $R = (-\infty; \infty)$.

Пусть $L(X, Y)$ пространство линейных ограниченных действующих из X в Y .

Рассмотрим в H следующую краевую задачу

$$\frac{d^2 u}{dt^2} + (A + A_1) \frac{du}{dt} + (qA^2 + A_2) u(t) = f(t), \quad t \in R_+ \quad (1)$$

$$u(0) = u'(0) = 0 \quad (2)$$

где $f(t), u(t) \in H$ при $t \in R_+$ почти всюду, а операторные коэффициенты удовлетворяют следующим условиям:

- 1) $q > 0$.
- 2) A - положительно определённый самосопряжённый оператор;
- 3) Операторы $A_1 \in L(H_1, H) \cap L(H_2, H_1)$, $A_2 \in L(H_2, H) \cap L(H_3, H_1)$.

Определение 1. Если при $f(t) \in W_2^1(R_+; H)$ существует вектор-функция $u(t) \in W_2^3(R_+; H)$ которая удовлетворяет уравнению (1) тождественно в $R_+ = (0, \infty)$, то $u(t)$ будем называть гладким решением уравнения (1) из $W_2^3(R_+; H)$.

Определение 2. Если при любом $f(t) \in W_2^1(R_+; H)$ существует гладкое решение $u(t)$ уравнения (1) из $W_2^3(R_+; H)$ которая удовлетворяет оценке

$$\|u\|_{W_2^3(R_+; H)} \leq \text{const} \|f\|_{W_2^1(R_+; H)},$$

то задача (1), (2) называется регулярно разрешимой в пространстве $W_2^3(R_+; H)$.

Обозначим через

$$P_0 u = P_0 (d/dt)u = u'' + Au + qA^2 u, \quad u \in \overset{0}{W}_2^3(R_+; H)$$

$$P_1 (d/dt)u = A_1 \frac{du}{dt} + A_2 u, \quad u \in \overset{0}{W}_2^3(R_+; H)$$

$$Pu = P_0 u + P_1 u \quad u \in \overset{0}{W}_2^3(R_+; H).$$

Теорема 1. Пусть выполняются условия 1) и 2). Тогда оператор P_0 изоморфно отображает пространство $W_2^3(R_+; H)$ на $L_2(R_+; H)$.

Теорема 2. Пусть $q > 0$. Тогда при $\beta \in [0, \beta_0)$, а при $\gamma \in [0, \gamma_0)$ операторные пучки (4) и (5) не имеет спектра на мнимой оси, где

$$\beta_0 = \begin{cases} q^2, & 0 < q \leq \frac{1}{2} \\ \frac{(4q-1)}{4}, & q \in \left(\frac{1}{2}, 1\right) \end{cases} \quad \gamma_0 = 1, \quad (6)$$

причем они представляются в виде

$$R_0(\lambda; \beta; A) = F_0(\lambda; \beta; A)F_0(-\lambda; \beta; A), \quad (7)$$

$$R_1(\lambda; \gamma; A) = F_1(\lambda; \gamma; A)F_0(-\lambda; \gamma; A) \quad (8)$$

где

$$F_0(\lambda; \beta; A) = \prod_{j=1}^3 (\lambda E - \omega_{j,0}(\beta)A) = \lambda^3 E + c_{2,0}(\beta)\lambda^2 A + c_{1,0}(\beta)\lambda A^2 + c_{0,0}(\beta)A^3 \quad (9)$$

$$F_1(\lambda; \gamma; A) = \prod_{j=1}^3 (\lambda E - \omega_{j,1}(\gamma)A) = \lambda^3 E + a_{1,0}(\gamma)\lambda^2 A + a_{2,0}(\gamma)\lambda A^2 + a_{0,0}(\gamma)A^3 \quad (10)$$

Здесь $\omega_{j,0}(\beta) = \omega_{j,0}(\alpha) = -1$, $\operatorname{Re} \omega_{j,0}(\beta) < 0$, $\omega_{j,1}(\gamma) < 0$, при $\beta \in [0, \beta_0)$ и $\gamma \in [0, \gamma_0)$

а числа

$$\begin{aligned} c_{2,0} &= 1 + 2\sqrt{\sqrt{q^2 - \beta} + 1 - q}, & c_{1,0} &= \sqrt{2\sqrt{q^2 - \beta} + 1 - q} + \sqrt{q^2 - \beta} \\ c_{0,0}(\beta) &= \sqrt{q^2 - \beta}, \end{aligned} \quad (11)$$

$$a_{2,1}(\gamma) = 1 + \sqrt{1 - \gamma}, \quad a_{1,1} = \sqrt{1 - \gamma} + q, \quad a_{1,0}(\gamma) = q \quad (12)$$

Лемма 1. Пусть $u \in W_2^3(R_+; H)$. Тогда

$$\begin{aligned} \|P_0 u\|_{W_2^1(R_+; H)}^2 &= \left\| \frac{d^3 u}{dt^3} \right\|_{L_2(R_+; H)}^2 + (2 - 2q) \left\| A \frac{d^2 u}{dt^2} \right\|_{L_2(R_+; H)}^2 + \\ &+ (q^2 + 1 - 2q) \left\| A \frac{du}{dt} \right\|_{L_2(R_+; H)}^2 + q^2 \|A^3 u\|_{L_2(R_+; H)}^2 - \|\varphi\|^2, \end{aligned}$$

где $\varphi = A^{1/2} u''(0)$.

Лемма 2. При $u \in W_2^3(R_+; H)$ имеет место равенство

$$\|F_1(d/dt; \gamma; A)u\|_{L_2(R_+; H)}^2 + (\alpha_{21}(\gamma) - 1) \|P_0 u\|_{W_2^1(R_+; H)}^2 - \gamma \left(\left\| A \frac{du}{dt} \right\|_{W_2^1(R_+; H)}^2 \right) \quad (21)$$

Лемма 3. При $u \in W_2^3(R_+; H)$ имеет место равенство

$$\|F_0(d/dt; \beta; A)u\|_{L_2(R_+; H)}^2 + (c_{2,1}(\beta) - \beta)\|\varphi\|_{1/2}^2 = \|P_0u\|_{W_2^1(R_+; H)}^2 - \beta\|A^2u\|_{W_2^1(R_+; H)}^2 \quad (22)$$

Отметим что из теоремы 1 следует, что в пространстве $W_2^3(R_+; H)$ нормы $\|P_0u\|_{W_2^1(R_+; H)}$ и

$\|u\|_{W_2^3(R_+; H)}$ эквивалентны, поэтому конечны следующие нормы

$$N_1 = \sup_{0 \neq u \in W_2^3(R_+; H)} \left\| A \frac{du}{dt} \right\|_{W_2^1(R_+; H)} \cdot \|P_0u\|_{W_2^1(R_+; H)}^{-1} \quad (23)$$

и

$$N_0 = \sup_{0 \neq u \in W_2^3(R_+; H)} \|A^2u\|_{W_2^1(R_+; H)} \cdot \|P_0u\|_{W_2^1(R_+; H)}^{-1} \quad (24)$$

Теорема 3. Норма

$$N_1 = 1, \quad N_0 = \beta_0^{-1/2}.$$

Теорема 4. Пусть выполняются условия 1)-3) и

$$q = N_1 \max(\|A_1\|_{H_1 \rightarrow H}, \|A_1\|_{H_2 \rightarrow H_1}) + N_0 \max(\|A_2\|_{H_2 \rightarrow H}, \|A_2\|_{H_3 \rightarrow H_1}) < 1 \text{ где числа } N_1 \text{ и } N_0$$

определены из теоремы 3. Тогда задача (1) и (2) регулярно разрешимо в $W_2^3(R_+; H)$.

ON A BOUNDARY VALUE PROBLEM FOR SECOND ORDER OPERATOR-DIFFERENTIAL EQUATIONS

Let H - a separable Hilbert space, A - positive definite self-adjoint operator in H , $H_\gamma (\gamma \geq 0)$ a scale of Hilbert spaces generated by the operator A , i.e.

$$H_\gamma = D(A^\gamma), (x, y)_\gamma = (A^\gamma x, A^\gamma y), \quad x, y \in H_\gamma$$

Let $L_2(R_+; H)$ be a Hilbert space vector – functions $f(t)$ determined almost everywhere in R_+ , with the values in H , for which

$$\|f\|_{L_2(R_+; H)} = \left(\int_0^\infty \|f(t)\|^2 dt \right)^{1/2}$$

Following the monograph [1] define the following space for natural $m \geq 1$:

$$W_2^m(R_+; H) = \{u(t) : u^{(m)}(t) \in L_2(R_+; H), A^m u(t) \in L_2(R_+; H)\}$$

with the norm

$$\|u\|_{W_2^m(R_+; H)} = \left(\|u^{(m)}\|_{L_2(R_+; H)}^2 + \|A^m u\|_{L_2(R_+; H)}^2 \right)^{1/2}.$$

For $m = 3$ we'll derive subspaces in $W_2^3(R_+; H)$

$$W_2^3(R_+; H) = \{u / u \in W_2^3(R_+; H), u(0) = u'(0) = 0\}$$

The spaces $L_2(R; H)$ and $W_2^m(R; H)$ are $R = (-\infty; \infty)$ are determined similarly.

Let $L(X, Y)$ be a space of linear bounded operators acting from X to Y .

Consider in H the following boundary value problem

$$\frac{d^2 u}{dt^2} + (A + A_1) \frac{du}{dt} + (qA^2 + A_2)u(t) = f(t), \quad t \in R_+ \tag{1}$$

$$u(0) = u'(0) = 0 \tag{2}$$

where $f(t), u(t) \in H$ for $t \in R_+$ almost everywhere, and the operator coefficient satisfy the following conditions

- 1) $q > 0$.
- 2) A - is a positive –definite self –adjoint operator
- 3) The operator $A_1 \in L(H_1, H) \cup L(H_2, H_1)$, $A_2 \in L(H_2, H) \cup L(H_3, H_1)$.

Definition 1. It for $f(t) \in W_2^1(R_+; H)$ there exists the vector-function $u(t) \in W_2^3(R_+; H)$ that satisfies equation (1) identically in $R_+ = (0, \infty)$, then $u(t)$ will be called a smooth solution of equation (1) from $W_2^3(R_+; H)$.

Definition 2. If for any $f(t) \in W_2^1(R_+; H)$ there exists smooth solution $u(t)$ of equation (1) from $W_2^3(R_+; H)$ that satisfies is estimation

$$\|u\|_{W_2^3(R_+; H)} \leq \text{const} \|f\|_{W_2^m(R_+; H)},$$

Then (1), (2) is called regularly solvable in the space $W_2^3(R_+; H)$.

Denote by

$$P_0 u = P_0 (d/dt)u = u'' + Au + qA^2 u, \quad u \in \overset{0}{W}_2^3(R_+; H)$$

$$P_1 (d/dt)u = A_1 \frac{du}{dt} + A_2 u, \quad u \in \overset{0}{W}_2^3(R_+; H)$$

$$Pu = P_0 u + P_1 u \quad u \in \overset{0}{W}_2^3(R_+; H).$$

Theorem 1. Let conditions 1) and 2). be fulfilled .Then the operator P_0 isomorphically maps the space $W_2^3(R_+; H)$ onto $L_2(R_+; H)$.

Teopema 2. Let $q > 0$. Then for $\beta \in [0, \beta_0)$, and for $\gamma \in [0, \gamma_0)$ operator bundles (4) and (5) have no spectrum on the imaginary axis ,where

$$\beta_0 = \begin{cases} q^2, & 0 < q \leq \frac{1}{2} \\ \frac{(4q-1)}{4}, & q \phi \frac{1}{2}; \end{cases} \quad \gamma_0 = 1, \quad (6)$$

and they are represented in the form

$$R_0(\lambda; \beta; A) = F_0(\lambda; \beta; A)F_0(-\lambda; \beta; A), \quad (7)$$

$$R_1(\lambda; \gamma; A) = F_1(\lambda; \gamma; A)F_1(-\lambda; \gamma; A) \quad (8)$$

Where

$$F_0(\lambda; \beta; A) = \prod_{j=1}^3 (\lambda E - \omega_{j,0}(\beta)A) = \lambda^3 E + c_{2,0}(\beta)\lambda^2 A + c_{1,0}(\beta)\lambda A^2 + c_{0,0}(\beta)A^3 \quad (9)$$

$$F_1(\lambda; \gamma; A) = \prod_{j=1}^3 (\lambda E - \omega_{j,1}(\gamma)A) = \lambda^3 E + a_{1,0}(\gamma)\lambda^2 A + a_{2,0}(\gamma)\lambda A^2 + a_{0,0}(\gamma)A^3 \quad (10)$$

Here $\omega_{j,0}(\beta) = \omega_{j,0}(\alpha) = -1$, $\operatorname{Re} \omega_{j,0}(\beta) < 0$, $\omega_{j,1}(\gamma) < 0$, for $\beta \in [0, \beta_0)$ and $\gamma \in [0, \gamma_0)$ and the numbers

$$c_{2,0} = 1 + 2\sqrt{\sqrt{q^2 - \beta} + 1 - q}, \quad c_{1,0} = \sqrt{2\sqrt{q^2 - \beta} + 1 - q} + \sqrt{q^2 - \beta} \quad (11)$$

$$c_{0,0}(\beta) = \sqrt{q^2 - \beta},$$

$$a_{2,1}(\gamma) = 1 + \sqrt{1 - \gamma}, \quad a_{1,1} = \sqrt{1 - \gamma} + q, \quad a_{1,0}(\gamma) = q \quad (12)$$

Lemma 1. Let $u \in W_2^3(R_+; H)$. Then

$$\begin{aligned} \|P_0 u\|_{W_2^1(R_+; H)}^2 &= \left\| \frac{d^3 u}{dt^3} \right\|_{L_2(R_+; H)}^2 + (2 - 2q) \left\| A \frac{d^2 u}{dt^2} \right\|_{L_2(R_+; H)}^2 + \\ &+ (q^2 + 1 - 2q) \left\| A \frac{du}{dt} \right\|_{L_2(R_+; H)}^2 + q^2 \|A^3 u\|_{L_2(R_+; H)}^2 - \|\varphi\|^2, \end{aligned}$$

где $\varphi = A^{1/2} u''(0)$.

Lemma 2. При $u \in \overset{0}{W}_2^3(R_+; H)$ it holds the following equality

$$\|F_1(d/dt; \gamma; A)u\|_{L_2(R_+; H)}^2 + (\alpha_{21}(\gamma) - 1) = \|P_0 u\|_{W_2^1(R_+; H)}^2 - \gamma \left(\left\| A \frac{du}{dt} \right\|_{W_2^1(R_+; H)}^2 \right) \quad (21)$$

Лемма 3. For $u \in \overset{0}{W}_2^3(R_+; H)$ it holds the following equality

$$\|F_0(d/dt; \beta; A)u\|_{L_2(R_+; H)}^2 + (c_{2,1}(\beta) - \beta) \|\varphi\|_{1/2}^2 = \|P_0 u\|_{W_2^1(R_+; H)}^2 - \beta \|A^2 u\|_{W_2^1(R_+; H)}^2 \quad (22)$$

Note that it follows from theorem 1 that in space $\overset{0}{W}_2^3(R_+; H)$ the norms $\|P_0 u\|_{W_2^1(R_+; H)}$ and $\|u\|_{W_2^3(R_+; H)}$

are equivalent, therefore the following norms are finite

$$N_1 = \sup_{0 \neq u \in W_2^3(R_+; H)} \left\| A \frac{du}{dt} \right\|_{W_2^1(R_+; H)} \cdot \|P_0 u\|_{W_2^1(R_+; H)}^{-1} \quad (23)$$

and

$$N_0 = \sup_{0 \neq u \in W_2^3(R_+; H)} \|A^2 u\|_{W_2^1(R_+; H)} \cdot \|P_0 u\|_{W_2^1(R_+; H)}^{-1} \quad (24)$$

Theorem 3. The norm

$$N_1 = 1, \quad N_0 = \beta_0^{-1/2}.$$

Theorem 4. Let conditions 1)-3) be fulfilled, and

$q = N_1 \max(\|A_1\|_{H_1 \rightarrow H}, \|A_1\|_{H_2 \rightarrow H_1}) + N_0 \max(\|A_2\|_{H_2 \rightarrow H}, \|A_2\|_{H_3 \rightarrow H_1}) < 1$ where the numbers N_1 and N_0 are determined from theorem 3 . respectively .Then problems (1) and (2) is regularly solvable in $W_2^3(R_+; H)$.

Key words: Gilbert space, operator-differential equations, smooth solutions, vector-functional, self-adjoint operator.



STRUCTURAL AND OPTOELECTRONIC PROPERTIES OF $\text{Sn}_{1-x}\text{Sc}_x\text{O}_2$ FOR PHOTOVOLTAIC CELLS

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Abstract :

In this study, the structural, optoelectronic properties of $\text{Sc}_x\text{Sn}_{1-x}\text{O}_2$ alloys with ($x = 0, 0.0416, 0.0625$ and 0.125) are investigated using first principle method with the full-potential linearized augmented plane wave (FP-LAPW) as implemented in WIEN2k code, which is based on the density functional theory (DFT). We have used the generalized gradient approximation parameterized of Perdew-Burke and Ernzerhof (PBE-GGA) to calculate the structural properties, while the electronic and optical properties were determined using the Tran-Blahamodified Becke-Johnson (TB-mBJ) potential functional which gives improved band-gaps compared to PBE-GGA. The results obtained from the structural properties of pure SnO_2 compounds are in good agreement with the available data. We also found that the formation energies of these materials are negative. Consequently our compounds are thermodynamically stable.

The results reveal that by Sc-doping SnO_2 the band gaps are broadening and remain direct at Γ . When substituting Sc-impurities, the Fermi level is displaced into the valence band due to 3d-Sc orbital producing a p-type semiconductor. The optical response shows low absorption, reflectivity and the blue-shifting of the optical transmittance in the Sc-doped SnO_2 due to increasing of the band gap, according to the Burstein-Moss effect. Our results reveal that the Sc-doped SnO_2 could be useful for transparent conducting applications.

Keywords : FP-LAPW, PBE-GGA, doping, Electronic properties, Optical properties .



BELARUSIAN BOOM OF YOUTUBE CHANNELS WITH HISTORICAL CONTENT

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Abstract

The rethinking of the history of Belarus for decolonization, which began in the second half of the 1980s, during perestroika, has borne fruit. Over the past decades national Belarusian historiography has made an unprecedented leap in the study of pages previously closed to it. New knowledge entered the education system. But, nevertheless, at the mass level, people have little knowledge of the history of their country. Meanwhile, historical memory is an important factor in the formation of national identity. Therefore, the Belarusian intelligentsia today faces the task of bringing the knowledge accumulated by science to the people in a popular form. YouTube channels with historical content help solve this problem. Their boom has been observed in the Internet space in the last two years.

The article describes the content and form of four YouTube channels in which the history of the Grand Duchy of Lithuania is a priority or a significant place is occupied: “Military history of the Belarusian people”, “Vusy Skaryny” (“Skaryna’s mustache”), “Tuteishy Shlyakhtsich” (“Local nobleman”), “Algierd is no longer the same”. The channels do not duplicate each other in terms of content and form of presentation of the material – each has its own specifics. Videos developed by the creators of the channels – creative representatives of the Belarusian intelligentsia from the historical community – are not 3-minute “heard-forgot” information, but materials that today, tomorrow, years from now are important for the historical education of Belarusians. Bloggers themselves have become actors of Belarusian historical politics. Modern information technologies give them the opportunity to broadcast Belarusian historical information to large areas and audiences, on both sides of the Belarusian border.

Keywords: history of Belarus, YouTube channels, bloggers, memory politics



Introduction

The real history of Belarus, such as it was, was hidden from the Belarusian people for a long time. Russian, Polish, later Soviet historians and ideologists imposed on Belarus the image of the historical past as they saw it, based on their national-state interests. Only since the late 1980s, the era of perestroika, the national concept of Belarusian history has declared itself. Over the past three decades, the national historiography of the history of Belarus has made a tremendous breakthrough in the reconstruction of the historical process from the perspective of the interests of their country and people. It turned out that Belarus has a great, unique history, which, unfortunately, at the mass level people know is very small. Therefore, today the task is to bring the knowledge accumulated by science to the people in a popular form. YouTube channels with historical content, which have been booming in the Internet space for the last two years, help solve this problem. The creators of the channels are, as a rule, professional Belarusian historians who, due to political circumstances related to the events of 2020, found themselves outside their educational or scientific institutions, or even outside their country. Among them are the channels “Military history of the Belarusian people”, “Tuteishy Shlyakhtsich”, “Vusy Skaryny”, “Algerd is no longer the same” and others. Authors-hosts of historical channels create their programs on the basis of historical sources and authoritative publications to ensure reliable knowledge. They make interesting and accessible videos for viewers of any age and level of education and dedicate them to the most important historical facts and unexpected turns of Belarusian history. We are interested in these channels from the point of view of their representation of the history of the Grand Duchy of Lithuania, which, representation, is the field of our research.

YouTube channel “Military history of the Belarusian people”

Belarusian military historian, reserve lieutenant colonel Vital Chirvinsky is a graduate of Baku Higher Military Academy (Azerbaijan, 1992). He served in motorized rifle, tank and reconnaissance units of the Armed Forces of the Republic of Belarus. He was the chief of staff of the tank battalion, motorized rifle battalion; the commander of the rifle battalion; deputy chief of staff of the intelligence battalion.

After receiving a historical education at the Belarusian State Pedagogical Institute named after Maksim Tank (2010), the officer was noticed in the main military department of Belarus, where there was a shortage of professional military historians. He was invited to the post of head of the group of military-historical and heraldic support of the military-scientific committee of the Armed Forces of the Republic of Belarus. He became the chief historian of the Ministry of Defense of the country. In 2013–2020, he worked as a teacher of the Department of Tactics at the Military Academy of Belarus. He taught military history, researched and



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popularized the military history of Belarus, personalities of Belarusian commanders. Oriented on Belarusian national values, the officer enjoyed great respect among the Belarusian intelligentsia and youth.

Belarusian military and everyone interested in the military history of Belarus liked Vital Chirvinsky's book "Беларусь у войнах. Асобы і падзеі" ("Belarus in wars. Persons and events") (Chirvinsky, 2016). In it, through the biographies of the most significant figures in Belarusian military history, presented in chronological order and supplemented by a calendar of military events and facts, the process of development of domestic military skill, military science and invention is shown. An attempt has also been made to understand the origins of heroism or betrayal of people endowed with military and state power. Attention is focused on the mark they left on the Belarusian land, in its history and in the national memory (Chirvinsky, 2016, p. 2). Vital Chirvinsky is also the author of the book "Беларусь у войнах Расійскай імперыі: асобы і падзеі" ("Belarus in the wars of the Russian Empire: people and events") (Chirvinsky, 2019).

The chief historian of the Ministry of Defense of Belarus was forced to resign from the Military Academy due to the pressure of its management, which began on him due to his civil position during the political crisis in Belarus in summer-autumn of 2020.

Vital Chirvinsk's professional fate is typical for most of today's creators and authors of YouTube channels of historical content.

Having thorough erudition and a solid factual base in his field, the retired lieutenant colonel began to develop the course "Military history of Belarus", which has not been and is not available in the higher military educational institutions of Belarus. He created YouTube channel "Military history of the Belarusian people" (registered on November 11, 2020), on which he presents the results of his work under the general name "Vital Chirvinsky. Conversations about military history". The channel has 10.6 thousand subscribers. To date, the channel has posted 66 videos, which have been viewed by about 219,000 people. The course program developed by the military historian is as follows: Development of military affairs in the Belarusian lands. The structure of the army. Means of armed struggle. Fortification. Military strategy. Tactics. Wars, campaigns, battles. Commanders and military leaders of the Belarusian land. Principality of Polotsk. Grand Duchy of Lithuania. Belarus in the wars of the Russian Empire and the Soviet Union. Armed Forces of the Republic of Belarus (Vital Chirvinsky. Conversations about military history).

Although the issue of the Grand Duchy of Lithuania is one item in this program, the author's priority interest in the military history of Belarus of this era is obvious. 73% of the content of YouTube channel is dedicated to it. It includes sections: Army of the Grand Duchy of Lithuania (18 videos), Commanders and military leaders of the Grand Duchy of Lithuania (14 videos), Iconic battles of the Grand Duchy of Lithuania



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(11 videos). Each lasting from 30 to 50 minutes. Separately, there are “Five Minutes” (several short videos, all of them also dedicated to the era of the Grand Duchy of Lithuania).

Portraits of historical figures and the course of events are presented in video lectures vividly and imaginatively. They seem to come alive together with the author’s story, video fragments, maps, documents, fragments of memories, richer illustrative material, tests. The author knows how to transport the audience to the world of the Grand Duchy of Lithuania, hold their attention, intrigue, joke, sometimes he takes on the image of a medieval warrior. And all this is very appropriate, well thought out. Vitaly Chirvinsky is an excellent didactic.

Views of each of the videos – from several hundred to several thousand. Regarding the emergence of the military teacher as a blogger, joked that at the Military academy he had several dozen listeners at his classes, now he has hundreds and thousands of them.

The videos are well-made and highly professional, and their value is not momentary, but eternal. We have a thoroughly developed military history of Belarus, presented in an interesting and informative way, from the Belarusian national point of view, with great educational potential, using modern technologies, and moreover in the Belarusian language (that is very important in the modern Russified Belarusian society). The videos instill pride in the history of their country and their great ancestors.

Viewers note in their comments note that it is impossible to tear yourself away from watching, the time flew by imperceptibly, that everything is presented clearly and simply, and at the same time inspiring. They thank the author that he “takes care of his people, passing on his knowledge to us”. In the comments they write: “You are working for the future of our country and our future modern history!” You can also find the following entry: “...it’s a pity, there is no Khadkevich now.....”.

YouTube channel “Vusy Skaryny” (“Skaryna’s mustache”)

Tour guide, historian, popularizer of the Belarusian language and history, social activist Timofey Akudovich left Belarus in 2021. He moved to Warsaw, taking a number of ideas. In the fall of 2021, together with a small team, they decided to make a program about Belarusian history. But not as usual. Serious, but not boring, visually rich, but without natural shots, and in such a way that it is suitable for both adults and children. History in Belarus is more often imagined as a battleground of different ideologies, but they tried to make history a place where you can reflect, look around and sometimes smile.

This is how a new unusual project “Vusy Skaryny” (“Skaryna’s mustache”) appeared – about the unexpected turns of Belarusian history. The intrigue begins with the very name of YouTube channel. Why is it called that? Skaryna is the first Belarusian and East Slavic bookprinter, a figure of the first magnitude in the



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history of Belarusian culture. We can guess about his appearance, age, circle of his interests and spheres of activity from the lifetime engraving of 1517, which he placed in one of the books of the Bible published by him. This portrait of Skaryna is known to every Belarusian since school. So, judging by the engraving, whether Skaryna had a mustache or if it is just a shadow from his nose, we still need to figure it out.

That's how Timofey Akudovich, the creator of YouTube channel, walks with his viewers from program to program, "pulling the story by the mustache", understanding its intricacies. A specific historical plot is chosen as the subject of the program: interesting, debatable, little-known, or a new, unexpected twist on a well-known plot. Each video is primarily an author's monologue, the "voices of history" are heard, but the effect of the viewer's involvement in the discussion is created. The programs are short – 14–20 minutes long, but extremely dynamic. The ad is true: "Historical program that you will definitely not fall asleep to!" 73 videos were created in 2.5 years. 37 of them, that is, half of all content, are dedicated to the era of the Grand Duchy of Lithuania. The channel has 29,000 subscribers. To date, 48.5 thousand views (Skaryna's mustache).

This videos are about the personalities of historical figures and political events of the Grand Duchy of Lithuania, about wars and battles, the army, laws, religions, cultural phenomena, monuments, etc. Each video has a catchy title.

The heroes of the programs became the monarchs – Grand Dukes: the founder of the Grand Duchy of Lithuania Mindaug, who made the ancient Belarusian city of Navahrudak the capital of new European state; the son of Prince Mindaug – Voishalk, who with his personality gave a rare historical example of a warrior monk; and others.

Among the heroes of the videos is the last king of the Polish-Lithuanian Commonwealth, Stanislav August Panyatovsky, who in his amorous adventures resembled the famous adventurer Giacomo Casanova. Casanova was well acquainted with the king. After learning about his death in 1796, he wrote that Panyatovsky was a good man, but he made one big mistake – he outlived his state.

One of the richest and most influential people of the Polish-Lithuanian Commonwealth, Karol Stanislav Radzivil, who had his own army, equal to the army of the Grand Duchy of Lithuania, fell into the field of vision of "Vusy Skaryny" project. But he became famous not for state or military affairs, but for his unusualness, eccentric actions, incredible fables and lavish parties with fireworks, theatrical performances and hundreds of bottles of wine and champagne.

A series of videos is dedicated to famous women of Belarusian history. One of them is about a 17-year-old girl, Sophia, a representative of the ancient Belarusian princely family of Galshansky, who in 1422 married



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the 71-year-old Polish king Jagaila, gave birth to three sons and founded Jagiellonian royal dynasty. Her two sons, four grandsons and two great-grandsons became kings.

The attention of the creators of the video was attracted by Sofya Slutskaya (1585–1612) from the Alelkovichy family – one of the richest magnate families of the Grand Duchy of Lithuania, whose representatives held high government positions. Alelkovichy ruled in Kiev, and after moving to the Belarusian Slutsk, they turned the city into a major center of Orthodoxy. At the age of 9, Sofia Slutskaya became the richest bride in the Polish-Lithuanian Commonwealth, and today she is known to us as a saint (canonized by the Russian Orthodox Church in 1984).

One of the editions of “Vusy Skaryny” examines the question of how bears were taught to earn money in Smorgon. This is a program about the “stars” of European shows – bears, who were trained in the Belarusian city of Smorgon: they were taught to dance, show various skits, imitate people’s behavior, turn the pages of a book. All this caused unimaginable admiration of the public at that time. Video tells about the difficult profession of a bear teacher and harsh methods of training predatory animals.

The program is dedicated to the “winged hussars” – cavalymen of the Polish-Lithuanian Commonwealth, who were feared by all enemies on the battlefield. The blow of a winged hussar’s pike could reach a power comparable to a shot from Makarov pistol.

A set of laws is under consideration – the Statute of the Grand Duchy of Lithuania of 1588 as the most perfect in Europe at that time and the most famous law written by Belarusians in 1000 years.

The program on the occasion of the 25th anniversary of the first division of the Polish-Lithuanian Commonwealth in 1772 was devoted to the analysis of political intrigues that led to this tragedy, that a huge state in the center of Europe began to fall to pieces – without major wars and cataclysms.

In honor of the Constitution of the Polish-Lithuanian Commonwealth on May 3, 1791, which is considered the first democratic constitution in Europe and the second in the world (after the USA), as it is assumed, approximately 300 commemorative columns were built on the territory of Belarus. Most of them disappeared or were destroyed. About these mysterious pillars, which can still be found on our land today, is told in the program from the series “Vusy Skaryny”.

The announcement of one of the programs reads as follows: “Did you know that the polonaise “Farewell to the Motherland” was proposed to be made the Belarusian national anthem? Have you heard what diplomat wrote it? Keep a short (and very funny) video about Mihal Cleofas Oginsky based on our program “Vusy



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Skaryny”. And about how he participated in Kosciushko uprising against the Russian Empire and took the bride away from the Russian general, see the full version of the program”.

The heirs of the Grand Duchy of Lithuania are Belarusians, Lithuanians and Ukrainians. Poland and Russia also claim the inheritance of this state. Therefore, it is not surprising that many of the programs of “Vusy Skaryny” project are dedicated to different pages of the history of these peoples: “How Zaparozhskaya Sech forged the Ukrainian character”, “Why Ukrainian Cossacks are one hundred percent Europeans”, “The Crimean Khanate began from Lithuania”, “Why Khmelnytsky created Belarusian regiment”, “Moscow broke out, collecting Russian lands” and others.

YouTube channel “Tuteishy Shlyakhtsich” (“Local nobleman”)

Usyaslau Pashkevich is a 24-year-old tour guide, blogger and social activist, who promotes Belarusian history, culture, and language. In July 2021, he had to flee Belarus from political persecution. Lives in Krakow (Poland), where he works on his project “Tuteishy Shlyakhtsich” (“Local nobleman”). Usyaslau believes that the Belarusian culture and nation are noble. He wants this idea to spread and for Belarusians to be proud of it, because usually, when they recall Belarusian culture, Belarusian ancestors, they talk about embroidery, peasants. When he and his parents restored their own genealogy and coat of arms, it turned out that they were of noble origin. In the Belarusian emigrant community of Krakow, disputes on historical topics constantly arise, because people are sincerely interested in history.

“I have a dream, – Usyaslau wrote on the main page of his YouTube channel, – that Belarusians know their history perfectly and have a strong national self-awareness. Only this will provide an inoculation against the absorption of our nation by another. Remember, our strength is in historical memory and native language” (Local nobleman).

YouTube channel “Tuteishy Shlyakhtsich” has 11.6 thousand subscribers. There are 72 videos on it, of which 45 are in the “History of Belarus” section. The analysis of the content shows that the priority for the blogger is the history of the 20th century. But there are also materials on the history of the Grand Duchy of Lithuania. Among them are videos with views from 2.6 to 32 thousand: “A brief history of the Grand Duchy of Lithuania from its foundation to its decline”; “How Peter the First committed a wild murder in Belarus”; “How Catherine the Second took the future away from the Belarusian people”; “Thaddeus Rayton and the division of the Polish-Lithuanian Commonwealth. Council of 1773”.

The reaction to Usiaslav Pashkevich’s program is very positive. The blogger has subscribers from Ukraine who like the Belarusian-language historical content he creates.



YouTube channel “Algierd is no longer the same”

After the events of 2020, many Belarusian families were displaced from their native nests around the world. Children often do not have the opportunity to study the history of Belarus in the schools where they find themselves. Knowing domestic history is fundamentally important for our distinctiveness and identity. Therefore, a small team of like-minded friends led by history teacher Dzianis decided to make a historical project in Belarusian, which will be posted on YouTube. The target audience of the project is primarily children who are outside their country and do not have the proper opportunity to study the history of Belarus. But the authors of the video lessons hope that pupils in Belarusian schools will also be interested in joining. They also want to connect with teachers who work in schools and want to help them diversify their teaching material.

“Were you waiting? Looking for? Interesting lessons on the history of Belarus? And here we are! Historical project “Algierd is no longer the same!” – with these words, at the beginning of 2022, the history teacher Dzianis opened his history channel for schoolchildren, teachers and parents, where he creates interesting video lessons on the history of Belarus in accordance with the school program. The is presented here in an interesting and unborning way.

The teacher invites to his classes like this: “Hey, pupils, can’t you hear the teacher in class? Do you fall asleep listening to a paragraph on the history of Belarus? Didn’t have time to read the story at home on your own, but it’s already morning and you’re going to school? Are you taught history at school in Russian, but you want it in the language of Algierd and Vytaut? Hey, parents, you need some time for yourself and the kids are going crazy and there’s nothing to occupy them? Hey, gentlemen, did you learn history at school and forget everything? Can’t tell Algierd from Keystut? Fly to us on YouTube” (History of Belarus / Algierd is no longer the same).

Now there are 132 publications on the channel. These are video lessons on the history of Belarus for pupils of grades 6 and 7 (Introduction. History of Belarus 6th grade; History of Belarus 7th grade), in which the history of the Grand Duchy of Lithuania is studied. Video lessons correspond to the content of school paragraphs and, accordingly, the curriculum, as well as the age characteristics of schoolchildren. But the educational material in these video lessons is presented in an interesting, imaginative, visual way, close to the mentality of a person of the 21st century. Nice way of teaching. The channel also features many interesting historical stories for the development of school curriculum content, such as: “Battle of Grunwald: places of memory”; “How was the Grand Duchy of Lithuania forced to sign the Union of Lublin?”; “Ivan the Terrible and the Cross of Efrasinnya of Polotsk”; “Smolensk and the Grand Duchy of Lithuania”, “Heraldics – this is”; “Your favorite hero of the history of Belarus”. The channel also contains historical games and tasks,

informative and memorable illustrations, books, films and methodical manuals for the teacher. The channel has 2,077 subscribers and very positive reviews.

Conclusion

To date, there is a whole list of Belarusian YouTube channels with historical content. Some of them are long-standing projects that continue their work today. But in 2021–2023, there is a real boom in the creation of new channels. Their appearance is the answer to another rewriting of the history of Belarus, when the names of its heroes and the most important events are erased from textbooks. History is our inoculation against the mistakes of the past and our chance for a better future.

The list of YouTube channels is not limited to those reviewed in this article. But these channels are primarily focused on the ancient history of Belarus, which is absolutely dominated by the history of the Grand Duchy of Lithuania.

Findings:

1) The creation of YouTube channels provides an opportunity for self-realization to creative Belarusians from historical community, threw out after 2020 of their institutions, spheres of activity, homeland. Each channel has its own specifics.

2) This is not 3-minute “heard-forgot” information, but materials, always are important for historical education of Belarusians.

3) Bloggers are becoming actors of the Belarusian historical politics. Their content works across state borders.

4) Video projects oppose the Russomir historical narrative, which is attacking Belarusian society.

5) The initiatives about the real history of Belarus are attractive for Belarusians, who are interested in history, and highly rated by users.

6) The priority attention of a number of channels to the problems of the Grand Duchy of Lithuania testifies to the far from realized cognitive and educational potential of this historical period in working with Belarusian society.

7) The history of Grand Duchy of Lithuania in the presentation of these channels is important for the formation of the national identity of Belarusians. Their content is nationally inspired.



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HOUSING OF ROMA FAMILIES ACCORDING THE ARTICLE 20 OF ALBANIA CONSTITUTION.

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Abstract

The Constitution of the Republic of Albania provides the right to housing for national minorities. The right to housing is sanctioned as a fundamental human right in the European Convention on Human Rights, ratified by Albania in 1996. Everyone has the right to respect for their private and family life, home and his correspondence. In the article 20 of Albania Constitution the national minorities have their rights and freedoms. Roma families have the right to housing in territory of the Republic of Albania and based on article 18/2 of the Constitution they can't be discriminates for reasons such as: gender, race, religion, ethnicity, language, political religious, economic status, education or parental status. The law “On social housing” was approved in 2018. This law guarantees that the Roma families will benefit from all program of social housing and defines the Roma as a priority group in some social housing programs. Albania has taken measures to support the housing of Roma and in particular in housing legislation: providing free legal aid to Roma applying for legalization, integration of families through pilot projects for urbanization and integration.

Keywords: Roma families, housing, national minorities, law.



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PARADİGMS OF EARLY MODERN HUNGARIAN HISTORY IN THE 16TH-17TH CENTURIES

16.-17. YÜZYILLARDA ERKEN MODERN MACAR TARİHİNİN BAZI PARADİGMALARI

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Özet

(İngilizce Özet aşağıdadır - yine de daha ayrıntılı olarak.) Macaristan, ilk binyılın başında tarih sahnesine çıktı. Daha sonra, 16. yüzyılda, Türk Sultanı Büyük Süleyman Macaristan'ın orta kesimini fethetti, Doğu kısmı da Padişahın eline geçmişti: Transilvanya bir vasal devletti. Batı ve Kuzey kısımları Habsburg Tacı altında Kraliyet Macaristan olarak kaldı. Burjuva gelişimi daha ziyade Batı arazisinde gerçekleşti, ve Alman yönetimi sadece boyunduruk değildi, ama aynı zamanda batı burjuva gelişimine doğru bir yol. Böylece, modern öncesi Macar edebi dilinin şekillendirilmesi, İncil'in çevirileri ve Batı'ya açıklık – bütün bunlar ve çok daha fazlası Kraliyet Macaristan'da gerçekleşti. Batı-Macar sosyal, kültürel ve ekonomik kalkınması Avrupa yolunda ilerledi, Yukarı Macaristan ve Batı Macaristan'daki kentleşme, erken burjuvaziyi artırdı, ayrıca kültürel refah, büyük ölçüde Kraliyet Macaristan'da gerçekleşti.

Anahtar Kelimeler: Macar Krallığı, Habsburg İmparatorluğu, Osmanlı İmparatorluğu, Erken Modern çağ, Transilvanya.

Abstract

Hungary appeared on the stage of history at the turn of the first millennium. The romantic patriotic historiography idealized the Middle Age epoch, the time of the Dynasty of Árpáds as some great kingdom, that was to be restored in later epochs. However, the state underwent different stages, great crises, and heydays, too. Then, in the 16th century, the Türkish Sultan Süleiman the Great conquered the central part of Hungary, and the Eastern part was put in the hands of the Sultan, too. These territories paid taxes to the Ottoman Porta in İstanbul. The only terrain that remained a juridically sovereign state, it was the “Royal Hungary” in the West, which was ruled by the Habsburgs, but they were kings of Hungary, due to the law of the inheritance and formally they were kings of the Hungarian Kingdom. The bourgeois development took place in this Western terrain, and the German rule was not some yoke but a way toward the western bourgeois development, instead of conserving the feudal middle-age noble aristocracy. Towns with urban culture were more and on a higher level than in Transylvania. Consequently, the traditional Hungarian stereotype about “falling into three parts” was never true and cannot be applied in historical sciences nowadays. The only part that remained under the name “Hungarian Kingdom” was the Royal Hungary in the West, while Transylvania was not a new state, nor some ‘continuation’ of the former Hungarian Kingdom, but a vassal terrain of the Ottoman Turks. Nevertheless, the Hungarian national continuity and national consciousness were not only preserved in Transylvania but rather in the Royal Hungary in the West. The great turn in European social and intellectual development, due to the appearance and activity of the burghers, thus the evolving of the bourgeois society, resulted in the new era called the Early Modern Age. This new Western world impacted largely the Western and Northern Hungary, thus the Upper Hungary and the Western edge. “Transylvaniam” was an ideology of Transylvanian supremacy over Hungarians inhabiting the central part of the country, thus those Hungarians, who lived in other than Transylvanian land, were regarded as suspicious and perhaps of “less value”, than those inhabiting Transylvania, in the aspect of Hungarian national spirit– according to the teaching of the Transylvanian ideology. But even on the contrary, the shaping of the premodern Hungarian literary language, translations of the Bible, and openness toward the West – all these and much more took place in Royal Hungary, on the Upperlands and the wide lands in the North, Upper Hungary. Hence, the radical and effective revaluation of Transylvania, seems necessary on any level of research and education, as well.

Keywords: Hungarian Kingdom, Habsburg Empire, Ottoman Empire, Early Modern age, Transilvania.



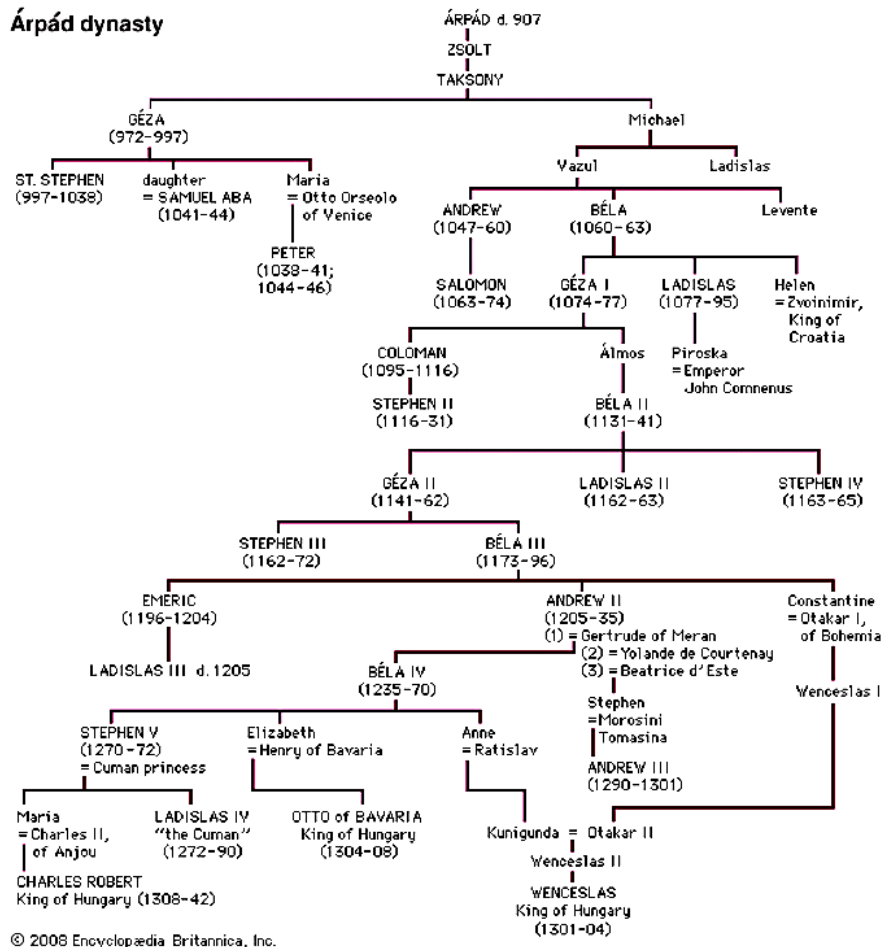
1. Figure Hungarian Kingdom cca. 1480, as great as it became under King Matthias Corvinus.

Yet instead the Polish/Lithuanian Commonwealth, the personal union of Kingdom of Poland and the Grand Duchy of Lithuania was visible, before the Lublin Union (1569); and Moldova was an independent but Polish-dependent state, while Walachia already a part of the Ottoman Empire. (Magocsi, 1991, map No.10.)

1. INTRODUCTION: THE SENSE OF THE HUNGARIAN KINGDOM

Here we are talking about the historical Hungarian Kingdom. That was much different from the modern Hungary in the 20th century, not only for the territorial measure but also for the multiethnic character of the population. A useful overview of the historical geography has been given by a scholar, who served as a Prime Minister, too, in the interwar period of Hungary, when Hungary was becoming a fascist-like regime, but this wise politician, Teleki resisted the right-wing nationalism and fascism and loudly warned of the dangers of the path of fascism, such as, he sent letters to the “Governor” Miklós Horthy to stop the stepping in the way together Hitler; therefore, Teleki’s overview in the historical geography can be proposed as a solid reference, of nonbiased views, of objective approach, even more, it has been published in America. (Teleki, 1923:1-24.) Territorial changes of Hungary happened due to the Trianon Peace Treaty (signed on 4 June 1920 in Versailles, France), after that Hungary had already a significantly smaller area, hence the proportion of nationalities changed already very low. (Romsics, 2002; 2005; 2009) The ruling elite reacted for this turn in Hungarian history in a very bad way. The concept of neo-nationalism and “cultural supremacy” was the ideology of the Horthy regime, which ruled in Hungary between the two World Wars, in the 1920-30-ies. It went back to the Trianon Treaty of 1920, which marked the borders of “little” Hungary because Hungary lost the First World War, and the losers were punished, of course. (Sadecki, 2020) The revanchist ideology of the Hungarian ruling noble class was the “regain what was lost”, that is, the strive to restore the former “Great Hungary”, which led to the aggressive military and expansive policy of the “small” Hungary, heated by imperial complexes. (Vardy,

1983) Thus, the ideology of “cultural supremacy” was the “tool” for restoring the former territories; via looking down and underestimating the Slavic and Roman ethnicities, proclaiming that those were “of less value” than Hungarians, and their culture was “on less level” than that of Hungarians. It was a sharp racism. (Földvári, 2023h)



2. Figure The Dynasties of Árpáds and Anjou: the former led to the latter, via the female line (Encycl. Brit.)

Hungary appeared on the stage of history in the 10th century after the Hungarian tribes conquered the Carpathian Basin in 895 led by the Prince Árpád (c. 845-c. 895-c. 907). Under his rule the Hungarian tribes, together with three kabar tribes (a Turkish people) moved from the East-European steppe to the Carpathian Basin. (Kristó, 1996.) Here they, as a pagan power in the tribal social regime, had become stronger and threatened Western Europe. (Kristó, 2000.) Then the last pagan Great Prince, Geysa, baptized according to the Byzantine rite as Stephanus (Greek Στέφανος) but turned to the Western, Roman form of Christianity and called Western monks to grow up his son, Vajk, who was thus baptized by a Western, Roman-rite bishop (namely, Adalbert) as Stephanus and was educated in a clear Christian spirit. He then became King Stephen



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(István) I, the founder of the Hungarian Christian, feudal state. (Györffy, 1988; 1994). He strengthened the royal power with German troops and organized a West-European state of Caroling-type with administration and church organization. His motivation was the stabilize his royal power, this was the reason to introduce and strengthen Christianity, in its Western version, as it is emphasized by Nóra Berend, too (with a rich bibliography). (Berend, 2013: 111-113, 128-135) Moreover, it seems to be complete nonsense to maintain that the first king turned to the Western, Latin form of Christianity to choose some “true” Christianity, which was “truly European”, while the Byzantine confession would be some “pagan” and “non-European”, as the Catholic historians and those authors maintain it, who are servile to the nationalist ideology, dominated by Roman Catholics. On the contrary, as Nora Berend and her research group concluded in their previous book: “No sharp dividing line existed from the beginning between the region that came to constitute Latin Christendom and the area of Byzantine Christianity. Byzantine influences penetrated central Europe and were significant in Hungary for centuries. As the case of Rus’ demonstrates, similarities in Christianization (although not in political structures) cut across the divide between Latin and Byzantine Christendom, while differences within Latin Christendom should not be minimized.” (Berend, 2007:37) The Byzantine confessional culture has always been an integrated component of the societies in Latin Christian states, mainly in Hungary. (Patlagean, 2000) Then his successors ruled the Hungarian Kingdom as the Dynasty of Árpádians, until 1301 when this royal dynasty was extinct by the death of King Andrew III. (Szűcs, 1993)

Then ruled kings of the Angevin (Anjou) Dynasty, Charles Robert (1308-42) and Louis the Great (1342-82), under the rule of whom the Hungarian Kingdom became wealthy and lived in peace. Louis The Great was crowned for the Polish throne, too, and under his reign the Hungarian–Polish state was the largest and of greatest power in Europe. (Barany, 1990:702) His younger daughter Hedvig/Jadwiga married the Lithuanian Jogaila/Jagello in 1386 and this was the beginning of the Polish-Lithuanian personal union (Halecki, 1974), which led to the significant strengthening of Poland but a significant weakening of the formerly powerful Grand Duchy of Lithuania. (Földvári, 2023) The elder daughter of Louis the Great, Maria, was crowned for the Hungarian throne, albeit the Hungarian society of noblemen was the most misogynous in contemporary Europe, and her husband Sigismund of Luxemburg was crowned, too, as her consort and ruled in Hungary (1387-1437), causing a sad decay after the heyday at Louis the Great. (Mályusz, 1984; Lendvai, 2003:62-74.) Then prosperity came again under the governor János Hunyady and his son King Matthias Corvinus (Zerffi, 1883), who enlarged the territory of Hungary in the Northwest and defended it from the Ottoman Turkish conquest in the South. (Lendvai, 2003:75-84.) He was a great patron of the Renaissance culture and his collection of books known under the name “Corvina” was very famous and of great significance. (Schütz, 1934) After him, a great national decay came, under the Jagiellon Dynasty: Vladislav II, King of Bohemia, Ulászló II in Hungarian

history. (Kubinyi, 2002) His son Louis II (1505-26) died tragically in the battle of Mohács in 1526, when the great conqueror, Turkish sultan Süleyman the Magnificent (Ágoston, 2014) defeated the Hungarian troops completely. (Engel, 2001).

2. THE PARADİGM OF “FALLING APART IN THREE PARTS” AND İTS AMBIGUITİES

Then Turkish Sultan Süleyman the Magnificent captured Buda, the capital city in 1541, and Hungary since that time was partitioned into three parts: the Turkish occupation in the central part, growing more and more, and the small Hungarian Kingdom in the West and North, being a province of the Habsburg Empire, and Transylvania in the East, being a vassal state of the Ottoman Turkish Empire, ruled by the Princes of Transylvania. (Hegyi, 1995; Ágoston, 1992) Vassalage of Transylvania is recognized by conservative, Christian historians, too: “The relationship between the principality and the Porta was fundamentally defined by the fact that the Ottoman political leadership always considered the Transylvanian state a vassal. This meant that the princes could only pursue an independent foreign policy with the Sultan’s approval, however, they had a completely free hand in managing internal politics. In exchange for vassalage, the principality paid an annual tax to the Porta, the amount of which increased from the ten thousand forints handed over for the first time (1543) to twenty thousand by the end of the century.” (Pálffy, 2021). This vassalage was and has been of significance, for it can and must correct the one-track approach of those who overemphasize the role of Transylvania in Hungarian history.

Any kind of political or military operations, such as beginning a war or interfering in a war, were only able with the permission of the Ottoman Porta. Such as, when the great powerful king of Poland and Grand Duke of Lithuania, Stephen Batory (Báthori), was engaged in war against the Muscovian Tsar Ivan IV (the Terrible), he, being the Prince of Transylvania, too, called Transylvanian cavalry soldiers in such a significant number, as the Transylvanian troops played a determining role in the siege of Polock, and the chief leader of his royal troops was Kaspar Bekes the Transylvanian nobleman — all these were only able with permission of the Turkish Sultan, because Transylvania was a vassal state and neither a single soldier was able to mobilize without permission of the Ottoman Turkish Porta. For this reason, the most skilled diplomat of King Batory (Báthori), the Transylvanian-Polish nobleman Martin Berzeviczy, was sent on a secret mission to the Turkish Sultan, to gain permission to use Transylvanian troops in the Russian-Polish war. Berzeviczy gained not only permission from the Sultan for troops from Transylvania, but also financial help and troops from Moldova, and Valachia, too, which was the former Țara Românească and both latter were vassal states of the Turkish Sultan such as Transylvania. (Veress, 1911:115, footnote 36)



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Let us take a look at this problem. The traditional, ultraconservative approach to this epoch and the topic of Transylvania was the overemphasizing “Hungarianness” of Transylvania (wow, the multiethnic country with “three nations”, amazing), its role was overvalued in “keeping the Hungarian nation”, holding the Hungarian identity: “Transylvania—the Stronghold of Hungarian Sovereignty” – wrote Paul Lendvai, however, it was not true but false, and it even seems to be a falsification. (Lendvai, 2003:1062-113.) Even nowadays this false privileged status of Transylvania in the Hungarian discourses has yet dominant as if Transylvania would be the only terrain of Hungarian culture and Royal Hungary would be Germanized — while the urban culture, which is the axial catalyzer of any historical development, was managed in Transylvania due to the local German population: The Saxons. They formed a special ethnic group of Germans living in Transylvania resulting all kinds of modernization, since any kind of modernization is always a result of the urban development and diligent work of burghers in the bourgeois spirit of urban citizens (Szelenyi, 2004), while Hungarian noblemen hunted for bears with their princes and proudly drank in their traditionally overdecorated dresses. The false overemphasizing of Transylvania peaked in interwar Hungary when the irredenta policy and revanchist ideology of the Horthy regime strengthened the overvaluation of Transylvania in Hungarian history and culture because in this way they strengthened the desire in the population to “return” Transylvania back to Hungary, as “the most Hungarian land”. (Vardy, 1983) To the sorrow of Humankind, such processes appeared lately in the illiberal Orbán regime, too; however, the Trianon Treaty happened already a century ago, and the fourth or fifth generation of ‘Hungarians’ inhabiting Transylvania has already been mixed with Romanians as for the blood, as for the culture, too (some acquaintances of the author are excellent Romanian scholars with Hungarian family names, and in many cases, descendants of mixed families spoke both languages well, thus the mixed population of Transylvania can and want to live in peace unless Orbán provokes them). History like any field of Science must be cultivated in an unbiased, objective way. Thus, the evaluation of Transylvania as the “Stronghold of Hungarian Sovereignty” is not only false but falsification and subordinates Historical Science to some kind of ideology.

In contrast to it, the quoted above historian, Géza Pálffy, emphasizes the vassalage of Transylvania, while being a representer of the recently ruling patriotic, national historiography, moreover, he is a Christian person expressed in his writings, too, thus belonging to that same wing of views and social position as Lendvai. Hence, if a similar author comes to different conclusions, then it must be considered the old-fashioned nationalist-heroic paradigm has already been outdated from the scholarly discourses. Moreover, Pálffy, in the quoted monograph of his, which was lately published by the Indiana University in Bloomington, highlights and analyses the European, early-bourgeois development in the small Hungarian Kingdom in West, which was a part of the Habsburg Empire. (Pálffy, 2021) Trade toward Europe, moreover, the bourgeois development and

European spirit, due to the integration into the Habsburg Empire — all these resulted in the modernization of the Western part of Hungary, which can be noticed even nowadays, considering the most correct, most precise, most accurate spirit of people in Western Hungary and contemporary Slovakia. The latter was the “Upper Region” of Hungary, with German inhabitants in a significant number, largely in the towns, resulting in the urban culture and bourgeois development. (Winter, 1926)



4. Figure Hungary's three parts in the 16/17 centuries: the Kingdom in the West, the Turkish Conquest in the Central part, and Transylvania in the East. (Magocsi, 1991 map No.14. - our great thanks to the author for permission)

In the next picture (Figure No.4), which is the map of Eastern Europe about 1570 created by professor Paul Robert Magocsi, it is visible that the Hungarian Kingdom was a small slice only in the West, and in the time of question, it was a part of the Habsburg Empire, thus marked with purple color together with the Habsburg terrains. (Figure No.3.) The central part of former Hungary was the territory of the “Turkish Conquest”, marked with a light-brown color, such as Transylvania in the East, which was a vassal of the Ottoman Turkish Empire, thus practically such a subject of Ottomans as the central part of Hungary. Although the author of the map, an expert in Hungarian history, and professor at Toronto University, Paul Robert Magocsi wrote the name “Hungary” on the map of to land of the “Turkish Conquest”, he depicted it with the same color of light brown as Transylvania has been depicted with this same color, and both are depicted with the same color of other

territories of the Ottoman Turkish Empire; on the other hand, Prof. Magocsi wrote into the Western slice that “Royal Hungary”, which has been depicted with the same purple color as all territories of the Habsburg Empire. (Magocsi, 1991: map No.14.)

3. THE “ROYAL HUNGARY” MEANT THE SOUVEREIGNTY AND EUROPEIZATION.

Hence, juridically, rather the “Royal Hungary” should have been called the “Stronghold of Hungarian Sovereignty”, because it was juridically a sovereign kingdom, although under the rule of Habsburg Kings, who inherited the Hungarian throne from Louis II of Jagello Dynasty. Habsburgs had to be colonized by the Hungarian crown, as well; it was a similar phenomenon to the Polish Kings were always separately inaugurated as Grand Dukes of Lithuania, too, when they were rulers of GDL, too, thus, to respect and express the juridical sovereignty of the state in question, while the real rule and practical independence were subjects of discussion. Royal Hungary was the terrain that recognized the Habsburg Kings as heirs of the throne, with an aristocracy that was loyal to the actual king. On the other hand, Transylvania was not able to elect its Princes in a free way but with the approval of the Turkish Sultan. Whenever the Transylvanian national assembly of three nations (Oborni, 1998) elected a new Prince, then an embassy was sent to Istanbul, to the Turkish Sultan, for the approval of the result of the elections. If the Almighty Sultan did not approve the person elected, then that person was not able to rule on the throne of Transylvania but another one was to be chosen. For instance, Gabriel (Gábor) Bethlen, who became a great Prince and ruled for a decade, began to build his career in Istanbul, lobbying for appointment to the throne of Transylvania, then he was elected by Transylvanians, because the Turkish Sultan “suggested” them to elect him; in a consequence, Bethlen remained always suspicious as a friend of Ottoman Turks, although he wanted to deliberate Hungary and unite it, as well.

Another example, in the 17th century, when Prince of Transylvania Stephen Bocskay [read 'bochkai] led victorious campaigns against the Habsburgs, he got a crown from the Turkish Sultan, but he did not take it on his head, for he had not accepted any “appointment for the Hungarian throne”, thus, he refused to be coronized. Why? Because in the case he accepted the Turkish crown as a king of the whole of Hungary, then he had been a vassal king to the Ottoman Turkish Empire, therefore, the whole of Hungary had been a vassal state of Turks, even those “Royal” territories were ruled by the Habsburgs as Hungarian Kings. Bocskay respected the juridical sovereignty of Royal Hungary (wow, the ‘rule of law’ in historical times!), although he fought against the Habsburgs, he did not want the whole Hungary to become a vassal of the Ottoman Turkish Empire, such as Transylvania was that. (Thallóczy, 1884; Benda, 1985)

Thus, what about Transylvania as the “Stronghold of Hungarian Sovereignty”? (Lendvai, 2003:106-113) Oh, what a great “sovereignty” it was, the complete dependence on Ottoman Turkish rule! Therefore, the outdated



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sloman, about the “falling in three parts” of Hungary, must not be maintained from a serious scholarly point of view, although it still has recently been a matter of lesson in the schools of Hungary (which appears, perhaps, because the authoritarian Orbán regime seems to be a mafia-state of those gypsies of Transylvanian origin, who recognize the son of the Orsós gypsy family for their voivodah, according to some views in the right-opposition, albeit it is not the subject of our paper to discuss it). Juridically, the Hungarian state was shrunk into one single piece in the West, under Habsburg Kings and it joined mostly to Europe. The West-Hungarian social, cultural, and economic development went in the European way, the urbanization in Upper Hungary and West Hungary resulted in the increase of early bourgeoisie, and the economic prosperity, as well as cultural prosperity, took place largely in Royal Hungary, much more than in the other two parts of the divided-in-three-parts Hungary, the opportunities for any European development were much better than even in Transylvania, and Upper Hungary, as a special terrain, was such worth of attention for the Hungarian development as Transylvania, even much more. (Paládi-Kovács, 1994; Kónya, 2012; 2016)

Merits of Transylvania must not be denied nor overemphasized. For instance, Brassó's library had been founded by Johannes Honterus, the significant Saxon typographer, in the middle of the 16th century, was the richest in the land, and to great sorrow, it suffered a devastating fire in 1689. Thanks to the peregrination of Protestant, and Calvinist students in the Netherlands, West European cultural impacts were significant. The personal libraries of scholars like Apáczai and Pápai Páriz contained many books due to their studies abroad. Printers in Transylvania were of significance, too, but too few to meet the growing demand for books. Calculations show that, between 1650 and 1680, the printers at Brassó, Szeben, Gyulafehérvár, Kolozsvár, Debrecen, and Nagyvárad published 396 titles, not counting reprints. (Hist.Trans. 2001) Although we have no room here nor any task for the overview of the Transylvanian intellectual history, it must be considered, that, with the whole brightening cultural history of Transylvania, it must not be opposed to the values of West Hungary, nor to be declared as the only “stronghold” of sovereign Hungary, denying in tendentious way the role of the Royal Hungary in West and North.

On the other hand, the early bourgeois development, in Royal Hungary (the Habsburg-ruled part of the partitioned Hungarian Kingdom] in the Early Modern Age, has been evaluated as a “Burghers’ Revolution” in the late 16th – early 17th century. Not in Transylvania, but in the Royal Hungary! (Szelényi, 2009) The European development and the urban culture in the Early Modern Ages are proved for instance by a large number of the five-century old shops and store-buildings in the boulevard “Castle Circle” in Sopron, West Hungary, at the border of the Hungarian and Austro-German language fields, and was a typical bourgeois city, representing the spirit of diligent burghers, contrary to the Transylvanian hunting/drinking provincial/patriarchal mentality. The

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bourgeois development and business culture are brightly evidenced by the architecture in the “Old Grain Square” and “Castle Circle Boulevard” in Sopron. (Szende, 2018) For example in Northern Hungary, on the “Upper Land”, it is worthy to consider the city of Lőcse/Levoča, with its Town Hall built in the Early Modern Age, evidencing the burghers’ culture and civilization of the town, together with the structure of city-building of the whole town; all these and more than a dozen of such towns proved, what great opportunities appeared in the Royal Hungary for the burghers’ development. (Demkó, 1896)

The rule of the Habsburgs did not bring more disadvantages, as the real dependence of Transylvania on the Ottoman Turkish Porta, but even benefits instead of Transylvanian disadvantages of suffering with inner conflicts within each other, strives due to the hunting/drinking provincial/patriarchal mentality of noblemen, in contrary to the spirit of diligent burghers. Although German burghers inhabited Transylvania, too, and their urban culture saved Transylvania from sinking to the swamp of the bear-hunting and constantly competing-debating noble class, the burghers in Western and Northern Hungary were in a better position, for their natural links to German lands, urged and supported the economic and trade contacts, while Transylvanian Germans, the Saxons (in Hungarian “szászok”) lived in a double dependence on the Turkish rule (suffering from some Turkish troops “going out for excursions” on the Ottoman Turkish lands of the vassal Transylvania) and the Hungarian patriarchal noble class as well, for the Saxons were not equal with Hungarians in reality, although Transylvania was “the country of three nations”. (Oborni, 1998) On the contrary, the Habsburg rule over Royal Hungary gave even benefit, for it provided the order, the perfect order, as far as it was possible within the framework of the “thirty-years war”. The “thirty-years war” was much more than a confessional war, therefore, it might have been a falsification to interpret it as a consequence of the “Confessionalization” that took place in the intellectual also social history of the 16th century. Thus it would be very false to derive the “thirty-year war” from the appearance of Protestantism and deny that much benefit the Protestant burghers’ culture brought to Europe. (Földvári, 2023a) The “thirty-years War” was much more than a confessional war, and lately, it has already not been regarded as a confessional war in the current literature (Wilson, 2008)

Therefore, it was not the fault of the Habsburgs, that Western Hungary suffered also much with the war, but not with the vassalage, nor with the local wars of its rulers, such as Prince of Transylvania, in the middle of the 17th century, who wanted to gain that Polish throne was earlier of Stephen Báthory, and continued bloody campaigns, led Transylvania to strange war for a nothing, thus destroying his own country. Noteworthy to compare: on January 25, 1576. Jan Tarlo voivodah of Lublin, in the name of all Polish noblemen, invited the Prince of Transylvania, Stephen to accept the crown of Poland, and gave him the official written example of pacta conventa, the document of promises and expectations of both sides. Thus, Batory (Báthori) had been



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invited by a significant part of Poles (not of all, of course). On the contrary, a century later, György Rákóczi II (the Junior) was involved in the Swedish-Polish war, on the side of the enemies of Poland: in 1656 he received the embassy of the Swedish king in Cluj (Kolozsvár), Transylvania, and made an agreement that the Swedish Kingdom must support his ambitions to the Polish crown, signed on December 6 in Radnót, Transylvania, and on September 7 of the same year, an alliance between the Cossacks (who were opposers of the Polish power at that time) and Transylvania was established, signed in Alba Iulia (Gyulafehérvár). Therefore Rákóczi II allied with the enemies of Poland but not with the Polish nobility; moreover, as it has been emphasized by the expert on the topic, Sándor Gebei, Rákócz II bonded himself and his country to such states and powers, which had no common interest with Transylvania, nor the Swedes, neither the Cossacks were interested in Transylvania's reign in Poland, but in weakening Poland in any way. (Gebei, 2001)

4. THE CASE OF THE CULTURAL CENTER TRNAVA, THAT SUPPORTED THE EUROPEAN INTELLECTUAL DEVELOPMENT.

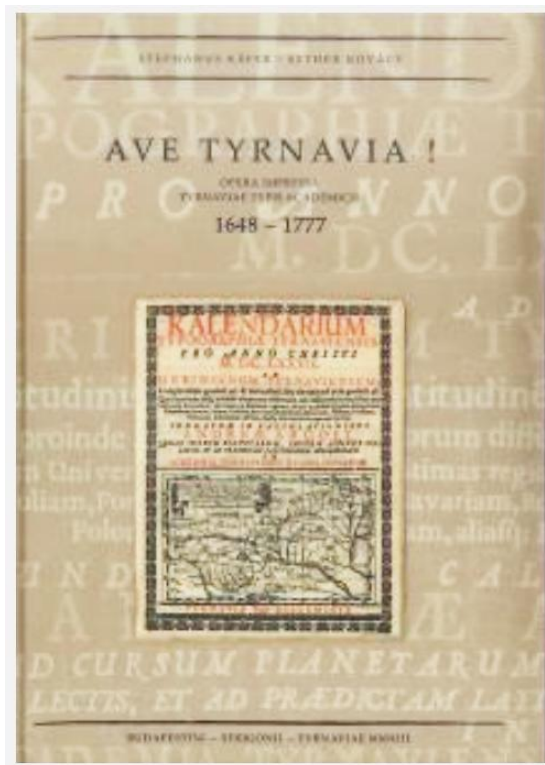
For an evidencing example, it is to be considered the establishment of the Royal University in Trnava (then-Nagyszombat, but also in Latin 'Trnava' as well as in Slovakian, now located in Slovakia), which was the predecessor of the recent Budapest University named Eötvös Loránd, which is lately the first one in Hungary, according to the international ranking, the most recognized and most scholarly university in Hungary. There, in Trnava, was established the Royal Hungarian University Typography, which played the most important role in the intellectual history of Hungarians as well as of other ethnicities. (Käfer, 1977; Käfer & Kovács, 2013) Later, when the Royal University moved from Trnava to Budapest, the Royal University Typography played an axial role (Király, 1983) as well as in the Hungarian culture as in the culture, national awakening (Király, 1993) and elaboration of literary languages (Király, 1980; 1985) of other ethnicities, such as Slovaks, Serbs, Romanians, and Carpatho-Ruthenians, too (Király, 1981), not to forget Ukrainians, whose third literary almanach (the "Rusalka Dnistrova") was printed in this typography in Buda, 1837. (Boyko, 1967) Yet in Trnava, books in significant numbers were printed, in various languages, providing the cultural development of Hungarians, as of other nations inhabited Hungary, as is evidenced by the lately published complete and detailed catalog and monograph. (Käfer & Kovács, 2013) As for the Slavic ethnicities, it was of great significance that The Jesuit Order provided the preaching in local vernaculars, too, not only in Latin nor in some well-recognized "imperial" languages but in the spoken ones in the respective regions; therefore, in Trnava they had Cyrillic letters, too, in their typography; however, in the period of question (while the university managed by the Jesuits had been working in Trnava, since the establishing in 1648 until the moving to Buda in 1773, the right part of recent Budapest) they printed only six books in Cyrillic letters. During the Jesuit period in 1648-1773, they issued a



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Serbian and two Ukrainian items in the late 17th century, those were registered by Károly Szabó in the retrospective bibliography of the old-printed books published in the Hungarian Kingdom. (Szabó, 1885:NoNo.1844, 1933, 1966.) Then another printed book in Cyrillic letters from the 18th century was described by Hiador Sztripszky (1911), the great researcher of Ukrainian culture and Cyrillic books in Hungary (Udvari, 1998; 1999), who translated Ukrainian literature to Hungarian in cooperation with Ivan Franko (Megela, 1993), and edited the journal *Ukránia* to let the Hungarian public know the Ukrainian culture. (Földvári, 2023k)

In Trnava, the representatives of the higher elite of the Uniate, thus Greek-Catholic Church was educated, after the Union of Uzhorod happened in 1646, when a significant number of Orthodox, thus of Byzantine rite priests accepted the supremacy of the Roman Pope, thus they were united to the Catholic church but with the rights to keep their Byzantine liturgy and some other privileges, which then were not completely provided. (Lacko, 1960) However, the theological education was not provided in the region of question, therefore, the Byzantine-rite priests were educated in Roman Catholic seminaries, such as in Eger (North Hungary; Földvári, 1997), Trnava (Upper Hungary, now Slovakia; Maurer, 1887:265-266, 369-380; Hodinka, 1941), Vienna (at the Barbareum Seminary at Sancta Barbara Chapel: Poliansky, 1881; Zschokke, 1894:546–550; Korczok, 1921; Földvári, 2007), and in Oradea (East Hungary, now in Romania). Noteworthy, the higher elite of the Carpathian Greek Catholics, such as all bishops of Carpathian Greek-Catholics, in the 18th century, were educated in Trnava, at the Jesuits. (Földvári, 1996)



5. *Figure* The Title page of: Ave Tyrnavia! Opera Impressa Tyrnaviae Typis Academicis 1648–1777: Publications of the Academic Press of Trnava 1648–1777 Written by Eszter Kovács and István Käfer. Budapest–Trnava–Esztergom, 2013., 288 pages ISBN 978 963 200 610 9

As to the question about Transylvania, it is worth to refer to the greatest innovator of the Hungarian prose, literary language and national culture: Archbishop Péter Pázmány, He was born in Transylvania, but entered the Jesuite Order, then uplifted in the Church hierarchy up to the highest rank of a national church: he was the head of the Hungarian Roman Catholic Church as Archbishop and was appointed Cardinal by the Roman Pope. He never returned to his birthland Transylvania, nor privileged Transylvania for being some “Stronghold” of Hungarian nation, albeit he wanted Hungary to keep and increase its national identity and mother tongues, thus his preaching addresses, homiletic sermons, as well as those essays published only in print but not for the pulpit in the church, brought the great turn in the developing the Hungarian literary language and Baroque literature, as it has already well-researched and analysed on the level of monographic syntheses, by the great expert of the Hungarian Baroque, István Bitskey, member of Academy of Sciences, former Chair for two decades of the Dept. of Old Hungarian Literature at the Debrecen University, issuing not a single but several books on Pázmány. (Bitskey, 1979; Bitskey, 2015) Pázmány was the person who was the founder of the university in Trnava, too, therefore, one of the monographs of above-mentioned scholar, Bitskey, was published by the Trnava University as for the founder of that. (Bitskey, 2010) Pázmány’s relation to Transylvania was of significantly great importance, for his activity in the language renovation and keeping the national heritage and consciousness did



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not take place in Transylvania but in the Royal Hungary, although he was of Transylvanian origin, but did not return there. He did not evaluate Transylvania's separateness for a necessary thing but meant that would be integrated in the Hungarian Kingdom. (Guitman, 2013)

Thus, what a great “Stronghold of Hungarian Sovereignty” was Transylvania (Lendvai, 2003:106-113), with its complete dependence on the Ottoman Turkish rule, not recognized even by the greatest patriote, renovator of Hungarian language, by the Warrior for the Hungarian national consciousness as well as for the independent, integrated Hungarian state: Cardinal Peter Pázmány! In West and North Hungarian terrains, Hungarians built European development, while Transylvanians hunted for bears and proudly drank in their traditionally overdecorated dresses. Nevertheless, they made much for the Hungarian culture, literature, and language, as well. However, Transylvanian writers as Miklós Bethlen or György Aranka, and others, as well as book-printers as Miklós Misztótfalusy-Kis, and all intellectuals, were first of all Transylvanians and at the second time Hungarians, their Hungarian national consciousness was a special Transylvanian-Hungarian consciousness, and later on such a soul the “Transylvaniam” appeared and flourished, which led in the 20th century to the false overemphasizing of Transylvania, regarding exclusively the real values and results of Transylvania for absolute ones, and such a biased, one-track-mind approach has already been a political but not a scholarly approach, to the sorrow of the science. (Nowadays the overemphasizing Transylvania serves some attempts for the state capture by a mafia that recognizes the son of the Orsós family for their voivodah – according to some views published by the right opposition, albeit it is not the subject of our paper to discuss it.) Transylvania must be taken on its real place, and evaluated not more and not less. Nevertheless, it is very necessary for the Clear Science, that some Hungarian historians of Transylvanian origin, who nowadays enjoy many benefits from their Transylvanian origin, must get away from the fleshy pot of the recently ruling right-wing illiberal regime, and not to use Transylvaniam for career-building as a profitable capital, for Science is not a stock-exchange but a fair terrain of investigations for seeking the Truth, and academia has not been a political kitchen – in better cases. (Sadecki, 2020:19-31)

In West and North Hungarian terrains Hungarians built European development, while hot-headed Transylvanian Princes led their people into strange wars and allied with powers that could-shouldered Transylvania. Peaceful wealth management with diligent work, or hunting for bears and proudly drinking in their traditionally overdecorated dresses — which one is the “stronghold of sovereignty”? It is much relevant to our topic: the Carpathian corner, Subcarpathia (yet in the Hungarian Kingdom) which from the 20th century is regarded as Transcarpathia (since the Trianon Treaty), was the most retarded terrain of the Hungarian Kingdom, however, it was also a commonplace to be reviewed. As above said, bishops and the higher stratum of the Uniate, Greek



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Catholic clergy were educated in Trnava, at the Jesuits, and who did not, those were educated in Eger, probably. Or in Oradea (Nagyvárad), which was located in the Northwest corner of Transylvania, not in the real territory of that, but in the land of “Partium”, which was the name of those territories of the Hungarian Kingdom belonged to the state of Transylvania. Largely the alumni of Trnava and Eger dominated in the Carpathian Ruthenian Greek Catholic, thus Byzantine-rite Catholic clergy, therefore, that region, as for the intellectual history, was bond to the Northern region of Hungary, thus for that former Royal Hungary (for the Hungarian Kingdom was already united under the Habsburg reign in the 18th century, except for Transylvania, that remained a separate country, but under the Habsburg rule, too), therefore, Carpathian Ruthenia belonged to that Western and Northern Hungarian region, which now has been much evaluated for the European development. Thus, when Orthodox priests chose the Union with Rome, they chose not only the social improvement of their place in the feudal society but also the way toward the West, while any link to Transylvania would result in some patriarchal/Asiatic/anachronic society. When evaluating the Church Union, described below, it must be considered, that Carpathian Ruthenia did not belong to the Transylvanian cultural region but to the European half of Hungary, thus, to the Western-Northern Royal Hungary. Wow, the point. Although the great Rákóczi family had large estates in Carpathian Ruthenia, they owned the Castle of Mukachevo, and the Calvinist Protestantism put its links to the region – this terrain had largely been and remained a Catholic land, and the Byzantine-rite Carpatho-Ruthenes did not accept the Reformation but preserved their traditional confessional identity expressed in the liturgy, and united to the Catholic church to be linked to that Habsburg-dominated terrain which was somehow part of Europe in the period of the question, albeit Transylvania seemed to be that in a much less measure. The church union, therefore, was the way toward the European development to the region it took place in, contrary to all ambiguities, as well. (Földvári, 1996)

5. THE OTTOMAN TURKISH CONQUEST: THERE ARE TWO SIDES TO A COIN.

The Turkish conquest concerns us, because the book import was influenced by some consequences of the defeat of Turks by the Habsburgs, for instance, the great growth and rebuild of the Eger city. The Ottoman conquest lasted for about a century and a half, and much-simplifying matter has been written about it in the popular literature, so we do not have the space for that, nor is it our task. Noteworthy, Ottoman Turks organized and established their special administration, based on vilayets as the special unit of the Ottoman Turk imperial administration, managed in a written way in the defters, the conscriptions of the taxes and taxpayer, thus it was not some “Asiatic” nomad horde but a well-organized empire, inheriting the world-conquering skills of the Islam at the empire-builder Arabs, and the Mongol-Türkish huge conquering talent as well. The cultural heritage of Islam contradicts any pejorative devaluation of Ottoman Turks. The first “globalization” in the



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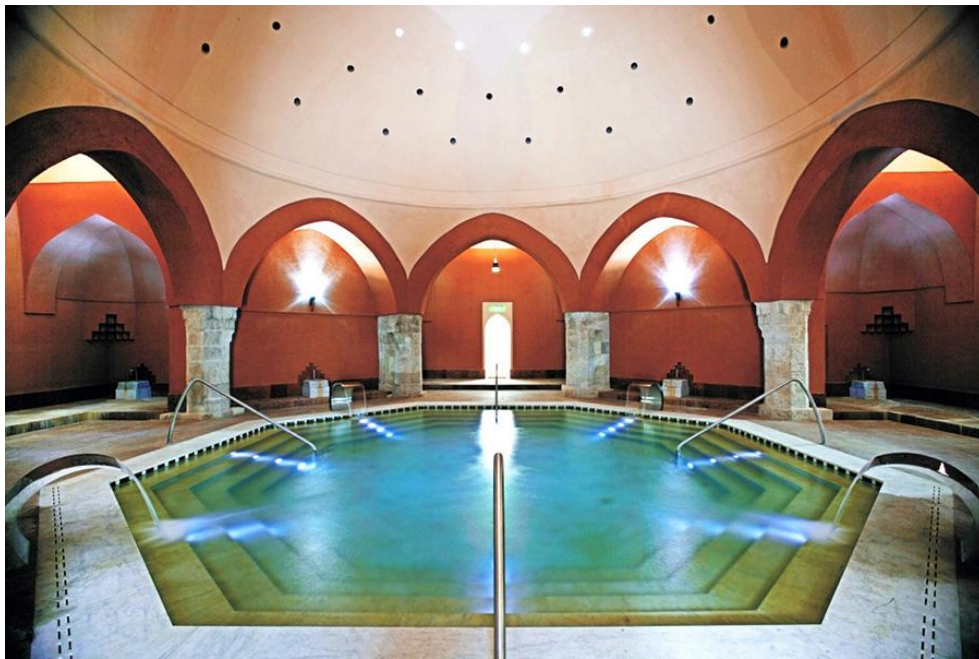
history of Humankind appeared as a result of Islam, in the epoch of the Abbasid Caliphs. (Daniel, 1966). The conquest of Islam from Gibraltar to Central Asia, and its spread up to the Indonesian Islands resulted in the first globalization in our world history. Trade, from the Mediterranean Basin through the Silk Road to Inner Asia and the Indian Ocean to the island of Borneo, formed one vast world economic system. In, in addition to Eastern spices and Western handicrafts, a peaceful exchange of cultures and ideas was constantly taking place. Figures of Indian origin are named in Europe as “Arabic figures”; while Western Europe used the outdated and complicated “Roman figures”. Al-Kvarizmi solved cubic equations; Mathematics in Islam was much more developed than in Europe.

Ottoman Turks followed this cultural heritage of the Islam and evolved special forms of the Turkish-Islam culture. As the worldwide recognized scholar of the Islam, Hajji Abdulkarim Germanus (Gyula/Julius Germanus of Hungarian origin) emphasized it, the Oriental studies disregarded the Turkish Islam while focusing on the Arabic Islam, however, the Turkish Muslim culture was and has been a special one of special values, but in no case some marginal phenomenon. (Germanus, 1918) If so, then the time of the Turkish conquest must not be evaluated only as some strange epoch of suffering under the terrible enemy, but as an encounter of two civilizations, considering that war is war, and those who were defeated were oppressed somehow, of course. Conservative nationalist Hungarians often remember it with a heroization of the sad past, thus, the Ottoman Turkish occupation was regarded as “The Disaster of Ottoman Rule” (Lendvai, 2003:94-105); however, there is always more than one side to a coin.

In the mainstream of Hungarian historiography, the whole of Hungarian history is regarded as a heroic sad past, if only Hungarians had suffered during the history and other peoples had enjoyed their history, therefore, this heroization would make Hungarians a special nation, which suffered much, hence it deserves now much, according to the popular rhetoric of the popular leaders. (Lendvai, 2003). However, the Ottoman Turks contributed much to the cultural heritage: we Hungarians eat potatoes, cultivate wonderful roses, and visit wellness bathes in five-hundred old Turkish buildings (such as in Budapest and Eger), that have remained for us as the valuable Turkish cultural heritage. (Papp, 2018) The Hungarian archaeologist Győző Gerő excavated more than a hundred Turkish buildings in Hungary and restored some of them, which are still working as bathes or a small mosque as a türbe of Gül baba in Buda. He was awarded by the Turkish State in the last part of the 20th century for his great, lifelong work on the Turkish cultural heritage in Hungary. (Gerő, 1980) Nowadays, when Budapest, the capital of Hungary, renews its rose gardens, some English-language newspaper articles inform the world that we have now become like the Turkish time when roses were flourishing and decorated the town of Buda. (Füredős, 2022) The Turkish heritage was emphasized in a previous lecture of ours at the 2. Bilsel

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International Ahalat Scientific Research Congress on December 10 in Bitlis, Türkiye, albeit we sent only the abstract there but no full paper, thus the full text is this one, here. (Földvári, 2023g) However, after the Turkish times, when the Habsburg Empire incorporated Hungary, under the umbrella of “deliberation”, all those towns, which earlier, in the epoch of the Ottoman conquest, were not built in a European way (but some significant Turkish buildings were made as well), now were rebuilt and extremely enlarged in the 18th century, in the style of the Baroque. Turkish buildings were destroyed, and more than half of the Turkish baths were ruined, although they made great contributions to wellness and health care, too, which is proved by the remained bathes which are still nowadays been working nowadays and attract many visitors, tourists, and those who need recreation in the hot medical mineral waters, with various illnesses. The significance of the Turkish conquest was underestimated by the traditional nationalist Hungarian historiography, which was impressed by the hot temp of building the Christian culture in Hungary, in the 18th century, and the increase of towns, which resulted in the architectural and intellectual development of those towns were ecclesiastical and cultural centers in the 18th century.



8. *Figure* The Turkish Bath of Veli Bej in Budapest, Hungary, the most wonderful Turkish bath in Hungary, still working and a lot of tourists visit it year by year – for five centuries it has still been working, together with a dozen other Turkish baths were built by the Ottoman Turks

6. DISCUSSION AND CONCLUSION

Hungary appeared on the stage of history at the turn of the first millennium. The romantic patriotic historiography idealized the Middle Ages epoch, the time of the Dynasty of Árpáds as some great kingdom, that

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was to be restored in later epochs. However, the state underwent different stages, great crises, and heydays, too. Then, in the 16th century, the Türkish Sultan Süleiman the Great conquered the central part of Hungary, and the Eastern part was put in the hands of the Sultan, too. These territories paid taxes to the Ottoman Porta in İstanbul.

The only terrain that remained a juridically sovereign state, it was the “Royal Hungary” in the West, which was ruled by the Habsburgs, but they were kings of Hungary, due to the law of the inheritance and formally they were kings of the Hungarian Kingdom. The bourgeois development took place in this Western terrain, and the German rule was not some yoke but a way toward the western bourgeois development, instead of conserving the feudal middle-age noble aristocracy. Towns with urban culture were more and on a higher level than in Transylvania. Consequently, the traditional Hungarian stereotype about “falling into three parts” was never true and cannot be applied in historical sciences nowadays. The only part that remained under the name “Hungarian Kingdom” was the Royal Hungary in the West, while Transylvania was not a new state, nor some ‘continuation’ of the former Hungarian Kingdom, but a vassal terrain of the Ottoman Turks.

The Hungarian national continuity and national consciousness were not only preserved in Transylvania but rather in the Royal Hungary in the West. The great turn in European social and intellectual development, due to the appearance and activity of the burghers, thus the evolving of the bourgeois society, resulted in the new era called Early Modern Age. This new Western world impacted largely the Western and Northern Hungary, thus the Upper Hungary and the Western edge.

“Transylvaniam” was an ideology of Transylvanian supremacy over Hungarians inhabiting the central part of the country, thus those Hungarians, who lived in other than Transylvanian land, were regarded as suspicious and perhaps of “less value”, than those inhabiting Transylvania, in the aspect of Hungarian national spirit—according to the teaching of the Transylvanian ideology. (Balogh, 1999) But even on the contrary, the shaping of the premodern Hungarian literary language, translations of the Bible, and openness toward the West – all these and much more took place in the Royal Hungary, on the Upperlands and on the wide lands in the North, the Upper Hungary. The West-Hungarian social, cultural, and economic development went in the European way, the urbanization in Upper Hungary and West Hungary resulted in the increase of early bourgeoisie, and the economic prosperity, as well as cultural prosperity, took place largely in Royal Hungary, much more than in the other two parts of the divided-in-three-parts Hungary, the opportunities for any European development were much better than even in Transylvania, and Upper Hungary, as a special terrain, was such worth of attention for the Hungarian development as Transylvania, even much more. Hence, the radical and effective revaluation of Transylvania, seems necessary on any level of research and education, as well.



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LEGAL IMPLICATION OF VOLUNTARY CARBON CREDITS: INTERNATIONAL EXPERIENCE AND RECOMMENDATION FOR VIETNAM

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ABSTRACT

On January 7, 2022, the Government issued Decree 06/2022/ND-CP to mitigate greenhouse gas emissions and protect the ozone layer. Vietnam is in the process of finalizing carbon market regulations. Voluntary carbon markets allow carbon emitters to offset their inevitable emissions by purchasing carbon credits led by projects that target the reduction of greenhouse gas emissions released from the atmosphere. Voluntary carbon credits are flexible and not limited by boundaries set by countries. They are also likely to be accessed by all sectors of the economy rather than a limited number of industries. The construction and operation of a carbon market are expected to help reduce greenhouse gas emissions, promote the development of low-emission technologies, and improve the competitiveness of enterprises. However, the legal nature of voluntary carbon credits still needs to be clarified and depends mainly on host country legislation. The article investigates the legal experience of the voluntary carbon credit market in France, Japan, and Singapore and several voluntary carbon credit exchanges worldwide. On that basis, the article recommends developing a law to regulate the voluntary carbon credit market in Vietnam. The issues of Vietnamese law that need to be adjusted include: (i) Determining what type of asset a carbon credit is; (ii) There should be a legal basis to affirm that carbon credits are intangible assets; (iii) There should be tax regulations related to carbon credit transactions; (iv) There should be regulations to ensure safety in carbon credit transactions.

Keywords: carbon offset; carbon credits; voluntary carbon credits; carbon credit market; carbon credit transaction



1. Introduction

In June 1992, in Rio de Janeiro, Brazil, the countries of the United Nations joined the United Nations Framework Convention on Climate Change (UNFCCC). This convention is the basis for all subsequent climate negotiations. After that, the Kyoto Protocol was promulgated on December 11, 1997, in Kyoto, Japan, and on February 16, 2005, a sufficient number of countries ratified it. The general principles of the Kyoto Protocol address the GHG reductions of developed countries and the ability to build credits for emissions reductions and international transactions. These provisions led to the emergence of an international "carbon market," named after the trading of credits measured in carbon dioxide equivalents. From there, the term "carbon credit" appeared in international law. The Kyoto Protocol is the place to pave the way for the creation of emission trading programs, creating a new market for goods, and allowing the trading of emission allowances to comply with emission limits.¹

The carbon credit trading market is divided into two main categories:

First, the compliance market, also known as the mandatory market, the "limit and exchange" market, or the "Emissions Trading Scheme (ETS)," as they are established by regulations of "limited trade" at the regional, national, and state levels. In these markets, carbon norms are issued by national and international governmental organizations, which are then traded on the secondary market.

Second is the voluntary market, where entities buy carbon credits to offset some or all of their carbon emissions. These carbon credits are issued in connection with projects that mitigate climate change through carbon removal and emission reduction, for example, by investing in renewable energy or planting trees. Carbon credits may also be awarded to projects that prevent greenhouse gas emissions into the atmosphere. These markets are largely unregulated today.

The critical difference between the compliance and voluntary markets is that the compliance market exists in the form of mandatory programs. Meanwhile, the voluntary market allows companies, governments, and others to purchase carbon credits voluntarily. The voluntary carbon credits market (VCM) also offsets emissions-generating activities that have yet to be significantly eliminated or limited. The types of carbon credits traded on the voluntary market are called voluntary carbon credits. Thus, voluntary carbon credits significantly differ from mandatory carbon credits, as voluntary carbon credits (VCCs) are now established outside any regulatory framework. Therefore, the specific legal nature of VCCs may differ from mandatory carbon credits.

2. Overview of the Voluntary Carbon Credits Market

¹ Julien Chevallier, *Econometric Analysis of Carbon Markets* (Springer, 2012) 4



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2.1. *Overview of voluntary carbon credits*

Carbon offsetting is based on the understanding that greenhouse gases like CO₂ are evenly distributed in the atmosphere, so their concentrations are roughly the same everywhere globally. The emissions caused anywhere on Earth are related to global greenhouse gas concentrations and the greenhouse effect. Funding climate projects in a different location can offset the remaining emissions. To do this, CO₂ reduction or avoidance activities must be quantified. One voluntary carbon credit corresponds to preventing the release of one ton of CO₂ equivalent emissions.

A voluntary market carbon credit is a transferable instrument, usually issued by an independent registry, and represents a reduction in one tonne of CO₂ emissions. In voluntary carbon markets, buyers will offset their emissions by purchasing a reduction from a third-party climate change mitigation project. Carbon offsetting is based on projects designed in one place to offset emissions elsewhere. Projects that issue carbon credits can differ significantly, from reforestation and forest conservation to renewable energy. These carbon credits, and the projects that underlie them, are generally grouped into two categories:

One is to reduce or avoid carbon emissions. Accordingly, projects underpinning carbon credits aim to limit the loss of natural resources by preventing the release of greenhouse gases into the atmosphere or helping to reduce the amount of greenhouse gases in the atmosphere, fund the transition to renewable energy, and ultimately mitigate climate change.

Second, carbon sequestration, whereby projects under which credits use natural resources or technologies to sequester carbon (e.g., reforestation projects) or remove it (e.g., by investing in technology to remove CO₂ from the atmosphere).

Thus, carbon offsetting can be defined as: "...compensation for the greenhouse gas emissions of an entity within its scope by achieving an equivalent amount of emission reduction or elimination outside the entity's boundaries or value chain".¹

2.2. *Mechanisms for the generation of voluntary carbon credits and components of the trading market*

The process of generating carbon credits begins with the development of a carbon reduction or removal project.² Typically, project developers map out projects, get funding, and execute the project.¹ To receive

¹ ICVCM, "The Integrity Council for The Voluntary Carbon Market" (ICVCM, July 2022) <<https://icvcm.org/wp-content/uploads/2022/07/ICVCM-Public-Consultation-FINAL-Part-5.pdf>> accessed July 31 2023

² Leonard, K, *Quality Enhancement in Voluntary Carbon Markets: Opening Up for Mainstream; Diplomica Verlag: Hamburg Germany* (Diplomica Verlag, 2009)



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carbon credits, these projects must receive certification through a certification standards organization. To receive certification, the project must meet certain specifications depending on the method used by the certification standards organization.

Once projects have been certified, the certification standards body will issue credits. It will then add the carbon credits to the certified projects register. Such registry systems provide transparency to the market for issued credits and record transactions to reduce the risk of double-counting carbon credits.² The issued credits can be traded and sold to buyers through brokers or exchange primary or secondary markets. Each credit has a specific classical year, the year in which emissions reductions occur, and a particular data retreats, commercially will be commercially available. Given the length of the certification and verification process, offsets can be issued years affection.

Due to the difficulty in evaluating projects, certification companies are also a significant factor involved. These companies will certify voluntary carbon credits based on their assessment of the underlying project. They provide deeper insights into the integrity of mitigation projects and compliance with specific standards and can alleviate concerns among market participants about the quality of carbon credits.

Buyers of carbon credits can withdraw a credit when they use it to offset their emissions or boost one's contribution to climate change mitigation efforts. Once a carbon credit has expired, it cannot be redeemed.³ The end buyers or end users are often private companies purchasing carbon credits to offset their greenhouse gas emissions or to contribute to mitigation efforts. When the final buyer declares that the carbon credit has been withdrawn to offset their greenhouse gas emissions, this must be recorded in the register of the certification standards body that approved the original issue.

Once credit has been issued, it can be withdrawn by the original buyer or put on the secondary market. Most voluntary carbon credit trading today is done through a decentralized market with little public pricing

¹ Chen, Si and Marbouh, Dounia and Moore, Sherwood, and Stern, Kris, "Voluntary Carbon Offsets: An Empirical Market Study" (December 9, 2021) <<https://ssrn.com/abstract=3981914> or <http://dx.doi.org/10.2139/ssrn.3981914>> accessed July 31, 2023

² IOSCO, *Voluntary Carbon Markets* (Discussion Paper, 2022) 9

³ Chen, Si and Marbouh, Dounia and Moore, Sherwood, and Stern, Kris, "Voluntary Carbon Offsets: An Empirical Market Study" (December 9, 2021) <<https://ssrn.com/abstract=3981914> or <http://dx.doi.org/10.2139/ssrn.3981914>> accessed July 31, 2023

information and no standardization. For this reason, financial intermediaries play an essential role in facilitating transactions between sellers and buyers.¹

Some exchanges have become more active as platforms for this market. The US and Australia-based Xpansiv CBL exchange is the largest voluntary carbon credits marketplace exchange by volume. Others, such as AirCarbon Exchange and Climate Impact X, have significant operations in Singapore. Derivative exchanges based on voluntary carbon credit markets have also emerged in the United States and elsewhere. Example: CME and Nodal Exchange, CFTC-registered derivatives exchanges that listed voluntary carbon offset derivatives contracts on June 17, 2022.² ICE Futures Europe has also launched voluntary carbon credit-based futures contracts.³

Japan has also launched a pilot project to establish a carbon credit exchange. Hong Kong Exchanges and Clearing Limited (HKEX) and China Emissions Exchange (CEEX) have signed a Memorandum of Understanding (MoU) to explore the development of a voluntary carbon emission reduction program in the Greater Bay Area. Guangdong-Hong Kong-Macao aims to support China's efforts to achieve carbon neutrality. Markets in Abu Dhabi, where AirCarbon has applied to launch the operations of an Accredited Investment Exchange and an Accredited Clearing Center for voluntary carbon markets. Malaysia has also established a voluntary carbon market run by Bursa Malaysia Berhad, a regulated integrated exchange operator of SC Malaysia.

3. International law on the nature of voluntary carbon credits

3.1. *International legal basis of voluntary carbon credits*

Voluntary carbon markets have emerged alongside compliance markets to enable companies and individuals to take responsibility for their emissions. This is done by financing climate projects by trading and purchasing Verified Emission Reductions (VERs) on the voluntary market. The United Nations Framework Convention on Climate Change (UNFCCC) forms the basis for voluntary carbon offsetting. Implementing Article 6 of the Paris Agreement introduces new considerations regarding carbon credit-related rights. Under Article 6.2 of the Paris Agreement, the host government has the right to authorize emission reduction or elimination for use by the

¹ Chen, Si and Marbouh, Dounia and Moore, Sherwood, and Stern, Kris, "Voluntary Carbon Offsets: An Empirical Market Study" (December 9, 2021) <<https://ssrn.com/abstract=3981914> or <http://dx.doi.org/10.2139/ssrn.3981914>> accessed July 31, 2023

² The contracts cover a range of offset standards and project types. The product group includes Voluntary Emission Reduction (VER) CORSIA-eligible Futures and Options; Verified Emission Reduction Nature-based (Base and Vintage) Futures and Options; Carbon Removal Futures, and Global Emission Reduction (GER) Futures contracts, which Nodal Exchange launched in cooperation with NetZero Markets.

³ IOSCO, *Voluntary Carbon Markets* (Discussion Paper, 2022) 10



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NDC or public or private entities for other international mitigation purposes. Implicit here is the understanding that national governments have certain rights regarding emission reductions or eliminations within their jurisdiction. It is worth noting that Article 6 of the Paris Agreement allows governments to purchase carbon credits voluntarily as long as the rules of Article 6 are respected.¹

Through the Article 6 rule, at COP26, governments adopted a set of rules to reinforce the use of Article 6 of the Paris Agreement, including laws regarding licensing, reporting, and accounting.² With the adoption of this code, governments essentially have the power to decide whether mitigation results achieved within their geographical boundaries can be transferred to other countries or organizations for private use and what mitigation results will be included in the host country's NDC.

VCM is a largely automated marketplace with participants voluntarily adhering to standards and guidelines developed by independent organizations. Since the market operates globally, it is difficult for any single government or organization to regulate it effectively.

3.2. *Legislation in some countries on voluntary carbon credits*

For an asset like a carbon credit, legal rights are essential. The rights underpinning these assets are derived from the laws or regulations of the country concerned. Therefore, currently, the legality of carbon credits is different between jurisdictions.³

Whether VCCs constitute a form of property under British law must be determined by reference to whether they are “identifiable, identifiable by third parties, capable of acknowledged by a third party of the nature and of some degree of permanence or stability.”⁴ VCC can accommodate these requirements. British courts have shown flexibility in recognizing property rights to intangible assets if the market considers such assets as assets (as with VCCs). Examples of intangible assets recognized under UK law include dairy quotas, waste management permits, and goodwill.⁵

Traditionally, French law required an asset to have three essential characteristics: (i) it must have value or be functional (this is a legitimate explanation for the desire to acquire it); (ii) it must possess the property necessary to permit a person the exclusive right to use or dispose of the property; and (iii) it must be

¹ Paris Agreement 1995

² COP 26 2020

³ ICVCM, “Taskforce on Scaling Voluntary Carbon Markets - Phase II Report” (ICVCM, July 8, 2021) <https://icvcm.org/wp-content/uploads/2022/03/TSVCM_Phase_2_Report.pdf> accessed July 31, 2023

⁴ *National Provincial Bank v Ainsworth* [1965] AC 1175

⁵ *National Provincial Bank v Ainsworth* [1965] AC 1175



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transferable.¹ Emission limits under EU ETS Directives, CERs, ERUs, and energy efficiency certificates have recently been recognized by law as movable and transferable assets.² However, VCC is not covered by this ETS directive. VCC is also not recorded in the European Registry created by Regulation EU 389/2013. VCCs that the Markets do not cover in the Financial Instruments Directive (MIFID II)³ as it is a voluntary market (as opposed to a compliant carbon market). A VCC is not considered a security within the meaning of the French Monetary and Financial Code, which lists financial securities in a limited and specific manner.⁴

However, voluntary carbon credits trading contracts (such as futures, forwards, options, or swaps for cash-settled or cash-settled VCCs) can be considered financial instruments.⁵ These contracts would then qualify as investment services and finance contracts under MiFID II, resulting in the need for an investment firm's license and compliance with a code of good conduct (such as best performance requirements and conformity/conformance testing). At that time, the regulations for the European market will apply.

In Singapore, according to The Conveyancing and Law of Property Act 1886, the property is defined as "real and personal property and any estate in any property, real or personal, and any debt and anything in action, and any other right." or interest like the property, whether in possession or not." This statutory definition itself still needs to be conclusive on the legal character of the VCC under Singapore law. Meanwhile, Singapore's Carbon Pricing Act 2018 (CPA) stipulates a carbon tax on specific greenhouse gas emissions by businesses in Singapore. For CPA 2018, only carbon credits can be purchased from the National Environment Agency, and each carbon credit has a fixed price of S\$5 (as of November 2022). While the 2018 CPA deals with transferable carbon credits (which suggests they are property), VCC differs from those carbon credits in several key respects. However, Cases in Singapore suggest that VCCs must be able to be recognized as an intangible asset under Singapore law if they are "definable, identifiable by third parties, capable in its nature of assumption by" third parties, and have some degree of permanence or stability."⁶ Singapore law has flexibility in recognizing ownership rights for VCCs.

In Japan, there is no specific law governing the legal nature of VCCs.⁷ Japan has adopted a civil law system. Thus, the courts need the power to make laws and take a cautious stance on recognizing new property

¹ ISDA, *The Legal Nature of Voluntary Carbon Credits: France, Japan, and Singapore* (2022) 7

² **French Environment Code (2010) FR197, Article L.229-11**

³ Markets in Financial Instruments Directive (European Parliament 2014) MiFID II/65

⁴ French Monetary and Financial Code (2000) CMF, Article L.211-1

⁵ Markets in Financial Instruments Directive (European Parliament 2014) MiFID II/65, Section C of Annex I

⁶ *National Provincial Bank v Ainsworth* (Singapore 1965) AC 1175

⁷ The Ministry of Economy, Trade and Industry of Japan, "Carbon Credit Report" (2022)

<www.meti.go.jp/shingikai/energy_environment/carbon_credit/pdf/20220627_2.pdf> accessed July 31, 2023



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rights. For example, in a 2004 case, when questioning the "publicity right," the Supreme Court of Japan did not recognize this right because there was no legal provision to mention its basis, content, and scope.¹ The Japanese civil law system has a general principle (according to Article 175 of the Civil Code) that no fundamental rights can be established if not provided for by law. This principle stipulates that any property rights to tangible property can be created only when provided for by law.² Accessing VCC as an asset under current Japanese law takes work. In September 2022, the Tokyo Stock Exchange launched a carbon credit demonstration project. During this pilot period, only J-Credits (local and government carbon credits³) marketable, no voluntary carbon credits yet.

3.3. *Regulations of some Voluntary Carbon Credit Registries*

There are currently four most prominent voluntary registries regarding VCC ownership and transfer, including the Climate Action Reserve, the American Carbon Registry, the Verra Registry, and the Gold Standard Impact Registry. Based on these registries' terms of use, VCCs are potentially proprietary and transferable.

According to the Climate Action Reserve rules, a user may only hold or withdraw in his account those offsets for which he is the sole owner of all legal rights and all rights of ownership. Except that, the user may: (a) recover offsets on behalf of a third party that owns such offsets and (b) hold a clearing in its account on behalf of a third party that owns it, subject to certain conditions. All clearing transactions will be settled or executed by the user and any third party under separate agreements that may exist between them. The Registry is not responsible for the settlement or execution of any transaction.⁴

The American Carbon Registry rules allow a voluntary transfer of carbon credits if the person is the owner.⁵ The user represents that he/she holds all lawful and beneficial titles in each clearing held, rescinded, or canceled by the user in any registered account.⁶

¹ ISDA, *The Legal Nature of Voluntary Carbon Credits: France, Japan, and Singapore* (2022) 7

² ISDA, *The Legal Nature of Voluntary Carbon Credits: France, Japan, and Singapore* (2022) 7

³ The Ministry of Economy, Trade and Industry, the Ministry of Environment, and the Ministry of Agriculture, Forestry and Fisheries, "The J-Credit Scheme is designed to certify the amount of greenhouse gas emissions reduced and removed by sinks within Japan" (November 16, 2022) <<https://japancredit.go.jp/english/>> accessed July 31, 2023

⁴ The Climate Action Reserve, "Terms of use" (2022) <<https://theclimatereserve.org/terms-of-use/>> accessed July 31, 2023

⁵ The American Carbon Registry, "Terms of use" (2020) <<https://americancarbonregistry.org/how-it-works/membership/acr-website-terms-of-use.pdf/view>> accessed July 31, 2023

⁶ (§ 11.1(i) of the Verra Registry's terms of use).



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The Gold Standard Impact Registry and the Gold Standard Impact Registry's rules also allow for the voluntary transfer of carbon credits.¹ The Registry does not enter into project-related or offset agreements between project developers, purchasers, or any other party.²

4. Vietnamese legislation on voluntary carbon credits and recommendations

On January 7, 2022, the Government of Vietnam issued Decree No. 06/2022/ND-CP Regulations on Reducing GHG Emissions and Protecting the Ozone Layer (effective on the same day). The Decree details Article 91 (Reducing greenhouse gas emissions), Article 92 (Protecting the ozone layer), and Article 139 (Establishing and developing a carbon market) of the Law on Environmental Protection 2020. For the carbon market, the Decree specifies that companies will be guided on the plan and undergo several pilot market activities, followed by the entire operation of the carbon credit trading market in 2028.

Article 105 of the 2015 Civil Code stipulates that "property is objects, money, valuable papers, and property rights," including "real estate and movable property." According to the provisions of Articles 110 to 114 of the Civil Code, carbon credits cannot be objects. According to the State Bank of Vietnam Law, carbon credits are not money. Carbon credits are also not valuable papers because they need to meet the criteria of the banking law. Thus, under current legislation, carbon credits can only be temporarily classified as an asset right as "other property rights."

The legal status of voluntary carbon credits in Vietnam could be more precise. Vietnamese legislation should address the following issues related to voluntary carbon credits:

One is the carbon credit classification. There should be a legal basis for determining what type of asset a carbon credit is. To be of value to holders, carbon credits must be recognized and protected as an asset.

Second, there should be a legal basis to affirm that carbon credits are intangible assets. Although it can be seen that carbon credits can be owned and sold but do not exist physically, it is like an intangible asset.

Third, there should be tax regulations related to carbon credit transactions. Carbon credits are transferable to a specific value. This raises tax issues regarding the gains or losses of transactions, such as the possibility of a value-added or corporate income tax. With the development of the carbon market and more and

¹ The Gold Standard Impact Registry, "Terms of use" (2018) <<https://globalgoals.goldstandard.org/standards/T-Preview-V1.1-Registry-App-Terms-of-Use.pdf>> accessed July 31, 2023

² The Verra Registry, "Terms of use" (2021) <https://verra.org/wp-content/uploads/Verra-Registry-TOU-September-2021_FINAL-1.pdf> accessed July 31, 2023



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more cross-border transactions due to the linkage of the markets, it is essential to consider determining the tax legal regime.

Fourth, there should be regulations to ensure safety in carbon credit transactions. This gives rise to the need for an owner registration system that controls the transfer of ownership. In addition, a mechanism should be established to ensure that the transferee has convenient control over the ownership status of the carbon credits. Such a system helps to promote confidence and increase liquidity in the market for carbon credits.

CONCLUSION

As with any legal asset or instrument, understanding the legal nature of VCCs is critical to assessing and documenting how they may be traded and what risks they present to the parties. Transactions, including what property interest may be claimed on them and what form of security may be exercised on them. Their legal nature also affects handling violations and the tax implications of trading and holding them. The legal nature of the VCC also determines whether financial market regulators have sufficient authority to regulate and supervise the spot market of such credits.

However, there is still a significant degree of uncertainty about the exact legal nature of the VCC. Since the VCC is a creation of contract law, not an instrument created through any legal framework or international treaties, its nature is determined by the law applicable to its creation, hold, and transfer. Therefore, it is determined by the laws of each country. It is expected that in the future, Vietnam will have about 10.8 million voluntary carbon credits provided each year.¹, accompanied by the need to exchange, buy and sell significantly. Forming a carbon market helps Vietnam seize opportunities to reduce carbon emissions effectively, increasing compatibility with international carbon pricing mechanisms. Therefore, building a safe, legal foundation for voluntary carbon credit transactions is essential.

¹ Vietnam Ministry of Industry and Commerce, "By 2028, it will officially operate a carbon credit exchange" July 14, 2023) <<https://moit.gov.vn/bao-ve-moi-truong/den-nam-2028-se-van-hanh-chinh-thuc-san-giao-dich-tin-chi-carbon.html>> accessed July 31, 2023



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PERSPECTIVES AND CURRENT CHALLENGES TOWARDS ACHIEVING GENDER EQUALITY IN ALBANIA IN THE LEGAL AND SOCIAL FRAMEWORK

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Abstract

Although more than three decades have passed since the fall of communism, the impact of the totalitarian approach in terms of gender equality has left its mark on Albanian society. There have been many legislative initiatives in this framework, but still there are barriers in fulfilling the objectives of the law and society's expectations. Discrimination at the political, social and economic level has been identified as an encouraging factor of gender-based violence and discrimination, placing women in a position of disadvantage in relation to men. In recent years, the level of representation of women in politics has increased, but regardless of this, Albania continues to be far from the standards of European democracies in respecting gender equality as part of the catalog of human rights. This situation is a product of the weak legal culture and the passive attitude of civil society. In legal terms, gender equality is affirmed by the Constitution and by a series of special laws. However, the theoretical formulations are insufficient to effectively guarantee the equal participation of women in decision-making processes, in labor relations and in economic enterprises. Through the analytical and descriptive method, the paper aims to elaborate the importance of gender equality as a constitutional and legal right, reflecting the need of society and institutions to be guided by the will to implement the principle of equality in the legal and social dimension. This process should start with early education in school curricula and should be finalized with the design of strategies and action plans in order to promote gender equality.

Keywords: gender equality, law, society, discrimination, perspectives



THE PERSIAN GULF IN THE ERA OF SHAH ISMAIL I

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Abstract:

The Persian Gulf in the Safavid era is important in many ways. On the one hand, the port of Hormuz is an important economic and historical port of Iran in the vicinity of the Strait of Hormuz and the Oman Sea, which has become the most important communication port of Iran with the Indian subcontinent, China and even Europe, and on the other hand, the presence of Portuguese colonists in the Gulf It is Fars. It had influenced this port as well as the entire Persian Gulf. The presence of the Portuguese colonists in the Persian Gulf disrupted the political and economic equations of the region and led to their 119-year presence in the port of Hormuz. Upon entering the Persian Gulf, the Portuguese plundered important ports such as Sohar, Qalhat, Bahrain and Hormuz. Antagonism with the indigenous elements of the region was one of the main policies of the Portuguese. The island of Hormuz, which is one of the most important islands in the Persian Gulf, has attracted the attention of the Portuguese during the battle stage due to the existence of popular resistance due to the successful use of new technology to capture Hormuz, and there are strong fortresses on this island. They prepared for themselves. This research seeks to describe the Persian Gulf region in the age of Ismail I Safavid. The research is written in descriptive and analytical Shahnameh method and relying on library sources.

Key words: Iran, Persian Gulf, Ismail I Safavid, colonialism, Portugal.



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Introduction:

The formation of the Safavid government was a turning point in the history of Iran from Islam, before the Safavid rule, the dominant trade in the world of that day was land trade, and as a result, it had a special importance and value in Iran, even though the economy of Iran was in the Safavid era. axis, but originally it was about trade in goods and raw materials through trade routes, in this era of trade based on animal husbandry, a few things are taken into account, the Ottoman problem for the Europeans who takes it away. Hitting the nose of Omid Nik led to reach the markets of the East. Second: Iran's security in the region as the most important opposition force to the Ottoman Empire, which provides a link between the interests of Iran and Europe, therefore the Persian Gulf has become a meeting point and alliance of Iran's interests with the West, and therefore the Europeans are determined to get raw silk through this region. On the other hand, Iran gained special importance for Europe as the most important economic and political pole opposed to the Ottoman Empire. However, although the peak of the importance of the Persian Gulf was seen in connection with the commercial position of Iran during the period of Shah Abbas I, it depended on the approach. As previously mentioned, the first half of the Safavid era provided the grounds for the growth and advancement of this situation, considering the role of trade in the economic foundations of the Safavid era and also the importance of Iran in this period for Europe to procure raw materials, therefore the Persian Gulf as the best sea route for it was the transfer of needed goods to Europe and the arrival of European goods to Iran. This approach, which reached its peak during the time of Shah Abbas I, basically goes back to the founding of the Safavid dynasty, so this research is based on it with two. The approach, Iran's commercial position in the eyes of the West, as well as the importance that the Safavid sultans had to export raw materials to Europe by bypassing the Ottomans, discuss the economic status of the Persian Gulf in the first half of the Safavid era.

The goals and contexts of the presence of colonialists in the East:

With the fall of Constantinople in 1453/557 AH. The Ottomans conquered the entrance to the Black Sea and the main trade route between Asia and Europe. The first effect of this incident in Europe was the scarcity of Eastern goods. On the other hand, after the conquest of Constantinople, the Ottomans planned to conquer the entire Balkans and the Black Sea. turn it into an inland sea and head towards Central Europe. 2 Therefore, the Europeans, including the Venetians and the Oranges, made efforts to get rid of the situation, here the action of the Oranges to find a way to the east is called. It is discussed with the Ottomans, until 1109 AD, the country of Portugal was always considered a part of Spain. In 487 AH/1090 AD, Henry of Burgundy came to Spain from France and accepted the service of Alphonse VI, King of Castile, the King of Castile in front of his daughter and a part of Spain. He gave him forever what is the land of Portugal today. (falsafi, 1937: 45) One of the



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reasons for Vasco da Gama's trip to the East was to eliminate middlemen and buy these goods directly³, but Noel I (1521-495/901 AD), who was the king of Portugal at that time, in one of his speeches, talks about the objectives of the Portuguese attack and their journey to the East. (Indeed, the purpose of sea route discoveries to India is to spread Christianity and reach the riches of the East, and when Gama reached Calicut in 1498/903, the surprised Tunisian merchants living there asked his sailors what brought them there. But Henry declared the independence of Portugal a few years later (1109 AD) and his son officially called himself the King of Portugal in 1139 AD. There were several reasons for the arrival of the Portuguese in the city, the geographical location of Portugal has influenced their explorations, this country was limited to the territory of the kings of Castile from the north and east, and there was always hostility between them, so they traveled by land. He could not advance and he had to take the sea route, but despite many efforts, the Portuguese did not succeed for many years, because on the one hand they were in conflict with the kings of Castile. and on the other hand, they were busy with their internal disputes. The economic factor was one of the important motivations of the Portuguese to reach the East, they wanted to take some of the welfare aspects of the East that they were familiar with during the Arab-Islamic rule of Andalusia (modern Spain), after the fall of Granada. (a city in Spain) in 1492/898. They realized the Muslim trade with the coasts of India. Their main goal was to control the spice trade and sea trade of the Indian Ocean. Before the settlement of Constantinople and the dominance of the Ottoman Turks on the east and west trade routes, they did not see any reason for their efforts. After this event, there were conditions for Portugal that other European countries except Spain did not enjoy. The Italian governments of the Mediterranean area had to deal with the advance of the Turks. France was involved in religious wars and the small and weak England sent its ships to protect It needed its own ports, so the Portuguese began to struggle to reach the spices and jewels of the Orient. Moreover, in the 14th and 15th centuries AD, along with the increase in the wealth of the countries of the Iberian Peninsula, i.e. Spain and Portugal, naturally, the rich were interested in having rare things and foods, since centuries ago, the products of the eastern world were Chinese silk, spices from the Maluk Islands and India, and delicate items. Hindi was transported to the Persian and Aden seas and the Red Sea by Iranian and Arab sailors and finally reached the European market. They answered ((the idea of finding Christians and spices)), the economic factor is one of the other factors that brought the oranges to the East. With the development of production tools in European countries, the productivity of goods increased and as a result, commerce grew and prospered more, for Coinage of many precious metals such as gold and silver was needed, the Europeans of the 15th century sent many expeditions to search for gold in unknown lands. Meanwhile, India was more tempting for Europeans than other countries, but after the Ottoman domination of the trade route, Indian goods reached Europe at a very high price, and as a result, eastern goods became scarce in Europe, and the motivation to discover new ways arose. Therefore, the Portuguese thought of



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direct communication with the East in order to obtain raw materials and gain access to gold, silver and pearl reserves and to provide a consumer market for European goods. The factor of religion has definitely been effective in this action as well, Muslims ruled almost the entire Iberian peninsula for almost eight hundred years from 721 AD, in 478 AH/1085 AD, the expulsion of Muslims began seriously from this time until the fall of the Muslim government in 1897/ 1491 AD lasted for more than four hundred years, the religious fervor against Muslims was still fresh during the discoveries of the Portuguese. On the other hand, the activities of the Portuguese were approved and encouraged by the Pope and Rome, who likened the Muslims to the plague, and the travels of the Portuguese had spirit It was a crusader, the Pope had ordered to draw a cross on the sails of the ships, because the crusades had not reached the desired result, the Portuguese were trying to reach the land of St. John, the Christian ruler of Abyssinia, whose character was a legend. At that time, the Christian nations They hoped to unite with him to confront the Islamic lands. (Qaim Maggi, 1975: 55)

The Portuguese monopolists and control over the Persian Gulf

The Portuguese, according to the information they already had about the Persian Gulf and the information they had obtained from their observations on the western coast of India, considered the importance of dominating the Persian Gulf and the Red Sea for the success of Muslim trade. In the Indian Ocean and closing the trade bottlenecks that were in the hands of Muslims and in the Red Sea and the Persian Gulf, they became more and more important. In the last years of the 15th century and the beginning of the 16th century, the fame of Hormuz and its horses and the pearls of the Persian Gulf were everywhere. It had reached India and Portugal in a letter sent by King Emmanuel I of Portugal to King Ferdinand of Castile in 1505. He wrote about the five expeditions of Portugal to Indian waters (from 1505-1500/1500-1505 AD) and mentions Hormoz Island and Julfar. From the content of this letter, it is clear that although the Portuguese had no geographical knowledge of the Persian Gulf But Hormuz was known for its pearl fishing. A part of the mentioned letter is as follows:

The sea of Iran 3, where there is Jolfa island, is full of pearls of all kinds, there is another island at the entrance of the said sea. "Agranouz" 4, where pearls are found in inexhaustible quantities, and the horses that exist in all these areas were very remarkable.(Dietrich,1999: 76) A composite fleet of fourteen ships headed towards East Farstad was under the command of a person named Trestao Daconha. They came to build forts and fortifications on Egyptian and Venetian ships, and after that he himself went to India with a part of ships and left a person named Albuquerque with a group of his companions there to capture Aden and Jeddah and trade. 7 Albuquerque was from a famous family, he fought with the Turks in Morocco and had an irreconcilable enmity with the Muslims. 1 On the way, there was a dispute between Dacon and Albuquerque over the destination of the ships. The Dacon left most of the ships with Albuquerque and went to India From the very beginning, these



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two men were at odds. The Dacons were interested in new discoveries, and while Albuquerque did not think of anything else except for military purposes and taking the Indian Ocean trade from the Muslims, Albuquerque actually wanted to close the Red Sea in order to He had prevented the trade of Egypt and Venice from entering the Indian Ocean, he was not satisfied with the operations and limits that he was ordered to do, and because he had the idea of forming the Portuguese Empire in his head, he decided to capture Hormuz in order to gain the strategic area of the Persian Gulf. On the other hand, Albuquerque knew that he could not attack Aden with this small force, so he attacked the Persian Gulf in order to do something more useful than temporarily closing the Red Sea.(Wathoqi,2001:120) Of course, before Albuquerque, a person named Francisco de Almeida, the first Viceroy of Portuguese India, was assigned by the King of Portugal to establish a continuous and strong trade in the Indian Sea and its branches such as the Red Sea, the Oman Sea, and the Persian Gulf. Almeida When he came to India, in order to fulfill this purpose, he first corresponded with the rulers of the coasts of the Indian Sea and the Persian Gulf. We don't know the full contents of it, but we know that their content was to establish peace, friendship and trade relations, although Almeida, by resorting to force, dominated the political and commercial situation on the coast of India, but he could not destroy the Portuguese dominion in the Persian Gulf. At this time, Hormuz ships that came to India for trade were attacked by the Portuguese, as in Dhi Qadeh 909 AH. In April 1504 AD, a Hormuz ship that came to the coast of India for trade was attacked and what it was carrying was looted in Rabi al-Thani 911 AH/September 1505 AD. A few Hormuz fishing boats that were fishing in the sea of Oman were forced to reach the shore due to the attack of the Portuguese ships. A few other boats that were taking horses to India were attacked. In the middle of 912 AH/1507 AD. Almeida's son, after looting, set fire to seven ships of Hormuz that were carrying horses, and arrested two other large ships that belonged to Hormuz. The Persian Gulf was like a bridge connecting the east and the west. Albuquerque received this strategic importance. Budalbuquerque believed that if the king of Portugal dominates the place. He can call himself the owner and king of the whole world. These three places were: Aden, Hermuz, and the islands of Malaga. Among them, Hermuz was considered more important. The big plan of the Portuguese was to close the traditional outlet like the Persian Gulf, the Red Sea. And the threats of Malaga forced all the commercial ships that traveled between Europe and India to bypass the Cape of Good Hope, at the same time, Hormoz was considered a commercial center and the heart of a maritime empire in the Persian Gulf, hence Albuquerque. After the conquest of Qalvareh, during the consultation he made with the officers of the ships, he left for the Persian Gulf. He set fire to a large number of fishermen's ships, which were more than any bananas, at Ras al-Had-Damagheh, which separates the Persian Gulf from the Indian Ocean. He was effective in the surrender of the people of Qalhat from the important coastal cities of Oman. The governor of Qalhat made peace with the Portuguese according to his son's letter to the viceroy of India. Albuquerque also gave him a

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letter of protection from the king after capturing Qalhat and providing food and cargo for his ships to Qoriyat. - He left the settlements on the coast of Oman, but the people of Qorbat stood against the people of Qalhat and killed many people until the city was captured by Albuquerque, Albuquerque set fire to fourteen ships in the port and plundered the city and killed its people, then went to Muscat. He went to the coastal cities of Oman, which is now the capital of Oman, and razed that city to the ground, set fire to its mosque, and cut off the ears and noses of many residents (27 Rabi al-Thani 913 AH. September 1507 AD). Albu Karak in Jumadi al-Awwal 913 AH / late September 1507 AD. He reached Hormuz. 4 The Portuguese were surprised by the fortifications of Hormuz. At first, they wanted to abandon the attack on Hormuz, but Albuquerque said that the work was over and now was not the time to return. He sent a message to the inhabitants that they should accept the order of the King of Portugal. They did not answer, war broke out between the parties, Khwaja Atta Vizier Saif al-Din Aba Nasr, the king of Hormuz, who had learned about the fate of Qalhat, Qoriyat, Muscat and other ports on the way, hastily sent a force of 300 Iranian and Arab warriors and mercenaries from different tribes. and gathered four hundred large and small ships and prepared for defense, and in order to delay the advance of Albuquerque's ships, he placed a number of fishing ships scattered in the path of Albuquerque, this huge force had caused Albuquerque to try at first without bloodshed. Ata forced Wasif al-Din to obey, but no results were obtained and finally a bloody war broke out. Although Hormuz's forces fought bravely, Albuquerque crushed Hormuz's fleet and caused many losses to Hormoz's forces, many of Hormoz's ships were sunk, finally in the last decade of Jumadi al-Awwal 913 AH / the first decade of October 1507 AD. (93). Hormuz surrendered², the conquest of Hormuz was actually an artillery conquest because the king of Hormuz was superior to Albuquerque in terms of naval forces and the number of troops in this war, but he lacked artillery and firearms.³ After the conquest, Albuquerque began to build a fort in There, when this fort was being built, the Muslims again protested and prevented them, the Portuguese entered into a battle with them and caused a lot of damage to them, and forced the king of Hormuz to conclude a contract. They avoided paying tribute to Albuquerque in any way possible, along with some other opponents, sought refuge in Khwaja Atta. On the other hand, the people of Hormuz were aware of the differences between the Portuguese captains and Albuquerque. The castle allowed them to return to the ship every night and completely prohibited the communication of the Portuguese with the people of Hormuz.(Falsafi, 1990: 78)

Countering the totalitarianism of the Portuguese:

The establishment of the Safavid government in Iran coincided with the invasion of the Portuguese into the Persian Gulf. Albuquerque after conquering Hormuz and its dependent cities on the coast of Oman in 913 AH/1507 AD. He concluded an agreement with Shah Hormoz in Jumadi al-Thani this year, the conditions of

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this agreement caused serious damage to Iran. Shah Hormoz from 907/1501 When Shah Ismail entered Shiraz, he became a tributary of the Safavid government. With the conclusion of this agreement between Albuquerque and King Hormuz, Hormuz became a citizen of the Kingdom of Portugal. At this time, a representative of the Safavid government arrived near Hormuz to collect the annual tribute. The closest writing to the time in question is the emissary of Shah Ismail, as soon as he learned about the construction of a strong fortress in Hormuz, he preferred to send a courier from land to convey the news of his arrival to the authorities of Hormuz and demand tribute, because the government of Hormuz Albuquerque shared Albuquerque's answer was clear: the kingdom of Hormuz belongs to the King of Portugal, who has captured it with his ships, if the king wants to pay tribute to the King of Portugal, I will give Hormuz to him, otherwise I will give it to someone who Do not be afraid of King Ismail. After this threat, Albuquerque loaded all kinds of firearms on the ships and asked King Hormuz to show them to King Ismail's envoy so that he would understand that the King of Portugal had ordered his captains to pay tribute to this receive the land that is under his control, in addition to declaring that he intends to add all the coastal and non-coastal areas that belong to Shah Ismail to his territory. The officials of Hormuz followed the orders of Albuquerque and refused to pay tribute to the Safavid government. Albuquerque's desire to give in and stop paying tribute to Iran 2 Mr. Dr. Vatoqi, in an article, considers the story of Shah Ismail's envoy as a trick on the part of Khwaja Atta, and based on the evidence, he states that Shah Ismail is most likely until 916 AH/1502 AD. He did not know about the presence of the Portuguese in the Persian Gulf (Bayani, 1977: 78) this matter is in accordance with Iranian sources that claim that Shah Hormuz gave his citizenship to Shah Ismail in 914 AH. That is, one year after the first attack of Albuquerque on the Persian Gulf, and Shah Safavi spent the whole winter of that year in Shiraz, it does not match. They were contacted by envoys to declare their obedience to the king, but he did not know about the arrival of the Portuguese in the Persian Gulf. In addition, the news mentioned below proves that Shah Ismail before 916 AH. He knew about the existence of the Portuguese in the Persian Gulf and the Indian Ocean. During the first conquest of Hormuz by Albuquerque, Khwaja Atta Wazir with the tact of Hormuz, who preferred the conquest of Shah Ismail over the Portuguese, was from the Safavid army, Shah Ismail also helped. He sent an army to confront the Portuguese. Regarding this incident, we gave two dates that the confrontation between the Safavids and the Portuguese happened for the first time in these two times, one was Rabi al-Thani 914 AH. And the other month of Ramadan / December of the same year, this distance is reduced by the fact that Albuquerque and his companions decided to stay in Hormuz until the end of Jumadi al-Thani / October and then move to Cannanore on the southeast coast of India. There is no doubt that this confrontation between 16 Rabi Al-Thani and 5 Rajab 914 AH. The description of this encounter according to Albuquerque's notes is as follows: "An Iranian caravan entered Bandarnai Band in the west of Hormuz, among its members were 500 Safavid warriors who wore tall



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hats and were commanded by two people who were secretly connected with Khwaja Atta. Shah Ismail intended to Their trick is to enter Hormuz through the Nai Band. Albuquerque, seeing these actions, tried to prevent these actions with a night attack on the Safavid Corps in the Nai Band. They failed in the orange night attack of the Safavid Corps, and two of its commanders were killed and the rest fled. If we accept Albuquerque's notes, hearing the news of this Portuguese defeat made Shah Ismail so surprised that he sent an ambassador to Hormuz to befriend Albuquerque, but in the meantime, the Portuguese returned to India and this meeting did not take place. After the return of Albuquerque from Hormuz (914 AH), Shah Hormoz once again favored Shah Ismail and from this time until 921 AH. The government of Hormuz was in the hands of Iranians.¹ The people of Hormuz paid their tribute to the orange agents who came there from time to time, but behind the scenes they disturbed the construction of the castle and were waiting for a suitable opportunity to present the government of Hormuz to Shah Ismail. This is not a tactic. He was followed not only by Saif al-Din II and Khwaja Atta, who were during the same period, but also by the new king of Hormuz, Turan Shah, who was the younger brother of Saif al-Din. Kurds became friendly with Shah Ismail because Iranians were Shiites and were hostile to Turks and Sunni Arabs and could be powerful allies for Portugal. 3. Shah Ismail's initial desire to establish relations with Albuquerque had several reasons. Shortly after Shah Ismail's ambassador left Albuquerque reached India in Goa and raised the issue of control of Goa, and for this purpose he tried to prepare Albuquerque for a completely strange proposal while he was the Viceroy of India. He asked Albuquerque to declare Shiism as the official religion of Goa. and make the Safavid coin customary there, according to the laws of Islamic law, this proposal only meant that the Safavids would dominate Goa, Albuquerque, who was not aware of this incident, rejected the proposal, and in the answer that Albuquerque gave to Shah Ismail's envoy and orders which was given to Albuquerque ambassador Roy Gomez to Shah Ismail's court, this is an evidence that Shah Ismail has his eyes on India and can use Shah Ismail against the Ottomans and Mamluks in front of the Viceroy of India. In the letter that Albuquerque wrote on March 21, 151 AD. He wrote to Amir Saifuddin Aba Nasr, the king of Hormuz, informing him of sending a representative from his side to Shah Ismail's court. Shah Ismail decided to poison the ambassador and finally did it. (Asadpour, 2008: 56) The purpose of the embassy to Gomes was to establish friendship and friendship with Shah Ismail and offer military cooperation with him against the Ottoman Sultan and the capture of Mecca and the war against the King of Cambay. In addition to this, Albuquerque wrote a description of the greatness of Portugal and its court and requested Shah Ismail to send an ambassador to the court of the king of Portugal, and then there was talk about stabilizing the religious status of Christians in Iran and commercial efforts and actions. On the death of Roy Gomez in Hormuz, Shah Ismail sent an ambassador named Mir Abu Ishaq to express his condolences. He arrived in Goa before the month of Rajab 916. Year 919 AH. He did not send an ambassador to Iran. Because Albuquerque was relieved from India, he



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chose an ambassador named Miguel Ferreira, and as a precaution, he took a priest named Juano Ferreira with him. This ambassador was also poisoned by one of his slaves on the way to Tabriz, but the Shah Ismail ordered to save him anyway. After three months, the ambassador recovered. During his stay in Iran, Ferreira managed to get a lot of information about the military, economic and social power of Iran. According to the available documents, during the same days when Ferreira was in Iran, Shah Ismail sent another ambassador named Khwaja Ali Khan to the Viceroy along with a letter addressed to King Emmanuel of Portugal, in which the Shah proposed friendship and alliance³. The situation in Iran and the invitation of the Safavid Shah to Jeddah, Bahrain, Qatif, etc. Albuquerque, according to his imagination, was waiting for Shah Ismail to march towards Mecca. According to Portuguese sources, Shah Ismail intended to capture Mecca, so Albuquerque was considering his fleet. to enter the Red Sea and advance to Jeddah which was near Mecca. He also expected a similar plan to be implemented in the Persian Gulf because Albuquerque wanted to advance his fleet to Basra. Albuquerque had suggested to Shah Ismail to unite with the King of Portugal to suppress their enemies and improve the trade of the two countries in Hormuz, but the Portuguese documents show that, despite this situation, Shah Ismail, while expressing friendship, also intended to capture Hormuz, for this reason, Albuquerque attacked Hormuz again. When Ferreira reached Hormuz with an envoy from Shah Ismail I on his way back, Albuquerque returned with a sufficient force and took Hormuz in 921 AH. The successes of Shah Ismail had shown the Portuguese that the power of the Safavid government was in fact a serious threat to their fleet, as both the king and his advisers were well aware of the importance of the Persian Gulf coast from the mouths of the Mezan Rivers to the Hormuz region. were, in fact, it was through Hormuz that the trade route between the shores of the Mediterranean Sea and India could be effectively controlled by land and sea. Albuquerque, for more control, above all, thought of creating a fort in the nearby Naiband It was the current port of Asaluyeh, because this city was located on the coast. Shah Ismail, who wanted to direct the Indian trade to his territory by sea, apparently learned from the failure of Nai Band and realized that if he did not have enough fleet It cannot do anything against the Portuguese, but the Portuguese, who were enemies of the Ottomans, could be resolved satisfactorily for both Iranian and Portuguese sides, and the Portuguese would act in the interest of Shah Ismail, instead of Shah Ismail's recapture. Hormoz insisted, during Albuquerque's last attack on the Persian Gulf in 921 AH/1515 AD. Done, Ferreira and Shah Ismail's ambassador arrived in Hormuz, Albuquerque received Shah Ismail's ambassador during a grand ceremony, Iranian ambassador Khawaja Alikhan was carrying two letters for Albuquerque and the King of Portugal, after delivering the gifts, he was guided to his resting place with special ceremonies. The Iranian ambassador announced his demands to Albuquerque, firstly, he asked him to pay the customs duties of the goods that are exchanged between Iran and Hormuz to Shah Ismail, the Portuguese government should build ships for transportation between Iran and



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Saudi Arabia. to put it under the authority of the Iranian government and that Portugal help the Shah of Iran to remove the Gwadar region from the hands of the Baloch rebels. Albuquerque rejected the two proposals. Regarding the third proposal, which is the removal of the Baloch rebels, he gave a favorable promise, provided that the passage of goods from The Indian side was going to Hormuz. In Gwadar, there should be no obstruction. Instead, Albuquerque asked for an alliance with Iran against the Ottomans. During an agreement, the parties pledged the following things: 1- The Portuguese to the Iranian government in retaking the Bahrain islands and the port. Qatif will be helped by the Bani Jabr family. 2- The Portuguese will help Shah Ismail in suppressing any rebellion in Makran. 3- Iran and Portugal will unite against the Ottoman Turks 4- The Shah of Iran will recognize Amir Hormuz as a tributary of the King of Portugal Some of his emirs ordered to capture Roimhar (now Bushehr) which was under the control of Hasan Sultan Rashehir because his brother Shah Ali had rebelled. And they sent Dargah and Li was killed in Tabriz³ during the reign of Selghar Shah II, which lasted from 940 to 948 AH. In Hormuz, under the Kurdish rule of Shiraz governor Ibrahim Khan Zul Qadr, a skirmish took place under the command of the Portuguese with the intention of seizing it, but finally a compromise was reached⁴ in 1543/950 AD. Sultan Ala, to whom the government of the southern regions of Persia and the coasts of the Persian Gulf from "Sharhad Shamil to Nakhilat and Manojan and Jask to Makran" had been entrusted, had set out "outside" Hormuz with a huge army with the intention of capturing Hormuz" The Portuguese had the position of leadership and superiority over the kings of Hormuz, but during the period of Portuguese domination, according to Fariasosa, "the sultans of Lar always tried to prevail over the kings of Hormuz, as in the past"⁶ in a letter sent by the king of Hormuz to the viceroy of India in 950 AH. In 1543, he wrote that there was talk of Khan Lar's control over the coasts, but each time they were forced to retreat due to the support of the Portuguese from Hormuz. India took place and had a courtyard aspect for the parties Sultan Suleiman wrote a letter to Shah Tahmasab asking him to fight with me like his father, Shah Tahmasab said in reply, "He is greater than Toksi that I follow his words and where God has forbidden Muslims from throwing themselves into the grave". How can I fight with the Muslims and put myself in danger? Moreover, my father's soldiers had drunk wine from night to morning in Chaldaran, but now, thanks to God, my army repented from drinking wine." On the other hand, the Shah assigned Muhammad Khan Teklo to Baghdad. made to join the Shah⁴, thus Baghdad and Basra were taken over by the Ottoman government, while according to the statements of Mohammad Khan Taklu⁵, the Iranian ruler of Baghdad, the Taklu family, who were under his command, were prepared for war with the Ottoman Turks, even Muhammad Khan killed the envoy who was sent by Ibrahim Pasha to bribe him, but when Shah Tahmasab's order arrived, he stopped resisting and took one thousand tomans of his property, which included "twelve thousand camels and fifty thousand sheep and all treasures and livestock". ⁶ With the capture of Baghdad by the Ottomans, Basra, which was under the



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citizenship of Iran in 914 AH, was captured by them. The matter did not affect the status and prosperity of Basra, the Turkish Pasha of Baghdad left Basra, which was a city in the southernmost point of his territory, surrounded by conflicts and threatened by tribes, and was satisfied with respect and a small tribute⁷, because the rulers of Basra had independence in their internal affairs. In the year 953 AH. Sultan Suleiman sent a large army to conquer Basra, Abdallah Munzernamei, who was the ruler of Basra, came out of the fortress and fought with the Romans (Ottomans), but when he saw that he could not do anything against the Ottoman army, he abandoned the city and the Ottoman army captured it. Immediately after settling in Basra, the Ottomans noticed the prosperity of the Persian Gulf and made a friendly offer to the Portuguese. The Ottomans intended to isolate the Safavids more by dominating Mesopotamia, capturing Baghdad in 941 AH. And the annexation of Basra in 956 AH made their access to the Persian Gulf possible. The extensive conflict that started in 941 AH between Iran and the Ottomans brought many benefits to the Ottomans, the factors that led the Ottomans to war against the Safavids were: their desire to more effectively control the trade routes, such as the road Silk, which came from Tabriz in Roman currency, tukat, and Bursia, the most important Ottoman trade center, and the spice route extended from Basra to Baghdad and Aleppo, during Sultan Suleiman's stay in Baghdad (December 1534 to April 1535), he was informed of his surrender. Rushd bin Maghamis found the ruler of Basra, he sent his son with the keys of Basra and the assurance of his loyalty. The chiefs of the local tribes of the islands of Lorestan and the borders of Huyza and Khuzestan near 5 declared their loyalty to the Ottomans. Also in Jamadi al-Thani 941 AH Envoys from Sheikh Qatif and Bahrain came to Baghdad to deliver a welcome message to the Sultan, probably these small states needed support or friendship with the Sultan against the Portuguese, in Basra until 945 AH. / 1538 AD. The Sultan's name did not appear on the coins and it was not recited in the Friday prayer sermons, so it can be seen that the statement and information of the ruler of Basra was apparent from the Ottoman Sultan. The Portuguese fought over the control of the Persian Gulf in the second half of the 16th century.⁶ Scholars disagree about the motives behind the Ottoman expansionist wars, some believe that the Ottoman advance towards the Red Sea and the Persian Gulf was due to their desire. The documents show that the Portuguese have been obtaining information about the relations between Iran and the Ottomans in order to use this information to their advantage in a letter dated October 30, 1552 AD. A letter has been written to the ruler of India from the head of Nooruddin, it says: "There is news from Lar and Shiraz that Shah Tahmasab is advancing towards the land of the Ottoman sultan in the front of Tabriz. After that, I have not heard any news about it. If I receive new news, I will send it to your Highness." In this letter, the actions of the Ottoman fleet under the command of Piri Bey are described in detail. The Portuguese, like the Ottoman government, were not unaware of the commercial position of Basra. Fariososa mentioned the influence of the Portuguese in Basra and

He writes: The Portuguese had established a commercial agency and a school of Christian religious sciences in Basra. (Egbal, 1949: 54)

Conclusion:

The commercial economy of the Persian Gulf in the era before the Safavid era had achieved a great number of prosperity and glory. Basically, the commerce and trade of the Persian Gulf at this point can be divided into the era before the Safavid era, the Safavid era and the Portuguese presence in the ports and islands of the Persian Gulf. The period before the Safavids gained power in the Persian Gulf can be considered the period of prosperity and economy and trade in the Persian Gulf, because the main and fundamental trade and shipping is based on free trade, and in other words, traditional trade was based on the discourse of trade. But over time, it is due to the special policies of the Safavid sultans, who sacrificed the Persian Gulf in the west and northwest to confront the Ottomans, and on the one hand, due to the presence of the Portuguese in the Persian Gulf, which was created by their colonial policies. A historical rupture was created in the Persian Gulf and the collapse of the traditional discourse of free trade in the region, the result of such a policy was on the one hand and on the other hand the paralysis of commerce and shipping in the Persian Gulf of Iranian merchants and sailors, perhaps the final result can be seen. Such developments in the Persian Gulf created a split and fragmentation in the Islamic world in the form of two hostile and conflicting ideologies (Shia-Sunni) on the one hand, and also laid the groundwork for the presence of colonial governments in the post-knowledge periods, colonialism which initially manifested itself in They do mold. Commercial companies are known to Iranian rulers, before the formation of the Safavid government of the Persian Gulf, they were directly or indirectly related to the governments that are formed in Iran. He annexed the region, but with the arrival of the Portuguese in the Persian Gulf, the political influence of Iran decreased there, although Shah Ismail hardly tolerated the Portuguese domination of Hormuz and parts of the Persian Gulf until the last years of his life, but issues such as It is. The conflict with the Ottomans and the need for help, especially after the Chaldran War, forced Shah Ismail to tolerate the Portuguese. During an operation, the Ottoman government removed the territory of Iran, including Arab Iraq, and accordingly removed Basra from Iran. . The formation and domination of these areas by concluding the peace agreement of Amasya in 962 A.H. The formalization of the conflict with the Ottomans until 1618 when Shah Abbas made peace with the Ottoman government, always the Ottoman issues, which means the clash of two ideologies, one of which is the lack of attention to the Safavid kings to the Persian Gulf. . On the other hand, the Iranian government knew that in order to confront its enemies with the help of the dominant forces in the Persian Gulf, considering that the presence of the colonial forces in the Persian Gulf was not pleasant, but it did not want to build tolerance with them, the military of Shah Abbas in the Persian Gulf and



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areas. Around it, Iran's dominance over more parts of the Persian Gulf was increasingly presented, using the semi-independent and rebellious governments of the southern coast of Iran to directly communicate with this region. In the year 1010 AH, the Bahrain Islands were removed from the possession of the Portuguese invaders and there were attacks against the Portuguese on the coast in front of Hormuz. These attacks laid the groundwork for the expulsion of the Portuguese from Hormuz, which was considered their most important base in the Persian Gulf. Finally, in 1031 AH, the government Iran expelled the Portuguese from Hormuz with the brief help of British ships. After the conquest of Hormuz, Iran attacked the opposite coasts of the Persian Gulf and Arab Khostar Iraq, playing a greater role in the region. It was guaranteed by the powerful troops of the Fars state, although Iran requested help from the fleet of the Dutch and British East India Companies to expand its dominance on the shores of the Arabian Peninsula and expel the Portuguese from these shores, then the non-acceptance of this request by the companies. The aforementioned made Iran adopt a friendly policy with the Portuguese and bring them into the scene of economic and commercial competition in the Persian Gulf, which was in Iran's favor, thus preventing their mischief and disturbance towards the shores of Iran. In general, it can be said that after the battle of Hormuz, Iran took over the political-economic and commercial affairs of the Persian Gulf more and more. During their centuries-old history, they paid a lot of attention to the economy, especially the commercial economy of the Persian Gulf, because by controlling the trade of this region, they benefited from its customs revenues.



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THE EFFECTS OF THE FIRST WORLD WAR ON THE REGION OF AZERBAIJAN AND NORTHWESTERN IRAN AND THE FORMATION OF THE PROVISIONAL NATIONAL GOVERNMENT

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Abstract

One of the most important political events of the 20th century around the world is the outbreak of the First World War, which took place after the great industrial and colonial competition between European countries, which affected most Islamic countries such as Iran, including Azerbaijan and northwestern Iran. Iran and especially the region of Azerbaijan was affected by the war because of its strategic location and being on important communication routes. The government of Iran adopted a policy of neutrality, but the announcement of Iran's neutrality did not have much effect on the warring countries in using the strategic position of Azerbaijan and Iran. Allied countries, including the Russian and British governments, entered the country from different regions, Russian forces from Azerbaijan and northern Iran and British forces invaded Iran from the south, and during the First World War, with the conclusion of the 1915 agreement, Iran was divided into two. They divided the area under their influence. The entry of Russian and British troops into Iran based on these agreements, and the damage that was done to the Azerbaijan region and other parts of Iran as a result, caused parliamentarians, clerics, politicians, ministers and even the Shah himself to confront the Russian and British aggression in the capital. To leave Qom, and decide to establish a government in exile. For this purpose, they established the National Defense Committee in Qom. The National Defense Committee was one of the most prominent types of resistance that was formed by the rulers of Iran at the time and a number of volunteers gathered in it, but with the attack of the Russians, the central core of the resistance of the National Defense Committee was crushed and caused a mass migration of them from Qom to Isfahan, and then Arak and Kermanshah, where they organized National Guard forces and formed a temporary national government headed by Nizam al-Sultaneh Mafi in Kermanshah. Considering the outbreak of the First World War and its political effects in Iran, including the occupation of Azerbaijan and northern Iran by the Russian government and the southern part of Iran by the British, Iranian statesmen planned to establish a government in exile called the Provisional National Government in order to counter their aggression.

Key word World War I, political effects, Iran, Azerbaijan, National Provisional Government

Introduction

From the first years of the 20th century, while the powerful and development-oriented European countries tried their greedy finding sources of wealth and searching for political and economic bases and new colonies in other continents continued, in Inside Europe, the colonialists tried to get rich and green lands by making territorial claims and threatening small European countries This continent will also get a bigger share. In this way, Europe became the scene of the war of powers. The only excuse needed was the fire of war to ignite, the "Sarajevo" incident and the murder of the Crown Prince of Austria at the hands of a young Serb became an excuse for the fire of war in the heart of Europe. flare up and in a short period of time cover this continent from east to west and other lands that were miles away from the focus of the war. get involved Iran and especially the region of Azerbaijan due to its special geographical location and being on the transportation route And the communication bridge with Russia was noticed by the Allies and the scope of the World War covered that region as well. Iranian government politics neutrality prevailed, but the Allies did not respect Iran's neutrality and entered their forces into Iran and completely occupied the entire land They occupied Iran, so that the Russian forces occupied all the regions of Azerbaijan and northern Iran, and England occupied the entire southern part of Iran They dominated.

The situation of Iran and Azerbaijan in the First World War

Iran through the 1915 agreement. This covenant that complements It was the 1907 agreement, the neutral zone concluded in the 1907 agreement was canceled and Iran was officially divided into two occupied zones, northern and southern. Kurds were divided, Azerbaijan and the northern parts of Iran were called the Russian region and the southern part of Iran was called the British region. Russia He recognized his dominance in the north and northwest of Iran, including Azerbaijan, Kermanshah and Qazvin, and the right to create a Cossack army. He found Russian in the areas under his control. The British also ignored the importance of Iran as a foreign stronghold in defense of its interests In India, they also gave great importance to oil areas and refineries in southern Iran. (Zargar, 1372 p. 43) Therefore, to capture and The occupation of the southern regions of Iran, including the cities of Isfahan, Lorestan, Fars, Khuzestan and Sistan and Baluchistan, and the southern police settled in Iran. (Ibid., p. 42) The intervention of British and Russian invaders in the internal affairs of their occupied areas was to a certain extent. that the Russians collected taxes from the people in Tabriz and Qazvin, and the British, in return for the small loan they had given, set up the customs of Bushehr in took authority (Sephehr, p. 9) The treaty of 1907 and 1915, which was concluded between London and Petrograd, was unpleasant from Berlin's point of view and caused the dissatisfaction of the Germans. German workers in Iran used Berlin's disapproval as a means of spreading their propaganda, and as a result of these propaganda, some

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political parties pro-German politicians were formed in Iran. With this propaganda, Germany wanted the Muslim people of Iran to cooperate with Muslims to force the Ottomans in the war against the Allies and if such an incident happened, most of the Islamic world would enter the war on the German front. It could be with the Allies, therefore, with a short distance, it helped the Ottoman government in participating and cooperating in the war. The Ottoman government also He wanted to change the war situation in Europe in favor of Germany by entering the war and opening the eastern front. According to Germany, now is the time It was decided that by joining Iran to the ranks of the allies, the Russian and British bases in Iran would be destroyed and the German and Ottoman forces would be able to Cross the territory of Iran and expel the Russian army from Azerbaijan and disembark from the south behind the gate of India. Also the Germans They wanted to take the oil of southern Iran out of the hands of the British.

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The presence of the German and Ottoman governments in Iran and their request for unity from Iran against the Allies and the declaration of the neutrality of the Iranian parliament

On November 1, 1914, by announcing its neutrality at the beginning of the war, the government of Iran tried to exclude Iran from the hostilities of the Allies and Keep the allies away. The Russian and British governments also wanted Iran to remain neutral and full security to be established in Iran. But The tendencies of the Iranian people, which are due to the special political situation of the country, which was stuck between the two colonial forces of Russia and England, the majority of them from The appearance of Germans in the country was happy, because they thought that with their help they could save themselves from the colonialists. The Iranian government ignored the people's wishes and promoted its neutrality with diplomatic methods, until the Ottoman government fell into line. joined the allies and practically declared war on the Russian government, as a result of which the war behind the gates of Iran and in the territory of Azerbaijan drawn. At the beginning of the war on November 11, 1914, Shaykh al-Islam Osmani Khairi Effendi issued a fatwa of Jihad against England, France and Russia. and asked the Muslims to wage jihad against these countries. that the Ottoman Empire declared war against the Allies, was signed, and on November 14, Tanin newspaper published it under the title "Jihad Akbar" and announced (Latfi, number 1/90-89) they also asked the Iranian government to participate in the war alongside the Muslim Ottomans (Mir Shenikoff, p. 47) but the central government could not openly declare whether it is against or in favor of this issue and is under the influence of the two northern policies And the South, meaning Russia and England, preferred to remain neutral and give more excuses to Russia to keep its soldiers in North and northwest of Iran. But neither Russia nor the allies paid any attention to this and continued to pursue their goals. Russia About eight thousand Russian soldiers entered Iran on four occasions to protect the lives and property of Russian nationals, also allegedly Expanding German activity, other forces entered Anzali port and headed towards Tehran. This worried the Ottoman government and they were likely to cause harm to that country, so on October 1, 1914, a force composed of six thousand soldiers and they brought artillery and cavalry into Iran and captured Qatur and Mahabad areas in Urmia region in order to block Iran's western roads in The Ottoman government was not satisfied with this and warned the Iranian government that if the Russian army does not leave the Iranian soil, The Ottoman army will occupy Azerbaijan to prevent possible Russian attacks. Following this, the Iranian government remembered Russia and England wanted to withdraw their forces from Iran and respect Iran's neutrality, but the two aggressor governments, Russia and England Not only

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did they not pay attention to this warning, but they added to their concentrated forces in Iran and after occupying the border areas of Iran, they entered They went to Ottoman soil and advanced towards Erzurum. The Ottomans also came to Tabriz from the side of the Urmia Sea and on July 14 They occupied Tabriz in 1915. The Russians chased the Ottoman forces and were able to take back Tabriz after 15 days and then to They went to Urmia and took this area from Osmani and advanced to the shores of Lake Van. Despite the failure that The Ottomans suffered from the Russian forces in Azerbaijan, but still in the northwestern parts of Iran, in Kermanshah, Hamedan, Lorestan and part of They settled in Khuzestan.

Migration during the war and the formation of the provisional national government with the help of the Ottoman and German governments

With the gradual expansion of the scope of the world war in Iran, all of its territory was invaded more and more, and the region of Azerbaijan He was also faced with the destruction of both land and vital resources. For this purpose, a group of millions and some representatives of the National Council decided They began to take action against Russia and England with the hope of obtaining material and spiritual support from the German and Ottoman governments. So to They thought of leaving Tehran and forming the immigration movement and forming another temporary national government in another part of Iran. Between Immigrants from all walks of life were present. This movement was known as "migration" in history. Meanwhile, the ambassadors of Germany, Osmani and Austrian minister Mukhtar accompanied the immigrants. The idea of emigrating or changing the capital took root when the Allies claimed Prince Reuss, Minister Plenipotentiary of Germany after his leave And his return to Iran brought with him a large amount of money, gold, weapons and ammunition. On the other hand, the British also claimed, The German embassy has issued an order to cause unrest in the south of Iran and to oversee the revolution in India and Afghanistan and wanted to do so. cause severe damage to the interests of Great Britain. They found that it is necessary to send Russian troops to Tehran so that an obedient and anti-German government can be established. Following this Russian Cossacks advanced to the city of Karaj and announced their readiness to enter Tehran. With the movement of Russian forces from Qazvin to Tehran, Sultan Ahmad Shah and his prime minister decided to move from Tehran and change the capital took Even the MPs were informed to move to the city of Isfahan and make Isfahan the temporary capital (Ahrar 1368, p. 419; Sepehr, pp. 239, 293, 300; Kasravi 1371, p. 640) This matter was discussed with Prince Royce, Minister of German Affairs It was discussed and he also confirmed this idea and supported them materially and spiritually. Mostofi al-Mamalek, Prime Minister of Iran He was secretly preparing the preparations for this trip and was busy moving the capital. The first group that left the capital, the leaders of the party It was a democrat who organized a committee in the city of Qom. When the Russian government found out about this action of the



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Iranian government, Marling, the Russian ambassador to Ahmad Shah, who was about to move to Isfahan, warned that if he leaves Tehran, he will lose his throne. He also threatened that if Iran signs a contract with the German and Ottoman governments, the Russian and British governments will also sign a contract with each other to implement what they had about the isolation of all of Iran. This threat of Russia was effective and the Shah of Iran with the Russian representatives decided to stay in the capital. Following this, Russian and British ambassadors went to the king and assured him that the troops Russia will not come to Tehran. When the Shah of Iran signed a reconciliation agreement with the two governments of Russia and England, the National Defense Committee in Shahr Qom The presidency of Suleiman Mirza had been established, the National Defense Committee did not value the compromise of the government and replaced itself with the government. and issued all the orders in his name. In the first step, the National Defense Committee started the war in Hamadan with the help of gendarmes and took the city of Hamedan. But he faced the advance of the Russians. The Russians defeated the Mujahideen of the Committee around the city of Hamedan They moved towards the city of Qom, the center of the committee, because of this, the National Defense Committee was forced to leave the city of Qom and go to Isfahan, but with the pursuit The Russians left there and reached Qasr Shirin via Lorestan and joined the Ottomans. The Ottoman army units defeated the British They defeated Iraq and pushed them back to the area of Kot al-Amara. They also defeated the Russians and dominated Kermanshah. Immigrants and members of the National Committee who were accompanied by the Ottomans, when They reached Kermanshah, dissolved the National Defense Committee and created another government called the National Provisional Government. Germans to lead immigrants They were looking for a person who could improve the situation in their favor, for this purpose Nizam al-Sultaneh Mafi, the governor of Lorestan, who hates The British had a reputation, they chose him and gave him financial and military aid. (Ittihieh, p. 25) took over, but they refused to cooperate with the Ottomans. , p. 41) and this caused failure and failure in the formation of the interim national government. Maybe if the provisional government to cooperate with the Ottoman forces He continued, the possibility of their success would increase and their actions could be useful for Iran's political independence. if It was mentioned that Mafi's Nizam al-Sultaneh, the head of the National Provisional Government, prevented the alliance with the Ottoman government, the Ottoman government was the only one able to could not confront the allies, and finally his forces were defeated in Kut al-Amara in Iraq in front of the British, and the Ottomans had to They retreated from Iran and abandoned the cities they had taken one by one. On the other front, with the advance of the Russians, the Ottomans They lost the cities of Hamadan, Daulat Abad and Bijar. With the fall of Kot al-Amara by the British, the road to Qasr-Shirin is open to the Russian forces And Qasr Shirin was evacuated. Mr. Nizam al-Sultaneh and another group of representatives,

with the help of German and Ottoman officers, evacuated there They entered Baghdad. (Shibani, p. 51, compare Kasravi, p. 666) They went to Berlin. (Kasravi, p. 666)

Conclusion

With the outbreak of the First World War in Europe, the war took on a wide scope and was called an international war. world war I It influenced most of the countries of the world. One of these countries was Iran, which due to its strategic location and location on Along the communication routes, it was the attention of the allied governments. The two colonial governments of Russia and England were among the allied governments that the nation Iran had hostile feelings towards them. In front of the allies, there were allied forces, including Germany and the Ottomans Was. At that time, Germany did not have a bad record in Iran, and it promoted itself as a supporter of Muslims with extensive advertisements. The Iranian government, with Assessing the aspects of the matter, he adopted the method of neutrality in the war. But the warring countries did not value this matter and the entire soil of Iran They became the arena of their conflicts and struggles. Freedom lovers and patriots and those interested in the independence of the country because they are able to defend They were not from their own country, they saw the solution in emigration. In order to protest against Russia's aggressive actions and announce it to the world their neutrality has been violated, and they are not willing to surrender to foreigners. Therefore, they thought of migrating and changing the capital and They formed a national provisional government headed by Nizam al-Sultaneh Mafi in the west of Iran. Therefore, the migration movement can be considered the most important movement He knew that the amendment was made by members of the Democratic Party and a group of parliamentarians in order to deal with Russian and British aggression took



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STUDY OF THE WAVE DISPERSION CHARACTERISTICS OF POROUS FG PLATES RESTING ON ELASTIC FOUNDATIONS VIA A QUASI-3D HSDT

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Abstract: In this article, wave propagation in functional gradation porous plates (FG) resting on an elastic foundation with two parameters is studied using a new quasi-three-dimensional (3D) higher-order shear theory (HOST). The new quasi-3D HSOT has only five variables in fields displacement, which means has few numbers of unknowns compared with others quasi-3D. This higher-order shear theory (HOST) includes shear deformation and effect stretching with satisfying the boundary conditions of zero traction on the surfaces of the FG plate without the need for shear correction factors. The FG plate is considered to rest on the Winkler layer, which is interconnected with a Pasternak shear layer. In addition, the effect of porosity is studied. The properties of the material graded for the plates are supposed to vary smoothly, with the power law, in the z-direction. By based on Hamilton's principle, we derive the governing equations of the FG plates resting on elastic foundation, which are then solved analytically to obtain the dispersion relations. The results are presented which have demonstrated the effectiveness of the current quasi-3D theory for predicting the effect of elastic foundation on the propagation of waves in FG plates.

Keys words: graded material; dynamics responses; quasi-3D theory, variables elastic foundations; porosity; wave propagation; stretching effect.



FERRICYPHEN AS AN OXIDANT FOR AQUEOUS DSSC

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ABSTRACT

This study focuses on the kinetics and mechanism of the redox reaction in an aqueous medium between ferricyphen (potential sensitizer for a DSSC) and iodide (common mediator for a DSSC). Ferricyphen oxidizes iodide in aqueous medium without the requirement for any external initiation. In order to determine the reaction's kinetics at constant ionic strength (60 mM) and room temperature (33 °C), the redox reaction was investigated spectrophotometrically on a laboratory scale. It is necessary to quantify each parameter's impact on the rate of reaction in order to suggest a mechanism.



FERRICYPYR AS AN OXIDANT IN TERT-BUTANOL/AQUEOUS MEDIA

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ABSTRACT

A DSSC's efficiency, economics, and environmental friendliness may all be enhanced by homogenous catalysis, which uses a tiny amount of an ecologically benign, non-toxic solvent with water. This may catalyze the rate of reaction and may increase its stability and cost-effectiveness because of water. As a result, this study is based on the use of 5% v/v tert-butanol as a catalyst to enhance the rate of reaction of ferricypyr-iodide in 95% (v/v) aqueous medium. The reaction was studied spectrophotometrically owing to highly colored product formation. The kinetics was pursued under the pseudo-first order condition at constant ionic strength and room temperature. The impact of several experimental factors such as pH, ionic strength, iodine's concentration and temperature were determined on rate constant of the reaction to propose an effective catalytic mechanism.



THE MODELING APPROACH FTIR COUPLED WITH CHEMOMETRICS FOR EVALUATE AND DETERMINE THE FALSIFICATION OF WALNUT OIL

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Abstract

This study aims to develop a model of walnut oil in a simple and reliable way, in order to detect adulteration, which constitutes a serious danger that attacks the food sector and human health. For this reason, we have based on the collection of nuts seeds in the agricultural region Beni Mellal-Khifra in Morocco. The extraction of nut oil is done about cold extraction in order not to mix this oil with other oils and distort the results of the study.

The experimental samples are divided into two sets, 25 calibration samples (Training set), and 7 validation samples (Test set) which were chosen from 20% of samples and also to cover the entire content of the studied range (4 calibration samples opposite one for validation) and with a falsification interval of sunflower oil with a percentage of 5.80-31.95% and rapeseed oil with 4.33-29.37%.

The treatment of infrared spectral results has been done by chemometrics techniques using the partial least square regression PLSR and the principal components regression PCR. The results shows that the perfect model of falsification of nut oil by sunflower -oil and rapeseed -oil illustrated in the spectral region 3050 to 700 cm^{-1} . The best model selected is RMSE with an R2 of 0.998 for sunflower oil and 0.999 for rapeseed oil.

Keywords: FTIR, Chemometrics, Nut oil, Adulteration, sunflower oil, rapeseed oil.



COORDINATION OF FE (II) METAL WITH PARACETAMOL (AS LIGAND) USING SOLID-STATE METHOD AND THEIR ANTIBACTERIAL EVALUATION

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ABSTRACT

Solid-state synthesis is a synthesis method that is characterized by its environmentally conscious nature. This technique is known for its expeditiousness and its ability to yield a higher quantity of products. The intricate $[\text{Fe}(\text{para})_2\text{Cl}_2]$ were produced employing the solid-state technique. The analysis of the spectra of both the ligand and the complex established the coordination between the ligand and the metal ion via the oxygen of the carbonyl of ketone and the nitrogen of the amide group. The activity of certain bacterial isolates has been observed to increase at higher concentrations with the introduction of a metal ion, specifically the paracetamol complex $[\text{Fe}(\text{para})_2\text{Cl}_2]$.

Key word: Solid-state, synthesis, metal ion, paracetamol

INTRODUCTION

Solid-state synthesis pertains to the mechanism whereby a reaction is mechanistically activated, resulting in the formation of supramolecular or molecular compounds. Typically, this synthesis utilizes solid materials as the initial components, either without the use of a solvent or with the incorporation of a minimal amount of environmentally friendly solvent (Jibril et al., 2023). Recently, there has been a demonstration by researchers indicating that the application of solid-state technology has been employed in the process of drug synthesis through the utilization of metal-ligand complexation (Braga et al., 2008).

In this document, we present a report on the coordination of Fe (II) metal with paracetamol through the utilization of a solid-state method, along with an assessment of its antibacterial properties.

MATERIALS AND METHODS

Materials / equipment's

Includes; glass wares, mortar, pestle and metal salt from the department of chemistry Aminu Saleh college of education Azare. Active pharmaceutical ingredients from Buya pharmaceutical industry Azare. FTIR, UV-Visible spectroscopy, magnetic susceptibility balance and conductivity meter were determined at Bayero University, Kano.

Methods

Solid-state synthesis of the complex

The synthesis was carried out using 2.0g of ligand and 1.0g of Fe (II) chloride in a glass mortar and pestle, and grounded with a single drop of ethanol as a liquid-assisted grinding (LAG) technique. A distinct brown powder was acquired and subjected to recrystallization. (Kuraw & Yammama, 2014).

Spectral Studies

FTIR spectra were recorded in the range of 400-4000 cm^{-1} using FTIR spectroscopy by Agilent technologies and electronic spectra was recorded in the range of 200-700 nm using ultraviolet spectrometer lambda 35, both in the Instrumental and central laboratories Bayero University Kano.

Antimicrobial Activity

The sensitivity discs were obtained from man no.1 filter paper, which were then subjected to sterilization through autoclaving at a temperature of 121°C for 15 minutes. The preparation of the sensitivity discs encompassed the assessment of the extract or filtration weight, followed by multiple doubling dilutions in ethanol ($\text{C}_2\text{H}_5\text{OH}$). This was followed by the placement of the modified paper disc in a solution possessing potencies of 500g, 1000g, 2000g, and 4000g (Yaro et al., 2023). Standardized cultures of each isolated strain were applied to the surface of Mueller Hinton agar in separate petri dishes. Additionally, discs containing the extract, standard antibiotic, and Ciprofloxacin (30g) were placed on the agar. The plates were then inverted and left undisturbed for a duration of 30 minutes, allowing the extract to diffuse into the agar. Subsequently, the plates were incubated aerobically at a temperature of 35 $^{\circ}\text{C}$ for a period of 18 hours. Following this, the zone of inhibition created by the test organism around each extract and standard antibiotic disc was measured. (Yaro et al., 2023).

RESULTS AND DISCUSSION

The synthesis was completed quickly within a shorter time of 15 minutes.

Table 1: The IR spectra (4000-400 cm^{-1}) of paracetamol and its metal (II) complex.

Ligand/complex	$\nu(\text{OH})$	$\nu(\text{N-H})$	$\nu(\text{C=O})$	(M-O)	(M-N)	(M-Cl)
Paracetamol	3163.40	1566.35	1655.39	-	-	-
[Fe (Para) Cl_2]	3156.40	1562.36	1651.43	478.10	605.11	713.30

Table 2: Electronic spectra, conductance, and magnetic moment (B.M) for prepared metal complex with their suggested geometry.

Compounds	Electronic Spectra			Conductance in DMSO ($\Omega^{-1}\text{cm mol}^{-1}$)	Magnetic moment (BM)	Geometry
	Wavelength (nm)	Energy (cm^{-1})	Assignments			
Paracetamol	208	48077	$n \rightarrow \pi^*$	30.5	5.69	Octahedral
	219	4662	$\pi \rightarrow \pi^*$			
	233	44843	C-T band			
[Fe (Para) Cl ₂]	242	41322	$\pi \rightarrow \pi^x$			
	247	40486	MLCT band			
	251	39840	$^5T_2 \rightarrow ^5T_{2g}$			
	301	33223	$5T_g \rightarrow ^5E_g$			

The infrared data of both the ligand and the complex is provided in Table 1. The spectral peaks observed at 1655 cm^{-1} and 1566 cm^{-1} in the unbound ligand can be attributed to the vibrational modes of the carbonyl group (ν (C = O)) and the amino group (ν (N-H)), respectively. These peaks underwent a slight shift to 1651 cm^{-1} and 1562 cm^{-1} in the complex, indicating the coordination between the metal ion and the ligand, as illustrated in the proposed molecular structure. Conversely, the peaks at 478.10 cm^{-1} , 605.11 cm^{-1} , and 713.30 cm^{-1} , which were absent in the unbound ligand, are assigned to the M-O, M-N, and M-Cl bonds, respectively. These findings serve as conclusive evidence for the formation of a novel solid-state synthetic compound. [Fe (para)₂ (Cl)₂]. Similar findings have been reported by (Refat et al., 2014).

The electronic spectra of the free ligand demonstrate the presence of three prominent bands at 208 nm, 219 nm, and 233 nm. These bands have been assigned as the $n \rightarrow \pi^*$, $\pi \rightarrow \pi^*$ and CT band. On the other hand, the complex exhibits main bands in the 242 nm, 247 nm, 251 nm, and 310 nm region. These bands have been interpreted as $\pi \rightarrow \pi^x$, MLCT band, $^5T_2 \rightarrow ^5T_{2g}$ and $5T_g \rightarrow ^5E_g$ respectively, these findings suggest an octahedral geometry around the Fe (II) ion in the Tanabe-Sugano diagram, as documented by previous research. (Mustapha et al., 2014).

The molar conductance of the complex in ethanol at a concentration of 1×10^{-3} in C₂H₅OH, as shown in Table 2, is measured to be $30.5 \Omega^{-1}\text{cm mol}^{-1}$. This value suggests that the complex is a non-electrolyte and is situated within the octahedral geometry when dissolved in ethanol. (Islamia & Wani, 2016).

Table 3: Antibacterial test of paracetamol and its metal (II) complex

Compounds	Concentration ($\mu\text{g}/\text{agar}$ –well	S. Aureus (mm)	E-Coli (mm)
Paracetamol	4000	18	16
	2000	15	14
	1000	13	11
	500	10	8
[Fe (Para) Cl ₂]	4000	13	11
	2000	10	9
	1000	8	7
	500	-	-
Standard			
Ciprofloxacin	500	35	30
	200	-	-

Table 4: Mole fraction of the ligand (paracetamol) and Absorbance of Fe²⁺ with the ligand.

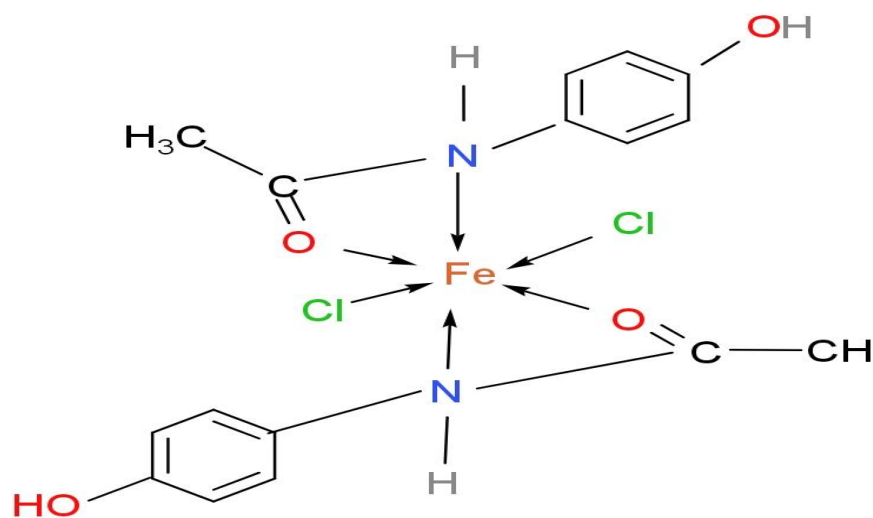
Mole fraction X (total volume = 9ml)	Fe: L ₂ λ_{max} = 580nm
0.060	0.102
0.191	0.098
0.315	0.177
0.440	0.210
0.565	0.251
0.688	0.224
0.810	0.227
0.940	0.130
1.000	0.098

The antibacterial assessment, as exhibited in Table 3, demonstrated that the compound $[\text{Fe}(\text{para})_2(\text{Cl})_2]$ the compound exhibits antibacterial activity against all strains of bacteria at higher doses, except for its lack of efficacy at lower doses against both isolates. $500 \mu\text{g}/\text{agar}$ –well (Chaudhary & Mishra, 2018).

The metal to ligand ratio, as indicated in Table 4, was determined through the application of Job's method of continuous variation. This method involves constructing a plot of absorbance against mole fraction, resulting in a curve that reaches maximum absorbance at the point corresponding to the ligand. By utilizing mole fraction in the calculation, the number of ligands coordinated to the metal ion was estimated, revealing a ratio of 1:2 (Jibril et al., 2020).

CONCLUSION

On the grounds of the analytical data obtained through spectral analysis, conductivity measurement, and magnetic moment, a preliminary structure for the metal (II) complex originating from paracetamol has been proposed.



Proposed structure of Paracetamol complex

Therefore, this research has again demonstrated the use of solid-state method in the synthesis of drugs with metal ion.



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THE EVOLUTION OF THE NUTRITIONAL QUALITY OF A BISCUIT

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Abstract:

Our study highlights, for the first time, the potential use of olive leaf extracts (OLE) as natural additives to extend the shelf life of biscuits and to formulate a healthy biscuit. The results of the work demonstrate that OLE, at a concentration of 500 μg GAE/g of paste, can be effectively used for this purpose, both in free and encapsulated form. Higher radical scavenging activity and oxidative stability were detected for the enriched biscuits compared to the controls, being those enriched with encapsulated polyphenols even more stable. On the other hand, the presence of alginate and pectin as wall materials of the microspheres influenced the water absorption phenomena, leading to a hardening of the texture of the biscuits. The results were confirmed under the two accelerated storage conditions tested (55°C; RH 50%), in the presence of UV light or by storing the biscuits in an OPP bag (abbreviation for oriented polypropylene) in the dark. Other studies in real storage conditions will be carried out to confirm these promising results.

Keywords: Olive leaf extracts (OLE), Alginate and Pectin, polyphenols, Wheat lignin, disaccharides, rapeseed oil



PHYTOCHEMICAL STUDY, ANTIOXIDANT, AND ANTIDIABETIC ACTIVITY OF CHENOPODIUM AMBROSIoidES (L.).

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Abstract

Chenopodium ambrosioides is a toxic plant of the Chenopodiaceae family that has been used for a long time by populations to treat various ailments, particularly in pediatric environments as a vermifuge, antispasmodic, and antipyretic. The objective of this study is to highlight the phytochemical composition of organic fractions and aqueous extracts of the aerial parts of *Chenopodium ambrosioides* and to evaluate their antioxidant and antidiabetic activity. The determination of polyphenols was performed using the method of the Folin-Ciocalteu reagent, flavonoids using the method of the aluminum trichloride reagent $AlCl_3$, and tannins using the method of vanillin. The evaluation of antioxidant activity was performed using the DPPH, FRAP, ABTS, and TAC methods, using quercetin, catechin, and ascorbic acid as standards. The antidiabetic activity was evaluated using α -glucosidase and α -amylase enzymes. The results obtained show that the ethyl acetate fraction of the plant is the most active fraction ($IC_{50}= 0.54\text{mg/ml}$) by the DPPH test. For the FRAP and ABTS tests, the n-butanolic and ethyl acetate fractions of the plant are the most active ($IC_{50}= 4.43 \text{ mg/ml}$, 12.9 mg/ml) ($IC_{50}= 1.6 \text{ mg/ml}$, 4.54 mg/ml) respectively. However, the TAC test shows that the macerated aqueous extract is the most active ($316.33 \text{ mg Eq AG/g}$), followed by the n-butanolic fraction ($250.67 \text{ mg Eq AG/g}$). These results can be explained by the richness of the n-butanolic and ethyl acetate fractions and the macerated aqueous extract in phenolic compounds, which are considered as agents responsible for the antioxidant activity. The enzymatic inhibition test revealed that all the extracts and fractions of *Chenopodium ambrosioides* had significant activity for the inhibition of α -amylase and α -Glucosidase, compared to the standard acarbose ($IC_{50}=396.42\mu\text{g/mL}$ α -amylase, $IC_{50}=199\mu\text{g/mL}$ α -glucosidase). The EAI and EAM aqueous extracts showed particularly significant activities compared to the fractions ($IC_{50}=4.4\mu\text{g/mL}$, $IC_{50}=1.4\mu\text{g/mL}$ α -Amylase, $IC_{50}=10.3\mu\text{g/mL}$, $IC_{50}=7.5\mu\text{g/mL}$ α -glucosidase). Our studies have shown that the extracts and fractions of *Chenopodium ambrosioides* have moderate antioxidant activities and important antidiabetic activity. These results can be explained by the presence of phenolic compounds with moderate quantity in the plant.



UDC 57

MORPHOLOGY OF GROUSE AND THEIR IMPORTANCE IN FARMING

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Among the lower plants, fungi are the most widespread, numbering about 100,000. This is a special group of natural nuclear organisms. It appeared on our planet very early. It is widely distributed in all regions of the earth: it lives in soil, water, tree trunks, bodies of living and dead organisms and other places. In addition, it is often found on the surface of metals, rubber objects, foodstuffs, and inside homes.

The mushrooms are very small, visible only under a microscope and can weigh several kilograms.

Fungi are similar to algae in a number of respects, but their cells do not contain chlorophyll. Fungi are divided into saprophytes and parasites depending on their nutrition. Saprophytic fungi feed on dead organic matter, and parasitic fungi inhabit the bodies of living organisms and feed by sucking the necessary substances from their cells. They also reproduce sexually, asexually and vegetatively.

Fungi occupy a special place in the process of metabolism in nature. They break down organic substances and transform them into mineral substances. In particular, it decomposes plant remains and provides the formation of humus in the soil. Fungi causing alcoholic fermentation are widely used in bread baking, alcohol extraction, fermentation of wine, beer, kvass, kefir.

Although there are about 100,000 species of fungi in total, their place in the systematics has not yet been fully defined. It would therefore be useful to deepen activities to identify invisible mould fungi and extract valuable medicines from them. Similarly, if the role of higher species in food production were enhanced, food types would increase.

Based on scientific data and research, identify the biological features and practical significance of higher plant species found in nature.

The population is growing every year. Providing food for mankind is a pressing issue. Therefore, mushrooms are cultivated not only for medicinal purposes, but also for food. If we talk about edible mushrooms, they are as follows: the fruiting body of the white mushroom (Boletaceal) is soft, consists of a cap and root, the covering is located at the bottom of the cap tube, the tube is easily separated from the cap. All white fungi are soil saprophytes, most species form ectoendotrophic mycorrhizae. The most common is the genus of white fungi (Boletus). Later it was divided into several related branches [1,3].



1. BILSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

For example: 1. The porcini mushroom is *Boletus edulis*. 2. Birch mushroom *B. scabra* (*krombholzia scabra*). 3. Podosinik *B. versipellis* (*krombholzia aurantiaca*). 4. Oak mushroom - *B. (Tubiporus) luridus*. 5. Fungi - *B. (Ixocomus) yellow elephantiasis, grolulatus*. They used to be referred to the family *Tortoviciana*, but now they are considered as a separate family and are referred to *Agaricaceae*, the reason for which, along with the above features, is the presence of an intermediate species connecting platy and porcini mushrooms, which brings porcini closer to platy mushrooms than *Tortoviciana* [2,3].

Rain mushrooms are often found in the field, on the roadside, in the meadow, and on the edges of forests; they belong to the relatives *Bovista*, *Lycoperdon*, and *Calvatia*. Their globular or pear-shaped fruiting bodies, when just sprouted, are supple and white, and are edible until their habitus changes colour. At maturity the colour changes to grey-brown, the peridium breaks off at the top and spreads brown spores inwards.

The fruiting body of the giant raindrop (*Colvatiagigantea*) is over 30 cm in diameter and the mass of spores grows to several kilograms.

Some fungi of this series inhabit dead trees. It belongs to the genus *Gnezdovia* (*Nidulariaceae*), the fruiting body is oval-ovate, bicoloured when young, when ripe the fruiting body resembles a small vase and contains basidiospores. At maturity, the peridium sheath ruptures and rapidly expands into a cone-shaped cap with a long root covered with a greenish cleggium, on the outer nested surface of which basidiospores ripen. It emits a deafening foul odour and spreads to insects. Insects landing on it spread the spores from one place to another by a green mucus attached to their bodies. They are also common in tropical regions [4,5].

The importance of mushrooms in the economy. There are many species of edible mushrooms, but only about thirty are used.

Edible mushrooms contain vitamins in addition to protein, fat, carbohydrate nutrients. Therefore, depending on their taste and nutritional properties, mushrooms can neighbour not only garden plants, but also fruits. However, they are called "plant meat". Indeed, the fruiting bodies of edible mushrooms contain up to 80-90 per cent water and only 2-4 per cent protein. At the same time, 15-45 per cent of this protein is not digested by the body. Fresh edible mushrooms contain only 1 per cent fat. There is less intermediate organic matter than protein. However, although mushrooms are low in calories, their content improves the flavour of food and promotes the release of digestive enzymes.

Fungi are of great importance in metabolism; they convert organic matter into mineral matter.

In this way it reintroduces a state suitable for the reception of higher plants.



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

Mushrooms have both beneficial and harmful functions in everyday life. Beneficial fungi include yeast fungi, which are widely used in the production of wine, kvass and in bakery products.

The activity of yeast fungi results in 24kg of bread from 16kg of barley flour. It improves the flavour of bread and increases digestibility. The swelling of the kneaded dough and its porous ripening depend on the carbon dioxide released by the fungus. In addition to this yeast, other mould fungi are also involved in baking. Amylase, an enzyme secreted by mould fungi, converts starch into sugar. If 1 t. If 20-30 g of amylase is added to flour, it will be delicious, flavourful and soft by increasing the sugar and fermenting the yeast to alcohol. The same can be said for the brewing process [5,6].

The yeast fungus, for which all primary raw materials are used, is also used in distillation. Starch-rich potato tubers, cereal grains, sugar beet, residues of sulphate-cellulose production, wood hydrolysate, peat, straw, corn stalk and heartwood are used as the first raw material.

Wine is made by fermenting the juice of sugar-rich fruits and berries with yeast fungi. The cells of wine yeast are elliptical in shape and they open different sugars - glucose, fructose, sucrose, galactose and maltose.

It is added to farm animal feed that is high in protein.

Mushrooms are used in the production of organic acids. Citric acid is obtained not from pure sugar itself, but from its solution - molasses of the fungus *Aspergillus niger*. Citric acid is used in tissue, confectionery, medical, ink industry and other places [6].

The abundance and ubiquity of edible mushrooms is due to the huge production and easy distribution of their spores. For example, a single sporangium of the mucor mushroom produces about 10,000 spores. A colony of *Penicillium* up to 2.5 cm in diameter produces about 400,000 conidia. The champignon mushroom produces about 16 billion spores in 6 days of sporulation, and the true trout (*Fomes Fomentarius*) produces 7.5 trillion basidiospores in 20 days.

Freshly picked young mushrooms should not be stored for more than a day. Mushroom dishes should not be left for a second day. However, even if mushrooms are dried, kneaded or pickled, their poisonous substance cannot be removed. Therefore, it is possible to get poisoned by mushrooms even in winter.



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ENHANCING ANIONIC DYE REMOVAL WITH POROUS ACTIVATED CARBON: AN INVESTIGATION IN SIMULATED MEDIA.

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Wastewater is known to contain a diverse array of contaminants, broadly categorized as biological, physical, or chemical pollutants. Among the chemical pollutants, synthetic organic dyes, particularly prevalent in the food, paper, and textile processing industries, as well as in cosmetics, personal care, and detergent manufacturing, pose a significant environmental concern. Their frequent detection in aquatic environments and water bodies raises potential threats to both human and ecological safety.

This study aims to explore the influencing experimental conditions on the removal rate of a Yellow 2G dye as a pollutant model for an anionic dye when utilizing porous activated carbon as an adsorbent. The investigation is conducted under consistent process parameters at ambient conditions. The results underscore the pivotal role of pH in determining the removal of this dye. Notably, a decrease in the pH of the dye solution correlates with a substantial increase in its removal rate. The percentage removal is observed to be notably high within the highly acidic pH range at the initial stage of contact time. All adsorption experiments are conducted within a batch adsorption study, ensuring the utilization of optimal process parameters.

KEY WORDS: Adsorption, activated carbon, anionic dyes, experimental conditions



DUNG BEETLES IN COW FECES TRAPS WITH RICH INDEX DIVERSITY INDEX AND EVENNESS INDEX IN INDONESIA

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Bukit Barisan Selatan National Park

Eny PUSPASARI

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ABSTRACT

Dung beetle is an animal commonly known as dung beetle which belongs to the Scarabaeidae group as a secondary seed dispersal and decomposer in secondary forest ecosystems that live in animal feces. This research was conducted in November 2023 in two research locations namely Bukit Barisan Selatan National Park and Tahura Wan Abdul Rachman. This study aims to determine the biodiversity of dung beetle in cow feces in Bukit Barisan Selatan National Park and Tahura Wan Abdul Rachman. The study used the trap method using cow feces with nocturnal and diurnal observation times. Dung beetle biodiversity was measured using three parameters, namely species richness, species diversity and species evenness. In the research in the Bukit Barisan Selatan National Park Forest, 4 species were found namely *Onthophagus sp*, *Oryctes rhinoceros L*, *Aphodius marginellus*, and *Scarabaeus sacer* while the Wan Abdul Rachman Tahura Forest found 2 species, namely *Onthophagus sp* and *Aphodius marginellus*. The value of dung beetle species richness in TNBBS is in the medium category with a value of $R = 2.79$ while in Tahura WAR is in the low category with $R = 1.44$. The value of species diversity in TNBBS location $H' = 1.24$ with a medium category while in Tahura WAR $H' = 0.56$ low category while the value of species evenness in two locations is stable with a value of $E = 0.77$ in TNBBS and $E = 0.81$ in Tahura WAR.

Keywords: Dung beetle, Richness Index, Diversity Index, Evenness Index, Indonesia.

INTRODUCTION

Insects have an influential role for human life and their existence and are used as a marker of ecosystem harmony (Ghannem *et al.*, 2018), because one of them is a kind of decomposer (Taradipha *et al.*, 2019). Scarabs are the largest insect family in nature, often called dung beetles because these fauna grow around faeces, with 2,600 species varieties in nature (Indarjani, 2020). There are approximately 1000-2000 varieties of dung beetle species that live in the islands between Indonesia and Australia (Rahmadi *et al.*, 2019). According to Rezzafiqrullah (2019), more than 1000 dung beetle species are found in Indonesia. They are actively influential in maintaining ecosystem harmony by acting as decomposers in the circulation of nutrients and supporting the circulation of plant seeds (Kristin, 2018).

The presence of dung beetles can be a parameter of habitat destruction in forest biomes, and dung beetles are also sensitive to changes in vegetation, climatic conditions and animals in their habitat (Malina *et al.*, 2018). Dung beetles in forests have functions including decomposing organic matter in the faeces of other animals, especially birds, reptiles or mammals (Moy, 2018). The faeces are broken down by dung beetles to form simple elements and solutions, a stage called nutrient reuse or nutrient recycling (Dewara, 2020). These dung beetles play a role in decomposing animal faeces, thereby supporting nutrient recycling, becoming seed dispersers or plant seed dispersers and synthesising antibacterial compounds (Priawandiputra *et al.*, 2020). In general, the dung beetle is one of the parameters of the quality of damage to tropical forests and their habitats, as well as the composition of populations and their distribution, which is very responsive to the phase of vegetation cover and forest body composition (Pulungan., 2018) so that the existence of dung beetles can be a marker of whether the forest area is healthy or not (Depari *et al.*, 2021). Apart from being a decomposer, dung beetles also have an important role in the forest ecosystem. The dung beetle decomposes animal waste and helps in nutrient cycling, seed dispersal and synthesizes antimicrobial compounds.

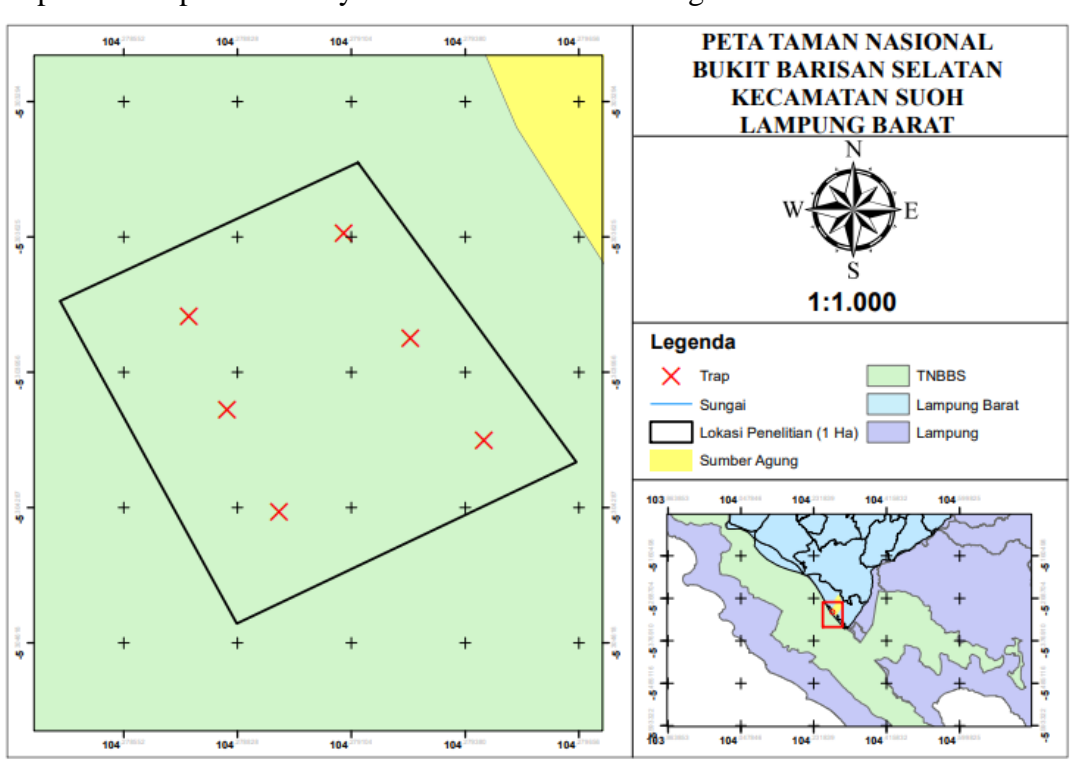
The Bukit barisan Selatan National Park and Wan Abdul Rachman Forest Park is one of the protected areas with protected and unprotected flora and fauna habitats with hydrological and socio-economic functions. Bukit Barisan Selatan National Park and Tahura Wan Abdul Rachman are areas with good vegetation for dung beetle life. Dung beetle dominantly lives with vegetation in the form of shrubs with high air humidity and many other creatures. The amount of flora affects the diversity of fauna, one of which is the type of dung beetle.

This study is very attractive and was chosen by the authors because there have not been many studies conducted on dung beetles in Indonesia. Considering the importance of dung beetle function in the ecosystem and the limited explanation and scientific information on dung beetle species diversity in Bukit Barisan Selatan National Park and Tahura Wan Abdul Rachman, this study is very influential. Therefore, the purpose of this

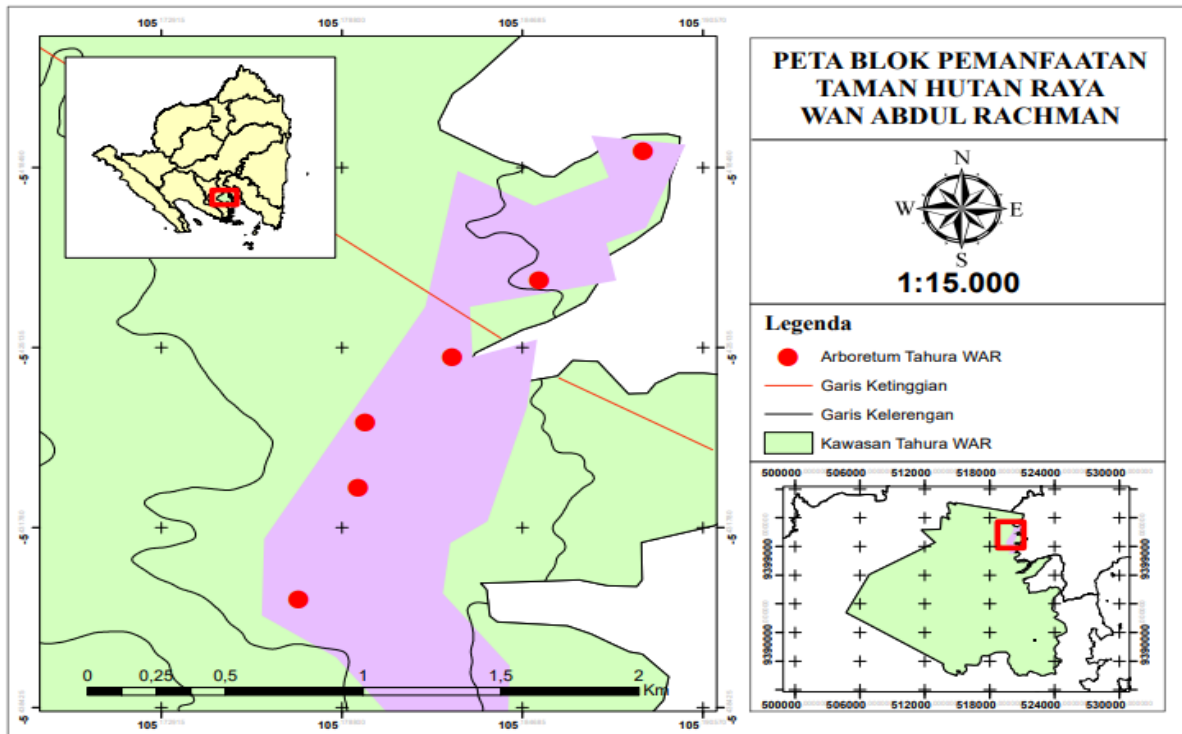
study is to examine the comparison of dung beetle biodiversity in Bukit Barisan Selatan National Park and Tahura Wan Abdul Rachman.

METHODE

This research was conducted in November 2023 in Bukit Barisan Selatan National Park, Suoh, West Lampung and Arboretum of Utilisation Block of Tahura Wan Abdul Rachman, Pesawaran, Lampung. The study was conducted for 9 days of observation with nocturnal and diurnal observation times. Each location was installed as many as 6 traps. The map of the study location can be seen in Figure 1.



(a)



(b)

Map of Research Location in Bukit Barisan Selatan National Park (a) and Location Map of Tahura Wan Abdul Rachman (b).

This study used the pit fall trap method with goat and cow feces bait. This trap is made using a plastic cup that is linked to a wire as a bait container. Then the bucket will be filled with 100 ml of water. After that the trap will be installed in the ground but still parallel to the ground. Each location is each installed 6 traps so that the total trap is 12 traps. Species diversity (H') was calculated by applying the Shannon-Wiener Index with the following formula:

$$H' = - \sum_{i=1}^n P_i \ln P_i \text{ where, } P_i = \frac{n_i}{N}$$

The criteria for the value of the Shannon-Wiener diversity index (H') are as follows.

- $H' \leq 1$ = low diversity,
- $1 < H' < 3$ = medium diversity,
- $H' \geq 3$ = high diversity .

The evenness index (E) uses the following formula.

$$E = - \frac{\sum P_i \ln(P_i)}{\ln(S)}$$

S is the number of types.

index criteria :

- $0 < E \leq 0.5$ = depressed community,
- $0.5 < E \leq 0.75$ = unstable community,
- $0.75 < E \leq 1$ = stable community.

The wealth index can be obtained using the following formula (Saputri *et al.* , 2022).

$$R = \frac{S-1}{\ln N0}$$

Information :

R = Species richness index

S = Number of species observed in a habitat

N0 = Number of individuals (all species) observed in a habitat

Ln = Natural logarithm

The criteria for species wealth index values are:

- $R \leq 2.5$: Low species richness
- $2.5 < R < 4$: Medium species richness
- $R \geq 4$: High species richness

RESULTS AND DISCUSSION

Shannon Wiener Diversity Index *Dung beetle* in the Bukit Barisan Selatan National Park Forest and Tahura Wan Abdul Rachman

Dung beetle community found in TNBBS Forest is 6 individuals, consisting of 4 species. This diversity index uses Shannon Wiener as a measure of diversity which is described in Table 1.

Table 1. *Shannon Wiener Diversity Index on Beetle Bird Diversity Research in Bukit Barisan Selatan National Park*

Scientific	Forest	Pi	ln pi	pi ln pi	H'	Information
<i>Onthophagus sp</i>	3	0.23	-1.47	-0.34	0.34	
<i>Oryctes rhinoceros L</i>	1	0.08	-2.56	-0.20	0.20	
<i>Scarabaeus sacer</i>	1	0.08	-2.56	-0.20	0.20	
<i>Aphodius marginellus</i>	1	0.08	-2.56	-0.20	0.20	
Individual Total	6				1.24	Medium
Number of Species	4					

The diversity index obtained at the two locations is very different, where at the TNBBS location $H' = 1.24$ is in the medium category, while in Tahura WAR $H' = 0.56$ is in the low category which is described in Table 2. This is due to research in The Tahura WAR location was carried out when environmental conditions entered the dry season, making it difficult to find the *dung beetle species* at this location.

Table 2. Shannon Wiener Diversity Index on Beetle Forest Diversity Research in the Arboretum on the Tahura WAR Utilization Block

Scientific	Forest	Pi	ln pi	pi ln pi	H'	Information
<i>Onthophagus sp</i>	1	0.20	-1.61	-0.32	0.32	
<i>Aphodius</i>	3	0.60	-0.51	-0.31	0.31	
Individual Total	4				0.56	Low
Number of Species	2					

The *dung beetle* is an animal that likes wet places and not too dry, whereas research at the Tahura WAR location has very dry soil conditions, which is different when conducting research at the TNBBS location where the weather tends to be damp and cloudy. This situation affects the condition of the vegetation that grows around *the trap*, where there is not much grass and bushes due to the dry condition of the soil.

○ **Species Evenness Index *Dung beetle* in the Bukit Barisan Selatan National Park Forest and Tahura Wan Abdul Rachman**

The abundance index is determined by the number of individuals and the number of bird beetle species found in the *traps* installed. The evenness index data obtained in this study is presented in Table 3.

Table 3. Diversity Index Obtained from Research on Beetle Diversity in TNBBS and Tahura WAR

No	Location	E (Evenness Index)	Information
1	TNBBS	0.77	Stable
2	Tahura WAR	0.81	Stable

This is because according to Daget (1976), the criteria for the evenness index are divided into 3, namely, $0 < 0.5$ is classified as depressed, $0.5 < 0.75$ is classified as unstable, and $0.75 < 1$ is classified as stable. This research location is classified as stable according to the Daget Evenness Index, indicating that the ecosystem has a good cycle between producers, consumers, microorganisms and predators. The level of species evenness is related to the habitat or ecosystem that exists as a place for a species' activities such as breeding, foraging and resting (Mario *et al.*, 2018).

The species evenness index value describes the stability of a community, that is, if the evenness value is more than 0.75, it is said to be a stable community. The smaller the value of the species evenness index, the

more uneven the distribution of species, meaning that in this community there is no species that dominates so there may be no competition in finding the necessities for life (Malina *et al.*, 2018).

○ **Species Richness Index *Dung beetle* in the Bukit Barisan Selatan National Park Forest and Tahura Wan Abdul Rachman**

The species richness index refers to the richness status of species in their natural habitat. The level of species richness is a measure of diversity that can be used to study successional stages. The number of *beetle* species and their individuals found in an area influences the value of the species richness index.

Table 4. Wealth Index Obtained from *Beetle Forest Diversity Research* in TNBBS and Tahura WAR

No	Location	R (Wealth Index)	Information
1	TNBBS	2.79	Medium
2	Tahura WAR	1.44	Low

A higher index value indicates a greater number of species found in a habitat. It was found that the richness value of *the dung beetle species* in TNBBS was in the medium category at $R=2.79$, while in Tahura WAR it was in the low category with $R= 1.44$. This is also related to the diversity of dung beetle types which are classified as low and medium. The low species richness at the research location was due to differences in weather and temperature that occurred at the two locations at the time of the study. The Tahura WAR location has hot weather conditions, resulting in the land tending to be drier.

CONCLUSION

Dung beetle biodiversity was measured using three parameters, namely species richness, species diversity and species evenness. In the research in the Bukit Barisan Selatan National Park Forest, 4 species were found namely *Onthophagus sp*, *Oryctes rhinoceros L*, *Aphodius marginellus*, and *Scarabaeus sacer* while the Wan Abdul Rachman Tahura Forest found 2 species, namely *Onthophagus sp* and *Aphodius marginellus*. . The value of dung beetle species richness in TNBBS is in the medium category with a value of $R = 2.79$ while in Tahura WAR is in the low category with $R = 1.44$. The value of species diversity in TNBBS location $H'= 1.24$ with a medium category while in Tahura WAR $H'= 0.56$ low category while the value of species evenness in two locations is stable with a value of $E = 0.77$ in TNBBS and $E = 0.81$ in Tahura WAR.

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1. BILSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

POTENTIAL NATURAL BEAUTY AND RECREATIONAL ACTIVITIES AT MUTIARA BARU BEACH IN INDONESIA

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ABSTRACT

One very important sector that can improve the economy of the community and the country is the tourism industry. Various regions in Indonesia, especially in villages, have developed the tourism sector in the coastal ecosystem. One of the provinces that has developed the beach tourism sector is Lampung Province, which is located in Karya Makmur Village, East Lampung Regency, namely Mutiara Baru Beach. This research was conducted in October 2023. The purpose of this study was to analyze the attractiveness of Mutiara Baru Beach attractions. The data collection methods used are observation, key person interviews and documentation. Data collection was carried out by interviewing the manager using the Snowball Sampling technique. The data collected includes the potential for natural beauty and recreational activities. The results showed that the potential for natural beauty consists of enjoying the view of the sunrise, enjoying the diversity of birds flying in the beach area, the calm waves, and the trees that grow around the beach Terminalia catapa, Casuarina equisetifolia and Rizophora. Recreational activities that can be done are swimming, playing water, playing sand, riding electric bikes, riding ATV, taking pictures, and walking along the beach.

Keyword : beach tourism, attractiveness, tourist attraction development



1. BILSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

CONSERVATION EFFORTS BASED ON THE PERCEPTIONS OF THE COMMUNITY IN WAY LALAAAN WATERFALL INDONESIA

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ABSTRACT

Conservation is an effort made by humans to protect nature while perception is a process of sensing something to the impression that a person gets on his environment. The purpose of this study is to determine the community's conservation efforts towards Way Lalaan waterfall. This research was conducted at the Way Lalaan waterfall tourist attraction in Tanggamus Regency, Lampung Province, Indonesia from September to November 2023. This study used a questionnaire method and direct interviews to 40 respondents analyzed descriptively using a measurement scale, namely the Likert scale. The results showed that community perceptions obtained a score of 4 including in the agree category, conservation efforts made by the community were to maintain the beauty of the waterfall by not littering so that tourists and the community could utilize water, air and landscape as a reflection of personal freshness and personal health.

Keywords: Conservation, Perception, Waterfall

INTRODUCTION

The World Conservation Union (WCU) defines ecotourism as all responsibility for the environment, in the broad definition of ecotourism means a tourist trip or activity carried out intentionally to illustrate environmental knowledge by applying principles related to natural sustainability (Ihsan et al., 2015) the purpose of ecotourism is to recognize and learn everything about nature, historical history, and culture or culture in areas whose management system involves local communities so as to help the economy and welfare of the community (Department of Culture and Tourism, 2009).

Referring to the Big Indonesian Dictionary (KBBI) the word Perception is defined as an immediate reaction to something. Perception in the English dictionary means observation, insight and response. The scope of a person's perception will be very broad and unlimited based on how the person's ability to understand and respond to something through a point of view. This effort is carried out as a form of process of a person's reflection on the impression obtained from his senses into a form of meaning message to his environment (Sondang et al., 1995) in a shorter scope Perception is a form of a process of interpretation or analysis of a person using the five senses (Drever et al., 2010).

Society is an interpretation of social interaction, derived from the Latin socius which means friend. In the picture of society an interaction or emotional tension in individuals or groups is very clear, therefore in general the definition of society is a group of individuals who live together and interact with each other. Mac Iver and Page (in Soerjono Soekanto 2006:22), define society as a system of behavioral habits, procedures, authority, supervision and cooperation between groups. Society is a picture of life together over a relatively long period of time so that in certain cases or in general it will produce a habit or custom.

Conservation is an effort made by humans to protect nature Sudarto (1998) suggests the concept of ecotourism or nature tourism must understand and support conservation activities as a form of effort to improve community welfare. The existence of different views triggers community diversity in perceiving a tourist attraction (Fentri et al., 2017).

METHODE

This research was conducted in Oktober until November 2023 located at Way Lalaan waterfall, East Kotaagung sub-district, Tanggamus district, Prov. Lampung. The map of the study location can be seen in Figure 1.

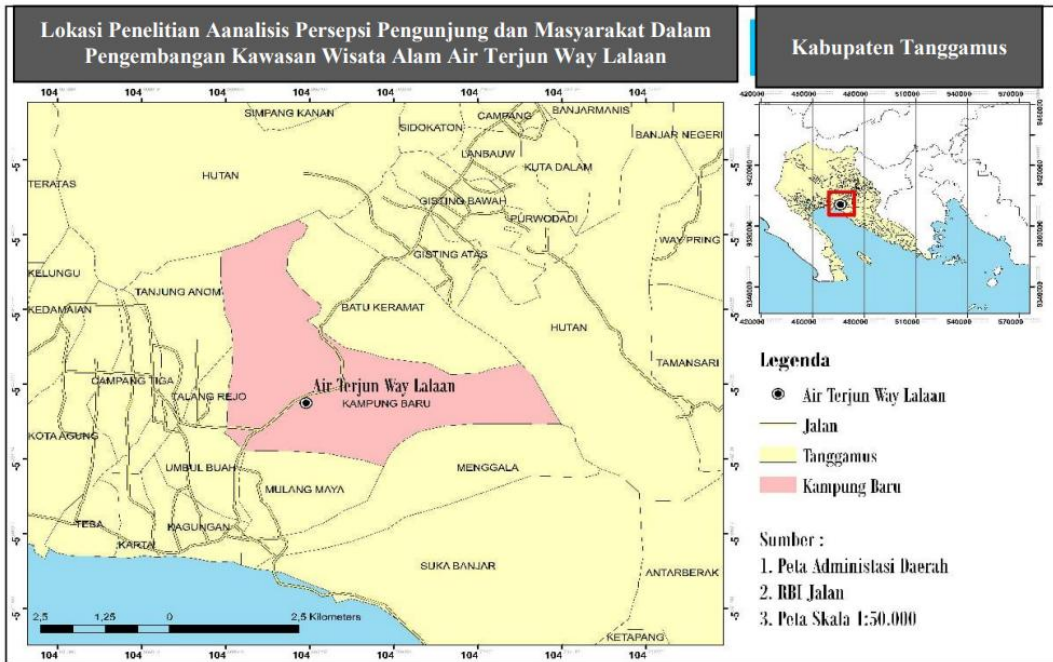


Figure 1 Map of the research location

Determination of respondents or samples was carried out using the Slovin formula by calculating the total population of Pekon Kampung Baru, Kota Agung Timur Subdistrict, Tanggamus Regency is 2726 individuals this data was obtained from BPS at the population census, namely:

$$n = \frac{N}{1 + N \cdot e^2}$$

$$n = \frac{2726}{1 + 2726 \cdot (15\%)^2} = 44$$

Then the respondents taken in the community sample were 44.

The data obtained based on interviews with respondents will be analyzed descriptively. Descriptive analysis is intended to describe respondents' statements that represent measurements of research variables. The measurement scale used in this study is Likert scale. Each answer from the respondent will be poured into a measurement that has a gradation of positive and negative values, this is usually termed a group of answers strongly agree, agree, hesitate, disagree, and strongly disagree. The scoring criteria for the answer choices above are as follows:

- a. Score 5 represents strongly agree / always / very positive answers
- b. Score 4 represents the answer agree/often/positive
- c. Score 3 represents the answer quite agree / undecided / neutral
- d. Score 2 represents the answer disagree / almost never / negative

e. Score 1 represents the answer strongly disagree / never

The processing of each variable in the questionnaire statement is as follows:

1. Likert Scale Scoring calculation is calculated using the following formula:

$$NL = \sum (n_1 \times 1) + (n_2 \times 2) + (n_3 \times 3) + (n_4 \times 4) + (n_5 \times 5)$$

Description:

NL = Likert scale scoring value

n = Number of answers score

2. Calculation on the average of each indicator with the following formula:

$$Q = NL / x$$

Description

Q = average aspect of question i

NL = Likert scale scoring value

X = Number of respondent samples

3. The calculation of the final value of each statement indicator is calculated using the following formula :

$$NA = \frac{Q_1 + Q_2 + Q_3 + Q_4 + \dots Q_p}{p}$$

Description

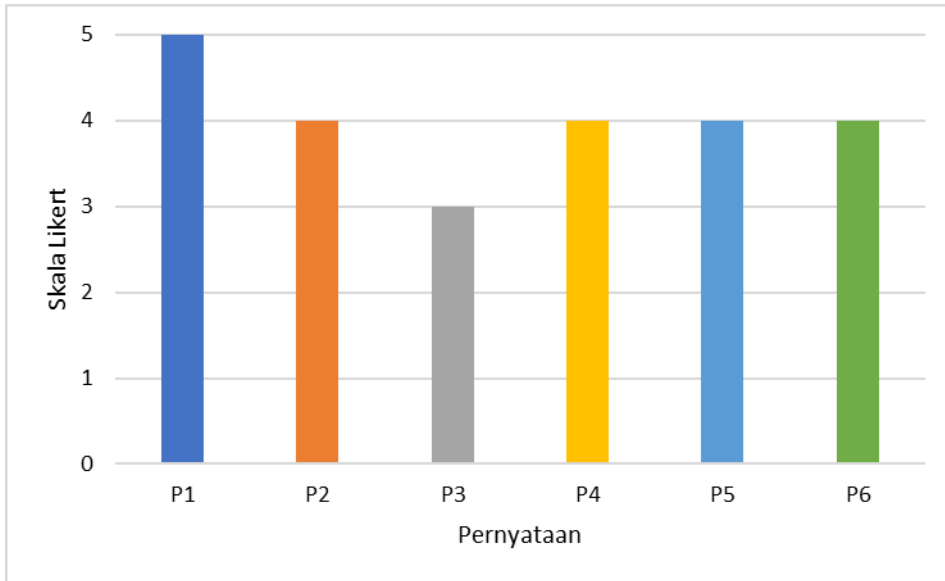
NA = Final score

Qp = average of each aspect of the statement

P = Total number of statements

RESULT AND DISCUSSION

The average scores of the conservation indicators are presented below in Figure 2



Average score of community conservation

Description:

P1 :Visitors must maintain the beauty around the waterfall tourist attraction.

P2 :Visitors have thrown garbage in its place.

P3 :Visitors plant trees for beauty around the tourist attraction

P4 : Visitors are allowed to catch fish around the tourist attraction

P5 :Visitors can utilize water, air and landscape.

P6 :Visitors can utilize waterfall tourism as a reflection of freshness and personal health.
personal health.

Based on the picture above, the statements from the results of community interviews have different average scores. In statement P1 "Visitors must maintain the beauty around the waterfall tourist attraction" obtained an average score of 5 the acquisition of this score is categorized as strongly agree. This shows that the community strongly agrees with the conservation indicator to maintain the beauty around the Way Lalaan waterfall tourist attraction.

In statement P2 "Visitors have thrown garbage in its place" obtained an average score of 4 or agree, the acquisition of this score shows that the community agrees that they have thrown garbage in its place.

In the P3 statement "Visitors plant trees for beauty around tourist attractions" obtained an average score of 3 or sufficient, the acquisition of this score shows that the community feels sufficient for conservation indicators with the statement Visitors plant trees for beauty around tourist attractions.



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In statement P4 "visitors are allowed to catch fish around tourist attractions" community interviews obtained an average score of 4 or agree, where the acquisition of these scores shows that the community agrees that fishing activities are allowed around or at the mouth of the waterfall river.

In statement P5 "visitors can utilize water, air and landscape" obtained an average score of 4 or agree, the acquisition of this score shows that the community agrees that visitors can utilize water, air and landscape at the Way Lalaan waterfall tourist attraction.

In statement P6 "Visitors can take advantage of waterfall tourism as a reflection of personal freshness and health" obtained a score of 4 or agree. The acquisition of this score shows that the community agrees that visitors can take advantage of waterfall tourism as a place of self-reflection.

CONCLUSION

The perception of tourists and the community towards conservation efforts that can be done obtained a score of 4 including in the agreed category, conservation efforts made by tourists and the community are maintaining the beauty of the waterfall by not littering so that tourists and the community can utilize water, air and landscapes as a reflection of personal freshness and personal health.



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ZİYARETÇİLERİN BİR TURİSTİK ÜRÜNÜN LOGOSUNU NASIL ALGILADIKLARI - SLOVAK KRALİYET ŞEHİRLERİ ÜZERİNE BİR ÖRNEK OLAY İNCELEMESİ

HOW VISITORS PERCEIVE THE LOGO OF A TOURIST PRODUCT - A CASE STUDY OF THE SLOVAK ROYAL CITIES

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Soyut:

Turizm dünyadaki en çok yönlü endüstrilerden biridir. Turizm pazarı, ziyaretçilerinin beklentilerini karşılamayı vaat eden turistik destinasyon teklifleriyle doludur. Teklifi akılda kalıcı, orijinal ve etkileyici bir markayla ayırt etmek mümkündür, bu aynı zamanda ziyaretçinin destinasyonun teklifinden ne bekleyebileceği konusunda daha iyi bir fikir edinmesine de katkıda bulunur. Aynı zamanda marka oluşturmanın zor ve uzun vadeli bir süreç olduğunun farkına varmak da önemlidir. Marka kimliği, belirli bir markanın görsel bileşenlerini ifade eder. Çoğu zaman bir logo tasarımıdır. Logo, işletmenin en önemli görsel kısmını temsil eder. Ancak renk, yazı tipi, şekil ve diğer unsurlardan çok daha fazlasını içerir. Logo her yerde bulunan bir iletişim aracıdır. Logo, destinasyonun turizm ürünlerinde, web sitesinde, yıllık raporunda, lobisinde ve hatta kartvizitlerinde yer alabilir. Bu nedenle turizmle ilgilenen tarafların, özellikle tüketicilerin, ziyaretçilerin/turistlerin sıklıkla gördüğü bir marka unsurudur. Çalışmada marka ve turizmde ürün yaratma açısından önemi ele alınmaktadır. Çalışmanın amacı, Slovak Kraliyet Şehirleri logosunun Slovakya'da yaşayanlar tarafından nasıl algılandığını ortaya çıkarmaktır. Ankette yer alan sorular aracılığıyla Slovak Royal Cities markasına ilişkin olumlu algının yanı sıra Slovak sakinlerinin markayla ilişkilendirdiği ilk algılar da belirlendi.

Anahtar Kelimeler: turizm, kraliyet kasabası, mark, turizm ürünleri



Abstract

Tourism is one of the most versatile industries in the world. The tourism market is full of tourist destination offers that promise to fulfil the expectations of its visitors. It is possible to distinguish the offer with a memorable, original and expressive brand, which also contributes to a better idea of what the visitor can expect from the offer of the destination. At the same time, it is important to realize that building a brand is a difficult, long-term process. Brand identity refers to the visual components of a particular brand. Most often it is a logo design. The logo represents the most important visual part of the business. But it includes much more than colour, fonts, shape and other elements. A logo is a ubiquitous communication tool. The logo can appear on the destination's tourism products, website, annual report, lobby and even business cards. It is therefore a brand element that is often seen by interested parties, especially consumers, visitors/tourists in tourism. The study deals with the brand and its importance for product creation in tourism. The aim of the study is to find out the perception of the Slovak Royal Cities logo by the inhabitants of Slovakia. Through the questions in the questionnaire, a positive perception of the Slovak Royal Cities brand was determined, as well as the initial perceptions that Slovak residents associate with the brand.

Key words: tourism, royal town, mark, tourism products

JEL Classification: Z32, Z39

1. INTRODUCTION

Currently, brands play a fundamental role, not only in the marketing field. This begs the question, why are brands so important?

Branding, as a brand policy, is classified among the special tasks of marketing workers (as well as marketing employees of destination management).

If we think about the creation and use of brands, we find that the roots of today's so important activity in the field of marketing (creation and promotion of brands) go back to the period of ancient China or ancient Greece. Keller (2007) states that already in this period, potters marked their products, later in the Middle Ages symbols were used for goods by printers, bakers or goldsmiths, who had to mark loaves of bread so that the possible introduction of weights could be checked. Gallo and shoulder. (2019). Olins (2009) says that it can basically be places, organizations, products and services, or even a famous person, a football club, a university. "Brands" have become a phenomenon of today.

Sammut-Bonnici (2023) says that a brand can be defined as a set of tangible and intangible attributes designed to create awareness and identity, and to build the reputation of a product, service, person, place, or organization. The holistic perspective of branding as a long-term strategy includes a wide set of activities ranging from product innovation to marketing communications. Štefko et al. (2012) describe 4 tools of brands - word (it is a word brand of one or more words, with a clear meaning), image (graphic design, e.g. sign, shape, colour and font, which can represent figures, animals and other drawings), space (three-dimensional figures, shapes of products or their packaging, special shape, e.g. bottles), sound (various sounds or signals). A brand helps products and services to differentiate themselves from other products and services that are meant to satisfy the same needs. The task of the brand is to leave indelible traces about it in the minds of customers. M. Healey (2008, p. 6), in the publication "What is branding?", who claims that a brand is not just a name or a word, but is also a carrier of emotions, characteristics and values. A "brand" is a promise of satisfaction. It is a sign, a metaphor acting as an unwritten contract between producer and customer, seller and buyer, performer and spectator, environment and those who inhabit it, events and those who experience them". The brand creates a certain relationship between the seller and the buyer, thus symbolizing a promise, which can be prestige, quality and many other expectations that are associated with the purchase of the given products or services by the customer.

Tourism takes place in a location often referred to as a region or more precisely as a destination (Matušíková, Gburová, 2015). By defining a destination, it is possible to understand a defined territory, which represents for a participant in tourism the space in which tourism enterprises are located, which will provide their products

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and services they offer in the destination (Dzurov Vargová et al., 2021). Destination marketing is not just branding about logos, but includes a holistic 360-degree approach to creating, developing and nurturing a unique destination identity according to key elements such as the destination's offer, heritage and values (Popović, Davidov 2023). Creating a brand identity and branding for destinations is a strategy where intangible, verbal or graphic values are attached to the destination and it is very important that such opinions have a realistic basis. Good brand care is essential for the future of any organization or business, as it can be a guaranteed source of income (Liu et al. 2020).

Logo as an important part of the destination and tourist product

A logo in tourism can have certain specifics that take into account the characteristic product / service of tourism (Šíra, Mitříková 2019). According to UN WTO (2023) tourism product is a combination of tangible and intangible elements, such as natural, cultural and man-made resources, attractions, facilities, services and activities around a specific centre of interest which represents the core of the destination marketing mix and creates an overall visitor experience including emotional aspects for the potential customers. A tourism product is priced and sold through distribution channels and it has a life-cycle.

A tourism product consists of several services, but is perceived by customers as a whole (Nagy 2009). The tourist product touches three areas:

- product from the point of view of the tourism company or tourism organizations - a set of various services, the purpose of which is to satisfy the needs of tourism participants, and which are offered in tourism enterprises,
- tourist product of the area or of the region or municipality – contains the attractions, infrastructure and services of the destination, as well as the availability, appearance and amount paid by visitors / tourism participants,
- the product from the visitor's point of view - represents the area of demand, i.e. the ideas, requirements and criteria that the tourism participant has for the tourist product (Šambronská 2023).

A brand builds image and awareness, identifies and differentiates itself from other brands. If we talk about the image, then it is about all the feelings, thoughts and opinions that the visited place evokes in the visitors. The name and logo are among the most important identifying elements of tourist product brands (Matušíková, Gburová 2015). After choosing the ideal logo design, the logo can be used in various promotional places (for example electronic and web advertisements, packaging, letterheads, business cards, annual reports and gifts). It is known that a logo evokes desired ideas and emotions, influences behaviour and accelerates the recognition of a destination as well as a tourism product. A country's (destination's) logo may reflect special or historical events or present the ethos of its citizens. A strong destination brand has been found to equate to significant tourist arrivals. Potential visitors and investors rely heavily on the image of a destination when making decisions (Lee, Rodriguez, Sar 2012). The elements should be sufficiently readable, simple and memorable so

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that the customer can immediately associate them with a specific product / service in tourism and its features, and thus suggest the benefits arising from its purchase. The task of the logo is to arouse positive emotions, identify brands with the concept and graphically present the qualities and advantages of the products. At the same time, in the design process, it is necessary to remember that the logo should be simple and appropriately placed in various places (e.g. signboards, posters or flyers, business cards, company documents or promotional materials). Because of this, destination branding and building an emotional relationship with a place have become vital competitive tools for destination management organizations (Liu, et al. 2020).

2. RESEARCH AND FINDINGS

The aim of the study is to find out the perception of the Slovak Royal Cities brand among the inhabitants of Slovakia.

The objects of the study were the cities of Bardejov, Kežmarok, Levoča and Stará Ľubovňa. They are exceptional historical towns located in the north of the Šariš and Spiš regions. To this day, they have preserved a rich and not only natural, but mainly cultural identity, and this increases their potential for tourism. In 2001, the cities created a joint brand Slovak Royal Places (hereinafter referred to as "SRC"), the main goal of which is "to implement sustainable development of tourism, taking care of respecting and valuing the natural and cultural heritage, strengthening peaceful and friendly contacts and connections between our residents and other nations of Europe and the world" (SKM 2023). Among the other goals of this association is the creation of the necessary prerequisites for the joint promotion of cities and the creation of mutual products in the field of tourism in order to strengthen tourism in the royal cities, as well as in the Šariša and Spiša regions in northeastern Slovakia. Another activity of the joint SRC brand is the creation and subsequent publication of promotional materials in several languages, the publication of SRC panoramic maps, joint promotion in selected domestic and foreign tourism trade fairs and, last but not least, the creation of the "SRC" joint brand website, www.royal-towns.sk (SACR 2023).

A total of 465 respondents were approached, 375 showed interest in participating in the study. The criterion for selecting respondents was the age of the respondents over 18 years.

The method used in the study was a questionnaire, which consists of three parts - the identification part of the respondents, the identification and knowledge of the royal cities that make up the association and opinions as well as the perception of the respondents towards the Slovak Royal Cities brand and its parts.

The research question RQ was established within the study:

Do visitors to the "SRC" perceive the association's logo as representing the cities in the context of historical significance?

Subsequently, the hypothesis was established:

There is a correlation between the respondent's gender and the perception of the SRC logo in the context of historical significance for each city.

Since these were non-parametric data, the Man-Whitney U test was chosen as the method for evaluating the hypothesis, divided into sub-hypotheses. The significance level α was set at 0.05.

2.1 Important findings

There were 375 respondents took part in the study. At least one of the royal cities (Bardejov, Levoča, Kežmarok, Stará Ľubovňa) was visited by 100% of respondents (which testifies to their potential for visitors, historical importance and popularity), while 89% plan to visit at least from the city during the year (2024).

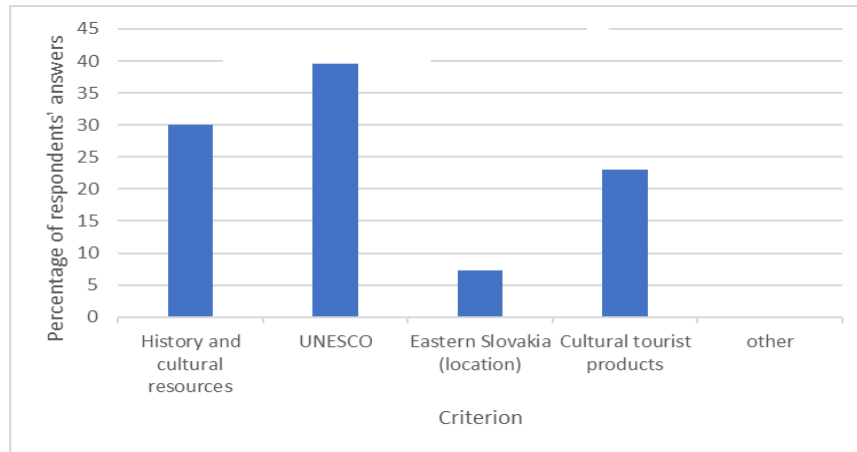
In terms of gender, women predominated at 77.3%, while men were 22.7%. The age distribution of the respondents was as follows.

Table 1 Age of respondents

<i>Criterion</i>	<i>Arithmetic Mean</i>	<i>Minimal</i>	<i>Maximal</i>	<i>Standard Deviation</i>
<i>Age</i>	41	20	72	±5.7
<i>Age groups</i>				
<i>18 – 25 years</i>	21%		<i>46 – 55 years</i>	32%
<i>26 – 45 r years</i>	37%		<i>55 and more</i>	10%

Source: oven processing

Respondents had to state what comes to their mind in connection with the cities of Bardejov, Levoča, Kežmarok and Stará Ľubovňa. As can be seen from graph 1, the respondents' perception of the selected cities in connection with history prevails. As can be seen in graph 1, most respondents perceive them in connection with UNESCO (40%) and subsequently the rich history of cities and their cultural wealth (30%).



Graph 1 Association of selected cities among respondents

Source: oven processing

Respondents were subsequently told that the cities of Bardejov, Levoča, Kežmarok and Stará Ľubovňa belong to the Slovak Royal Cities community. The logo of the Slovak Royal Cities was presented to the respondents. 67% of respondents still could not associate the logo with the term "SRC". 30% of respondents could identify that it was "SRC" and 3% of respondents knew that they had seen the given logo, but the connection took longer and the identification was not accurate.



Figure 2 Logo SRC

Source: www.bardejov.sk

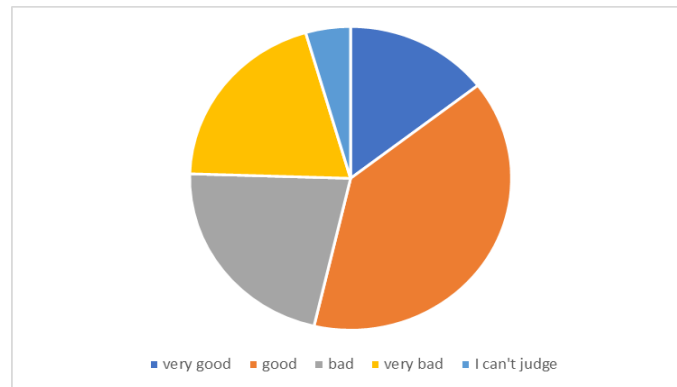
After identifying the "SRC" logo, the respondents were asked what the logo (as part of the brand) evokes in them - what feeling, initial thought, association, etc. They could give an association with the brand to the given question. The answers are recorded in Table 2. Respondents emphasized historical significance in 78%, attractive cultural tourism products in 72%, grandeur in 61%, romantic atmosphere in 57%, dignity in 48%, interesting architecture in 34% in power in 17% and so on.

Table 2 Association of the SRC logo among respondents

<i>Criterion</i>	Respondents answer	Respondents answer (%)
<i>Historical significance</i>	78	20.8
<i>Attractive cultural tourism products</i>	72	19.2
<i>Sublimity</i>	61	16.2
<i>Romantic atmosphere</i>	55	14.7
<i>Dignity</i>	34	9.1
<i>Interesting environment</i>	17	4.5
<i>Interesting architecture</i>	15	4.0
<i>Museums and exhibitions</i>	13	3.5
<i>Protection of cultural heritage</i>	10	2.7
<i>Just another brand</i>	8	2.1
<i>Power</i>	8	2.1
<i>Other answer under 1% together</i>	4	1.1
	N=375	100

Source: oven processing

Respondents evaluated the colour composition of the "SKM" logo (see Graph 2). As can be seen in the graph, the respondents evaluated the colour composition of the brand relatively positively. There were 14.5% of respondents rate the logo as very good in colour, 39.1% rate the colour composition of the logo as good. 21.8% of respondents do not like the colour of the logo, who rate it as bad, and 20% rate it as very bad. Only 4.5% of respondents could not comment on the given question



Graphrt 2 Colour composition of the "SRC" logo
Source: oven processing

Respondents were asked to indicate what they would change about the logo. Among the most common answers were graphic design (41%) and colour combination (36%). 15% of respondents would change the font style, 2% would change the colour shade and 6% would change absolutely everything.

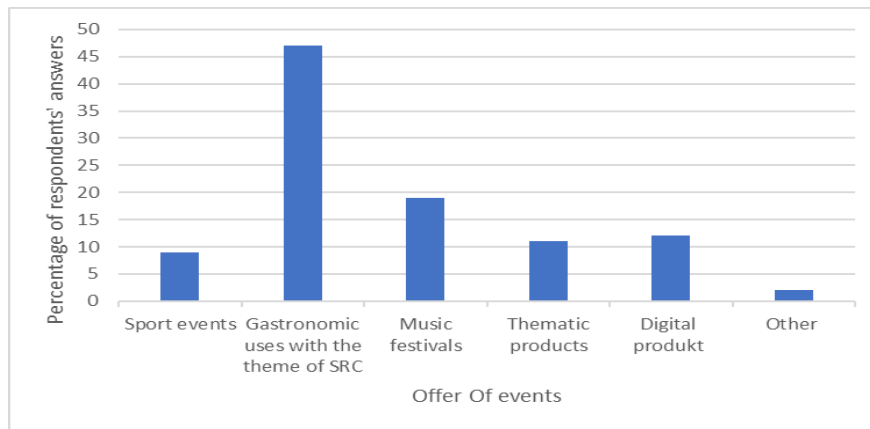
We were interested in where, in the opinion of the respondents, it would be appropriate to place the "SRC" brand so that it would be better perceived by tourism participants and city visitors. According to the respondents, this brand should definitely be found on all promotional materials of the given cities (35%). This was followed by the marking of historical parts of the city (eventual marking of routes) (30%) and the

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respondents would also welcome photo points in the city (15%). Subsequently, they listed selected souvenirs and gifts (10%) and, according to the respondents, postage stamps should have the least occupancy (3%). Within other, 8% of respondents mentioned the possibility to send an online postcard.

After consideration, the respondents think that the "SRC" brand has power, represents an interesting tourist product, and thus can attract more visitors to the region (71%).

At the end of the study, the respondents were asked to indicate what, in addition to monuments and rich history, they would welcome with the designation "SRC" as an expanded offer of a comprehensive tourism product (Chart 3). Most respondents would welcome the expansion of "SRC" products to include culinary tourism. Gastronomic products and events thematically related to the "SRC" philosophy would be welcomed by 47% of respondents.



Graph 3 Additional offer of events for "SRC" with the aim of increasing attendance according to respondents' opinions

Source: oven processing

Evaluation of the hypothesis

The main hypothesis (see Methods) was partially evaluated for each city belonging to the SRC association.

H_{1,1}: Is there a connection between the gender of the respondent and the perception of the SRC logo in the context of historical significance for the city of Bardejov?

H_{1,2}: Is there a connection between the gender of the respondent and the perception of the SRC logo in the context of historical significance for the city of Levoča?

H_{1,3}: Is there a connection between the gender of the respondent and the perception of the SRC logo in the context of historical significance for the city of Kežmarok?

H_{1,4}: Is there a connection between the gender of the respondent and the perception of the SRC logo in the context of historical significance for the city of Stará Ľubovňa?

The results of hypothesis testing are presented in Table 3.

Table 3 Testing partial hypotheses H1,1 – H1,2 Man Whitney U test

<i>Criterion / city</i>	Bardejov	Levoča	Kežmarok	Stará Ľubovňa
<i>α</i>	0.05	0.05	0.05	0.05
<i>Sct. por. (Man)</i>	6848.000	4814.000	4775.000	6336.000
<i>Sct. por-(Woman)</i>	6355.000	8389.000	8428.000	6867.000
<i>U</i>	1795.000	2536.000	2497.000	2307.000
<i>p-value</i>	0.000000	0.007014	0.010454	0.000997
<i>Verification / falsification H</i>	confirmed	confirmed	confirmed	confirmed

Source: oven processing

Given that the p-values of sub-hypotheses H1,1 – H1,4 acquire values above the set significance level $\alpha = 0.05$, all sub-hypotheses were confirmed. Subsequently, it is possible to state that the main established hypothesis was also confirmed and thus it is valid: "there is a connection between the gender of the respondent and the perception of the SRC logo in the context of historical significance for each city".

3. CONCLUSION

It is possible to derive several insights from the theoretical and practical part of the conducted study. Important findings include:

- of the four cities selected in the north-east of Slovakia, the Spiš and Šariš regions, the respondents could most often identify the royal city of Bardejov,
- most respondents recall UNESCO cultural monuments and history when mentioning the Slovak Royal Cities,
- most respondents have already visited the mentioned cities,
- up to 67% of respondents did not notice the promotion of the joint brand of the Slovak Royal Cities,
- for the majority of respondents, the brand has a historical impression, grandeur and dignity,
- only 54% (cumulative total) of respondents like the current colour of the brand,
- 40% of respondents do not like the colour of the logo, the reason being colour combinations or graphic design.
- according to the respondents, the "SRC" brand should be found mainly on promotional materials, suitable places should be websites, welcome boards in front of the city or village or city and tourist information centres,
- 71% of respondents think that the presentation of the brand would attract more visitors,
- 47% of the respondents would welcome the expansion of the offer to include thematic gastronomic products,
- almost half were willing to visit the given cities for a cultural event.

As such, the joint brand of the Slovak Royal Cities works well, despite the fact that its weakness is promotion. One of the options that could help make the brand more visible is social media promotion. This is primarily about the establishment of the official website of the Slovak Royal Cities and not just displaying the organization on the official websites of individual cities, which are marked as "SRC". The recommendation in the future is to focus the study on foreign visitors and their perception of the SRC logo and brand.

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ASSESSING PERCEIVED RISKS IN THE ALGERIAN TOURISM INDUSTRY: A LOCAL TOURISTS-BASED SURVEY

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ABSTRACT

The present study aims to show how tourism in Algeria is risky. The research is based on an online survey that was done between June 24 and October 23, 2023. All the participants were from Algeria. Based on the test of McNemar which aims to examine tourist attitudes before and after the survey, the results indicate that the p-value isn't significant ($p = 0.625$). In other words, the perceived risks do not influence the decision-making process for internal tourism in Algeria.

Keywords: Tourism risks; Perceived risks; Tourism; Algeria; Consumer behavior; Mc Nemar's test.



REAL ESTATE INVESTMENT STRATEGIES PERFORMANCE IN ABUJA, NIGERIA

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ABSTRACT

The paper investigates the level of real estate investment strategies performances in Abuja. Land and buildings have played an important role in both the ancient and the modern world as a source of wealth, power, and economic strength. The study intends to look at the aspect of the number of houses developed as measures of performance, while the strategies will focus on the nature and ways they have put in place to achieve the development of the houses and also look at the private housing development in Abuja through the members of the Real Estate Developers Association of Nigeria (REDAN) Abuja Branch. Quantitative analysis was adopted for this research work because the data is numeric in nature. The research strategy used was the survey strategy. For the purpose of this study, the sampling frame will be 1,277 members of the (REDAN) Abuja branch which form the population of the study and 297 was used as sample size was carried. For the purpose of this study, a Simple Random Sampling was used. The findings indicate that Performance of real estate helps in inflation protection constitute the most performance measure, and is thus ranked 1st with a mean of 3.76 and standard deviation of 1.357, while Income Growth can be seen always in real estate investment over time is 2nd with a mean of 3.40 and standard deviation of 1.384. The study concludes that real estate investment performance in the study area is high. It was recommended that Government needs a diversification from oil, and real estate development is a rip area to venture into. Further research studies can be carried out on areas like Real Estate Investment Strategies on Public Housing Development in Abuja Metropolis.

KEYWORDS: Real Estate, performance, housing, investment, strategies



THE IMPACT OF GENERATIVE ARTIFICIAL INTELLIGENCE ON OPERATIONS MANAGEMENT: A CONVERSATION WITH CHATGPT

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Abstract

The rise of ChatGPT and similar Large Language Models (LLMs) changed the landscape of management philosophies in the workplace across different industries. Operations management is one such discipline where the multifaceted roles of these technologies, which are grounded in artificial intelligence (AI), play a crucial role in optimizing processes and improving productivity. Although ChatGPT can facilitate flowing communication, personalized customer and employee experience, and automation of some tasks, ethical concerns regarding data privacy, algorithmic biases, and similar persist. Thus, the purpose of this research endeavor is to investigate the potential benefits, use cases, challenges, and roles of generative AI in operations management. The research will use the interview methodology with ChatGPT on its potential impact on operations management. The findings have potential implications for business leaders/managers who are directly affected by the use of AI in operations management. Considering that, they can implement the findings in creating strategies and organization-wide policies for encouraging or limiting the use of generative AI for some tasks as well as finding ways to boost productivity and efficiency with this technology.

Keywords: Operations management, Generative artificial intelligence, ChatGPT, Interview

JEL Classification: M11, M16



EFFECTS OF ENVIRONMENTAL DISASTER ON RESIDENTIAL PROPERTIES VALUE IN RIVER BANK AREAS OF BAUCHI STATE

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ABSTRACT

This paper tried to highlight the effects of environmental disaster on residential properties valuation in the river bank areas of Bauchi State. Government response to floods in Nigeria has been instantaneous. The Nigerian meteorological agency (NIMET) did predict floods long before they came. Because floods are an intrinsic part of the hydrologic cycle and are specifically linked to the high incidences of rainfall and a variety of ubiquitous factors that influence flood processes, there is a need for a more sustainable approach than this fire-brigade approach by NEMA, which seem to lack the desired capability in managing the various disasters that have occurred in Nigeria in recent years. This equally calls to question the level of disaster response in the country. The impacts of disasters have become increasingly evident in scope and frequency. Developing countries are particularly vulnerable to environmental catastrophes and often hit extremely hard by the consequences, as they also face higher difficulties in handling post-disaster situations. Methodology adopted was quantitative and critical review of scholarly journal papers and the target population are household heads living in the study areas. The respondents are 1,929. Simple random sampling would be the sampling technique adopted. The finding of the study revealed that flooding is the key issue in destruction and affect residential property value in the study area. It's also revealed that desertification is the second environmental disaster that affect the value of residential properties in the study. It was recommended that residential properties developments should be not allow in river bank areas, it was recommended that deforestation should be discouraged. The study concludes that climate change was identified.

Keywords; disaster , environmental , housing , residential value, properties.



DETERMINANTS AND STRUCTURAL CHANGE OF FDI IN ROMANIA DURING THE LAST TWO DECADES

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Abstract

The importance of the foreign direct investments (FDI) has been largely debated in the specialized literature, most of the analysts concluding that they represent an essential factor for the developing countries to achieve higher rates of economic growth. Since the beginning of 2000, Romania, a developing country that faced a transition from a centralized to a market economy, started to attract foreign investors. However, the evolution of the FDI' inflows was sinuous, with significant changes in their sectorial composition and, implicitly, in their determinants. Considering all these aspects, the main objective of the present paper is to analyze the evolution of the foreign investments' inflows in this state from the point of view of their structure and major determinants. In order to reach this goal, several research methods were used. First of all, we have we analyzed the secondary data offered by various statistical yearbooks, reports and by different empirical investigations. Secondly, in order to identify the factors which have attracted the foreign investors in Romania during time, we have conducted in-depth interviews on managers and experts from 22 multinational companies present in Romania.

Key words: FDI inflows, structural changes of FDI, FDI determinants, Romania



EMPIRICAL INVESTIGATION OF THE IMPACT OF BRAIN DRAIN ON ECONOMIC GROWTH IN DEVELOPING COUNTRIES

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Abstract

The international migration of skilled workers, known as the phenomena of brain drain, has long been a debated topic for economists and government planners in many countries, but especially in the developing ones. It was noticed that, after completing the studies, the skilled labor force from these states is tempted to migrate towards the advanced economies, in search for better jobs. Some studies have shown that, in many middle-income and low-income countries, a negative relationship between the skilled emigration rates and the levels of public per-student spending on tertiary education has been noticed. Considering all these aspects, the purpose of the present paper is to investigate the impact that the brain drain has on the economic growth in Romania, from the perspective of the public spending on education. By using an econometric model, we found an inverted U-shaped relationship between migration, on one hand, and the public spending on education and economic growth, on the other hand. This result suggests that as the country started to develop more and increased the public spending with education, due to a lack of proper job conditions and remuneration, people with tertiary education, fully financed from public resources, are more tempted to migrate. However, this trend might stop at a certain point of development in which the national business environment changes in the favor of the employees.

Key words: brain drain, public expenditure, economic growth, Romania



REPRESENTATION OF NUCLEAR WAR IN HOLLYWOOD MOVIES

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Abstract:

Few years after the United States used nuclear weapons against Japan, HOLLYWOOD began making movies about nuclear threats: starting with the '50s horror and science fiction cinema often allegorized the threat of atomic war and radiation in movies. In the early 1980s, when American movies and television ramped up production of nuclear war films to reflect the Reagan administration's prominent expansion of the arms race and the president's demonizing rhetoric against the Soviet Union. These nuclear war-themed movies dramatized both the danger and the imminence of a nuclear holocaust and generated tremendous fear, exploiting the collective fear that our world could disappear at any moment in time. In this context, our presentation endeavors to make parallel between film production and social-historical moments focusing on analyzing the movies about nuclear threats produced during 1950-1990 in Hollywood.

Key words: Nuclear threat, movies, fear



FRAMING MIGRANT'S CRIME IN BRITISH MEDIA

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Abstract:

“Framing theory” assumes that while our expectations are based on our past experiences, we still have the flexibility to create and use new or different expectations. In addition, it argues that we are always monitoring the environment for social cues that signal when we should make such changes. The implication is that cues learned from the media are used to create frames. Using framing theory, we can assess how the media can reinforce a dominant ideology or alter an existing one. Research on media coverage on violence showed that mediated information about crime is commonly derived from government sources such as political leaders, law enforcement officials and other state managers, which are considered to be the definers of the situation. In order to test this theory we used a content analysis of 117 articles published in British media associated with the topic of Romanian migrants living in United Kingdom.

Key words: Framing theory, Romanian migrants, content analysis



INNOVATIONS FOR ENTREPRENEURIAL KNOWLEDGE AND DEVELOPMENT

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Abstract:

Entrepreneurial activities require innovation when entrepreneurs move from the environment of initial uncertainty to certainty. It is an essential decision for entrepreneurial ventures and the innovators for their development and success through necessary changes. Changes are crucial for growth, called 'innovation' (Kraus et al., 2021). Innovation and entrepreneurship must be supported by public administration and government policies due to their innovative program designs and development policies for growth and sustainability. Local, regional, national, and international development depends on continuous innovations in many areas through the activities of many talents and their good ideas. Entrepreneurship and social innovations create many opportunities, such as a knowledge-based economy, talent-based skills among individuals, growth, and sustainability. In developed countries, entrepreneurship and innovations have been recognized for economic and social development through which they have been generated from their base, which is their superstructure. Organizations tend to access skills and knowledge from research sources to develop social networks and collective actions. The overall picture, therefore, depends on an entrepreneurial concept that comes from innovative processes. The article discusses innovation, innovative access, and the importance of innovation for entrepreneurship, entrepreneurial growth, and development in a society for overall societal development. The methodology has been conducted through documentary analysis. The feature question is how innovation works to create an entrepreneurial environment in all communities, whether it is a capitalist or a socialist. The economy is vital for every nation; therefore, innovation and entrepreneurship are essential for creating a solid economy. Accordingly, how does it act?

Keywords: Innovation, Knowledge, Entrepreneurship, Open Economy, Growth, Sustainability, Free Market, Western Ideology as Neo-liberalism, Blue Cluster, Society, Interpretation of Mercantile Economy, Collaboration and Co-resistance, Global Reality and Relations, Economic Globalization, Cluster as Business Activity, Commercial Environment and Innovation, Schumpeter and Creative Destruction, COVID-19, World of Research, and Innovation, Pandemic Lesson, Innovation in Science and Technologies as Evolutionary Step, Discovery Theory, Creation Theory, Entrepreneurial Ability and Sensing Over the Environment, Objective



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Contingency, Entrepreneurial Likelihood, Entrepreneurial and Innovative Competencies, Setting Goals and Mind, Adopting External Narratives, Organizational Opportunities for Open Innovation, Institutional Opportunities for Open Innovation, Triple-helix Approach(government-university-private sectors), Digital Opportunities for Open Innovation, ICT, Physical Collaborative Space, Canadian Model of Innovation and Entrepreneurial Collaboration, Reflective Observation, Socialist Innovation and China, Dollar-to Dollar Function.

Introduction: The first definition of open innovation (Flamini et al., 2021) was imagined by Chesbrough, who considered O.I. a technological advancement that helps industries and firms use internal and external contributions and paths to increase and develop the market industry. Innovation, therefore, is an essential term in management and managerial discipline, as well as an important in the context of literature on entrepreneurship. Free enterprise has increased due to globalization and neo-liberalization and through many Western ideologies for increased connection and collaboration commercially, socially-culturally, and academically. Therefore, open innovation is a term for the co-existence with entrepreneurship to match those ideologies for a better and free economy and market worldwide. ¹The relationship between entrepreneurship and Open Innovation is in a stage of exploration for the orientation of marketing and international business. Entrepreneurship is a free enterprise, a common term in an open democratic economy. However, how this economy can be boomed through its creation and many explorations have been referred to as innovation. Innovation has been categorized as open due to its open market policies worldwide as a term of Western condition. Therefore, the relationship between O.I. and entrepreneurship is quite common (Flamini et al., 2021) for its knowledgeable understanding and evolution, such as the inauguration of digital economy² and entrepreneurship. Communication, connection, and innovation are narratives for the mercantile economy and, therefore, exist globally. This is an interaction, connection, and co-existence worldwide instead of its local characteristics. Many stakeholders and actors worldwide, such as private and public organizations and enterprises, are launching opportunities for entrepreneurship. Therefore, whatever the issues are behind negative mechanization, this open innovation and entrepreneurship, such as socialist ideology over state-oriented entrepreneurship instead of privately mechanized entrepreneurship based on a closed economy without any change, is decreasing. A new interest arises in analyzing the role of the mechanism through which free enterprise and its entrepreneurs can be facilitated and develop an effective open innovation strategy. It is all

¹ Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Paragraph 2nd.

² Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Paragraph 2nd.

about an open economy for better connection and economic collaboration with other parts of the world through government policies and cooperation between private and public enterprises (Flamini et al., 2021).

Many terms and narratives exist for the presumption over Open Innovation (O.I.) and entrepreneurial concepts and their co-existence, such as ¹'blue cluster' (Flamini et al., 2021). Blue cluster is a term for entrepreneurial opportunities for open innovation. The discussion over entrepreneurship through society and social inclusion has been valued over community relationship that goes beyond the boundaries of the frontier of every country. In this context of the blue cluster, open innovation has been gloried globally, such as ²'Canada's Global Innovation Cluster' through which companies, academic institutes, non-profit organizations, and other public and private collaboration make various areas as clusters for business activity that boost innovation and growth in a particular industry. Blue cluster-based entrepreneurial discussions mostly use the theory of Joseph Schumpeter³, the father of 'creative destruction' (Flamini et al., 2021). According to the idea of creative destruction, it is another way to discuss capitalism through innovation. It is a notion of forming an old structure into a new one for a newly built entrepreneurship. Therefore, innovation and entrepreneurship improve production methods (Copp, 2021). The introductory part briefly says that open innovation and entrepreneurship are the two parts of the same coin, along with its many narratives like creative destruction theory, exploration, maintaining an open commercial flow, openness, and the base of capitalism. This is how entrepreneurs enjoy terms and conditions to create their business in a mercantile environment.

Literature Review: Technology⁴ is a steam that pushes entire human beings to become vital and dynamic through constant exploration and innovation in telecommunication, biotechnology (Engel, 2021), entertainment, healthcare, and family life. It is a continual transformation for the betterment of human life, recognized as an innovative societal process through social change. The tidal wave of COVID-19 taught humanity to continue exploration and innovation in science, medicine, and technology to protect from invisible viruses and bacteria. In the context of the pandemic environment, it was a realization that humanity depended on the innovation of technologies and their surrounding phenomena. It was an advantage that because of the dependence and exploration of many miracles, the giant wave of COVID-19 was finally eradicated through new innovative medicines in medical science. However, the question is, what was the lesson throughout the pandemic scenario

¹ Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Blue Cluster. Paragraph 1st.

² About Canada's Global Innovation Clusters. What is Cluster. Paragraph 1st.

³ What is Creative Destruction? Paragraph 1st.

⁴ Innovation and Entrepreneurship: Tools for building a resilient society. The Challenge. Paragraph 1st.

(Engel, 2021)? Was it true that new technologies explored and innovated because of the pandemic? The answer is no. The continuation of exploration and innovation in the market for its dynamization was not a gift due to the rise of the pandemic. Still, it was, for many years, an innovative evolution for the development of science and technology and the medical industry.

Therefore, there was no innovation due to a specific circumstance, like a pandemic, as a universal disaster. Consequently, it can be said that the outcome of the research and experiment has been used as a tool during the pandemic through social distancing, work-from-home, sustaining productivity, etc., were not like a technical innovation but a complete customer solution with a functioning business model (Engel, 2021). The resolution of the pandemic era was a venture of entrepreneurial entities collaborated by scientists, engineers, and entrepreneurs for the exploration of tools from their early groundwork, and the processes involved many independent interpretations (Engel, 2021) and versions on themes like Skype, Messenger, WhatsApp which is now a failed and forgotten processors. It was all dangerous experiments with no assurance of financial payments. Skeptics would criticize those ways for being solutions to a problem like a global disaster pandemic. However, it was not a permanent way through many media for a solution but a preparedness for an immediate answer that was urgent. Therefore, it can be said that innovation and entrepreneurial models have gone through many experiments based on many types of environmental and societal circumstances. It has failed, and it has succeeded. It has been tested based on the socio-economic and ecological solutional scenarios. An evolution thus created throughout much research and experimentation over innovation and entrepreneurship for society's well-being, whether risky or regular. Innovation and entrepreneurship are practical when an organization is prepared through early experiments. It is, therefore, not an immediate or sudden reaction. Elders in every society have said that ¹'luck can be favoured for a prepared community' (Engel, 2021). Therefore, preparedness is a must as an activity in a dynamic environment. This continuous activity makes everyone ready for action. It is, therefore, innovation.

Methodology: The paper has been assumed through subordinate sources of data. Subordinate sources of data include academic articles, websites, etc. The description of sources has taken the method of writing the essay, reading, gathering in-depth insights on topics, exploring ideas, summarizing, interpreting, and mainly expressing in words (documentary analysis through qualitative approach). This article critically discusses many narratives of innovation over entrepreneurship. The focus has been on 'innovation,' which is essential to society for societal change global change. Innovation has been seen as creating an economic organization based on openness, the central doctrine of democracy, and the theories of Western ideologies such as neo-liberalism,

¹ Innovation and Entrepreneurship: Tools for building a resilient society. The Challenge. Paragraph 13th.



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creative destruction, and capitalism. The article has discussed innovation for mercantile solutions through exploring entrepreneurship, which is essential to succeed as an economic power. The invention has also been discussed through an emergency scenario such as the pandemic era, and the solution for the urgent is through the benefit of earlier research and experimentation in societal things. It has been discussing social inclusion for human dignity and societal evaluation. Through an open, innovative environment, the economy can flourish when an educated and long-standing society can be created through a resilient environment. Therefore, academic and cultural innovation in the community is also required to economically expand that society and the country. The article has focused on the relations between entrepreneurs and innovation based on financial gain and complete observation of how to become successful entrepreneurs through innovative clusters and learn many models of creative entrepreneurship, such as the Canadian model of innovation and entrepreneurship. Those are the issues that have been discussed theoretically in this article.

Discussion: The theory of blue cluster, which favours capitalism, mentions that innovation is not only ¹a technological invention but also passes through a firm adaptation and elaboration (Flamini et al., 2021). It is the duty and responsibility of entrepreneurs to have access to skills and knowledge for the use of market information and its effective translation for better realization and, thus, the creation of opportunities collectively. In this context, 'discovery theory'² (Flamini et al., 2021) mentions the existence of opportunities in the environment through which entrepreneurs will learn about the right place for their entrepreneurial abilities and their sensing of those abilities. The motion of discovery theory refers to the injunction of open innovation (O.I.), which also suggests entrepreneurs seek and scan the environment and thus discover opportunities throughout the environment. The opportunity is the discovery of new products or services. Entrepreneurs who can predict and discover the suitability of the environment for innovative production and services are recognized as ³'effective entrepreneurs' (Flamini et al., 2021) who are experts in market dynamics through their mindset and entrepreneur orientation to look out and grab the opportunities. Therefore, an entrepreneurial mindset is essential for open innovation for identifying opportunities, setting goals, and developing a business model through capturing knowledge from an external setting. This dynamic mindset is stimulated by an entrepreneurial

¹ Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Blue Cluster. Paragraph 1st.

² Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Blue Cluster. Paragraph 4th.

³ Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Blue Cluster. Paragraph 4th.

education that can sustain learning and development and adopt entrepreneurial and innovative competencies (Flamini et al., 2021). Therefore, through the morphogenetic power of the entrepreneurs, it is possible to create opportunities, which is also a combination of action, reaction, and enactment of the entrepreneur's exploration style and ways to produce new products or services. In this regard, the tools of technology and entrepreneurial skills are essential combinations for creating opportunities. ¹Organizational opportunities for open innovation have been categorized as a purple cluster. It has been said that the purple cluster mentions the organizational boundaries and internal capacities for discovering, capturing, and enjoying the gist of innovation and its opportunities given by open innovation (O.I.), thus improving innovation performance (Flamini et al., 2021). Organizational resources through inbound research and development (R&D), creating inbound strategies, new product development, and using proper human resources management practices (HRMPs) are examples of organizational clusters (purple cluster) through which open innovation can flourish for the creation of opportunities and creating strategic mind among entrepreneurs. Organizations should change traditional routines by replacing new job roles and functions, new recruitment and training, and compensation policies. It will encourage the skills innovation, its interpretation, and its realization among the new entrepreneurs. ²Institutional opportunities for open innovation (Flamini et al., 2021) have been categorized as a green cluster through which organizations transfer technology to each other using ³institutional actors, such as governments and universities. In this context, the 'triple-helix' approach⁴ is an example of institutional amalgamation. The triple-helix (Flamini et al., 2021) approach creates a combination of governmental and private entities through which research funds are distributed to the universities and private sectors for research and development from the government under the control of the government. Thus, The government shapes those private sectors and universities directly and interacts with the innovative network. Digital opportunities for open innovation⁵ (Flamini et al., 2021) have been categorized as a yellow cluster, which has been focused on technological exploration and innovation and its

¹ Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Purple Cluster. Paragraph 1st.

² Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Green Cluster. Paragraph 1st.

³ Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Green Cluster. Paragraph 1st.

⁴ Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Green Cluster. Paragraph 1st.

⁵ Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Yellow Cluster. Paragraph 1st.



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outcome for open innovation (O.I.). In this context, ¹'information communication technology (ICT)' has been useful for the definition of open innovation, its collaboration, and meanings, as well as the creation of new 'physical collaboration spaces'² through digital innovation such as exploration of media and electronic gathering for meetings and conversation. This virtual platform is also an example of entrepreneurial activity in the context of the wider ecosystem rather than a traditional, open, innovative environment. This digital platform creates more attraction over the market, creating places for fundraising capital, reducing sunk costs, etc., entrepreneurs can meet through digitality by lowering barriers to entrance. Active participation in those digital platforms increases the 'organizational visibility in consumers'³ (Flamini et al., 2021). It is also a technical capacity as a technological boost in a new era environment. Entrepreneurs can guide and push the business processes towards open innovation by leading workers towards participation in virtual mode and research and development (R&D) networks. ⁴Innovation and Entrepreneurship are important for building social resilience (Engel, 2021) in the post-pandemic era for the progress of the society that has been coming out from a giant wave of disaster pandemic. It is, therefore, a process and progress to set up societal resilience. It is a fact that enterprises do not want to replace their existing solution with a radical and disruptive innovation. It is now happening in the post-pandemic era due to a long-term uncertain period. Therefore, if big companies like Apple and Google can not trust radical innovational criteria for changing in a new post-pandemic era, a new approach must be explored and innovated, which can provide resiliency to meet current challenges. The innovative solution can emerge through discovery, inspired by a vision of discovery, a sense of practices, investments, and finding customers. Entrepreneurship can be thus defined and set up through innovation, which is, according to ⁵Professor Howard Stevenson of Harvard University, "the pursuit of opportunity beyond the resources under one's control" (Engel, 2021). It also reflects the communicational standard through which entrepreneurs' skills can be set and allows them to continue their forwardness. ⁶Cluster of innovation is not only technology or economic marketization; it also influences a prepared community, called societal inclusion (Engel, 2021). The prepared community through

¹ Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Yellow Cluster. Paragraph 1st.

² Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Yellow Cluster. Paragraph 1st.

³ Entrepreneurial approach for open innovation: opening new opportunities, mapping knowledge and highlighting gaps. Yellow Cluster. Paragraph 1st.

⁴ Innovation and Entrepreneurship: Tools for building a resilient society. Innovation-The Opportunity. Paragraph 1st.

⁵ Innovation and Entrepreneurship: Tools for building a resilient society. Entrepreneurs Journey. Paragraph 1st.

⁶ Innovation and Entrepreneurship: Tools for building a resilient society. The Clusters of Innovation Framework—creating and sustaining the “prepared community.” paragraph 1st.



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innovation can be 'Silicon Valley' (Engel, 2021), a qualified community for many variations. A group of professors has thus organized the community cluster to support innovation and entrepreneurship socially, economically, and culturally through a diverse amalgamation. ¹It represents the ecosystem (Engel, 2021) and the culture (Engel, 2021) narrated through interaction, a behavioural approach. Therefore, innovation and entrepreneurship and innovation over entrepreneurship are characterized by many environmental narratives such as through marketing finance, an open economic system, capitalism, politically structured democracy, a free market economy, and the behavioural approach of society. The success of innovation and entrepreneurship also depends on the behavioural approach of the country's society through its attraction to consumers, its openness and liberal thoughts, and its choices. The cluster of innovation has layers through academics and non-profit industries as well. Academics such as universities contribute through research for findings. University laboratories explored many innovative works for societal and economic development, which the government funds. Therefore, government, universities and non-profit organizations are also a narrative of entrepreneurial activity for creating a better society and economy through connecting, attracting, growing, empowering, and innovating. Therefore, innovation of cluster on entrepreneurship is a lucrative narrative or theme for creating entrepreneurs' industries through advanced manufacturing, enhancing the use of digital technology such as artificial intelligence, supply chains, and societal resilience and inclusion. Education and knowledge are essential for better communication and collaboration in entrepreneurial activity. One of the examples of an innovative cluster over entrepreneurship is 'Canadian global innovation clusters,' which has helped to develop skills and a diverse workforce in Canadian communities. The innovation program creates opportunities for women and racialized Canadians, indigenous communities, and other under-represented groups. Many examples can be defined. For example, Oceans² has created opportunities for indigenous people by providing meaningful work experience for innovative blue economy career options. It has offered workshops and formalized training regarding the industry's members' skills and talent development needs, learning facilities, etc. ³The contribution of artificial intelligence allows members to upgrade their skills and learning, and they have planned to train an estimated 12500 students for pre-university education for their final university education and recreation. ⁴Canadian Innovation, Science and Economic Development (ISED) will ensure that the innovation cluster has succeeded over the next ten years by creating 50 thousand jobs and \$50 billion in

¹ Innovation and Entrepreneurship: Tools for building a resilient society. What is a Cluster Innovation? -Components and Behaviors. Paragraph 1st.

A. ² About Canada's Global Innovation Clusters. How this program can help you. Paragraph 2nd.

³ About Canada's Global Innovation Clusters. How this program can help you. Paragraph 2nd.

⁴ About Canada's Global Innovation Clusters. How this program can help you. Paragraph 3rd.



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Gross Domestic Product (GDP). It is an independent (Canadian innovative cluster) and non-profit entity owned by the board of directors. It manages activities, selects funding projects, and advises other independent entrepreneurs on education, skill, and developmental activities. The funding comes through the Canadian government and industries with an expectation of ¹dollar-for-dollar matching.

Conclusion: The feature question is how innovation works to create an entrepreneurial environment in all communities, whether it is a capitalist or a socialist. The economy is vital for every nation; therefore, innovation and entrepreneurship are essential for creating a solid economy. Accordingly, how does it act? Innovation is vital in creating free enterprise, entrepreneurs, entrepreneurial works, etc. It works economically, socially, culturally, and academically. It has around performance. Economic solidarity is a theme of every nation for its economic development that can empower a country to become rich and economically powerful. However, the economy is not only characterized by being a complete nation. A nation can also be categorized through social inclusion, resilience, diverse cultural integration, education through learning and development, and societal interaction. The innovative entrepreneurial approach can focus on all themes from social-economical-cultural and academic perspectives. Therefore, its stakeholders like government, private sector, academic institutions, non-profit sectors, financial organizations, and entrepreneurs decide the path of the nations based on their political structure, whether capitalist or socialist economy. Even the concept of a socialist economy does not recognize capitalism as a free economic market or an open society with freedom of speech and other practices. Still, they are also following innovation and entrepreneurship to create a strong economy. China is an example in this context. The action has been created and continuous throughout the innovational steps. Countries' research and development areas (R&D) have helped continue new products and their production through experimentation for the market launch. An integration, therefore, is observed among the entrepreneurs, private and public sectors, and academic institutions for a final discovery of technology, products for social solidarity and a better inclusive life for the citizens. Distribution of knowledge and educational efforts have been taken to develop human resources. After that, the choices, attractions, and behavioural approaches also change due to the exploration of many models, their innovation, and their continuous evolution and evaluation. As a result, during the pandemic, solutions have been created urgently in many ways, such as work-from-home social distancing. Even though bigger industries have not accepted disruptive exploration due to the risk of the COVID-19 disaster, the solution has been finalized. It has been accepted by many new reforms in the post-pandemic era to continue market policies and community involvement. The economy is vital for every nation through collective performance and implementation in industries and communities. Citizens, entrepreneurs, and other stakeholders thus come together for new approaches to build their nations, as well as to build global innovative

¹ About Canada's Global Innovation Clusters. How this program can help you. Paragraph 3rd.

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entrepreneurship for collective gain and to make this universe economically, socially, and culturally sustained by crossing global boundaries. Concepts of entrepreneurs, entrepreneurship, entrepreneurial activity, and innovation have different definitions through renowned scholars. Commonly, it has been characterized that an entrepreneur can be any individual who starts a business and makes a profit. Entrepreneurship is a free enterprise based on its independent entity, which is ideal for an open economic market. Entrepreneurial activity is a capitalist business openly and liberally where profit and the customer are always right. Business innovation can help create ideas for business strategy. Therefore, innovation over entrepreneurship can help understand and realize business development. A relationship between innovation and entrepreneurship is important for successfully creating a business. Innovational activities help entrepreneurs enhance the products and their processes, which can also help generate and value the products through many ideas and identifications. Innovation develops creativity, allows one to respond to trends and competition, helps to use the existing products well, helps to decide a selling point, helps for communication skill development, helps for industry knowledge, helps to become self-disciplined, helps to become a strategic thinker, helps to become flexible, helps to become persuasiveness, helps to learn about money management, helps to expand networking, helps for research and development criteria, helps to adopt to listen and accept constructive criticism, and helps to advertise brands on behalf of the entrepreneurs. Economic connectivity is thus reflected throughout many lessons and criteria. At the same time, innovation becomes creative over cultural and societal features to make entrepreneurs social, essential to becoming people's friends for economic variety and success. Therefore, innovation has various roles in entrepreneurial activity and entrepreneurship. The reflections can be viewed through continuous observation from the market and society.



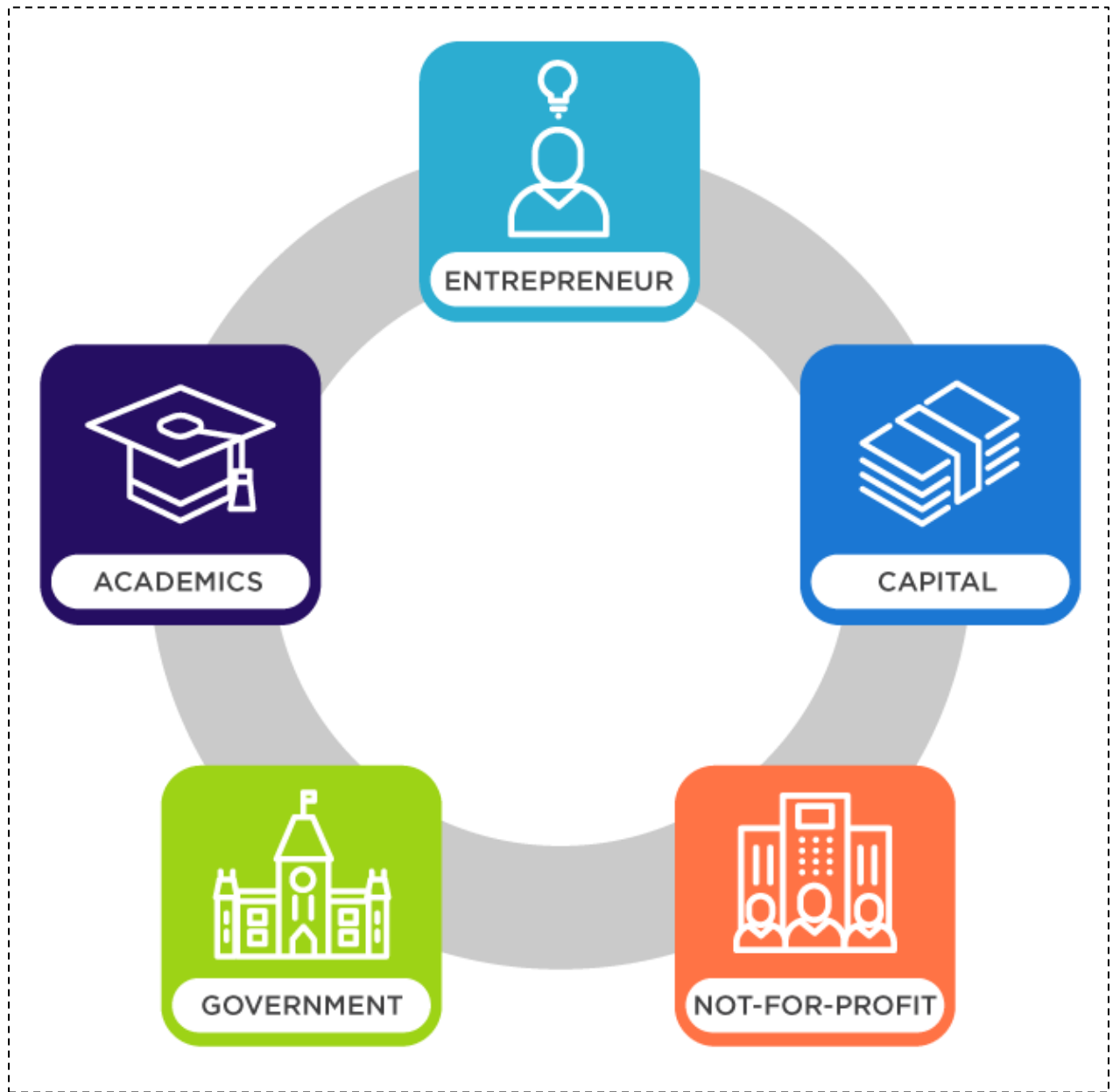


Figure 1: Innovational Cluster. [About Canada's Global Innovation Clusters](#)



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WEB SCRAPING FOR DIGITAL MARKETING OPTIMIZATION

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Abstract

Digitalization processes stimulate modern users to spend a large amount of time every day visiting the Internet and satisfying their own needs. Focusing on the needs of users and their habits, a large number of companies actively use the digital environment to implement effective marketing strategies. Thanks to modern digital marketing tools, companies get the opportunity to identify the target audience and establish close, long-term communications. The process of choosing marketing tools and forming an optimal strategy is based on comprehensive data on the market functioning of the company, characteristics of the target audience, etc. Data collection on the Internet is possible thanks to the use of modern web analytics tools, which allow companies to accumulate information about the company's resources on the Internet based on a system of metrics. There are specialized web analytics services that can collect data on activity on competitors' web resources. However, this approach allows you to collect only data about competitors based on a small set of metrics. Thanks to web scraping, it is possible to legally monitor the websites of various companies and the social media accounts of the target audience. Data collection is carried out by parsers according to the settings system for searching the Internet for relevant information. The accumulated data reflects the real market situation and makes it possible to establish the needs of potential customers, accordingly adjusting the brand's marketing campaign in the digital environment and applying relevant digital marketing tools. Monitoring the digital environment thanks to web scraping and forming conclusions based on the received information allows a company to quickly adjust its marketing strategy and ensure a high level of conversion. It is expedient for companies to process the data obtained thanks to parsers thanks to artificial intelligence algorithms.

Keywords: big data, digital marketing, optimization, target audience, web scraping



CONSEQUENCES OF THE RELATIONSHIPS BETWEEN THE EUROPEAN UNION AND KOREA

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Abstract

The purpose of this paper is to look at the consequences of the relationship between the European Union member countries and Korea. Next to the political and economy related aspects, we can notice a cultural cooperation between these two worlds, Europe and the Asian world representative which is Korea. Common values between the European Union and Korea include the preoccupations for democracy, human rights, as well as the rule of law and the same interest in market economy. Security and trade are among the shared interests between the EU and Korea. Science, technology, as well as policies related to climate change and energy are what connects the two areas in the world to cooperate. Education and culture is an area of cooperation which is among the most visible for citizens of the EU in their everyday lives. In Romania, where the author of the present paper lives, we can find various cultural events for promoting Korean cultural products. Book launchings, translations from Korean authors, preoccupations for the phenomenon of K-pop, for studying the language, for travelling to Korea, for trying out their specific foods and learning about their traditions are among the events promoting their soft power, or culturally appealing elements. Any interest and promotion of cultural products of a country starts from their presence being allowed and encouraged by their friendly relationships at political and economic level. The European Union should not be viewed as having its interests restricted to the member countries, but also according to the way it related to other parts of the world and to their cultures.

Keywords: Culture, Politics, Trade, Soft Power, Cooperation



Introduction

The fascination for Asian cultures has been an ongoing phenomenon in Europe and the Western world (Harding, 2024). These two worlds, Western and Asian, have not been without ties and have been curious one about the other constantly. Their connections have ranged from several areas, from culture, to economy, politics, and security, and these are visible with the European Union.

Romania makes no exception in being fascinated by Asian cultures. There is currently interest in Korean culture, which is visible with the presence of the preoccupation and promotion for the Korean language, for Korean pop culture products, such as the K-pop phenomenon, Korean film series, Korean anime and manga, Korean food, Korean travel, Korean art, as well as Korean literature. Book launching events of books written by Korean authors and translated into Romanian are also present. Kyung-sook Shin is one of the contemporary Korean authors (born in 1963) who has benefitted from having her novels translated into Romanian and also from being part of book launchings, where discussions about these novels were present. *The Court Dancer*, *I Went to See My Father, I'll Be There*, and *Please Look After Mom* are all titles of novels by Kyung-sook Shin which are present in bookshops and which have been popularized by the media and publishing houses, which have benefitted from translations into Romanian. Moreover, in Bucharest, Romania, we can find small food supermarkets from Korea and shops with products from this country, including bags, purses, as well as plush toys. *Princess Bari* by Hwang Sok-yong and *The Cloud Dream of the Nine* by Kim Man-Jung are other novels by Korean authors which have been translated into Romanian and which are recommended by the Romanian-Korean Association RoKoria on its Facebook page in a post from 22 June 2014.

The paper refers to the case of Romania, since it is a member of the European Union and the country where the author of this paper lives in, so she can have first-hand experience and observation about what is going on related to the promotion and the interest in Korean culture.

Such cultural products show the soft power (Nye, 1990) of Korean culture in European countries. We can start from this noticeable phenomenon of promoting and having interest in Korean cultural products in order to understand how the European Union has a relationship with Korea. This is the level of culture and education, but it is not the only one. However, it is one of the most visible in the everyday life of European Union countries' members such as the Romanians. We may wonder why we find Korean culture products so frequent around us and why the young generation is so much interested in learning the Korean language. We can also start wondering why Korean authors' fiction works are so present, and why K-pop is so popular among youths, as well as Korean anime and manga. Korean film series have also been around for a while, and have sparked a lot of interest from the Romanian public. The interest in traditions, rituals, holidays, as well as architecture and the way traditional Korea looks like, with its traditional clothing style and history present in fictional works such as novels and films are all signs of the appeal of Korean culture in the European Union countries. Definitely Korean tourist industry benefits from such an interest in its culture. The soft power of Korea leads to knowledge and interest in its cultural identity manifestations, a grid which includes, according to Baciu (2013), values, symbols, traditions, rituals, practices, personalities and heroes.



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Materials and Methods

The possibilities of having Korean cultural products available comes from larger-level relations between the European Union and Korea. These relationships have a legal basis, related to trade, economy, and politics (Harrison, 2013).

The European Union collaborates with the Republic of Korea regarding common values of today's world, such as peace, democracy, human rights, market economy and the rule of law, which are also among the values of the mission of the EU (EAAS, 2024). A Strategic Partnership between the EU and Korea has been going on since 2010 (EAAS, 2024). Politics, trade, and security are the levels had in view by this Strategic Partnership (EAAS, 2024). According to Yuun & Zamorano (2023), after the Free Trade agreement from 2010, Korea started to develop a positive public perception of the European Union. Cultural cooperation was started according to the Eu-RoK free trade agreement, which included especially a collaboratuon between the two parties in the audio-visual sector.

There is a bilateral agreement between the EU and Korea, which started in 2014, and which is concerned with aspects such as security against terrorism, against mass destruction weapons, as well as with issues related to climate change and energy security and, of course, human rights (EAAS, 2024).

All the concerns in the cooperation programmes of the EU and Korea are universal concerns of the world today, which preoccupy supranational organizations such as the EU, as well as the citizens of the world. Mass-media always popularizes such concerns, to the point where they have become values of today's society around the globe. The Republic of Korea considers itself one of the most advanced democratic societies in Asia, and believes that it could help the EU with goals such as peace, as well as stability, all over the world (EAAS, 2024).

According to EAAS (2024), the promotion of the human rights is a common concern of the EU and Korea. In addition, Korea also helps the EU in crisis management operations.

With respect to trade, according to EAAS (2024), the EU and Korea have another agreement on free trade starting with July 2011. One other previous free trade agreement was set up in 2007 (Kelly, 2012). According to Kelly (2012), the European Union did not need the collaboration with Korea to gain more prestige, as it was already a well-known international organization. What the EU gains is psychological satisfactions for having established a relationship with an Asian culture, and one of the few ones, which have adopted completely "European Enlightenment values" (Kelly, 2012). We can, therefore, notice that the main part of the common aspects of collaboration between the two countries is a sympathetic one, based on cultural awareness which is reciprocal. We could speak about a cultural exchange, which is due to the mutual interest in the other's culture and its cultural products. We can speak about the need to explore a culture that is completely different, and which can have its benefits for tourists, as well as for those interested in finding out about a different culture, since in this way they can learn about completely different perspectives on various aspects of everyday life. This can lead members of other cultures to reconsider their own wishes and their own ways of dealing with problems in everyday life, as well as with their own personal values, principles, and lifestyles. According to Kelly (2012), Korea functions according to the Westphalian model, being an autonomous state, with "a distinct people and culture (Cumings,



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2005; Kang, 2009; Kim, 2010a, b)”, meaning that it does not want to submit to the EU’s idea of “Asian regionalization and consequent ‘interregional’ dialogue.” Kelly (2012) claims that both cultures agree, however, on the cultural and educational exchange, and to the exchange related to soft power and this type of communication.

We can notice how, gradually, the relationship between Korea and the EU relied mostly on culturally-related issues cooperation, while they may have been in the beginning more reticent to other issues and would only be willing to cooperate formally, and not go to deeper levels. Trade has led to an opening towards cultural issues, since some cultural products such as Korean films, books, anime, and others can be objects of trade. At the same time, students can be “traded,” within university exchange programmes, to have insight into another culture and its ways at the same time. Additionally, it could go without saying that once two cultures come into contact through trade, their cultural differences and need for cultural awareness are definitely going to be felt. Negotiations at political, security, trade, and overall diplomatic level cannot ignore aspects of cultural difference, which can range from the language of gestures, specific ways of polite answers and requests, as well as ways of greeting and receiving guests.

Thus, in addition to trade, and other aspects of politics, we have education, which includes students’ mobility programmes such as Erasmus (EAAS, 2024) between the EU and Korea. Moreover, we have the Foreign Policy from 2016, where freedom of expression, together with respect for values that are fundamental are strongly connected to culture and its exchange in-between the EU countries and Korea. The EU and Korea also cooperate in the field of science and technology. Domains such as health, energy, nanotechnology and satellite navigation are included. The environmental care is another sector of cooperation.

We can notice how the European Union countries and an Asian country, namely Korea, while being so different from the point of view of cultural heritage, share, through political and economic cooperation, common values, which are universal in today’s world. Respect for different cultural values and mindsets are ensured through cultural differences awareness and sympathizing with a different culture. At the same time, the world nowadays seems to be united, either through supranational organizations such as the EU or with cooperation with such organizations in a common effort, based on common concerns, principles and values.

While, in the past, military alliances were formed, nowadays the world relies mostly on soft power and alliances of cooperation based on the level of science and culture preoccupations, next to marketing ones, e.g. trade, as well as security ones, but also on measures taken to ensure our well-being as citizens of this planet.

In 2023, we witnessed “the 60th anniversary of diplomatic relations between the European Union and the Republic of Korea” (Carter, 2023), which included both economic and cultural collaboration. According to Carter (2023), regarding economy, we are reminded of how South Korea, following the 1960s’ war, has completely changed from its status as one of the poorest economies towards one of the largest in the world, occupying 13th place. Currently, the European Union is the first and largest supranational organization investing in Korea. We can also speak, from a cultural influence point of view, about a Korean wave, or Hallyu, which appeals to the European public. The Hallyu is made up of “. K-pop, K-



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culture, K-drama, and K-food” (Carter, 2023). Culture, nowadays, becomes just as important as economics and security, as far as a diplomatic society is concerned (Carter, 2023).

The official diplomatic relationships between EU and Korea started in 1963 (Park, 2020). Gradually, their partnership grew stronger over time, reaching the conclusions that even stronger cooperation with respect to dialogues on policies and “common efforts, especially in climate change and energy, education and culture, and international development cooperation” (Park, 2020) would be beneficial to both parties.

By cooperating with other cultures, the European Union seeks to continue its values and principles related to multiculturalism, and respect for cultures that think and feel differently about various issues. Knowledge of other cultures can help achieve harmony at individual citizen and personal level, not only at a large political level.

Results

The result of the cooperation between the EU and Korea lies in the way that these two parties contribute to the creation of a society that is relevant through its values and through the principles it is built on to today’s citizens. In the meantime, it ensures the basic conditions for their life, such as security, peace, and a democratic society, where everyone would have equal opportunities for self-development and for psychological well-being.

With all these advantages comes the advantage of allowing EU member countries to have access to the cultural products and traditions, as well as understanding of values and mentalities, of Korean culture. This understanding of another culture becomes the basis on establishing relationships of collaboration at persona, everyday level, as well as at professional level with members of other cultures. In this way, a first step is taken towards building up respect for diversity, under the form of different lifestyles, ways of thinking, different values, and sympathy. Culture differences awareness is significant in mutual respect between two cultures and in establishing and adapting to a multicultural society.

Discussion

A multicultural society seems to be built, in the case of EU-Korean collaboration, based on the old curiosity between these cultures, and on the fascination with Asia of the Western world ever since the times when the world was still being explored in order to be known and to put together the world map. The wish to know, explore, and understand other cultures has remained with us to these days, when we travel and the touristic industry is part of the economy of any country.

Eventually, we can see how the cultural element becomes the predominant one in the collaboration between the EU and Korea. Both parties agree to the cultural exchange, which is not separate from trade. Cultural products can actually be traded in-between two different cultures, or shared, and trade is one means through which contact between cultures can be achieved.

There is no other more efficient means to support a globalized world, where we can freely travel and freely have any product we want with almost no effort than through trade. Additionally, there is no more efficient way to support



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globalization than through creating collaboration opportunities between two very diverse, and different cultures, European and Asian. There can be no clearer example of cultural sympathy and tolerance than at this level, which is exemplified by EU member countries and Korea.

At the same time, we can see it as a sign of good, on friendly terms basis relationships at political, economic and security level once we find in our country access to cultural products belonging to another culture. We may then expect that at geopolitical level, their relationships are good once the cultural products of another culture are promoted and readily available in our country, and once students have the opportunity for free tutoring and exchange programmes to study in another country. This is how the young generation is prepared for future communication and cooperation with the other country, as well as for adapting to the society which results from the cooperation between the two cultures.

This is a means not to allow the other culture to threaten our culture's members' nationalist feelings and to lose the young people to leaving to start a new life in the other culture's country. We can have access to the other culture's products, to travelling to their country and to collaborate together professionally, which allows young and older generations to have the feeling that they can have access to advantages offered by the other culture while not leaving their own country and while still contributing to its well-being.

Conclusion

Just like cooperation is needed at a diplomatic level, including political, economic, and cultural, as well as technological and scientific, so it is needed at the level of personal and business relationships. The way we interact with other cultures is part of the mindset established at EU level and also supported by the EU. Gradually, this mindset becomes our own, through having it supported by rules and laws. However, anything works if we citizens consent, and the supranational organizations such as the EU need our support through their being persuasive about these values and principles. The soft power elements, which are the cultural products, of a culture are part of the persuasion process, which leads us citizens to connect emotionally to other culture members, as we feel attracted by the way they think and live.



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THE APPEAL OF FLOATING MARKETS

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Abstract

The purpose of this paper is to understand the appeal of floating markets found in the Asian world for Western culture members. While in Asia this is a specific and usual practice, in the Western world we only have usual, down to earth markets. For Western culture members, watching floating markets can seem a completely different approach to doing trade and shopping, which breaks off with their established routine and habits in everyday life. We are used to shopping online, in malls, in the streets and marketplaces, but having floating markets can bring about an element of art and, in Shklovsky's terms, defamiliarization, by bringing a fresh perspective on trade and shopping. Defamiliarization is used when describing art, but, for tourists, we can see this experience still valid for everyday life presented from the perspective of another culture. Such floating markets were popular and a usual practice in the Asian world due to the fact that transport by water had a significant role. Countries from Asia such as Myanmar, Thailand, Indonesia, Vietnam, Sri Lanka, Bangladesh and India offer tourists the opportunity to experience such floating markets. The sight is not simply commercial and practical for everyday shopping, but also artistic, since the boats have special shapes, the traders are dressed in traditional clothing and wearing specific hats, and since, viewed from a distance or from upwards, the sight is aesthetically appealing. The boats are many, gathered side by side, and the amount of merchandise suggests richness and also an aesthetic sense of arrangement. We may be aware of the artistic side of everyday life in Asian cultures, which is visible in the practice of floating markets.

Keywords: Culture, Defamiliarization, Soft Power, Asia, Tourism.



Introduction

Business and selling have always been around, all over the world, under one form or another. The setting where shopping takes place is not without importance. The design of the shops is always taken into account, together with the way in which the customer is treated by the seller. All these aspects are taken into account by introducing psychology notions in the field of marketing. The psychology of the customer has been intuitively known by sellers in Turkish bazaars, who greet customers in a very friendly manner, offering them a cup of tea and to try some Turkish delight, and also have a friendly chat with them. They also negotiate with their customers, which can become a marketing strategy, so that the clients feel that they have control over their shopping and over the price of what they want to buy.

Various cultures have specific places for shopping, leaving aside the universal by now malls and supermarkets. Nowadays, we have closed marketplaces everywhere, in Bucharest, Romania, where the author of the present paper lives, included. In the past, before 1989 and a bit further on, open marketplaces were part of the usual everyday life. Now we can see them in photographs of old Bucharest, present on social media groups, where people having lived through those times share nostalgic memories. In Turkey, Morocco, and other Middle Eastern countries we can see the famous bazaars, full of everything, which remind Western culture members of the oriental fairy-tales they have read about Aladdin or Ali Baba.

Specific places where shopping can be done in Asian cultures are the floating markets. They are part of the traditional past, meaning that they were part of the local people's everyday lives, while nowadays they have been kept as a tourist attraction. They are part of Asian cultures' heritage, and they can be seen as a symbol used to identify where the respective scene takes place as we see it in photographs shared on social media. We immediately know that the photograph was done in an Asian country, which could be Myanmar, Thailand, Indonesia, Vietnam, Sri Lanka, Bangladesh, or India.

In the past, floating markets were usual ways of buying fruits, vegetables, snacks, and cooked foods on an everyday life basis. Nowadays, with the change in technology and development of possibilities of trade, there have been changes with respect to floating markets as well, as the rivers would not be the only way of trade any longer for the Asian countries previously mentioned. Back in the past, in Thailand, there were no other possibilities for trade other than the rivers, since there were no highways, roads, and other means of transport we know today, in Bangkok (Comaposada, 2022). Instead, the floating markets have become symbols of these Asian cultures and recognizable specific practices for members of other cultures, and especially for tourists. When we travel to another country, we expect to find a different world, through distinctive practices and visible aspects of the respective culture and country, such as a different type of architecture, differently looking streets, differently looking and differently dressed people. In Western world countries, the differences are less noticeable, since we are largely based on a similar cultural background and heritage, and especially since globalization has been at work. We need to look for differences at deeper levels than the visually-related ones. Except for some distinctive monuments and old architecture, the new part of the cities includes similar modern architecture which we see everywhere and which makes cities look alike in various countries. We could say that everywhere we travel we have a

recognizable part, and a specific, culturally-related part for which we need to dig deep if we want to find it. Guided tours can include standard tourist attractions which may keep us as tourists away from experiencing the real culture of the country we visit. This is done, however, to protect us from culture shock and to help us see what is meant for tourists in the respective countries. Yet, in Asian countries, it is impossible not to find a different world, which is striking right from a visual point of view. There is a differently looking architecture, people look differently, as they belong to a different race. While they have also adopted Western world fashions and they are also, to some extent, part of the globalized world, they still maintain their traditional side.

The floating markets are one such traditional side, and they present a unique, distinctive sight to Western countries tourists, as they are not found in their countries. They have changed their purpose from the past, when they were means of trade and negotiation for the locals, to means of attracting tourists (Pongajarn, 2018; Fakfare et al, 2021) and presenting them with specific fruits, vegetables, foods, and souvenirs. From a local, everyday life purpose they have changed to a tourist attraction purpose.

Materials and Methods

We can see floating markets in Asian cultures as having to do with what Baciu (2013) has called culture identity manifestations, and which include values, traditions, rituals, practices, symbols, heroes and personalities. The floating markets can be seen, first of all, as symbols of Asian cultures by Western culture members, as well as traditions and practices in this world in the past. They can also be seen as symbols for the preoccupation for and respect for the past and its traditions by Asian cultures.

Floating markets can also be seen as a form of soft power (Nye, 1990), which refers to the way in which certain cultural products are popularized around the world, promoting like this the respective culture in countries other than its own. In this case, this element of soft power is used to the benefit of the Asian countries in order to increase tourism, which can come as a consequence of the curiosity regarding Asian cultures, then leading to the wish to explore their countries in order to see the respective symbols and practices.

Floating markets are a means of challenging our perception of a marketplace from Western cultures, where the marketplace, whether open or closed, is situated entirely on land. Instead, floating markets can be situated either on rivers or on lakes. The sellers do not leave their boats when selling their goods. The tourists need to get on a boat and go towards the sellers in the floating markets, just as in the past. According to Comaposada (2022), in Thai, the word we have translated as floating markets is *Taladnaam*, which is composed of *Talad*, meaning market, and *Naam*, meaning water. This shows that the translation floating markets may be wrong, and that water market is more suitable. The term water market also designates markets that are situated by the water, not necessarily on water.

Judging by this error in translation, we can see how we have the tendency to underline what is special about these markets. The way these boats with trading goods float on water is a special sight, creating a special setting, also having aesthetic connotations.

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The floating markets may have been the creation of a reality meant for tourists, as they would be considered very appealing in sight. According to Comaposada (2022), shop-boats are not even such a common sight in Thailand, and they are simply traders selling near the water. Perhaps these floating markets are simply a sight that has impressed and still does impress Western-culture members who start exploring and discovering various distinctive visual aspects of Asian cultures. They are fascinating since they present an entirely different world for Western culture members. While these photographs may not present genuine and actual practices, they are still very attractive to tourists and still present traditional and specific foods, as well as traditional costumes worn by the traders.

In addition, these floating markets can be seen as an artistic side of Asian everyday life, next to rice terraces, scenes of fishing, with fishermen throwing their nets from similarly-shaped boats to those used in floating markets, to the architecture of temples, presence of cherry blossom trees, Zen gardens, and others. These floating markets include both an artistic, or aesthetic element, and an element of practical everyday life, in terms of sellers' gaining money and of the buyers' getting the goods they need. The challenging of our perception present with respect to floating markets comes from the unexpected setting of the place where the shopping and selling occur: in boats, having a specific pointed shape, and on water. The specific foods to Asian culture which are waiting to be tried and tasted on the spot by tourists represent what we could call, both literary and figuratively, a taste of the specific Asian country's culture. Tourists try on local practices, under the form of doing their shopping on floating markets, even if it is more for entertainment and curiosity purposes than for precise needs. Otherwise, they can do their shopping at usual supermarkets which are present all over the world.

Shklovsky (2007) would call this change of setting for a marketplace shopping defamiliarization, as it asks us to see reality from a completely fresh and unexpected perspective. While his theory refers to art, we cannot deny that there is an aesthetically pleasing dimensions in photographs of floating markets, such as in the following ones presented in Figures 1-6 below.



Fig. 1. Image source: <https://timesofindia.indiatimes.com/travel/destinations/stunning-floating-markets-in-asia-that-are-special/photostory/103084852.cms>

In Fig. 1, we can see an unexpected perspective of a floating market from above. The merchandise in the boats looks artistically arranged, and we do not know if it has been placed like this for the photograph or if it is just the way it looks like on a daily basis. However, we notice a colour and shape harmony that is pleasing to the eye.

In Fig. 2 below, we can see a crowded marketplace, yet its sight is not tiring and also not at all disorderly. Everything is placed in an apparently unexpected harmonious sight, without us being able to tell why. It could be the effect of the colour harmony or of the boats' shape, or both. The crowded scene is not unpleasant and we do not experience the sight as an uncomfortable scene:



Fig. 2. Image source: <https://rove.me/to/borneo/banjarmasin-floating-markets>

Fig. 3 below shows another perspective from upwards of a smaller number of boats which are part of a floating market. The arrangement is special in that it shows four boats closely placed together, showing a strong sense of communion. We could claim that the socializing aspects of the floating market is shown through this picture, where the boats could be understood as replacing the human beings. In Asian cultures, the focus on harmonious relationships and preserving them is a famous aspect.



Fig. 3. Image source: <https://www.rainforestcruises.com/guides/floating-markets-of-the-mekong-river>

Fig. 4 and Fig. 5 show other examples of floating markets, seen from upwards angles. We can see the harmonious arrangements of vegetables and fruits, as well as the specific hats worn by the sellers, together with the specific shapes of the boats. Even if the boats have such a small distance in-between them, the entire landscape and scene does not look crowded and tiring, however. It could be the harmony of the colours that suggest an aesthetically pleasing scenery, or it could be the entire idea of having a marketplace floating on water which makes the scene agreeable and not at all tiring or disturbing to the viewer. The colours suggest the harmony of nature, and of the fruits and vegetables that have been planted in their fields. We can recall the beauty of fields of crops presented for Asian countries, where the harmony and beauty of colours can be so striking. As Western culture members, we are conquered at the aesthetically pleasing aspect of various realities of everyday life in Asian countries, and the floating markets are no exception. The visual aspect of these markets seems to work together with its name, which suggests something poetic and belonging to a fantasy world. For us Western culture members, a floating market is not a frequent site in our daily lives, and we can see it as something special. We can make the connection between Asian cultures and various everyday life practices which seem taken over from art and from stories.



Fig. 4. Image source: <https://www.cuddlynest.com/blog/bangkok-floating-markets/>



Fig. 5. Image source: <https://www.cuddlynest.com/blog/bangkok-floating-markets/>

Fig. 6 shows a scene which is more anchored in everyday life reality, as the scene is pictured in a realistic setting. We can see the rooftops of houses, as well as people on the shore, and, in spite of the boats, merchandise and sellers still looking in harmony and aesthetically pleasing, this scene is no longer shown in isolation, which makes it a more common type of scene.



Fig. 6. Image source: <https://www.cuddlynest.com/blog/bangkok-floating-markets/>

Figures from 1 to 5 allow us more room for daydreaming, and for imagining idyllic and idealistic fantasy worlds starting from the floating markets. We have the habit of daydreaming of fantasy and utopic worlds, where everything is beautiful, and where nothing could go wrong. The Figures from 1 to 5 look perfect, while Fig. 6 starts making us aware of the possible imperfections which could be found even in Asian countries.

As Western culture members, we tend to idealize Asian cultures, as many photographs can prompt us to start fantasizing about the beauty of these places. There are lots of visually surprising aspects which differ so much from what we are used to. We tend to imagine further other scenes which are as idyllic and as seemingly taken over from the visual arts as the rest of the photographs we see on social media and elsewhere on the Internet.

We could resort to Scruton's belief (2018) that we always need, as human beings, to find beauty in this world in order to feel well in this world. The floating markets can be understood from this point of view.

Results

The floating markets are popularized as a means of pleasing tourists and also as allowing them to witness displays of specific practices of Asian cultures. Such marketplaces help tourists connect the aspect of everyday life and aesthetically pleasing aspects, the latter of which seem to always be present in Asian cultures. Asian culture members seem to know how to make visually pleasing arrangements in their everyday life practices. From this point of view, we can recall minimalism, used in interior design, as well as in garden design, the beautifully designed traditional clothes, such as the Korean hanbok, and of the intertwining of aesthetics and spirituality. Aesthetics and spirituality are together when we see

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temples situated in nature, and when we see beautiful and untrimmed nature in gardens. The aesthetically pleasing aspect comes from combining what is natural with what is beautiful to human beings. Nature is frequently depicted in paintings, and painters seem to have a very sensitive perception of beauty, and focus on selecting the details that matter the most.

Floating markets can give tourists an idea about the general aesthetics and everyday life in Asian cultures. Everything seems so well-thought in Asian cultures, and no detail seems left to chance, in art as well as in daily life. After all, art for Asian cultures has been, traditionally, a means of keeping in touch and keeping themselves anchored during the present moment. They used painting and poetry writing as other means of meditating according to Zen Buddhist principles. Nature offered the best setting for people to consider their ephemeral time of Earth in comparison with that of nature and of the passing seasons.

The fruits and vegetables being sold in floating markets are clearly succeeding in anchoring us to the present moment, as they are sold when they are in season.

Discussion and Conclusion

While we may start to believe that the floating markets are just part of the illustrations of a story book for tourists, since they are more preserved for the enjoyment of tourists, they still retain the specificity of Asian cultures. They have been a part of everyday life before other means of trade was possible, even if not to the large extent to which they are being portrayed today.

We could consider the floating markets to be situated at the border of tradition and modern life, fantasy and reality, art and practical trading skills, as well as shopping activities, as well as at the border between entertainment and genuine local traditions.

We can see how they have become included in the local practices and traditions that are being promoted by tourist based sites and tourist themed social media Facebook pages. We could also claim that, while the floating markets may be presented in a fantasy and romantic light especially for tourists, in general sites for tourists try to create a different reality. They present tourist with what is the best and with what is the most beautiful and romantic reality and traditions of a certain country and its culture. Tourists have various expectations and touristic focused sites help them daydream and offer them what they want. After all, their time spent in the respective country chosen for their visit is limited, and they wish to make the most of it.



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UNDERSTANDING JAPANESE HOSPITALITY THROUGH THE CONCEPT OF OMOTENASHI

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Abstract

The purpose of this paper is to understand the specificities of the Japanese mindset related to hospitality presented through the concept of *omotenashi* and the way their idea of hospitality differs from other countries and cultures. Clients, guests, or friends are treated in a very welcoming and polite manner by the Japanese. This conception of hospitality is considered to go, in Japanese culture, beyond being polite. Business and informal contexts can include this type of hospitality which is considered to be authentic, sincere and not interested in receiving anything in exchange. What is specific to Japanese culture related to hospitality is the way train staff bows before the passengers. If we look at what each compounding word of *omotenashi* means, we can better understand its meaning. Thus, *omote* means your public image or your public face, while *nashi* means nothing, or less. The public face, in the case of Japanese hospitality, is the sincere and authentic one, and this behaviour is not one of facade. The tea ceremony constitutes the origins of the concept of Japanese hospitality, or *omotenashi*. Harmony among the persons gathered to have tea together is the main purpose of this ceremony, and it is interrelated with the idea of hospitality. Thus, the connection among those having tea together is a genuine one and not just an act of social conventions. Hospitality, for the Japanese, just like other activities in their lives, is considered an art.

Keywords: Culture, Relationships, Honesty, Politeness, Harmony.

Introduction

Hospitality is a practice and concept present in all cultures. How have the Japanese adapted it to their culture, making it acquire specificity? They have created the term *omotenashi*, which should sum up an entire set of features, values, and understandings of Japanese hospitality. They have tied it to their rituals, such as we could call their tea ceremony. The Japanese are strongly tied to their traditions, and they cannot conceive of their present without their past. It is part of their national and personal identity.

Members of Western cultures present Japanese culture through mentioning their own concepts for various traditions and values, and by underlining what these concepts include, so that we can have better access to understanding the way the Japanese view reality. In Japanese culture, we can thus clearly see how language shapes reality and reflects the way that they think. This could be since their culture is so different from our own. We need to look at a concept and examine it in detail in order to understand their habits, traditions and values, and to connect them to their culture overall.

This is the case with their concept of *omotenashi*. We can start from looking, as suggested by Bishamon (2021), at the etymology of the word *omotenashi* in order to understand it. Thus, the term *omotenashi* originates in the verb *to treat*, and it refers to treating the others with respect. At the same time, the word *omotenashi* refers to using the mind and various things to treat the customers well. Without fronts is another meaning related to *omotenashi*, meaning that the heart without fronts and backs refers to an honest heart when receiving guests and treating them well and, thus, treating them with kindness in complete honesty, without putting on a polite public face just to behave in a polite way. The polite treatment of guests and the joy in receiving them is, for the Japanese, an authentic, sincere, honest attitude. This behaviour is genuine, and not at all an act. Additionally, the term also refers to the way in which the host treats guests with kindness and respect without having any interest, meaning without expecting anything in return.

The term *omotenashi*, and with it the practice of hospitality, started from the tradition of the tea ceremony (Bishamon, 2021; Peters, 2022). The Japanese have hospitality principles expressed under the form of the Seven Rules of Rikyu. It all started with Sen-no Rikyu, a practitioner of the tea ceremony (Bishamon, 2021; Kastuti, 2018). While these seven rules refer, in detail, to the tea ceremony, they also include principles about hospitality. The seven rules include the following: to prepare a good bowl of tea, to prepare the charcoal to ensure that the boiling goes well, to prepare as a host to offer good conditions, such as warmth in winter and coolness in summer, to prepare flower arrangements that should look natural, to prepare before the arrival of the guests, to take measures considering it could rain, and, the last one, to treat the guests as well and with as much consideration as possible (Acar, 2024). According to these principles, it is believed that each guest, taken individually, needs to be offered the best space where they feel comfortable. The present time occupies significant place, as each guests needs to be focused on by the host, and to offer them the best care here and now. As Westerners familiar with Japanese Zen Buddhism in haiku poems and meditation practice, we can clearly see here the influence of Buddhist philosophy focusing on the here and now (Simpkins & Simpkins, 2016), since the present moment is believed to be everything that we have (Hanh, 2012).



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Translation is not enough, as the correspondence between *omotenashi* and hospitality does not solve everything we need to know in order to understand the Japanese mindset and practices related to their receiving and treating guests. Simple translation does not lead us to understanding the concept of *omotenashi* at a deeper level regarding the Japanese understanding of hospitality and related practices.

Materials and Methods

If we examine further the meaning of the concept of *omotenashi*, we can get a deeper understanding of the Japanese hospitality. According to Li (2017) and Peters (2022), the word *omote* can be translated as “public face,” which is, of course, the way the others perceive us and the image that we show up publicly. The word *nashi* can be translated as “nothing.” Honesty becomes the clear message associated with the concept of Japanese hospitality, once we consider that the translation of *omote*, “public face,” and *nashi*, “nothing,” could be understood as no putting on a public face for facade, not pretending in public, and not hiding our genuine self and emotions towards the guests.

Going still deeper into the understanding of the concept of *omotenashi*, we find out that there is a set of three core values included in it, which consists of the following: anticipation, selflessness, and sincerity (Lexus Paramatta, 2024).

According to Heartland Japan (2020), the concept *omotenashi* describes both hospitality and mindfulness, in complete relationship with one another.

Due to the Zen Buddhist philosophy and mindset, the Japanese culture members place a very strong focus on the idea of being themselves, of being their genuine, true self right at the present moment, since it is during the present moment that we could say that we are who we are (Katagiri, 2008). When meditating observing nature, and when writing haiku poems based on our observations after walking in nature, the exercise is supposed to allow us to see nature and everyday reality details as they are, not as we see them or as we have been taught to see them. We want to have access to reality as it is, in all its authenticity and honesty. Meanwhile, human beings in Japanese culture live in harmony with nature, as we can see in the way their temples are located in natural settings, allowing large openings to contemplate nature through sliding window and door screens in temples and in personal, traditional homes. The concept of hospitality and the attitude of the host could be related to the way the human personality is shaped by Zen Buddhism, in allowing ourselves as persons to be our own, genuine, true self when treating our guests and considering their every need, in a practice of honest empathy. Japanese hospitality, just like the practice of socialising at the onsen, or Japanese thermal baths, show how we can try to be ourselves and establish harmonious relationships with the others without pretending at all. The relationships can, thus, go very deep and be profound, not superficial, and those we meet are not treated as simple acquaintances as it sometimes happens in Western cultures, where we no longer genuinely connect at all times with people we come into contact with. At the onsen, there is not even the barrier represented by clothes in our way, meaning that we lay ourselves bare at all levels, both figurative, spiritual, psychological and physical. There, at the onsen, the social class distinction is erased and we can truly be ourselves, just like nature can be seen in what it truly is, without bringing about any distortions to it and to us, which can be brought about by culture and social conventions. The artificiality seems to be not valued and even



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banned in various aspects of Japanese culture members' lives. As an example, ikebana, or the art of flower arrangement, relies on natural elements, while the Japanese gardens try to look as natural as possible, without much of human beings' intervention. In the meantime, haiku poems do not rely on figures of speech, which would distort our presentation and perception of nature. In Western culture, we tend to personify elements in nature and to present nature comparatively with elements in our human lives, which takes us away from the proper way of being of nature. Nature should be observed objectively, so that we get to understand it precisely as it is. We need to be anchored in the here and now in order to see the world as it is, not as we want it to be and as we create it. As human beings, we have the tendency to attribute various features to the reality around us, nature included, and we tend to fashion ourselves in such a way so as to please others, as we wonder about how we are being perceived and, especially, judged by the others. This, however, could be considered, next to it being an effort for us to find out who we actually are, and an effort to adapt to the environment in which we have to live, in our everyday lives, a means of getting away from who we truly are. We need to leave all these behind and focus on who we actually are in order to know ourselves. In order to establish harmonious relationships with the others, and also honest ones, we need, first of all, to establish a harmonious relationship with ourselves and to be in harmony with ourselves. The result of the honesty in the case of being a host and behaving well towards our guests can come from us, first of all, being honest to ourselves. Then we can start not judging the others just as we do not judge ourselves, and accept anyone for what they are, just as we accept ourselves for what we are.

In Japanese culture, the idea of establishing and maintaining harmonious relationships (Iwai, 1996) comes from it being a collectivist culture, focusing on the good of the entire community and on the actions of the individual in order to help benefit the entire community. For the Japanese, collectivism (Yamaguchi, 1994) could lead to willing to understand the others, to sympathize with them, and establish harmonious relationships with them, just as we see in the case of *omotenashi*.

For the Japanese, hospitality consists of "Ritualized routines to quiet, to sooth the mind, the spirit" (Seki & Brooke, 2005). When receiving guests, the host looks at various clues regarding the way they feel and what they need. This could be found in Japanese culture since it is an indirect communication culture (Ciubancan, 2015; Clancy, 2008), where context provides the basis for common understanding. Nobody says directly what they mean or want, or need, but they can offer clues through body language, the language of gestures, or they may have their own practice of saying "yes," yet this only means that they wish to maintain the harmonious relationship and not offend their interlocutor, while providing clues through silence and hesitations during further talk in order to show what they actually mean related to a topic. Hosts can infer based on what their guests do, such as leave some foods on the plate that they do not really like them, or if they do not talk much they may conclude that they are tired and allow them to leave or offer them to lead them to their room to sleep. Hotels and other business-like services provide the same honest, selfless approach to hospitality, anticipating in advance what the guests need, and not expect anything in return (Tokyo, 2015), meaning no tips, as is the usual practice in Western cultures.

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Omotenashi has been called more than a simple concept. It has been called a philosophy (Tokyo, 2015), and even a way of life (Heartland Japan, 2020). Not only individual hosts and hotels can offer *omotenashi*; stores and restaurants also practice it, welcoming guests with a distinctive Japanese polite bow (Heartland Japan, 2020). Thus, even within businesses there is no simple transaction relationship, based on money, but the human element in the relationship is instead very much present. The host in hotels, restaurants, and shops tries to provide a very warm and comfortable atmosphere for the guests.

We can speak of three principles of *omotenashi*, according to Frew (2024): *Kikubari*, *Ichigo Ichie*, and *Omakase*. *Kikubari* involves empathy of the host towards the guest, as well as intuition regarding their needs, and which thus allow anticipation of actions to make the guests feel comfortable. Knowing about the guests' interests and hobbies could also help, e.g. a guest may enjoy reading fiction, so the host may provide for them such a book. *Ichigo Ichie* allows hosts to take care of a certain meeting with their guest as if it were their last, meaning to take extreme care of everything and to be there and now with their guest. *Omakase* refers to the feeling of trust between guests and hosts.

All these principles and values provide us with a deeper understanding of Japanese hospitality, and of the way it involves several rituals, to the point where it becomes a ceremony in itself, just like the tea ceremony in which it originates. At the same time, while Western culture members could associate a ceremony with rules and not with honest behaviour, the practice of *omotenashi* in Japanese culture challenges this perception. Ceremony does not mean only rules and conventions, and respecting them mechanically. A genuine emotional feeling in the relationship between guest and host comes up. Honesty and rules do not represent separate realities in Japanese culture.

Results

The Japanese concept of *omotenashi* shows how the Japanese culture members pay attention to the others' needs, and understand them through observation, by applying their notions of another practice, that of indirect communication. *Omotenashi* sounds universal, as hospitality is found in all the other cultures, and kindness seems to be common for all cultures when treating a guest. However, *omotenashi* includes a real ceremonial behaviour, based on values and principles which originate in the tea ceremony, a distinctive Japanese practice.

The honesty and sincerity with which guests are treated by the host could be related to the hosts accepting both themselves for whom they are, naturally, as well as their guests. Zen Buddhism allows the viewer to observe nature for what it is, not for what it interprets it to be or even forces on it to be based on figures of speech and what they have been taught about it. The host observes guests and sees them for what they are, and, at the same time, understand what they need and think ahead to make them as comfortable as possible. Living in the present moment, which is a Zen Buddhist principle, is visible in being a good host, as the host is aware here and now about the needs of the guest.

Discussion and Conclusion

In order to understand the concept of *omotenashi*, we need to go through explanations which take us on a journey throughout the entire Japanese mindset and understanding of the world. *Omotenashi* does not exist outside the context



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provided by other Japanese traditions, rituals, and practices, as well as symbols and values, elements which make up, according to the grid devised by Baciu (2013), the culture identity manifestations, in this case, of the Japanese culture.

At the same time, knowledge of rituals and ceremonies is not without an emotional component. The Japanese show attachment to their traditions, and their ceremonies do not mean simply mechanic execution of certain practices according to certain established rules. There rules and conventions are not without an emotional component, where the practice and ceremony is lived with all sincerity.



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THE LABOR MARKET AND UNEMPLOYMENT RATE IN KOSOVO

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ABSTRACT

The main purpose of this study is to analyze employment and unemployment rates in Kosovo, looking specifically at youth unemployment (18–24 years) in Kosovo. In Kosovo, the labor market is distinguished by many specifics. There is a large number of working age population and very little opportunities for their employment. The unemployment rate in the Republic of Kosovo is quite worrying where according to the latest data the unemployment rate is 12.6 percent. The results of the study show that unemployment in the young age group 18-24 is high and that the labor market policies are also not adequate. The empirical study includes data from scientific literature as well as data from various local and international reports regarding the labor market and unemployment.

The study shows that in Kosovo 21.4% of young people aged 18-24 are unemployed and that unemployment is more pronounced among women (27.0%) compared to men (18.8%) (Statistics Agency of Kosovo, 2023). Kosovo's problem with unemployment, especially youth unemployment, is the result of low economic development as well as inefficient labor market policies.

In this study, the labor market and the unemployment rate in Kosovo in recent years are analyzed, where the conclusions and recommendations are also given. Through this study, the conclusions and recommendations given can be taken into consideration by relevant institutions.

Key words: Labor market, unemployment, employment, youth.



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**ENTREPRENEURIAL SKILLS ARE NECESSARY TO EMPOWERING WOMEN
(FROM ISLAMIC PERSPECTIVE)**

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ABSTRACT

This research study explains that if a woman wants to start a business, she can do business because Islam also advises to live under self-help, so any woman who wants to start a business, she can do this but according to Islamic principles. Providing training, financial support and guidance is very important for starting a business. So that she can understand the nuances of business. Therefore, awareness of the role of networking, financial literacy and education is essential in promoting women's entrepreneurship, along with the need for equitable access to capital and technology. Furthermore, this study highlights the need for continued collaborative efforts by Islamic communities, governments, and organizations to advance gender equality, diversity, and inclusion so that women can advance in the business arena as well as men. She be able to support herself and her family.

The ultimate objectives of women's empowerment via entrepreneurship with Islamic influences are to enhance economic independence and preserve moral values derived from Islamic teachings. Because of its specialised sector, this study project may provide new academics and researchers with relevant material.

Keywords: Empower Women, Entrepreneurial Skills, Islamic teachings



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INNOVATIVE APPROACHES TO INTERFAITH DIALOGUE

(A RESEARCH REVIEW)

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ABSTRACT

This abstract looks into modern and creative approaches of developing interfaith relationships to further understanding and cooperation between people of various religious affiliations. Life keeps changing dynamically in our world hence traditional approaches often pose challenges and call for the need to look at more innovative strategies.

From this research work, it is clear that technology like virtual reality and online platforms are used to enable inclusive and accessible interfaith discussions. Additionally, it critically review the role of arts and culture in studying impacts because creative expressions have been strong to break religious boundaries or put across common values.

Additionally, the abstract focuses on incorporating experiential learning and collaborative projects as successful approaches for developing empathy and mutual respect among participants. The aim of highlighting these successful cases is to foster new initiatives aimed at promoting interfaith harmony amidst a rapidly changing world.

Keywords: Interfaith Dialogue, innovative strategies, religious boundaries



GREEN INNOVATIONS AS A PATH TOWARDS A MORE SUSTAINABLE GLOBAL ECONOMY¹

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Abstract:

In previous years, due to society's increasing concern about climate change, it seems that there has never been more pressure on companies to turn to green innovation as a main means of achieving sustainable development. Companies that have already taken steps towards this commitment are perceived by consumers as responsible and as those that are oriented towards environmental sustainability and improvement of economic and social performance. This strategy attracts new consumers, improves competitive advantage, market position and reduces time and costs of production processes. Therefore, green innovations simultaneously contribute to the preservation of the environment and the development of the economy. In a broader sense, a country that is committed to innovation as a means of enabling sustainable development can strengthen its international position and build an image of itself as innovative and environmentally friendly. Among the green innovations most represented on the market are photovoltaic cells for converting sunlight into energy, windmills (which generate energy from the wind), electric cars, green architecture, etc. Such innovations promote economic growth and have the role of reducing carbon emissions as well as redefining waste management and the use of renewable resources, thus reducing the negative effects that people have on the planet. The increasing scarcity of resources due to global economic expansion has forced countries to focus more strongly and decisively on sustainable development. The global economy can collectively drive the positive change needed to protect our planet for future generations by supporting and investing in these technologies.

Keywords: Green innovations, Sustainability, Global economy

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INTRODUCTION

As people become more conscious of the effects of climate change, modern society is attempting to modify its way of life to promote sustainable development in both the corporate and environmental spheres (Baltezarević et al., 2022). Green technologies, sometimes referred to as clean technologies or environmental technologies, are a variety of goods, methods, and procedures made with the least amount of adverse effects on the environment in mind while yet offering sustainable solutions. Green technology can also refer to the use of environmentally friendly fuels or clean energy sources like wind or solar power. In the end, it comes down to figuring out how to save the environment and lessen damage to wildlife (Chomsky, 2023).

The company's support for green innovation is demonstrated by its attention to social expectations and the pressure it faces from stakeholders who are willing to take on responsibility but who also have a big influence on social expectations, such as awareness of the opportunity to use sustainability in the environment (Lee et al., 2018). Modern businesses must respond promptly and adequately to all obstacles in order to maintain a competitive position in the market (Baltezarević et al., 2015). A growing awareness of environmental issues has prompted several nations, particularly in the energy transformation sector, to build a green economic growth infrastructure for resource and environmental protection (Khan, 2020). To achieve routes to green growth, green technological innovation is necessary. One example is the utilization of both renewable and non-renewable energy. These initiatives are predicated on the idea that environmental technology continuously drive economic growth and environmental sustainability at the county level (Gali et al., 2020).

It is predicted that the economic costs of climate change would account for 2–10% of the world's GDP. Global economies and communities are impacted by ecosystem deterioration. Low-income nations and areas will be most severely affected because they are frequently the ones that contributed the least to the issues. Between 32 and 132 million people are predicted to live in poverty by 2030 as a result of climate change alone (WRI, 2023). The governmental and corporate sectors have come to understand in recent years how critical it is to promote wider social development by looking out for marginalized communities, their workers, and the environment (Baltezarević - Baltezarević, 2020). In the coming generation, technology and the benefits it can provide to people and organizations equally will remain crucial (Safieddine - Baltezarević, 2016).



GREEN INNOVATIONS: THE PURSUIT OF CREATIVE SOLUTIONS TO PROMOTE THE GLOBAL SUSTAINABILITY

Innovation may be defined as the process of developing and applying creativity in order to meet consumer tastes and demands by creating something new or enhanced (Kahn, 2018). Innovation enables organizations to quickly enter and expand into new markets. Successful innovation involves a combination of vision, passion, excitement, energy, and hard effort to turn innovative concepts into action (Babu-Pinstrup - Andersen, 2007).

Green innovation has emerged as a critical strategic instrument for achieving effective sustainable development (Weng at al., 2015). It comprises the creation of a regenerative economy based on principles of recycling, repair, reconditioning, and reuse (Millar et al., 2019). This innovation is a part of the whole business cycle, meaning that it affects the creation, manufacturing, distribution, and final use of commercial goods, all of which primarily support environmental sustainability (Takalo - Tooranloo, 2021). There has never been a stronger need to strike a balance between innovation and sustainability as the world deals with technology and environmental issues (Lee et al., 2022). Studies have indicated that companies that are actively involved in green innovation typically demonstrate a stronger dedication to environmental sustainability goals (Gadekar et al., 2022).

Research & development expenditures for developing green technology are frequently high, and breaking through technological obstacles can be a challenging process (Yuan et al., 2022). Green innovation and sustainability demand businesses to think about the social impact of their actions in addition to the financial gain (Kim, 2018). These innovations can take many different forms at the individual company level. These include the creation of new or improved institutional arrangements, processes, marketing strategies, organizational structures, and products and services that have a lower environmental impact than alternatives (OECD, 2010). The global market for sustainability and green technologies is expected to expand between 2022 and 2030. This market was valued at approximately 13.76 billion US dollars in 2022. It is anticipated to reach its peak in 2030 at around 62 billion US dollars, growing at a compound annual growth rate of 20.8% between 2023 and 2030 (Statista, 2023).

Three categories apply to green innovation. First, green innovation that reduces a business's environmental effect by recycling and reusing products. Secondly, green innovation that addresses the environmental concerns of the company by reducing the use of hazardous materials. The final category is green innovation, which creates products that have positive effects for the environment and employs efficient procedures while consuming less energy or resources (Mishra, 2021). Green innovation improves economic and



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social performance (by reducing waste, costs, and other inefficiencies), attracts new customers (66 percent of respondents are willing to pay more for sustainable products, according to the Nielsen Global Corporate Sustainability Report), reduces manufacturing time and costs, finally, improves market position and gives them an advantage over their competitors (Ecocation, 2023). Additionally, green innovations can be further divided into four main groups: green products, green marketing, green processes, and green management. These categories are focused on creating an eco-friendly environment, reducing energy consumption and increasing resource efficiency, managing pollution emissions, recycling waste, enhancing organizational performance, and offering a pollution-free environment to society on a large scale (Seman et al., 2019). When green patent applications are doubled annually, real economic growth increases by 4.8 percentage points, but non-green patent applications only increase by 3.4 percentage points annually. Thus, it can be said that green investments have the potential to simultaneously benefit the economy and the environment (KPMG, 2021). The economic benefits of green innovation are mostly realized through greater investment in the early years. Cheaper energy and more energy efficient industrial methods will lead to additional growth gains over time. Most crucially, they result from less global warming and fewer (and less costly) climatic calamities (Hasna et al., 2023). Therefore, a nation must be perceived as innovative and open to modifying its market resources in order to meet societal demands if it hopes to strengthen its position in the international marketplace (Rosenzweig, 2017).

It is consequently imperative that businesses think about their operational management from the standpoint of long-term growth. Companies are pursuing sustainable growth as a means of addressing stakeholder concerns. Due to demand to develop sustainable processes in an environmentally sustainable way in order to stay competitive in the markets, a comparatively higher number of companies are emphasizing green innovation (El-Kassar - Singh, 2019). There is no shortage of instances where environmentally beneficial green technology are being implemented. Solar energy, which uses photovoltaic cells to turn sunlight into power, is one of the most well-known examples. A further popular instance that contributes to lowering carbon emissions and dependency on fossil fuels is the electric automobile (Chomsky, 2023).

Environmental standards and sustainable development should be ingrained in companies' corporate culture, according to stakeholders who have harshly condemned them on these matters (Sodhi - Tang, 2018). While there is great potential for greater sustainability through green innovation, the process is complicated and full of unknowns because it is not always clear how to match operations within and between organizations to support green innovation (Afeltra et al., 2021). A strategy that benefits stakeholders over the long run is corporate sustainability. Using this method, a business strategy that incorporates the ethical, social, environmental, cultural, and economic domains is put into practice (Wüstenhagen, 2008). The goal of



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sustainability as a social objective is to achieve triple bottom line performance: profit, people, and the environment (Cruz - Marques, 2014). Benefits from corporate sustainability include less of an impact on the environment, financial gains, improved government relations, enhanced brand loyalty, increased risk-management skills, increased technology and innovation skills, and easier hiring (Ameer - Othman, 2012).

By revolutionizing energy generation, redefining waste management, and utilizing renewable resources, green innovations are changing the planet. These innovations create new avenues for economic growth while simultaneously lessening the negative effects of human activity on the environment. We are getting closer to a future that is more sustainable and greener as people, organizations, and governments adopt sustainable practices more and more (Rekart, 2023).

CONCLUSION

Unconscionable industrial development in many regions of the world, as well as human activities, have contributed over many years to the disruption of natural balances and to climate change. These negative changes caused general concern and increased pressure on companies and countries to opt for clean technologies and find creative solutions in their production processes. Green innovations as a means of achieving sustainable development are gaining more and more importance. Such innovations include finding alternative solutions for the production of electricity (such as solar or wind energy), electric cars or the construction of green buildings, which contribute to the preservation of the natural environment and economic development. On the other hand, companies that decide to introduce such innovations in their business, even though they are faced with many implementation difficulties, will have great benefits that will be reflected in new customers and improved loyalty, because they will be perceived as innovative and as those who care about the protection of the natural environment, and therefore also about people's health. However, in order for such initiatives to have a global effect, international cooperation and a significant number of countries that would participate in investing in such a process are needed. In addition, countries that would opt for green innovations would build a better international market position and a reputation as someone who cares about nature conservation, and above all, they would be a link in the chain that will leave a healthy environment at the disposal of future generations.



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REVOLUTIONIZING CONSTRUCTION MANAGEMENT: THE ROLE OF DRONES IN ENHANCING EFFICIENCY AND SAFETY

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Abstract :

Amidst technological advancements reshaping industries, the construction sector leads the charge in embracing change. Drones or the Unmanned Aerial Vehicles (UAVs), more than just flying gadgets, are revolutionizing how construction projects are managed. This paper delves into their crucial role within construction management. Drones are catalysts for cost-effective, efficient, and safe construction processes. They collect real-time data, conduct site inspections, and enable precise surveying and monitoring, significantly boosting productivity and accuracy. Their integration reduces costs, streamlines operations, and expedites decision-making through rapid aerial inspections. Additionally, the adaptability of drones to various environmental conditions ensures their applicability across diverse construction settings, including inaccessible or hazardous terrains, augmenting their role in ensuring comprehensive project coverage. As a result, their integration into construction management practices marks a fundamental shift, ushering in an era where data-driven insights, proactive risk management, and streamlined operations converge to redefine the benchmarks of success within the construction landscape. Ultimately, the ongoing evolution and refinement of drone technologies are poised to continually revolutionize and optimize construction management practices, heralding a future where efficiency, safety, and innovation seamlessly intertwine within the industry.

This paper examines the integration of drones within construction management, highlighting their pivotal role in enhancing productivity, reducing costs, improving safety measures, and heralding a new era of efficiency in the construction industry.



1. INTRODUCTION :

In the dynamic landscape of the construction industry, effective management stands as the cornerstone determining project success. Management orchestrates the intricate symphony of tasks, resources, and stakeholders, pivotal in delivering projects on time, within budget, and meeting quality standards.

The importance of management in construction cannot be overstated. It serves as the compass guiding project execution, from conception to completion. Efficient management ensures seamless coordination among multidisciplinary teams, optimizing resource allocation, and fostering a cohesive workflow. It promotes strategic planning, risk mitigation, and adherence to regulatory frameworks, safeguarding projects against pitfalls that may derail progress.

However, despite its significance, the construction sector grapples with multifaceted challenges in management. Among these challenges lies the complexity of project dynamics the interplay of time constraints, budget fluctuations, and evolving scope requirements. Managing these variables demands adeptness in adapting to changing conditions while maintaining equilibrium among project parameters.

Furthermore, the industry often contends with communication gaps and siloed information, hindering efficient decision-making and collaboration. Inadequate technological integration, resistance to innovation, and inconsistent adoption of best practices exacerbate management woes, impeding the industry's full potential.

Another critical challenge is the persistent issue of sustainability and environmental impact. Management practices must evolve to integrate sustainable methodologies, navigate stringent environmental regulations, and address societal expectations for eco-friendly construction practices.

In essence, while management remains the linchpin for construction success, addressing the inherent challenges demands a paradigm shift. Embracing technological advancements, fostering a culture of innovation, promoting interdisciplinary collaboration, and prioritizing sustainability can transform management approaches, paving the way for a more efficient, resilient, and impactful construction industry.

Various advanced sensing and information technologies have been developed and implemented in the construction sector to improve construction performance in terms of safety, quality, productivity, and cost. (1) Among the myriad technological advancements shaping construction, our focal point revolves around the (UAVs), in construction management. Their integration represents a revolution in traditional management practices.

Drones according to the Cambridge Dictionary are defined as aircrafts that do not have a pilot and are controlled by ground operators [**Cambridge Dictionary**].

Compared to the previous year, the use of drones in construction increased by >200% in 2018, and the trend continues based on statistics from 180 countries. Despite the worldwide economic impact of the pandemic, 88%

of worldwide drone users in the construction industry intend to grow or maintain investment in drone technology in 2021. (1)

Drones play a pivotal role in enhancing communication, a critical aspect in construction sites. They provide comprehensive information crucial for construction activities through photos, maps, and data collection.

2. METHODS :

In this paper, we propose the use of drones for four specific purposes, all geared toward accomplishing the primary goal of effective management of construction projects.

2.1. The delivery of construction materials :

Drones have proven their worth in the speedy delivery operations of the e-commerce landscape. (2) This success prompts a question: why not harness this remarkable capability in the realm of construction management, especially in areas deemed dangerous or difficult to access? Picture this: a scenario where materials need urgent transportation to a construction site situated in a hazardous zone. Drones could be the answer, swiftly navigating these challenging environments, ensuring timely delivery while eliminating potential risks to human workers. Moreover, their versatility extends beyond material transport alone. These aerial wonders could efficiently deliver crucial documents, plans, or urgent supplies to any corner of a construction project.

Imagine the significant time saved by swiftly transporting materials to remote or hazardous construction sites, circumventing delays caused by accessibility issues. This time-saving aspect translates directly into cost-effectiveness. Swift deliveries mean streamlined operations, reducing expenses associated with project delays or extended on-site work hours. The integration of drones into construction management logistics has the potential to be a game-changer, not just in saving time but also in optimizing budgets, ensuring smoother operations, and ultimately, enhancing project outcomes.

2.2. Project monitoring :

Drones utilized for project monitoring introduce a distinct capability, the capacity to supervise and administer sites from a distance, particularly in areas posing significant risks or dangers. A compact and cost-effective drone equipped with a camera was employed to identify instances of working at heights that violated safety regulations. This particular UAV was chosen for its maneuverability in open spaces and user-friendly operation through a mobile phone or tablet application. (3)

2.3. Transferring information :

(UAVs) can be used to swiftly and efficiently transfer crucial information and other data among various teams on-site. For instance, delivering reports, maps, or daily updates to engineering or administrative teams.

2.4. Risk management :



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Drones can assist in overcoming potential site issues, such as identifying collapses or potential structural problems through regular aerial surveys, enabling engineering teams to take early corrective actions.

3. RESULTS AND DISCUSSION:

By incorporating the strategies discussed earlier, a robust project management framework emerges, allowing for the successful achievement of cost, schedule, and performance objectives. The comprehensive utilization of drone technology in logistics, enhanced communication through aerial oversight, and the strategic use of drones for remote site management, especially in high-risk areas, converge to create an optimized system. This holistic approach not only streamlines operations but also elevates project efficiency, consistently meeting or surpassing predetermined targets for costs, schedules, and overall performance.

4. CONCLUSION :

In conclusion, the integration of drones in construction management has emerged as a transformative force, revolutionizing project oversight, efficiency, and safety. Through their aerial perspectives and advanced capabilities, drones offer a multifaceted approach, enabling real-time data collection, precise mapping, and enhanced decision-making. Their utilization streamlines workflows, mitigates risks, and optimizes resource allocation, ultimately fostering a new era of construction project management. As technology continues to evolve, embracing the potential of drones will not only redefine industry standards but also pave the way for unprecedented advancements in the construction landscape.

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FEDERATED LEARNING FOR BRONCHUS CANCER DETECTION USING TINY MACHINE LEARNING EDGE DEVICES

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Abstract

In deep learning, acquiring sufficient data is crucial for making informed decisions. However, due to concerns regarding security and privacy, obtaining enough data for training models in the era of deep learning is challenging. There is a growing need for machine learning (ML) solutions that can derive accurate conclusions from small data while preserving privacy. Smartphones, which are widely used and generate large amounts of data, can serve as an excellent source for data generation. One suitable approach for regularly evaluating real-world data from edge devices is Tiny Machine Learning (TinyML). With the increasing number of edge devices involved in transmitting private data, it's vital to have a method that allows computations to be performed on edge devices and pushed to the edge rather than over the network. Considering these obstacles, the combination of TinyML edge devices and Federated Learning can be applied in the early treatment of Bronchus Cancer. Under the framework of federated learning, local edge devices are trained independently and then integrated into the server without exchanging edge device data. This approach enables the creation of secure models without sharing information, resulting in a highly efficient solution with enhanced data security and accessibility. This article provides a comprehensive discussion of the key challenges addressed in recent literature, accompanied by an extensive examination of relevant studies. Additionally, a novel model based on edge devices and federated learning is proposed.

Keywords: Artificial Intelligence, Federated learning, TinyML, edge device, Internet of things

I. Introduction

The healthcare sector has felt the impact of artificial intelligence, particularly with the advancements in deep learning. These advancements have brought about revolutionary technologies in radiology, including X-rays, ultrasounds, MRIs, and others. Deep learning is commonly used in e-healthcare applications with the goal of improving efficiency, virtual care management, and cancer diagnosis by learning from extensive personalized datasets. To ensure the security and privacy of data, we can utilize tiny machine learning and federated learning to develop a secure model without the need for sharing information.

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According to the World Health Organization (WHO), cancer is the leading cause of death in developing countries [1]. Research shows that bronchus tumors are the fifth most common tumor and can be successfully treated if detected early [2]. However, detecting diseases in bronchus X-rays is a challenging task that requires the expertise of radiologists. The focus on electronic healthcare provides an opportunity to overcome this challenge by using TinyML and federated learning through edge devices. This approach will enable the training of models for researchers and medical practitioners while protecting individual privacy. Moreover, the distributed nature of the local dataset makes it suitable for federated learning using TinyML edge devices. Please see Picture 1 for a visual representation of how data can be shared using TinyML and federated learning.

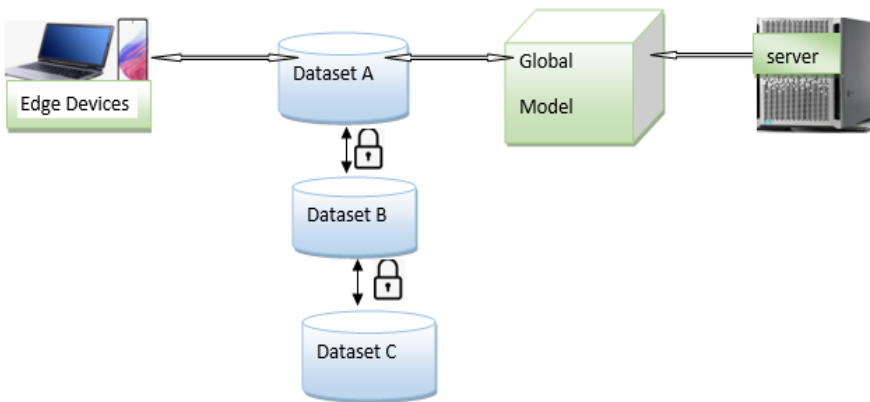
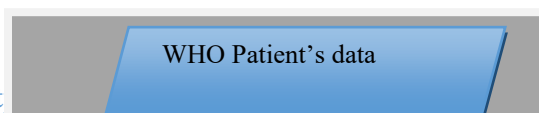


Figure1: Federated learning using TinyML edge device.

Even though many imaging centers have extensive imaging databases, many of the images are unlabeled, making it impossible for the model to learn. Every hospital needs a skilled radiologist to manually label the radiographs. As a result, creating a training dataset can take a long time, which is a key stumbling block in the development of AI for medical imaging. Federated learning is used to overcome this challenge by training algorithms across multiple healthcare institutions to generate superior AI models through collaboration. A given algorithm collects labeled patient data from a variety of sources to supplement its learning base and, as a result, improve its ability to detect patients across a large population. In this context, federated learning (FL) has emerged as a promising alternative for developing cost-effective smart healthcare applications that are also more private [3–8]. To offer the primary data and model, we employed the World Health Organization (WHO) as a central server. Figure 2 shows how this model is constructed and how data is transferred.



Result



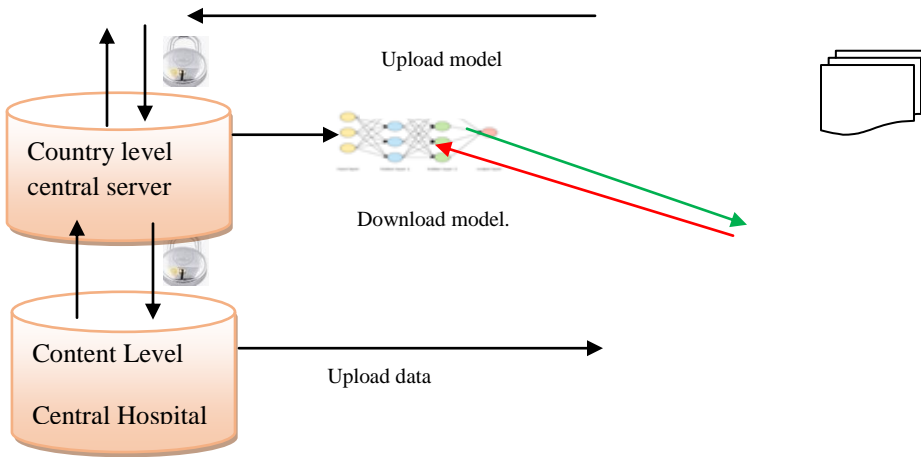


Figure 2: Proposed model for data sharing using TinyML and Federated Learning

FL and TinyML models can update data from different health data clients, including edge devices [9-12], without needing direct access to the local data. This approach reduces the risk of privacy breaches by limiting the exposure of sensitive user information and preferences. Moreover, FL leverages extensive computation and dataset resources from various health data clients to train AI models, resulting in enhanced quality of health data training, including accuracy. This improvement is not achievable with centralized AI approaches that rely on limited data and computational capabilities.

II. Methods

Federated learning can be used to collect massive amounts of data from various locations around the world, remotely train models, and then import the generated results of these models for further usage through IoT and cloud computing technology. However, due to the confidentiality of hospital data, sharing data is a challenge. The proposed model aims to help hospitals adopt a common model to solve problems without sharing local data or having a common model. Another example of federated learning, which is applied in various medical situations, is the segmentation of brain tumors. This task is challenging because the desired training data may not be readily available. To classify the disease, we followed three basic procedures:

- (i) Infection segmentation based on local contrast of symptoms using a local contrast haze reduction (LCHR).
- (ii) Retrieval and merging of geometric features and LBP using a canonical correlation analysis (CCA) approach. At this stage, we introduced noise in the form of irrelevant and redundant information, which is subsequently removed by the Neighborhood Component Analysis (NCA).
- (iii) Subsequently, a multi-class SVM is used to classify the final reduced features.

The presence of noise in the image pixels can lead to incorrect labeling. To address this issue, we utilized LCHR to extract significant features for future segmentation and classification methods. This approach enables us to overcome the challenges of misclassification, improve the model's accuracy, and reduce execution time. To enhance the local contrast of the affected region in the input image, we applied equation 1 to a $p \times p$ frame size.

$$\theta = \alpha * \frac{\mu}{\sigma} \tag{1}$$

α represents constant parameter with values [0, 1] and μ is global mean, σ is the sandardeviation.

The Local mean can be obtained by applying equation 2.

$$\lambda(k) = \frac{1}{m*m} \sum_{x=0}^{m-1} * \sum_{y=0}^{m-1} k(x, y) \tag{2}$$

Where $k(x, y)$ is the original input image, The following formula can be used to measure the standard deviation:

$$\sigma = \sqrt{\frac{1}{m*m} \sum_{x=0}^{m-1} * \sum_{y=0}^{m-1} [k(x, y) - n(k)2]} \tag{3}$$

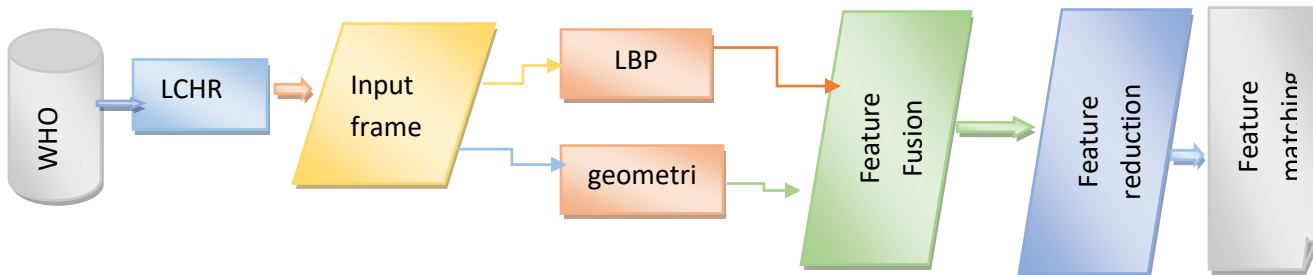


Figure 3: the proposed model for bronchus tumor classification

The complement of the input image $I(p)$'s contrast is generated by

$$I(p) = \theta * (p - n) + \frac{n}{\sigma}, \text{ where } p \in (x, y) \tag{4}$$

Early detection of tumors is beneficial for early treatment. The current study focuses on local data, which makes it very difficult to develop a global model. As a result, an FL-based model is proposed for segmenting images into meaningful portions. For this we followed some major steps:(a), weighted function-based channel selection,

(b) morphological operations refining, and (c) finally mapping and drawing ROI. The main benefit of grouping Lab features is that it allows you to check the information for each individual channel. The extracted features are mapped using cross-entropy activation function.

$$C(fi, \omega) = -\sum_c^c \beta(on, L\omega) \text{LOG}(\beta(n, \omega)) \quad (5)$$

Where probability is represented by β feature represented by f , w_j represent class, represent number of observations. We reduce features into short vectors after extracting them to eliminate redundancy and provide efficient and valuable information. For lung tumor categorization, we used geometric and LBP features. Local Binary Pattern (LBP) is used to examine local texture formation to determine local patterns rather on pixel level. LBP use distinct simple primitives to explain complicated formations in an image [9].

$$\psi p, r = \sum_{p=0}^{p-1} s(gp - gc) 2p * s(x) = \begin{cases} 1 & \text{if } x \geq 0 \\ 0, & \text{otherwise} \end{cases} \quad (6)$$

And we used geometiric featuature to check If there is swelling, we used Geometric characteristics. This will allow us to see if the shape around the problem area has changed.

$$\rho = \sum_{i=0}^n * \sum_{j=0}^m A[i, j], \gamma = \varphi(2l + 2w) \quad (7)$$

Where γ is parameter

To combine various retrieved features, we used feature fusion. We can cut computing costs by merging features. For feature fusion, we used canonical correlation analysis (CCA).

$$\delta = \max \frac{\max * x_a^T x_b \quad C_{abc} x_c}{\sqrt{x_a^T C_{aa} x_a * x_b^T C_{bb} x_b * x_c^T C_{cc} x_c}} \quad (8)$$

C_{abc} covariance matrix between feature set $C_{aa} = AA^T$, $C_{bb} = BB^T$, $C_{cc} = CC^T$ represents covariance within three feature sets. When the matrices within feature sets are nonsingular then CCA can be obtained by computing generalized Eigenproblem

III. Result

In this section, we discuss the steps and parameters that were employed during the computation of the results. In the bronchus tumor classification, we tested the proposed model. During testing, the accuracy and error rate of the proposed model were both taken into account. Many public datasets have been used to compare the performance and effectiveness of the model. We employed various classifiers (quadratic SVM, cubic SVM, cosine KNN, and M-SVM) to validate the performance of our model. Throughout the validation phase, we found M-SVM to be effective. The proposed segmentation result has an overall accuracy of 95.95 percent. The results obtained are listed in tables.

Table 1: Dataset

Disease type	Total images	Training images	Testing images	Cross-fold-validation
Adenocarcinomas	1383	692	691	10
Squamous cell carcinomas	1076	538	538	10
Large cell carcinomas	1180	590	590	10
Bronchial carcinoids	423	212	211	10
Total	4062	2032	2030	40

The data is collected from CT scans and X-ray images. A publicly available dataset is also used for benchmarking purposes. The images are converted into a format suitable for machine learning, and features are extracted through pre-processing techniques. The diverse data collected is annotated to identify tumors, lesions, or abnormalities in the images. The dataset is then divided into training (70%) and testing sets (30%), which are crucial for training and evaluating the performance of the federated learning model.

Table 2: Classification results using CCA based features fusion.

Method	Sensitivity (%)	Specificity (%)	Precision (%)	AUC	FPR	Accuracy (%)
ESD	92.35	93.46	95.00	0.98	0.0312	92.03
Quadratic SVM	93.25	95.86	95.10	0.99	0.0312	94.22
Cubic SVM	94.55	96.14	95.12	0.99	0.0312	93.45
Cosine KNN	90.50	89.99	90.99	0.97	0.0350	92.02
M-SVM	94.75	95.00	95.11	0.99	0.0300	95.38

Table 2 shows the overall performance of the model in detecting bronchus cancer using CCA-based feature fusion. The model achieved an accuracy level of 95.38%.

Table 3: proposed classification after NCA based feature reduction.

Method	Sensitivity (%)	Specificity (%)	Precision (%)	AUC	FPR	Accuracy (%)
ESD	94.00	94.19	94.98	0.98	0.0312	94.99
Quadratic SVM	94.52	94.49	94.95	0.98	0.0312	93.90
Cubic SVM	93.65	93.89	94.00	0.98	0.0200	92.95
Cosine KNN	89.00	89.00	89.99	0.96	0.0399	89.89
M-SVM	95.99	96.00	96.00	0.99	0.0300	95.95

Table 3 presents the overall performance of the model utilized for bronchus cancer detection through labeling. The model achieved an accuracy rate of 95.95% by implementing NCA-based feature fusion, surpassing the accuracy achieved with CCA.

Table 4: confusion matrix for NCA after based reduction approach.

Adenocarcinomas	91	9		
Squamous cell carcinomas	8	92	1	1
Large cell carcinomas	0	1	99	1
Bronchial carcinoids	1	1	0	98
	Adenocarcinomas	Squamous cell carcinomas	Large cell carcinomas	Bronchial carcinoids

Table 4 presents the results obtained from NCA. The rows in this table correspond to the actual class labels, while the columns represent the predicted class labels. The matrix displays the counts of instances for each combination of true and predicted classes. The diagonal line running from the top left to the bottom right represents the correct predictions (true positives), while the elements outside the diagonal represent misclassifications. This confusion matrix provides a comprehensive understanding of the classification model's performance across different classes.

IV. Conclusion

The lack of diagnostic tools in developing countries has a significant impact on people's lives. Therefore, it is critical to diagnose illnesses early and provide accessible and affordable treatments. We have developed an automated approach for detecting lung tumors using saliency assessment and prominent feature selection. Various features are retrieved, and a CCA-based fusion strategy is used to select the best features using the NCA method. Compared to existing approaches, we used an M-SVM classifier for classification and achieved an accuracy of 95.95 percent. We also calculated the computing cost of the proposed system, and the cost was minimized after the selection procedure. However, the suggested approach has several drawbacks, such as reduced accuracy for complex images. We plan to implement a more robust system in the future.

CONFLICT OF INTEREST

The corresponding author confirms that there are no conflicts of interest, and that no organization has sponsored this work. The author personally covered all expenses.

DATA AVAILABILITY STATEMENT

The datasets from the current study are not publicly available due to data privacy. However, they can be obtained from the corresponding author upon reasonable request once the ownership of the data is approved.



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MAINTENANCE MANAGEMENT PRACTICES IN THE OIL AND GAS INDUSTRY: A PRACTICAL REVIEW

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ABSTRACT

This research investigates the utilization of Computerized Maintenance Management Systems (CMMS) in maintenance management within the context of an oil and gas company. The study aims to assess the impact of CMMS on optimizing maintenance processes, improving asset reliability, and enhancing overall operational efficiency. Through a comprehensive review of existing literature, case studies, and interviews with industry professionals, the research examines the implementation challenges and benefits associated with CMMS adoption in the complex and dynamic environment of the oil and gas sector. The investigation delves into the role of CMMS in facilitating preventive and predictive maintenance strategies, evaluating its effectiveness in reducing unplanned downtime, enhancing equipment lifespan and asset performance predictability. Additionally, the study explores the integration of CMMS with other enterprise systems to ensure seamless communication and coordination across various operational facets. Potential hurdles, such as initial implementation costs and workforce training, are scrutinized to provide a balanced assessment of the practicality and viability of CMMS adoption in the oil and gas maintenance landscape. The findings of this research contribute valuable insights to industry practitioners, shedding light on best practices and potential areas for improvement in leveraging CMMS for maintenance management in oil and gas exploration and production operations.

Key words: Computerized Maintenance Management Systems (CMMS); equipment lifespan; machine learning; asset performance predictability; unplanned downtime, predictive maintenance

INTRODUCTION

Maintenance management plays a crucial role in enhancing production efficiency and overall performance within an organization. It involves the systematic planning, coordination, and execution of maintenance activities to ensure the reliability and longevity of equipment, machinery, and facilities [1]. By adopting effective maintenance management practices, businesses can minimize downtime, reduce operational costs, and optimize production processes. Many companies already regard maintenance management as a vital part of production activities. Excellent maintenance management may reflect well on various sectors of a company, and even boost companies to the extent that, through planned maintenance, they will obtain a competitive advantage [2].

Regular maintenance activities, such as preventive and predictive maintenance, help identify and address potential issues before they escalate into costly breakdowns. This proactive approach not only extends the lifespan of equipment but also ensures consistent performance, leading to increased productivity. Well-maintained assets operate more efficiently, resulting in higher output and lower energy consumption [13].

Maintenance management also contributes to improved safety standards by identifying and rectifying potential hazards. A well-maintained working environment reduces the risk of accidents, protecting both personnel and assets. Additionally, adherence to regulatory compliance and industry standards is facilitated through systematic maintenance practices. Effective maintenance management is a cornerstone of successful production and performance optimization. It fosters a stable and reliable operational environment, enhances equipment efficiency, and ultimately contributes to the overall success and sustainability of an organization [12].

AIM/OBJECTIVE OF STUDY

This paper presents the findings of an investigation on the application of a **Computerised Maintenance Management System (CMMS)** in managing maintenance planning and scheduling at Grafen Integrated Oilfield Services Limited (GIOS), an indigenous production firm.

GENERAL OVERVIEW ON TYPES OF MAINTENANCE ACTIVITIES

Maintenance in the oil and gas industry is a critical aspect that ensures the reliability, efficiency, and safety of various equipment and facilities. It involves a set of activities aimed at preventing equipment failures, reducing downtime, and extending the lifespan of assets. Maintenance in the oil and gas sector can be broadly categorized into three main types: preventive maintenance, predictive maintenance, and corrective maintenance [11].

Maintenance is a combination of all technical, administrative and managerial actions during the life cycle of an item intended to keep it in or restore it to a state in which it can perform the required function [3]. Previously, maintenance has been supposed as an expense account with performance measures developed to track direct

costs or surrogates such as the headcount of tradesmen and the total duration of forced outages during a specified period [10].

- (i) Preventive maintenance is a proactive approach that involves routine inspections, lubrication, cleaning, and replacement of components before they fail. This type of maintenance aims to prevent equipment breakdowns and is typically scheduled based on time, usage, or predefined performance thresholds. In the oil and gas industry, preventive maintenance is crucial for ensuring the continuous operation of production facilities and minimizing the risk of unplanned shutdowns [9].
- (ii) Predictive maintenance relies on advanced technologies such as sensors, data analytics, and condition monitoring to assess the health of equipment in real-time. By analysing data trends and performance indicators, maintenance teams can predict when equipment is likely to fail and schedule maintenance activities accordingly. This approach helps optimize maintenance schedules, reduce costs, and minimize downtime by addressing issues before they escalate [7].
- (iii) Corrective maintenance, also known as breakdown or reactive maintenance, involves addressing issues after they occur. While this type of maintenance is generally less desirable due to the potential for unplanned downtime and increased repair costs, it is sometimes unavoidable. Corrective maintenance is typically employed for unexpected failures or emergencies that cannot be predicted or prevented through other maintenance strategies [9].

In the oil and gas industry, preventive and predictive maintenance are particularly emphasized to ensure the reliability of critical equipment, such as pumps, compressors, pipelines, and drilling rigs. Regular inspections, equipment testing, and data analysis play a crucial role in identifying potential issues and addressing them before they lead to costly failures [14].

Furthermore, the implementation of a computerized maintenance management system (CMMS) has become common in the oil and gas sector. CMMS enables organizations to plan, track, and manage maintenance activities efficiently. It helps in optimizing resource allocation, reducing downtime, and improving overall operational performance [8].

The maintenance organisation is confronted with a wide range of challenges that include quality improvement, reduced lead times, set-up time and cost reductions, capacity expansion, managing complex technology and innovation, improving the reliability of systems and related environmental issues [6] and must have a proper plan [4].

RESEARCH METHODS

An intensive case study was conducted in July 2021, and one of the authors recently had undergone industrial attachment and spent almost six months, focusing on productivity improvement activities at the case study

company. Observation, focus group discussion and simulation application were used to collect the primary data that related to CMMS applications.

RESULTS

Computerized Maintenance Management Systems (CMMS) play a crucial role in optimizing maintenance processes in the oil and gas industry. These systems help manage assets, streamline work orders, and improve overall operational efficiency. Below is a step-by-step discussion of the use of CMMS in the oil and gas sector:

1. Data Input and Asset Management:

Data input and asset management are foundational steps in the effective utilization of Computerized Maintenance Management Systems (CMMS) in various industries, including the oil and gas sector. This process involves capturing and organizing information about assets to ensure that maintenance activities are planned, executed, and documented efficiently. Below is a closer look at the key aspects of data input and asset management for CMMS:

(a) Asset Identification and Classification:

The first step is to identify and classify all assets within the organization. In the oil and gas industry, this can include a wide range of equipment such as pipelines, drilling rigs, pumps, compressors, and safety devices. Each asset is assigned a unique identifier, and its classification is determined based on factors such as criticality, function, and maintenance requirements.

(b) Data Collection and Input:

Relevant data for each asset is collected and entered into the CMMS. This data may include technical specifications, manufacturer details, installation date, warranty information, and historical maintenance records. The accuracy and completeness of this information are crucial for effective maintenance planning and execution.

(c) Hierarchy and Relationships:

CMMS organizes assets in a hierarchical structure, reflecting their relationships and dependencies. For example, a pumping station may be part of a larger system that includes pipelines and storage tanks. Establishing these relationships in the CMMS helps in understanding how failures or maintenance activities on one asset may impact others in the system.

(d) Criticality Assessment:

Assets are often assessed for their criticality to operations. Criticality is determined by considering factors such as the impact of failure on safety, production, and the environment. The CMMS may use this criticality assessment to prioritize maintenance activities, ensuring that the most critical assets receive appropriate attention.



(e) Condition Monitoring Integration:

For certain assets, especially those in continuous operation, integrating condition monitoring systems with the CMMS is essential. Condition monitoring involves using sensors and data analytics to assess the health of equipment in real-time. Data from condition monitoring systems is fed into the CMMS, enabling predictive maintenance strategies and timely interventions based on the actual condition of assets.

(f) Documenting Workflows and Procedures:

CMMS allows organizations to document standard operating procedures (SOPs) and workflows related to asset management and maintenance. This documentation ensures consistency and compliance with industry regulations. Workflows may include procedures for asset inspections, routine maintenance tasks, and responses to equipment failures.

(g) Regulatory Compliance:

In industries like oil and gas, compliance with regulatory requirements is crucial. CMMS helps in managing and documenting compliance-related information, such as inspections, certifications, and adherence to safety standards. Having this data readily available supports audit processes and ensures that the organization meets industry regulations and standards.

(h) User Training:

Adequate training of personnel responsible for data input and asset management is essential. Users should understand how to navigate the CMMS interface, input data accurately, and utilize the system for effective asset management. Training programs may cover aspects such as data integrity, updating asset information, and utilizing CMMS features for optimized asset performance.

(i) Data Security and Access Control:

Considering the sensitive nature of asset data, CMMS implementations in the oil and gas industry prioritize data security. Access to the system is controlled, and user roles are defined to ensure that only authorized personnel can input, modify, or view specific information. Regular security audits and updates are performed to safeguard against potential cyber threats.

(j) Data Validation and Quality Assurance:

Organizations implement processes for ongoing data validation and quality assurance to ensure the accuracy and reliability of the information stored in the CMMS. Regular audits and reviews are conducted to identify and rectify any discrepancies, improving the overall reliability of the CMMS data.



2. Preventive Maintenance Planning:

Once asset data is in the CMMS, preventive maintenance schedules are established. These schedules are based on various factors, including equipment manufacturer recommendations, industry best practices, regulatory requirements, and historical performance data.

The system allows for the creation of maintenance plans that outline tasks such as routine inspections, lubrication, calibration, and part replacements. Maintenance intervals can be set based on time, usage, or predefined performance thresholds.

3. Work Order Generation:

Work order generation is a crucial component of the maintenance management process, facilitated by Computerized Maintenance Management Systems (CMMS). It involves the systematic creation of instructions or directives that outline specific maintenance tasks to be performed on assets within an organization. In the context of the oil and gas industry, where the reliability of equipment is paramount, effective work order generation is essential for ensuring the continuous operation of critical infrastructure.

The process of work order generation typically follows a structured workflow which is given below:

(a) Identification of Maintenance Needs:

Maintenance needs are identified through routine inspections, condition monitoring, or triggered by predefined schedules. CMMS continuously monitors asset health and triggers work orders based on predefined criteria or when issues are detected.

(b) Task Specification:

Each work order specifies the nature of the maintenance task, whether it is preventive, predictive, or corrective. It includes details such as the asset to be serviced, the type of maintenance required, and any specific instructions or procedures to follow.

(c) Priority Assignment:

Work orders are often categorized by priority levels. The priority is determined based on factors such as the criticality of the asset, safety considerations, and the urgency of the maintenance task. This helps maintenance teams prioritize and allocate resources efficiently.

(d) Resource Allocation:

Once work orders are generated, CMMS assists in allocating the necessary resources, including skilled technicians, equipment, and materials. The system considers factors such as technician availability, skill sets, and workload to optimize resource allocation.



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(e) **Scheduling:**

CMMS allows for the scheduling of work orders based on various criteria, such as equipment availability, production downtime windows, and compliance with regulatory requirements. This ensures that maintenance activities are performed at optimal times to minimize disruption to operations.

(f) **Notification and Dispatch:**

Maintenance teams are notified of their assigned work orders through the CMMS, often via email, mobile notifications, or within the system itself. Dispatching work orders promptly ensures that technicians have the necessary information and can begin tasks without delay.

(g) **Real-Time Updates:**

Technicians use CMMS to provide real-time updates on the progress of maintenance tasks. They can log details such as work performed, parts replaced, and any unexpected issues encountered. This real-time data entry enhances communication and transparency between field technicians and the central maintenance team.

(h) **Documentation and Compliance:**

CMMS captures comprehensive data related to each work order, serving as a valuable documentation tool. This documentation is crucial for compliance with industry regulations, auditing purposes, and continuous improvement initiatives.

Effective work order generation within CMMS not only streamlines maintenance processes but also contributes to improved asset reliability, reduced downtime, and optimized resource utilization. The seamless integration of work order generation with other CMMS functionalities supports a proactive approach to maintenance management in the dynamic and critical environments of the oil and gas industry.

4. Assignment and Dispatch of Work Orders:

Once work orders are generated, they are assigned to specific maintenance teams or technicians based on skill sets, availability, and workload. CMMS facilitates efficient work order assignment to ensure that the right personnel with the appropriate expertise handle each task. The system can also automate the dispatch process, notifying technicians of their assignments and providing them with all the necessary details to carry out the maintenance tasks effectively.

5. Execution of Maintenance Tasks:

Technicians use the information provided in the work orders to perform maintenance tasks. They may use mobile devices or tablets connected to the CMMS to access real-time data, update work order status, and record observations. During this phase, CMMS allows technicians to log details about the work performed,

including any issues encountered, parts replaced, and the time taken to complete the task. This real-time documentation enhances transparency and contributes to the accuracy of maintenance records.

6. Inventory Management:

CMMS helps manage inventory by tracking the usage of spare parts and consumables during maintenance activities. When technicians use materials from the stock, the system automatically updates inventory levels. This feature assists in maintaining optimal inventory levels, preventing stockouts or overstock situations. Automated alerts can be set up to notify personnel when inventory levels fall below a specified threshold, ensuring timely replenishment.

7. Recording and Analysing Data:

CMMS records all data related to maintenance activities, including asset performance, work order completion times, and materials used. This data is valuable for performance analysis and decision-making. Analytics tools within the CMMS allow maintenance managers to assess equipment reliability, identify trends, and make informed decisions about future maintenance strategies. Predictive maintenance models can also be developed based on historical data to anticipate potential failures.

8. Reporting and Documentation:

CMMS generates detailed reports on various aspects of maintenance operations. These reports can include key performance indicators (KPIs), work order history, equipment downtime, and compliance with regulatory requirements. Documentation is crucial for audits, compliance reporting, and continuous improvement initiatives. CMMS facilitates the creation of comprehensive documentation to demonstrate adherence to maintenance standards and regulatory guidelines.

9. Integration with Other Systems:

To enhance overall operational efficiency, CMMS in the oil and gas industry can be integrated with other enterprise systems such as shown briefly below:

(a) Enterprise Resource Planning (ERP)

In the oil industry, Enterprise Resource Planning (ERP) systems serve as integral tools for optimizing operations. These systems seamlessly integrate diverse functions like finance, human resources, procurement, and project management, providing a holistic view of the entire enterprise. For oil companies, managing complex supply chains, large-scale projects, and extensive physical assets is streamlined through ERP, ensuring efficient procurement, inventory control, and asset lifecycle management. ERP systems also aid in navigating stringent regulatory compliance, supporting financial transparency, and enhancing human resource management. The ability of ERP systems to generate and analyze vast amounts of data facilitates informed decision-making, while



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mobile capabilities enable real-time access and collaboration, particularly in remote and challenging operational environments. Ultimately, ERP solutions tailored to the unique demands of the oil sector contribute to heightened efficiency, reduced costs, and improved overall business performance.

Supervisory Control and Data Acquisition (SCADA)

Supervisory Control and Data Acquisition (SCADA) systems play a critical role in the oil industry by providing real-time monitoring and control of remote facilities. In oil companies, SCADA is utilized to oversee and manage processes such as drilling, refining, and pipeline operations. These systems collect and analyze data from various sensors and devices, offering operators a comprehensive view of operational conditions. SCADA enhances efficiency by enabling quick response to anomalies, minimizing downtime, and ensuring the safety and reliability of critical infrastructure. Additionally, SCADA facilitates data-driven decision-making, contributing to optimized production processes and overall operational excellence in the oil sector.

(b) Geographic Information System (GIS)

Geographic Information System (GIS) is pivotal in the oil and gas industry for spatial data management and analysis. In oil companies, GIS integrates geographical and operational data to support decision-making across exploration, drilling, and facility management. It aids in site selection, pipeline routing, and environmental impact assessments by visualizing geospatial relationships. GIS enhances asset management by mapping infrastructure and tracking changes in real-time, optimizing maintenance and risk assessment. Additionally, GIS is crucial for compliance with regulatory requirements and emergency response planning, providing geospatial insights that contribute to efficient and sustainable operations in the dynamic and geographically diverse landscape of the oil and gas sector.

Integration enables seamless data flow between different departments, improving communication, and providing a holistic view of operations. For example, integrating CMMS with SCADA systems allows for real-time monitoring of equipment health.

10. Continuous Improvement and Adaptation:

CMMS provides a platform for continuous improvement by allowing organizations to learn from historical data and adapt their maintenance strategies accordingly. Regular reviews of CMMS data and performance metrics enable organizations to identify areas for improvement, refine preventive maintenance plans, and implement changes to enhance overall efficiency and reliability.

The step-by-step use of CMMS in the oil and gas industry involves comprehensive data management, strategic preventive maintenance planning, efficient work order generation and execution, inventory management, data

recording and analysis, reporting, integration with other systems, and a continuous improvement mind-set. Implementing CMMS in this industry is instrumental in ensuring the reliability, safety, and cost-effectiveness of operations.

CONCLUSION

In conclusion, the research on the use of Computerized Maintenance Management Systems (CMMS) in an oil and gas exploration company underscores the transformative impact of technology on enhancing operational efficiency and asset management. The findings reveal that implementing a CMMS is instrumental in streamlining maintenance processes, reducing downtime, and optimizing resource utilization. The system's ability to schedule and track maintenance activities, manage spare parts inventory, and generate insightful reports fosters a proactive maintenance approach, ultimately extending the lifespan of critical equipment.

Moreover, the research highlights the role of CMMS in promoting data-driven decision-making. The system's capacity to capture, store, and analyse maintenance data provides valuable insights into equipment performance, aiding in predictive maintenance strategies and minimizing the risk of unplanned shutdowns. The integration of CMMS with other enterprise systems fosters a holistic approach to operations, enabling seamless communication and coordination among various departments.

However, challenges such as initial implementation costs, staff training, and system integration complexities should not be overlooked. These aspects require careful consideration during the adoption phase. Despite these challenges, the research underscores that the long-term benefits of CMMS implementation far outweigh the initial hurdles, contributing significantly to cost reduction, regulatory compliance, and overall operational excellence in the dynamic and demanding environment of oil and gas exploration. As technology continues to evolve, embracing CMMS becomes imperative for oil and gas companies seeking sustained success through efficient asset management and maintenance practices.



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TOPOGRAPHY OF SELECTIVE LASER MELTING

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Abstract

It is difficult to refer to industrial 3D printing systems as just "printers." They belong to a distinct industry called additive manufacturing, and the technology they utilize in their designs is called Selective Laser Melting, or SLM for short. The core of this technology is the laser melting of metal powder to a homogenous mass at the precise locations specified by the designer's original, electronically constructed CAD model. Using ultra-thin layers of metal powder melted by lasers, Selective Laser Melting (SLM) technology is an additive manufacturing process that produces three-dimensional objects. Thin, dense, homogenous objects are created by selectively melting thin layers of minute particles with a laser. Metal printing with selective laser sintering (SLM) is a 3D printing technology that makes it possible to print with metal. With this process of printing, the metal powder melts fully, forming a uniform metal structure. This kind of additive printing is one of the technologies involved. The process of layer-by-layer synthesis or raw material build-up yields the finished product. The foundation material for SLM is a unique metal-based powder. By using a focused laser beam to melt the printed area, layers are created. Complex problems in the fields of aerospace, energy, oil and gas, mechanical engineering, metalworking, medical, and jewelry making are solved with SLM printers. When conducting research and experiments, they are also utilized in design bureaus, research institutes, and educational organizations. I will present topography of SLM specimens.



STRUCTURE-BASED DRUG REPURPOSING TO INHIBIT THE DNA GYRASE OF *MYCOBACTERIUM TUBERCULOSIS*

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Short Introduction

Drug repurposing is an alternative avenue for identifying new drugs to treat tuberculosis (TB). Although TB can be cured with anti-tubercular drugs, the emergence of multidrug-resistant and extensively drug-resistant strains of *Mycobacterium tuberculosis* H37Rv (Mtb), as well as the significant death toll globally, necessitate the development of effective drugs to treat TB.

Experiments and Key result findings:

In this study, drug repurposing approach was employed to address this drug resistance problem by screening drugbank database to identify novel inhibitors of the Mtb target enzyme, DNA gyrase. The compounds were screened against the ATPase domain of gyrase B subunit (MtbGyrB47), and the docking results showed Echinacoside, Doxorubicin, Epirubicin, and Idarubicin possess high binding affinities against MtbGyrB47. Comprehensive assessment using fluorescence spectroscopy, SPR, and CD titration studies revealed that Echinacoside as a potent binder against MtbGyrB47. Further, ATPase, and DNA supercoiling assays exhibited IC₅₀ values of 2.1-4.7 μ M for Echinacoside, Doxorubicin, Epirubicin, and Idarubicin. Among these compounds, the least MIC₉₀ of 6.3 μ M and 12 μ M were observed for Epirubicin and Echinacoside, respectively. Hence, our findings indicate that Echinacoside and Epirubicin target mycobacterial DNA gyrase, inhibit its catalytic cycle, and retard mycobacterium growth. Further these compounds exhibits potential scaffolds for optimizing novel anti-mycobacterial agents that can act on drug-resistant strains.

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ELECTRICAL CHARACTERIZATION OF MATERIALS USING HIGH FREQUENCY METHODS

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Summary

Measuring electrical conductivity through high-frequency current involves applying an alternating current to a material and assessing its electrical response. Typically, within the radio frequency range, from a few kilohertz to several megahertz, this method offers a non-destructive means of characterizing materials such as metals, semiconductors, and insulators. One widely used technique is the four-point probe method. This involves positioning four electrodes on the material, with two acting as a current source and the other two measuring voltage. By applying high-frequency current and gauging the voltage response, the material's electrical conductivity can be determined with precision.

Another method, eddy current testing, employs a nearby coil to induce high-frequency currents in the material. The resulting magnetic field generates eddy currents, which, when detected by the same coil, offer insights into the material's electrical conductivity and other properties. The strength and phase of these eddy currents provide valuable information. A crucial concept in this context is complex conductivity, a complex-valued quantity encompassing both electrical conductivity and dielectric properties. Measurement at various frequencies enables the extraction of comprehensive data on a material's electrical and dielectric characteristics across a broad spectrum.

Importantly, high-frequency current measurement is non-destructive and non-invasive. The accuracy and precision of the results hinge on factors like current frequency, electrode or coil geometry, and the material's inherent properties. This method allows for the thorough examination of diverse materials, aiding in the understanding and optimization of their electrical behavior.

Keywords: High Frequency Current, Complex conductivity, Non destructive, Four Probe Method, Eddy current testing.



1. BILSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

ADVANCED COATINGS FOR CORROSION PREVENTION IN FAST REACTOR MATERIALS: A PROMISING PATHWAY FOR ENHANCED PERFORMANCE

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Summary

Fast reactors hold tremendous potential for next-generation nuclear power generation, offering improved fuel utilization and reduced nuclear waste. However, the harsh operating conditions, characterized by high temperatures, corrosive environments, and intense radiation fluxes, pose significant challenges to the materials used in these reactors. Mitigating corrosion-related degradation is crucial to ensure long-term operational safety and reliability. This abstract explores the latest advancements in special coatings for corrosion prevention in fast reactor materials. The incorporation of advanced coatings presents a promising pathway to enhance the performance and lifespan of structural components in fast reactors, while maintaining their mechanical integrity under extreme conditions. The first part of this abstract focuses on the critical requirements for coatings in fast reactors, highlighting the necessity for materials with exceptional corrosion resistance, irradiation tolerance, and thermal stability. Special emphasis is placed on the identification of key corrosion mechanisms encountered in fast reactor environments and the need for tailored solutions to mitigate their detrimental effects. The second part highlights recent breakthroughs in the development and characterization of innovative coating materials specifically designed for fast reactor applications. Key coating technologies, such as advanced ceramics, metal alloys, and hybrid systems, are discussed, with a focus on their unique features and advantages in combating corrosion. Furthermore, novel coating fabrication techniques, including physical vapor deposition, chemical vapor deposition, and sol-gel methods, are presented, offering insights into their suitability for large-scale deployment in fast reactor systems. The final part of the abstract addresses the evaluation and performance assessment of coated materials under relevant operational conditions. Special attention is given to the investigation of corrosion behavior, mechanical properties, irradiation resistance, and long-term stability of coated materials. Experimental results and simulation studies are presented, demonstrating the efficacy of these coatings in mitigating corrosion-induced degradation and preserving material integrity in fast reactors.

Keywords: Fast reactor materials, Corrosion prevention, Advanced coatings, Corrosion behavior, Long-term stability.



EXPERIMENTAL STUDY OF FORCE APPLICATION IN A SIMPLE THREE-STATE TRELLIS

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Abstract:

Force is an essential parameter in material strength, and in solving problems in either simple or complicated trellis. The study of this article based on the demonstration of simple force decompositions, and the distribution of forces in simple bar structures. In addition, three tubes of short, medium and long spacing were used, each of which is triangular angle (60° - 60° - 60° , 45° - 90° - 45° and 30° - 120° - 30°), respectively. In addition, the device (gunt HAMBURG) was used to carry out this test. The results obtained were compared with other reference results.

Key words: gunt HAMBURG, forces, trellis, Experimental study



PREPARATION AND CHARACTERIZATION OF NANOADSORBENTS BY SYNTHESIS OF METAL NANOPARTICLES ON A POROUS SUPPORT

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Abstract

A granular activated carbon enhanced by bimetallic oxides was fabricated by co-precipitation method to remove organic and inorganic pollutants, In this study we prepared two materials from commercial extruded activated carbon well treated and supported by nanoparticles of bimetallic oxides, after doing some preliminary tests like methylene blue index and iodine index on virgin activated carbon and the two prepared materials, the results of these analysis gives an increase in methylene blue index from 220.68mg/g to 276.16mg/g for the first material and a decrease from 220.68mg/g to 215.25mg/g for the second one which leads us to conclude that the meso pore surface of our adsorbent is increased for the first material and remains almost stable for the second one, and let's concern the iodine value gives an increase from 666.38mg/g to 1016.98mg/g and to 740.99mg/g for the first and the second material respectively which means a good increase of the microporosity for the first one compared to the second one. We conclude that we can continue this study to know if this synthesized material can be used to remove organic and inorganic pollutants from wastewater.

Key words : Granular activated carbon, bimetallic oxides, co-precipitation, nanoparticles, methylene blue index, iodine index, microporosity, meso pore surface.



SWEETENING PROCESSES FOR CRUDE OIL

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Abstract:

Crude oil often contains undesirable sulfur compounds, primarily hydrogen sulfide (H₂S) and mercaptans, which contribute to unpleasant odors, corrosivity, and environmental concerns. Sweetening processes aim to remove these sulfurous components, rendering the oil more refined and marketable. This abstract provides an overview of common sweetening techniques employed in the petroleum industry.

1. Chemical Sweetening:

Amine Sweetening: Utilizes amine-based solutions to absorb H₂S from the oil stream. Various amine types offer different absorption capacities and regeneration efficiencies.

Caustic Sweetening: Employs sodium hydroxide (NaOH) or other caustic bases to chemically react with H₂S, forming insoluble sodium sulfide (Na₂S). This method is effective for high H₂S concentrations but generates solid waste.

Doctor Sweetening: Oxidizes mercaptans to disulfides using sodium plumbite (Na₂PbO₂) solution. This process is efficient for light hydrocarbon fractions but has environmental concerns due to lead usage.

2. Physical Sweetening:

Vacuum Stripping: Reduces H₂S content by creating a vacuum environment that encourages its evaporation from the oil. Simple and energy-efficient, but limited to lighter hydrocarbons.

Membrane Separation: Utilizes selective membranes to permeate H₂S from the oil stream, leaving a purified product. Emerging technology with promising environmental benefits.

Adsorption: Employs activated carbon or other adsorbents to capture sulfur compounds physically. Effective for both H₂S and mercaptans but requires regeneration of the adsorbent.

3. Catalytic Sweetening:

Hydrodesulfurization (HDS): Employing catalysts and hydrogen, HDS converts sulfur compounds into hydrogen sulfide and hydrocarbons. Widely used for deeper desulfurization but requires high temperatures and pressures.

4. Emerging Technologies:

Biodesulfurization: Utilizes microorganisms to biodegrade sulfur compounds. Environmentally friendly but lacks the speed and efficiency of conventional methods.

Ionic Liquids: Exploring the potential of ionic liquids for selective extraction of sulfur compounds, offering potential environmental and performance advantages.

Common sweetening methods include:

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- Hydrodesulfurization (HDS): The most prevalent approach, HDS utilizes catalysts and hydrogen to convert sulfur compounds into hydrogen sulfide and hydrocarbons. It offers high efficiency and flexibility for various sulfur types but requires high capital and operating costs.
- Amines-based sweetening: This method employs amine solutions to capture H₂S and mercaptans through reversible chemical reactions. It is energy-efficient and suitable for light oils but can face issues with amine volatility and waste disposal.
- Solid sorbent adsorption: Activated carbon, zeolites, and other adsorbents can selectively remove sulfur compounds from crude oil. This approach is often simpler than amine-based methods but may have lower capacity and regeneration challenges.
- Membrane separation: Emerging technologies utilize membranes to selectively permeate hydrocarbons while rejecting sulfur compounds. This method is energy-efficient and offers potential for low environmental impact but requires further development for large-scale implementation.

The choice of sweetening process depends on several factors:

- Type and concentration of sulfur compounds: Different methods have varying effectiveness against specific sulfur types.
- Crude oil properties: Viscosity, temperature, and other characteristics influence process compatibility.
- Environmental regulations: Emission limits and waste disposal requirements can impact technology selection.
- Economic considerations: Capital and operating costs, along with product quality and yield, play a crucial role.

Future trends in sweetening:

- Advancements in catalysts and sorbents: Development of more efficient and selective materials could improve process performance and reduce costs.
- Integration with other refinery processes: Combined sweetening and refining technologies could optimize resource utilization and energy efficiency.
- Renewable energy sources: Utilizing hydrogen from renewable sources for HDS processes can lower carbon footprint and promote sustainability.

Conclusion:

In conclusion, sweetening processes play a vital role in transforming crude oil into a valuable and environmentally acceptable product. Selecting the appropriate method requires careful consideration of technical, economic, and environmental factors. Continuous research and development efforts are crucial for advancing sweetening technologies towards greater efficiency, sustainability, and environmental responsibility.

The choice of sweetening process depends on factors like sulfur content, oil type, desired sulfur removal level, cost, and environmental regulations. Continuous research and development are aiming to improve existing methods and explore novel technologies for efficient and sustainable sweetening of crude oil.



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Crude oil often contains undesirable sulfur compounds, including hydrogen sulfide (H₂S) and mercaptans, which impart a foul odor and contribute to environmental concerns. Sweetening processes aim to remove these sulfurous components, rendering the oil more marketable and environmentally friendly. This abstract explores various sweetening techniques, highlighting their advantages and limitations.

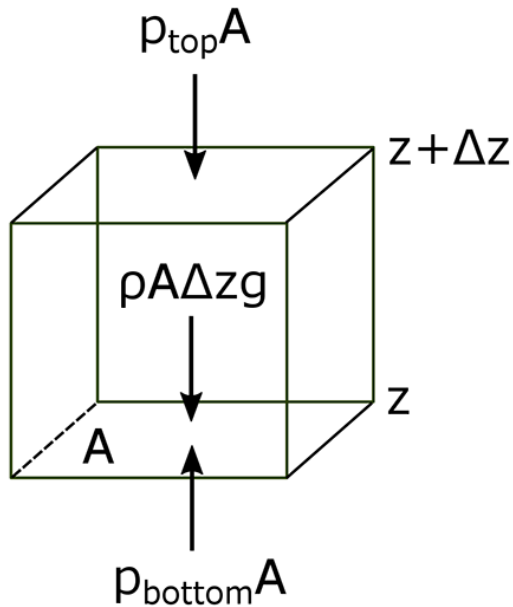
Keywords: Crude oil, Sweetening, Desulfurization, H₂S, Mercaptans, Amine, Caustic, Doctor, Vacuum Stripping, Membrane Separation, Adsorption, HDS, Biodesulfurization, Ionic Liquids.

HYDROSTATIC EQUILIBRIUM IN GRAVITATIONAL AND CENTRIFUGAL FIELDS

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Abstract:

Hydrostatic equilibrium is a fundamental concept in fluid mechanics, describing the state of a fluid at rest when the inward force of gravity is perfectly balanced by the outward force of pressure. This delicate interplay between forces shapes celestial bodies, influences atmospheric pressure, and even governs the flow of fluids in microscopic scales. However, the presence of centrifugal force, arising from rotation, can disrupt this equilibrium, leading to fascinating consequences.



This abstract shows variation between gravitational and centrifugal forces in the context of hydrostatic equilibrium.

The fundamental principles of hydrostatic equilibrium begins by establishing the core equations governing pressure and density variations within a fluid in equilibrium. This sets the stage for understanding the interplay between forces.

The influence of gravity: Gravity, the ever-present sculptor of the universe, exerts an inward pull on every fluid element. We examine how the strength and direction of gravity impact the pressure distribution within a fluid, leading to phenomena like hydrostatic pressure gradients and the spherical shape of celestial bodies.

The emergence of centrifugal force: When a fluid element is in rotation, centrifugal force, an outward force directed away from the rotation axis, comes into play. We investigate how centrifugal force counteracts gravity, potentially distorting the fluid's shape and influencing its internal pressure profile.

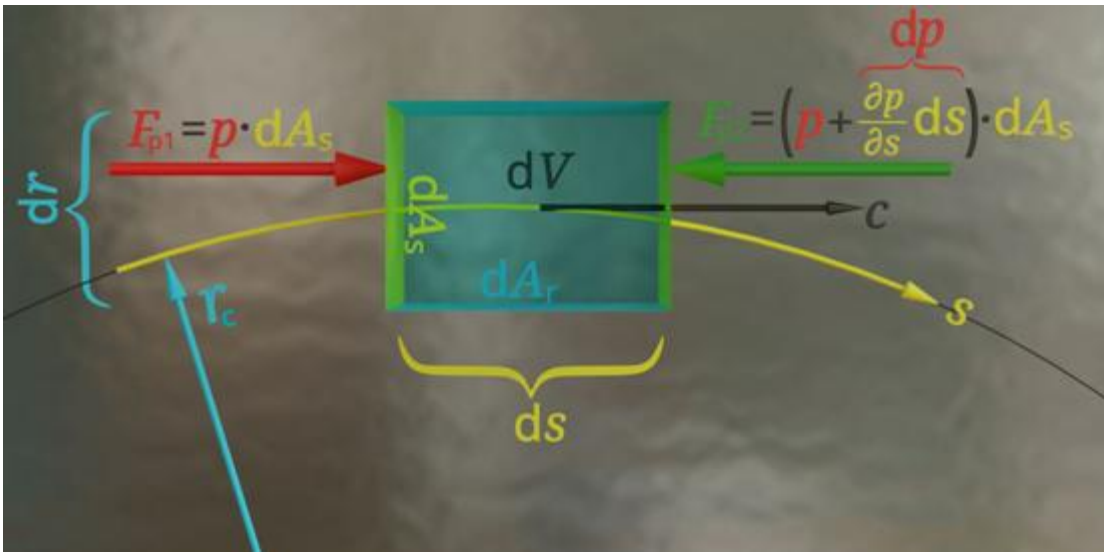


Fig. 1. Centrifugal force acting on a fluid element

Applications and implications: We explore the diverse applications of hydrostatic equilibrium in various fields, from astrophysics (understanding the structure of stars and planets) to meteorology (predicting atmospheric pressure variations) and even microfluidics (manipulating fluids at the microscopic level).

Challenges and future directions: Finally, we acknowledge the complexities and challenges associated with analyzing hydrostatic equilibrium in situations with complex geometries, non-uniform rotation, and turbulent flow. We briefly discuss ongoing research efforts to address these challenges and push the boundaries of our understanding.

In conclusion, the study of hydrostatic equilibrium in gravitational and centrifugal fields unveils a captivating interplay between fundamental forces, shaping the form and function of fluids across diverse scales. By delving into this equilibrium, we gain a deeper appreciation for the invisible forces that govern our universe and pave the way for advancements in various scientific and technological fields.

Keywords: Hydrostatic, Equilibrium, Gravitational, Centrifugal Fields



LICES OF DOMESTIC PIGEONS (*COLUMBA LIVIA DOMESTICA*) BREED IN SPREAD BELGRADE AREA

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Özet

The domestic pigeons (*Columba livia domestica*), represent the largest and most numerous representatives of the ornitofauna of cities. In addition to a large number of flocks of controlled birds, the cities are home to an extremely large population of "wild" city pigeons. The characteristics of city pigeons are that they are highly adaptable animals that make maximum use of existing food sources and habitats in the city area. For their shelters and nesting, they use roofs and all places in attics, attics, balconies, eaves and in general all hidden places that the urban environment can provide. Their population is the most numerous in the old city core, and they move into the newly created urban units simultaneously with their construction and settle them permanently in two months. During their movement in search of food, they have wide range flights so that they represent a permanent transmitter of infections and parasites to both humans and domestic animals. Examining the dovecote and attic areas where pigeons are nesting. Examinations were carried out on spread Belgrade area in free-living birds and flocks in controlled conditions, using standard methods of collection, fixation and determination of ectoparasites. During examination we established six lice species: *Columbicola columbae*, *Lipeuris caponis*, *Campalunotes compar*, *Menopon giganteum*, *Goniocotes bidentatus*, *G.galinae*, and two flea species *Ceratophyllus columbae* and *C.gallina*. During infestation with lice birds start to pick and scratch to counter the irritation caused by these ectoparasites. Ectoparasites cause distress, allergies, and occasionally transmit infectious diseases. Most abundant lece species was *Columbicola columbae* found at 23.3% of examined birds, follow by *Lipeuris caponis* (13.2%), and *Campalunotes compar* (9.1%).

Anahtar Kelimeler: pigeons, *Columba livia domestica*, ectoparasites, Belgrade area



A REVIEW OF ANTIMICROBIAL DRUG RESIDUES IN MILK: ITS RISK FACTORS AND POTENCIAL EFFECTS ON PUBLIC HEALTH

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ABSTRACT

The environment and food quality, in particular, have a direct impact on human health. The quality of food from animal products concerns widely public health agencies around the world since antimicrobial drugs has played an important role. These drugs are used to cure or prevent diseases and as growth promoters to increase feed efficiency. The frequent use of drugs may cause their residues, which poses various problems, and potential risks for consumers. Allergies to antibiotics like penicillin or amoxicillin represent over 40% of cases; cutaneous symptoms are the most common, and severe instances include anaphylactic responses that spread throughout the body. Nitroimidazole residues had carcinogenic and mutagens effects, although sulphonamide toxic effects were associated with thyroid and pituitary dysfunction. For more, aminoglycosides, it has been reported to cause damage to the kidney and to hearing. While long-term exposure to fluoroquinolone residues may result in chronic harmful consequences, such as the development of bacterial resistance in humans.

In the dairy industry, the antimicrobial residues can also be responsible for undesirable effects inhibit the fermentation of bacterial starter cultures and negatively affect the quality of the final product.

The requirement to ensure food safety and increase its quality led the European Union has established tolerance levels for these compounds as maximum residue limits (MRLs).

There are several screening and confirmatory methods that provide full information on the identity of the residue and may also confirm the quantity present to guarantee milk that is safe for consumers and of high quality for the dairy industry.

Keywords: Antimicrobial Residues, Public Health, Detection Methods



CHALLENGES AND STRATEGIES FOR IMPROVING CERVICAL CANCER SCREENING IN NIGERIA

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ABSTRACT

Background: Cervical cancer is one of the most treatable cancer when detected early and managed. Unfortunately, the mortality rate is projected to surge in Nigeria. This study aimed to examine published reports and provide updated information on challenges and strategies for improving cervical cancer screening in Nigeria.

Methods: In this review, scientific papers published in electronic databases including PubMed, Scopus, and Google Scholar were retrieved using search themes such as cervical cancer, risk factors, and preventive methods were examined.

Result: The true prevalence of cervical cancer in Nigeria is largely unknown because most cases are not documented. Lack of awareness, cultural barriers, poor infrastructure, unfavorable perception, shortage of supplies, lack of partner involvement, poor monitoring, and evaluation system were the major barriers that hinder cervical cancer screening service in Nigeria.

Conclusion: Lack of awareness, unfavorable perception, problems with health system structure and process were the major barriers for improving cervical cancer screening in Nigeria. Therefore, packages of intervention is necessary to create awareness, provide essential equipment, and strengthening follow up system are indispensable for service improvement.

Keywords: Cervical cancer screening, Nigeria



THE ROLE OF ALPHA SYNUCLEIN IN THE ONSET AND DIAGNOSIS OF PARKINSON'S DISEASE

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Abstract

Parkinson's disease is considered the second most common neurodegenerative disorder, and a major cause of disability in the elderly. It is a chronic, slowly progressive pathology with an insidious onset. The aim of this study is to demonstrate the role of alpha synuclein in the onset and diagnosis of Parkinson's disease.

Parkinson's disease is characterized by the destruction of certain neurons in the brain and the accumulation of protein clusters toxic to nerve cells. Very rare before the age of 45, the incidence of Parkinson's disease increases with age, peaking between 70 and 89.

Patients remain asymptomatic until 50-70% of dopamine neurons are destroyed, and the brain is no longer able to compensate. In people suffering from Parkinson's disease, the alpha synuclein molecule acquires an abnormal three dimensional structure that promotes aggregation of the alpha synuclein molecule, which is detrimental to neuronal function.

This work not only identified genes potentially involved in the pathological process, but also helped to better understand the disease by studying the molecular, cellular and metabolic dysfunctions associated with the alpha synuclein molecule.

Keywords: Parkinson's disease, Alpha synuclein, Diagnosis



LOW MOLECULAR WEIGHT HEPARIN WITH OR WITHOUT ASPIRIN IN PREVENTION OF MATERNAL AND PERINATAL COMPLICATIONS IN RISK PREGNANCY

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APSTRACT

Introduction: Placenta mediated pregnancy complications, as preeclampsia, stillborn, intrauterine growth restriction, abruptio placentae and recurrent miscarriages are the most common risk factors for maternal and fetal morbidity and mortality in the developed countries. Women with previous placenta mediated pregnancy complications are at increased risk of recurrence in a future pregnancy.

The aim of the study is to investigate how much antenatal thromboprophylaxis with low molecular weight heparin (LWH) and aspirin will increase the rate of live births compared with antenatal thromboprophylaxis only with LMWH and control group. Secondary goals also derive from the primary goal, investigate how much antenatal thromboprophylaxis will reduce the percentage of adverse pregnancy outcomes: preeclampsia, stillbirths, intrauterine growth restriction, placental abruption, and recurrent miscarriages. To determine the safety of the use of LWH and aspirin: to detecting bleeding, thrombocytopenia, an allergic reaction, pain at the injection site of LMWH and osteoporotic fracture.

Material and Methods: The study is a prospective, controlled comparative study and was performed in the Department of Gynecology and Obstetrics at the Clinical Hospital Tetovo for the five-year period, from 2012-2017. The study included 100 patients over 18 years of age who met the inclusion criteria of the study. Patients were in the first trimester of pregnancy with previous pregnancies with preeclampsia, stillbirths, intrauterine growth restriction, and recurrent miscarriage. All patients were divided in two groups: The first group consisted of 31 patients who were treated with LMWH (Nadroparin 0.3 ml) / 24h. The second group consisted of 33 patients treated with LMWH (Nadroparin 0.3 ml) / 24h and Aspirin 100 mg per os. The control group consisted of 36 patients who were not treated with antenatal thromboprophylaxis, but had previous pregnancies with adverse outcome. They were included in the study when they were delivered to our hospital.

Results: The total number of pregnant women examined was 100. The basic demographic characteristics and obstetric past were similar among the examined groups. A significant difference was found in the rate of live

birth among the three groups, 31/31 (100%) in the group treated with NMH, 32/33 (97%) in the group treated with NMH and Aspirin and 29/36 (80.60%) in the control group of patients, $p = 0.006$. Control group / group of LWH, $p = 0.01$, (OR = 0.81 / 95% CI: 0.69-0.95), Control group / group of NMH and aspirin, $p = 0.06$, (OR = 0.83 / 95% CI: 0.83-49.52). There was no significant difference in the occurrence of a adverse pregnancy outcome between the three groups in relation to the occurrence of preeclampsia ($p = 0.43$), intrauterine growth restriction ($p = 0.70$), abruption placentae ($p = 1.00$). A significant difference was found in relation to the occurrence of recurrence miscarriages ($p = 0.005$). In the LWH treated group of 31 patients 3 (9.70%) had bleeding, 1 (3.20%) had an allergic reaction to LWH, pain had 5 (16.10%). In the group of treated patients with LWH and Aspirin from 33 patients, 5 (15.20%) had bleeding, 5(15.20%) had pain and one patient (3.00%) had pain and bleeding. There was no significant difference between the two groups of patients in the findings concerning the adverse effects of the therapy.

Conclusion: Antenatal thromboprophylaxis with LWH significantly increases the rate of live birth in pregnant women with previous pregnancy with adverse outcome. Treatment with LMWH and Aspirin proved to be less effective in increasing the rate of live birth from treatment with LMWH alone. Antenatal thromboprophylaxis does not reduce the negative outcomes of pregnancy, such as preeclampsia, intrauterine growth restriction, and abruptio placentae. LMWH significantly reduces the number of recurrent abortions. LMWH and Aspirin are safe in pregnancy with no significant difference between the two groups of patients in the findings of bleeding, thrombocytopenia, allergic reaction, and pain at the injection site of the drug.

Key words: risky pregnancy, low-molecular weight heparin, aspirin, antenatal thromboprophylaxis.



USE OF ANTIBIOTICS IN RESPIRATORY VIRAL INFECTIONS

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Abstract:

Viruses pose a significant global threat to human health, encompassing various causative agents responsible for potentially fatal infections and cancers. Despite this peril, the recurring emergence or re-emergence of viral infections highlights the inadequacy of effective antivirals for prevention, control, and cure. Throughout the 21st century, this challenge has been evident in the limited availability of antiviral treatments for diseases such as SARS-CoV (severe acute respiratory syndrome coronavirus), MERS-CoV (Middle East respiratory syndrome coronavirus), Chikungunya virus, Ebola virus, and Zika virus

Furthermore, the struggle against longstanding viral adversaries remains evident. Despite notable successes in developing drugs for human immunodeficiency virus (HIV) and hepatitis B virus, both significant global threats, these medications can only manage replication, falling short of providing a cure for individuals afflicted by these viral infections.



DRUG REPURPOSING: AN ADVANCE WAY TO TRADITIONAL DRUG DISCOVERY

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Abstract

Developing medications to address a variety of diseases remains challenging even with improvements in drug discovery techniques. Therefore, in order to develop therapies that can treat both common and unusual ailments, cutting-edge techniques like pharmaceutical repurposing are required. A technique known as "drug repurposing" can be employed in the drug discovery process to find novel therapeutic applications for approved drugs that conflict with their intended use. A technique known as "drug repurposing" can be employed in the drug discovery process to find novel therapeutic applications for approved drugs that conflict with their intended use. Drug repurposing, which finds new applications for pharmaceuticals that are already licensed, may help traditional drug development by reducing the significant time, expense, and risk associated with it. Currently, most repurposed pharmaceuticals have been discovered by chance throughout the course of careful observations made by physicians, medical personnel, and basic researchers. The development of technologies like proteomics, genomics, transcriptomics, and metabolomics, along with the availability of massive databases resources like drug omics data, disease omics data, and so forth, have created numerous opportunities to discover drugs by combining all of the above methods/approaches.

Keywords: Transcriptomics, Genomics, Repurposing Medications and Proteomics



THE GUT-BRAIN-SKIN AXIS IN ACNE: IMPACT OF POLENODERM

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Background It is increasingly believed that the interaction between skin microbes and host immunity plays an important role in acne. Acne also has close connections with the gastrointestinal tract, and many argue that the gut microbiota could be involved in the pathogenic process of acne. The emotions of stress, have been hypothesized to aggravate acne by altering the gut microbiota. The presence of a gut-brain-skin axis that connects gut microbes, oral probiotics, and diet, currently an area of intense scrutiny, to acne severity. This study concentrates on the skin and gut microbes in acne, the role that the gut-brain-skin axis plays in the immunobiology of acne, and newly emerging microbiome-based therapies that can be applied to treat acne.

Objective The purpose of this study was to compare the diversity of the skin microbiota in acne patients before and after taking Polenoderm.

Materials and methods A longitudinal cohort study was performed on 20 participants with moderate to severe facial acne with no recent use of oral and topical antibiotics/retinoids.

Results Hence, it is crucial to understand Polenoderm impact on the acne skin microbiota which is thought to be perturbed, our study provides insight into the skin microbiota in acne and how it is modulated by Polenoderm and diet.

Conclusion Acne also has close connections with the gastrointestinal tract, and many argue that the gut microbiota could be involved in the pathogenic process of acne. As understanding of the microbiome in healthy skin and the pathophysiology of acne continues to develop, new therapeutic targets are arising.

Keywords: acne, gut-brain-skin axis microbiota, Polenoderm, diet



RESPONSE OF PILE TO TUNNELLING

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Summary

As the urban population grows, so do the demands of expanding cities. This involves the creation of an infrastructure capable of meeting the needs and improving the quality of life of residents. To meet these challenges, engineers are exploiting underground space as an alternative solution to meet social needs without significantly disrupting surface activity. As a result, the use of tunnels is becoming increasingly practical for inspecting and upgrading underground facilities. However, these tunnels can interact with other structures such as subways, buildings and different types of foundations, whether superficial or deep, such as piles. These interactions have a considerable influence on the piles, leading to potentially intolerable consequences, such as deformations and additional forces, due to changes in the stresses of the surrounding soil. It therefore becomes necessary to carry out studies to predict these deformations and estimate the extent of these forces caused to the piles in order not to harm the stability and safety of the structures. Hence the objective of this article is the evaluation of the movements and forces caused by tunnel excavations and their effects on the piles.

Keywords: Tunnelling, pile, interaction, Bending moment, axial force



ARTIFICIAL INTELLIGENCE: SECURITY RISKS AT THE DAWN OF A NEW ERA

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Abstract

The emergence of Artificial Intelligence (AI) has significantly altered the landscape of security, offering new opportunities for criminal activities. This transformation is not only recognized in the changing nature of criminal acts but also highlighted in the assessment reports by Interpol and Europol. My presentation focuses on two main aspects: Firstly, it examines the evolution in cybercrime types due to AI solutions, highlighting the increased sophistication in criminal activities. Secondly, it explores the potential of technology to perfect psychological manipulation, paving the way for a new generation of scams where even security awareness might not offer sufficient protection.

My presentation shows the impact of deepfake methods, not only in terms of deception but also concerning the challenges they pose in criminal proceedings, particularly the authenticity of evidence. Additionally, the rise of large language models introduces the possibility of misuse in creating bioweapons by circumventing AI security protocols. The study also addresses the emergence of a sharing model in the information society, paralleled in the criminal world, most notably in the "crime as a service" method, where crime execution can be outsourced.

This comprehensive analysis underlines the increasing complexity and danger posed by AI-assisted criminal activities, emphasizing the need for continued vigilance and adaptation in law enforcement and security strategies.

Keywords: Artificial intelligence, crime, law enforcement, security risks,



ZINC OXIDE ELECTRON TRANSPORT LAYER EFFECT ON PEROVSKITE SOLAR CELLS

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Abstract

In this present work we report a numerical modeling of perovskite solar cell using a SILVACO simulator. Accordingly, this study is mainly focused on exploring of potentially high-stable electron transport materials (ETLs), several materials were studied for possible electron transport layers (ETL). Organic fullerene derivative phenyl-C61-butyric acid methyl ester (PCBM), indium gallium zinc oxide (IGZO), tin dioxide (SnO₂), titanium dioxide (TiO₂) and zinc oxide (ZnO) are tested as an ETL and compared to ITO. To enhance its performance, several materials were suggested as electron transport layers (ETL). Among the proposed ETL materials it was found that zinc oxide is the most adequate material.

Keywords: Perovskite, Solar cells, SILVACO, ETL, ZNO.



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REMOVAL OF A PHARMACEUTICAL POLLUTANT ON AN ADSORBENT FROM VEGETABLE WASTE

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Abstract

Water pollution (pesticides, dyes...) is a source of environmental degradation. Our work was devoted to the process of adsorption for the removal of pharmaceutical pollutant used in pharmaceutical industry and which is considered as a micropollutant by a vegetable biosorbent, we began our work by the valuation of our vegetable waste at the level of laboratory and put in evidence some parameters such as the time of contact, the dose, the pH on the capacity of adsorption. The obtained results show that the percentage of removal of the dye methylene blue by the prepared biosorbent reached 61.82% under the best conditions: contact time was 60min, pH equal to 2, quantity of biosorbent 8g/l.



1. BILSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

INDIVIDUALS FROM METROPOLITAN TO PROVINCIAL REGIONS ARE CURRENTLY UTILIZING ON THE WEB STAGES TO LOOK FOR MANY ITEMS, FROM HARDWARE TO DESIGN AND FOOD IN PAKISTAN WHAT ARE THE EXTENT OF E-COMMERCE IN PAKISTAN

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ABSTRACT

The Terms The web-based business area in Pakistan has been encountering huge development, and there is extensive degree for additional development. Nonetheless, kindly note that the data might have advanced from that point forward, and checking the most recent hotspots for the latest updates is suggested. Pakistan has seen a consistent expansion in web entrance, with additional individuals accessing the web. The developing utilization of cell phones has additionally worked with web-based shopping, as it gives a helpful stage to customers. Pakistan's growing middle class is becoming more tech-savvy and prefers online shopping more and more. According to nearby exchange assets, Pakistan is the 46th biggest market for Web based business with an income of \$5.2 billion of every 2023. This segment shift makes a significant buyer base for web-based business organizations. Digital payment methods like mobile wallets and online banking have made transactions easier, which has helped e-commerce expand. The public authority of Pakistan has shown interest in advancing digitalization and web-based business. Approaches supporting the development of the area can additionally help its extension. Online commercial centers that offer many items, including gadgets, design, and food, are acquiring prominence. These stages give an all-inclusive resource to purchasers. Improvement in planned operations and conveyance administrations is urgent for the progress of web-based business. As these administrations create, they add to the development of online organizations, particularly in conveying food and other regular basics. Cross-line web-based business can assume a critical part in extending the range of items accessible to Pakistani customers as well as the other way around. The development of nearby online business stages and new companies adds to the general development of the area. These organizations frequently center around tending to the particular requirements and inclinations of the nearby populace. The coordination of



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online entertainment with internet business, known as friendly trade, is building up forward momentum. Stages like Facebook and Instagram are being utilized for promoting and selling items. Notwithstanding the development potential, there are difficulties, for example, guaranteeing secure web-based exchanges, building trust among purchasers, and tending to framework issues in specific locales. The extent of web-based business in Pakistan is promising, driven by elements like expanding web entrance, a developing working class, and government drives. The area's proceeded with progress will rely upon conquering difficulties and adjusting to advancing shopper inclinations. Please confirm the most recent information to ensure its relevance and accuracy.

Keywords: obligations, assumptions, Evaluators, illuminate, intermittent, upgrade.



1. BILSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

THE MOST EFFECTIVE METHOD TO OVERSEE LOW DEVELOPMENT RATES, ELEVATED DEGREES OF OBLIGATION, EXPANSION, LOW EFFICIENCY, AND UNFORTUNATE SERIOUSNESS IN PAKISTAN

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ABSTRACT

Low development rates, elevated degrees of obligation, expansion, low efficiency, and unfortunate intensity requires a complete and composed approach including monetary, financial, and underlying changes. Execute sound financial and monetary arrangements to settle the economy. Fortify the autonomy of the national bank to guarantee compelling command over expansion. Hold back nothing monetary strategy by diminishing financial plan deficiencies and controlling public obligation. Embrace primary changes to upgrade the business climate, support private area speculation, and further develop intensity. Smooth out and work on administrative cycles to diminish regulatory obstacles for organizations. Focus on instruction and expertise advancement to upgrade the efficiency of the labor force. Advance professional preparation and specialized instruction to adjust abilities to the necessities of the market. Put resources into basic foundation ventures to further develop network, transportation, and energy supply. Foundation improvement can draw in unfamiliar venture and animate financial development. Foster a supportable obligation the executive's methodology to address elevated degrees of obligation. Arrange ideal terms for credits and investigate obligation rebuilding choices. Elevate send out arranged ventures to further develop the exchange balance. Investigate economic alliance with different nations to improve market access for Pakistani items. Carry out compelling financial strategies to control expansion. Address primary issues that add to expansion, for example, supply-side imperatives and failures. Support advancement and the reception of innovation to help efficiency. Establish a favorable climate for innovative work. Carry out friendly security nets to safeguard weak portions of the populace from the unfriendly impacts of financial changes. Designated cash move projects can assist with lightening neediness. Fortify establishments



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and further develop administration to decrease defilement and increment straightforwardness. Lay out law and order and guarantee an anticipated administrative climate for organizations. Look for worldwide help and team up with multilateral establishments to help monetary changes. Participate in conciliatory endeavors to draw in unfamiliar direct venture. Executing these actions requires political will, supported exertion, and powerful correspondence with partners. It's essential for the public authority, confidential area, and common society to cooperate in tending to these difficulties for long haul monetary manageability. Intermittent surveys and acclimations to strategies in view of advancing monetary circumstances are fundamental.

Keywords: unfortunate, compelling, diminishing, venture, conciliatory.



CERAMIC POWDER UTILISATION IN MORTAR PRODUCTION

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Abstract

This paper investigates the performance of mortar containing ceramic powder as a partial substitution of cement. Portland cement (PC) was partially replaced with 0-40% ceramic powder. Testing included compressive strength, ultrasonic pulse velocity, and absorption. Specimens were cured in water at 20°C. The results indicate that the maximum strength of mortar occurs at around 10% ceramic powder. Beyond 10% ceramic powder the strength of mortar reduces and is lower than that of the control.

Keywords: Ceramic industry, mortar, superplasticizer, Compressive Strength



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MUĞLA İLİNDE ÜRETİLEN BAZI SIĞLA YAĞI (*STYRAX LIQUIDUS*) NUMUNELERİNDEKİ KURŞUN MİKTARLARININ PLATİN KAPLI TUNGSTEN SARMAL ATOM TUZAK HİDRÜR SİSTEMLİ ATOMİK ABSORPSİYON SPEKTROMETRİ YÖNTEMİ KULLANILARAK BELİRLENMESİ

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Özet

Bu çalışmada, ilk defa Muğla ilinde üretilen bazı sıgla yağlarındaki kurşun miktarları platin kaplı (Pt-kaplı) tungsten sarmal (W-sarmal) atom tuzak hidrür sistemli atomik absorpsiyon spektrometrisi (HG-AAS) yöntemi ile belirlenmiştir. Bir projeksiyon ampulünden çıkarılan W-sarmal yüzeyi ilk önce Pt ile başarıyla kaplandı. Kaplamasız ve kaplamalı W-sarmal yüzey morfolojisi taramalı elektron mikroskobu-enerji dağılım spektroskopisi (SEM-EDS) kullanılarak incelendi. Daha sonra Pt-kaplı W-sarmal, hidrür sistemiyle üretilen uçucu kurşun (Pb) atomlarını tuzaklamak amacıyla kuvars T-tüp atomlaştırıcının (QTA) giriş koluna monte edildi. Tek değişkenli optimizasyon yöntemi kullanılarak deneysel parametrelerin en uygun değerleri belirlendi. Muğla ilinde yaşayan yerel halktan temin edilen sıgla yağı (*Styrax Liquidus*) numuneleri mikrodalga yakma ünitesi vasıtasıyla çözündürüldü. Deneysel olarak belirlenen optimum koşullar altında, önerilen yöntem ile sıgla yağı numunelerindeki Pb miktarları belirlendi. Sıgla yağı numunelerindeki en düşük ve en yüksek Pb konsantrasyonları sırasıyla $4,78 \mu\text{g kg}^{-1}$ ve $18,94 \mu\text{g kg}^{-1}$ olarak belirlenmiştir. Kullanılan yöntemin doğruluğunu test etmek için NIST SRM 1640a (trace elements in natural water), ERM-BD151 (skimmed milk powder) ve BCR-191 (Brown bread) sertifikalı referans malzemeleri kullanıldı. Sertifikalı referans malzemeler için elde edilen geri kazanım değerleri ise oldukça iyi olup %100,3-106,4 arasındaydı.

Anahtar Kelimeler: Pt-kaplı W-sarmal, Pb tayini, HGAAS



DETERMINATION OF LEAD IN SOME SWEETGUM BALSAM (*Styrax Liquidus*) SAMPLES PRODUCED IN THE PROVINCE OF MUĞLA USING THE PLATINUM COATED TUNGSTEN COIL ATOM TRAP HYDRIDE GENERATION ATOMIC ABSORPTION SPECTROMETRY

Abstract

In this study, the lead concentrations in some sweetgum balsam samples produced for the first time in the province of Muğla were determined using platinum-coated (Pt-coated) tungsten coil (W-coil) atom trap hydride generation system atomic absorption spectrometry (HG-AAS) method. The surface of the W-coil, extracted from a projection bulb, was first successfully coated with Pt. The uncoated and coated W-coil surface morphology was examined using scanning electron microscopy-energy dispersive spectroscopy (SEM-EDS). Subsequently, the Pt-coated W-coil was attached on the entrance arm of the quartz T-tube atomizer (QTA) to trap volatile lead (Pb) atoms produced by the hydride generation system. The optimal values of experimental parameters were determined using the single variable optimization method. Sweetgum balsam (*Styrax Liquidus*) samples obtained from the local people living in the province of Muğla were digested through a microwave digestion unit. Under the experimentally determined optimum conditions, the Pb concentrations in sweetgum balsam samples were determined using the proposed method. The lowest and highest Pb concentrations in the sweetgum balsam samples were determined to be $4.78 \mu\text{g kg}^{-1}$ and $18.94 \mu\text{g kg}^{-1}$, respectively. Certified reference materials NIST SRM 1640a (trace elements in natural water), ERM-BD151 (skimmed milk powder), and BCR-191 (Brown bread) were used to test the accuracy of the method. The recovery values obtained for certified reference materials were quite good, ranging from 100.3% to 106.4%.

Keywords: Pt-coated W-coil, Pb determination, HGAAS

1. GİRİŞ

Dünya çapında meydana gelen hızlı sanayileşme, ağır metallerin endüstriyel alanlarda yaygın olarak kullanılmasına yol açmıştır (Zhao vd., 2022). Endüstriyel atıkların gelişigüzel çevreye atılması, ağır metallerden kaynaklanan çevre kirliliği açısından dünyada büyük endişelere neden olmaktadır (Afroze ve Sen, 2018). Ağır metaller biyolojik olarak parçalanamamakta ve canlı organizmalarda kolayca birikebilmektedir (Sanmartin vd., 2022). Kurşun (Pb), ciddi sağlık sorunlarına neden olan en zararlı ağır metallerden biridir (Sanmartin vd., 2022). İnsan hücrelerdeki antioksidanların ve enzimlerin yüksek konsantrasyonda kurşuna maruz kalması, reaktif oksijen türevlerinin artmasına neden olmakta ve reaktif oksijen türevleri de DNA hasarlarına, lipitler ve proteinlerde çok sayıda işlev bozukluğuna yol açmaktadır (Atasoy, 2023). Ensefalopatiye, bilişsel bozukluğa, böbrek hasarına, anemiye ve nörolojik sistemde toksisiteye neden olabilmektedir (Zhou vd., 2017). Pb, endüstriyel üretim ve yoğun araç trafiği gibi insan faaliyetleri yoluyla kaçınılmaz bir şekilde çevreye salınmaktadır (Li vd, 2021). Her ne kadar ülkeler çevre düzenlemelerini sürekli olarak sıkılaştırıyor ve buna paralel olarak atık yönetimi teknolojilerini geliştiriyor olsa da, kurşunun büyük bir kısmı toprakta ve suda hala dolaştığından kurşun kirliliği büyük bir sorun olmaya devam edecektir (Golcs vd., 2021).

Sığla, (*Styrax Liquidus*), *Liquidambar orientalis* Miller ağacının yaralı kabuklarından elde edilen reçineli bir sızıntıdır. Bu reçine yüzyıllardan beri Türk halk hekimliğinde peptik ülser semptomlarının tedavisinde kullanılmaktadır (Gurbuz vd., 2013). Sedef hastalığı, mantar, mide ve onikiparmak bağırsağı ülserleri gibi hastalıklarına karşı pomat ve yama formunda kullanıldığı, aynı zamanda sağlıklı bir antiseptik ve parazit karşıtı olduğu iddia edilmektedir (Ulusoy, Ceylan ve Peker, 2021). Sağlık açısından çok önemli bir yere sahip olan bu ağacın toprakta ve suda hala dolaşımında olan kurşunu da bünyesine alabilme ihtimali bulunmaktadır. Bu nedenle sığla numunelerdeki Pb konsantrasyonunu etkin ve doğru bir şekilde belirlemek için yeni, hızlı, sağlam ve düşük maliyetli yöntemlerin geliştirilmesi büyük önem taşımaktadır (Zhou vd., 2017).

Çevre ve gıda örneklerindeki Pb konsantrasyonları genellikle indüktif eşleşmiş plazma kütle spektrometrisi (ICP-MS) (Yılmaz, Arslan ve Rose, 2013), indüktif eşleşmiş plazma optik emisyon spektrometrisi (ICP-OES) (Khaleel, Raouf ve Tuzen, 2018) gibi yüksek duyarlılığa sahip spektroskopik yöntemler ile belirlenmektedir. Fakat bu yöntemlerin hem satın alma hem de işletme maliyetleri oldukça yüksektir (Atasoy, 2023). Alevli atomik absorpsiyon spektrometri (FAAS) yöntemi özellikle gelişmekte olan ülkeler için popülerliğini koruyan bir yöntemdir. Yalnız bu yöntemle mg L^{-1} düzeyinde analiz yapılabildiği için çevresel ve gıda örneklerdeki eser elementlerin analizi yapılamamaktadır (Karababa vd., 2023). Hidrür sistemli atomik absorpsiyon spektrometrisi (HGAAS) yöntemi ile Se, As, Pb, Sn, Sb ve Tl gibi hidrür oluşturan elementlerin $\mu\text{g L}^{-1}$ hatta düşük düzeyde analizi mümkün hale gelmiştir. Ayrıca HGAAS yöntemi ile numune matriks etkisinden kurtulduğu için matriks

kaynaklı girişimlerin de etkisi azaltılmaktadır (Atasoy, Yildiz ve Kula, 2022). HGAAS yönteminde kullanılan kuvars tüp atomlaştırıcıya (QTA), W-sarmal atom tuzakları monte edilerek, hatta gerektiğinde tungsten-sarmal (W-sarmal) yüzeyinin metallere kaplanmasıyla ultra eser düzeyde (ng L^{-1}) düzeyde analiz yapabilmek mümkün hale gelmiştir (Atasoy, 2023).

Bu çalışmanın amacı, sığla numunelerindeki Pb miktarını doğru ve kesin bir şekilde belirlemek için düşük bir maliyetli, duyarlı ve sağlam bir metot önermektir. Kaplamasız ve kaplamalı W-sarmal yüzey morfolojisi taramalı elektron mikroskobu-enerji dağılım spektroskopisi (SEM-EDS) kullanılarak incelendi. Önerilen tuzak yöntemindeki parametreler deneysel olarak optimize edildi. Muğla'da yaşayan yerel halktan temin edilen sığla numuneleri bir mikro dalga parçalama sistemi vasıtasıyla çözüldürüldü ve optimum deneysel koşullar altında analiz edildi. Önerilen yöntemin doğruluğu üç farklı sertifikalı referans maddenin (CRM) analiziyle test edilmiştir.

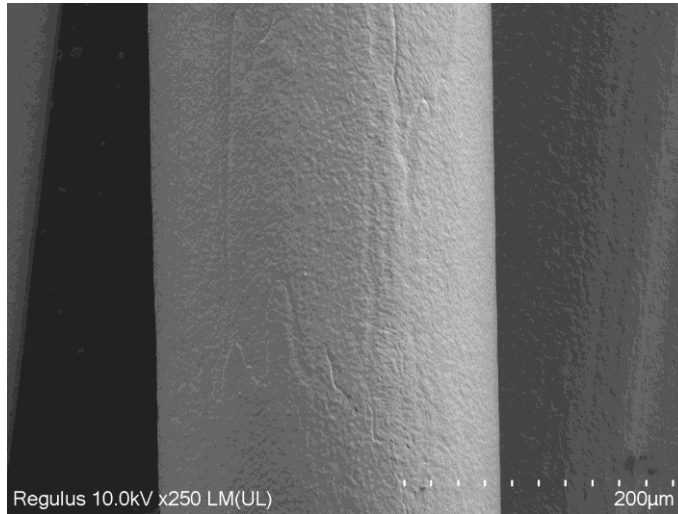
2. DENEYSEL ÇALIŞMALAR

Deneysel çalışmalarda tayin işlemi için hidrür oluşturma sistemi (HG) ile donatılmış Agilent Teknoloji 200 serisi alevli atomik absorpsiyon spektroskopisi (FAAS) cihazı kullanılmıştır. Zemin düzeltme olarak döteryum (D_2) lambası kullanılmıştır. Pb oyuk katot lambası 10,0 mA, spektral bant genişliği 0,5 nm ve dalga boyu ise 283,3 nm olarak ayarlandı. Alev olarak hava-asetilen alevi kullanıldı. QTA'nın dikey kolunun giriş kısmına 10 cm uzunluğunda başka bir kuvars boru eklendi. Bu kuvars borunun tam orta kısmına küçük bir delik açıldı. W-sarmal, yanmaz-sızdırmaz bir alüminyum soba bandı ile açılan bu deliğe monte edildi. Deneysel çalışmalarda, piyasadan temin edilen Osram marka (HLX, 64633) projeksiyon ampulünden çıkarılan W-sarmal kullanılmıştır. Analit çözeltisi olarak 1000 mg L^{-1} konsantrasyona sahip Pb standart çözeltisi kullanılmıştır. Diğer analit çözeltileri bu standart çözeltilerden uygun miktarlarda seyreltilerek hazırlanmıştır. Hidrür sistemiyle oluşturulan kurşun hidrürü (PbH_4), stabilize etmek amacıyla potasyum hekza siyano ferrat (III) ($\text{K}_3[\text{Fe}(\text{CN})_6]$) kullanılmıştır. Hidrür sisteminde asit çözeltisi olarak hidroklorik asit (HCl), indirgeyici reaktif olarak sodyum bor hidrür (NaBH_4) ve indirgeyici reaktif için stabilizatör olarak sodyum hidroksit (NaOH) kullanılmıştır. Asit dışındaki çözeltiler günlük olarak hazırlanmıştır. Deneysel çalışmalarda kullanılan tüm reaktifler analitik saflıktaydı.

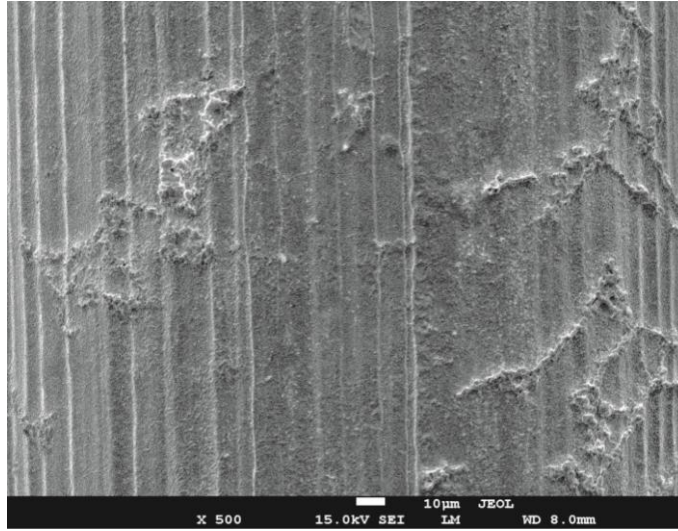
2.1. Kaplama İşlemi

Kaplama işleminde, kaplama düzeneği olarak bir plastik santrifüj tüpü kullanılmıştır. Santrifüj tüpünün kapağına W-sarmalın elektrik uçları girebilecek kadar iki delik açılmıştır. Hidrojen (H_2) ve argon (Ar) gazlarının tubinglerinin girebileceği büyüklükte kapak üzerinde iki farklı delik daha açılmıştır. Bir tane de içerideki gaz karışımını tahliyesini sağlamak amacıyla delik açılmıştır. Kaplama çözeltisi olarak 1000 mg L^{-1} derişime sahip standart platin (Pt) çözeltisi kullanılmıştır. İlk önce W-sarmal, tüpün kapağına tutturuldu ve bu çözeltiden W-sarmal yüzeyine $20,0 \mu\text{L}$ damlatıldı. Daha sonra tüpün kapağı kapatıldı ve gaz akışları aktif hale getirildi. W-sarmalın elektrik uçlarına bir güç kaynağı (TT T-ECHNI-C, Çin) bağlandı ve sarmala 60 saniye boyunca 3,8 amper, 30 saniye boyunca 4,2 amper, 5 saniyeline akım kesildi ve son olarak 5 saniye boyunca 7,0 A'lık akım uygulanmıştır. Bu işlemlerden sonra tekrar $20 \mu\text{L}$ Pt çözeltisi damlatıldı ve güç kaynağı ile uygulanan prosedür tekrarlandı. Bu işlem art arda 4 kez tekrarlandı.

W-sarmal yüzeyinin kaplanıp kaplanmadığını belirlemek amacıyla yüzey çalışmaları gerçekleştirildi. W-sarmalın yüzeyi, Muğla Sıtkı Koçman Üniversitesi Malzeme Araştırma Laboratuvarı ve Eskişehir Osmangazi Üniversitesi Merkezi Araştırma Laboratuvarı'ndaki enerji dağılımlı spektroskopi-taramalı elektron mikroskobu (SEM-EDS) kullanılarak analiz edildi. Kaplamasız W-sarmalın 250-kat büyütülmüş SEM görüntüsü Görsel 1'de verilmiştir. Pt-kaplı W-sarmalın 500-kat büyütülmüş SEM görüntüsü de Görsel 2'de verilmiştir.



Görsel 1. Kaplamasız W-sarmalın 250-kat büyütülmüş SEM görüntüsü



Görsel 2. Pt-kaplı W-sarmalın 500-kat büyütülmüş SEM görüntüsü

2.2. Numune Hazırlama Prosedürü

Muğla ilinin farklı yerlerinde yaşayan yerel halktan temin edilen 10 farklı sığla yağı numunelerinin çözündürülme işleminde CEM marka Mars 6 serisi bir mikrodalga parçalama sistemi kullanıldı. Her bir sığla numunesinden yaklaşık 0,5 g tartıldı ve üzerlerine 10,0 mL derişik nitrik asit (HNO_3) ilave edildi. Çözündürülmesi işleminin, 20 dakika içinde 210 °C'ye ısıtılmasını ve ardından bu sıcaklıkta 15 dakika tutulmasını içeren bir gıda programı ile gerçekleştirildi. CRM'ler (ERM-BD151 ve BCR-191) de aynı çözündürme programı kullanılarak çözündürüldü.

2.3. Tayin Yöntemi

Sığla numunelerindeki Pb miktarını belirlemek için kullanılan Pt-kaplı W-sarmal atom tuzak HG-AAS yöntemi iki adımdan oluşmaktaydı. Toplama olarak adlandırılan ilk adımda, hidrür oluşturma sistemiyle üretilen uçucu Pb atomlarının, bir miktar H_2 ve Ar varlığında bir güç kaynağı vasıtasıyla belirli bir sıcaklığa getirilmiş olan Pt-kaplı W-sarmal üzerinde biriktirilmesi sağlandı. Ar, taşıyıcı gaz olarak, H_2 ise tuzak ortamını kararlı hale getirmek ve sarmalın oksidasyonunu engellemek amacıyla kullanılmıştır. Belirli bir süre uçucu analit atomlarının tuzak yüzeyinde birikmesi sağlanmıştır. Sıyırma adı verilen ikinci adımda ise ilk önce hidrür oluşturma sisteminin peristaltik pompası kapatılmıştır. Yani sisteme gönderilen çözelti akışı durdurulmuştur. Daha sonra tuzak sistemine gönderilen H_2 gazı ve güç kaynağı ile uygulanan akım sadece birkaç saniyelik süre aynı anda arttırıldı, en yüksek uçuculuk verimliliğine ulaşılarak iki-üç saniye içerisinde kısa süreli ve keskin bir analit sinyali elde edilmiştir.

3. SONUÇLAR VE DEĞERLENDİRME

3.1. Optimizasyon Deneyleeri

Optimizasyon çalışmaları boyunca tek deęişkenli optimizasyon yöntemi kullanılmıştır. Sadece en uygun deęeri belirlenecek olan parametre deęiştirilmiş, dięer parametreler ise en uygun deęerlerinde sabit tutulmuştur. İlk önce yöntemdeki çözeltilerin en uygun derişimleri belirlenmiştir. Daha sonra toplama ve serbest bırakma sıcaklıklarının en uygun deęerleri belirlenmiştir. Sisteme gönderilen gazların (Ar ve H₂) akış hızları optimize edilmiştir. Yalnız sisteme gönderilen H₂ gazının akış hızı, toplama ve sıyırma basamakları için ayrı ayrı optimize edilmiştir.

Toplama süresi de optimize edilmiştir. Yapılan çalışmalarda toplama süresi arttıkça analit sinyali de artmaya devam etmiştir. Fakat çözelti sarfiyatının artmasını engellemek ve analiz süresini de mümkün olduğunca kısa tutmak amacıyla toplama süresinin en uygun deęeri 90 s olarak belirlenmiştir. Son olarak da analit, HCl ve NaBH₄ çözeltilerinin akış hızları optimize edilmiştir. Elde edilen optimum deęerler Çizelge 1’de özetlenmiştir.

Çizelge 1. Önerilen yöntemdeki parametrelerin deneysel olarak belirlenen en uygun deęerleri

Parametre	En uygun deęer
Taşıyıcı çözelti	0,2 mol L ⁻¹ HCl, 4,95 mL dakika ⁻¹
İndirgeyici reaktif	% 2,5 (w/v) NaBH ₄ , % 0,3 (w/v) NaOH, 4,95 mL dakika ⁻¹
Numune çözeltisi	% 1,0 (w/v) K ₃ [Fe(CN) ₆], 4,55 mL dakika ⁻¹
Toplama adımıdaki taşıyıcı gazlar	208 mL dakika ⁻¹ Ar; 30 mL dakika ⁻¹ H ₂
Sıyırma adımıdaki taşıyıcı gazlar	208 mL dakika ⁻¹ Ar; 140 mL dakika ⁻¹ H ₂
Toplama sıcaklığı	85 °C
Sıyırma sıcaklığı	940 °C
Toplama süresi	90 s

Deneysel olarak en uygun deęerleri belirlenen parametreler kullanılarak kalibrasyon grafięi oluşturuldu ve önerilen yöntemin doğrusallık aralığı belirlendi. Önerilen yöntemin 0,01 µg L⁻¹ ile 10,0 µg L⁻¹ arasında doğrusallık gösterdięi tespit edilmiştir.

3.2. Yöntemin Doğruluęunun Test Edilmesi

Önerilen yöntemin doğruluęu, NIST SRM 1640a, ERM-BD151 ve BCR-191 sertifikalı referans maddelerin analiziyle deęerlendirilmiştir. Optimum koşullar altında kalibrasyon grafięi oluşturuldu ve herhangi

bir standart ekleme işlemine ihtiyaç duyulmadan daha önceden çözündürülmüş olan CRM'ler analiz edildi. Ölçümler 3 kez tekrarlanmış olup, elde edilen değerler ile sertifikalı değerler Çizelge 2'de verilmiştir. CRM'ler için elde edilen geri kazanım değerleri ise oldukça iyi olup %100,3-106,4 arasındaydı.

Çizelge 2. CRM'ler için analiz sonuçları

Sertifikalı referans madde	Sertifikalı değer	Bulunan değer	% Geri kazanım
NIST SRM 1640a ($\mu\text{g L}^{-1}$)	12,101 \pm 0,050	12,149 \pm 0,09	100,3
ERM-BD151 (mg kg^{-1})	0,207 \pm 0,014	0,218 \pm 0,07	105,3
BCR-191 ($\mu\text{g kg}^{-1}$)	187 \pm 14	199 \pm 22	106,4

3.3. Sığla Yağı Numunelerinin Analiz Edilmesi

Önerilen yöntem ile sığla yağı numunelerindeki Pb konsantrasyonları belirlendi. Her bir numune üç tekrarlı olacak şekilde ölçüldü ve bu üç ölçümün ortalaması temel alındı. Sığla yağı numunelerindeki en düşük ve en yüksek Pb miktarları sırasıyla 4,78 $\mu\text{g kg}^{-1}$ ve 18,94 $\mu\text{g kg}^{-1}$ olarak belirlenmiştir. Analiz sonuçları Çizelge 3'te verilmiştir.

Çizelge 3. Sığla yağı numuneleri için tespit edilen Pb konsantrasyonları

Sığla numunesi	Pb miktarı ($\mu\text{g kg}^{-1}$)	Sığla numunesi	Pb miktarı ($\mu\text{g kg}^{-1}$)
1	4,93 \pm 0,42	6	13,88 \pm 0,95
2	6,28 \pm 0,57	7	18,94 \pm 0,76
3	4,78 \pm 0,49	8	8,34 \pm 0,53
4	12,41 \pm 0,86	9	10,26 \pm 0,69
5	16,53 \pm 0,62	10	6,85 \pm 0,71

Sonuç olarak; sığla numunelerindeki Pb konsantrasyonları, düşük maliyetli, yüksek duyarlılığa sahip ve sağlam bir metot olan Pt-kaplı W-sarmal atom tuzak HGAAS yöntemi ile başarılı bir şekilde belirlenmiştir. Yöntemde atom tuzak olarak kullanılan W-sarmal, piyasadan kolayca temin edilebilen bir malzemedir. Ayrıca gerektiğinde kolayca yenisi ile değiştirilebilir. W-sarmal yüzeyini kaplama prosedürü de oldukça kolaydır. Tayin için kullanılan HGAAS ise her analitik laboratuvarında bulunan temel enstrümanlardan birisidir. Dolayısıyla ICP-MS ve ICP-OES gibi pahalı cihazlara erişimi olmayan araştırmacılar için, bu çalışmada önerilen yöntem, çevresel ve gıda örneklerinde ultra-eser düzeyde bulunan Pb miktarını belirlemek için iyi bir alternatif olabilir.

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SPIRULINA SUŞLARININ PROTEİN ÜRETKENLİKLERİNİN FOTOBİYOREAKTÖR KOŞULLARINDA KÜLTİVASYONLA KIYASLANMASI

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Özet

Spirulina, biyokütle kuru ağırlığının %60'ını aşan yüksek protein içeriği nedeniyle endüstriyel olarak üretilen fotosentetik bir algdir. Mevcut üretim hacmi, *Spirulina*'nın sürdürülebilir bir protein kaynağı olarak tam potansiyelini yansıtmamaktadır. Bu esas olarak yüksek üretim maliyetlerinden kaynaklanmaktadır. *Spirulina*, fotobiyoreaktörlerde süspansiyon halinde dış mekân koşullarında yetiştirilir. Endüstriyel üretkenlik ile ilgili parametreler yetiştirilen suştan suşa büyük değişkenlikler gösterdiği için sistem üretkenliğini büyük ölçüde suş seçimi belirlemektedir. Endüstriyel olarak kullanılan suşlar ticari gizlilik nedeniyle açıklanmadığından ve akademik araştırmalar için kullanılanlar neredeyse yalnızca yerel çevreden izole edildiğinden veya yerel kültür merkezlerinden elde edildiğinden, doğrudan kullanılabilir suş bilgileri oldukça sınırlıdır. Sunulan çalışma, büyük kültür toplama merkezlerinden temin edilen beş *Spirulina* suşunun protein verimliliğini tarayarak bu literatür boşluğunu doldurmayı amaçlamaktadır. Suşlar, kabarcık kolon fotobiyoreaktörde standartlaştırılmış proses koşulları altında kesikli olarak yetiştirilmiştir. Işık şiddeti, yetiştirme sıcaklığı ve havalandırma hızı sırasıyla 250 $\mu\text{mol}/\text{m}^2\text{-sn}$, 30°C ve 2 L/dk olarak sabitlenmiştir. Biyokütle konsantrasyonu ve protein içeriği, yetiştirme süresinin bir fonksiyonu olarak değerlendirilmiştir.

Nihai biyokütle konsantrasyonları 1,2 ila 1,9 g/L arasında değişmiştir ve suşa özgüdür. En yüksek biyokütle üretkenlikleri günde 0,15 ila 0,20 g/L arasında değişim göstermiştir. Kuru biyokütle oranı cinsinden protein içeriği suşlar arasında ve ayrıca yetiştirme süresiyle önemli ölçüde değişmiştir. Örneğin, bir suş log ve durağan büyüme fazlarında sırasıyla %35 ve %70 protein içeriğine sahipken, bir diğer suşun her iki aşamada da yaklaşık %40 protein içeriğine sahip olduğu görülmüştür. Sürekli yüksek protein içeriğine sahip olduğu belirlenen bir suşun on günlük yetiştirme süresince protein oranının %60 ila %64 arasında değiştiği belirlenmiştir. Nihai protein konsantrasyonları 0,4 g/L ile 1,4 g/L arasında değişmiştir. Maksimum protein üretkenliği günde yaklaşık 0,11 g/L olarak gözlemlenmiştir. Sonuçlar, suş seçiminin yüksek alg proteini üretkenliği oluşturmadaki kritik rolünü göstermektedir.

Anahtar Kelimeler: alg, *Spirulina*, protein, fotobiyoreaktör, kesikli yetiştirme

Abstract

Spirulina is a photosynthetic alga produced industrially for its high protein content, exceeding %60 of its biomass dry weight. The current production levels do not reflect *Spirulina*'s full potential as a sustainable protein source. This mainly results from high production costs. *Spirulina* is cultivated in outdoor conditions in suspension in photobioreactors. The production strain largely determines system productivity, as industrially relevant productivity metrics vary significantly at the strain level. Directly usable strain information is highly scarce as the industrially utilized strains are not disclosed due to commercial secrecy, and those used for academic research were almost exclusively isolated from the local environment or obtained from local culture centers. The presented work aims to fill this literature gap by screening the protein productivity of five *Spirulina* strains procured from major culture collection centers. The strains were cultivated in batch under standardized process conditions of a bubble column photobioreactor. The light intensity, cultivation temperature, and aeration rate were fixed at 250 $\mu\text{mol}/\text{m}^2\text{-sec}$, 30°C, and 2 L/min, respectively. The biomass concentration and protein content were assessed as a function of the cultivation time.

The final biomass concentrations varied from 1.2 to 1.9 g/L and were strain-specific. The peak biomass productivities ranged from 0.15 to 0.20 g/L-day. The protein contents varied significantly among the strains and also with the cultivation time. For example, while one strain had protein contents of 35% and 70% at the log and stationary growth phases, respectively, another had a protein content of about 40% at both stages. The strain with consistently high protein content generated a range of 60 to 64% during ten days of cultivation. The final protein concentrations ranged from 0.4 g/L to 1.4 g/L. The highest peak protein productivity was around 0.11 g/L-day. The results demonstrate strain selection's critical role in establishing high algal protein productivity.

Keywords: algae, *Spirulina*, protein, photobioreactor, batch growth



THE EFFECT OF PIRIMIPHOS METHYL ON TOTAL HEMOCYTE COUNTS IN FRESHWATER MUSSELS

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Abstract

Pesticides widely used in agriculture for pest control reach aquatic ecosystems, posing a risk to non-target aquatic species in this ecosystem. The toxic effects of pesticides can range from changes in a single cell to changes in the entire organism and even populations. Pirimiphos methyl is an effective and wide-spectrum organophosphorus pesticide, especially widely used to control mosquitoes. Therefore, the aim of this study is to determine the effect of pirimiphos methyl, which is also applied to aquatic ecosystems, on aquatic species by studying the total number of hemocytes in freshwater mussels. Freshwater mussels from fishermen, *Unio delicatus*, were tested after a two-week adaptation process. Mussels are placed in 10 L aquariums (5 mussels/L). The average weights of the freshwater mussels were 35.74 ± 1.45 g; their lengths were 64.50 ± 0.88 mm; their thicknesses were 32.52 ± 0.48 mm; and their heights were 25.74 ± 0.44 mm. There are two control groups in the study, control and solvent control. 10 mg/L and 25 mg/L pirimiphos methyl have been administered to aquariums. At the end of the 96-hour exposure period, hemolymph samples were taken from mussels in aquariums to determine total hemocyte count. Hemocyte cells were counted under a light microscope using the Thoma slide. A significant increase in total hemocyte counts compared to the control group was observed in the 10 mg/L pirimiphos methyl group, while a decrease in the 25 mg/L pirimiphos methyl group ($P < 0.05$). The results of this study show that pirimiphos methyl has a physiologically toxic effect on non-target species.

Key Words: Freshwater mussel, pirimiphos methyl, total hemocyte count

PİRİMİPHOS METHYL'İN TATLI SU MİDYELERİNDE TOPLAM HEMOSİT SAYISINA ETKİSİ

Özet

Tarımda haşere kontrolü için yaygın olarak kullanılan pestisitler, sucul ekosistemlere ulaşarak bu ekosistemdeki hedef dışı sucul türler için risk oluşturmaktadır. Pestisitlerin toksik etkileri tek bir hücredeki değişikliklerden tüm organizmadaki ve hatta popülasyonlardaki değişikliklere kadar ulaşabilir. Pirimiphos methyl, özellikle sivrisinekleri kontrol etmek için yaygın olarak kullanılan etkili ve geniş spektrumlu organofosforlu bir pestisittir. Bu nedenle, bu çalışmanın amacı sucul ekosistemlere de uygulaması gerçekleşen pirimiphos methylin sucul türler üzerindeki etkisi tatlı su midyelerindeki toplam hemosit sayısının incelenmesi ile tespit edilmesidir. Balıkçılardan temin edilen tatlı su midyeleri *Unio delicatus* iki haftalık adaptasyon sürecinden sonra deneye alınmıştır. Midyeler 10 L'lik akvaryumlara (5 midye/L) yerleştirilmiştir. Tatlı su midyelerinin ortalama ağırlıkları $35,74 \pm 1,45$ g; uzunlukları $64,50 \pm 0,88$ mm; kalınlıkları $32,52 \pm 0,48$ mm; yükseklikleri $25,74 \pm 0,44$ mm olarak tespit edilmiştir. Çalışmada kontrol ve solvent kontrol olmak üzere iki adet kontrol grubu bulunmaktadır. Akvaryumlara 10 mg/L ve 25 mg/L pirimiphos methyl uygulanmıştır. 96 saat maruziyet süresi sonunda midyeler akvaryumlardan alınarak toplam hemosit sayısını belirlemek için hemolemf örnekleri alınmıştır. Hemosit hücreleri, Thoma lamı kullanılarak ışık mikroskopunda sayılmıştır. Toplam hemosit sayısı kontrol gruplarına göre 10 mg/L pirimiphos methyl uygulanan grupta anlamlı bir artış gösterirken 25 mg/L pirimiphos methyl uygulanan grupta azalma meydana gelmiştir ($P < 0,05$). Bu çalışmanın sonuçları, pirimiphos methyl maddesinin hedef dışı türler üzerinde fizyolojik olarak toksik etki gösterdiğini ortaya koymaktadır.

Anahtar Kelimeler: Tatlı su midyesi, pirimiphos methyl, toplam hemosit sayısı

Introduction

Crop and livestock protection involves the use of organophosphate compounds, one of the most common chemical classes. Pirimiphos-methyl is among commonly used organophosphate pesticide. These pesticides' acute toxicity to the aquatic environment makes water contamination from them extremely concerning. Because of their discovery in groundwater and subsequent poisoning of hydrological systems, these compounds are included in many groundwater monitoring programs (Patakioutas et al. 2002).

Pesticides applied in agricultural and domestic areas contaminate aquatic ecosystems due to excessive use, unwanted accidents and surface runoff (Day and Scott, 1990). As a result of such contamination, effects on aquatic organisms may occur. These effects are in acute and chronic exposure and can range from non-lethal to lethal concentration values (McLoughlin et al. 2000).

Pirimiphos-methyl is a substance that hydrolyzes with its half-life varying at different pH values. It has been reported that it lasts up to 7.3 days at more acidic pH values and up to 62 days at more basic pH values (USEPA, 2006).

Mollusks with bivalve shells are frequently employed as sentinel species in the marine environment to identify xenobiotics. Bivalve hemocyte activities are frequently investigated as a final step in the study of xenobiotic stressors (Sauvé et al. 2002).

The aim of this study is to determine the effect of pirimiphos methyl, which is also applied to aquatic ecosystems, on aquatic species by studying the total number of hemocytes in freshwater mussels.

Materials and Methods

Freshwater mussels *Unio delicatus* (mean weight 35.74 ± 1.45 g; mean length 64.50 ± 0.88 mm; mean thickness 32.52 ± 0.48 mm; mean height 25.74 ± 0.44 mm) taken from Hatay (Türkiye) were used in this study. After brought to laboratory, the mussels were kept in the aquariums. After 15d of adaptation and acclimatization process to laboratory conditions, the mussels were taken to the experiment.

Mussels were exposed to sublethal concentrations of pirimiphos methyl (10 and 25 mg/L) for 96 h. The study also included control and solvent control groups. After 96h exposure, hemolymph fluid was taken from the mussels and the hemocytes were counted according to Yavuzcan and Benli (2004). All the data were distributed normally and the significance between the groups were analyzed one-way ANOVA.

Results and Discussion

In this study, the total hemocyte count parameter was used to evaluate the effects of pirimiphos methyl, a

pesticide, on the aquatic ecosystem. The change in total hemocyte numbers as a result of acute sublethal exposure of freshwater mussels to the substance pyrimiphos methyl was examined.

The change in the total number of hemocytes in freshwater mussels is shown in Figure 1. The total hemocyte count increased significantly in the 10 mg/L pyrimiphos methyl group compared to the control group, while a decrease occurred in the 25 mg/L pyrimifos methyl group ($P < 0.05$).

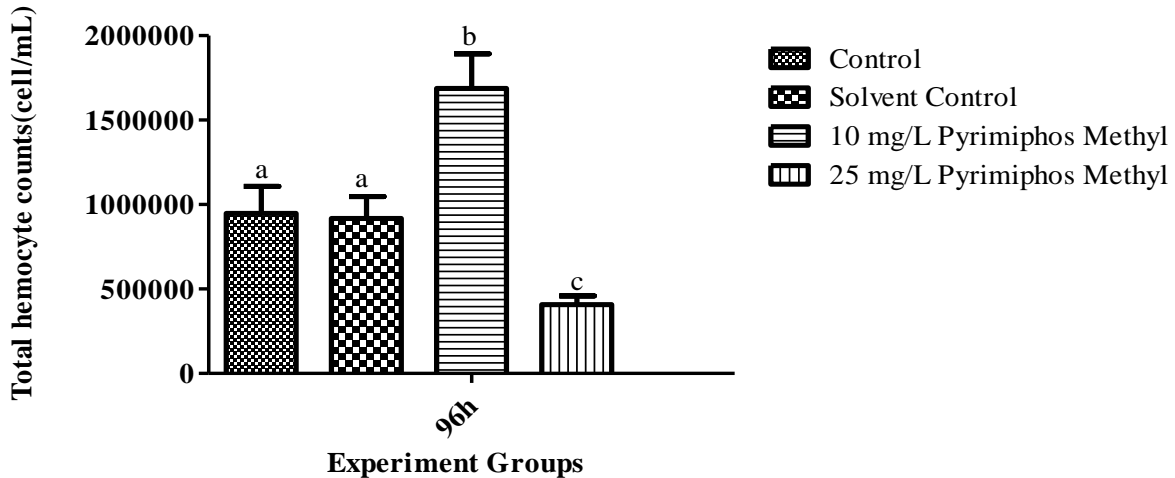


Figure 1. The total hemocyte counts (mean±SEM) in the freshwater mussels (different letters show the significance $P < 0.05$)

The total hemocyte count in circulation is a stress indicator, but this parameter varies in a way that is not specific to the natural rhythm of the environment, chemical and physicochemical stress (Moullac and Haffner, 2000). A study with snails showed an increase in the total number of hemocytes in snails exposed to the pesticide for 96 hours (Russo and Lagadic, 2004).

Conclusion

Hemocytes play important roles in the immune and antioxidative systems and can be easily affected by external factors such as pesticides. The functions of hemocytes in bivalves are often studied as the endpoint of xenobiotic stresses. This study demonstrated the potential effects of freshwater mussels *Unio delicatus* exposed to different sublethal concentrations of the pirimiphos methyl on total hemocyte counts. The results of this study show that pirimiphos methyl has a physiologically toxic effect on non-target species.

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THE HEMOLYMPH FLUID BIOCHEMICAL VALUES OF FRESHWATER MUSSELS: THE CASE OF PYRIPROXYPHEN EXPOSURE

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Abstract

Aquatic invertebrates have hemolymph fluid instead of the blood tissue found in vertebrates. There are hemocyte cells in the hemolymph fluid, which have characteristics similar to white blood cells. Any change in the living environment or health of the organisms causes a change in the number of hemocytes. While there are many studies examining the total number of hemocytes in aquatic organisms, the number of studies examining the biochemical parameters of hemolymph fluid is relatively limited. In this study, it was aimed to examine the changes in the hemolymph fluid biochemical parameters of freshwater mussels *Anodonta vescoiana*, an aquatic invertebrate species, due to pesticide exposure. Mussels obtained from fishermen were adapted and acclimated to laboratory conditions for two weeks. At the end of this period, mussels were placed in 10 L aquariums (5 mussels/L). The pesticide used within the scope of the study was pyriproxyfen and was applied to aquariums at 50 and 500 µg/L. The experiment also included a control and a solvent control. At the end of the 72-hour exposure period, hemolymph fluid was taken from freshwater mussels and total antioxidant status (TAS), total oxidative stress (TOS), glucose, aspartate aminotransferase (AST), and alanine aminotransferase (ALT)



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parameters were examined. While hemolymph TAS values of freshwater mussels showed a significant increase in the 50 µg/L pyriproxyfen applied group, TOS and glucose values showed a significant decrease due to the increase in pyriproxyfen concentration ($P<0.05$). Hemolymph AST and ALT values showed a significant decrease in the pyriproxyfen applied groups compared to the control groups ($P<0.05$). According to the results of this study, hemolymph biochemical parameters of freshwater mussels can be used as a biomarker in aquatic ecosystem pollution.

Key Words: Hemolymph biochemistry, TAS, TOS, ALT, AST



TATLI SU MİDYELERİNİN HEMOLEMF SIVISI BİYOKİMYASAL DEĞERLERİ: PYRİPROXYFEN MARUZİYET ÖRNEĞİ

Özet

Sucul omurgasız canlılarda omurgalı canlılardaki kan dokunun yerine hemolemf sıvısı bulunmaktadır. Hemolemf sıvısı içerisinde akyuvar hücrelerine benzer bir özellik gösteren hemosit hücreleri yer alır. Canlının yaşadığı ortamda veya canlının sağlığında herhangi bir değişiklikte hemosit sayılarında değişim meydana gelmektedir. Sucul canlılarda toplam hemosit sayısının incelendiği birçok çalışma yer alırken hemolemf sıvısı biyokimyasal parametrelerin incelendiği çalışma sayısı görece sınırlıdır. Bu çalışmada, sucul omurgasız canlı türlerinden tatlı su midyeleri *Anodonta vescoiana*'nın hemolemf sıvısı biyokimyasal parametrelerinin pestisit maruziyetindeki değişiminin incelenmesi amaçlanmıştır. Balıkçılardan temin edilen midyeler, laboratuvar koşullarına iki hafta süre ile adaptasyonu ve aklımasyonu sağlanmıştır. Bu süre sonunda, 10 L'lik akvaryumlara midyeler (5 midye/L) yerleştirilmiştir. Çalışma kapsamında kullanılan pestisit pyriproxyfen olup 50 ve 500 µg/L olarak akvaryumlara uygulanmıştır. Deneyde ayrıca kontrol ve solvent kontrol de bulunmaktadır. 72 saat maruziyet süresinin sonunda tatlı su midyelerinden hemolemf sıvısı alınarak toplam antioksidan durumu (TAS), toplam oksidatif stres (TOS), glukoz, aspartat aminotransferaz (AST), alanin aminotransferaz (ALT) parametreleri incelenmiştir. Tatlı su midyelerinin hemolemf TAS değerleri 50 µg/L pyriproxyfen uygulanan grupta anlamlı bir artış gösterirken TOS ve glukoz değerleri pyriproxyfen konsantrasyonunun artmasına bağlı olarak önemli bir azalma göstermiştir ($P<0,05$). Hemolemf AST ve ALT değerleri ise kontrol gruplarına göre pyriproxyfen uygulanan gruplarda önemli bir azalma göstermiştir ($P<0,05$). Bu çalışmanın sonuçlarına göre, tatlı su midyelerinin hemolemf biyokimyasal parametreleri sucul ekosistem kirlenmesinde bir biyobelirteç olarak kullanılabilir.

Anahtar Kelimeler: Hemolemf biyokimyası, TAS, TOS, ALT, AST

Acknowledgments: *Gülsüm Batmaz was supported by TÜBİTAK 2211-A Domestic Doctoral Scholarship Program 2022/1.*

Introduction

Biochemical parameters of aquatic invertebrates can be used as a biological marker to detect pollution in many aquatic environments, as exposure to pollutants affects these parameters. It has been shown that while some hemolymph biochemical parameters decrease when exposed to different types of pollutants at different levels, the activity of enzymes in organs responsible for detoxification such as the hepatopancreas also decreases (Altöfen et al. 2023).

Pyriproxyfen is used as an alternative to organophosphate and pyrethroid-derived insecticides, especially in the public health field. Pyriproxyfen is an insecticide used in many countries to control pests in agricultural products such as cotton, oranges and almonds, and pests such as cockroaches and fleas in indoor spaces. One of its most common uses is in the field of public health against mosquitoes that cause diseases such as yellow fever and malaria (Salesa et al. 2023) It is also applied to control pests in the larval stage by using it in drinking water sources (10 and 100 µg/L) (Lajmanovich et al., 2019; Salesa et al. 2023). It is also one of the insect growth-regulating insecticides that prevents the pupation of an insect in the larval stage. Therefore, it is an endocrine disruptor. (Sullivan and Goh, 2008).

There are a limited number of studies investigating the mode of action in non-target animal species other than insects. It has been reported that it causes negative effects on embryos and adults in studies conducted with terrestrial species such as aquatic organisms such as water fleas (Salesa et al. 2023) and zebrafish (Dzieciolowska et al. 2017). The aim of this study is to examine the effects of the acute-term effect of pyriproxyfen applied to freshwater mussels (*Anodonta vescoiana*) at sublethal concentrations on hemolymph tissue biochemistry.

Materials and Methods

Freshwater mussels *Anodonta vescoiana* (n=20, mean weight 22.30 ± 7.83 and mean length 4.59 ± 0.84 cm) were obtained from fishermen in Bursa and brought to Gazi University, Gazi Faculty of Education, Biology Education Laboratories. In the laboratory, they were placed in two 20 L aquariums (10 mussels/aquarium), the water of which had previously been rested and dechlorinated. After a two-week adaptation and acclimatization process to laboratory conditions, the mussels were taken to the experimental environment.

Studies conducted with mussels are briefly shown in Figure 1. Mussels were exposed to sublethal concentrations of pyriproxyfen (50 and 500 µg/L) for 72 h. The study also included control and solvent control groups. At the end of the exposure period, the hemolymph fluid of the mussels was taken and the biochemical parameters of total antioxidant status (TAS, Rel Assay, RL0017), total oxidant status (TOS, Rel Assay, RL0024), glucose (Otto Scientific, OttoBC142), aspartate aminotransferase (Otto Scientific, OttoBC127), and alanine aminotransferase (Otto Scientific, OttoBC128) were studied. The values obtained as a result of colorimetric readings were calculated according to the kit procedures. Statistical analyzes were performed in IBM SPSS 20 program. Since the data showed normal distribution, the degree of significance between the groups was evaluated with one-way ANOVA. The graphs were drawn using GraphPad Prism 5 program. The columns in the graphs show the mean value and standard error.

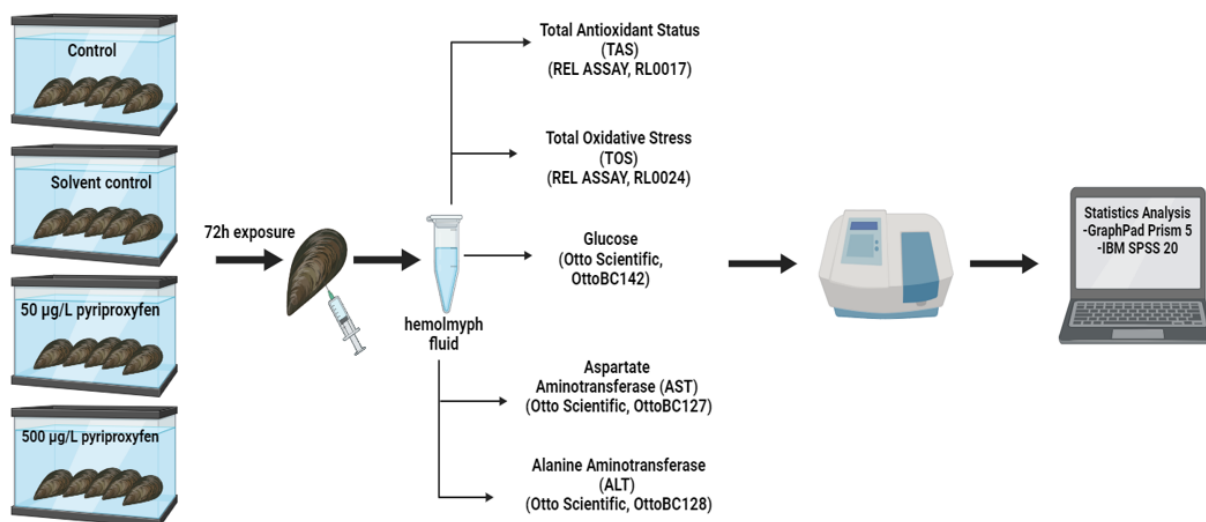


Figure 1. The summary of the methods

Results and Discussion

In this study, the suitability of hemolymph biochemistry parameters of freshwater mussels, an aquatic invertebrate, for use in ecotoxicological studies and biological monitoring studies was examined with exposure to pyriproxyfen, an insecticide.

The hemolymph TAS values of the experimental and control groups are shown in Figure 2. The hemolymph TAS values showed a significant increase in the group exposed to low concentration pyriproxyfen compared to the control groups ($P < 0.05$).

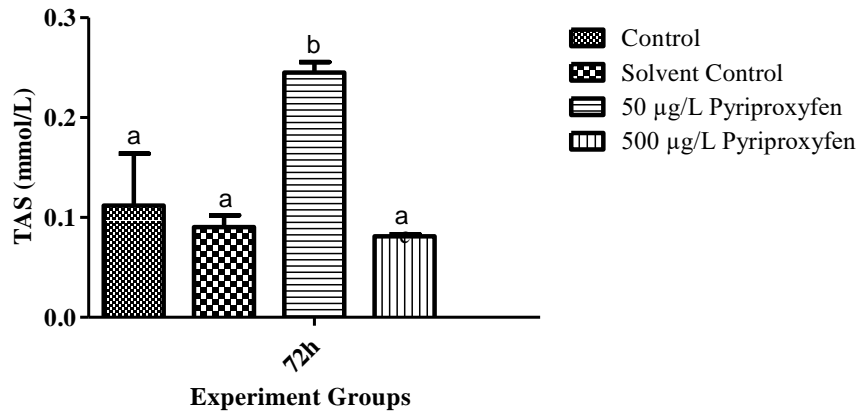


Figure 2. The TAS results of experimental and control groups (different letters show significant: $P < 0.05$)

The hemolymph TOS values of the experimental and control groups are shown in Figure 3. The hemolymph TOS values showed a significant decrease in the pyriproxyfen applied groups compared to the control groups ($P < 0.05$).

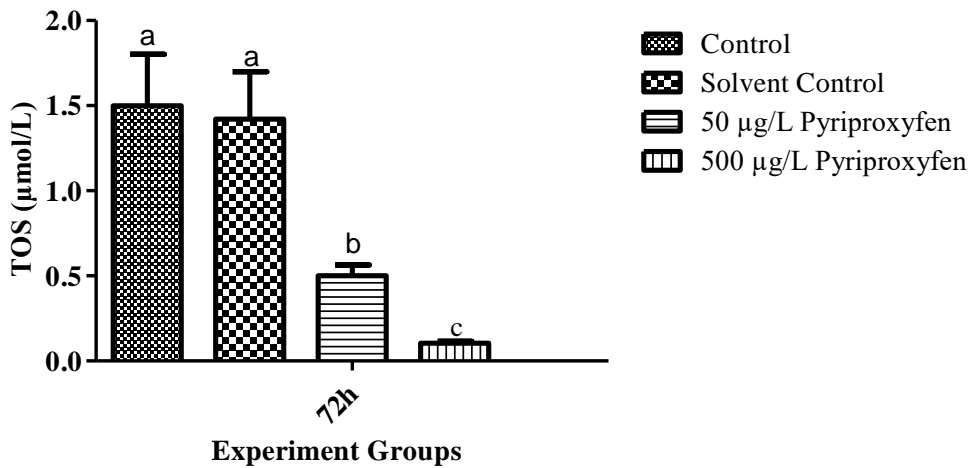


Figure 3. The TOS results of experimental and control groups (different letters show significant: $P < 0.05$)

Under normal conditions, cells neutralize reactive oxygen species (ROS) with antioxidant defense systems to eliminate free radicals. If these radicals are produced more than normal and antioxidant systems are inadequate, cells will suffer oxidative damage. As a result, protein, carbohydrate, lipid or nucleic acid metabolisms are damaged. Insecticide-derived chemical substances change the ROS balance in the cell and cause oxidative stress in many living things. TAS and TOS values of organisms indicate the antioxidant and oxidative stress status of an organism (Rahim et al. 2022; Arslan and Günal, 2023). In this study, as in other studies in the literature, it was determined that there was a decrease in TAS and TOS values.

The hemolymph glucose values of the experimental and control groups are shown in Figure 4. The hemolymph glucose values showed a significant decrease in the pyriproxyfen applied groups compared to the control groups ($P < 0.05$).

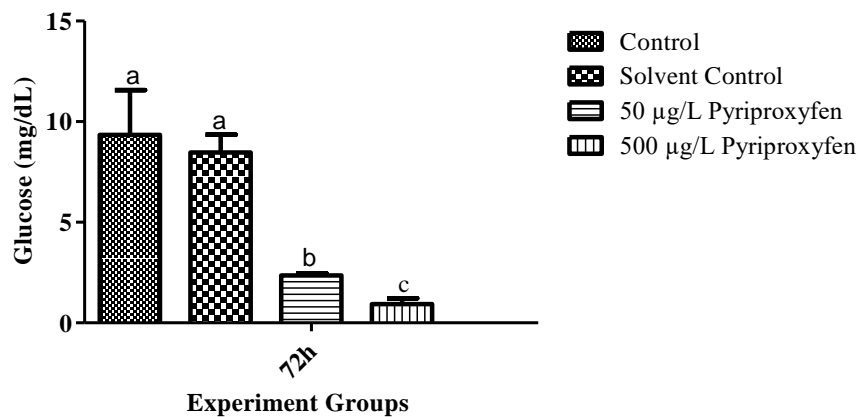


Figure 4. The glucose results of experimental and control groups (different letters show significant: $P < 0.05$)

Glucose is an important nutrient in the cultivation of freshwater invertebrates, especially economically important species. Increased growth and survival rates are seen in freshwater invertebrates with the addition of glucose to the diet. As a result of this study, it was observed that there was a decrease in hemolymph glucose concentration values. The results of this study are similar to studies in which different species are exposed to pollutants. Hemolymph tissue glucose values in freshwater shrimp (*Macrobrachium nipponense*) exposed to iron, copper, lead, and cadmium were lower than in control groups (Altöfen et al. 2023).

The hemolymph AST values of the experimental and control groups are shown in Figure 5. The hemolymph AST values showed a significant decrease in the group exposed high concentration pyriproxyfen compared to the control groups ($P < 0.05$).

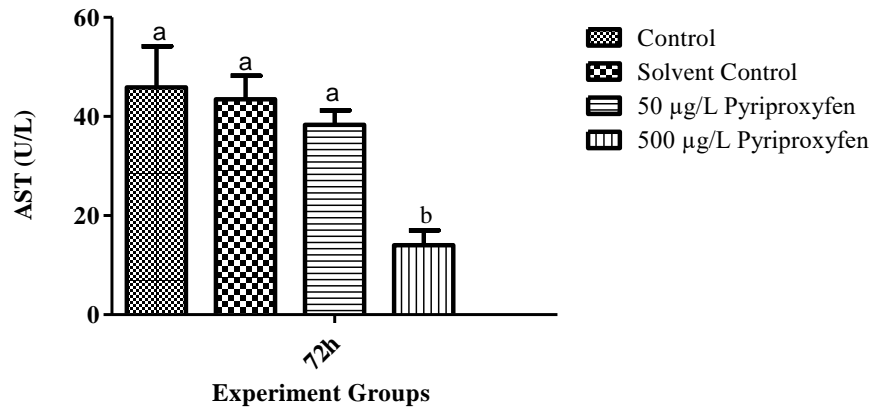


Figure 5. The AST results of experimental and control groups (different letters show significant: $P<0.05$)

The hemolymph ALT values of the experimental and control groups are shown in Figure 6. The hemolymph ALT values showed a significant decrease in the pyriproxyfen applied groups compared to the control groups ($P<0.05$).

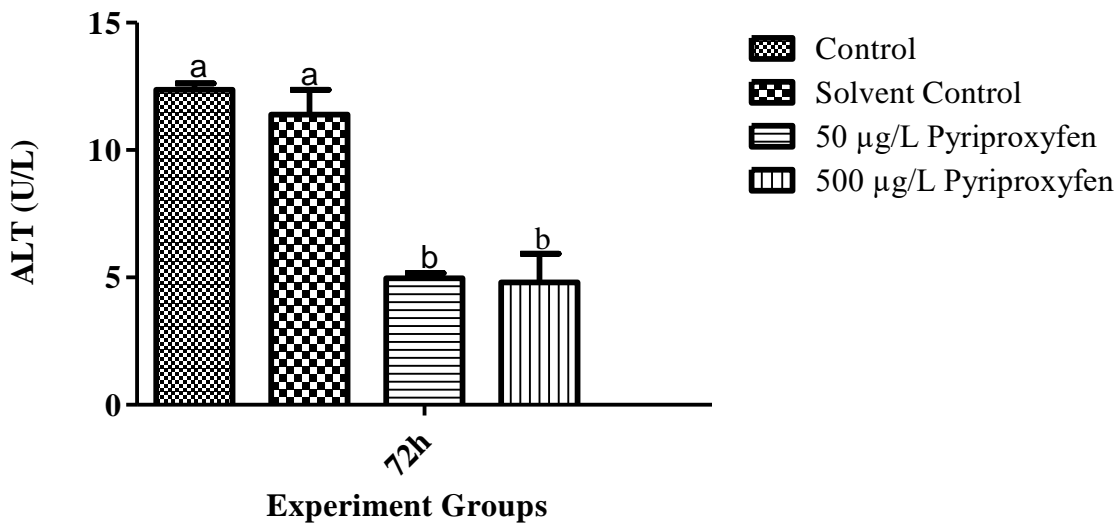


Figure 6. The ALT results of experimental and control groups (different letters show significant: $P<0.05$)



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

The hemolymph tissue AST and ALT values in freshwater shrimp (*M. nipponense*) exposed to iron, copper, lead, and cadmium were lower than the control groups (Altofen et al. 2023). In freshwater crayfish (*Astacus leptodactylus*) exposed to microplastics, hemolymph tissue AST and ALT values were found to be higher than in control groups (Gholamhosseini et al. 2023). The results obtained in limited studies examining the hemolymph tissue AST and ALT parameters of aquatic organisms are similar to our findings but also differ. This may be due to the different types of substances applied.

Conclusion

This study demonstrated the potential effects of freshwater mussels *Anodonta vescoiana* exposed to different sublethal concentrations of the insecticide pyriproxyfen on the biochemical parameters TAS, TOS, glucose, AST, and ALT. It was observed that hemolymph biochemistry parameters decreased in mussels exposed to insecticide. The information obtained in this study can be a resource for examining biochemical response responses between tissues by examining the same biochemical parameters in different tissues.



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YENİ KUMARİN-PİRAZOL TÜREVLERİNİN SENTEZİ, KARAKTERİZASYONU VE ANTİBAKTERİYEL AKTİVİTESİNİN İNCELENMESİ

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Özet

Pirazol türevleri, biyolojik aktivite çeşitliliği nedeniyle birçok ilaç etken maddesi olarak kullanılmıştır. Bu nedenle, pirazoller ile ilgili kimyasal yapıları ve biyolojik aktiviteleri üzerine pek çok literatür çalışması bulunmaktadır. Kumarin, doğal kaynaklarda bulunan bir benzopyron türevidir ve çeşitli biyolojik aktivitelere sahiptir. Antioksidan, anti-inflamatuar ve antikoagülan özellikleriyle bilinen kumarin, özellikle bitkilerde ve bazı mantar türlerinde bulunmaktadır. Kumarinler, tıbbi alanda kan pıhtılaşmasını önleyici etkisi nedeniyle antikoagülan ilaçlarda kullanılmıştır. Bu çalışma, çeşitli biyolojik aktiviteleri olan pirazol ve kumarin gruplarını tek bir bileşikte birleştirerek daha yüksek biyolojik aktivite potansiyeline sahip yeni hibrit bileşiklerin sentezi amacıyla yapılmıştır. Bu amaç doğrultusunda ilk aşamada, 3-(1-(2-(benzo[d]tiyazol-2-il)hidrazono)etil)-2H-kromen-2-on (1) bileşiğinden yola çıkarak başlangıç bileşiği olan 1-(benzo[d]tiyazol-2-il)-3-(2-okso-2H-kromen-3-il)-1H-pirazol-4-karbaldehit (2) uygun koşullar altında sentezlenmiştir. İkinci aşamada ise 2 bileşiği, çeşitli aromatik hidrazinler ile etkileştirilerek yeni pirazol-kumarin türevleri (3-10) elde edilmiştir. Bu çalışmada sentezlenen tüm bileşiklerin yapıları, FT-IR, ¹H-NMR, ¹³C-NMR ve Kütle Spektroskopisi teknikleri kullanılarak karakterize edilmiştir. Çalışmanın son aşamasında, sentezlenen pirazol-kumarin türevleri gram-negatif (*Escherichia coli*) ve gram-pozitif (*Staphylococcus aureus*) bakterilerine karşı disk difüzyon yöntemiyle dimetilsülfoksit (DMSO) veya dimetilformamit (DMF) çözücülerinin kullanımıyla aktiviteleri değerlendirilmiştir. Sonuç olarak, bu çalışmada ilk defa sentezlenen pirazol-kumarin türevlerinin içerdiği fonksiyonel gruplara bağlı olarak zayıf-orta düzeyde antibakteriyel aktivite gösterdikleri ve ilerleyen çalışmalarda farklı türevlerin eldesi ile daha yüksek antibakteriyel aktivite elde edilebileceği sonucuna ulaşılmıştır.

Anahtar Kelimeler: Pirazol, Kumarin, Pirazol-Kumarin Türevleri, Antibakteriyel Aktivite



SYNTHESIS, CHARACTERIZATION, AND INVESTIGATION OF THE ANTIBACTERIAL ACTIVITY OF NOVEL COUMARIN-PYRAZOLE DERIVATIVES

Abstract

Pyrazole derivatives have been utilized as active ingredients in numerous pharmaceuticals due to their diverse biological activities. Consequently, there is a considerable body of literature on the chemical structures and biological activities of pyrazoles. Coumarin, a benzopyrone derivative found in natural sources, exhibits various biological activities, including antioxidant, anti-inflammatory, and anticoagulant properties. Coumarins, known for their anticoagulant effect preventing blood clotting, have been employed in anticoagulant drugs in the medical field, particularly in plants and certain fungal species. This study aims to synthesize new hybrid compounds with higher potential for biological activity by combining pyrazole and coumarin groups, each possessing various biological activities, into a single compound. In the initial phase, the starting compound 1-(benzo[d]thiazol-2-yl)-3-(2-oxo-2H-chromen-3-yl)-1H-pyrazol-4-carbaldehyde (2) was synthesized from 3-(1-(2-(benzo[d]thiazol-2-yl)hydrazono)ethyl)-2H-chromen-2-one (1) under appropriate conditions. In the second stage, compound 2 was reacted with various aromatic hydrazines to obtain new pyrazole-coumarin derivatives (3-10). All compounds synthesized were characterized using FT-IR, $^1\text{H-NMR}$, $^{13}\text{C-NMR}$, and Mass Spectroscopy techniques. In the final phase of the study, the antibacterial activities of the synthesized pyrazole-coumarin derivatives against gram-negative (*Escherichia coli*) and gram-positive (*Staphylococcus aureus*) bacteria were evaluated by the disc diffusion method using dimethyl sulfoxide (DMSO) or dimethylformamide (DMF) solvents. The results suggest that the newly synthesized pyrazole-coumarin derivatives, for the first time in this study, exhibit weak to moderate antibacterial activity depending on the functional groups present. Further studies involving the synthesis of different derivatives may lead to compounds with higher antibacterial activity.

Keywords: Pyrazole, Coumarin, Pyrazole-Coumarin Derivatives, Antibacterial Activity

GİRİŞ

Bitkilerde ve belirli mantar türlerinde bulunan kumarin heterosiklik bileşiklerin sınıfını α -benzopiron türevleridir. Genellikle bitkilerin gövde, yaprak ve tohum gibi farklı kısımlarında bulunurlar. Kumarin ve türevleri anti-inflamatuar, antikoagülan, anti-paraziter, antimikrobiyal, antitümör ve antioksidan gibi çeşitli biyolojik aktivitelere sahip olduğu için tıbbi uygulamalarda kullanılmaktadır. (Hooper, Wolfson, McHugh, Winters, & Swartz, 1982; Salwan & Sharma, 2020).

Pirazol, beş halkalı bir yapıya sahip olan ve önemli bir heterosiklik bileşen olarak sınıflandırılan bir organik bileşiktir. Bu bileşik, doğal olarak birçok bitki türünde ve sentetik olarak birçok ilaç ve biyolojik etkili molekülde bulunur. Pirazol ve türevleri, antikanser (Alam et al., 2022; Tołoczko-Iwaniuk, Dziemiańczyk-Pakieła, Nowaszewska, Celińska-Janowicz, & Miltyk, 2019), antioksidan (Zebbiche et al., 2022), antidepresan (Polish et al., 2020), antimikrobiyal (A. Bekhit, Hymete, El-Din A. Bekhit, Damtew, & Y. Aboul-Enein, 2010; Bennani et al., 2022), anti-inflamatuar (Mantzanidou, Pontiki, & Hadjipavlou-Litina, 2021), antiviral (Karati, Mahadik, & Kumar, 2022), antikonvülsan (Gao, Qu, Zhang, & Wang, 2021), antipiretik ve analjezik (Bekhit et al., 2022) gibi çeşitli biyolojik aktivitelere sahip olmaları nedeniyle farklı tıbbi alanlarda kullanımına yol açmıştır.

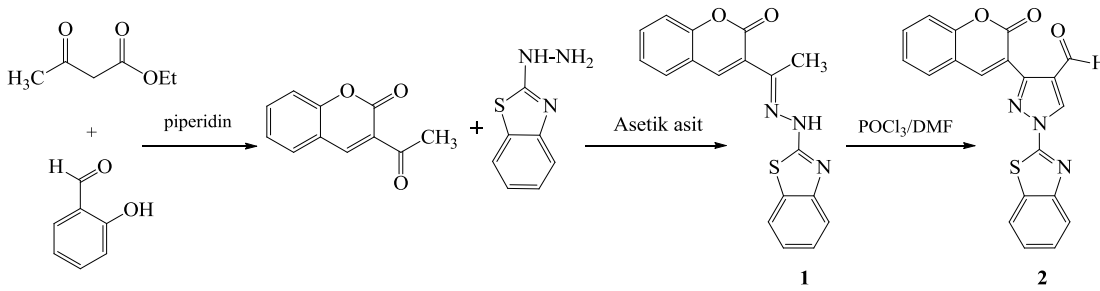
Antibakteriyel ilaçların geliştirilmesi, bakteriyel enfeksiyonların tedavisi açısından kritik bir öneme sahiptir. Antibakteriyel ilaçlar, bakterilerin büyümesini veya çoğalmasını engelleyerek veya öldürerek enfeksiyonu tedavi etmeye yardımcı olmaktadır. Ancak, etkili antibiyotiklerin bulunmaması bakterilerin direnci artırmıştır. Bu nedenle, antibiyotik direnciyle mücadele etmek için yeni tedavilerin geliştirilmesi büyük bir önem arz etmektedir (Silver, 2011; Salwan & Sharma, 2020; Centers for Disease Control and Prevention (U.S.), 2019).

Bu çalışmada kumarin ve pirazol moleküllerinin tek bir yapı üzerinde birleştirilerek daha yüksek biyolojik aktiviteye sahip hibrit bileşiklerin sentezi, FT-IR, NMR ve Kütle spektrometresi yöntemleri aracılığıyla yapılarının karakterize edilmesi amaçlanmakta ve antibakteriyel aktivitesi incelenmektedir. Bunun için bu türevlerinin sentezi için ilk adım olarak Vilsmeier-Haack reaksiyonu kullanılarak pirazol-4-karbaldehit başlangıç (2) bileşiği elde edilmiştir. Ardından başlangıç bileşiği (2), çeşitli hidrazit ve hidrazin türevleriyle reaksiyona sokularak yeni kumarin-pirazol hibrit türevleri sentezi gerçekleştirilmiştir. Bu çalışmada tüm bileşiklerin hem DMSO'da hem de DMF'de çözülerek antibakteriyel aktiviteleri disk difüzyon yöntemi ile incelenmiştir.

SONUÇ VE TARTIŞMA

Bu çalışmanın ilk kısmında pirazol-4-karbaldehit (2) başlangıç bileşiğinin sentezi 3 aşamada gerçekleştirilmiştir (

Şekil (1). Birinci aşamada, 3-asetil kumarin bileşiği Knoevenagel yöntemi kullanılarak elde edilmiştir (Ismiyarto et al., 2019). İkinci aşamada, Wolff-Kishner reaksiyonundan yararlanılarak 3-asetil kumarin ve 2-hidrazinobenzotiyazol hidrazonu (1) sentezlenmiştir (Elsayed, El-Gharabawy, Butler, & Atlam, 2020). Üçüncü aşamada ise hidrazon (1) bileşiğinden yola çıkılarak pirazol-4-karbaldehit türevi elde edilmiştir. Çalışmamızda hidrazon (1) ve pirazol-4-karbaldehitin (2) sentezi farklı koşullar altında gerçekleştirilerek verimleri arttırılmıştır. Kullanılan yöntemlere göre bileşiklerin reaksiyon süresi, sıcaklığı ve verimi Tablo (1)'de verilmiştir.



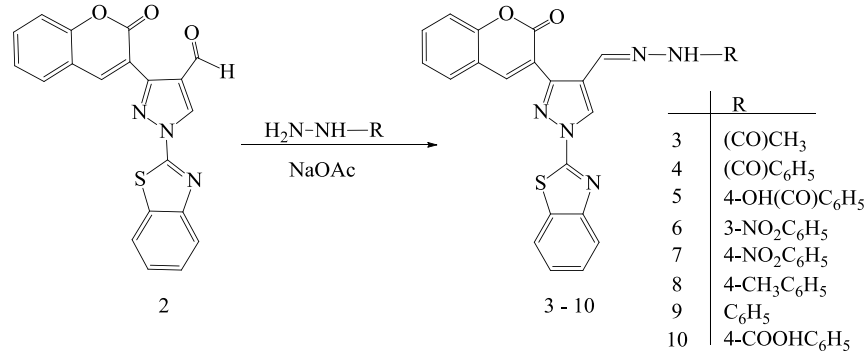
Şekil (1): Piazol-4-Karbaldehit (2) Bileşiğinin Sentez Aşamaları

Tablo (1): kullanılan yöntemlere göre Hidrazon (1) ve pirazole-4-karbaldehit (2) bileşiklerin reaksiyon süresi, sıcaklığı ve verimi

Bileşikler	Yöntem	Reaksiyon Süre (saat)	Sıcaklık °C	Verim %
1	Karıştırma	2	0 – 5	90,25
		1,5	25	94,65
	Reflüks	2	90	89,59
2	Karıştırma	15	25	16,95
		5	60	76,77
	Reflüks	3	70	77
		3	80	84,7
		3	90	56,5

Çalışmamızın ikinci kısmında ise başlangıç bileşiği olan 2 bileşiğinin, çeşitli hidrazit ve aromatik hidrazinlerle etkileştirilmesi sonucunda sekiz tane kumarin-pirazol türevi (3 - 10) sentezlenmiştir (

Şekil (). Elde edilen tüm bileşiklerin reaksiyon süresi, sıcaklığı ve verimi Tablo ()'de özetlenmiştir.



Şekil (2): Kumarin-Pirazol Bileşiklerin Reaksiyon Şeması

Tablo (2): Kumarin-Pirazol bileşiklerinin reaksiyon süresi, sıcaklığı ve verimi

Bileşikler	Hidrazit/Hidrazon	Reaksiyon süresi (saat)	Sıcaklık °C	Verim %
3	Asetohidrazit	1	90	56,27
4	Benzohidrazit	2	90	73,56
5	4-hidroksibenzohidrazit	3	90	70,88
6	3-nitrofenilhidrazin	7	90	80,60
7	4-nitrofenilhidrazin	5	90	65,33
8	4-metilfenilhidrazin	6	90	79,50
9	Fenilhidrazin	7	90	71,50
10	4-hidrazinilbenzoik asit	6	90	77,53

FT-IR spektrumu incelendiğinde, **1** bileşiğinde öne çıkan gruplar 3488 - 3415 cm⁻¹ aralığında NH gerilme titreşimleri ve 1734 cm⁻¹'de ester karbonil grubu gerilme titreşimleri gözlenmektedir. **2** bileşiğinin FT-IR spektrumunda ise, 1729 cm⁻¹'de ester karbonil grubu gerilme titreşimi ve 1690 cm⁻¹'de aldehit karbonil grubu gerilme titreşimi gözlenmektedir. Kumarin-pirazol türevlerinin (**3 - 10**) FT-IR spektrumuna bakıldığında, 3446 - 3139 cm⁻¹ aralığında NH gerilme titreşimleri, 1734 - 1729 cm⁻¹ aralığında ester karbonil grubu gerilme titreşimleri görülürken 1715 - 1701 cm⁻¹ aralığında amit karbonil grubu gerilme titreşimleri gözlenmektedir. **10** bileşiğindeki karboksilli asit karbonil grubu gerilme titreşimi ise 1677 cm⁻¹'de gözlenmektedir. **5** bileşiğinin OH grubu gerilme titreşimleri 3183 cm⁻¹'de ve **10** bileşiğinin OH grubu gerilme titreşimleri ise 3278 cm⁻¹'de gözlenmektedir (Jain, Gupta, & Agarwal, 2017; Nandiyanto, Oktiani, & Ragadhita, 2019).

1 bileşiğine ait ¹H-NMR spektrumu incelendiğinde yapıda oluşan rezonanstı dolayı NH protonu gözükmemektedir. Ayrıca molekülün yapısında bulunan metil grubu protonlarının 2,39 ppm'de sinyal verdiği

görülmektedir. **2** bileşiğinin spektrumunda 10,00 ppm'de gözlenen sinyal aldehit protonuna karşılık gelmektedir. Pirazol C₅ karbonuna bağlı proton 9,41 ppm'de sinyal vermektedir. Kumarin-pirazol türevlerinin (**3 - 10**) spektrumu incelendiğinde ise NH grubu protonlarının 11,87 - 10,21 ppm arasında, $\underline{\text{C}}\text{H}=\text{N}-\text{N}$ protonlarının ise 9,19 - 8,98 ppm arasında singlet olarak sinyal verdiği görülmektedir. **3** ve **8** bileşiklerinin yapısında bulunan metil grubu (-CH₃) protonları sırasıyla 1,78 ve 2,13 ppm'de sinyal verirken **5** bileşiğinin yapısında bulunan hidroksil grubunun (-OH) ise 10,11 ppm'de sinyal verdiği görülmektedir (Gunawan & Nandiyanto, 2021; Jain et al., 2017).

Hidrazon (**1**) bileşiğinin ¹³C-NMR spektrumu incelendiğinde; benzotiyazol C₂ karbonuna ait sinyal 168,55 ppm'de gözlenmektedir. Ester karboniline ait sinyal 159,65 ppm'de görülmektedir. Moleküldeki CH₃ grubu ise 16,98 ppm'de sinyal vermektedir. Pirazol-4-karbaldehit (**2**) bileşiğinin spektrumunda; Benzotiyazol C₂ karbonuna ait sinyal 159,35 ppm'de gözlenirken ester karbonili 159,31 ppm'de sinyal vermektedir. 185,81 ppm'de gözlenen sinyal aldehit karboniline karşılık gelmektedir. Kumarin-pirazol bileşiklerinin (**3 - 10**) spektrum değerlerine baktığımızda, benzotiyazol C₂ karbonuna ait sinyaller 159,84-159,25 ppm arasında gözlenmektedir. Ester karboniline ait sinyaller ise 159,28-159,14 ppm aralığında görülmektedir. Amit karbonil karbonları 171,91-159,62 ppm aralığında sinyal vermektedir. **10** bileşiğindeki karboksilli asit karbonil karbonu 167,67 ppm'de sinyal verirken, $\underline{\text{C}}\text{H}=\text{N}-\text{N}$ karbonlarının 145,41-143,24 ppm aralığında sinyal verdiği gözlenmektedir. **3** bileşiğindeki CH₃ grubu 20,13 ppm'de sinyal verirken, **8** bileşiğindeki CH₃ grubu karbonuna ait sinyal 20,64 ppm'de görülmektedir (Gunawan & Nandiyanto, 2021).

Elde edilen tüm bileşiklerin Kütle spektrumunda moleküler iyon piki, tam olarak molekül ağırlığı ile örtüşmektedir.

Karakterizasyon sonrası yapıları aydınlatılan bileşiklerin (**2 - 10**), gram-negatif (*E. coli*) ve gram-pozitif (*S. aureus*) bakterilerine karşı *in vitro* olarak antibakteriyel aktiviteleri incelenmiştir. kontrol olarak kloramfenikol (C-30) 30 µg/disk ve tetrasiklin (TE-30) 30 µg/disk kullanılmıştır (Aminzare, Moniri, Hassanzad Azar, & Mehrasbi, 2022; Karaca, Kocabas, & Akay, 2022). Kontrol antibiyotiklerin etki sonuçları Tablo (3)'te verilmiştir.

DMSO'da çözünen bileşiklerden *E. coli* bakterisine karşı en yüksek antibakteriyel etkiyi **4** numaralı bileşik göstermiş ve 11 mm değerinde aktivite gözlenmiştir. **2**, **5**, **7** ve **8** numaralı bileşikler ise 10 mm değerinde antibakteriyel etki göstermiştir. **6** ve **10** numaralı bileşiklerin antibakteriyel etkisi ise 9 mm olarak belirlenmiştir. **9** numaralı bileşiğin antibakteriyel etkisi 7 mm olarak belirlenmiştir. Ancak, bu bileşiklerin kloramfenikol ve tetrasiklin referans antibiyotiklere karşı etkileri daha düşük bulunmuştur. Ayrıca, **3** numaralı bileşiğin ve çözücünün *E. coli*'a karşı herhangi bir aktivitesi tespit edilmemiştir. DMSO'da çözünen

bileşiklerden *S. aureus* bakterisine karşı en yüksek antibakteriyel etki **6** ve **8** numaralı bileşikler göstermiş ve 13 mm değerinde bir aktivite gözlenmiştir. **10** numaralı bileşik ise 12 mm değerinde antibakteriyel etki göstermiştir. **7** bileşiklerinin antibakteriyel etkisi 11 mm, **2**, **5** ve **9** bileşiklerin antibakteriyel etkisi 10 mm olarak gösterirken **4** bileşiği 8 mm değerinde antibakteriyel etki gösterdiği belirlenmiştir. Ancak, yine de bu bileşiklerin kloramfenikol ve tetrasiklin referans antibiyotiklere karşı etkileri daha düşük olarak tespit edilmiştir. Ayrıca, **3** numaralı bileşiğin ve çözücünün *S. aureus*'a karşı herhangi bir aktivitesi bulunmamıştır Tablo ().

Tablo (3): Antibiyotiklerin Antibakteriyel Aktivite Sonuçları

Antibiyotik	İnhibisyon zonu (mm)	
	<i>E. coli</i>	<i>S. aureus</i>
Kloramfenikol (C-30)	25	30
Tetrasiklin (TE-30)	22	28

Tablo (4): Bileşiklerin Antibakteriyel Aktivite Sonuçları

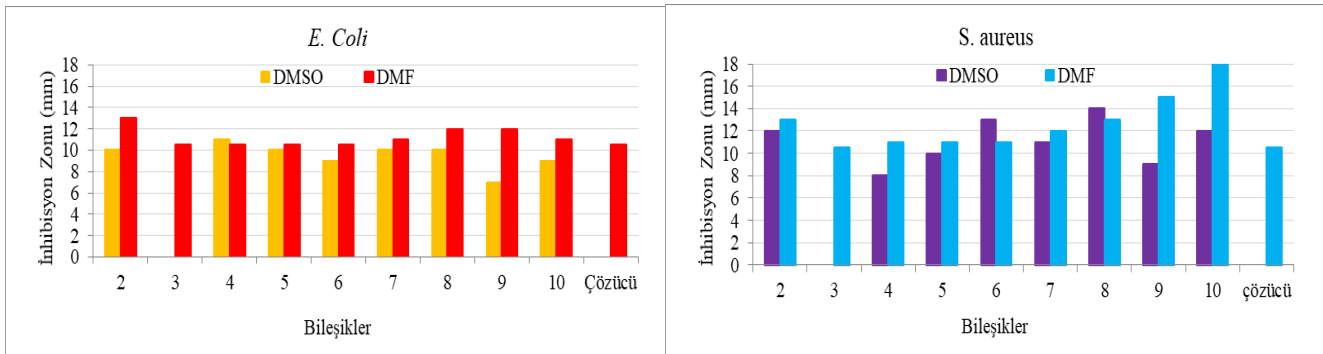
Bileşikler	DMF		DMSO	
	<i>E. coli</i>	<i>S. aureus</i>	<i>E. coli</i>	<i>S. aureus</i>
2	12	10	10	10
3	10	9,5	-	-
4	9	10	11	8
5	9	10	10	10
6	9	10	9	13
7	10	11	10	11
8	11	11	10	13
9	11	15	7	10
10	11	17	9	12
Çözücü	9	9,5	-	-

DMF'da çözünen bileşiklerden *E. coli* bakterisine karşı en yüksek antibakteriyel etkiyi **2** numaralı bileşik göstermiş ve 12 mm değerinde bir aktivite gözlenmiştir. **8**, **9** ve **10** numaralı bileşikler ise 11 mm değerinde antibakteriyel etki göstermiştir. **3** ve **7** numaralı bileşiklerin etkileri 10 mm olarak belirlenmiştir. **4**, **5** ve **6** numaralı bileşiklerin değeri 9 mm, DMF çözeltisinin değeri ile aynıdır. Ancak, bu bileşiklerin kloramfenikol ve tetrasiklin referans antibiyotiklerine karşı etkileri daha düşük bulunmuştur. DMF'da çözünen bileşiklerden *S. aureus* bakterisine karşı en yüksek antimikrobiyal etkiyi **10** numaralı bileşik göstermiş ve 17 mm değerinde bir aktivite gözlenmiştir. **9** numaralı bileşiğin antibakteriyel etkisi ise 15 mm olarak belirlenmiştir. **7** ve **8** numaralı bileşiklerin antimikrobiyal etkileri 11 mm değerinde göstermiştir. **2**, **4**, **5** ve **6** numaralı bileşikler 10 mm değerinde, **3** bileşiği ve çözücü ise 9,5 mm değerinde antibakteriyel etki

belirlenmiştir. Bu bileşiklerin kloramfenikol ve tetrasiklin referans antibiyotiklerine karşı etkileri düşük olduğu bulunmuştur Tablo ().

Çalışmamızdaki antibakteriyel aktivite değerlendirmeleri için kumarin-pirazol bileşiklerinin inhibisyon zonları ölçülmüştür. İnhibisyon zonu ≤ 12 mm olan sonuçlar zayıf antibakteriyel aktiviteyi, $12 \text{ mm} <$ inhibisyon zonu > 20 mm olan sonuçlar orta derecede antibakteriyel aktiviteyi, inhibisyon zonu ≥ 20 mm olan sonuçlar ise güçlü antibakteriyel aktiviteyi ifade etmektedir (Aminzare et al., 2022).

Sonuç olarak, elde edilen kumarin-pirazol türevlerinin genel olarak DMSO'da çözünen bileşiklerin gram-negatif (*E. coli*) ve gram-pozitif (*S. aureus*) bakterilere karşı zayıf ve orta derecede antibakteriyel aktivite gösterdiği, DMF ile çözünen bileşiklerin ise iki bakteri türüne karşı zayıf antibakteriyel aktivite gösterdiği görülmüştür. DMF'nin daha toksik etki sahip olduğu için DMF'da çözünen bileşiklerin antibakteriyel etkilerinin perdelendiği belirlenmiştir (Yang et al., 2014). Bileşiklerin *E. coli* ve *S. aureus* bakterilere karşı gösterdiği antibakteriyel inhibisyon zon değerleri grafik halinde Şekil ()'de verilmiştir.



Şekil (3): bileşiklerin *E. coli* ve *S. aureus* bakterilere karşı etkileri

Birçok benzer çalışma, kumarin-pirazol türevlerinin antibakteriyel aktivite potansiyelini araştırmıştır. Örneğin, Gondru (2018), gram-pozitif ve gram-negatif bakteri türlerini kullanarak yapısında pirazol, tiyofen, kumarin ve benzotiyazol grupları içeren yeni bir moleküler hibrit serisi sentezlemiş ve bu bileşiklerin agar kuyusu difüzyon yöntemi ile yedi bakteri türü üzerindeki etkilerini incelemiştir. Biyolojik aktivite sonuçlarına göre, test edilen bakteri türlerine karşı 2 bileşik güçlü antibakteriyel aktivite sergilediği gösterilmiştir (Gondru et al., 2018). Bu çalışmaların sonuçları, mevcut çalışmamızın bulgularını daha da desteklemektedir.

SONUÇ

Bu çalışma, bir başlangıç bileşiği ve ondan türetilen sekiz kumarin-pirazol hibrit türevinin sentezinin başarıyla gerçekleştirildiğini göstermektedir. Ayrıca, bu bileşiklerin *E. coli* ve *S. aureus* bakterilerine karşı

antibakteriyel aktiviteleri incelenmiş ve DMSO çözeltilisinde çözünen bileşikler 3 numaralı bileşik hariç tüm bileşiklerin orta-zayıf derecede etkili olduğu, DMF çözeltilisinde çözünen bileşiklerin ise antibakteriyel etkisinin perdelendiği ve zayıf derecede etkili olduğu gözlenmiştir. Bu sonuçlar, sentezlenen bileşiklerin potansiyel antibakteriyel özelliklere sahip olduğunu göstermektedir. Çalışmanın ileriki aşamalarda, sentezlenen bileşiklerin yeni potansiyel ilaç adaylarının geliştirilmesi sürecinde önemli bir referans kaynağı olarak kullanılabilir. Bu bileşiklerin biyolojik aktivitelerinin yanı sıra diğer fizikokimyasal özelliklerinin de detaylı bir şekilde incelenmesi, ilaç adaylarının geliştirilmesi sürecinde daha fazla bilgi sağlayabilir. Gelecekteki araştırmaların, bu tür yeni bileşiklerin farmakolojik ve tıbbi uygulamalardaki potansiyelini daha iyi anlamak ve değerlendirmek için odaklanması önerilmektedir.

DENEYSEL YÖNTEMLERİ

1. Pirazol-4-Karbaldehit Türevlerinin Genel Sentez Prosedürü

3-asetilkumarin

8,35 mL salisilaldehit ve 11,48 mL etilasetoasetat bir balonda karıştırıldı. Karışımın üzerine 0,5 mL piperidin eklendikten sonra karışım oda sıcaklığında manyetik karıştırıcı ile karıştırıldı. Reaksiyon tamamlandıktan sonra oluşan çökelek süzülüp uygun çözücüyle saflaştırıldı. Renk: açık sarı, EN: 118 - 119 °C. FT-IR (ν , cm^{-1}): 1737 (ester C=O), 1679 (keton C=O).

3-(1-(2-(benzo[d]tiyazol-2-il)hidrazono)etil)-2H-kromen-2-on (1)

1,88 g 3-asetil kumarin ve 1,65 g 2-hidrazinobenzotiyazol ayrı ayrı 10 mL asetik asit içinde çözüldü. Daha sonra 3-asetilkumarin çözeltilisi, 2-hidrazinobenzotiyazol çözeltilisine damla damla ilave edildi. Tablo (1)'de gösterildiği gibi farklı koşullar altında denendi. Oluşan çökelek süzüldü ve uygun çözücüyle saflaştırıldı. Renk: sarı, EN: 213 - 215 °C; FT-IR (ν , cm^{-1}): 3488-3415 (N-H), 1734 (ester C=O); $^1\text{H-NMR}$ (400 MHz, CDCl_3) δ (ppm): 8,12 (s, 1H, kumarin), 7,71 – 7,34 (m, 8H, Ar-H), 2,39 (s, 3H, CH_3); $^{13}\text{C-NMR}$ (101 MHz, DMSO) δ (ppm): 168,55 (benzotiyazol C_2), 159,65 (ester C=O), 153,78, 150,74, 141,24, 132,71, 131,61, 129,57, 113,42, 127,02, 126,53, 125,23, 122,23, 122,16, 119,37, 117,86, 116,42, 16,98 (CH_3), LC/MS-Q-TOF: m/z 336,07 [$\text{M}+\text{H}$] $^+$ (hesaplanan $\text{C}_{18}\text{H}_{13}\text{N}_3\text{O}_2\text{S}$: 335.08).

1-(benzo[d]tiyazol-2-il)-3-(2-okso-2H-kromen-3-il)-1H-pirazol-4-karbaldehit (2)

17 mL *N,N*-dimetil formamit buz banyosunda soğutularak üzerine 6 mL soğuk fosforil klorür damla damla ilave edildi. Buz banyosunda bir süre karıştırıldıktan sonra karışımın üzerine 3,354 g 1 numaralı bileşik eklenerek karıştırıldı. Reaksiyon tablo 1'de gösterildiği gibi farklı koşullar altında denendi. Daha sonra reaksiyon üzerine buzlu su ilave edildi. Oluşan çökelek süzülerek uygun çözücüyle yıkanıp saflaştırıldı. Renk:

kahverengi, EN: 260 - 261 °C FT-IR (ν , cm^{-1}): 1729 (ester C=O), 1690 (aldehit C=O); $^1\text{H-NMR}$ (400 MHz, DMSO) δ (ppm): 10,00 (s, 1H, CHO), 9,41 (s, 1H, pirazol C_5), 8,46–7,43 (m, 9H, Ar-H); $^{13}\text{C-NMR}$ (101 MHz, DMSO) δ (ppm): 185,81 (aldehit C=O), 159,35 (benzotiyazol C_2), 159,31 (ester C=O), 154,12, 150,58, 149,35, 144,04, 134,08, 133,54, 133,48, 129,79, 119,06, 116,78, 126,22, 125,45, 124,90, 123,29, 123,05, 119,54; LC/MS-Q-TOF: m/z 374,06 $[\text{M}+\text{H}]^+$ (hesaplanan $\text{C}_{20}\text{H}_{11}\text{N}_3\text{O}_3\text{S}$: 373.05).

2. Kumarin-Pirazol Türevlerinin (3 - 10) Genel Sentez Prosedürü

1 mmol **2** numaralı bileşik ve 1 mmol sodyum asetat, 20 mL 1,4-dioksan/etanol karışımında çözüldü. Üzerine 1,1 mmol hidrazin veya hidrazit eklenerek karışım karıştırıldı. Reaksiyon koşulları tablo 2’de gösterilmiştir. Oluşan çökelek süzöldükten sonra uygun çözücünden kristallendirilerek saflaştırıldı.

N'-((1-(benzo[*d*]tiyazol-2-il)-3-(2-okso-2*H*-kromen-3-il)-1*H*-pirazol-4-il)metilen)asetohidrazit (3)

Renk: sarı, EN: 307,3 – 308,1 °C; FT-IR (ν , cm^{-1}): 3419, 3203 (N-H), 1734 (ester C=O), 1715 (amit C=O); $^1\text{H-NMR}$ (400 MHz, DMSO) δ (ppm): 11,22 (s, 1H, NH), 9,12 (s, 1H, CH=N-N), 8,39 (s, 1H, pirazol), 8,16–7,42 (m, 9H, Ar-H), 1,78 (s, 3H, CH_3); $^{13}\text{C-NMR}$ (101 MHz, DMSO) δ (ppm): 171,91 (amit C=O), 159,67 (benzotiyazol C_2), 159,14 (ester C=O) 153,98, 150,80, 148,42, 143,68, 134,65, 133,24, 129,67, 129,58, 128,35, 127,59, 125,88, 125,42, 123,18, 122,73, 121,09, 121,02, 129,35, 119,08, 116,61, 20,13 (CH_3); MS LC/MS-Q-TOF: m/z 429,09 $[\text{M}+\text{H}]^+$ (hesaplanan $\text{C}_{22}\text{H}_{15}\text{N}_5\text{O}_3\text{S}$: 429.09 $[\text{M}+\text{H}]^+$).

N'-((1-(benzo[*d*]tiyazol-2-il)-3-(2-okso-2*H*-kromen-3-il)-1*H*-pirazol-4-il)metilen)benzohidrazit (4)

Renk: bej, EN: 304,7 – 305,7 °C; FT-IR (ν , cm^{-1}): 3418, 3192 (NH), 1733 (kumarin C=O), 1701 (amit C=O), 1193 (ester C-O); $^1\text{H-NMR}$ (400 MHz, DMSO) δ (ppm): 11,87 (s, 1H, NH), 9,11 (s, 1H, CH=N-N), 8,48 (s, 2H, pirazol ve kumarin), 8,17 – 7,43 (m, 13H, Ar-H); $^{13}\text{C-NMR}$ (101 MHz, DMSO) δ (ppm): 163,17 (amit C=O), 159,64 (benzotiyazol C_2), 159,28 (ester C=O), 154,18, 150,80, 149,10, 144,16, 139,90, 133,31, 133,24, 132,22, 129,71, 129,68, 128,90, 128,50, 119,20, 116,74, 128,04, 127,61, 125,93, 125,32, 123,20, 122,83, 121,33, 120,31; LC/MS-Q-TOF: m/z 491,11 $[\text{M}+\text{H}]^+$ (hesaplanan $\text{C}_{27}\text{H}_{17}\text{N}_5\text{O}_3\text{S}$: 491,11).

N'-((1-(benzo[*d*]thiazol-2-il)-3-(2-okso-2*H*-kromen-3-il)-1*H*-pirazol-4-il)metilen)-4-hidroksibenzohidrazit (5)

Renk: beyaz, EN: 303,8 – 304,5 °C; FT-IR (ν , cm^{-1}): 3351 (NH), 3183 (OH), 1732 (ester C=O), 1712 (amit C=O); $^1\text{H-NMR}$ (400 MHz, DMSO) δ (ppm): 11,63 (s, 1H, NH), 10,11 (s, 1H, OH), 9,06 (s, 1H, CH=N-N), 8,45 (s, 2H, pirazol ve kumarin), 8,16 – 6,84 (m, 12H, Ar-H); $^{13}\text{C-NMR}$ (101 MHz, DMSO) δ (ppm): 159,62 (amit C=O), 159,25 (benzotiyazol C_2), 159,23 (ester C=O), 154,65, 154,13, 150,80, 144,21, 144,14,

138,94, 133,29, 133,20, 130,12, 129,67, 116,70, 115,36, 130,10, 127,56, 125,89, 125,30, 124,15, 123,16 122,80, 120,28, 119,18, 115,43; LC/MS-Q-TOF: m/z 507,10 [M+H]⁺ (hesaplanan C₂₇H₁₇N₅O₄S: 507,10).

3-(1-(benzo[d]tiyazol-2-il)-4-((2-(3-nitrofenil)hidrazono) metil)-1H-pirazol-3-il)-2H-kromen-2-on (6)

Renk: turuncu, EN: 267,3 – 268,6 °C; FT-IR (ν, cm⁻¹): 3419, 3260 (NH), 1728 (ester C=O); ¹H-NMR (400 MHz, DMSO) δ (ppm): 10,81 (s, 1H, NH), 9,11 (s, 1H, CH=N-N), 8,44 (s, 1H, pirazol), 8,16 – 7,11 (m, 13H, Ar-H); ¹³C-NMR (101 MHz, DMSO) δ (ppm): 159,78 (benzotiyazol C₂), 159,21 (ester C=O), 154,28, 151,04, 149,59, 149,58, 146,87, 143,81, 133,42, 133,11, 133,10, 131,51, 130,51, 129,56, 119,28, 116,74, 128,49, 127,52, 126,89, 125,82, 125,35, 123,01, 122,77, 121,18, 118,42, 113,33; LC/MS-Q-TOF: m/z 508,10 [M+H]⁺ (hesaplanan C₂₆H₁₆N₆O₄S: 508,10).

3-(1-(benzo[d]tiyazol-2-il)-4-((2-(4-nitrofenil)hidrazono) metil)-1H-pirazol-3-il)-2H-kromen-2-on (7)

Renk: açık turuncu, EN: 295,7 – 296,4 °C; FT-IR (ν, cm⁻¹): 3418, 3272, 3139 (NH), 1729 (ester C=O); ¹H-NMR (400 MHz, DMSO) δ (ppm): 11,32 (s, 1H, NH), 9,19 (s, 1H, CH=N-N), 8,46 (s, 1H, pirazol), 8,18 – 6,82 (m, 13H, Ar-H); ¹³C-NMR (101 MHz, DMSO) δ (ppm): 159,73 (benzotiyazol C₂), 159,25 (ester C=O), 154,26, 151,01, 150,91, 148,65, 143,85, 134,08, 133,45, 133,23, 133,22, 129,66, 128,37, 119,35, 111,67, 127,55, 126,15, 125,87, 125,46, 123,04, 122,79, 121,69, 121,15, 116,71; LC/MS-Q-TOF: m/z 508,10 [M+H]⁺ (hesaplanan C₂₆H₁₆N₆O₄S: 508,10).

3-(1-(benzo[d]tiyazol-2-il)-4-((2-(p-tolil)hidrazon)metil)-1H-pirazol-3-il)-2H-kromen-2-on (8)

Renk: koyu kırmızı, EN: 258,4 – 259,2 °C; FT-IR (ν, cm⁻¹): 3419, 3283 (NH), 1729 (ester C=O); ¹H-NMR (400 MHz, DMSO) δ (ppm): 10,21 (s, 1H, NH), 9,98 (s, 1H, CH=N-N), 8,38 (s, 1H, pirazol), 8,14 – 6,58 (m, 13H, Ar-H), 2,13 (s, 3H, CH₃); ¹³C-NMR (101 MHz, DMSO) δ (ppm): 159,84 (benzotiyazol C₂), 159,21 (ester C=O), 154,03, 150,93, 148,23, 143,24, 143,17, 133,15, 133,05, 129,82, 127,60, 127,51, 116,63, 112,17, 126,98, 125,71, 125,38, 123,11, 122,70, 122,58, 119,27, 116,67, 20,64 (CH₃); LC/MS-Q-TOF: m/z 477,13 [M+H]⁺ (hesaplanan C₂₇H₁₉N₅O₂S: 477,13).

3-(1-(benzo[d]tiyazol-2-il)-4-((2-fenil hidrazono)metil)-1H-pirazol-3-il)-2H-kromen-2-on (9)

Renk: koyu turuncu, EN: 228,6 – 229,7 °C; FT-IR (ν, cm⁻¹): 3419, 3262 (NH), 1729 (ester C=O); ¹H-NMR (400 MHz, DMSO) δ (ppm): 10,28 (s, 1H, NH), 8,98 (s, 1H, CH=N-N), 8,36 (s, 1H, pirazol), 8,13 – 7,44 (m, 13H, Ar-H); ¹³C-NMR (101 MHz, DMSO) δ (ppm): 159,81 (benzotiyazol C₂), 159,24 (ester C=O), 154,03, 150,92, 148,26, 145,41, 143,42, 143,23, 133,16, 133,02, 129,48, 129,24, 128,09, 119,07, 116,65, 127,48, 127,16, 125,69, 125,35, 123,08, 122,59, 122,17, 121,84, 119,27; LC/MS-Q-TOF: m/z 463,11 [M+H]⁺ (hesaplanan C₂₆H₁₇N₅O₂S: 463,11).

4-(2-((1-(benzo[d]tiyazol-2-il)-3-(2-okso-2H-kromen-3-il)-1H-pirazol-4-il)metilen)hidrazinil)benzoik asit (10)

Renk: sarı, EN: 297,7 – 298,7 °C; FT-IR (v, cm⁻¹): 3446, 3421 (NH), 3278 (asit OH), 1727 (ester C=O), 1677 (asit C=O); ¹H-NMR (400 MHz, DMSO) δ (ppm): 10,81 (s, 1H, NH), 9,09 (s, 1H, CH=N-N), 8,41 (s, 1H, pirazol), 8,16 - 6,70 (m, 13H, Ar-H); ¹³C-NMR (101 MHz, DMSO) δ (ppm): 167,67 (asit C=O), 159,76 (benzotiyazol C₂), 159,24 (ester C=O), 154,03, 150,88, 148,89, 148,34, 143,44, 133,20, 133,15, 130,80, 129,56, 127,89, 119,23, 116,64, 131,32, 127,53, 125,76, 125,44, 123,11, 122,64, 121,57, 122,06, 120,84, 111,33; LC/MS-Q-TOF: m/z 507,10 [M+H]⁺ (hesaplanan C₂₇H₁₇N₅O₄S: 507,10).

3. Kumarin-Pirazol Türevlerinin (2 - 10) Biyolojik Aktivitelerine İlişkin Genel Prosedür

Mikroorganizmalar

Bu çalışmada gram-pozitif (*Staphylococcus aureus*) ve gram-negatif (*Escherichia coli*) mikroorganizmaları kullanılmıştır. Mikroorganizmalar, Eskişehir Teknik Üniversitesi Mühendislik Fakültesi'nden temin edilmiştir. Bileşiklerin antimikrobiyal değerlendirilmesi için disk difüzyon duyarlılık testi kullanılmıştır. Numuneler, ayrı ayrı DMSO ve DMF çözeltileri içinde çözülerek aktiviteleri test edilmiştir.

Disk difüzyon Yöntemiyle Antibakteriyel Aktivitesinin Belirlenmesi

Bu çalışmada antibakteriyel aktivite disk difüzyon yöntemi kullanılarak belirlendi (Karaca et al., 2022). Başlangıçta, analiz edilen her bir bileşik, 2 mg/mL konsantrasyonunda DMSO veya DMF çözeltileri ile hazırlandı. Daha sonra 25 mm çapında steril filtre kullanarak steril edildi ve eppendorf tüplerinde saklandı. Testi yapmak için, *E. coli* ve *S. aureus* bakterileri, besleyici agar içeren Petri kaplarına aşılandı ve 35 °C'de 18-20 saat inkübe edildi. Koloniler oluşuktan sonra, doğrudan koloni süspansiyon yöntemi kullanılarak 0.2 McFarland bulanıklığı elde edildi. Daha sonra, 0.2 McFarland bulanıklığına ayarlanmış inokülümden 100 µL alarak Mueller-Hinton agar Petri kaplarının yüzeyine eşit olarak yayıldı. Kağıt diskler, agar yüzeyine dikkatlice yerleştirildi ve stabilitelerini sağlamak için hafifçe bastırıldı. Ardından 20 µL hazırlanan numuneler disklere uygulandı. Kontrol antibiyotik olarak 30 µg/diskte kloramfenikol (C-30) ve 30 µg/diskte tetrasiklin (TE-30) kullanıldı. Petri kapları 35°C'de 18-20 saat inkübe edildi ve disklerin etrafında oluşan inhibisyon bölgelerinin çapı milimetre cinsinden ölçüldü.

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ÇİMENTO FABRİKASI ÇEVRESİNDE YER ALAN ÇOCUK OYUN PARKLARINDAN TOPLANAN TOZ ÖRNEKLERİNDE AĞIR METAL KONSANTRASYON SEVİYELERİNİN BELİRLENMESİ

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Özet

Ağır metaller çevresel ortamlarda aşırı miktarlarda bulduklarında insanların ve çocukların sağlık ve yaşam kalitelerine olumsuz yönde etki edebilmektedirler. Bu çalışmada çocuk oyun parklarındaki oyuncaklar üzerindeki yüzey tozları analiz edilerek ağır metal kirliliğinin seviyelerinin tespit edilmesi amaçlanmıştır. Bu amaçla, Bursa'daki bir çimento fabrikasının etrafında yer alan çocuk oyun parkları seçilmiş ve bu çocuk oyun parklarından yağmur ve kar yağışının olmadığı günlerde 120 adet yüzey tozu örneği toplanmıştır. ICP-MS cihazıyla toplanan yüzeysel tozu örneklerinde on altı ağır metal türünün içeriği tespit edilmeye çalışılmıştır. Örnekleme bölgelerinde tespit edilen ortalama toplam ağır metal konsantrasyon seviyelerinin 2401-6832 mg/kg aralığında değiştiği tespit edilmiş ve örnekleme bölgelerine göre ortalama toplam ağır metal konsantrasyonlarının yüksekten düşüğe doğru PG4 > PG3 > PG1 > PG2 > PG5 > PG6 > PG8 > PG11 > PG10 > PG9 > PG7 şeklinde belirlenmiştir. Cr, Mn, Fe, Co, Cu, Zn, Pb, Cd, As ve Ni toplanan örneklerde en sık tespit edilen ağır metal türleri olarak belirlenmiştir. İstatistiksel analiz yöntemleri kullanılarak tespit edilen ağır metal türleri arasında korelasyon olup olmadığı ve kaynak analizi işlemleri gerçekleştirilmiştir. İstatistiksel analizler sonucunda, Zn ve Cd dışında Cr, Mn, Fe, Co, Cu, Pb, As ve Ni arasında anlamlı bir pozitif korelasyon ($p < 0,01$) olduğu ve Cu ile Pb ağır metallerinin de birbirleriyle korelasyonunun ($p < 0,05$) olduğu tespit edilmiştir. Ağır metallerin kaynaklarının tespiti amacıyla temel bileşen analizi yapılmış ve sonuçta toplam varyansın %79,905'ini açıklayan üç temel bileşenin olduğu tespit edilmiştir. Elde edilen sonuçlar neticesinde, çimento fabrikalarının ağır metal kirliliği üzerinde etkili olduğu ve kirlenici kaynağa olan mesafeye bağlı olarak ağır metal konsantrasyonlarının değişim gösterdiği tespit edilmiştir.

Anahtar Kelimeler: Ağır metal, Çocuk oyun parkı, İstatistiksel analiz, Bursa.



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Özet

Günümüzde bütün dünya için bir olgu haline gelen yabancı dilin insanların sosyal yaşamları ve ticari ilişkileri üzerindeki etkisi çok büyüktür. Temel şartlar içerisinde kar elde etmek amacıyla gerçekleştirilen tüm alım-satım yöntemlerine ise ticaret adı verilmektedir. Ticaret, insanlığın başından itibaren vardır ve dünyanın ekonomik şekilde gelişmesini destekleyen en önemli unsurdur. Ticarete 3 ana madde bulunmaktadır ve bunlar; üreticiler, tüketiciler ve aracılardır. Dünyanın her bölgesinde üretici ve tüketiciler arasında aracılar bulunmaktadır. Dilde bir nevi üretici ve tüketici arasındaki önemli araçlardan biridir. Çoğu küresel şirket, içeriklerini farklı dillerde sunabileceği birçok fırsatı düşünmektedir. Tüketicilerle etkili ve verimli bir şekilde iletişim kurabilmek için, onlarla tercih ettikleri dilde konuşulması gerekmektedir. Birçok Türk işletmede yabancı dilin tüketici ve işletme sahipleri üzerindeki etkisi önemli ölçüde görülmektedir. Bu işletmeler çeşitli yollarla tüketicileri etkileyerek kendilerine doğru çekmeye çalışmaktadırlar. Tüketicilerin kültürel ve psikolojik yapıları bilinçaltını etkileyerek satın alma kararlarında belirgin rol oynamaktadır. Bu faktörlerin tüketici üzerindeki etkilerini fark eden işletmeciler de diğer işletmelerden farklı olduklarını hissettirebilmek amacıyla farklı stratejiler uygulamaktadır. İşletmeler yabancı kelimeler seçerek daha kolay hatırlanan ve akılda kalıcı işletmeler olmayı amaçlamaktadır. Bu araştırmanın hedefi yabancı dillerin Türk işletmelerinin imajına olan katkıları ve Türk tüketicilerin işletmelerdeki yabancı dil kullanımına olan bakış açılarını ve işletmelere karşı imajlarının ne olduğunu incelemektir. Araştırmadan elde edilen bulgulara bakıldığında; Türk işletmelerinde yabancı dil kullanımının Türk tüketicileri üzerindeki imajına yönelik oluşturulan “ilgi duyma” ve “tercih etme”

¹ “TÜBİTAK-2209-A Üniversite Öğrencileri Araştırma Projeleri Desteği Programı” Tarafından Desteklenmektedir.



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boyutlarının her ikisi üzerinde de etkisi bulunmaktadır; ancak bu etki “ilgi duyma” boyutu üzerinde çok daha yüksektir. Buradan yola çıkarak Türk işletmelerinin yabancı dili kurumlarında kullanmasının işletmeye duyulan ilgiyi, o işletmeyi tercih etmeye oranla daha fazla arttırabildiği sonucu çıkartılabilmektedir.

Anahtar Kelimeler: Yabancı Dil, İşletme, Marka İmajı, Markalaşma



A RESEARCH ON THE IMAGE OF FOREIGN LANGUAGE USE IN TURKISH BUSINESSES ON TURKISH CONSUMERS

Abstract

Foreign languages, which have become a phenomenon for the whole world today, have a great impact on people's social lives and commercial relations. All buying and selling methods carried out with the aim of making a profit under basic conditions are called trading. Trade has existed since the beginning of humanity and is the most important element supporting the economic development of the world. There are 3 main items in trade and these are; producers, consumers, and intermediaries. There are intermediaries between producers and consumers in every region of the world. In a way, language is one of the important intermediaries between the producer and the consumer. Many global companies are considering many opportunities to offer their content in different languages. To communicate effectively and efficiently with consumers, it is necessary to speak to them in their preferred language. In many Turkish businesses, the impact of foreign languages on consumers and business owners is significant. These businesses try to attract consumers by influencing them in various ways. Consumers' cultural and psychological structures play a significant role in purchasing decisions by influencing their subconscious. Businesses that realize the effects of these factors on the consumer apply different strategies to make them feel that they are different from other businesses. By choosing foreign words, businesses aim to be more easily remembered and catchy. The aim of this research is to examine the contributions of foreign languages to the image of Turkish businesses and Turkish consumers' perspectives on the use of foreign languages in businesses and what their images are towards businesses. Looking at the findings from the research; The use of foreign languages in Turkish businesses has an impact on both the "interest" and "preference" dimensions created for the image of Turkish consumers; however, this effect is much higher on the "interest" dimension. Based on this, it can be concluded that Turkish businesses' use of a foreign language in their institutions can increase their interest in the business more than choosing that business.

Keywords: Foreign Language, Business, Brand Image, Branding

1. Giriş

İnsan ilişkilerinde iletişimi sağlayan ve canlı bir varlık olan dil, kültürel değerlerin geçmişten günümüze aktarılmasında taşıyıcı bir niteliğe sahiptir. Canlı olma özelliği sebebiyle dil, zaman içerisinde gelişir, hatta bazı özelliklerini kaybedip yeni unsurlarla zenginleşebilir. Gelişen dünyada uluslararası iletişimi ve ilişkileri geliştirmek, bu rekabet ortamında gelişen teknoloji ve ticaretin dışında kalmamak için her bireyin en az bir yabancı dil öğrenmesi gerekmektedir. Bugün dünya üzerinde kabul görmüş en yaygın yabancı dil İngilizcedir.

İngilizce 94 ülkede 339 milyon insan tarafından ana dil olarak konuşulur ve birçok önemli küresel kuruluşun da resmi dilidir. Bu nedenle İngilizce, uluslararası ortamda gelişmek isteyen herhangi bir şirket için çok önemlidir. Ek olarak sadece İngilizce değil, toplamda 1 milyar konuşmacı ile dünyanın en çok konuşulan dili olan Çince, 405 milyon ana diliyle İspanyolca, 295 milyon insan tarafından konuşulan ve 28 ülkenin resmi ana dili olan Arapçanın da en az İngilizce kadar önemli görülmektedir (www.polyglotclub.com).

Tüketiciler satın alacakları ürünleri değerlendirirken psikolojik (tat, tasarım, başarımlar) ve çevresel (marka, garantiler, ürünün kökeni vb.) olmak üzere iki tür etmeden yararlanmaktadır (Han ve Terpstra, 1988; Han, 1989, Samiee, 1994, Thakor ve Lavack, 2003). Fakat ortalama bir tüketici için psikolojik etmenleri değerlendirmenin zorluğuna bağlı olarak, ürün değerlendirmelerinin çoğunlukla çevresel etmenlere dayandırılmasına sebep olmaktadır (Cordell, 1992; Haubl ve Elrod, 1999; Eliot ve Cameron, 1994; Jin ve diğ. 2006; Pecotich ve Ward, 2007). Tüketicinin ürünün kalitesini objektif olarak değerlendirme kabiliyeti ya da ürünle ilgili deneyiminin yeterli olmadığı durumlarda ise, en çok başvurulan çevresel etmenin marka adı olduğu tespit edilmiştir (Dawar ve Parker, 1994). Çevresel etmenler arasında ele alınan marka kavramının oldukça geniş olan kapsamı içinde incelenen konulardan biri de marka adı olarak belirlenen kelimenin kökeni ile ilgilenen yabancı dilde markalama konusudur (Baran, 2020). Günlük yaşamda oldukça fazla yabancı kelime kullanılarak oluşturulmuş marka isimleri ile karşılaşılmaktadır. Hatta markalar bir yana günümüzde mağaza isimleri bile yabancı kelimelerden seçilmektedir (Bardakçı ve Akıncı, 2014). Belki hiç farkında olunmadığı ticarethane adlarında bile Türkçe olmayan ad kullanımı oldukça yaygın olduğuna dair bulgulara rastlanmıştır (Aydoğan, 2012).

Şimdiki zamanda hüküm süren küreselleşme ve serbest piyasa ekonomisi sebebiyle ürün seçenekleri çoğalmakta ve markalar daha da önemli hale gelmektedir. Marka ve marka imajı, işletmelerin vurguyla üzerinde durması gerektiği konulardan bir tanesidir (Li & Murray, 2002). Bir markanın yabancı dil kullanmasıyla, tüketici o markayı zihninde daha güçlü bir marka olarak değerlendirmekte, bu da daha olumlu bir marka imajı oluşmasını sağlamaktadır. Bundan dolayı da marka ismi yabancı dilde olan ürünlerin imajı, yerli marka adlarına göre daha nitelikli olarak görülmektedir, tüketiciye olumlu yönde tesir etmektedir (Kuruşçu, 2017). Bu

markalaşma sadece sosyal yaşamda değil, ticari ilişkilerde de belirleyici bir etkidir. Diğer rakiplerinden sıyrılıp daha akılda kalıcı ve başarılı olmak isteyen işletme sahipleri yabancı müşterileri çekmek için dili bir satış stratejisi haline getirmeye başlamışlardır. Bunun örnekleri öncelikli olarak son yıllarda daha çok artmış olan yabancı dillerde yazılmış tabelalarda, menülerde ve marka isimlerinde görülmektedir.

Çalışmada Türk işletmelerinin yabancı dil kullanımının; Türk tüketicileri üzerindeki imajına yönelik bir araştırma gerçekleştirme amacı bulunmaktadır. Bu amaçta yabancı dilin etkisi tüketiciye nasıl yansıyor ve tüketici bunu nasıl karşılıyor, yabancı dil kullanımının Türk işletmelerindeki etkisinin ne yönde olduğu ölçülüp yabancı dil etki sonuçları ölçülecektir. Bu konuyla ilgili Türkiye’de yapılan anket, makale, tezlerde yeterli sonuçlara ulaşılamadığı ve alanyazının gelişmesi için halen araştırmalar yapılması gerektiği görülmektedir. Bu çalışma ile alanyazına katkı sunulması düşünülmektedir. Çalışmada varılan sonuç kapsamında Türk işletmelerinin yabancı dil kullanımının; Türk tüketicileri üzerindeki etkileri hakkında olumlu veya olumsuz herhangi bir bilgi sahibi olunacağı hedeflenmektedir.

2. YÖNTEM

2.1. Araştırmanın Amacı

Çalışmanın amacı Türk İşletmelerinde Yabancı Dil Kullanımının Türk Tüketicileri Üzerindeki İmajının araştırılmasıdır. Bu araştırma “TÜBİTAK–2209-A Üniversite Öğrencileri Araştırma Projeleri Desteği Programı” kapsamında Bayburt Üniversitesi Eğitim Fakültesi İngilizce Öğretmenliği ve Uygulamalı Bilimler Fakültesi Yönetim Bilişim Sistemleri bölümleri öğrencileri tarafından yürütülmektedir. Çalışma önceden yapılan çalışmaların genelinden farklı olarak tasarlanmıştır. Yapılan birçok çalışmada sadece yabancı dil kullanımının markalaşma üzerindeki etkisi ele alınırken, eldeki çalışma ile işletmelerde yabancı dil kullanımının işletmelerin imajına olan etkileri ve Türk tüketicilerin bu konudaki olumlu ve olumsuz tutumlarını ele alarak incelemek hedeflenmektedir.

Araştırmada hedef kitle olarak önce işletme sahipleri, devamında ise işletme ile her zaman bağlantı içerisinde olan tüketici olacaktır. Bu doğrultuda işletmeler diğer rakiplerinden her konuda farklılaşma çabası içine girebilir. Bu farklılaşmalar ise işletmelerin farklı dillerden kelimeler kullanması, bünyesinde yabancı dil bilgisi fazla olan iş görenler barındırması, gelen yabancı müşterilerin para birimlerini kullanmak gibi çeşitli satış stratejileri uygulayabilirler. Bu alanda profesyonelleştikten sonra küresel boyutta iş yapmak isteyen işletmeler, yabancı dil kullanımına son derece önem vermektedir. Belirtilen yabancılaştırmanın gerçekleştiği alanlar ise genel olarak turistik olan sahil şehirleri, tarihi köklü bir geçmişe dayanan büyük şehirler ve birçok farklı ülkeden insanların bulunduğu kısımlardır. Yerli tüketici kısmında ise etrafında sürekli olarak artan yabancı tabelalar, marka adları, mağaza isimleri görmek tüketiciyi yerlisi olduğu ülkede yabancı gibi

hissettirebilir. Bu araştırmanın yapılmasındaki sebep Türk işletmelerinde yabancı dil kullanımının işletmelerin profesyonelliğine olan etkilerinin hangi yönde olduğu ve Türk tüketicilerinin bu konudaki olumlu veya olumsuz tutumunu belirleyebilmek amacıyla sorular ve ifadeler yöneltilmektedir.

2.2. Araştırmanın Veri Toplama Yöntemi

Araştırmanın veri toplama yöntemi olarak survey.com da 22 ölçek maddesi 5’li Likert ölçekli, 12 adet demografik sorudan oluşan bir anket hazırlanmış ve bir “online örnekleme yöntemi” olan “kolayda örnekleme yöntemi” kullanılarak uygulamaya konulacaktır. Elde edilen veri seti için SPSS 25 paket programı kullanılarak sınıması yapılmıştır. Çalışma çevrimiçi ortamda kolayda örnekleme yöntemi ile gerçekleştirilmiştir. Dolayısıyla evren olarak tüm Türk vatandaşları kabul edilecek ve ulaşılabilen her Türk vatandaşının araştırmanın örnekleme olduğu varsayılmıştır. Çağ dijital çağ ve sürdürülebilirlik açısından kırtasiye israfı yapmamak dünyamızın kaynaklarından daha uzun süre faydalanmak için önemlidir. Bundan dolayı da anket çıktısı alıp, yüz yüze örnekleme çalışması yerine, survey.com sitesinden elde edilen link çevrimiçi ortamlardan katılımcılara gönderilmiştir ve 257 katılımcının yeterli bir örnekleme olduğu ve evreni temsil ettiği varsayılmıştır.

Araştırmanın bulgularına erişebilmek amacıyla oluşturulan anket formu daha önceden yapılan çalışmalara bakılarak uyarlanmıştır. Bunun için bir alanyazın taraması yapılmış ve araştırma hipotezlerini ölçmek için en uygun olabilecek ölçek hazırlanmıştır. Anket 12 adet demografik soru ile başlamakta ve ardından da tüketicilerin işletmelerdeki yabancı dil kullanımına yönelik tutumlarını belirlemeyi amaçlayan yargı cümleleri yer almaktadır ve 5’li Likert tipinde yöneltilmiştir. Anket formunun oluşturulmasında Özer vd. (2014); Kuruşçu (2017) ile Yeniçeri ve Çakar (2018)’in çalışmalarından yararlanılmıştır.

2.3. Araştırmanın Varsayımları ve Sınırlılıkları

“Türk İşletmelerinde Yabancı Dil Kullanımının Türk Tüketicileri Üzerindeki İmajına Yönelik Bir Araştırma” başlıklı çalışmada çevrimiçi anket yöntemi kullanılmıştır ve bu anket sonucu 257 örnekleme ulaşılmıştır. Bu katılımcı sayısının evreni temsil ettiği varsayılmaktadır. Çalışma Türkiye çapında yapılacağından, bulguların tüm ülkeyi temsil ettiği varsayılmaktadır. Çünkü evrenin 100 milyonun altında olduğu durumlar için %95 güven aralığında $p=0,8$ ve $q=0,2$ olduğunda yeterli örnekleme sayısı en az 245’tir. Dolayısıyla 257 katılımcının olması araştırmada gerekli örnekleme sayısı için yeterli olduğu varsayılmıştır.

Ancak yukarıda bahsedilen bu durum aynı zamanda da araştırma için bir sınırlılıktır. Eğer çalışma farklı coğrafik bölgelerde, illerde ya da kırsal-kentsel şeklinde yapılırsa hangi yöre ne derece elde edilmeye çalışılan bulgulara sahip daha net görülebilecektir. Ayrıca çevrimiçi anket yöntemi yerine yüz yüze ya da tesadüfi yöntemlerden birinin kullanılmaması da bir diğer kısıt olarak görülebilir. Araştırmanın bu sınırlılıkları aynı

zamanda gelecek araştırmalar için bir öneri olarak sunulmaktadır. Aynı zamanda katılımcıların bazı ifadelerle sabırsız cevap vermiş olabileceği düşünülüp sınırlılık içerisinde değerlendirilmiştir. Fakat buna rağmen tüm anket katılımcılarının soruları ve ölçek maddelerini doğru anladıkları ve samimi cevaplar verdikleri varsayılmıştır.

3. Bulgular

3.1. Demografik ve Diğer Tanımlayıcı Bulgular

Katılımcılara yönelik demografik ve tanımlayıcı bulgular aşağıdaki Tablo 1 ile sunulmuştur.

Tablo 1: Katılımcıların Demografik ve Diğer Tanımlayıcı Özellikleri

Değişken	Grup	N	%
Yaş	18-24	231	89,9
	25-34	17	6,6
	35-44	4	1,6
	45-54	3	1,2
	55 ve üstü	2	0,7
Cinsiyet	Kadın	150	58,4
	Erkek	107	41,6
Medeni Durum	Evli	14	5,4
	Bekâr	243	94,6
Eğitim Durumu	İlkokul	3	1,2
	Ortaokul	2	0,8
	Lise	38	14,8
	Yüksekokul	25	9,7
	Üniversite	183	71,2
	Lisansüstü	6	2,3
Eşinizin Çalışma Durumu	Eşim yok	223	86,8
	Çalışmıyor	18	7,0
	Kısmi zamanlı çalışıyor.	8	3,1
	Tam zamanlı çalışıyor	7	2,7
	Emekli	1	0,4
Genelde Yerli İşletmelerden mi Yabancı İşletmelerden mi Alışveriş Yapmayı Tercih Ederiniz?	Yerli	186	72,4
	Yabancı	55	21,4
	Fark etmiyor	16	6,2
Vatandaşı Olduğunuz Ülke	Türkiye	245	95,3
	Diğer	12	4,7
Girdiğiniz İşletmede Konuşulan Dil Sizi Etkiler Mi?	Her zaman	71	27,6
	Çoğu zaman	80	31,1
	Bazen	64	24,9
	Nadiren	23	9
	Hiçbir zaman	19	7,4
Kaç Tane Yabancı Dile Hakimsiniz?	0	109	42,4
	1	88	34,2
	2	52	20,3
	3	5	1,9
	4	3	1,2

3.2. Araştırmanın Güvenilirliği ve Geçerliliği

Araştırmanın 22 ölçek maddesine ait güvenilirliğine ve geçerliliğine ilişkin bulgu ise Tablo 2 ile sunulmuştur. Araştırmanın güvenilirliği için Cronbach's Alpha değeri 0,936 ve geçerliliği için KMO değeri 0,921; $p=0,000$ 'dır. Elde edilen bu değerler yüksek seviyede olup, bu değerlere göre araştırma güvenilir ve geçerlidir. Ayrıca gerçekleştirilen faktör sınaması sonucunda açıklanan toplam varyans %60,534'dür. Faktör analizi sonucu 3 boyut ortaya çıkmış ve bu boyutlara Dil Kullanımı (9 madde), İlgi Duyma (9 madde) ve Tercih Etme (4 madde) adları verilmiştir. Böylece “dil kullanımı ölçeği” için oluşturulan boyuta yine aynı ad verilmişken; dil kullanımının Türk tüketicileri üzerindeki imajına yönelik boyutlara “ilgi duyma” ve “tercih etme” adları verilmiştir.

Tablo 2: Araştırmanın Güvenilirliği ve Geçerliliği

Cronbach's Alpha	0,936
KMO	0,921
P	0,000

3.3. Ölçek Boyutları Arasındaki Korelasyon

Araştırmada ortaya çıkan boyutlar arasındaki korelasyonu görebilmek için kurulan hipotezler şöyledir;

H₁: Dil kullanımı ve ilgi duyma boyutları arasında pozitif yönlü doğrusal bir ilişki mevcuttur.

H₂: Dil kullanımı ve tercih etme boyutları arasında pozitif yönlü doğrusal bir ilişki mevcuttur.

H₃: İlgi duyma ve tercih etme boyutları arasında pozitif yönlü doğrusal bir ilişki mevcuttur.

Tablo 3’de görüldüğü gibi 3 boyut arasında da $p=0,000$ olup, korelasyon bulunmaktadır. Ancak “dil kullanımı” ile “ilgi duyma” arasındaki ilişkide $r=0,822$ olup yüksek; “tercih etme” arasındaki ilişkide $r=0,323$ olup orta düzeydedir. “İlgi duyma” ile “tercih etme” arasındaki ilişkide ise $r=0,290$ olup düşük ilişki seviyesindedir. Bu sonuçlara göre H₁, H₂ ve H₃ kabul edilmektedir.

Tablo 3: Korelasyon Analizi Sonuçları

		Dil Kullanımı	İlgi Duyma	Tercih Etme
Dil Kullanımı	Pearson Korelasyon		0,822**	0,323**
	P		0,000	0,000
İlgi Duyma	Pearson Korelasyon	0,822**		0,290**
	P	0,000		0,000
Tercih Etme	Pearson Korelasyon	0,323**	0,290**	
	P	0,000	0,000	

**Korelasyon 0.01 düzeyinde anlamlıdır (2 Kuyruklu).

3.4. Regresyon Analizi

Araştırmada “dil kullanımı” bağımsız; “ilgi duyma” ve “tercih etme” boyutları ise bağımlı değişken olarak belirlenmiştir. Buradan yola çıkarak regresyon analizine ait hipotezler şöyledir;

H₄: Türk işletmelerinde yabancı dil kullanımının Türk tüketicilerin o işletmeye ilgi duyması üzerinde olumlu bir etkisi bulunmaktadır.

H₅: Türk işletmelerinde yabancı dil kullanımının Türk tüketicilerin o işletmeyi tercih etmesi üzerinde olumlu bir etkisi bulunmaktadır.

Tablo 4’de sunulduğu üzere “dil kullanımı” bağımsız değişkeninin “ilgi duyma” bağımlı değişkeni üzerindeki etkisi $\beta=0,866$ ve “tercih etme” bağımlı değişkeni üzerindeki etkisi $\beta=0,311$ ’dir. Her iki kurulan hipotezde de $p=0,000$ olup bir etki söz konudur ve bu durumda H₄ ile H₅ kabul edilmektedir. Regresyon sınamasına göre “dil kullanımı” bağımsız değişkeninin tüketiciler üzerindeki imajına yönelik oluşturulan 2 bağımlı değişkenden “ilgi duyma” üzerinde çok daha fazla etkiye sahip olduğu görülmektedir.

Tablo 4: Araştırmaya İlişkin Regresyon Analizi Bulguları ve Hipotezlere İlişkin Kararlar

Bağımsız Değişken	Bağımlı Değişken	R	P (R)	β	P (β)	Hipotez	Karar
Dil Kullanımı	İlgi Duyma	0,822	0,000	0,866	0,000	H ₄	✓
	Tercih Etme	0,323	0,000	0,311	0,000	H ₅	✓

✓ :Kabul; X : Ret

4. Sonuç ve Öneriler

Genel olarak, Dil, insanın iletişim ihtiyacını sağlayan vazgeçilmez bir araç konumundadır. İnsanların hem içerisinde yaşadıkları toplum hem de başka toplumlardan insanlarla iletişim kurabilmeleri, etkileşime geçebilmeleri ve birlikte iş görebilmeleri ancak birbirlerini anlamalarına ve ortak bir dili kullanabilmelerine bağlıdır. Bu çalışmanın amacı Türk İşletmelerinde Yabancı Dil Kullanımının Türk Tüketicileri Üzerindeki İmajının araştırılmasıdır ve bu araştırmada farklı demografik yapıya sahip katılımcılar seçilmiştir. Araştırmada gerçekleşen sınamada bağımsız değişken olan ‘Dil Kullanımı’ boyutunun 2 adet bağımlı değişken üzerinde etkisi olduğu belirlenmiştir ve araştırmanın 2 temel hipotezi de kabul edilmiştir. Buna dayanarak, çalışmada Türk işletmelerinde kullanılan yabancı dillerin tüketicinin ‘ilgi duyma’ değişkeni üzerinde daha fazla etkiye sahip olduğu ancak ‘tercih etme’ değişkeni üzerinde ciddi derecede bir etkisi olmasa da yine de bir etkisi olduğu görülmüştür.

Araştırmada görülen bulguda ‘İlgi Duyma’ değişkeni üzerinde görülen etkinin önemli derecede; ancak ‘Tercih Etme’ değişkenine bakıldığında etkinin ilgi duyma değişkenine kıyasla çok daha düşük olduğu



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görülmüştür. Dolayısıyla yapılması gereken tercih etme noktasındaki etki düzeyini artırmaya çalışmaktır. Buna bağlı olarak kendini geliştirmek isteyen işletmelerin, dil kullanımını sadece ilgi çekmek için değil tercih edilme (satın alma davranışı gösterme) noktasında da daha fazla çalışmalar yapması gerektiği söylenebilir. Bir başka deyişle ortaya çıkan ilginin, sempatinin satın alma davranışına dönüşmesi gerekmektedir. Ayrıca dil kullanımına olan ilginin yüksek bir etkiye sahipken, tercih etmeye yönelik etkinin görece orta seviyede olması bilim insanlarının da üzerinde durması ve neden böyle olduğunu araştırması gereken bir konudur.

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TEKNOLOJİ KULLANIMININ İNSANLAR ÜZERİNDEKİ SOSYAL DAVRANIŞLARINA ETKİSİ¹

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Özet

Günümüzde gelişen Teknoloji, sosyal hayatımızda önemli bir rol oynamaya başlamıştır ve çevrimiçi hizmetler; eğitim, sağlık, alışveriş, bankacılık ve eğlence gibi pek çok sahaya yayılmıştır. Zaman ile Teknoloji, kullanıcılarının, karşı karşıya kaldıkları medyayı kendi ihtiyaç ve arzuları gereği şekillendirdikleri fazlaca bireyselleştirilmiş bir bilgi meydanı haline gelmiştir. Teknolojinin bizlere sunduğu sayısız imkanların kullanımının biz insanlar üzerindeki etkileri Teknolojiye yönelik alakanın beraberinde ciddi sonuçlar getirdiği görülmektedir. Teknoloji kullanım alışkanlıklarının temelini sanal ortamdaki iletişim davranışları oluşturmaktadır. Teknoloji kullanım alışkanlığı bir süre sonra teknoloji bağımlılığına dönüşmektedir bu bağımlılıkta sosyal ortamlarda (aile, iş, arkadaş gibi) ki davranışları etkileyebilmektedir. Özellikle pandemiyle (covid-19) birlikte teknoloji kullanımı artmıştır. Teknolojiyi daha çok kullanan yani alışkanlık haline getiren mesajlaşma uygulamasını kullanan bireylerin sosyal davranışların daha sorunlu olabildiğine dair görüşler bulunmaktadır. İnsan sosyal bir varlıktır ve toplum içinde var olurlar, var olduğu toplumu etkilerler ve toplumdan etkilenirler. Sosyal davranışlarının çoğu sosyal çevrenin etkisiyle biçimlenirken, bu biçimlenmede teknoloji kullanımı ile sosyal davranışlar arasında kuvvetli bir bağ bulunmaktadır. Özellikle insanın ön planda olduğu işlerde sosyal davranışlar daha önemli hale gelmektedir. Araştırmada teknoloji kullanımının insanlar üzerindeki sosyal davranışlarını olumlu mu yoksa olumsuz mu etkiliyor? Sorusunun cevabını bulmak adına anket uygulanması uygun görülmüştür. Araştırmanın yöntemi olarak bir tane 13 ölçek maddeli 5'li Likert ölçekli "teknoloji kullanım ölçeği", bir tane 25 ölçek maddeli 5'li Likert ölçekli "sosyal davranış ölçeği" ve 6 adet demografik

¹ "TÜBİTAK-2209-A Üniversite Öğrencileri Araştırma Projeleri Desteği Programı" Tarafından Desteklenmektedir.



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sorudan oluşan bir anket hazırlanmış ve bir “online örnekleme yöntemi” olan “kolayda örnekleme yöntemi” kullanılarak uygulamaya konulmuştur. Elde edilen veri seti için SPSS paket programı kullanılarak sınıması yapılmıştır. Dolayısıyla araştırma nicel, ampirik bir uygulama olmuştur. Araştırmada; boyutlar içerisinde en yüksek ortalamaya “teknoloji algısı”; en düşüğüneyse “olumsuz etki” değişkeni sahiptir. Regresyon sınımasında en yüksek etkinin teknoloji çılgınlığının sosyalleşeme üzerindeki; en düşük ise, teknoloji takibinin katılımcılarda olumsuz etki yaratması üzerindeki rolü olduğu bulunmuştur.

Anahtar Kelimeler: Teknoloji Kullanımı, Sosyal Davranışlar, Sosyal Medya, İnternet



THE EFFECT OF THE USE OF TECHNOLOGY ON PEOPLE'S SOCIAL BEHAVIOR

Abstract

Today, developing technology has started to play an important role in our social life and online services; It has spread to many fields such as education, health, shopping, banking, and entertainment. Over time, technology has become a highly individualized information arena where users shape the media they encounter according to their own needs and desires. It is seen that the effects of the use of the countless opportunities offered by technology on humans bring serious consequences with the interest in technology. Communication behaviors in the virtual environment form the basis of technology usage habits. The habit of using technology turns into a technology addiction after a while, and this addiction can affect behavior in social environments (such as family, work, and friends). Especially with the pandemic (COVID-19), the use of technology has increased. There are opinions that the social behavior of individuals who use technology more, that is, use messaging applications that make it a habit, maybe more problematic. Humans are social beings and they exist in society, they affect the society in which they exist and are affected by society. While most of the social behaviors are shaped by the influence of the social environment, there is a strong connection between the use of technology and social behaviors in this formation. Social behaviors become more important, especially in jobs where people are at the forefront. In the research, does the use of technology affect people's social behavior positively or negatively? It was deemed appropriate to conduct a survey to find the answer to the question. As the method of the research, a survey consisting of a 5-point Likert scale "technology use scale" with 13 scale items, a 5-point Likert scale "social behavior scale" with 25 scale items and 6 demographic questions was prepared and it was implemented using the "convenience sampling method", which is an "online sampling method". The obtained data set was tested using the SPSS 25 package program. Therefore, the research is a quantitative, empirical exercise. In the research; among the dimensions, "technology perception" has the highest mean, while the "negative impact" variable has the lowest. In the regression test, the highest effect was the effect of technology craze on socialization; the lowest effect was found to be the role of technology follow-up in creating a negative impact on the participants.

Keywords: Technology Use, Social Behaviors, Social Media, Internet

1. Giriş

Günümüzde dijitalleşmenin hızla büyümesi ile teknolojinin her mecrada kullanımını da hızla çoğaltmaktadır. İnternet kullanımının popülerleşmesi, bilgisayarlar, akıllı telefonlar ve diğer teknolojik aletlerin sayısının artması ve hızla gelişmesi nedeniyle insanların birbirleriyle istenildiği anda ulaşılabilir hale geldiği görülmektedir (Ersöz ve Özmen, 2020). Teknolojinin hızla büyümesi sebebiyle çevrimiçi hizmetler; eğitim, sağlık, alışveriş, bankacılık ve eğlence gibi pek çok sahaya yayılmıştır (Beyaz Özbey, 2022).

Zaman ile internet, izleyicilerin, karşı karşıya kaldıkları medyayı kendi ihtiyaç ve arzuları gereği şekillendirdikleri fazlaca bireyselleştirilmiş bir bilgi meydanı haline gelmiştir. Bu dönüştürme, bilginin harmanlandığı ve kullanıcı üretiminin de içeriğe imkân veren Web uygulamaları ile kullanışlı hale gelmiş ve yayıncı merkezli medyadan ziyade tüketici merkezli medyanın bir simgesi olmuştur (Daughtry vd., 2008: 17).

Teknoloji, çağımız insan hayatının her sahasına hâkim olmuş vaziyettedir (Yam ve İlhan, 2020). Teknolojinin gelişiminin getirmiş olduğu oluşumlar, insanların gündelik yaşamlarını kolaylaştırmaya yardımcı olmakta ve değişen dünya şartlarına uyum sağlamasına katkı da bulunmaktadır (Açık vd., 2021). Buna karşın bu durum, yeni jenerasyonun en önemli sıkıntılardan birisi olan teknoloji bağımlılığını gün yüzüne çıkarmıştır (Wang vd., 2017). Madde bağımlılığına benzer göstergelere (yoksunluk çekme, ulaşma arzusu vb.) sebebiyet veren teknoloji bağımlılığı, zaman ile internet, sosyal medya ve bilgisayar bağımlılığı gibi farklı sahalarda baş göstermiştir.

Teknolojiye olan ilginin beraberinde belirgin sonuçlara neden olduğu görülmektedir. Söz edilen etkilerin günlük yaşantıya en belirgin yankısı, aile bireylerinin sıklıkla oğullarının veya kızlarının gün geçtikçe cep telefonlarına bağımlı hale geldiklerini belirtmesi, video oyunları oynamaları ya da televizyon izlemeleri gibi hususlarda şikâyetlerde görülebilir. Artık insanlar teknolojik aletlerin birer esiri olmuşçasına davranışlar göstermektedir. Hafta sonlarını veya artakalan boş zamanlarının büyük bir kısmını teknolojik aygıtlar ile geçirmeyi seçen insanlar eski değerlerden hızla kopmuşlardır (Küçükvardar ve Tingöy 2018). Kültürel değerler altında sosyalleşme mobil uygulamaları da toplumdaki insanların olumlu veya olumsuz sosyal davranışlarında oldukça önemli bir yere sahiptir. Dolayısıyla toplumdaki insanlar ahlaki güdülerinin kendi kültürel değerleri için önem taşıyan sosyal norm uygulamaları ile yönlendirilmektedirler (Kumru ve Carlo, 2004).

Çalışmada; günümüzde gelişen teknoloji ile internet kullanımının sosyal yaşantımızda ne derece yer aldığı ve insanlar tarafından ne kadar benimsedikleri belirlenmeye çalışılmıştır. İnternet kullanıcılarına yapılan anket sonucunda elde edilen veriler ile teknoloji kullanımının insanlar üzerindeki sosyal davranışlarına etkisi belirlenmeye çalışılmaktadır. Ülkemizde yapılan bu konudaki araştırmalara bakıldığında yapılan çalışmaların

devam ettiği ve alanyazının halen gelişim gösterdiği görülmüştür. Bu sebep ile yapılacak olan araştırmanın sonucunda teknoloji kullanımının insanlar üzerine etkisi aydınlatılmaya devam edebilecektir.

Çalışmanın anket kısmı 3 bölümden oluşmaktadır. 1. bölüm teknoloji kullanım ölçeği, 2. bölüm ise sosyal davranış ölçeği konusundaki ifadelerdir. 3. bölüm ise demografik soruların bulunduğu kısımdır. Çalışmada varılan sonuç neticesinde teknoloji kullanımının sosyal davranışlara etkisi hakkında olumlu veya olumsuz herhangi bir bilgi sahibi olunacağı ve elde edilen sonuçların bilim çevresine fayda sunabileceği düşünülmektedir.

2. YÖNTEM

2.1. Araştırmanın Amacı

Hızla gelişen teknolojinin sosyal yaşantı içerisinde büyük bir rol almakta ve giderek hayatın vazgeçilmez bir parçası haline gelmektedir. Teknolojinin insanlığa sunduğu sayısız imkanlar mevcuttur ve sunulan bu imkanların kontrolsüz, bilinçsiz bir şekilde kullanılmasının birçok etkisi olmaktadır. Bu etkilerin insanlar tarafından ne kadar benimsendiğini yapılan anket sonucunda aydınlatılması araştırmayla amaçlanmaktadır. Bu araştırma Bayburt Üniversitesi Uygulamalı Bilimler Fakültesi Yönetim Bilişim Sistemleri bölümü öğrencilerince “TÜBİTAK–2209-A Üniversite Öğrencileri Araştırma Projeleri Desteği Programı” kapsamında yürütülmektedir. Araştırmanın odak noktası toplumdur. Toplumda yaşayan insanların internet kullanımı, teknolojik aletler kullanımı (telefon bilgisayar vs.), sosyal medya uygulamaları, alışveriş veya bankacılık mobil uygulamaları gibi teknoloji ile bütünleşen hayatta ne kadar olumlu veya olumsuz yönde etkilendikleri belirlenmeye çalışılmaktadır. Araştırmada hedef “teknoloji kullanımının insanlar üzerindeki sosyal davranışlarını olumlu mu yoksa olumsuz mu etkiliyor?” sorusunun cevabını bulmaktır.

2.2. Araştırmanın Veri Toplama Yöntemi

Araştırma sorusunun cevabını bulmak adına anket uygulanması uygun görülmüştür. Araştırmanın yöntemi olarak bir adet 13 ölçek maddeli 5’li Likert ölçekli Teknoloji Kullanım Ölçeği, bir tane 25 ölçek maddeli 5’li Likert ölçekli Sosyal Davranış Ölçeği olan ifadeler ve 6 adet demografik sorudan oluşan bir anket hazırlanmıştır. Oluşturulan anket bir “online örnekleme yöntemi” olan “kolayda örnekleme yöntemi” kullanılarak uygulamaya konulmuştur. Elde edilen veri seti için SPSS paket programı kullanılarak sınaması yapılmıştır. Dolayısıyla araştırma nicel, ampirik bir uygulama özelliği taşımaktadır.

Araştırmanın hipotezleri kısmında belirlenen hipotezleri test etmek için SPSS paket programında ilgili Tek Örneklem T Testi gerçekleştirilmiştir. Ayrıca bağımsız değişkenlerin bağımlı değişkenler üzerindeki etkisini görebilmek amacıyla Regresyon sınaması da yapılmış ve böylece bir değişkene ilişkin değişimin diğer



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bir deęişkende nasıl bir deęişim sağlayabileceęi de gözler önüne serilebilecek ve buradan çıkan sonuçlar sonraki yeni yapılacak olan araştırmalar için bir tetikleyici olabilecektir. Anket 260 kişi ile yapılmıştır ve elde edilen bu sayının evreni temsil ettięi varsayılmıştır.

Anketin ölçek maddeleri oluşturulurken “teknoloji kullanım ölçeęi” için Zincirkıran ve Tiftik (2014), Aksoy (2018) ve Küçükvardar (2020)’ın ; “sosyal davranış ölçeęi” için ise Korkmaz (2019) ve Topaloęlu (2020)’nun çalışmalarından faydalanılmıştır.

3. Bulgular

3.1. Demografik Bulgular

Katılımcılara ilişkin demografik özellikler Tablo 1 ile sunulmaktadır. Toplam 260 katılımcı arasında yapılan ankette %51.2 kadın, %48.8 erkek olarak anket gerçekleştirilmiştir. Katılımcıların %52,7’si 18-24 yaş, %25’i 25-34 yaş, %8.8’i 35-44 yaş, %6.2’si 45-54 yaş, %5’i 55-64 yaş, %2.3’ü 65 ve daha üzeri yaş grubuna aittir. Katılımcılar eğitim durumlarına göre %7.7’si İlköğretim, %17,7’si Ortaöğretim, %18.5’i Önlisans, %52.7’si Lisans, %1,9’u Yüksek Lisans, %1,5’i Doktora olarak gruplandırılmıştır. Aylık kişisel gelir bazında dağılımı ise 0-8.500 arasında %50,4, 8.500-15.000 arasında %21.5, 15.000-20.000 arasında %15.4, 20.000-30.000 arasında %7.3, 30.000 ve üzerinde kazamlar %5.4 oranında dağılmıştır. Demografik özellikler İstihdam durumuna göre ayrıldığında Özel Sektör %34.2, Kamu %8.5, Öğrenci %38.8, Emekli %7.3, Diğer ise %11,2 oranında dağılmıştır.

Tablo 1: Katılımcıların Demografik Özellikleri

Değişken	Grup	N	%
Cinsiyet	Kadın	133	51,2
	Erkek	127	48,8
Yaş Aralığı	18-24	137	52,7
	25-34	65	25,0
	35-44	23	8,8
	45-54	16	6,2
	55-64	13	5,0
	65 ve Üstü	6	2,3
Eğitim Durumu	İlköğretim	20	7,7
	Ortaöğretim	46	17,7
	Önlisans	48	18,5
	Lisans	137	52,7
	Yüksek Lisans	5	1,9
	Doktora	4	1,5
Gelir	0-8.500	131	50,4
	8.500-15.000	56	21,5
	15.000-20.000	40	15,4
	20.000-30.000	19	7,3
	30.000'nin üzeri	14	5,4
İstihdam Durumu	Özel Sektör	89	34,2
	Kamu	22	8,5
	Öğrenci	101	38,8
	Emekli	19	7,3
	Diğer	29	11,2

3.2. Araştırmanın Güvenilirliği ve Geçerliliği

Araştırmanın güvenilirliği noktasında Cronbach's Alpha değeri “teknoloji kullanımı ölçeği” için 0,852 ve “sosyal davranış ölçeği” için ise 0,931’dir. Bu sonuçlara göre her iki ölçeğin de yüksek seviyede güvenilir olduğu sonucu bulunmaktadır. Araştırma sonucu Tablo 2’de sunulmaktadır.

Tablo 2: Araştırmanın Güvenilirliği

Ölçek	Cronbach's Alpha	Madde Sayısı
Teknoloji Kullanımı	0,852	13
Sosyal Davranış	0,931	25

Araştırmanın geçerliliği noktasındaysa KMO değeri “teknoloji kullanımı ölçeği” için 0,845 ve “sosyal davranış ölçeği” için ise 0,922’dir ve her iki ölçek için de $p=0,000$ ’dır. Bu sonuçlara göre araştırma geçerlidir. Araştırma sonucu Tablo 3 ile verilmektedir.

Tablo 3: Araştırmanın Geçerliliği

Ölçek	KMO	P
Teknoloji Kullanımı	0,845	0,000
Sosyal Davranış	0,922	0,000

Yapılan faktör analizi neticesindeyse; “teknoloji kullanımı ölçeği” için 3 faktör meydana getirilmiştir ve bu 3 faktörün toplam açıkladığı varyans %59,255’dir. “Sosyal davranış ölçeği” için de yine aynı şekilde 3 faktör oluşturulmuş ve bu 3 faktör %60,415 oranında toplam varyansı açıklamaktadır. Her iki toplam açıklanan varyans değeri de %50’nin üzerindedir. “Teknoloji kullanımı ölçeği” için oluşturulan faktörlere alanyazındakine uygun olarak “teknoloji takibi”, “teknoloji çılgınlığı” ve “teknoloji algısı” adları verilmiştir. “Sosyal davranış ölçeği” için oluşturulan faktörlere de “sosyalleşme”, “yoksunluk hissi” ve “olumsuz etki” isimleri konulmuştur.

3.3. Ölçek Boyutlarının Ortalaması

Araştırmanın ölçek boyutlarının ortalamasını yorumlayabilmek için yaygın bir şekilde kullanılan ve 0,8 puan artarak (Puan Aralığı = (En Yüksek Değer – En Düşük Değer) / 5 = (5 – 1) / 5 = 4 / 5 = 0,80) sıralanan 5’li Likert ölçek aralıkları (1,00-1,80 Kesinlikle Katılmıyorum; 1,81- 2,60 Katılmıyorum; 2,61-3,40 Kararsızım; 3,41-4,20 Katılıyorum ve 4,21-5,00 Kesinlikle Katılıyorum) dikkate alınmıştır (Şengül, 2013: 91). Buna göre “teknoloji kullanımı ölçeği” için oluşturulan 3 boyuttan 2’si olan “teknoloji takibi” ve “teknoloji algısı”

boyutlarının ortalaması 4 ile kodlanan “katılıyorum” seçeneği içerisindedir. Bir başka anlatımla katılımcılar teknolojiyi takip ettiklerini ve teknolojiye yönelik algılarının yüksek olduğunu düşünmektedirler. Buna karşın diğer boyut olan “teknoloji çılgınlığı” için ise 3 ile kodlanan “kararsızım” seçeneğini tercih etmişlerdir. Katılımcılar teknoloji çılgını olup olmadıkları noktasında yansız olduklarını beyan etmişlerdir. Bir diğer araştırma ölçeği olan “sosyal davranış ölçeği” boyutlarından “sosyalleşme” için katılımcılar 4 ile kodlanan “katılıyorum” seçeneğini; “yoksunluk hissi” için 3 ile kodlanan “kararsızım” seçeneğini ve “olumsuz etki” için ise 2 ile kodlanan “katılmıyorum” önermesini seçmişlerdir. Bu durumda katılımcılar teknoloji kullanımı ile sosyalleşebildiklerini, bu teknoloji kullanımının herhangi bir olumsuz etki yaratmadığını ve teknolojiden yoksun kalmalarının yaratacağı hissiyatın olumsuz ya da olumlu bir etki oluşturması noktasındaysa kararsız kaldıklarını belirtmişlerdir.

Tablo 4: Araştırma boyutlarının Ortalaması

Boyut	Ortalama	Standart Sapma	Çarpıklık	Basıklık
Teknoloji Takibi	3,7262	,86355	-,898	1,404
Teknoloji Çılgınlığı	3,2429	,80556	-,148	,487
Teknoloji Algısı	3,9192	,90857	-1,081	1,127
Sosyalleşme	3,7087	,86935	-,794	1,026
Olumsuz Etki	2,2601	,91806	,959	,863
Yoksunluk Hissi	2,6269	1,01900	,185	-,673

3.4. Regresyon Analizi

Araştırmanın bağımsız değişkeni olan “teknoloji kullanımı ölçeği” için oluşturulan teknoloji takibi, teknoloji çılgınlığı ve teknoloji algısı değişkenlerinin “sosyal davranış ölçeği” için meydana çıkartılan sosyalleşme, olumsuz etki ve yoksunluk hissi bağımlı değişkenleri üzerindeki etkisini görebilmek amacıyla Basit Doğrusal Regresyon Analizi yapılmıştır. Bu analize ilişkin hipotezler aşağıdaki gibidir;

- H₁: Teknoloji takibi boyutunun sosyalleşme boyutu üzerinde olumlu doğrusal yönde bir etkisi vardır.
- H₂: Teknoloji takibi boyutunun olumsuz etki boyutu üzerinde olumlu doğrusal yönde bir etkisi vardır.
- H₃: Teknoloji takibi boyutunun yoksunluk hissi boyutu üzerinde olumlu doğrusal yönde bir etkisi vardır.
- H₄: Teknoloji çılgınlığı takip boyutunun sosyalleşme boyutu üzerinde olumlu doğrusal yönde bir etkisi vardır.
- H₅: Teknoloji çılgınlığı boyutunun olumsuz etki boyutu üzerinde olumlu doğrusal yönde bir etkisi vardır.
- H₆: Teknoloji çılgınlığı boyutunun yoksunluk hissi boyutu üzerinde olumlu doğrusal yönde bir etkisi vardır.

H₇: Teknoloji algısı takip boyutunun sosyalleşme boyutu üzerinde olumlu doğrusal yönde bir etkisi vardır.

H₈: Teknoloji algısı boyutunun olumsuz etki boyutu üzerinde olumlu doğrusal yönde bir etkisi vardır.

H₉: Teknoloji algısı boyutunun yoksunluk hissi boyutu üzerinde olumlu doğrusal yönde bir etkisi vardır.

Tablo 5’de belirtildiği gibi oluşturulan 9 hipotezden 8’i (H₁, H₂, H₃, H₄, H₅, H₆, H₇, H₉) kabul edilmekte; sadece H₈ reddedilmektedir. Bu sonuçlara göre teknoloji algısının katılımcıların teknoloji kullanımından dolayı ortaya çıkan davranışlarına olumsuz bir etki oluşturmasında rolü bulunmamaktadır. Bağımsız değişkenin bağımlı değişken üzerinde etkisi olduğu sonucu çıkan analizlerdeyse, en yüksek etkinin H₈ hipotezi olan teknoloji çılgınlığının sosyalleşme üzerindeki etkisi olduğu sonucu görülmektedir. Bu hipotezde $\beta=0,784$ olup teknoloji çılgınlığı boyutundaki 1 birimlik değişim sosyalleşme boyutu üzerinde 0,784 birimlik bir değişime yol açabilmektedir. Sınamadaki en düşük etki ise H₂ hipotezi olan teknoloji takibinin katılımcılarda olumsuz etki yaratması üzerindedir ve bu hipotez için $\beta=0,187$ ’dir. Teknoloji takibindeki 1 birimlik değişim katılımcılar üzerinde olumsuz etki bırakması boyutunu 0,187 birim değiştirebilmektedir. Bağımsız değişkenlerin bağımlı değişkenler üzerindeki etki kat sayılarına bakıldığında tüm sınamalarda en yüksek etkinin “sosyalleşme” boyutu üzerinde olduğu görülmektedir.

Tablo 5: Basit Doğrusal Regresyon Analizi Sonuçları

Bağımsız Değişken	Bağımlı Değişken	R	β	P	Hipotez	Karar
Teknoloji Takibi	Sosyalleşme	0,740	0,745	0,000	H ₁	✓
	Olumsuz Etki	0,176	0,187	0,004	H ₂	✓
	Yoksunluk Hissi	0,423	0,499	0,000	H ₃	✓
Teknoloji Çılgınlığı	Sosyalleşme	0,727	0,784	0,000	H ₄	✓
	Olumsuz Etki	0,248	0,283	0,000	H ₅	✓
	Yoksunluk Hissi	0,430	0,544	0,000	H ₆	✓
Teknoloji Algısı	Sosyalleşme	0,563	0,538	0,000	H ₇	✓
	Olumsuz Etki	0,068	0,068	0,277	H₈	X
	Yoksunluk Hissi	0,222	0,249	0,000	H ₉	✓

✓ : Kabul; X: Ret

4. Sonuç ve Öneriler

Bu çalışmanın amacı, teknoloji kullanımının sosyal davranışlarına olan etkisi sınanmaktadır ve sınamayı yapmak için farklı demografik yapıya sahip katılımcılar seçilmiştir. Teknoloji kullanım düzeylerini belirlemek ve bu kullanım düzeyinin sosyal davranışlara olan etkisi görülmeye çalışılmıştır. Bunu görebilmek amacıyla da Teknoloji kullanım ölçeği bağımsız değişken olarak; sosyal davranış ölçeği ise bağımlı değişken olarak tasarlanmıştır. Faktör analizi sonucu Teknoloji Kullanım Ölçeği ve Sosyal Davranış Ölçeği için 3'er adet faktör meydana getirilmiştir. Araştırmada gerçekleşen sınamada bağımsız değişkenin 8 adet bağımlı değişken üzerinde etkisi olduğu sonucu ortaya çıkmış ve bundan dolayı araştırmanın 8 temel hipotezi "kabul edilmiş" (H1,H2,H3,H4,H5,H6,H7,H9); 1 temel hipotez "reddedilmiştir" (H8). Buna dayanarak teknoloji algısının katılımcıların teknoloji kullanımından dolayı ortaya çıkan davranışlarına olumsuz bir etki oluşturmasında rolü bulunmamaktadır. Bağımsız değişkenin bağımlı değişken üzerinde etkisi olduğu sonucu çıkan analizlerdeyse, en yüksek etkinin H₄ hipotezi olan teknoloji çılgınlığının sosyalleşme üzerindeki etkisi olduğu sonucu görülmektedir. Araştırma boyutlarının ortalamalarına ait bulgulara göre katılımcılar teknoloji kullanımının sosyalleşmelerine fayda sağladığı ve üzerlerinde herhangi bir olumsuz etki yaratmadığını düşünmektedirler. Ayrıca katılımcılar teknoloji kullanımından yoksun kalmaları durumunda oluşacak hissiyatın olumlu ya da olumsuz bir durum oluşturup oluşturmayacağı noktasında ise "nötr" fikre sahip olduklarını belirtmişlerdir. Bahsi geçen bu bulgu başta psikoloji ve tüketici davranışları çalışan pazarlama bilim insanlarının üzerinde durması gereken bir araştırma konusudur. Çünkü bir çok araştırma dijital çağın getirdiği yeniliklerin Z ve Alfa kuşağını olumsuz etkilediği, sosyal davranışlara, aile ilişkilerine olumsuz yönde yansıdığını ifade ederken, katılımcıların öyle olmadığını düşünmesi psikoloji biliminin; bu düşüncenin nasıl bir satın alma davranışı sergileyebileceği ise pazarlama disiplininin ve markaların incelemesi gereken bir durumdur.

Kaynakça

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FUTBOL HAKEMLERİNİN VIDEO YARDIMCI HAKEM SİSTEMİNE YÖNELİK TUTUMLARI İLE HAKEM ÖZ YETERLİĞİ ARASINDAKİ İLİŞKİNİN İNCELENMESİ¹

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Özet

Bu araştırmanın amacı, futbol hakemlerinin VAR (Video Yardımcı Hakem) sistemine yönelik tutumları ile öz yeterlilik düzeyleri arasındaki ilişkiyi incelemektir. Araştırmada mevcut bir durumun hiç değiştirilmeden olduğu gibi yansıtılması ve kavramlar arasındaki ilişkinin incelenmesini ele aldığından ilişkisel tarama modelinde tasarlanmıştır. Araştırmanın evrenini farklı hakemlik klasmanlarında görev yapan 150 futbol hakemi oluşturmaktadır. Araştırmada örneklemin belirlenmesinde basit seçkisiz örnekleme yöntemi kullanılmıştır. Araştırmada örnekleme sayısının belirlenmesi için %95 güven aralığı ve %5 hata oranında gereken hesaplamalar yapılmıştır. Araştırmada örneklem grubu için ideal syı 108 bulunmuştur. Araştırmada verilerin analiz edilmesi için normallik analizi yapılmıştır. Çarpıklık ve basıklık değerlerinin -2 ile +2 arasında olması verilerin normal dağılımı için uygunluk göstermektedir. Normal dağılıma sahip verilerin analizinde parametrik testler kullanılmıştır. İki bağımsız değişkenin karşılaştırılması için bağımsız örneklem t testi ikiden fazla bağımsız grubun karşılaştırılması için tek yönlü varyans analizi anova testi uygulanmıştır. Araştırmada değişkenler arasındaki ilişkilerin test edilmesi için pearson korelasyon analizi uygulanmıştır. Araştırmada hakem öz yeterliği ile video yardımcı hakem sistemine yönelik tutumun etkileşimi için yol analizi uygulanmıştır. Sonuç olarak, futbol hakemlerinin hakem öz yeterlikleri üzerinde video yardımcı hakem sistemine yönelik tutumları pozitif derecede anlamlı şekilde etkili bulunmuştur ($p < 0,01$).

Anahtar Kelimeler: Futbol, Futbol Hakemi, Video Yardımcı Hakem Sistemi, Öz Yeterlilik

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1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

AN ASSESSMENT OF THE GRADUATE THESES ON LONELINESS AND RELIGIOUSNESS PRODUCED IN TURKEY (1998-2023)

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Abstract

In recent years, it is seen that many studies examining the effects of religiosity and spirituality on loneliness have been carried out in the studies psychology of religion relationsip that have increased in recent years. In this study, general studies on loneliness and religiousness were conducted between 1998 and 2023. In this context, our study aims to provide data for researchers who want to work on loneliness and religiousness, to and to be a source for future research. Our study follows the case study (embedded theory) pattern, a qualitative research technique. The graduate theses published on loneliness and religiousness that we cover in our research were accessed through a comparative review of the data from the Council of Higher Education (YÖK) National Thesis Center and the data from the ISAM Catalog of Theses from Schools of Religion. As a result of our research, considering the distribution of published studies by years, the most published studies were in 2022 (n=4) and the least in 1998 (n=1), 1999 (n=1), 2005 (n=1), 2009 (n=1). At the same time, as a result of the examination of the studies, three headings were determined: survey, interview/interview and document scanning/documentation, and the studies were classified accordingly. Among the studies examined, it was determined that the survey technique was used the most (n=13). It was determined that among the 27 postgraduate theses examined, the most theses were from Ankara University (n = 5) and there were a total of 6 study groups (students, elderly individuals, local people, teachers, engineers and disabled families) as samples in the relevant theses. As a result of the research, it was found that religiosity is effective in reducing loneliness and coping with the problems caused by loneliness.

Keywords: Psychology of Religion, Loneliness, Religiousness, Thesis.



YALNIZLIK VE DINDARLIK KONUSUNDA TÜRKİYE’DE YAPILAN LİSANSÜSTÜ TEZLER (1998-2023) ÜZERİNE BİR DEĞERLENDİRME

Özet

Son yıllarda artan din psikolojisi çalışmalarında dindarlık ve maneviyatın yalnızlık üzerindeki etkisini inceleyen pek çok araştırmanın yapıldığı görülmektedir. Bu çalışmada yalnızlık ve dindarlık konusunda 1998-2023 yılları arasında yapılmış lisansüstü çalışmaların taraması gerçekleştirilmiştir. Bu bağlamda çalışmamızda yalnızlık ve dindarlık konusunda çalışma yapmak isteyen araştırmacılar için bir veri sağlanması ve ortaya çıkacak verilerin yapılacak araştırmalarda kaynak olması amaçlanmaktadır. Araştırmamızda nitel araştırma tekniklerinden durum çalışması (gömülü teori) deseni kullanılmıştır. Araştırma kapsamına aldığımız yalnızlık ve dindarlık konusunda yayımlanmış lisansüstü tezlere Yükseköğretim Kurulu (YÖK) Ulusal Tez Merkezi verileri ile İSAM İlahiyat Fakülteleri Tezler Kataloğu veri tabanı arasındaki veriler karşılaştırmalı şekilde incelenerek ulaşılmıştır. Araştırmamız neticesinde, yayımlanan çalışmaların yıllara göre dağılımı dikkate alındığında en çok 2022 (n=4) yılında, en az ise 1998 (n=1), 1999 (n=1), 2005 (n=1), 2009 (n=1) ve 2011 (n=1) yıllarında yayımlandığı görülmüştür. Aynı zamanda çalışmaların incelenmesi sonucunda anket, görüşme/mülakat ve belge tarama/dökümantasyon şeklinde 3 başlık belirlenmiş ve çalışmalar buna göre sınıflandırılmıştır. İncelenen araştırmalar arasında en fazla anket tekniğinin (n=13) kullanıldığı saptanmıştır. İncelenen 27 lisansüstü tezler içerisinde en fazla tezin Ankara Üniversitesi (n=5) ’nde olduğu ve ilgili tezlerde örneklem olarak toplam 6 çalışma grubunun (öğrenci, yaşlı bireyler, yerel halk, öğretmen, mühendis ve engelli aileleri) bulunduğu tespit edilmiştir. Araştırma sonucunda dindarlığın yalnızlığı azaltmada ve yalnızlığın yol açtığı sorunlarla başa çıkmada etkili olduğu bulgulanmıştır.

Anahtar Kelimeler: Din Psikolojisi, Yalnızlık, Dindarlık, Tez.

Introduction

In recent years, increasing psychological disorders and the fact that people choose loneliness preferably rather than necessarily have attracted the attention of many researchers. Particularly during the Covid 19 pandemic, the mandatory increase in the distance between individuals and the limitation of face-to-face communication has inevitably paved the way for many new behaviors to be revealed by people. However, although the increases in suicide cases are tried to be explained based on economic reasons, it is clear that the current situation cannot be reduced to just one reason. Because human beings are not only a one-sided, materially focused creature, they also have a number of spiritual needs that must be met. That's why postgraduate studies on loneliness and religiosity were examined in our research. Although studies on loneliness began in the mid-1900s, ancient religions and various social norms have always aimed to create a culture of coexistence for human beings. However, when loneliness is mentioned, a confusion arises in the sense that the individual simply moves away from the people around him. However, while loneliness is a feeling that an individual may feel towards people, it may also be a feeling of distance or avoidance of seeing other beings, such as animals or plants or nature. As a result, human beings are obliged to communicate with other people in order to survive, to continue their generation, and to meet their spiritual needs. In this context, the negative relationship between loneliness and religiosity in all of the studies examined reveals that religion contributes to both the mental health and human relations of religious individuals.

Within the scope of the research, postgraduate theses written in Turkey on loneliness and religiosity were examined. Thus, it is aimed to provide data for researchers who want to study loneliness and to be a source for future research. The aim of this study is to reveal the current situation by analyzing postgraduate theses about loneliness and religiosity written in Turkey between 1998 and 2023.

1. Findings

In this section of the study, findings regarding the postgraduate theses included in the research are included.

1.1. Numerical Data on Obtained Postgraduate Theses

In this section, a total of 27 postgraduate theses, 9 doctoral theses and 18 master's theses, were examined. The findings obtained are given below in tabular form.

Table 1. Distribution of Examined Postgraduate Theses by Years

Year	Degree	Doctorate
1998	1	
1999	1	
2000	1	1
2005	1	
2006	1	
2007	1	
2009	1	
2011		1
2016	1	1
2018	2	1
2019	2	
2020	1	1
2021	2	
2022	3	1
2023		3
Toplam	18	9

According to Table 1, when 27 postgraduate theses published on loneliness and religiosity are examined, it is seen that most of the studies were published in 2022 (n = 4).

Table 2. Distribution of Postgraduate Theses by Universities Where They Are Published

University Name	f	%
Ankara University	5	18,51
Süleyman Demirel University	3	11,11
Dokuz Eylül University	3	11,11
Atatürk University	2	7,40
Ondokuz Mayıs University	2	7,40
Sakarya University	1	4,38
Erciyes University	1	3,70
Çukurova University	1	3,70
Marmara University	1	3,70
Harran University	1	3,70
Anadolu University	1	3,70
Uşak University	1	3,70
İbni Haldun University	1	3,70
Cumhuriyet University	1	3,70
Uludağ University	1	3,70
Bingöl University	1	3,70
Tokat Gaziosman Paşa University	1	3,70
Total	27	100

According to Table 2, when 27 postgraduate theses on loneliness and religiosity were examined between 1998 and 2023, it was seen that the most studies were conducted at Ankara University (n = 5).

Table 3. Distribution of Theses by Working Groups

Subject	f	%
Adult Individuals	8	33,33
Students	7	29,16
Elderly People	5	20,83
Teachers	2	8,33
Engineers	1	4,16
Parents of Disabled Children	1	4,16
Total	24	100

According to Table 3, when 27 postgraduate theses published on loneliness and religion were examined, it was seen that the largest sample group in the studies was adults (n = 8).

Table 4. Distribution by Data Collection Techniques

Design	f	%
Survey	13	48,14
Document Scanning	8	29,62
Interview	6	22,22
Total	27	100

According to Table 4, when 27 postgraduate theses published on loneliness and religion were examined, it was seen that the most data (n=13) were collected through surveys.

Conclusion

Within the scope of the study, a total of 27 theses written between 1998 and 2023 were examined and it was determined that master's theses (n = 18) were more than doctoral theses (n = 9). Considering the distribution of the theses published in the study by years, it was seen that most of them were published in 2020 (n = 4). Until 2020, there were no access barriers to postgraduate theses on loneliness and religiosity in Turkey and the theses we identified. When the master's and doctoral theses published between 1998 and 2023 on loneliness and religiosity were analyzed according to the universities and years where the studies were conducted, the highest



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number was Ankara University (n = 5) and the lowest was Sakarya University, Erciyes, Çukurova, Marmara, Harran, Anadolu, Uşak, İbni Haldun, Cumhuriyet, Uludağ, Bingöl and Tokat Gaziosman Paşa Universities (n = 1). As a result of examining the postgraduate theses, three headings were determined: survey, document scanning and interview, and the studies were classified accordingly. Among the theses examined, it was determined that the survey technique was used the most (n=13). A total of 6 study groups (students, elderly individuals, local people, teachers, engineers and disabled families) were identified as samples in the 27 postgraduate theses studies examined. When the data were examined, it was seen that the most studied sample groups were adults (n = 8) and university students (n = 7). It was determined that the least studied sample group was engineers (n=1) and parents of disabled children (n=1).

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GÜNDELİK HAYATIN SEKÜLERLEŞMESİ: GENÇLERDE DİNİ REFERANSLARIN DEĞİŞİMİ (GOP ÜNİVERSİTESİ ÖRNEĞİ)

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Özet

Bu bildiri de gündelik hayatın sekülerleşmesi üniversite öğrencileri örneğinde ele alınacaktır. Sekülerleşme çok boyutlu bir olgu olduğu için çalışmamızda bu durum özellikle dini referansların değişimi bağlamında incelenmiştir. Sekülerleşme konusu gündelik hayata bilfiil dokunan sosyolojik olguların başında gelen ve kuramsal düzeyde tartışılan bir meseledir. Modernleşme ile birlikte dinin ya da doğüstü alanın bireyin ve toplumun yaşantısında etki ve yaptırım gücünün azalması olarak tarif edilen sekülerleşme tarihsel kökleri itibariyle daha çok Batı Avrupa kaynaklı bir kavram olarak literatüre girmiştir. Bildiri de sekülerleşme olgusunun kuramsal ve tarihsel eleştirisine dikkat çekilmiş ve Türkiye örneğindeki farklılıklar vurgulanmıştır.

Çalışmamızda üniversite öğrencileri üzerinde gerçekleştirdiğimiz nicel yöntem ve tekniklerle toplanan veriler kullanılmıştır. Araştırmada öncelikli olarak, sekülerleşme ile birlikte gündelik hayat pratiklerinde farklılaşmaların ortaya konulması amaçlanmıştır. Sekülerleşme ile gündelik hayatın aile ilişkilerinden sosyal medya kullanımına, arkadaş grupları içerisindeki sosyalleşmelerden evlilik tercihlerine, alışveriş alışkanlıklarından boş zaman kullanımına kadar çeşitli boyutlarında ciddi değişimler ortaya çıkmaktadır. Çalışmanın inceleme odağını oluşturan bu pratiklerde hem geleneksel anlam dünyaları hem de yeni tarzları inşa eden referans çerçevesinin analizi ana amaçlarımızdan birini oluşturmaktadır. Burada eksen alınan sekülerleşme boyutu ise daha çok geleneklerin yaşanmasında meydana gelen referans değişimleridir.

Çalışmanın ana hipotezlerden birisi; genç kuşakların gelenekle ilişkilerinde ani kopuşlar veya reddediler değil de modern anlam içerikleriyle biçim ve yön değişiklikleri ortaya çıkacaktır şeklindedir. Bildiri, sekülerleşmenin diğer boyutlarını göz önünde tutmakla birlikte daha çok geleneksel algı, yaşayış ve pratiklerdeki anlam ve biçim değişikliklerini tartışmaktadır. Yüksek lisans tezine esas teşkil eden bu çalışmada Tokat GOP Üniversitesinin çeşitli fakültelerinde okuyan toplam 410 öğrenciye anket uygulanmıştır. Anket bağımsız ve bağımlı değişkenler ile dini referanslardaki değişimi ölçen sorulardan oluşmaktadır. Araştırmanın sekülerleşme ile dini referansların değişimi konusunda temel bulgularından birisi, değişimin gündelik hayattaki temel göstergesi gelenekle ilişkilerde ortaya çıkmaktadır.

Anahtar Kelimeler: Sekülerleşme, Üniversite Gençliği, Referans Değişimi



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AKRAN ZORBALIĞI ÜZERİNE BİR İNCELEME: WILLIAM GOLDİNG “SİNEKLERİN TANRISI” ESER ANALİZİ

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Özet

Roman, bir grup İngiliz çocuğu taşıyan uçağın ıssız adaya düşmesiyle başlar. Bu çocuklar, başlangıçta uyum içinde bir topluluk kurmaya çalışsalar da, zamanla akran zorbalığı ve güç mücadelesi ortaya çıkar. Çocuklar, sivil toplumdan uzaklaştıkça ve kendi kurallarını oluşturdukça, içlerindeki vahşi doğayı açığa çıkaran bir ortam yaratırlar. Bu vahşilik, akran zorbalığı ve çatışma biçiminde nasıl belirginleştiğini ve karakterlere nasıl yansıdığını analiz edeceğiz. Karakterlerin tahlilini yaparken, demokratik bir alan yaratmak için zemin hazırlayan çocuklar, sınırlı bilgileriyle alışılmadık bir doğadaki ilkel bireyleri temsil etmektedirler. Yabancı doğadaki karanlık, oğlanlar arasında bir canavar korkusu uyandırır ve bu korku adadaki çocuklar için bir “güç”e sığınmalarıyla, yaratılmak istenen demokratik ortam bir anda totaliter rejime dönüşür. Totaliter rejimin güç hırsıyla ortaya çıkardığı zorbalık, içsel çatışma ve kurulmaya çalışılan düzenin yıkılmasıyla ıssız adanın nasıl cehenneme dönüştüğüne tanıklık etmekteyiz. Bir yandan Jack’ın güç hırsından, çocukların güçsüzlüğünden ve korkularından faydalanması sonucu ortaya çıkan zorbalıklar ölümlerle sonuçlanırken diğer yandan da Simon’un ermişliği, sakinliği, Domuzcuk’un karanlık güçlere karşı direnmesi ve Ralph’ın yiğitliği Sineklerin Tanrısı’nı (içimizdeki kötülüğü) yenmenin bir umudu olarak karşımıza çıkacaktır.

Anahtar kelimeler: Akran Zorbaları, güç, şiddet, Sineklerin tanrısı, totaliter



A REVIEW ON PEER BULLYING: ANALYSIS OF "LORD OF THE FLIES" BY WILLIAM GOLDING

Abstract

The novel begins with the plane carrying a group of English children crashing on an isolated island. Though these children initially try to establish a harmonious community, peer bullying and power struggles emerge over time. As children move away from civil society and create their own rules, they create an environment that reveals their inner wilderness. We will analyse how this brutality becomes evident in the form of peer bullying and conflict and how it is reflected in the characters. While analysing the characters, children, who lay the groundwork to create a democratic space, represent primitive individuals in an unusual nature with their limited knowledge. The darkness in the foreign nature creates a fear of the monster among the boys, and this fear turns into a totalitarian regime when the children on the island take refuge in a "power". We witness how the deserted island turned into hell with the tyranny, internal conflict and destruction of the order that was tried to be established, brought about by the totalitarian regime's passion for power. On one hand, the tyranny that emerged as a result of Jack's greed for power and taking advantage of the children's weakness and fears resulted in deaths, while on the other hand, Simon's saintliness and calmness, Piggy's resistance against the dark forces and Ralph's bravery proved to be the key to defeating the Lord of the Flies (the evil within us) will appear as a hope.

Keywords: *Peer bullying, power, violence, lord of the flies, totalitarian*

Giriş

Sineklerin Tanrısı'nda çocuklar bir mercan adasında mahsur kaldıklarını fark ettiklerinde bir örgütlenme ihtiyacı hissetmektedirler. Ralph karar almak için şefe oy verilmesi fikrini önermektedir(Golding, 2008, s.15). Toplantıda Ralph ayrıca “avcılara” ihtiyaç olduğu yönündeki görüşünü de dile getirerek (Golding, 2008, s.21) çocukların isimleri yazılarak görev dağılımı yapılmaktadır. Bu yapılanlar ilk etapta demokratik bir devlet kurmanın başlangıcı olarak değerlendirilse de adada “güç” konusu merkezileştirilmekte ve totaliter bir yapı kurulmaktadır. Totalitarizm, teröre, baskıya ve zulme dayalı olan zor kullanma gibi yöntemlerle toplumu tamamen kontrol eden bir siyasi sistemdir. Totalitarizm, sivil toplumu tamamen ortadan kaldırmayı ve bireyin özel alanını sonlandırmayı hedefler (Heywood, 2012). Bu nedenle yazar, görünüşte masum ve saf olan çocukların, yetişkin baskısından uzak ve tamamen izole bir ortamda savunmasız bırakıldıklarında, benzer şekilde acımasızlaşmış kendi saf dünyalarının dışına nasıl çıktıklarını gözlemleyerek bize anlatıyor. Öte yandan. Jack'in liderliğindeki grup, güç mücadelesi, kontrol isteği ve kendi kurallarını oluşturma çabasıyla belirginleşir. Bu süreçte, Jack'in liderliği altındaki çocuklar arasında hiyerarşi oluşur ve bu hiyerarşi, akran zorbalığının ortaya çıkmasına neden olur Bu çalışma; akran zorbalığına sebep olan hırs, korku ve güç mücadelesini karakterler üzerinde ele alarak tahlil etmiştir.

Bu çalışmada, belge tarama/doküman analizi tekniğinden yararlanılmıştır. Roman ile ilgili tezler, makaleler, romanın tarihsel gelişimi ile ilgili yayınlar, akran zorbalığı üzerine yapılmış araştırmalar, makaleler ve tezlerden faydalanılarak veriler toplanmıştır.

William Golding'in Yaşamı

1911 yılında Cornwall'da doğan Golding, oyuncu, öğretim görevlisi, denizci, müzisyen ve son olarak okul müdürü olarak çalıştı. 1954'te yayınlanan ve ilk romanı olan Sineklerin Tanrısı romanında elde ettiği başarının ardından tüm hayatını yazma eylemiyle geçirdi. Sineklerin Tanrısı, 1963 yılında Peter Brook, çağımızın klasiklerinden sayıldığı için okullar ve üniversitelerde okutulan bu kitabın oldukça ilginç bir filmi çevirdi. 1983'te Nobel Edebiyat Ödülüne layık görüldü. Öncelikle bir romancıydı ama aynı zamanda şiirler, oyunlar, makaleler ve kısa öyküler de yazdı.

Romandaki Karakterler

Ralph:

Romanın başında adanın demokratik lideri olarak seçilen bir karakterdir. Temsil ettiği değerler, düzen ve uyum üzerinedir. Ralph, adadaki güç mücadelesinde Jack ile çatışır. Jack'in zorbalığına karşı direnir ve adadaki

düzenin sürdürülmesi için çaba harcar. Ancak, zamanla Ralph'in liderliği zayıflar ve Jack'in zorbalığı karşısında etkisiz kalır. Bu da akran zorbalığına direnme çabasının zorluklarını gösterir.

“Zorbalık farklı boyutlar içermektedir. Fiziksel bir şekilde vurma, dövme gibi ortaya çıkan zorbalık, şiddet ile bağdaşmaktadır. Şiddet ile zorbalığı birbirinden ayıran nokta, zorbalığın sadece fiziksel bir şekilde ortaya çıkmamasıdır.” (Gökler, 2007). Başta romanda fiziksel bir zorbalık yoktur. İlk etapta var olan zorbalık grubun lideri olmak ve deniz kabuğunu elinde ilk kim tutarsa konuşma hakkına sahip olmaktır. Deniz kabuğu, demokratik düzeni temsil eden bir sembol olarak karşımıza çıksa da zamanla bu düzen bozulur deniz kabuğu sembolü de bu çöküşün parçası haline gelir. Çocuklar arasındaki güç mücadelesi ve vahşet arttıkça, deniz kabuğu etkisizleşir ve çocuklar içgüdülerine teslim olurlar. Jack, yanına Simon'ı alarak bir keşif gezisine çıkarken, dönüş yolunda bir yavru domuzla karşılaşır fakat Jack kınından çıkardığı bıçağı ağacın gövdesine mihlar ve domuza acıdığı için onu öldürmez çünkü hala kan dökmenin kötü bir şey olduğunun farkındadır. Domuzu öldürmeyen, kan dökmenin kötü bir şey olduğunu düşünmüştür. Adadan kurtulma düşüncesiyle sürekli yanması gereken bir ateşi kontrol etmesiyle sorumlu tutulan Jack, adada güç otoritesini kurma hırsıyla domuz öldürme peşindedir ve her gün ava çıkmaktadır. Kurtulmalarının bir umudu olan bir geminin geçtiği esnada Jack domuz öldürme peşindedir. Jack ise *“Domuzdan çıkan kanı görecektin sen”* (Golding, 2008, s.80) diyerek Jack'in domuzları öldürdükçe nasıl vahşi ve yabansı olduğunu çok net görebiliyoruz. Artık şiddetin ön plana çıktığını ve domuz öldürülürken seyirci kalan diğer akranların da bundan eğlendiğini görüyoruz. Graham (2016)'a göre; zorbalık olaylarında üç tür tanık rolü vardır: zorbayı teşvik edebilecek pekiştiriciler (reinforcers), mağdurun yardımına koşabilecek savunucular (defenders) ve zorbalığı gözlemleyen ama hiçbir şey yapmayan seyirciler (bystanders). Seyirci durumundaki çocukların bu durumu hoşnutsuzlukla karşılaması ya da yapılan haksızlığa ses çıkarmaması zorbayı ödüllendiren ve davranışını pekiştirmesine yardımcı olan bir durum olarak karşımıza çıkabilmektedir. Nitekim bu zorbalık artık sadece bir domuzun değil gruptaki fertlerin ölümleriyle sonuçlanmaktadır.

Domuzcuk

“O şişko değil” dedi Ralph, *“Gerçek adı Domuzcuktur onun, Domuzcuk! Domuzcuk! ” Herkes katıla katıla güliyordu En küçükler bile katılmıştı bu gülüşmelere.”*(Golding,2008.s.18). Domuzcuk'a şişmanlığından dolayı böyle bir takma isim verilmiştir. Arada nefes darlığından kaynaklı nöbetler geçiren Domuzcuk, Mantıklı düşünce ve akıl gibi uygarlık değerlerini temsil eden bir karakterdir. Özellikle gözlükleri, ateşi kontrol etmek için kullanılabilen tek araç olan mercekle kullanıldığı için önemli bir rol teşkil etmektedir. Jack, liderlik pozisyonu için çabalayıp gruplar arasındaki çatışma arttıkça, Domuzcuk, Jack'in liderliğini sorgulayan ve eleştiren bir figür haline gelir. Sonunda, Jack'in kontrolündeki çocuklar, domuzcuk

karakterini öldürürler. “ *Kaya, çenesinden dizine kadar, yandan çarptı Domuzcuk’a. Deniz kabuğu, binlerce beyaz parçaya dağılıp yok oldu. Domuzcuk, bir şey söylemeden, inlemeye bile vakit bulamadan havada uçtu; uçarken yana döndü.*”(Golding, 2008, s.222) Deniz kabuğunun parçalanması, Jack kontrolündeki çocukların kayayı Domuzcuk’un üzerine atması adadaki uygarlığın tamamen çökmesini ve vahşi doğanın üstün gelmesini simgeler. Bu durum, bir grup içindeki güç dengelerinin ve grup içi dinamiklerin, bazı bireyleri dışlamak ve zorbalığa uğratmak için nasıl kullanılabileceğini gösteren bir örnektir.

Simon

Simon, adada diğer çocuklar arasında dışlanmış ve anlaşılamayan bir karakterdir. “*Zorba akranın yanı sıra zorbalığa uğrayan mağdur konumunda bulunan akranlar, daha güvensiz, genellikle endişeli, sosyal becerileriler ve arkadaşlık ilişkileri bakımından yoksun ve kendilerini sosyal ortamlar dışında tutan kişiler olarak görebilmekteyiz.*”(Banks, 1997). Bu yüzden Simon kendini çocuklardan uzak tutan bir birey olmuştur. Çocukların korkularını dışsal bir şeye, bir canavara, yılan benzeri bir şeye benzetmeleri, korkularını kontrol edilebilir kılmak için verdikleri zihinsel mücadeledir. Bu canavar korkusu adada çığ gibi büyür. Kendi kalbinde de bir canavar büyüten ve canavar gibi davranan Jack, canavarın varlığına inanmak ister. Çocukların da canavara inanmasıyla beraber Jack ile Ralph arasındaki düşmanlık daha da büyür. Canavara inanmayan tek çocuk Simondur. Karanlıktan hiç korkmadığı için karanlıkta yalnız başına ormana gidebilen, zaman zaman bir çeşit sara nöbeti geçiren Simon’u, öteki çocuklar kafadan biraz çatlak bulurlar. Simon, Ralph’ın günün birinde bu adadan kurtulacağı evine geri döneceği öngörüsünde bulunduğu gibi “*Hayır delirmiş değilim, senin sağ salim eve döneceğini sanıyorum sadece*” (Golding, 2008, s.134) aynı zamanda da canavarın dış dünyada değil, çocukların kendi içlerinde olabileceğini anlar. Ancak, kitap ilerledikçe, Simon'un dışlanması ve anlaşılamaması, trajik bir şekilde sonlanır.

Adadaki Korku ve Siyasal iktidar (Jack)

Çocuklar, adada kaldıkça vahşi ortamda korkuları daha da büyümektedir. Bazı çocuklar kâbuslar ve hallüsünasyonlar görür. Çünkü adada bir canavarın varlığına dair kaygı ve korku hat safhadadır. Jack'in, kendi gücünü ve liderliğini sağlamlaştırmak için canavarın varlığına inanmayı bir tür araç olarak kullandığını söyleyebiliriz. Jack, iktidardır. İktidarın yaydığı korkunun, güç ve otoriteyle adayı yönetmesinin daha kolay olacağını farkındadır. Korku, birey ve toplumlar arasında dört temel süreç ile karşımıza çıkmaktadır. Jack, “Sineklerin tanrısı”nı sıradan, alışılmışa dönüştürerek çocukların iradesini de esir alarak önemsizleştirir. Doğru ve yanlış kaygısı adada kaybolarak çocuklar duyarsızlaşır. İktidarın yanında olan çocuklar pasif ve edilgen duruma düşerek tepkisizleşir ve son olarak da içlerindeki korku artık onları tamamen ele geçirdiğinde korkularına teslim olmaktadır (Çetin, 2012, s. 42).

İçlerinde korku artık ölümlere sebep vermektedir ki hat safhaya ulaşılan korkunun şiddetiyle birey; bir hayvan saldırısına maruz kaldığı bir durum gibi kendine ve başkalarına zarar verebilir.(Machiavelli, 2019). Nitekim Simon, vahşi bir dans sırasında diğer çocuklar tarafından yanlışlıkla öldürülür. Çocukların korktuğu canavar figürü, esasında kayaya çarpıp ölen bir paraşütçüden ibarettir. Simon bunu farkeder ve çocuklara haber vermek ister. O gece, Jack liderliğindeki grup, bir şiddet ve dans ritüeli düzenler. Çocuklar, büyük bir coşku ve kontrolsüzlük içinde, ritüelin sonunda yanlarında getirdikleri bir domuz başını taşırlar. Ancak yağmurlu bir gecenin karanlığında ortaya çıkan Simon“tepedeki ölü adam” diyerek at nalı biçimindeki dans halkasına girer. Bütün çocuklar Simon’u canavar sanıp üzerine çullanarak Simon’un ölümüne sebep olurlar. Bu olay, sadece Simon'un akranları tarafından dışlanmakla kalmayıp, aynı zamanda fiziksel şiddet görmesiyle de akran zorbalığından kaynaklı bir ölümü teşkil eder.

Sineklerin tanrısı, üstüne sineklerin konduğu ölü bir domuz başıdır. Jack, ıssız adada karanlık güçleri az da olsa dindirmek ve öncelikle kendi güvenliğini sağlamak amacıyla bir domuzu öldürmüş, domuzun başını kesip iki ucu sivri bir kazığa geçirerek bir tür put oluşturmuştur. Bu korkunç başı da canavara sunmuştur. Bu noktada da, şamanizm inancının kurban adama törenleri gibi yakılan büyük ateşte tanrıya yapılan sunum ve adanan hayvan figürü söz konusudur. Adadakiler canavardan öyle çok korkuyorlar ki, kendilerine zarar vermemeleri için domuz başını canavara adıyorlar. Şamanizm de yapılan bu kurban adama işi, barış içinde yaşama istemi içindir (Akgün, 2007).

Yapılan zorbalıklar, çatışmalar ve gruplaşmalar çocukları kan dökene kadar vahşileştirmiştir. Jack ve Roger karakterleri şiddete eğilimleri olduğu gibi diğer çocuklarında fikir beyan etmeden yapılan zorbalıkları onaylamaları ıssız adayı adeta bir alev topuna çevirmiştir. *“Doğrudan zorbalık gerçekleştirilirken, zorba kişi mağdur kişiye karşı açık bir şekilde zorba davranışlarını sergilerken, dolaylı zorbalıkta zorba kişi mağdur kişiyi direkt olarak kasıtlı şekilde grup dışında bırakarak dışlama yolu ile zorba davranış gerçekleştirilebilir.”* (Olweus, 1994). Jack, Roger ve destekçileri, güçlerini kullanarak, önce oyunlar aracılığıyla, ardından gerçek av etkinlikleriyle, mutlak kontrol ve hakimiyet kurarlar, kendilerini diğerlerinden üstün, neredeyse tanrısal bir düzeyde görerek, adanın hükümdarları olduklarına inanırlar. Bu durum, gücün ve kontrolün bozulma sürecini vurgulayarak, çocukların içsel vahşetini ve insan doğasının karanlık yönlerini gözler önüne serer. Bütün bu zorbalık ve kötülüklerin doğuştan var olabileceği kitap boyunca bizi düşündürse de Simon, Ralph ve domuzcuk karakterlerin ermişliği, iyiyi kötüden ayırmaları saf kötülüğün olmayacağı konusunda bir umut kaynağı olmuştur.

Sonuç

Sineklerin Tanrısı'nda çocukların adada bir araya geldiklerinde, topluluk içindeki güç mücadelesinin akran zorbalığına nasıl dönüştüğünü gördük. Jack'in liderliği altında, çocuklar arasındaki dinamik, akranları arasındaki güç mücadelesiyle birlikte vahşileştiği ve zorbalığın seyirci durumunda olan diğer çocukların, olaylara sessiz kalarak veya doğrudan zorbaya destek vererek içsel vahşetin bir ifadesine dönüştüğüne tanıklık ettik. Golding' "Sineklerin Tanrısı" romanında, kontrolsüz liderliğin ve sorgusuz desteklenen bir sistemin, Hitler, Mussolini gibi diktatörlerin yarattığı gibi, tesadüfi olmadığını vurgular. Jack'in öyküsü aracılığıyla, diğer çocukların düşünmeden desteklemesi ve vicdan ile akılcılıktan uzaklaşarak primitif bir diktatörün ortaya çıkışını betimlemiştir. Bu diktatörlük, Jack'in zorbalıkları ve kendi bünyesinde tuttuğu diğer çocuklarla kan dökecek noktaya gelmesi şiddetin doğurduğu ölümlere yol açmıştır.

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SHAKESPEARE ESERİ MACBETH; BAZI PERDELERİN İÇERİK ANALİZİ

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Özet

Birçok edebi çalışmada tiyatro her daim önemli bir yer almıştır; ancak Tiyatro'nun konusu ve bunun seyirciye ya da okuyucuya gösterme biçimi eser için en önemli unsurdur. Bu çalışmada Shakespeare'in ünlü eseri olan Macbeth ele alınmıştır çünkü bu eser hem olay örgüsü hem de karakterlerin kurgulanması açısından önemli bir öneme sahiptir. Elizabeth dönemi tiyatrosu ve Shakespeare 'in hayatı hakkında bilgi verildikten sonra Shakespeare tarafından 16.yüzyılın başında yazılan bu eserin içeri analizi yapılmıştır. Ayrıca eserdeki önemli karakterlerden olan Macbeth ve Lady Macbeth 'in karakter özelliklerine değinilmiştir. İçerik analizi yapılırken eserlerden alıntılarla desteklenmiştir. Karakterlerin iktidar hırsı yüzünden nasıl değiştikleri analiz içinde verilmiştir. Ayrıca çalışmada günlük yaşantımızda kötü ya da zararlı denilecek unsurların, yaşam boyunca değişime uğrama ve bundan dolayı farklı zıt özelliklerle tanışıp edinme durumlarına da değinmiştir. Sonuç olarak, bu çalışmada hırs ve dünya sevgisinin insanları oldukça yıpratılabildiği vurgulanmış ve insanların günlük hayatındaki birçok önemli unsura iyice odaklanması gerektiği belirtilmiştir.

Anahtar kelimeler: *Macbeth, Lady Macbeth, Analiz, İktidar Hırsı.*



SHAKESPEARE'S MACBETH; CONTENT ANALYSIS OF SOME ACTS

Abstract

Theatre has always had a significant place in many literary works; however, the subject of the theatre and the way it is shown to the audience or the reader is the most important element for the work. In this study, Shakespeare's famous work, Macbeth is discussed since it is really crucial in terms of both the plot and the fictionalisation of the characters. After providing some information about Elizabethan theatre and Shakespeare's life, the content analysis of this work written by Shakespeare at the beginning of the 16th century was made. In addition, the character traits of Macbeth and Lady Macbeth, who are important characters in the work, were mentioned. The content analysis was supported by quotations from the work. How the characters changed due to the ambition for power is pinpointed within the analysis. Besides, in the study, the elements that can be called bad or harmful in our daily lives have also touched upon the situation of undergoing change throughout life and therefore meeting and acquiring different opposite characteristics. As a result, this study emphasises that ambition and love of the world can wear people out and that people should focus on many important elements in their daily lives.

Keywords: *Macbeth, Lady Macbeth, Analysis, Passion for power*

Giriş

Bir tiyatroyu ya da oyunu en önemli kılan özelliklerden birisi konusu ve bunu gösterme biçimidir. Geçmişte günümüze kadar sergilene sayısız oyunlar, isimlerini karakterlerinden almaktadır. Shakespeare'in Macbeth, Hamlet, Kral Lear, Romeo ve Juliet ve Othello gibi bazı önemli eserleri de isimlerini karakterlerinden alarak karakter özelliklerini keskin bir şekilde okuyucuya ve seyircilere göstermiştir. Neredeyse yüzyıllardır ünlü eseri Macbeth araştırma ve incelemelere konu olmuştur. Her yazar gibi Shakespeare de yaşadığı dönemin olaylarından etkilenerek bu gelişmelerinin izlerini eserlerinde görmekteyiz. Olaylar farklı olsa da Macbeth eserinin de dönemin siyasi olaylardan etkilenerek yazdığını ama karakterleri kendi değiştirerek kendi bakış açısına göre oluşturduğunu söyleyebiliriz. Bu çalışmada da Shakespeare dönemi tiyatrosu ve Shakespeare ile bilgi verilip Macbeth eserinin içerik analizi yapılarak karakterlerin dönüşümleriyle araştırmalar yapılmıştır.

Elizabeth Dönemi Tiyatrosu

Geçmişten günümüze kadar gelen tiyatronun uçsuz bucaksız bir tarihi geçmişi vardır. Öncelikle tiyatro nedir? Tiyatro, içinde her türlü oyunun sergilendiği, seyircilerin oyunlarını izlediği, oyuncuların da oyunlarını sahneleyebildikleri, dekor ve elbiselerin oluşturduğu bölümlerden oluşan bir yapıdır. Tiyatronun binlerce yıllık tarihi bir geçmişi vardır; toplumlarda yaşanan sosyal, dinsel, siyasal değişim ve gelişmeler birçok alanı etkilediği gibi tiyatronun da gelişmesine olumlu veya olumsuz etkilerde bulunmuştur. Her çağda tiyatro farklı konularla sahnelenmiş ve farklı türlerle seyircilerin karşısına çıkmıştır. Her çağda ve neredeyse her ülkede yer aldığı gibi İngiltere'de de tiyatro çok önemli bir yere sahipti. Özellikle de Shakespeare'in yaşadığı dönemde İngiltere Tiyatrosu altın çağını yaşıyordu diyebiliriz. Peki Shakespeare döneminde tiyatro nasıldı? Shakespeare döneminde İngiltere tiyatrosu çok canlıydı. Bu döneme İngiliz Elizabeth Dönemi tiyatrosu da denmektedir. Bu dönemdeki tiyatrolar şiir ve düz yazıyla yazılmış oyunlar gezgin tiyatrolar tarafından sergilenirdi. 1576'lı yıllarda Londra'nın yoğun yerleşim ve ünlü yerlerinde tiyatronun kurulmasına izin verilmediği için daha çok ücra yerlerde ve Thames Nehri kıyılarından inşa edilirdi. Elizabeth dönemi tiyatrosu şekli sekizgen biçiminde ve üstü açıktı. Oyunlar hiç ara verilmeden devam edilir ve ucuz bilet alanlar ayakta izlerken zenginler de en önlerde izlemiş.

Shakespeare'in Hayatı

Bu dönemin ünlü yazarlardan biri de Shakespeare'di. Dünyaca ünlü İngiliz şair, yazar ve oyuncu Shakespeare sadece kendi dönemini değil günümüzde de çok önemli bir yere sahiptir. 1564 yılında İngiltere'de doğdu. Babası tüccar ve maddi durumları oldukça iyiydi. Eğitim hayatından sonra 18 yaşında Anne Hathaway ile evlenip üç çocuğu olmuştur. 11 Yaşında olan bir çocuğunu bilinmeyen bir sebeple kaybediyor ve kayıptan dolayı yaşadığı acı ve duyguları eserlerine de yansıtmıştır.

Shakespeare' in çok sayıda eseri vardır. 16.yüzyılın sonları ve 17.yüzyılın başlarında yaşayıp ancak 18.yüzyılda araştırılmaya ve anlaşılmaya başlanılmış ve halen 21. yüzyılda da değerinden hiçbir şey kaybetmediğini hatta değerinin katlanarak devam ettiğini eserlerinin çok farklı uyarlamalara konu olduğunu ve dünya tarihinde en çok okunan yazar-yazarlardan biri olduğunu söyleyebiliriz. İlk oyunları çoğunlukla komedi ve tarihsel iken daha sonra trajedi türünde eserler vermiştir. Hamlet, Romeo ve Juliet, Kral Lear, Othella ve bizim de içerik analizi yapacağımız Macbeth eseri en önemli eserlerinden bazılarıdır.

Korkusuzca savaşır ve bunu Macduff'a söyler. Bunun üzerine Macduff annesinin karnından alındığını söyleyerek Macbeth'i öldürür. Böylece İskoçya'nın yeni Kralı Malcom olur. "Shakespeare'in Macbeth eseri dünya tiyatrolarında defalarca oynanmış ve hâlen oynanmaya devam etmektedir. Sadece tiyatro sahnesiyle sınırlı kalmayan bu eser beyazperdeye de aktarılmıştır." (Mertoğlu, 2019: 32).

Macbeth Eser Analizi

Birinci Perde

Shakespeare'in en önemli tragedya eserlerinden olan Macbeth bir kralın eser boyunca iktidar hırsı yüzünden nasıl bir şekilde büründüğünü görmekteyiz. Eser umut, umutsuzluk, pişmanlık, özellikle iktidar hırsı gibi tüm duyguları okuyucuya yansıtmaktadır. Birinci perde birinci sahnede üç cadının konuşmasıyla ve hava durumuyla ilgili bilgilerle başlar oyun. Havanın yağmurlu, kasvetli olması hiç de normal değildir aynı zamanda. Macbeth ismini ilk defa onlardan duyarız. Macbeth ile karşılaşım konuşacaklarını söylerler. Cadılar genelde kötüyü çağrıştırdığı için oyun içinde kötü olayların yaşanabileceği gelir akla.

"Üç cadı birden: İyi demek kötü demek, kötü demek iyi demek;

Sisli puslu havalarda kanatlanıp uçmak gerek." (Shakespeare, s.4)

Başta bu sözlerin esere nasıl bir katkıda bulunacağını bilemiyoruz; Cadıların bu sözlerini okurken kötü bir şeyler olacağını sezeriz ama tragedyaların bazı unsurlarını sezebilir; çünkü insanoğlu iyi ve kötü özellikler taşı içinde. Her iyinin içinde kötülükler olabileceği gibi kötülükler içinde de iyi şeyler olabilir. Gerçek ve hayal; kötü ve iyi arasındaki farkı ima etmektedir. Türk İngiliz edebiyat profesörü, yazarı ve çevirmeni olan Mine Urgan ilk sahne için bu eserin diğer tragedyalarından farklı olarak konuşmalarla, anlatılan durumlarla değil de ıssız, kasvetli bir havada başlayan ve oyun boyunca sürecektek olan gök gürültüleri ve uzaktaki bir savaş arasında başlayıp kısacık sahnede gizemli bir büyüyü uyandıran ve gök gürültüsü bitip savaşın kazananı, kaybedeni belli olduktan sonra Macbeth ile görüşeceklerini söylerler. Savaşın kazananın gibi kaybedeni de önemlidir çünkü Macbeth 'in kazandığı bu savaş daha sonra hırslarına yenilerek kaybedecektir. Cadılar bu yüzden iyi ve kötü

arasında hiçbir ayırım görmediklerini “iyi kötüdür; kötü de iyidir (Fair is foul; foul is Fair) söylerler (Urgan, 2014:222).

Cadılar eserde önemli yaratıkları simgelemektedir. Cadılar fiziksel özellikleriyle doğa üstü varlıklar olarak görülse de aslında bazı eleştirmenler hatta Shakespeare tarafından gelecekler ilgili haberler veren haberci ya da kötülüğün temsilcileri olarak tanımlanabilir. “Cadı sözcüğü, Shakespeare’in asıl metninde değil de 18. Yüzyılda oyunların baskılarını hazırlayanların, oyunculara yol göstermek için parantez içinde metne ekledikleri açıklamalarda geçer ancak. Shakespeare bu doğa üstü üç varlığı “the weird sisters” adını verir her zaman. “Weird” kader anlamına geldiği için, kimi eleştirmenler bu yaratıkları kaderin temsilcileri sayarlar (Urgan, 2014:223).

İkinci Sahnede Macbeth’e yiğitçe savaştığı için Kral Duncan tarafından Cowdar Beyi ünvanı verilir ama bundan Macbeth ‘in haberi yoktur henüz. Bu haberi ona vermek için bir asker görevlendirilir. Üçüncü sahnede tekrar cadıların fundalıkta ve bir gök gürültüsü ile sahneye girdiklerini görürüz. Macbeth ‘in tam da söylediği “Bundan kötü, bundan iyi bir gün yaşamadım.” Sözü aslında hava ne kadar kötü olursa olsun savaştan zaferle döndüğü için bu cümleleri kullanıyor. Bu cümleleri Mine Urgan yine söyle yorumlar: Macbeth cadılarla karşılaşmamış olmasına rağmen Macbeth ‘in onlar gibi cümleler kurmasını onlarla kurduğu gizemli bir bağ olduğunu ve şimdiden onların gizemli etkisine kapılmış diye yorumlar (Urgan, 2002: 224). Henüz hiçbir şeyden haberi olmayan Macbeth tam da bu cümleleri söyledikten sonra üç cadı ile karşılaşır. Yanında da yakın dostu Banquo vardır. Cadılar sırayla Macbeth’i şöyle selamlar:

“Birinci Cadı:

Selam sana Macbeth! Selam Sana Glamis beyine!

İkinci cadı:

Selam Sana Macbeth! Selam Cawdor beyine!

Üçüncü Cadı:

Selam sana Macbeth! Selam yarının kralına!” (Shakespeare, 2002: 9)

Yarının yani geleceğin kralı sözcükleriyle Macbeth sarsılır, kendinden geçerek dalar. Banquo Macbeth ‘in tepkileri karşısında neden böyle olduğunu sorar ona. Cadılar Banquo için de kral olmasa da krallar yetiştireceğini söylerler. Macbeth ‘in aksine Banquo onun gibi etkilenmez umutlanmaz. Cadıların etkisindeyken çıkamayan Macbeth ve Banquo soylu askerlerden Angus ve Ross ‘un getirdiği haberler bir kez daha irkilirler; çünkü cadıların ilk kehaneti gerçeklermiş Macbeth Cawdor Beyi’ olmuştur. Bu hem iyi hem kötü

bir haberdır; belki de Macbeth ‘in cadıları görmeden söylediği söz önce Glamis beyi iken şimdi de Cawdor beyi ve gelecekte de kral olması onu gelecekle ilgili aynı zamanda da korkutmaktadır. (Bozdemir, 2023:136) Gelecekle ilgili bu sözlerden büyük bir şok yaşayan Macbeth birçok duyguyu bir arada yaşar. Belki de o an kralı öldürme fikri gelir aklına. Cadılar ona Kral olacağını söylerler ama nasıl olacağını söylemezler. Kehaneti duyması ve kralı öldürme fikirleri aynı sahne içindedir bir süre sonra eşi Lady Macbeth ‘in kışkırtmasıyla kralı öldürmeye karar vereceğini göreceğiz.

Macbeth her ne kadar bir ikilemde yani kararsız kalsa da Duncan ile bir araya geldiklerinde Kralın varis olarak oğlunu göstermesiyle Macbeth bunu bir tehdit olarak görür ve kralı öldürme fikri daha da keskinleşir kafasında. Duncan’ın Cowdar beyinin ihaneti için şu cümleleri kurar:

“Duncan:

İnsanın içinden geçenler yüzünden okunabilseydi!

Nerde! Öyle bir sanatımız yok.

Bu beye nasıl güveniyordum,

Ne kuşkusuz bir güvenle...” (Shakespeare, 2002: 15)

Aslında burada bir ironi vardır. Cawdor beyinin ihanetinden bahsederken dış görünüşün insanı yanıltabileceğini düşünürken bir yandan da Macbeth’i övmesi onu ödüllendirmesinde bir ironi olduğunu söyleyebiliriz çünkü dış görünüşün onu bir kez daha yanıltacağını, çok güvendiği Macbeth tarafından ihanete uğrayacağını hatta bunu canı ile ödeyeceğini sonraki sahnelerde göreceğiz. (Shakespeare, 2002: xxxv)

Macbeth, cadıların kehanetini bir mektupla eşine Lady Macbeth’e haber verir; kralı öldürmeyi nerdeyse kararlı olduğunu Malcolm’un tahta varis gösterildiğini şu cümlelerle açıklar:

“Macbeth (kendi kendine)

Cumberland prensi ha’ Al sana bir engel daha:

Ya düşüp kalacaksın önünde ya da atlayıp geçeceksin:

Yolu tıkadı prens.

Yıldızlar, kapayın gözlerinizi! hiçbir ışık sızmasın

İçimdeki derin, karanlık isteklere.

Göz görmesin elin ne yaptığını:

Yine de olsun ama, olsun bu iş;

Gözün bakamayacağı kadar korkunç da olsa (Shakespeare, 2022:17)

Karanlık hırslarının onu katil edeceğini bunu yaparken bu işi gözlerinden nasıl saklayacağını düşünür. Her ne kadar kralı öldürmeyi düşünse de Lady Macbeth ona güvenemez bu yüzden onu kışkırtır; çünkü Macbeth iyi-kötü çatışması içindedir. Lady Macbeth kötü tarafı seçerek planını ona anlatır. Lady Macbeth cinlere seslenerek ondan kadınsı duygularını merhametini almalarını isteyerek ne kadar ileri gidebileceğini gösterir. Lady Macbeth 'in Kral Duncan'ın uşaklarını sarhoş edip Kralı bir hançerle öldürdükten sonra kanını uşakların ellerine sürerek onları suçlama planları ve kocasının vazgeçebileceği korkusuyla onu sürekli manipüle etmesi erkek olmamasıyla suçlaması karşısında Macbeth 'in aslında içinde halen bir parça insani duygular olduğunu şu sözlerle açıklayabilir:

“Macbeth:

Yeter sus artık! Bir insana yaraşan

Her şeyi yapmaya varım. Ondan ötesini yaptım mı,

İnsan olmaktan çıkarım.” (Shakespeare, 2002:23)

İkinci Perde

Kral Duncan Macbeth 'in evine misafir olmuş ve gece olmuştur. Kral Duncan uyumak için odasına geçer. Herkesin uykudayken planlarını gerçekleştireceklerdir. Macbeth yalnızken hayali bir hançer görür. Bu hançer Kral Duncan'ı öldüreceği hançerdir ve cinayeti simgeler. Macbeth içinde halen bir korku olsa da Lady Macbeth harekete geçip hançeri ona verir ve Kral Duncan'ı öldürür. Lady Macbeth de akan kanı uşakların ellerine ve elbiselerine sürer ki gerçekçi olsun; ancak eline bulaşan bu kan daha sonra onun için kâbus olacak ve aklını yitirecek konuma gelip hayatına son verecektir. Macbeth 'in kralı öldürmesiyle içindeki huzuru öldürdüğünü söyler artık gözlerine uyku girmez kral olur ama yine mutlu olmaz içini bir korku huzursuzluk kaplamaya devam eder. Uykuyu öldürdüğünü şu sözlerle dile getirir:

“Macbeth:

Bir ses duyar gibi oldum:

“Kimseler uyumasın artık! Macbeth uykuyu öldürdü!”

Evet, masum uykuyu,

Kaygılar yumağını çözen uykuyu,” (Shakespeare, 2002:32).

Karalın öldürülmesi tanrıya olan bir başkaldırı gibidir çünkü yeryüzünde kral tanrının temsilcidir; Cinayet gecesi de doğa buna çok şiddetli bir şekilde karşılık verir; bacalar uçar, çığlık sesleri, toprağın titremesi, kargaşalar, Duncan'ın atlarının yerinde duramaması, bir şahinin fare yiyen bir baykuşun pençesinde can vermesi belki de burada yine bir gönderme var kralın şahine benzetilip baykuşun da Macbeth olması ve ortalığı birbirine katmasıdır. (Çalışkan, 1992: 73). Sabah olduktan sonra Macduff kralı uyandırmaya gider ama gördükleri manzara karşısında dehşet kapılır. Macbeth ve Lady Macbeth hiçbir şey olmamış gibi davranırlar. Kralın oğulları bu cinayetin onlara da zarar verebileceğini düşünerek ülkeyi terk ederler. Macbeth 'in önünde hiçbir engel kalmayınca kralın akrabası olarak tahta geçer.

Üçüncü Perde

Dunsan ölmesiyle yeni kral artık Macbeth'tir. Üçüncü perde Banquo'nun şüpheleriyle başlar.

“Banquo:

Kral, Cawdor, Glamis, hepsi oldun:

Cadı karılar ne dediyse çıktı.

Çıksın diye de korkarım kötü,

Çok kötü bir oyun oynadın.

Ama bir de ne demişlerdi:

Senin soyuna kalmayacakmış bütün bunlar.

Bense krallar atası, babası olacaktım.

Bir doğruluk varsa bu cadıların falında

-ki senin için gün gibi var, Macbeth-

Neden sana dedikleri çıksın da

Bana dedikleri çıkmasın?

Umuda kaptırmasın beni?

Ama sus şimdi, uzatma! (Shakespeare, 2002:45)

Bu sözlerden Banquo'nun Macbeth'ten şüphelendiğini ve kendisi için de tahtta karşı içinde umutlar beslediğini görmekteyiz. Bu sözler üzerine Macbeth tahtının güvende olmadığını hisseder ve Banquo'yu da yok

etme planları oluşur kafasında ancak tekrar bir cinayetten dolayı yaşayacağı pişmanlık ve huzursuzluğu tatmamak için bu sefer katiller tutarak Banquo ve oğlu Fleance'yi öldürmelerini ister.

Kral Duncan'ın öldürülmesinden sonra Lady Macbeth artık eskisi gibi aktif değildir. Macbeth adeta yalnızdır ve yaşadığı huzursuzluk belki de onu yalnızlaşmış bir bakıma da yüreğinin bir yerinden vicdaniyla hesaplaştığını söyleyebiliriz ancak yine de bunlar onu kötülük yapmaktan alıkoyamıyor ve kötülükleri tek başına Lady Macbeth olmadan yapmaktadır. Lady Macbeth'in de bir pişmanlık duygusu içindedir.

“Lady Macbeth:

Kendini boşa harcamış olur insan,

Dilediğine erer de sevinç duymazsa.

Yıktığın hayat kendininki olsun daha iyi,

Yıkmakla kazandığın şey kuşkulu bir mutluluksa” (Shakespeare, 2002:51)

Kocasının kral olması ne ona ne de kocasına mutluluk getirmeyeceğini artık anlamıştır. Lady Macbeth'in sözleri artık kocası için hükümsüzdür. Kralı öldürürken büyük rol oynarken artık sonraki süreçlerde geri planda kalarak köşesine çekilmiş bir kadın gibidir. Macbeth yaptıklarını ona haber bile vermez.

Dördüncü Perde

Dördüncü perde cadıların konuşması ile açılmaktadır. Geleceği merak eden Mabet cadılarla kendisi için kehanetlerde bulunmaları için konuşmaya kara verir. Cadılar Mabet için kehanetlerde bulunurlar. Anne rahminden doğmayan hiç kimsenin ona zara vermeyeceğini ve Birnam ormanı yürümedikçe ona bir şey olmayacağını söylerler. Banquo'nun varislerinin de kral olup olmayacağını sorduğundan olumlu cevap alır Macbeth. Macbeth Macduff'un ailesini öldürtür. Bunu duyan Macduff Macbeth'e savaş açmaya karar verir. Malcolm'un güvenin alan Macduff ikisi beraber askerleri de yanlarına alarak Macbeth'i tahtan indirmek üzere yola çıkarlar.

Beşinci Perde

Beşinci perdenin Hekim ve kadının konuşmasıyla açıldığını görmekteyiz. Konuşmalardan Lady Macbeth'in hasta olduğunu aklını yitirdiğini şu sözlerden anlıyoruz

“Lady Macbeth

Çık elimden, korkunç leke çık diyorum sana!

Bu bir...Bu iki... Tamam: Haydi şimdi.

Cehenneme ne karanlıkmış!

Yazık, koca kralım benim.

Yazıklar olsun! bir asker korkar mı hiç?

Ne diye korkuyorsun bilinmesinden?

Kimim haddine bizden hesap sormak?

Bir ihtiyardan bu kadar kan akacağını kimin aklına gelirdi?” (Shakespeare, 2002:93)

En kanlı cinayeti planlayan Lady Macbeth artık duyduğu pişmanlıktan dolayı sınırları bozulmuştur; uyuyamaz, uyur gezerler gibi uykusunda gezinip elindeki hayali lan lekelerini temizlemeye, kokularından kurtulmaya çalışır bütün bunlara dayanamayan Lady Macbeth’i çözümü doktorda değil de ölümden bularak hayatına son verir. Ölüm haberini alan Macbeth bu haberi çok sakin karşılar.

“Macbeth

Er Geç ölecekti kraliçe:

Er geç söylenecekti bir gün bu söz.” (Shakespeare, 2002:101).

Macbeth cadıların kehanetlerine güvenerek öldürülmeyeceğinden emindir ama cadıların bir kehaneti daha gerçekleşmiş olur. Malcolm ve askerleri kendileri kamufle etmek Büyük Birnam Ormanının dallarını keserek kafalarına geçirmiş ve Macbeth’in şatosuna saldırmışlardır. Macbeth ve Macduff dövüşürken Macbeth korkusuzca savaşır Macduff’un anne karnının kesilerek alındığından haberi olmadan ve Macbeth’in kafası Macduff tarafından kesilir. Tahta da Malcolm geçer ve İskoçya’nın yeni kralı olur.

Sonuç

Bir oyun ve türü de tragedya olan bu eser perde perde analiz edilmiştir. Analizi yapılırken sahnelerden karakterlere ait olan alıntılar yapılarak yorumlarla desteklenilmiştir. Eserin asıl teması mutluluğa giden yolun içindeki arzuların gerçekleşmesi olduğunu ancak bu hırsların insanları nasıl değiştirdiğini ve sonunda kendi canlarına mal olduğunu söyleyebiliriz.



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EMİLE ZOLA'NIN “GERMİNAL” KİTABINDA MADENCİLER: BİR ESER ANALİZİ

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Özet

Maden işçiliği genellikle yer altında yapılan dünyanın en tehlikeli işçiliklerinden biridir. Emile Zola Germinal kitabında 19. Yüzyılda madende çalışan işçilerin yaşadığı zorlukları, ücret adaletsizliğini, yaptıkları grevleri ve çocukların etkilenme biçimini natüralist bir yaklaşımla yazmıştır. Sanayi Devrimi ve Fransız İhtilali'nin maden işçilerinin çalışma ve fikir dünyasını nasıl etkilediğini dönemin gerçek verileriyle ifade eden yazar dünya edebiyatında madenciler üzerine yazılan en iyi kitaplardan birini okuyucuya sunmuştur. Madencilerin hayatları çalışma şartlarının zorluklarını tüm yönleriyle yansıtan yazar okuyucunun maden işçisini daha iyi anlamasına aracılık etmiştir. Bu çalışmada kitabın konusu ve yazarın hayatı hakkında bilgi verilecektir. Ayrıca kitabın yazıldığı dönemin koşulları, madencilerin yaşam şartları, çocuk işçiliği ve işçilerin çalışma şartları hakkında analizler yapılacaktır.

Anahtar kelimeler: *Germinal, madenci, grev, çocuk işçiler, mücadele.*



MINERS IN EMILE ZOLA’S BOOK “GERMINAL”: A TEXTUAL ANALYSIS

Abstract

Mining is one of the most dangerous jobs in the world, usually done underground. In his book *Germinal*, Emile Zola wrote about the difficulties experienced by workers working in mines in the 19th century, wage injustice, their strikes and the way children were affected, with a naturalistic approach. Expressing with real data of the period how the Industrial Revolution and the French Revolution affected the working and intellectual world of miners, the author presented one of the best books written on miners in world literature to the reader. The author, who reflects the difficulties of miners' lives and working conditions in all aspects, has helped the reader to better understand the mine workers. In this study, information will be given about the subject of the book and the life of the author. In addition, analyses will be made about the conditions of the period in which the book was written, the living conditions of miners, child labour and the working conditions of workers.

Keywords: *Germinal, miner, strike, child workers, struggle.*

Giriş

Yazarımız Emile Zola “Germinal” adlı kitabı gerçek hayattan alınmıştır. Zola Fransa’nın kuzeyindeki Montsou kömür ocakları grevlerini, işçilerin çalışma koşullarını ve sermayenin buna yaklaşımını “natüralist” bir yaklaşımla gözler önüne sermektedir. İşçilerin ağır çalışma koşulları karşısında ana karakterimiz Etienne öncülüğünde kurmuş olduğu yardım sandığı ve devamında gelen grevler işçilerin gözüyle aktarılmaktadır. Bu çalışmada dönemin sosyal ve siyasal şartları, kitapta maden işçilerinin yaşam ve çalışma koşulları ve çocuk işçiliği konularını metin analizi yaparak inceleyeceğiz.

Bu konuda yapılan çalışmalardan Adnan Mahiroğlu’nun “Emile Zola’nın Germinal’i ve 19. Yüzyılın sonlarında Fransız endüstri ilişkileri” makalesinden dönemin koşulları konusunda ışık tutacaktır. Fesun Koşmak’ın “Hayatın kaynağı- hayatın sonu olarak “Ölümün Ağzı” ve “Germinal”de maden” adlı çalışmasında işçilerin çalışma koşulları hakkında verdiği bilgilerden faydanılacaktır. Ayrıca Karl Marx– Friedrich Engels – Vladimir Lenin. “Sanat ve Edebiyat Üzerine” ve Karl Marx- Friedrich Engels’in Komünist Manifesto’sundan sınıf kavramı ve sosyalizm konusunda bilgiler edinildi.

Germinal’in Konusu

19. Yüzyılda Fransa’daki madencilerin çalışma ve hayat şartlarını işçi sermaye çatışmasını ücret adaletsizliğini anlatan edebi bir başyapıttır. Romanın başkahramanı Etienne, önceki işinden kovulmuş iş arar. Montsou’daki maden ocaklarına gelir çok zor işlerde çalışan işçileri görür iş ister önce iş yok derler fakat o an bir kadı işçi ölür onu işe alırlar. Madende kömür arabası iter. Bu işi Maheu adında bir işçi bulur. Maheu’nun babası Bonnemort evin en yaşlı bireyi sekiz yaşında madende çalışmaya başlamış defalarca madende ölmek üzereyken kurtarılmıştır. Şirket bunlara rağmen emekli etmemektedir. Maheu tüm ailesi küçük çocukları çalışmaktadır fakat geçinememektedirler. Etienne evin büyük kızına aşık olur fakat o başkasıyla birlikte olur. İşçilerin mevcut koşullarından rahatsız olan Etienne örgütlenme çalışmaları yapar ve yardım sandığı adında bir proje başlatır. Bir miktar para toplanır ve grev başlar. Montosu’da başlayan grev diğer yerleri de etkiler uzun ve çetin bir mücadele süreci başlar yer yer çatışmalar olur. Çatışmaların birinde Maheu ölür. Bunun üzerine maden ocakları açılır işçiler çalışmaya başlar. Fakat koşulları pek değişmez. Etienne kitabın sonuna doğru oradan ayrılır. Yolda madende çalışmaya başlayan Maheu’nun eşi Maheuda ile karşılaşır kadın ona kızmadığını, kocasının ve iki çocuğunun ölmesinden sonra dahi her zaman içinde bir umudun olduğunu söyler.

Emile Zola’nın Hayatı

Emile Zola 2 Nisan 1840 tarihinde Paris’te yoksul bir ailenin çocuğu olarak dünyaya geldi. Babası Venedik göçmeni mühendis François Zola, annesi Fransız Emilie Aubert’tir. Çocuk yaşta babasını kaybeden

Zola College Bourbon da yatılı okudu. Edebiyata olan ilgisi okul çağında drama, şiir ve tiyatroya olan ilgisiyle başladı. Yoksulluk nedeniyle eğitim hayatında aksamalar oldu. Ailesinin tanıdıklarının desteğiyle liseyi bitirdi fakat bakoloryasını veremedi. Bunu iki defa denemesine rağmen başarılı olamadı. Öğrenimine devam edemeyen Zola iş aramaya başladı. İki yıl işsiz kalan 1862’ de yeni kurulan Hachette yayın evinde memur olarak işe başladı. Gazetelerde sanat ve edebiyat eleştirmenliği de yapan Zola 1866 da yayın evinden ayrıldı. Sadece yazarlık yapmaya karar verdi. Kendi hayatından yola çıkarak yazdığı ilk romanı “*Claude'un İtirafları*” (*La Confession de Claude*) yayımlandı. Yazar bu romandan sonra birçok eser yazdı. Zola genel olarak toplumun görünmeyen nahoş yönlerini eserlerine yansıttı. Zola yazarlık dışında toplumsal konularada ilgiliydi Dreyfus olayında taraf oldu.bundan dolayı bir yıl İngiltere de yaşamak zorunda kaldı. Olayın çözülmesiyle ülkeye geri döndü. Zola 29 Eylül 1902'de şömineden sızan dumandan zehirlenerek hayatını kaybetti. Cenazesine elli bin kişi katıldı. Katılan kişiler hep bir ağızdan “Germinal” diye bağırdı.

Öne çıkan eserleri: Germinal, Meyhane, Rougonlar'ın Serveti, Nana

Dönemin Koşulları

18. ve 19. yüzyıl insanların çalışma ve toplumsal düzenini değiştiren Endüstri devrimi ve Fransız devrimi adında iki önemli devrim yaşandı. Endüstri devrimi Üretim tarzını ve çalışma ilişkilerini Fransız devrimi de toplumsal yaşamı değiştirmiştir. “Endüstri Devrimi, üretimde makineleşme oranının giderek artışı geleneksel üretim tarzını ve çalışma ilişkilerini, Fransız Devrimi ise çağlar boyu küçük değişimlerle sürüp gelen siyasal yaşamı değiştirmiştir. Sonuçta her iki devrimin, ekonomik ve sosyal normları derinden etkilediği kuşkusuzdur.” (Talas, 1992, s.23). 18. Yüzyıla kadar Avrupa'nın ekonomisi tarıma dayalı idi. Sanayi Devrimi'nden sonra üretim tarzı değişmiş fabrikalar açılmıştır. Fabrikalarda yoğun insan gücüne ihtiyaç duyulmuş ve insanlar çalışmaya başlamıştır. Bu dönem işçi sermaye mücadelesinin başladığı dönemdir. İşçiler uygun çalışma koşulları, insanca yaşam ve emeklerinin karşılığı ücretler almak için büyük grevler yapmıştır. İşçiler arasında sosyalist ideoloji yayılmış sınıfsal tanımlamalar yapılmıştır. “*İdeoloji kavramı, burjuvazinin feodalizme karşı verdiği ilk mücadeleler sırasında, geleneksel aristokratik toplumda doğmuştur. Bu mücadeleler 18. yüzyıl aydınlanmasının arka planını oluşturmuş, daha açık söylemek gerekirse, ideoloji kavramı bu dönemin kültürel, felsefi ortamı içinde üretilmiştir.*” (Larrain, 1995, s.21)

Emile Zola'nın "Germinal" Kitabında Madenciler

Madencilerin Yaşam Koşulları

"Mum, içinde üç yatak bulunan iki pencere, dört köşe, ufacık odayı aydınlatıyordu. Bir dolap, bir masa, iki eski ceviz sandalye, odanın mobilyasıydı. Çivilere takılmış eski püsküler, yerde bir testi, küvet görevi gören kırmızı bir leğen, dekoru tamamlıyordu." (Zola, 2005, s.16).

"Dünkü gibi eli boş döndürme beni, cumartesiye kadar aç oturacak değiliz ya...Bütün istediğim iki ekmek." (Zola,2005, s.80)

"Hey Allah'ım ya rabbim, dolapta bir lokma ekmek evde satacak tek bir şeyim kalmadı." (Zola, 2005, s.224)

"Evin her tarafı kaloriferle ısınıyordu. Fakat yemek odasında, içinde maden kömürünün alev alev yandığı bir ocak vardı. Burada büyük bir yemek masası, sandalyeler, bir etajer ve ev sahiplerinin zevk ve rahatlarına düşkün olduğunu gösteren rahat koltuklar vardı. Ailece burada otururlar ve salona pek ender geçerlerdi." (Zola, 2005, s.67).

Romanımızdaki metinlerde işçilerin çok kötü koşullarda yaşamaktadır. İşçiler onlara yapılan baraka evlerde yaşamakta orda bütün fizyolojik ihtiyaçlarını gidermektedir. Aile bireylerinin çoğu çalışmaktadır fakat ev ihtiyaçlarını almakta bile zorlanmaktadır. Montsou'da bulunan bakkaldan borç ekmek almak için evin annesi yalvarmaktadır. Zola dönemin işveren yani patronlarının yaşam koşullarını çok iyi betimlemiştir. Madenciler ve işverenin yaşam koşullarına baktığımızda aradaki uçurum dikkat çekmektedir. Zamanla bu koşullar sınıf farklılıklarını oluşması ve derinleşmesine etki etmiştir. Tabiatıyla, bir istek, bir ideal olarak fikrin ortaya atılması yeterli değildi. Bir toplumda ekonomik eşitliğin gerçekleştirilmesi için nasıl bir düzen ve sistemin tatbik edilmesi gerektiği de gösterilmeliydi. İşte bu güç meseleye cevap bulma çabası, birçok düşünür ve yazarları çok çeşitli sosyalist fikirleri sürmeye yöneltmiştir (Armaoğlu, 2010, s.34).

Çocuk İşçiliği

"Bizimkiler küçük Lydie'e rastlamışlardı. Yavrucak çok ağır bir yükte cebelleşen kapkara incecik bir karınca misali, o dal gibi kol ve bacaklarını gererek yeniden vagonunu itmeye başladı." (Zola, 2005, s. 52)

"Diğer çocuk işçilerden Bebert 12 (Zola, 2005, s. 22), Jeanlin 11 (Zola, 2005, s. 17), Catherine 15 (Zola, 2005, s. 17) yaşlarındaydılar.

"Madene indiğimde sekizime bile gelmemiştim. Şimdi elli sekizindeyim. Varın siz hesaplayınGayri. Önce tumbacı çiraklığı, sonra vagon itecek kadar büyüyünce tumbacılık yaptım." (Zola, 2005, s. 12)

Sanayileşmeyle beraber bütün Avrupa’da olduğu gibi Fransa’da da ucuz iş gücüne ihtiyaç duyulmuştur. Ucuz iş gücünün ana kaynağı da çocuk işçiliğidir. Madende çalışan çocuklar kitaptaki metinlerden de anlaşılacağı gibi çok kötü şartlarda çalışmakta ve büyük zorluklarla karşılaşmaktadır. Oyun çağındaki çocuklar ağır maden işlerinde çalışmakta çocukluğunu yaşamamaktadır. Bu dönemde Fransa’da 6 yaşındaki çocukların iplik işleri sarma çilesinde çalıştırıldığı bilinen bir gerçektir. 1868’ de yapılan bir ankete göre toplam olarak sanayide 225.000 çocuk çalışmaktadır. (Brizon, 1977, s. 476). Ayrıca yoksulluğun ağır yaşandığı aileler çocuklarının alması gereken ahlak, cinsel ve cinsiyet eğitimi konusunda yetersiz kalmaktadır. Bunun yarattığı sonuçlar kitabımızda çarpıcı ve açık bir şekilde aktarılmıştır.

İşçilerin Çalışma Şartları

“Beni oradan, tam üç kere paramparça çıkardılar. Birincisinde saçım, sakalım baştan aşağı yanmıştı. İkinci sefer gırtlığıma kadar toprağa gömüldüm, son defa ise karnım su ile şişmişti. Ölmeye niyetim olmadığını anlayınca, alay olsun diye adımları Bonnemort koydular” (Zola, 2005, s.11).

“Ciğerlerimde, beni hayatımın sonuna kadar ısıtacak kömür var. Halbuki beş yıldır çukura bir kez bile inmedim. Herhalde, farkında olmadan içime depo etmişim. Boş ver! İnsanı korur bu kömür” (Zola, 2005, s.13).

“Etienne bu cehenneme bir daha inmektense yollarda aç açına dolaşmaya karar vermişti. Bu cehennemde ekmek parası kazanmaktansa, hemen geberip gitmek daha iyiydi. Burada çalışamazdı. Günün birinde şeflerinden birini rahatça boğazlayabileceğini düşündü.” (Zola, 2005, s.58).

İşçilerin çalışma koşullarını betimleyen yukarıdaki metinlerimizde de görüldüğü gibi işçiler çok düşük ücretlerle çalışmakta bu ücretler karınlarını bile doyurmaya yetmemektedir. Yazarın kitapta ücretlerle ilgili verdiği veriler dönemin kaynaklarına baktığımızda gerçek rakamlar olduğu anlaşılmaktadır. İşçiler günlük olarak 15-17 saat arası çalışmaktadır. Çalışma koşulları oldukça sağlıksız madenciler madende çalışmaktan dolayı sürekli ağır hastalıklarla karşı karşıya kalmaktadır. İş güvencesi yok denecek kadar az olan madenlerde işçi ölümlerinin sıradanlaştığı görülmektedir. Bu ve bunun gibi onlarca sömürüye dönüşen kötü çalışma koşulları işçileri çileden çıkaracak örgütlenmelerinin yolunu açacaktır. *“Toplumun bir bölümünün öteki bölümünce sömürülmesi.”* (Marx – Engels– Lenin, 1990, s.58). Madenciler önce yardım sandığı altında sendikal bir örgütlenme kuracak daha sonra kitabımızın ana konusu olan grevlere başlayacaktır.

Sonuç

Kitabın yazıldığı dönemde yaşanan Sanayi Devrimi ve Fransız İhtilali toplumsal yaşamı derinden etkilemiştir. İnsanlar tarımsal iş gücünden fabrikalarda madenlerde yığınlar halinde çalışmaya başlamıştır. Sermaye güçlenmiş işçiler sürü muamelesi görmüştür. Zola 19. Yüzyıla maden işçilerinin aldığı düşük



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ücretlerden kaynaklı yaşadığı sefalet hayatı, madenlerde uzun çalışma sürelerini, sağlıksız çalışma koşullarını ve işçi ölümü karşısındaki kayıtsızlığı bütün ayrıntılılarla eleştirel bir dille aktarmaktadır. Çocuk işçiliği konusunda ise çağlar boyunca kötü yaşam koşullarının ilk yansıması olan çocukların çocukluklarında koparılışını iç acıtıcı bir dille yazmıştır. Yazarımız o dönemde sermayenin işçileri nasıl sömürdüğünü, işçilerin sendika ve sandık kurmadaki aşamaları ve grevde yaşanan olayları olumlu olumsuz tüm yönlerini açıkça dönemin verileriyle belirtmiştir. Kitabımız işçilerin yaşadıkları



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LEARNERS' PERCEPTION ON ACADEMIC WRITING SKILLS IN HIGHER EDUCATION

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Abstract

Although the natural order hypothesis focuses a lower priority on writing as a linguistic competence, learners who regard writing in academic contexts are more inclined to question the legitimacy of this arrangement. Therefore, it is unexpected that writing has a greater importance in academic environments, mostly owing to its direct and usefulness in many academic endeavours, including assessments, essays, and dissertation. English language learners often involve themselves in the development of texts in the academic paper format as a component of their regular writing process. They want to demonstrate their presence in the academic language group by adhering to the appropriate academic norms. Nevertheless, a significant proportion of students are unable to attain their intended level of proficiency. Cultural differences become apparent in language classrooms, and student's interpretations of writing assignments vary, pointing out the requirement to investigate the opinions of learners on academic writing classes. In order to achieve this objective, survey, assessing learners' writing proficiency, were conducted among prep school learners attending in the Academic Writing lesson at Bahçeşehir University. The data was collected from the survey and expressed with the percentage in terms of the result.

Keywords: Learner anticipation, ESL writing, Academic Writing, Prep school learners

1. Introduction

Writing is one of the fundamental skills which can affect learners' development in the English language process. Learners should create sufficient time for their education to enhance their writing skills. In the educational environment, writing should be shown as entertainment for students who need to develop both their grammar and vocabulary strategies and teachers can pay attention to guide learners on how they can write properly for their upcoming experience on writing. Writing should be acknowledged for not only learners to exercise with pleasure but as to manage how to deal with communicative competence in real-life experiences. Writing provides an opportunity for learners how they can become better critical thinkers while writing and makes them feel more independent to reach the objectives of the target skill. Teachers can design the writing skills in terms of learners' needs and circumstances where they have difficulty creating a thought in this process. This problem should let learners whip them up to generate different ideas in order to implement them in their further experiences. Therefore, the thoughts of learners should be a priority for teachers when they begin to conduct the lesson to teach more flexibly to learners. Wu (2006) stated that if learners' anticipations were despised for reaching the target objectives or developing their process, their learning wishes could be destructed easily and teachers could lose them in the classroom.

Writing is an excellent discovery for learners who want to see their weaknesses and try to overcome them in order to get the inner motivation to achieve their goals. Learners should get to know themselves to find a way for expressing their ideas. This can be useful for them to practice in the English language classes. Learners can produce cognitive effort to create different topics and build structures of grammar by supporting target vocabulary learning in their lessons. On the other hand, gender can be another factor in writing skills because learners' perceptions can be focused on how they approach writing. To illustrate, females are tremendously successful in writing skills due to practicing and studying what they covered in the class rather than males preferring to deal with something else but not focus on writing. However, the teachers' role is to observe their learners' processes without considering gender, and they should be aware of the way they can alter learners' ideas on the target skill. The aim of the study will be on the perceptions of learners in academic writing skills. Without considering their nationality and gender, teachers should focus on how to guide them to implement the true organization, content, grammar, vocabulary, punctuation, and spelling skills.

2. Literature Review

In writing literature, there are several beliefs that learners use their mother language while thinking on the topic rather than the target language. In foreign language classes, teachers should encourage learners

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to use and think about the English language in the writing lessons by practicing. Hyland (2006) demonstrated that writing is the major route where learners can show the evaluation of their ideas and thoughts by checking their processes by teacher marking or notes. Moreover, writing can be considered an academic training where learners can integrate language competence into the second language learning environment. It can be useful for learners to use their previous knowledge which they learned and practiced in the class. Silva (2014) said that academic writing skills should be a compulsory productive skill for learners so as to promote their academic skills. In preparatory schools of the state and foundation universities, teachers conduct writing lessons as separate lessons due to their heavy curriculum.

Learners struggle with writing in their mother language owing to not doing brainstorming properly and they try to write any topic in L2. In schools, there are native and non-native learners and their language levels are completely different from each other. Especially in writing skills, native learners are much more careful than non-native learners because they pay attention to language as a duty and they care about writing ability and have knowledge that they will need in their faculties. Huang (2008) showed that in Canada where he did research to find a difference in that skill between types of learners and the validity and reliability scores are different. Learners' perceptions can depend on assistance from their teachers to reach a proficiency level in the language. Writing ability is the last step of acquisition because all the children took input from the social environment in the language process and when they are old enough, they will have the ability to reveal what they acquired previously. Hyland (2011) defined that the writing perspective has an impact on psychology to combine quantitative and qualitative methods to assist teachers and researchers to examine learners' perceptions.

Writing is defined as the most challenging skill for learners who are studying in prep schools. Learners have different levels of proficiency including language competence and vocabulary knowledge where they can compare them in the class and it will affect them to stop writing or feel failure due to those assumptions. Lee (2008) argued that the classroom can play an essential role in learners' perception of teachers' feedback either effectively or negatively perception.

Research Questions of the Study

To search for the perception of learners in academic writing skills of Bahçeşehir University students, two research questions are designed for conducting.

- 1- What are the perceptions of learners on academic writing skills at universities?
- 2- What are the effects of learners' perceptions in L2 learning process?

3. Methodology

3.1 Subjects

The participants of the research were 112 students in the prep school. The first section of questionnaire was gender part. In the research, 50.9% of students were males whereas 49.1% of students were female. The researcher conducted questionnaire to prep learners taking in Academic Writing courses. Furthermore, all the students who completed the questionnaire answered all the questions.

3.2 Instruments

In the research, the only instrument was questionnaire which was created by Hasan Sağlamel and M. Kayaoğlu. The questionnaire includes six parts involving gender, feeling towards L2 writing, writing at school, motivation to write in L2, beliefs about L2 writing, beliefs about L1 and L2 writing proficiency. A 5-point Likert scale from strongly agree (5) to strongly disagree (1) was employed. The survey took 20-25 minutes for learners.

3.3 Data Collection

The researcher began data collection in the second semester. The data was strategically designed and done at that specific time for learners to enhance their understanding of the course and to enable the researcher to create a strong connection with the learner. One hundred-twelve questionnaires were given out and then collected from learners in their classrooms.

3.4 Data Analysis

The researcher analyzed the data from google forms and write the data with percentages in findings part. The researcher used the rate while expressing the numbers in the questionnaires

4. Findings and Discussion

In the first part of the questionnaire was gender part and it was mentioned in the subject part of methodology. Moreover, in the second part of the research, the topic was Feelings towards L2 Writing. 60% percent of the students enjoy writing in English and they find it easy while others find it boring. Furthermore, 84% of learners enjoy writing in English, and the rest does not love it. Also, 86% of students have positive experience with writing and they love it.

In the third part of the questionnaire was Writing at School. 76% of learners feel comfortable in writing lessons just as the rest does not feel comfortable. What's more, 70% of students agree doing writing assignments only at school rather than home, but the rest disagree with this idea. In order to these ideas, 80% of learners agree with that writing is something that they only anticipate doing for writing lesson.

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In the fourth part, the topic was Motivation to Write in L2. 95% of students agree that they can write well but need more practice at the school. Also 95% of students consider the same idea that English learning is an essential skill for their academic life in the university. 90% of learners agree that they need to learn foreign language for their future career. In addition to this, 90% of learners consider that writing is very important skills for their academic area. Besides, 86% of students practice writing in English whereas the rest does not spend time on writing. 96% of students think that writing is necessary for them in their current circumstances. 98% of learners consider that academic writing is necessary and important for their student life.

In the fifth part, the topic was Beliefs about L2 Writing. 92% of learners agree that with practicing, they can develop writing skills. Also, 75% of learners agree that if people have talent on writing, they can easily achieve their goals. Moreover, 89% of learners agree that they can become good writers if they practice a lot. 89% of learners strongly agree that they prefer working with their teachers during writing lessons rather than working with students. Furthermore, 84% of students consider that they need to look a sample writing before writing assignment and they think that they are good at grammar.

In the sixth part, the topic was Beliefs about L1 and L2 Writing Proficiency. 72% of learners agree that they like writing English because they are good writer in Turkish while the rest consider the opposite idea. Besides these learners also thinks that they can write in Turkish and English writing assignment explicitly. Additionally, 87% of learners consider that English and Turkish are different languages. What's more, 67% of learners consider that only native speakers can write well in English while the others think differently. Finally, 90% of learners have a positive view that a person should know the foreign culture well so as to be native in L2.

5. Conclusion

In this research, learners' perceptions were observed and analyzed to focus on the method of teaching writing skills. The outcomes enlighten learners' expressions and feelings towards it and the data showed that teachers should focus on learners' thoughts and weaknesses in order to approach and guide them properly. Moreover, learners should focus on writing strategies for their development, and comprehension of the objectives of the target language in production skills. This empirical research demonstrated that learners have various expectations and beliefs whether positively or negatively. Knowledge and skills are independent areas for students while learning production skills. Schumann



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(1978) stated that teachers could help learners' development in learning by assessing properly, and it could change the thoughts of students in particular skills.

Additionally, learners should be encouraged to practice writing skills outside of the school by providing extra materials according to the objectives of the related week. Cafarella and Barnet (2000) demonstrated that writing is an interesting process due to learners' style and how they connected to the instructions that they learned by exercising a lot. Learners' thoughts can be altered by teaching those skills in a more joyful mode and teachers should eliminate the native effects of their previous knowledge. In the result part, learners focused on the prejudice that occurred as the education years passed and they need to overcome this process. Lee (2007) searched that writing could be developed with the help of the interaction between teachers and learners by designing different activities. Overall, the ideas of students in writing skills will completely affect the teaching methodology and approach on how to become a better writer.



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**ÖĞRETMENLERİN İDEAL ÖĞRENME VE ÖĞRETME SÜRECİNE İLİŞKİN GÖRÜŞLERİNİN
İNCELENMESİ**

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Özet

Okuldaki eğitim öğretim faaliyetlerinin merkezinde öğretmenler yer almaktadır. İdeal bir öğrenme ve öğretme sisteminin hazırlanması ya da kurulması sürecinin ilk adımını öğretmen faaliyetleri oluşturmaktadır. Okul kendi içerisinde bir bütün olarak ele alındığında bu sistemin en önemli ögesi öğretmenlerdir. Öğretmenlerin ideal öğretime ilişkin görüş ve anlayışları bu sistemin işleyişin yönünün belirlenmesinde önemli bir etken olmaktadır. Bu düşünceden hareketle bu araştırmada öğretmenlerin ideal öğrenme ve öğretime ilişkin görüşlerinin belirlenmesine çalışılmıştır. Öğretmenlerin ideal öğrenme ve öğretime yükledikleri anlamların ya da bakış açılarının geniş bir perspektifte belirlenmesi amaçlandığında araştırmada yöntem olarak nitel araştırma desenlerinden biri olan olgubilim kullanılmıştır. Çalışma grubunu Erzurum'un Yakutiye ilçesindeki okullarda okulöncesi, ilkokul, ortaokul ve lise kademelerinde görev yapan 24 öğretmen oluşturmaktadır. Öğretmenlerin konuyla ilgili görüşlerinin alınabilmesi amacıyla araştırmacılar tarafından hazırlanan 5 sorudan oluşan bir yarı yapılandırılmış görüşme formu kullanılmıştır. Elde edilen verilerin analizinde ise içerik analizi tekniğinden yararlanılmıştır. Araştırmanın sonunda öğretmenlerin ideal öğrenme ve öğretime ilişkin görüşlerinin mevcut sistemde tecrübe edilenlerden önemli ölçüde farklılaştığı anlaşılmıştır.

Anahtar Kelimeler: : İdeal okul, ideal öğrenme ve öğretme, olgubilim, öğretmen görüşleri



AN INVESTIGATION OF TEACHERS' VIEWS ON THE IDEAL LEARNING AND TEACHING PROCESS

Abstract

Teachers are at the center of education and training activities in schools. Teacher activities constitute the first step in the process of preparing or establishing an ideal learning and teaching system. When the school is considered as a whole within itself, teachers are the most important element of this system. Teachers' views and understandings about ideal teaching are an important factor in determining the direction of the functioning of this system. Based on this idea, this study aims to determine teachers' views on ideal learning and teaching. When it is aimed to determine the meanings or perspectives that teachers attribute to ideal learning and teaching in a broad perspective, phenomenology, one of the qualitative research designs, was used as a method in the study. The study group consisted of 24 teachers working at preschool, primary, secondary and high school levels in schools in Yakutiye district of Erzurum. In order to obtain the opinions of the teachers on the subject, a semi-structured interview form consisting of 5 questions prepared by the researchers was used. Content analysis technique was used to analyze the data obtained. At the end of the study, it was understood that teachers' views on ideal learning and teaching differed significantly from those experienced in the current system.

Keywords: Ideal school, ideal learning and teaching, phenomenology, teacher views.

Giriş

Toplumsal yaşamın en önemli faaliyet alanlarından biri eğitimidir. İnsan etrafında gelişen olayları ve bu olaylar içerisindeki kendi yerini eğitim vasıtasıyla anlar. Antik çağda insanlar eğitim konusunda daha yolun başında olduğu için doğanın insafına kalmışlardı. Doğada gelişen olaylar insanlar için bir sır olarak varlıklarını sürdürüyorlardı. Fakat insanların aletleri keşfetmeleri, hayvanları evcilleştirmeleri, tarımsal etkinliklerde bulunmaları ve en önemlisi de tüm bu faaliyetleri kendilerinden sonraki kuşaklara eğitim aracılığıyla bir miras olarak bırakmaları, sonrasında gelen nesillerin tüm bu faaliyetleri daha da ileri götürmeleri ile insanlık bu güne ulaşabilmiştir. Bugün fen bilimlerinden ya da sosyal bilimlerden bahsedilebiliyorsa bu hiç şüphesiz eğitim ile gerçekleşebilmiştir.

Toplumsal kalkınma için gereken şartlardan en önemlisi nitelikli bir öğrenme-öğretme sisteminin varlığıdır (Barr ve Dreeben, 1983; Gibbs ve Habeshaw, 2003). Çünkü toplumu oluşturan bireylerin şahsiyet ve yetenekleri eğitim süreciyle birlikte şekillenmektedir. Nitelikli bir eğitimle birey bir yandan kendi yeterliliklerinin farkına varırken diğer yandan da yaşadığı çevrenin farkına vararak topluma psikososyokültürel şartlar açısından uyum sürecini tamamlar (Chickering, ve Kytile, 1999). Bu durum ise bireyin hayatı deneyimlerken kendini içsel olarak her an motive etmesine imkân tanır.

2000’li yılların başından itibaren yapılan çalışmalardan elde edilen sonuçlara bakıldığında ve günümüz eğitim sistemi sorunları ile karşılaştırıldığında olumluya giden çok fazla durum olmadığı görülmektedir. İlgili alan yazını incelendiğinde birçok araştırmacının bu sorunları ele aldığı ve çözüme yönelik araştırmalar yaptıkları anlaşılmaktadır (Arslan, 2023: 13). Fakat süreç içerisinde tüm bu sorunlar ve sorunların çözüme kavuşturulamaması, eğitimcilerin farklı bir eğitim arayışına daha doğrusu ideal eğitimi bulma arayışına girmesine yol açmıştır (Çobanoğlu ve Kasapoğlu, 2010).

“İdeal öğrenme ve öğretme” kavramı, her bakımdan mükemmel olan bir eğitim sistemini ifade eder. İdeal öğrenme ve öğretme sürecinin diğer eğitim süreçlerinden en belirgin farkı ise eğitim sistemi içerisinde yer alan tüm paydaş ya da öğelerin olağan performansın üzerinde bir öğrenme-öğretme ürününe dönük olmasıdır. Bahsi geçen bu paydaşlardan en önemlisi ise öğretmenlerdir.

Öğretmenlerin çağın ihtiyaçlarını tüm yönleriyle doğru bir şekilde kavramış ve buna inanmış olmaları, toplumsal farkındalığın oluşmasının önündeki en önemli basamaktır (Rockoff ve Speroni, 2010; Sağlam ve Kürüm, 2005; Tezer, 1998). Ancak bu basamak aşılabılırsa toplum, çağdaşlaşma sürecini etkin bir şekilde başlatabilir. Çünkü öğretmenler bu sistemin motivasyon kaynaklarıdır (Kyridis vd., 2014; Oktar ve Yazçayır, 2008; Telli ve Çakıroğlu, 2008). Dünyanın neresinde olursa olsun kaliteli bir okuldan bahsedebilmek için öncelikle çağın ihtiyaçlarını doğru anlamış, bu ihtiyaçlara cevap verebilecek faaliyetlere başlamış, buna inanmış öğretmenler

gerekmektedir (Rowan vd., 2002). Bu nedenle öğretmenin ideal öğrenme ve öğretme ile ilgili algı ve düşünceleri, çağdaşlaşma sürecinin yönünün tayininde belirleyici bir role sahiptir (Kızıltepe, 2002). Öğretmenlerin ideal bir öğrenme ve öğretme sürecinde aldıkları bu rolden hareketle yapılan bu çalışmada öğretmenlerin ideal öğrenme ve öğretime ilişkin görüşlerinin belirlenmesine çalışılmıştır. Bu amaç doğrultusunda şu araştırma sorusuna yanıt aranmıştır:

1. Öğretmenlerin ideal öğrenme ve öğretme süreçlerine ilişkin görüşleri nasıldır?
 - 1.1. Sizce bir dersin ideal süresi ne kadar olmalıdır? Düşüncelerinizi gerekçeleriyle belirtiniz.
 - 1.2. Sizce bir günde kaç dersin olması idealdir? Düşüncelerinizi gerekçeleriyle belirtiniz.
 - 1.3. Sizce haftada kaç gün okula gidilmesi idealdir? Düşüncelerinizi gerekçeleriyle belirtiniz.
 - 1.4. Sizce ideal sınıf mevcudu kaç olmalıdır? Düşüncelerinizi gerekçeleriyle belirtiniz.
 - 1.5. Sizce zorunlu eğitim süresi kaç yıl olmalıdır? Düşüncelerinizi gerekçeleriyle belirtiniz.

Araştırma Deseni

Bu çalışmada öğretmenlerin ideal öğrenme ve öğretme süreçlerine ilişkin görüşleri ortaya konularak mevcut durumun yorumlanması; belirlenen ihtiyaçlar doğrultusunda ilgili birimlere yönelik önerilerde bulunulması hedeflenmiştir. Bu nedenle araştırma yönteminin belirlenmesinde “algı ve olayları bağlı buldukları çevre içinde ve bütüncül bir biçimde araştırmayı ve anlamayı içeren” (Yıldırım ve Şimşek, 2021: 39) nitel araştırma yöntemlerinden biri olan olgubilim kullanılmıştır. Araştırmanın amacı doğrultusunda bütüncül bir bakış açısıyla araştırılan çalışma için olgubilim deseninin çalışma için uygun bir desen olduğuna karar verilmiştir.

Nitel araştırmalar, bir konunun “nedenlerini” derinlemesine algılama ve çözümleme imkân tanınması nedeniyle, anlamların ve gerekçelerin belirlenmesine olanak sağlamaktadır (Punch, 2013). Olgubilim deseni, farkında olduğumuz ancak derinlemesine ve ayrıntılı bir anlayışa sahip olmadığımız olgulara odaklanmakta; aşına olduğumuz fakat tam anlamıyla tanımlayamadığımız olguları araştırmayı hedefleyen çalışmalar için uygun bir araştırma olanağı tanımaktadır (Yıldırım ve Şimşek, 2021: 66).

Çalışma grubu

Çalışma grubunun belirlenmesinde amaçlı örnekleme yöntemlerinden maksimum çeşitleme örnekleme yöntemi kullanılmıştır. Maksimum çeşitleme örnekleme yöntemi kullanılırken, araştırma sorusuyla ilgili çeşitliliği en üst düzeye çıkaran az sayıda birim veya durum seçilmektedir. İnceleme ve analiz için küçük homojen bir grup veya birim seçme süreci gerçekleştirilir. Sandelowski (1995: 181), maksimum çeşitleme örnekleme yönteminin en sık kullanılan amaçlı örnekleme türlerinden biri olduğunu ve örneklerinde maksimum varyasyon isteyen araştırmacıların ne tür çeşitlemeleri maksimize etmek istediklerine ve her bir türü ne zaman maksimize edeceklerine karar vermeleri gerektiğini öne sürmektedir. Çeşitleme örnekleri ırk, sınıf, cinsiyet veya kişiyle

ilgili diğer özellikler olabilir. Bu araştırmada farklı kademe ve branşlardan görüş çeşitliliğinin sağlanması amacıyla Tablo 1’de görüldüğü üzere bir çalışma grubu oluşturulmuştur.

Tablo 1. Çalışma Grubunun Özellikleri

Kademe	Cinsiyet	Sosyal Bilimler		Fen Bilimleri		Genel Yetenek		Toplam
		<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>
Okulöncesi	Kız	1	4,17	1	4,17	1	4,17	3
	Erkek	1	4,17	1	4,17	1	4,17	3
İlkokul	Kız	1	4,17	1	4,17	1	4,17	3
	Erkek	1	4,17	1	4,17	1	4,17	3
Ortaokul	Kız	1	4,17	1	4,17	1	4,17	3
	Erkek	1	4,17	1	4,17	1	4,17	3
Lise	Kız	1	4,17	1	4,17	1	4,17	3
	Erkek	1	4,17	1	4,17	1	4,17	3
Toplam		8	33,36	8	33,36	8	33,36	24

Tablo 1’de görüldüğü üzere okulöncesi, ilkokul, ortaokul ve lise kademelerinin her birinde sosyal bilimler, fen bilimleri ve genel yetenek/genel kültür branşlarının her birinden en az 2, her bir cinsiyetten en az 3, toplamda ise en az 6 katılımcının yer alması sağlanarak maksimum çeşitlilik sağlanmaya çalışılmıştır.

Veri toplama aracı

Çalışma grubunu oluşturan öğretmenlerle yapılan veri toplama sürecinde, bir şematik taslağı ve soruları belli olan, fakat görüşme sırasında açık uçlu soruların da yöneltmesine imkân tanıyan esnek yapısı ile derinlemesine sonuçlara erişilmesini sağlayan yarı yapılandırılmış görüşmelerden (Yıldırım ve Şimşek, 2021) yararlanılmasına karar verilmiştir. Hem sınırları belli hem de gerektiğinde farklı olanaklar sunan bir teknik olması nedeniyle, bu araştırmada yararlanılacak veri toplama biçimlerinden biri yarı yapılandırılmış görüşme tekniği olarak planlanmıştır.

Yarı yapılandırılmış görüşme formunun hazırlanması sürecinde öncelikle ideal öğrenme ve öğretme ile ilgili hem yerli hem de yabancı literatür gözden geçirilerek bir soru havuzu oluşturulmuştur. Hazırlanan bu soru havuzu Türkçe eğitimi ve eğitim bilimleri alanlarında uzman dört öğretim üyesinin görüşlerine başvurulmuş,

kimi sorular değiştirilerek kimi sorular da elenerek formda beş sorunun yer almasına karar verilmiştir.

Görüşmelerin sessiz ve sakin bir ortamda yapılarak katılımcının dikkatini dağıtacak öğelerden kaçınma maksadıyla her bir katılımcıdan randevular talep edilmiş, buluşma yeri konusunda önerilerde bulunulmuş, katılımcıların da önerileri dikkate alınarak görüşme günü ve saatinde tüm görüşmeler tamamlanmıştır. Katılımcıların görüşme sorularına daha rahat ve kaygısız bir şekilde yanıt verebilmeleri için görüşmeler kayıt altına alınmamış fakat tüm görüşmelere her iki araştırmacı da katılarak ayrı ayrı notlar almış, her bir görüşme sonrasında bu görüşme notları birbirleriyle karşılaştırılarak verilen cevaplar teyit edilmeye çalışılmıştır.

Çalışma grubunu oluşturan öğretmenler ile yapılan görüşmeler 15.3.2023 tarihinde başlamış, 10.6.2023 tarihinde tamamlanmıştır. Görüşmelerin 18'i araştırmacıların ofislerinde, 6'sı ise katılımcıların görev yaptıkları okulların kütüphanelerinde gerçekleştirilmiştir. Görüşmeler toplam 7 saat 40 dakika sürmüştür. Yapılan görüşmeler bir defada gerçekleştirilmiş ve ikinci bir görüşmeye ihtiyaç duyulmamıştır.

Verilerin analizi

Yarı yapılandırılmış görüşmelerden elde edilen veriler, Microsoft Word programı kullanılarak her bir görüşme ayrı olacak şekilde dosyalanmıştır. Yazılı hâle getirilen görüşme verileri, görüşmenin gerçekleştirildiği katılımcı ile paylaşılarak onayları alınmıştır. Onay alındıktan sonra ise çözümleme aşamasına geçilmiştir.

Elde edilen veriler tümevarımcı bir bakış açısıyla içerik analizi yoluyla incelenmiştir. Tümevarım, olguların açıklamalarını oluşturmayı sağlar. Böylece tümdengelim yaklaşımıyla fark edilemeyen kavramlar bu biçimde ortaya çıkabilir (Yıldırım ve Şimşek, 2021: 249). Çalışmalar için kavramlar oldukça önemlidir. Araştırmacı bu kavramlar sayesinde durumları açıklayabilir ve farklı ilişkiler kurabilirler (Strauss ve Corbin, 1990: 62). İncelenen kavramların kategorilere ayrılması ve kodlanması, tümevarımcı analizin bir parçasıdır. Bu noktada daha derinlemesine bir çözümleme için tümevarımcı bir anlayışla içerik analizine başvurmak mümkündür.

İçerik analizi, elde edilen nitel veriler içindeki belirli kelimelerin, temaların veya kavramların varlığını belirlemek için kullanılan bir araştırma aracıdır. Veri kaynakları röportajlardan, açık uçlu sorulardan, alan araştırma notlarından, konuşmalardan veya kitaplar, makaleler, tartışmalar, gazete başlıkları, konuşmalar, medya, tarihi belgeler gibi materyallerden oluşabilir. Katılımcılarla yapılan görüşmelerden oluşturulan görüşme metinleri her bir soru bağlamında kodlara ayrılmıştır. Metinler kodlarına ayrıldıktan sonra yine her bir soru bağlamında kod kategorileri oluşturulmuştur. Sonraki aşamada ise bu kod kategorileri birbirleriyle ilişkilendirilerek temalara ulaşılmıştır.

Geçerliğe, Güvenirliğe ve Etik Eylemlere İlişkin Yapılan İşlemler

Bilimsel araştırmaların en önemli ölçütlerinden biri sonuçların geçerliği ve güvenirligidir. Daymon ve

Holloway geçerlik ve güvenilirlik kavramlarını araştırmanın sonuçlarının inandırıcılığını veya niteliğini gösteren en önemli unsurlar olarak ifade etmişlerdir (Daymon &Holloway, 2003). Sonuçların inandırıcılığı, bilimsel araştırmanın en önemli ölçütlerinden biri olarak kabul edilir.

Araştırmanın geçerliğinin sağlanabilmesi amacıyla çalışma grubunda yer alan katılımcıların özellikleri kademe, branş ve cinsiyet özelinde tüm ayrıntısı ve gerekçeleriyle ifade edilmiştir.

Araştırmanın güvenilirliğinin sağlanması amacıyla çalışma grubunun oluşturulması, veri toplama aracının hazırlanması ve uygulanması, elde edilen verilerin analizi, ulaşılan bulguların veri toplama aracının temel mantığıyla tutarlılık gösterip göstermediği ve böylece ulaşılan sonuçların gerçeği yansıtıp yansıtmadığının anlaşılmasına ilişkin çalışmada takip edilen tüm yöntemsel aşamalar ayrıntılı bir şekilde ifade edilmeye çalışılmıştır.

Çalışma grubu oluşturulurken aday katılımcılarla birebir görüşmeler yapılmış, araştırmanın gerekçesi hakkında açıklamalar yapılmış, görüşme sürecinin aşamaları hakkında bilgiler verilmiş, araştırmaya katılımın tamamen gönüllülük esasına dayandığı ve elde edilen verilerin araştırma kapsamı dışında katılımcıları deşifre edecek şekilde kullanılmayacağı konusunda teminat verilmiştir.

Bulgular

Araştırmanın birinci alt problemi “Sizce bir dersin ideal süresi ne kadar olmalıdır? Düşüncelerinizi gerekçeleriyle belirtiniz.” olarak belirlenmiştir. Öğretmenlerin bir dersin ideal süresiyle ilgili görüşlerine ilişkin sıklık değerleri Tablo 2’de verilmiştir.

Tablo 2. Birinci Alt Probleme İlişkin Bulgular

Ders süresi	Gerekçe	<i>f</i>	%
25 dakika	Dikkatin dağılması	2	8,3
	Dikkatin dağılması	12	50
30 dakika	Yaş gruplarının dikkate alınması	4	16,8
	İlginin azalması	2	8,3
	Sürenin artmasının öğrenme kalitesinin artırmaması	2	8,3
40 dakika	Mevcut sürenin uygun bulunması	2	8,3
Toplam		24	100

Tablo 2’ye bakıldığında katılımcıların çok büyük bir kısmının (%83,4) ideal bir ders süresinin 30 dakika olması gerektiğini düşündükleri görülmektedir. Tablo 2 incelendiğinde ders süresinin 30 dakika olması gerektiği yönünde görüş bildiren öğretmenlerin bu düşüncelerine gerekçe olarak sırasıyla 30 dakikayı aşan derslerde öğrenci dikkatinin dağıldığını, süre belirlenirken yaş gruplarının dikkate alınmasının gerektiğini, ders süresi uzadığında ilginin azaldığını ve sürenin artmasıyla öğrenme kalitesinin artmadığını dile getirdikleri anlaşılmaktadır. Tablo

2'ye bakıldığında katılımcılardan 2'si ders süresinin öğrenci dikkatinin de dikkate alınarak 25 dakika olması gerektiğini düşündükleri, geri kalan diğer ikisinin ise mevcut sürenin uygun olduğunu dile getirdikleri görülmektedir. Tablo 2 genel olarak değerlendirildiğinde öğretmenlerin % 91,7'sinin ders süresinin en fazla 30 dakika olması gerektiğini ve bunun üzerindeki sürelerde öğrencilerin dikkatlerini toplamakta zorlandıklarını belirttikleri anlaşılmaktadır.

Araştırmanın ikinci alt problemi “Sizce bir günde kaç dersin olması idealdir? Düşüncelerinizi gerekçeleriyle belirtiniz.” olarak belirlenmiştir. Öğretmenlerin bir günde olması gereken ders sayısı ile ilgili görüşlerine ilişkin sıklık değerleri Tablo 3'te verilmiştir.

Tablo 3. İkinci Alt Probleme İlişkin Bulgular

1 Günde	Gerekçe	f	%
4 ders	İsteksizliğin artması	2	8,3
5 ders	Yorgunluğun artmasına bağlı olarak verimin düşmesi	4	16,7
	Dikkatin dağılması	4	16,7
6 ders	Öğretmen performansının düşmesi	6	25
	Dikkatin dağılması	4	16,7
	Mevcut sürenin uygun bulunması	2	8,3
8 ders	Mevcut sürenin uygun bulunması	2	8,3
Toplam		24	100

Tablo 3'e bakıldığında katılımcıların %50'sinin bir günde 6 dersin olmasının ideal olduğunu, %33,4'ünün ise günde en fazla 5 ders olması gerektiğini düşündükleri görülmektedir. 2 katılımcı günde 4 saat dersin yeterli olduğunu, geri kalan diğer 2 katılımcının ise 8 saatin günlük ders saati olarak yeterli olduğunu düşündükleri anlaşılmaktadır. Katılımcıların cevaplarına ilişkin gerekçeleri incelendiğinde ise en çok dile getirilen gerekçelerin sırasıyla dikkatin dağılması (%33,4) ve öğretmen performansının düşmesi (%33,4) olduğu görülmektedir.

Araştırmanın üçüncü alt problemi “Sizce haftada kaç gün okula gidilmesi idealdir? Düşüncelerinizi gerekçeleriyle belirtiniz.” olarak belirlenmiştir. Öğretmenlerin bir haftada okul günü sayısı ile ilgili görüşlerine ilişkin sıklık değerleri Tablo 4'te verilmiştir.

Tablo 4. Üçüncü Alt Probleme İlişkin Bulgular

Haftada	Gerekçe	<i>f</i>	%
3 gün	Öğrencilerin sosyal zamanlarının artırılması	2	8,3
4 gün	Çocuğun okuldan sıkılmaması	2	8,3
	Çocuğun okulla bütünleşmesi	8	33,3
5 gün	Müfredatın tamamlanabilmesi	8	33,3
	Çocuğun öğretmeniyle bağlarının güçlenmesi	4	16,8
Toplam		24	100

Tablo 4'e bakıldığında katılımcıların %83,4'ünün haftada beş gün okula gidilmesinin çocuğun okulla bütünleşebilmesi, öğretmenlerin yıllık müfredatlarını yetiştirilebilmeleri ve çocukların öğretmenleriyle ilişkilerinin güçlenebilmesi için ideal olduğunu düşündükleri görülmektedir. Katılımcılardan 2'si öğrencilerin sosyal etkinliklerine ait zamanın artırılabilmesi için haftada üç gün okulun yeterli olduğunu, diğer ikisinin ise çocuğun okuldan sıkılmaması için haftada 4 gün okulun olmasının ideal olduğunu dile getirdikleri anlaşılmaktadır.

Araştırmanın dördüncü alt problemi "Sizce ideal sınıf mevcudu kaç olmalıdır? Düşüncelerinizi gerekçeleriyle belirtiniz." olarak belirlenmiştir. Öğretmenlerin sınıf mevcuduyla ilgili görüşlerine ilişkin sıklık değerleri Tablo 5'te verilmiştir.

Tablo 5. Dördüncü Alt Probleme İlişkin Bulgular

Sınıfta en fazla	Gerekçe	<i>f</i>	%
10 öğrenci	Öğretimin niteliğinin artırılması	2	8,3
	Öğretimin niteliğinin artırılması	6	25,1
20 öğrenci	Öğrenci-öğretmen etkileşimi	4	16,7
	Öğretimin bireyselleşmesi	2	8,3
	Sınıf yönetimi	2	8,3
	Etkin katılım	4	16,7
25 öğrenci	Öğretimin niteliğinin artırılması	2	8,3
	Öğrenci-öğretmen etkileşimi	2	8,3
Toplam		24	100

Tablo 5 incelendiğinde katılımcıların %58,4'ünün sınıfta en fazla 20 öğrencinin, %33,3'ünün ise 25 öğrencinin olması gerektiğini belirttikleri görülmektedir. Tablo incelendiğinde sınıfta en fazla 20 öğrencinin olmasının öğretimin niteliğinin artması, öğrenci-öğretmen etkileşiminin sağlanması, öğretimin bireyselleştirilmesi ve sınıf yönetiminin kolaylaşması açısından önemli olduğunu düşündükleri anlaşılmaktadır. Sınıfta en fazla 25 öğrencinin olması gerektiği yönünde görüş bildiren öğretmenlerin ise bu görüşlerine gerekçe olarak etkin

katılımın sağlanması, öğretimin niteliğinin artırılması ve öğrenci-öğretmen etkileşimi gibi bir önceki gruba benzer gerekçeleri dile getirdikleri görülmektedir. Tablo 5'teki bulgulardan hareketle araştırma kapsamında görüş belirten öğretmenlerin ideal bir sınıf mevcudununun 25'i geçmemesi gerektiğini düşündükleri söylenebilir.

Araştırmanın beşinci alt problemi "Sizce zorunlu eğitim süresi kaç yıl olmalıdır? Düşüncelerinizi gerekçeleriyle belirtiniz." olarak belirlenmiştir. Öğretmenlerin zorunlu eğitim süresiyle ilgili görüşlerine ilişkin sıklık değerleri Tablo 6'da verilmiştir.

Tablo 6. Beşinci Alt Probleme İlişkin Bulgular

Zorunlu Eğitim	Gerekeçe	f	%
Zorunlu eğitim olmamalı	Öğrenciler ilgi ve yeteneklerine göre eğitim almalı	2	8,3
	Üzerindeki diğer kademeler isteğe göre olmalı	4	16,7
4 yıl	Temel bilgi ve beceriler 4 yılda verilebilir	2	8,3
	Mesleki eğitime yönlendirilmeli	2	8,3
5 yıl	Öğrencinin isteğine bırakılması	6	25,1
	Gerçekten eğitim almak isteyenlere engel olunması	2	8,3
8 yıl	Mesleki eğitime yönlendirilmeli	4	16,7
	Öğrencinin isteğine bırakılması	2	8,3
Toplam		24	100

Tablo 6'ya bakıldığında katılımcıların zorunlu eğitimle ilgili görüşlerinin çeşitlendiği görülmektedir. 4 yılın üzerindeki diğer kademelerin isteğe göre olmasını, temel bilgi ve becerilerin 4 yılda verilebileceğini ve öğrencilerin 4. yılın sonunda mesleki eğitime yönlendirilmesi gerektiğini düşünen katılımcılara göre zorunlu eğitim 4 yıl olmalıyken, beş yılın üzerindeki eğitimde öğrenci isteğinin gözetilmesini ve gerçekten eğitim almak isteyenlerin önünün kesilmemesini düşünen öğretmenlere göre ise zorunlu eğitim en fazla 5 yıl olmalıdır. Öğrencilerin 8. sınıftan sonra mesleki eğitime yönlendirilmesini ve yine öğrencinin eğitime devam etme isteğinin gözetilmesini düşünen öğretmenlere göre ise zorunlu öğretim en fazla 8 yıl olmalıdır. Öğrencilerin ilgi ve yeteneklerine göre eğitim almalarının gerektiğini düşünen 2 öğretmen ise zorunlu eğitimin olmaması gerektiği yönünde görüş bildirdikleri anlaşılmaktadır. Tablo 6 genel olarak değerlendirildiğinde öğretmenlerin 8 yılın üzerinde zorunlu eğitimi onaylamadıkları söylenebilir.

Sonuç ve tartışma

Öğretmenlerin ideal öğrenme ve öğretime ilişkin görüşlerinin belirlenmesinin amaçlandığı bu araştırmada öncelikle aşına olduğumuz fakat tam anlamıyla tanımlayamadığımız olguları araştırmayı hedefleyen nitel araştırma desenlerinden biri olan olgubilim belirlenmiştir. Bu doğrultuda tüm okul kademelerinin araştırmaya dâhil edildiği sosyal, fen, genel yetenek ve genel kültür branşlarından 24 öğretmen, çalışma grubu olarak belirlenmiştir. Öğretmenlerin konuyla ilgili görüşlerinin alınabilmesi amacıyla araştırmacılar tarafından hazırlanan 5 sorudan oluşan bir yarı yapılandırılmış görüşme formu kullanılmıştır. Elde edilen veriler, içerik analizi tekniği ile çözümlenerek çalışmanın bulgularını oluşturmuştur.

Araştırmanın “Öğretmenlerin ideal öğrenme ve öğretme süreçlerine ilişkin görüşleri nasıldır?” problemi kapsamında katılımcılara, “Sizce bir dersin ideal süresi ne kadar olmalıdır? Düşüncelerinizi gerekçeleriyle belirtiniz.” birinci alt problemi yöneltmiştir. Katılımcıların büyük bir çoğunluğu (%83,4) bu soruya ideal bir ders süresinin 30 dakika olması gerektiğini belirtmiştir. Çünkü 30 dakikayı aşan derslerde öğrencilerin dikkatinin dağıldığı, ders süresi belirlenirken yaş gruplarının dikkate alınması gerektiği, ders süresinin uzamasına paralel olarak derse ilginin azaldığını, sürenin artmasıyla öğrenme kalitesinin artmadığını dile getiren sonuçlara ulaşılmıştır.

Katılımcıların, araştırmanın ikinci alt problemi olan “Sizce bir günde kaç dersin olması idealdir? Düşüncelerinizi gerekçeleriyle belirtiniz.” sorusuna %50 oranında bir günde 6 dersin ideal olduğunu, %33,4 oranında ise günde en fazla 5 ders olması gerektiğini ifade ettikleri sonucuna ulaşılmıştır. Bu görüşlerine gerekçe olarak ise öğrencilerin dikkatinin dağılması ve öğretmen performansının düşmesini öne süren sonuca ulaşılmıştır. Çaycı (2018) görüşlerini aldığı öğretmenlerin % 82,5 gibi büyük bir çoğunluğunun, ilkokuldaki günlük toplam ders saatinin uygun olmadığını ifade ettikleri ve bu ifadede bulunan öğretmenlerin tamamının, 6 saatlik günlük toplam ders sayısının azaltılması gerektiğini belirttikleri sonucuna ulaşılmıştır. Bu sonuç da araştırma ile uyumluluk göstermektedir.

Araştırmanın üçüncü alt problemi “Sizce haftada kaç gün okula gidilmesi idealdir? Düşüncelerinizi gerekçeleriyle belirtiniz.” sorusuna katılımcıların %83,4’ünün haftada beş gün okula gidilmesi fikrini beyan ettikleri sonucuna ulaşılmıştır. Katılımcıların, bunun sebebi olarak da çocuğun okulla bütünleşebilmesi, öğretmenlerin yıllık müfredatlarını yetiştirilebilmeleri ve çocukların öğretmenleriyle ilişkilerinin güçlenebilmesi için ideal olduğunu düşündükleri sonucuna ulaşılmıştır.

Araştırmanın dördüncü alt problemi olan “Sizce ideal sınıf mevcudu kaç olmalıdır? Düşüncelerinizi gerekçeleriyle belirtiniz.” sorusuna katılımcıların, %58,4’ünün sınıfta en fazla 20 öğrencinin, %33,3’ünün ise 25 öğrencinin olması gerektiğini belirttikleri sonucuna ulaşılmıştır. Katılımcılar, bu görüşlerinin gerekçesini



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sınıfta en fazla 20 öğrencinin olmasının öğretimin niteliğinin artması, öğrenci-öğretmen etkileşiminin sağlanması, öğretimin bireyselleştirilmesi ve sınıf yönetiminin kolaylaşması açısından önemli ifadeleriyle açıklamışlardır.

Araştırmanın beşinci alt problemi olan “Sizce zorunlu eğitim süresi kaç yıl olmalıdır? Düşüncelerinizi gerekçeleriyle belirtiniz.” sorusuna katılımcıların, 4 yılın üzerindeki diğer kademelerin isteğe göre olmasını, temel bilgi ve becerilerin 4 yılda verilebileceğini ve öğrencilerin 4. yılın sonunda mesleki eğitime yönlendirilmesi gerektiğini ifade ettikleri sonuçlara ulaşılmıştır. Yine ek olarak katılımcılara göre zorunlu eğitim 4 yıl olmalıyken, beş yılın üzerindeki eğitimde öğrenci isteğinin gözetilmesini ve gerçekten eğitim almak isteyenlerin önünün kesilmemesini düşünen öğretmenlere göre ise zorunlu eğitim en fazla 5 yıl olmalıdır sonucuna ulaşılmıştır.

Yükseköğretim dışındaki eğitim öğretimin sıkça yapılandırılması nedeniyle belirsizlikten doğan bir karmaşa yaşanmaktadır. İdeal öğrenme ve öğretme sürecinin öğretmen görüşleri ile aktarılmaya çalışıldığı bu araştırma göz önüne alınarak daha farklı ve sıklıkta yeni araştırmalar yapılabilir.



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EMOJİLERLE DEYİM ÖĞRETİMİ: DENEYSEL BİR ÇALIŞMA

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Özet

Dil, duygu ve düşüncelerimizi diğer insanlara iletmede en önemli unsurdur. Geniş bir kelime hazinesine sahip olan insanlar duygu ve düşüncelerini daha akıcı, rahat ve doğru bir şekilde dile getirirler. Bu bağlamda sözcüklerin kalıplaşmasıyla oluşan güçlü bir deyim bilgisinin öğrencilerin kendilerini etkili olarak ifade etmelerinde, söylenenleri eksiksiz anlamalarında büyük bir öneme sahip olduğu söylenebilir. Bu düşünceden hareketle yapılan bu çalışmada, günümüzde iletişimde çokça kullanılan, popüler kültürün önemli bir aracı olan “emojiler”, oyunlaştırılmış etkinlikler içerisinde kullanılarak bu etkinliklerin ortaokul 7. sınıf öğrencilerinin deyimleri öğrenmelerindeki etkisi incelenmeye çalışılmıştır. Araştırmada yöntem olarak ön test – son test kontrol gruplu yarı deneysel desen kullanılmıştır. Araştırmanın çalışma grubunu Erzurum’un Yakutiye ilçesindeki bir ortaokulda öğrenim gören iki grup 71 altıncı sınıf öğrencisi oluşturmaktadır. Dört hafta boyunca haftada ikişer saat olmak üzere çalışma dört oturumda tamamlanmıştır. Araştırmanın verileri 25 çoktan seçmeli sorudan oluşan Deyimleri Öğrenme Başarı Testi (DÖBT) aracılığıyla toplanmıştır. Elde edilen verilerin analizinde basit ve kestirime dayalı istatistiksel teknikler kullanılmıştır. Araştırmanın sonunda son test ortalama başarı puanları karşılaştırıldığında oyunlaştırılarak kullanılan emojilerin öğrencilerin deyimleri öğrenmeleri üzerinde olumlu etkilerinin olduğu anlaşılmıştır.

Anahtar Kelimeler: : Emojiler, deyimler, deyim öğretimi, deneysel araştırma



Abstract

Language is the most important element in conveying our feelings and thoughts to other people. People who have a wide vocabulary express their feelings and thoughts more fluently, comfortably and accurately. In this context, it can be said that a strong knowledge of idioms, formed by formulating words, is of great importance for students to express themselves effectively and fully understand what is said. Based on this idea, in this research, "emojis", which are widely used in communication today and are an important tool of popular culture, were used in gamified activities and the effect of these activities on 6th grade secondary school students' learning of idioms was tried to be examined. As a method in the research, a quasi-experimental design with a pre-test and post-test control group was used. The study group of the research consists of two groups of 71 sixth grade students studying at a secondary school in Yakutiye district of Erzurum. The study was completed in four sessions, two hours a week for four weeks. The data of the research were collected through the Idiom Learning Achievement Test (DABT), which consists of 20 multiple-choice questions. Simple and predictive statistical techniques were used in the analysis of the data obtained. At the end of the research, when the post-test average success scores were compared, it was understood that the gamified emojis had positive effects on students' learning of idioms.

Keywords: Emojis, idioms, idiom teaching, experimental research.

GİRİŞ

Toplumsal yapının ve kültürün aynası olarak değerlendirilebilecek olan dil, kültürel değerlerin kazanılmasında en önemli araçlardan biridir. İnsanlar yüz yıllarca süre içerisinde konuştukları dili işleyerek onu hem iletişimsel hem de estetik olarak ön plana çıkarırlar. Zengin ya da fakir dil yoktur; işlenen, değerli görülen, muhafaza edilen, önem verilen ya da bunların tam aksi davranılan diller vardır. Eğer bir dilin zenginliğinden bahsedilecekse o da ancak o dilin ifade etmede gücü ve pratikliğiyle anlaşılabilir (Aksan, 2013). Bu nedenle tekerleme, atasözü ve deyim gibi kalıplaşmış sözlerin dilin işlenmişliği ya da zenginliğinde belirleyici etkileri vardır. Bu etki, bir yandan dilin iletişimsel kapasitesini genişletirken diğer yandan da gücünü artırır (Korkmaz, 1992).

Bir topluma ait kültürün ve yaşam tarzının en güzel yansımalarından biri de deyimlerdir. Kültürel ve sosyal birikimlerin sonraki kuşaklara aktarımında önemli bir işlev gören deyimler, bir araya gelerek toplumu oluşturan insanların dil, kültür, edebiyat, sanat, günlük hayat gibi pek çok alandaki millî ve manevi duyularının canlı kalmasında hayati bir işlev görür (Büyükikiz vd., 2019). Dolayısıyla deyimlerin, kültürel birikimin kuşaktan kuşağa aktarılacak ortak duyusun sürekliliğinin sağlanmasında hayati bir öneme sahip olduğu söylenebilir (Özden, 2016).

Deyimler açısından oldukça zengin bir dil olan Türkçenin ayrı bir güzellik ve anlatım gücü bulunmaktadır. Hem ana dili hem de yabancı dil olarak Türkçe öğretiminde deyim öğretimi, bu güzelliğin ve anlatım gücünün Türkçe konuşurlara kazandırılmasında önemli bir yer tutmaktadır. Deyimlerin mecazi anlamlarının bulunması, günlük hayatta anlaşmayı sağlayan en önemli unsurlardan biri olması ve öğrencilerin öğrenmekte zorlandığı kavramlar arasında yer alması nedeniyle deyim öğretiminin üzerinde önemle durulması gerekmektedir (Hayran ve Yazıcı, 2020; Kemiksiz, 2022).

Deyim öğretimi ile ilgili alan yazınına bakıldığında araştırmacı ve uygulayıcılar tarafından çok farklı yöntem ve tekniklerin kullanıldığı anlaşılmaktadır (Akçay ve Şimşek, 2015; Atagül, 2016; Aydın ve Ünal, 2015). Bu yöntem ve teknikler içerisinde özellikle içinde bulunduğumuz çağın önemli bir ürünü olan teknolojiden de yararlanıldığı anlaşılmaktadır (Aydeir, 2019; Büyükikiz vd., 2019). İnternet teknolojisinin çok hızlı bir şekilde geliştiği günümüzde iletişim de bu doğrultuda hızlı ve pratik bir biçimde yerini almaktadır. Özellikle genç kuşaklar, birbirleriyle internet tabanlı sosyal medya üzerinden iletişim kurarken uzun cümleler yerine kısa ifadeler ya da emojilerle anlaşmaya çalışmaktadır. Çocuk, genç, yaşlı hemen hemen herkeste bulunan akıllı telefonlar aracılığıyla iletişimin de farklı bir boyut aldığı söylenebilir. Öğrencilerin özellikle bu teknolojiye maruz kaldığı durumları eğitim-öğretim adına fırsata çevirmek için onların ilgisini çekecek ve kullanabilecekleri programlar fayda sağlayabilir. Teknolojinin sunduğu imkânları kullanarak iletişimini daha etkili hâle getirmeye ve aynı zamanda ifadede pratik olmayı sağlamaya çalışan insanların özellikle sanal iletişimde emojileri sıklıkla

kullandıkları anlaşılmaktadır.

Emoji, bir duyguyu, düşünceyi ya da sembolü iletmek için metne eklenebilen küçük resimler olarak tanımlanabilir. Başlangıçta farklı duyguları gösteren gülen yüzler olarak başlayan emojiler artık hayvanlardan yiyeceklere, spordan teknolojiye, nesnelere sembollere hatta bayraklara kadar her şeyi temsil eden yüzlerce emoji bulunmaktadır. Emojilerin tür ve sayısındaki bu artış aslında onların insanlar tarafından iletişimsel bir araç olarak ne kadar çabuk bir şekilde içselleştirildiklerinin de en açık ifadesidir (Harn, 2017; Marder vd., 2019). Emojilerin kullanımındaki sıklık ve yaygınlıktan hareketle bu çalışmada yedinci sınıf Türkçe derslerinde deyim öğretimine ilişkin etkinlikler emojilerle ilişkilendirilerek yeniden düzenlenip emojilerin deyim öğretimi üzerindeki etkisi incelenmeye çalışılmıştır. Bu amaç doğrultusunda çalışmada şu temel araştırma sorusu ve alt problemlerine yanıt aranmıştır:






2. Emojiler kullanılarak hazırlanmış etkinliklerin yedinci sınıf öğrencilerinin deyimleri öğrenmeleri üzerindeki etkisi nedir?
 - 2.1. Deney grubu öğrencilerinin DÖBT (Deyim Öğretimi Başarı Testi) ön test puanları ile kontrol grubu öğrencilerinin DÖBT ön test puanları arasında anlamlı bir fark bulunmakta mıdır?
 - 2.2. Deney grubu öğrencilerinin DÖBT ön test puanları ile DÖBT son test puanları arasında anlamlı bir fark bulunmakta mıdır?
 - 2.3. Kontrol grubu öğrencilerinin DÖBT ön test puanları ile DÖBT son test puanları arasında anlamlı bir fark bulunmakta mıdır?
 - 2.4. Deney grubu öğrencilerinin DÖBT son test puanları ile kontrol grubu öğrencilerinin DÖBT son test puanları arasında anlamlı bir fark bulunmakta mıdır?

Araştırma Deseni

Araştırmada emojiler kullanılarak hazırlanmış etkinliklerin yedinci sınıf öğrencilerinin deyimleri öğrenmeleri üzerinde anlamlı bir etki oluşturup oluşturmadığına bakıldığından nicel araştırma yöntemlerinden biri olan ön test – son test kontrol gruplu yarı deneysel desen kullanılmıştır. Deneysel araştırma bilimsel yöntemler içerisinde kesin sonuçların elde edildiği araştırmadır. Çünkü araştırmacı karşılaştırılabilir işlemler uygular ve daha sonra onların etkilerini inceler, bu tür bir araştırmanın sonuçlarının araştırmacıyı kesin yorumlara götürmesi beklenir (Büyüköztürk, vd., 2017). Deneysel araştırmaların bu özelliğinden yararlanmak üzere araştırmada bir kontrol grubu, bir de deney grubu oluşturulmuştur. Deney grubunda emoji kullanılarak hazırlanmış etkinlikler kullanılırken kontrol grubunda mevcut öğretim programındaki etkinlikler kullanılmıştır. Bu uygulama 4 hafta sürmüştür.

7. Etkinlik: Aşağıda A sütununda emojiler, B sütununda ise deyimler

verilmiştir. A sütunundaki deyimlerle B sütunundaki deyimleri eşleştirerek Boşluk sütununa kodlayınız.

Boşluk	A Sütunu	B Sütunu
—	1 	A Düşünüp taşınmak
—	2 	B Ayakta uyumak
—	3 	C Ağzına fermuar çekmek
—	4 	D Hayrete düşmek
—	5 	E Zora koşmak
		F Burnundan solumak
		G Gülmekten çatlamak
		H İçi kan ağlamak

Şekil 1. Deney grubunda uygulanan etkinliklerden bir örnek

Araştırmacılar tarafından hazırlanan başarı testi uygulama süreci başlamadan önce hem deney hem de kontrol grubundaki öğrencilere uygulanmış ve elde edilen bulgular Tablo 1’de gösterilmiştir.

Tablo 1. Homojenlik Testi Bulguları

Test	Grup	Skewness	Kurtosis
Başarı Ön test	Deney	,398	,778
	Kontrol	,493	,868
Başarı Son test	Deney	,591	,971
	Kontrol	,581	,872

Mevcut çalışmada grupların normal dağılım gösterip göstermediğinin belirlenmesi amacıyla normallik testi

yapılmış, bu test için Skewness ve Kurtosis değerlerine bakılmıştır. Kurtosis ve Skewness değerleri -1.5 ile +1.5 olduğu zaman normal dağılım olduğu kabul edilmektedir (Tabachnick and Fidell, 2013). Dolayısıyla araştırmada analiz için parametrik testler kullanılmıştır.

Uygulama süreci tamamlandıktan sonra ön test olarak kullanılan başarı testi bu defa son test olarak kullanılmış ve deney grubunda deyim öğrenme başarısı açısından anlamlı bir fark oluşup oluşmadığı anlaşılmaya çalışılmıştır.

Çalışma grubu

Çalışma grubunu oluşturmak için amaca uygun örneklem seçimi yoluna gidilmiş ve 2022-2023 öğretim yılı güz döneminde Erzurum ilinin Yakutiye ilçesindeki bir ortaokulda hâlihazırda öğrenim gören yedinci sınıflardan belirlenmiştir. Amaçsal örnekleme yönteminde belli ölçütleri karşılayan veya belli özelliklere sahip olan gruplar örnekleme alınır (Büyüköztürk vd., 2017). Uygulamanın yapıldığı okulda yedinci sınıflar A, B ve C olmak üzere üç şubeden oluşmaktadır. Uygulama başlamadan önce Deyim Öğretimi Başarı Testi bu üç şubeye de uygulanmıştır. Her üç şubeye ait ortalamalar arasındaki farkın anlamsız olduğu yani grupların başarı açısından birbirine benzer oldukları görülmüştür. Bu aşamada rastgele atama yapılarak 35 öğrenciden oluşan A şubesi deney, 36 öğrenciden oluşan C Şubesi de kontrol grubu olarak belirlenmiştir.

Tablo 2. Gruplara Göre Öğrencilerin Dağılımı

Cinsiyet	Deney Grubu		Kontrol Grubu	
	<i>f</i>	%	<i>f</i>	%
Kız	15	42,86	17	47,22
Erkek	20	57,14	19	52,78
Toplam	35	100	36	100

Tablo 2'ye göre araştırmaya katılan deney grubu öğrenci sayısı 35 (15 kız, 20 erkek) kontrol grubu öğrenci sayısı ise 36'dır (17 kız, 19 erkek).

Veri toplama aracı

Çalışmada veri toplama aracı olarak araştırmacılar tarafından hazırlanan Deyim Öğretimi Başarı Testi kullanılmıştır. Başarı testinin hazırlanmasında OKS ve YGS'de geçmişte sorulmuş deyim ile ilgili sorulardan bir havuz oluşturulmuş ve bunlar içerisinde 25 soru seçilerek başarı testi hazırlanmıştır. Testin, yedinci sınıf öğrencileri açısından uygulanabilirliği ve soruların anlaşılabilirliğinin tespiti için sınıf öğretmeniyle birlikte toplam 5 Türkçe öğretmenin görüşleri alınarak teste son hâli verilmiştir.

Verilerin analizi

Verilerin analizinde hangi istatistiksel tekniklerin kullanılacağı belirlenmesi amacıyla veri setinin normallik dağılımına bakılmıştır. Bir testin normal dağılıma sahip olduğunun kabul edilebilmesi için aritmetik ortalama ile medyanın birbirine yakın bir değere sahip olması, skewness ve kurtosis değerlerinin -1.5 ile +1.5 standart sapma aralığında olması (Tabachnick vd., 2013), Shapiro-Wilk testi (50'den az olan örneklem için) sonucunun ise anlamlı bir farklılık göstermemesi gerekmektedir. Özellikle sosyal bilimlerde Shapiro-Wilk testinden daha çok skewness ve kurtosis değerlerine bakılır. Veri seti üzerinde normallik testi yapıldığında skewness ve kurtosis değerlerinin -1.5 ile +1.5 standart sapma aralığında olduğu tespit edilmiş ve verilerin normal bir dağılım gösterdikleri sonucuna varılmıştır. Sonrasında grup içi karşılaştırmalarda bağımlı örneklemelerde t testi, gruplar arasında ise bağımsız örneklemelerde t testi kullanılmıştır.

Bulgular

Bu bölümde araştırmacılar tarafından çalışma kapsamında hazırlanmış olan 25 soruluk “Deyim Öğretimi Başarı Testinin (DÖBT)” deney ve kontrol gruplarından elde edilen istatistiksel sonuçları paylaşılmıştır.

Deney ve Kontrol Grupları Ön Test Puanlarının Karşılaştırma Bulguları

Araştırmanın birinci alt problemi olan “Deney grubu öğrencilerinin DÖBT ön test puanları ile kontrol grubu öğrencilerinin DÖBT ön test puanları arasında anlamlı bir fark bulunmakta mıdır?” sorusuna yönelik analizde parametrik bağımsız örneklemelerde T Testi uygulanmıştır.

Tablo 3. Deney Grubu – Kontrol Grubu Ön Test DÖBT Puanları Bağımsız Örneklem T Testi

Test	Test	N	\bar{X}	SD	t	p
Ön Test	Deney	35	63,09	9,259	-,455	,651

Kontrol	36	64,11	9,727
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Tablo 3'e bakıldığında bağımsız örneklem T Testi'ne göre deney grubu ve kontrol grubu ön DÖBT puanları arasında istatistiksel olarak anlamlı bir fark bulunmadığı ($p=.651$, $p>.05$) görülmektedir. Bu sonuç uygulama öncesinde grupların başarı düzeyi açısından birbirine benzer olduğunu ifade etmektedir.

Deney Grubu Ön ve Son Test Puanlarının Karşılaştırma Bulguları

Araştırmanın ikinci alt problemi olan "Deney grubu öğrencilerinin DÖBT ön test puanları ile DÖBT son test puanları arasında anlamlı bir fark bulunmakta mıdır?" sorusuna yönelik analizde parametrik bağımsız örneklemde T Testi uygulanmıştır.

Tablo 4. Deney Grubu Ön ve Son DÖBT Puanları Bağımsız Örneklem T Testi

Grup	Test	N	\bar{X}	t	p
Deney Grubu	Son test	35	71,89	6,378	,000
	Ön test	35	63,09		

Bağımsız örneklemde T Testi'ne göre deney grubu ön ve son DÖBT puanları arasında istatistiksel olarak son test lehine anlamlı bir fark olduğu ($p=.000$) ($p<.05$) ortaya çıkmaktadır. Bu bulguya göre araştırmada kullanılan yöntemin deney grubunda başarının artmasında anlamlı düzeyde etkili olduğu söylenebilir.

Kontrol Grubu Ön ve Son Test Puanlarının Karşılaştırma Bulguları

Araştırmanın üçüncü alt problemi olan "Kontrol grubu öğrencilerinin DÖBT ön test puanları ile DÖBT son test puanları arasında anlamlı bir fark bulunmakta mıdır?" sorusuna yönelik analizde parametrik bağımsız örneklemde T Testi uygulanmıştır.

Tablo 5. Kontrol Grubu Ön ve Son DÖBT Puanları Bağımsız Örneklem T Testi

Grup	Test	N	\bar{X}	t	p
Kontrol Grubu	Son test	66,67	36	2,500	,017
	Ön test	64,11	36		

Bağımsız örneklemde T Testi'ne göre kontrol grubu ön ve son DÖBT puanları arasında istatistiksel olarak son test lehine anlamlı bir fark olduğu ($p=.017$) ($p<.05$) ortaya çıkmaktadır. Bu bulguya göre kontrol grubunda uygulanan mevcut öğretim programının da başarının artmasında anlamlı düzeyde etkili olduğu söylenebilir.

Deney ve Kontrol Grupları Son Test Puanlarının Karşılaştırma Bulguları

Araştırmanın dördüncü alt problemi olan "Deney grubu öğrencilerinin DÖBT son test puanları ile kontrol grubu

öğrencilerinin DÖBT son test puanları arasında anlamlı bir fark bulunmakta mıdır?” sorusuna yönelik analizde de parametrik testlerden bağımsız örneklemelerde T Testi uygulanmıştır.

Tablo 6. Deney Grubu – Kontrol Grubu Son DÖBT Puanları Bağımsız Örneklemeler T Testi

Test	Test	N	\bar{X}	SD	t	p
Son Test	Deney	35	71,89	10,605	2,215	,030
	Kontrol	36	66,67	9,221		

Bağımsız örneklemelerde T Testi’ne göre deney grubu ve kontrol grubu son DÖBT puanları arasında istatistiksel olarak anlamlı bir fark olduğu ($p=.003$, $p<.05$), bu farkın da deney grubu lehine olduğu anlaşılmıştır. Bu bulgudan hareketle başarıyı artırma açısından deney grubunda uygulanan etkinliklerin, kontrol grubunda uygulanan etkinliklerden daha etkili olduğu söylenebilir.

Sonuç ve Değerlendirme

Bu çalışmada yedinci sınıf Türkçe derslerinde deyim öğretimine ilişkin etkinlikler emojilerle ilişkilendirilerek yeniden düzenlenip emojilerin deyim öğretimi üzerindeki etkisi incelenmek amaçlanmıştır. Bu amaç doğrultusunda öncelikle çalışma grubunu oluşturan deney ve kontrol gruplarının deney öncesi “Deyim Öğretimi Başarı Testi” ile homojenlik durumları test edilmiştir. Her iki grubunda Skewness ve Kurtosis değerlerine göre normal dağılım gösterdiği anlaşılmıştır.

Araştırmanın birinci alt problem olarak “Deney grubu öğrencilerinin DÖBT ön test puanları ile kontrol grubu öğrencilerinin DÖBT ön test puanları arasında anlamlı bir fark bulunmakta mıdır?” sorusuna yönelik analizde katılımcılara parametrik bağımsız örneklemelerde T Testi uygulanmıştır. Uygulanan bu teste göre deney grubu ve kontrol grubu ön DÖBT puanları arasında istatistiksel olarak anlamlı bir fark bulunmadığı ($p=.651$, $p>.05$) tespit edilmiştir. Bu durum araştırmaya katılan deney grubu öğrencileri ile kontrol grubu öğrencilerinin deyim öğrenme başarıları düzeylerinin uygulama öncesinde birbirlerine denk olduğunu göstermektedir.

Araştırmanın ikinci alt problemi olarak “Deney grubu öğrencilerinin DÖBT ön test puanları ile DÖBT son test puanları arasında anlamlı bir fark bulunmakta mıdır?” sorusuna yönelik uygulanan bağımsız örneklemelerde T Testi’ne göre deney grubu ön ve son DÖBT puanları arasında istatistiksel olarak son test lehine anlamlı bir fark olduğu ($p=.000$) ($p<.05$) sonucuna ulaşılmıştır. Bu sonuç araştırmada kullanılan emojilerle deyim öğretme yönteminin deney grubu öğrencilerinin deyim öğrenme başarılarının artmasında etkili olduğunu göstermektedir.

1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

Araştırmanın üçüncü alt problemi olarak “Kontrol grubu öğrencilerinin DÖBT ön test puanları ile DÖBT son test puanları arasında anlamlı bir fark bulunmakta mıdır?” sorusuna yönelik analizde parametrik bağımsız örneklemelerde T Testi uygulanmıştır. Uygulanan test sonucuna göre kontrol grubu öğrencilerine uygulanan mevcut öğretim programının da deyim öğrenme başarılarının artmasında anlamlı düzeyde etkili olduğu sonucuna ulaşılmaktadır.

Son olarak araştırmanın dördüncü alt problemi olan “Deney grubu öğrencilerinin DÖBT son test puanları ile kontrol grubu öğrencilerinin DÖBT son test puanları arasında anlamlı bir fark bulunmakta mıdır?” sorusuna yönelik analizde de parametrik testlerden bağımsız örneklemelerde T Testi uygulanmıştır. Uygulanan bu test analizine göre deney grubu ve kontrol grubu son DÖBT puanları arasında istatistiksel olarak anlamlı bir fark olduğu ($p=.003$, $p<.05$), bu farkın da deney grubu lehine olduğu sonucuna ulaşılmaktadır. Bu sonuçtan hareketle öğrencilerin deyim öğrenme başarısını artırma açısından deney grubuna uygulanan emoji etkinliklerinin, kontrol grubunda uygulanan mevcut öğrenme etkinliklerinden olumlu yönde daha etkili olduğu söylenebilir.

İlgili literatür incelendiğinde öğrencilerin sözel ifade becerilerini geliştirme, kültürel birikimden haberdar olma ve etkili konuşmalarına katkıda bulunan deyimlerin, öğrencilerin ve genç kuşağın internet tabanlı iletişimlerinde sıklıkla kullandığı emojilerin deyim öğretiminde kullanıldığına rastlanılmamıştır. Bu bakımdan çalışmanın, alana katkı sağlayacağı ve ilgili araştırmacılara yol göstereceği düşünülmektedir.

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İTERAKTİF SANAT VE YENİ MEDYA

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Özet

Bu çalışmada Yeni medya sanatı ve interaktif sanat ilişkisi günümüz sanat anlayışına göre ortaya çıkarılması ve açıklaması amaçlanmıştır. Araştırmada, günümüz dijital sanat anlayışının ilerleyiş yapısı, anlamaya ve anlatılmaya çalışılmıştır. Araştırmanın bulguları kurgulanırken öncelikle yeni medya sanat ile ilgili bilgiler, yorumlar ve değerlendirmeler ele alınmıştır, Yeni medya ne olduğu ve interaktif sanat anlayışının anlam boyutu yönünde kapsamlı bir literatür taraması yapılmıştır. Geçmiş ve günümüz sanatçıların yeni medya ve interaktif sanat kurgusu ile teknolojiyi kullanarak yaptıkları çalışmalara yer verilmiştir. Araştırma betimsel bir araştırmadır. Araştırma, kaynak tarama yöntemi ve betimsel yöntem kullanılarak yürütülmüştür.

Anahtar Kelimeler: Yeni medya, İteraktif sanat, Teknoloji



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Özet

Meydana gelen depremler, günümüze kadar birçok insanın canını ve malını kaybetmesine sebep olmuştur. Deprem tehlikesi, bir bölgede belirli periyotlarda can ve mal kaybına sebep olabilecek büyüklükte bir sismik hareketin olasılığını ifade etmektedir. Bu olasılık, geçmiş deprem verilerinin istatistiksel yollarla değerlendirilmesini ve gelecek açısından yorumlanması sonucunu ortaya çıkarmaktadır. Bu çalışmada Çanakkale Biga ilçesinin depremselliği incelenmiştir. Biga ilçesi, Sakarya ili güneyinde ikiye ayrılan Kuzey Anadolu Fay Zonu'nun güneybatı yönünde uzanan kolunda oluşan sismik aktivitenin etkisinde kalmaktadır. İlçe merkezinin yakınında başlayıp Çan ilçesinin yerleşim alanına kadar uzanıp devam eden Biga-Çan Fayı ve Yenice-Gönen arasında oluşmuş sismik kırık ilçe merkezini doğrudan tehdit etmekte ve Marmara Denizi içerisinde ilerleyen ve Gelibolu Yarımadası üzerinden Ege'ye uzanan Kuzey Anadolu Fay Zonu'nun diğer kolu üzerinde gerçekleşen yüksek magnitüdü depremler de ilçe merkezini etkilemektedir. Bu kapsamda, ilçenin jeolojik durumu, sismik hareketliliği ve deprem geçmişi göz önüne alınarak deprem azalım ilişkileri belirlenmiştir. Sonuçta, ilçenin sismik aktiviteye maruz kaldığı, bu nedenle zemin açısından dikkat edilmesi gerektiği görülmüştür.

Anahtar Kelimeler: Biga ilçesi, Depremsellik, Olasılıksal yöntem



SEISMICITY OF BIGA DISTRICT

Abstract

Earthquakes that have occurred to date have caused the loss of lives and properties of many people. Earthquake hazard refers to the probability of a seismic event of a certain magnitude that can cause loss of life and property in a region within specific periods. This probability arises from the statistical evaluation of past earthquake data and its interpretation for the future. In this study, the seismicity of Çanakkale Biga district was investigated. The district is affected by seismic activity in the southwestward extension of the North Anatolian Fault Zone branch, which is divided into two parts south of Sakarya province. The seismic fault formed between Biga-Çan and Yenice-Gönen, which starts near the district center and extends to the settlement area of Çan district, directly threatens the district center. Furthermore, high-magnitude earthquakes occurring on the other branch of the North Anatolian Fault Zone, which progresses within the Marmara Sea and extends to the Aegean Sea via the Gallipoli Peninsula, also affect the district center. In this context, earthquake attenuation relationships were determined considering the social structure, geological situation, seismic activity, and earthquake history of the district. As a result, it was observed that the district is exposed to seismic activity, so attention should be paid to the ground conditions.

Keywords: Biga district, Seismicity, Probabilistic method

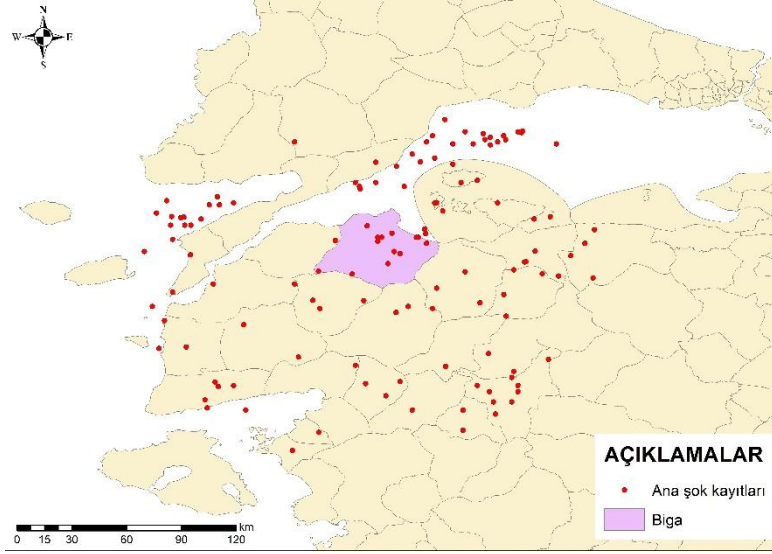
1. Giriş

Depremler, günümüze kadar birçok insanın canına mal olmuş, tarih boyu kurulan pek çok yaşam alanını yok etmiştir. Deprem tehlikesi, belirlenen çalışma alanında, belirli periyotlarda can ve mal kaybına sebep olabilecek büyüklükte bir sismik hareketin olasılığını ifade etmektedir. Bu olasılık, geçmiş deprem verilerinin istatistiksel yollarla değerlendirilmesini ve gelecek açısından yorumlanması sonucunu ortaya çıkarmaktadır. Belirlenen olasılıkla şekillenen deprem tehlikesi, gelecekte yaşanması beklenen depremin büyüklüğünü, çalışma alanının merkez noktasına uzaklığını, etkileyeceği zeminin koşullarını, enerjisinin aktarılacağı yapının durumunu ve yaşatacağı hasarın boyutunu ele alır (Türkelli 2008). Bu çalışma incelenen Çanakkale'nin Biga ilçesi, Sakarya ili güneyinde ikiye ayrılan Kuzey Anadolu Fay Zonu (KAFZ)'nun güneybatı yönünde uzanan kolunda oluşan sismik aktivitenin etkisindedir. İlçe merkezinin yakınında başlayıp Çan ilçesinin yerleşim alanına kadar uzanıp devam eden Biga-Çan Fayı ve Yenice-Gönen arasında oluşmuş sismik kırık, ilçe merkezini doğrudan tehdit etmektedir. Bununla beraber Marmara Denizi içerisinde ilerleyen ve Gelibolu Yarımadası üzerinden Ege'ye uzanan KAFZ'ın diğer kolu üzerinde gerçekleşen yüksek magnitudlü depremler de ilçe merkezini etkilemektedir. Biga Yarımadası'nda bulunan platoların güneyden kuzeye doğru gidildikçe yükseltilerinin azaldığı, Biga civarına gelindiğinde ovalık araziler ile bu yükseltilerin deniz seviyesine çok yakın bir kademeye indiği görülmektedir. Kazdağı bölgesinde zirve yapan yükseklik, derin vadiler ile Biga civarında neredeyse sönümlenmektedir. Doğal olarak, yüksek mevkilerden başlayan akarsu kaynakları Biga bölgesinde büyük bir hız kaybına uğrayarak malzeme çökelleri oluşturmuştur. Bu alüvyon birikimine hem günümüzün aktif akarsuları hem de tarih boyunca kuruyup vadilere dönüşmüş eski yataklar sebep olmuştur. Bu veri, Biga Yarımadası'nın kuzey kesimindeki yaklaşık 80 m kalınlıkta olan alüvyal alanları açıklamaktadır. Buna bağlı olarak, Biga ve kuzeyinin sismik aktiviteyle deprem dalgalarını şiddetle yansıtacağı ve zemin büyütme oranlarının oldukça yüksek olacağı görülmektedir (Efe 1993). Bu makale kapsamında, kullanılacak olan olasılıksal sismik tehlike analizi sayesinde bölgeye ait geçmiş deprem verilerine dayanarak elde edilen moment dağılımı ile deprem büyüklüklerinin periyotları belirlenmiş, oluşabilecek pik moment magnitudleri hesaplanmıştır. Bu çalışmada ilçenin jeolojik durumu, sismik hareketliliği ve deprem geçmişi göz önüne alınarak olasılıksal sismik tehlike analizi kullanılarak ilçenin depremselliği belirlenmiştir.

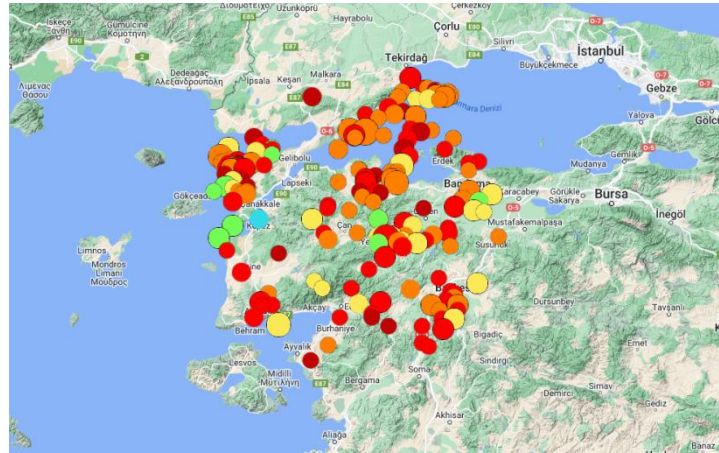
2. Materyal ve Metot

Çalışmada Boğaziçi Üniversitesi, Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü (KRDAE)'nin Bölgesel Deprem-Tsunami İzleme ve Değerlendirme Merkezi (BDTİM)'nde deprem kataloğu sekmesinde 1900 yılı sonrasında gerçekleşen depremler belirlenmiştir. Biga merkezli, 100 km yarıçaplı dairesel çalışma alanı oluşturulmuş (Şekil 1) depremin gerçekleştiği azami derinlik 300 km, büyüklük aralığı 4 ila 10 arasında ve zaman aralığı da 1 Ocak 1900 ile 1 Ocak 2022 tarihleri olarak sınırlandırıldığında 192 adet deprem gerçekleştiği

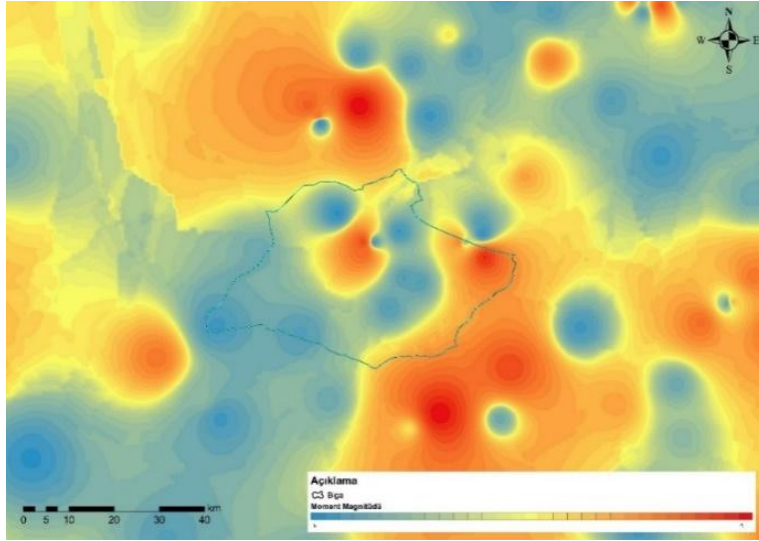
görülmüştür (Şekil 2). Tüm depremlerin büyüklükleri moment magnitüd türüne (M_w) göre listelenmiştir (Şahin vd. 2018). Depremler ArcGis adlı bilgisayar uygulaması üzerinden haritalandığında çalışma sahasındaki ana şokların dağılımı daha net görülmektedir (Şekil 3).



Şekil 1. Biga merkezli 100 km yarıçaplı alanda gerçekleşen ana şok depremleri ve yerbulduru haritası



Şekil 2. Kandilli Rasathanesi'nin veri tabanında çalışma alanında gerçekleşen 1900 yılı sonrası depremler



Şekil 3. Çalışma sahası içerisinde aletsel dönemde kaydedilmiş depremlerin ürettiği moment magnitüdülerinin arazide zeminden bağımsız dağılımı

2.1. Olasılıksal Deprem Tehlike Analizi

Poisson modelinin kullanıldığı (Kayabalı 1995) çalışmada, ilk olarak çalışma sahası içerisinde gerçekleşmiş olan depremlerin frekans ilişkilerinin tespiti (Tablo 1) ve ikinci olarak deprem sayılarına bağlı olarak magnitüd-frekans ilişkisine ait eğri denklemi ortaya çıkarılmıştır (Gutenberg ve Richter 1944). Depremsellik parametreleri ışığında (Işık 2013; Tabban ve Gencoğlu 1975) çalışma sahasının olasılık değerleri ve dönüşüm periyotları Tablo 2’te verilmiştir.

Tablo 1. Deprem magnitüd ortalama değerleri ile frekansları

ΣM	$4.0 \leq M < 4.5$	$4.5 \leq M < 5.0$	$5.0 \leq M < 5.5$	$5.5 \leq M < 6.0$	$6.0 \leq M < 6.5$	$6.5 \leq M < 7.0$
N	65	26	19	12	2	3
M_{ort}	4.2	4.7	5.2	5.6	6.2	6.7
ΣN	127	62	36	17	5	3
Log (ΣN)	2,1038	1,7924	1,5563	1,2304	0,6990	0,4771

Merkez noktası ve 100 km’lik yarıçapıyla belirlenen çalışma sahasında yer alan aktif fayların listesi, Maden Tetkik ve Arama Genel Müdürlüğü (MTA) bünyesinde Yenilenmiş Diri Fay Haritaları’ndan yararlanılarak çıkarılmıştır. Fay uzunlukları ve orijin noktasına mesafesi incelenerek üretebileceği en yüksek deprem büyüklüğü belirlenmiş ve Tablo 3’te verilmiştir. Çalışma sahasında 25 adet farklı diri fay tespit edilmiştir (MTA 2023).

Tablo 2. Çalışma sahasının olasılık değerleri ve dönüşüm periyotları

M _w	n(M)	Yıllara Bağlı Sismik Risk					T _r
		R ₁	R ₁₀	R ₃₀	R ₅₀	R ₁₀₀	
4.0	1,029	0,643	0,999	1	1	1	1,0
4.1	0,881	0,586	0,999	1	1	1	1,1
4.2	0,754	0,530	0,999	1	1	1	1,3
4.3	0,646	0,476	0,998	1	1	1	1,5
4.4	0,553	0,425	0,996	1	1	1	1,8
4.5	0,474	0,377	0,991	0,999	1	1	2,1
4.6	0,406	0,333	0,983	0,999	1	1	2,5
4.7	0,347	0,293	0,969	0,999	1	1	2,9
4.8	0,297	0,257	0,949	0,999	1	1	3,4
4.9	0,255	0,225	0,922	0,999	0,999	1	3,9
5.0	0,218	0,196	0,887	0,998	0,999	1	4,6
5.1	0,187	0,170	0,845	0,9963	0,999	1	5,4
5.2	0,160	0,148	0,798	0,992	0,999	1	6,3
5.3	0,137	0,128	0,745	0,983	0,998	0,999	7,3
5.4	0,117	0,111	0,690	0,970	0,997	0,999	8,5
5.5	0,100	0,095	0,633	0,951	0,993	0,999	10,0
5.6	0,086	0,082	0,576	0,924	0,986	0,999	11,6
5.7	0,074	0,071	0,521	0,889	0,975	0,999	13,6
5.8	0,063	0,061	0,467	0,848	0,957	0,998	15,9
5.9	0,054	0,052	0,417	0,802	0,933	0,995	18,5
6.0	0,046	0,045	0,369	0,749	0,901	0,990	21,7
6.1	0,039	0,039	0,327	0,695	0,862	0,981	25,3
6.2	0,034	0,033	0,287	0,638	0,816	0,966	29,5
6.3	0,029	0,029	0,252	0,581	0,765	0,945	34,5
6.4	0,025	0,024	0,220	0,525	0,711	0,916	40,3
6.5	0,021	0,021	0,191	0,472	0,655	0,881	47,0
6.6	0,018	0,018	0,166	0,421	0,598	0,838	54,9
6.7	0,016	0,015	0,144	0,373	0,541	0,789	64,2
6.8	0,013	0,013	0,125	0,329	0,487	0,737	74,9
6.9	0,011	0,011	0,108	0,290	0,435	0,681	87,5
7.0	0,009	0,009	0,093	0,254	0,387	0,624	102,2

Tablo 3. Biga ilçesi ve 100 km yarıçaplı dairesel dış alanı içerisindeki diri faylar (MTA 2023)

Fay No:	Fay Adı	R (km)	SRL (km)	K	$M_{w_{max}}$
1	KAFZ - Saros Segmenti	72,8	56	DA	7.1079
2	KAFZ - Ganos Segmenti	51,7	109	DA	7.4434
3	KAFZ - Tekirdağ Segmenti	67,7	42	DA	6.8711
4	Karabiga Fayı	18,1	18,2	NB	6.5417
5	Ortaburun Sırtı	15,2	5,6	NB	5.9479
6	Biga-Çan Fay Zonu	3,4	44,9	DA	6.9966
7	Yaygın Çizgiselliği	12,8	14,5	NB	6.4272
8	Sarıköy Fayı	14,7	65,5	DA	7.1868
9	Sinekçi Fayı	7,2	32,6	T	6.8353
10	Gündoğan Fayı	24,7	19,7	DA	6.5816
11	Edincik Fayı	43,1	29,9	DA	6.7918
12	Bandırma Fayı	69,2	32,1	NB	6.8275
13	Karacabey Fayı	91,1	25,9	NB	6.7194
14	Mustafakemalpaşa Fayı	92,8	35,8	DA	6.8825
15	Manyas Fay Zonu	50	32,7	DA	6.8369
16	Akçapınar Fayı	31,4	18,2	NB	6.5417
17	Yenice Gönen Fayı	31,7	86,5	DA	7.3269
18	Balıkesir Fayı	72,8	65,2	DA	7.1845
19	Havran – Balya Fay Zonu	65,6	90,7	DA	7.3508
20	Şamlı Fayı	58,8	9,5	NB	6.2142
21	Eybek Çizgiselliği	50,5	42,1	NB	6.9642
22	Pazarköy Fayı	41,9	35,2	DA	6.8740
23	Bekten Fayı	25,3	16,3	DA	6.4861
24	Evciler Fayı	36,3	46,3	DA	7.0121
25	Edremit Fay Zonu	55,5	74,6	N	7.2524

2.1. Azalım İlişkisi

Azalım ilişkisin, aletsel olarak deprem büyüklüğünün tespit edilebildiği dönemde oluşan ve ivme değerleri okunabilmiş sismik aktivitelerden elde edilen farklı araştırmacılar tarafından geliştirilmiş istatistiksel verilere dayanan yer hareketi tahminini sağlayan bağıntılardır (Koçyiğit vd. 2010). Fay hattından uzaklaştıkça yer ivme değerinin nasıl bir değişim gösterdiği bu bağıntılar sayesinde önceden anlaşılabilir. Ulusay ve arkadaşlarının (2004) geliştirdiği azalım ilişkisi (Ulusay vd. 2004) Eşitlik 1’de verilmiştir (Tablo 4).

$$PGA = 2.18e^{0.0218(33.3M_w - R_e + 7.8427S_A + 18.9282S_B)} \quad (1)$$

Tablo 4. Biga ilçe merkezinde, çalışma sahasınca saptanan sismik kaynaklar sebebi ile oluşabilecek pik yer ivme değerleri (Ulusay, Tuncay, Sönmez ve Gökçeoğlu'nun 2004'te sunduğu azalım ilişkisi sonucu)

Fay No:	R_e (km)	SRL (km)	M_{max}	PGA (gal)		
				Kaya	Zemin	Yumuşak Zemin
1	72,8	56	7,1079	77,65	92,13	117,31
2	51,7	109	7,4434	156,92	186,18	237,07
3	67,7	35	6,8711	73,07	86,70	110,40
4	18,1	18,2	6,5417	169,63	201,26	256,27
5	15,2	5,6	5,9479	117,42	139,32	177,40
6	3,4	44,9	6,9966	325,16	385,79	491,25
7	12,8	14,5	6,4272	175,22	207,89	264,72
8	14,7	65,5	7,1868	291,80	346,21	440,85
9	7,2	32,6	6,8353	266,24	315,88	402,24
10	24,7	19,7	6,5816	151,21	179,41	228,45
11	43,1	29,9	6,7918	117,94	139,93	178,18
12	69,2	32,1	6,8275	68,52	81,30	103,52
13	91,1	25,9	6,7194	39,30	46,63	59,38
14	92,8	35,8	6,8825	42,63	50,58	64,41
15	50	32,7	6,8369	104,85	124,39	158,40
16	31,4	18,2	6,5417	126,93	150,60	191,77
17	31,7	86,5	7,3269	223,00	264,58	336,91
18	72,8	65,2	7,1845	82,09	97,40	124,02
19	65,6	90,7	7,3508	108,36	128,57	163,72
20	58,8	9,5	6,2142	55,07	65,34	83,20
21	50,5	42,1	6,9642	113,75	134,96	171,85
22	41,9	35,2	6,8740	128,51	152,47	194,15
23	25,3	16,3	6,4861	139,26	165,22	210,39
24	36,3	46,3	7,0121	160,51	190,43	242,49
25	55,5	74,6	7,2524	125,74	149,18	189,97

İnan ve arkadaşlarının (1996) geliştirdiği azalım ilişkisi (İnan vd. 1996) Eşitlik (2)'de, Aydan ve arkadaşlarının (1996) sunduğu, Aydan (2001)'in geliştirdiği azalım ilişkisi (Aydan, Sedaki, ve Yarar 1996)

Eşitlik 3’te, Beyaz (2004)’ın geliştirdiği azalım ilişkisi (Beyaz 2004) Eşitlik 4’te, Yunatçı (2010)’nın geliştirdiği azalım ilişkisi (Yunatçı 2010) Eşitlik 5’te, Gülkan ve Kalkan (2002)’in sunduğu, 2004’te geliştirdiği azalım ilişkisi (Gülkan ve Kalkan 2002) Eşitlik 6’da ve Boore ve arkadaşlarının (1997) sunduğu azalım ilişkisi (Boore, Joyner, ve Fumal 1997) Eşitlik 7’de verilmiştir.

$$PHA = 10^{(0.65M - 0.9 \log R - 0.44)} \quad (2)$$

$$PHA = 2.8(e^{0.9M} - 1)e^{-0.025R} \quad (3)$$

$$\log(PHA) = 2.08 + 0.0254M_w^2 - 1.001 \log(R + 1) \quad (4)$$

$$\ln(PHA) = b_1 + b_2(M_w - 6, 2) + b_3(M_w - 6, 2)^2 + [b_4 + b_5(M_w - 6, 2)] \ln(R^2 + b_6^2)^{\frac{1}{2}} + b_7SOFT + \sigma_\epsilon \quad (5)$$

$$\ln(PHA) = b_1 + b_2(M_w - 6) + b_3(M_w - 6)^2 + b_5 \ln(r) + b_v \ln\left(\frac{V_s}{V_a}\right) \quad (6)$$

$$\ln(PHA) = b_1 + b_2(M_w - 6) + b_3(M_w - 6)^2 + b_5 \ln(r) + b_v \ln\left(\frac{V_s}{V_A}\right) \quad (7)$$

Tablo 5. Azalım ilişkilerine göre pik ivme değerleri

Fay No	PHA					
	İnan vd.	Aydan vd.	Beyaz	Yunatçı	Gülkan, Kalkan	Boore vd.
1	319,31	271,8	31,14	81,48	72,33	100,91
2	717,92	623,26	58,04	143,9	108,39	156,83
3	239,16	249,4	27,57	71,67	70,78	94,22
4	478,83	640,25	76,67	184,08	187,95	213,96
5	230,4	402,62	58,6	138,93	156,68	176,78
6	4260,52	1393,71	477,86	446,79	485,32	622,91
7	551,04	659,19	97,32	216,53	227,98	255,37
8	1516,56	1247,28	156,61	319,33	281,79	347,46
9	1703,6	1095,85	224,91	370,44	373,12	441,62
10	384,24	562,77	58,74	146,88	149,62	174,31
11	318,88	429,45	40,33	103,44	102,05	127,91
12	219,69	230,96	26,05	67,64	68,23	90,54
13	145,9	121,18	18,22	46,94	51,09	69,12
14	183,16	134,54	20,37	53,32	53,69	74,26
15	298,47	376,41	36,14	93,14	91,26	116,89
16	291,65	459,14	45,18	115	120,26	142,64
17	936,61	925,19	84,63	199,85	160,28	214,21
18	358,12	291,24	33,2	86,79	74,19	105,07

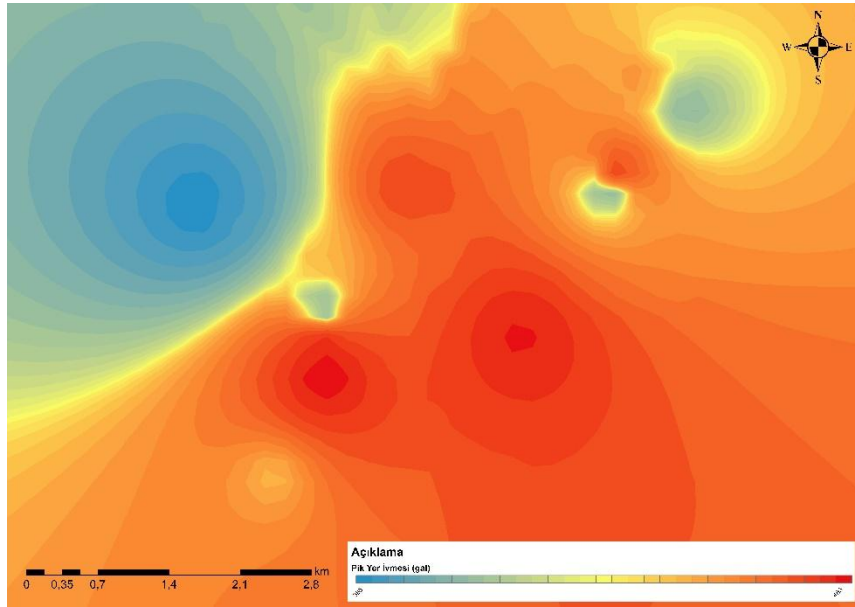
19	504,46	405,05	42,38	108,95	85,6	124,31
20	101,57	172,2	19,16	47,03	59,28	74,31
21	357,89	416,95	39,66	102,01	94,99	124,04
22	369,91	476,59	44,27	113,13	108,07	136,49
23	325,97	508,63	53,36	134,28	140,38	162,84
24	517,53	620,9	56,97	142,77	128,84	163,76
25	506,04	477,13	45,94	113,46	96,38	134,27

Elde edilen azalım ilişkilerinde 6 numara ile gösterilen Biga-Çan Fay Zonu'nun en büyük yer ivmesi üreteceği görülmektedir.

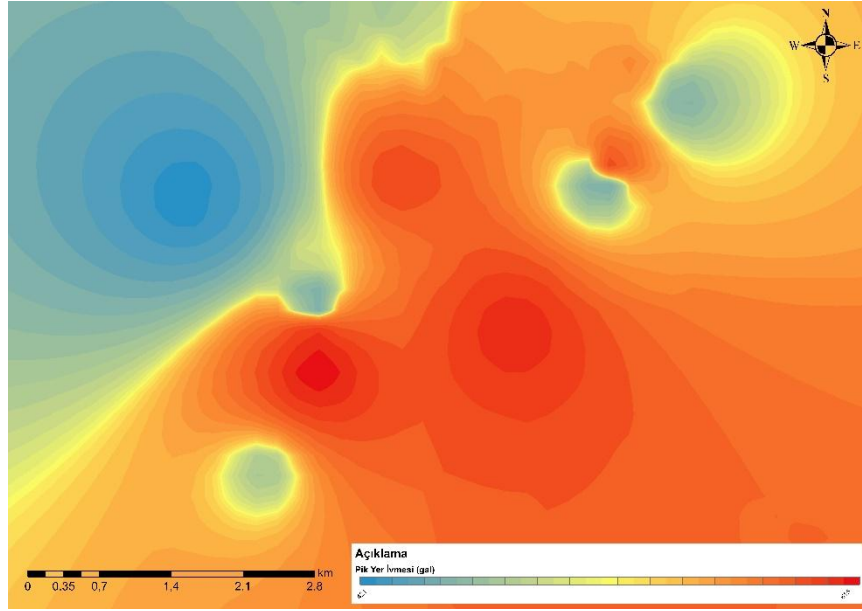
3. Bulgular ve Tartışma

Elde edilen azalım ilişkilerinden Ulusay ve arkadaşlarının (2004) önermesine göre ilçe merkezinde tüm yer tipleri için en yüksek pik ivme değeri 6 numara ile ifade edilen Biga-Çan Fay Zonu'nda görülmektedir. Bu zonun ilçe merkezinde yaratacağı ivmeler, kaya için 325,16 gal (0,33 g), zemin için 385,79 gal (0,39 g), yumuşak zemin için 491,25 gal (0,49 g) değerlerindedir. İnan ve arkadaşlarının (1996) önerdiği bağıntı kapsamında ise ivme değerleri, yer karakterine göre değil, tamamen fayın üretebileceği maksimum magnitüd değerine göre çalışmanın merkez noktası ile arasındaki mesafesine bağlıdır. En büyük ivme değerini 4260,52 gal büyüklüğü ile Biga-Çan Fayı oluştururken, 101,57 gal ile en düşük ivme değerini yaratan kırık ise Balıkesir il merkezinin kuzeyinde yer alan Karesi ilçesine bağlı Şamlı köyü yakınlarında bulunan Şamlı Fayı'dır. Aydan ve arkadaşlarının (1996) azalım ilişkisine göre 1393,71 gal (1,39 g) ivme değeri ile Biga-Çan Fay Zonu diğer bağıntı sonuçlarında olduğu gibi ilçe merkezini tehdit eden en önemli sismik kırıktır. Karacabey Fayı ise 121,18 gal (0,12 g) pik yer ivmesi ile ilçe merkezi açısından en az risk barındıran sismik kırıktır. Beyaz (2004)'ın sunduğu azalım ilişkisine göre Biga-Çan Fay Zonu 477,86 gal değerinde yer hareketine sebep olmaktadır. En düşük pik ivme değerini 18,22 gal ile Karacabey Fayı sağlamaktadır. Yunatçı (2010)'a göre Biga-Çan Fay Zonu 446,79 gal pik ivme değeri ile Biga ilçe merkezi için en tehlikeli fay konumundadır. 46,94 gal pik ivme değeri ile Karacabey Fayı'nın en az pik ivme değeri yaratan sismik kaynaktır. Gülkan ve Kalkan (2002)'in azalım ilişkisi ile Biga ilçe merkezi için 485,32 gal değeriyle Biga-Çan Fay Zonu en büyük pik ivme değerini sağlamaktadır. 373,12 gal pik ivme değeri ile Sinekçi Fayı gelmektedir. Buna karşı en küçük pik ivme değerini ise 51,09 gal değeri ile Karacabey Fayı sağlamaktadır. Boore ve arkadaşlarının (1997) azalım ilişkisinde, diğer azalım ilişkisi sonuçlarında görüldüğü gibi en büyük pik yatay ivme büyüklüğünü 622,91 gal ile Biga-Çan Fay Zonu, en küçük yatay ivme büyüklüğünü ise 69,12 gal ile Karacabey Fayı sağlamaktadır. Diğer azalım ilişkileri ile kıyaslandığında tutarlı sonuçlar verdiği görülmektedir. Biga-Çan Fay Zonu'ndan hemen sonra en riskli

sismik kaynak olarak görülen Sinekçi Fayı 441,62 gal pik yer ivmesi ile Gülkan ve Kalkan'ın sunduğu azalım ilişkisine paralellik göstermektedir. Yapılan azalım ilişkileri sonucunda bulunan pik yer ivmesi değerlerinin tamamında Biga-Çan Fayı'nın ilçe merkezince en etkili sismik kırık olduğu görülmektedir. Azalım ilişkisi sonuçları kıyaslanırken Ulusay ve arkadaşlarının (2004) sunduğu ilişkide yumuşak zemin için verilen bağıntı göz önünde bulundurulmuştur. En yüksek değerler yumuşak zeminde görülse de diğer azalım ilişkilerine göre oldukça düşük pik ivme değerleri ile karşılaşmıştır. Ancak fayın ilçe merkezine mesafesi ve üretebileceği maksimum moment büyüklüğü beraber göz önünde bulundurulduğunda, bu çalışma açısından en tutarlı sonucu Ulusay ve arkadaşlarının (2004) önerdiği azalım ilişkisinin verdiği anlaşılmaktadır. Elde edilen pik yer ivmesi değerleri ArcGis adlı bilgisayar uygulaması üzerinden haritalanarak ilçenin zemin karakterinden bağımsız deprem tehlikesi analiz edilmiştir (Şekil 4 ve Şekil 5).



Şekil 4. Gülkan ve Kalkan (2002)'in azalım ilişkisine göre Biga ilçe merkezinde pik yer ivmesi haritası



Şekil 5. Boore ve arkadaşlarının (1997) azalım ilişkisine göre Biga ilçe merkezinde pik yer ivmesi haritası

4. Sonuçlar

Biga ilçe merkezi orijinli (40.1331 kuzey enlemi, 27.1437 doğu boylamı) ve 100 km yarıçaplı dairesel bir alan oluşturulmuş, sınırlar içerisinde kalan alanda 1900-2022 yılları arasında gerçekleşen depremler dikkate alınarak ilçenin deprenselliği belirlenmiştir. Olasılıksal sismik tehlike analizi sonucunda gerçekleşmesi beklenen depremlerin 1, 10, 30, 50 ve 100 yıl içinde gerçekleşme olasılıkları belirlenmiş ve bu depremlerin ivmeleri hesap edilerek yerleşim alanlarındaki risk haritalanmıştır. Yalnızca ortalama kayma dalgası hızı göz önünde bulundurularak yapılan zemin değerlendirmesine göre Hamdibey Mahallesi'nin oldukça güvenli olduğu görülmektedir. Şirintepe ve Yeniceköy mahalleleri arasında hızın düştüğü dikkat çekmektedir. En düşük kayma dalgası hızı ise Sakarya Mahallesi'nde sağlanmaktadır. Sonuç olarak, ilçenin sismik aktiviteye maruz kaldığı, bu nedenle zemin açısından dikkat edilmesi gerektiği görülmüştür.

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ÖNGERİLMELİ BETONARME KİRİŞLERİN DARBE YÜKÜ ETKİSİ ALTINDAKİ DAVRANIŞININ SAYISAL ANALİZİ

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Özet

Bu çalışma, öngerilmeli betonarme kirişlerin, darbe yükü etkisi altındaki davranışlarının ve tepkilerinin LS-DYNA kullanarak sayısal analizinin gerçekleştirilmesini konu alır. Yapıların ve köprülerin güvenliği, darbe yüklerine karşı dayanıklılıklarına bağlıdır. Özellikle, öngerilmeli betonarme kirişler, modern inşaat projelerinde yaygın olarak kullanılmaktadır ve bu kirişlerin darbe yüklerine karşı performansı, yapısal güvenlik açısından hayati öneme sahiptir. Çalışma, LS-DYNA'nın geniş yeteneklerini ve esnekliğini kullanarak, öngerilmeli betonarme kirişlerin darbe yükleri altındaki tepkilerini modellemeyi ve analiz etmeyi amaçlar. Kirişlerin geometrisi, malzeme özellikleri ve öngerilme durumu, modelin doğruluğu ve güvenilirliği için kritik parametrelerdir. Darbe yükleri, farklı enerji seviyelerinde ve açılarda uygulanarak, kirişlerin tepkileri detaylı bir şekilde incelenmiştir. Bulgular, kirişlerin darbe yükleri altında gösterdiği deformasyon, gerilme ve hasar davranışlarını ayrıntılı olarak ortaya koymaktadır. LS-DYNA, çeşitli darbe senaryolarını ve hasar modellerini hızlı ve etkili bir şekilde analiz etme yeteneği ile dikkat çekmektedir. Bu, mühendislerin ve araştırmacıların, öngerilmeli betonarme kirişlerin darbe yükleri altındaki performansını daha iyi anlamalarına ve bu bilgiyi, daha güvenli ve dayanıklı yapılar tasarlamak için kullanmalarına olanak tanır. Sonuç olarak, bu çalışma, öngerilmeli betonarme kirişlerin darbe yükü etkilerini LS-DYNA ile sayısal olarak analiz eden kapsamlı bir çalışmayı sunar. Elde edilen bulgular, darbe yüklerine karşı yapısal elemanların tepkilerini daha iyi anlamak, modellemek ve tahmin etmek için önemli bilgiler sağlar. Elde edilen sonuçlar, öngerilmeli betonarme kirişlerin darbe yükleri altındaki davranışını ve tepkilerini daha derinlemesine anlamamıza katkı sağlamayı amaçlamaktadır.

Anahtar Kelimeler: Öngerilme, Betonarme Kiriş, Darbe Yükü, Sayısal Analiz, LS-DYNA



TREATMENT OF DOMESTIC WASTEWATER USING ANAEROBIC BAFFLED DYNAMIC MEMBRANE BIOREACTOR (AnBDMBR)

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Abstract

In recent years, interest in the recovery and reuse of domestic wastewater has increased due to the decrease in water resources and the need for recovery applications. Many different aerobic and anaerobic process configurations and technologies have been used in the literature for the treatment of domestic wastewater and membrane technology has been widely applied in the recovery phase. In this study, a new system configuration defined as anaerobic baffled dynamic membrane bioreactor (AnBDMBR) was developed by combining dynamic membrane (DM) technology and anaerobic baffled reactor (ABR) processes. The new system utilizes the proven advantages of the anaerobic baffled reactor compared to other anaerobic reactors and has the advantage of dynamic membrane layer formation.

Within the scope of the study, a five-compartment Anaerobic Baffled Dynamic Membrane Bioreactor (AnBDMBR) with an active volume of 8.6 L and a submerged steel sieve with a pore size of 25 µm was used as support material for the formation of a dynamic membrane layer in the last compartment. The reactor was inoculated with sludge from anaerobic digester and its performance for the treatment of synthetic domestic wastewater was investigated. A hydraulic retention time (HRT) of 24 hours was used throughout the operation period and the reactor performance was studied for COD (chemical oxygen demand) and suspended solids (TSS) parameters. In addition, membrane filtration performance was investigated using flux and transmembrane pressure (TMP) parameters for the dynamic membrane layer.

In this study, an integrated process that brings a new approach to wastewater recovery processes was aimed and the deficiencies and disadvantages of the anaerobic treatment processes applied in the literature were tried to be eliminated. An inexpensive and easy-to-operate process that prevents membrane clogging while providing high



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quality effluent is developed with this reactor type in which anaerobic baffled reactor and dynamic membrane system are integrated.

Keywords: Dynamic membrane, Anaerobic baffled reactor (ABR), Anaerobic domestic wastewater treatment, Anaerobic baffled dynamic membrane bioreactor (AnBDMBR)

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ANAEROBİK PERDELİ DİNAMİK MEMBRAN BİYOREAKTÖR (AnBDMBR) KULLANILARAK EVSEL ATIKSULARIN ARITILMASI

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Özet

Son yıllarda su kaynaklarının azalması ve geri kazanım uygulamalarına duyulan ihtiyaç sebebiyle evsel atıksuların geri kazanımına ve yeniden kullanımına olan ilgi artmıştır. Evsel atıksuların arıtılması maksadıyla literatürde aerobik ve anaerobik birçok farklı proses konfigürasyonu ve teknoloji kullanılmakta olup geri kazanılması aşamasında ise membran teknolojisi yaygın bir şekilde uygulanmaya başlanmıştır. **Bu** çalışmada, dinamik membran (DM) teknolojisi ve anaerobik perdeli reaktör (ABR) proseslerinin birleştirilmesi ile anaerobik perdeli dinamik membran biyoreaktör (AnBDMBR) olarak tanımlanan yeni bir sistem konfigürasyonu geliştirilmiştir. Yeni sistemle; anaerobik perdeli reaktörün diğer anaerobik reaktörlere kıyasla kanıtlanmış üstünlükleri kullanılmakta olup dinamik membran tabakası oluşumu ile de avantajlı bir durum oluşmaktadır.

Çalışma kapsamında 8,6 L aktif hacme sahip beş bölmeli Anaerobik Perdeli Dinamik Membran Biyoreaktör (AnBDMBR) ile son bölmesinde, dinamik membran tabakası oluşumu maksadıyla, batık olarak yerleştirilmiş 25 µm gözenek boyutuna sahip çelik elek destek malzemesi olarak kullanılmıştır. Reaktör anaerobik çürütücünden alınan çamur ile aşılansmış ve sentetik evsel atıksuların arıtılması için performansı incelenmiştir. İşletme süresi boyunca 24 saatlik hidrolik bekletme süresi (HRT) kullanılmış olup reaktör performansı KOİ (kimyasal oksijen ihtiyacı) ve askıda katı madde (AKM) parametreleri için incelenmiştir. Ayrıca dinamik membran tabakası için akı ve transmembran basıncı (TMP) parametreleri kullanılarak membran filtrasyon performansı incelenmiştir.

Çalışmada atıksu geri kazanım proseslerine yeni bir yaklaşım getiren entegre bir proses amaçlanmış olup literatürde uygulanmakta olan anaerobik arıtma proseslerinin eksiklikleri ve dezavantajları giderilmeye çalışılmıştır. Anaerobik perdeli reaktör ile dinamik membran sisteminin entegre olarak geliştirildiği bu reaktör



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tipliyle yüksek kalitede çıkış suyu sağlanırken membran tıkanmasının da engellendiği ucuz ve işletilmesi kolay bir proses geliştirilmiştir.

Anahtar Kelimeler: Dinamik membran, Anaerobik perdeli reaktör (ABR), Anaerobik evsel atıksu arıtımı, Anaerobik perdeli dinamik membran biyoreaktör (AnBDMBR)

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GR6J HİDROLOJİK MODELİNDEKİ ARTIK YAĞIŞ AYRIŞTIRMA SABİTİNİN MODEL KALİBRASYONUNA ETKİSİ

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Özet

Bu çalışmamızın amacı havza modellemesinde sık kullanılan Génie Rural à 6 paramètres Journalier (GR6J) hidrolojik modelinin üretim ve öteleme katmanları arasındaki su geçişini etkileyen ancak modelde sabit 0.1 ve 0.9 olarak alınan artık yağış ayırıştırma sabitinin hidrolojik model performansına etkisini araştırmaktır. Bu amaçla modelin yapısına, bu sabiti serbest bırakacak bir parametre (X7) daha eklenmiştir. Çalışma alanı olarak Yukarı Fırat bölgesinden Karasu havzası seçilmiştir. Su dengesini eniyileyen parametre setinin tayininde (model kalibrasyonunda) hidrolojide yaygın kabul görmüş Shuffled Complex Evolutionary Algorithm University of Arizone (SCE-UA) algoritması kullanılmıştır. Testlerimiz literatürde de önerilen 1000 maksimum iterasyonlu ve NSE amaç fonksiyonu ile tasarlanmıştır. Aldığımız ilk sonuçlara göre 10 yıllık (1983-1992) kalibrasyon periyodunda 0.9 sabit ile yapılan en iyi NSE değeri 0.5563 gelirken, serbest bırakıldığında, $X7=0.9893$ değerini alırken buna karşılık NSE değeri biraz daha iyileşerek 0.5671 olmuştur. 10 yıllık (1994-2004) validasyon periyodunda ise 0.9 sabit ile elde edilen en iyi NSE değeri 0.3616 olurken, kalibrasyon sürecinde optimize edilmiş $X7=0.9893$ değeri ile elde edilen en iyi NSE değeri biraz daha iyileşerek 0.3682 olmuştur. Bu ilk sonuçlara göre model esnekliğini azaltıcı sabitlerden kaçınılması önerilmektedir. Böylece GR6J modelinin farklı havzalara uyumu 7 parametrelili GR7J versiyonu ile daha mümkün olacaktır. Çalışmamızın ileriki aşamalarında GR7J esnek model yapısı farklı iklim ve havza karakteristiklerine sahip başka havzalar üzerinde de test edilecek ve sonuçlar karşılaştırmalı olarak sunulacaktır.

Anahtar Kelimeler: airGR, GR6J, GR7J, hidrolojik model, kalibrasyon



EFFECT OF RESIDUAL RAINFALL SEPARATION CONSTANT ON MODEL CALIBRATION IN THE GR6J HYDROLOGICAL MODEL

Abstract

The aim of this study is to investigate the effect of the residual precipitation separation constant, which affects the water passage between the production and translation layers of the Génie Rural à 6 paramètres Journalier (GR6J) hydrological model commonly used in watershed modeling, but which is taken as constant 0.1 and 0.9 in the model, on the hydrological model performance. For this purpose, another parameter (X_7) was added to the model structure to release this constant. Karasu basin from the Yukarı Fırat region was selected as the study area. The Shuffled Complex Evolutionary Algorithm University of Arizona (SCE-UA) algorithm, which is widely accepted in hydrology, was used to determine the parameter set that optimizes the water balance (model calibration). Our tests were run with 1000 maximum iterations and NSE objective function as suggested in the literature. According to our preliminary results, in the 10-year (1983-1992) calibration period, the best NSE value with a constant of 0.9 was 0.5563, while when it was released, $X_7 = 0.9893$, while the NSE value improved slightly to 0.5671. In the 10-year (1994-2004) validation period, the best NSE value with a constant of 0.9 was 0.3616, while the best NSE value with the optimized value of $X_7 = 0.9893$ in the calibration process was slightly improved to 0.3682. According to these preliminary results, it is recommended to avoid constants that reduce model flexibility. Thus, the adaptation of the GR6J model to different basins will be more possible with the 7-parameter GR7J version. In the future stages of our study, the GR7J flexible model structure will be tested on other basins with different climate and basin characteristics and the results will be presented comparatively.

Keywords: airGR, GR6J, GR7J, hydrological model, calibration

GİRİŞ

Hidrolojik modelleme, su sistemlerinin karmaşık dinamiklerinin anlaşılması ve yönetilmesinde ön planda yer almakta ve etkili su kaynakları yönetiminde çok önemli bir rol oynamaktadır. Bu disiplin, belirli bir coğrafi alandaki suyla ilgili süreçlerin davranışını simüle etmek ve tahmin etmek için model olarak bilinen matematiksel temsillerin geliştirilmesini ve kullanılmasını kapsar. Yağış, buharlaşma, yüzey akışı ve yeraltı suyu akışı gibi çeşitli hidrolojik bileşenleri özümseyen bu modeller, bir su havzasındaki suyun hareketini ve dağılımını yöneten karmaşık etkileşimler hakkında değerli bilgiler sunar.

Su kaynakları yönetiminde hidrolojik modellemenin önemi yadsınmaz. Küresel nüfus arttıkça ve iklim modelleri değiştiğinde, sürdürülebilir ve verimli su kaynağı kullanımına olan talep de artmaktadır. Hidrolojik modeller, su mevcudiyetini değerlendirmek, akışı tahmin etmek ve insan faaliyetlerinin ve çevresel değişikliklerin su sistemleri üzerindeki etkisini değerlendirmek için vazgeçilmez araçlar olarak hizmet vermektedir. Bu modeller sayesinde karar vericiler, su tahsisini optimize etmek, sel veya kuraklık risklerini azaltmak ve su kaynaklarının uzun vadeli dayanıklılığını sağlamak için bilinçli stratejiler formüle etme becerisi kazanmaktadır.

Çalışmalarımızda kullanılan GR modeli, karmaşık havza süreçlerini simüle etmesiyle tanınan kavramsal bir yağış-akış modelidir. Temel bileşenler arasında yağış-akış dönüşümü için algoritmalar, bir kar erimesi modülü, yönlendirme süreçleri ve dinamik toprak nemi temsili bulunmaktadır. Bu unsurlar, modelin yağışın akışa nasıl dönüştüğünü doğru bir şekilde tasvir etme kapasitesine toplu olarak katkıda bulunur. Bileşenlerini anlamak, modelin su yönetimi için bilinçli karar verme potansiyelinden yararlanmak için çok önemlidir.

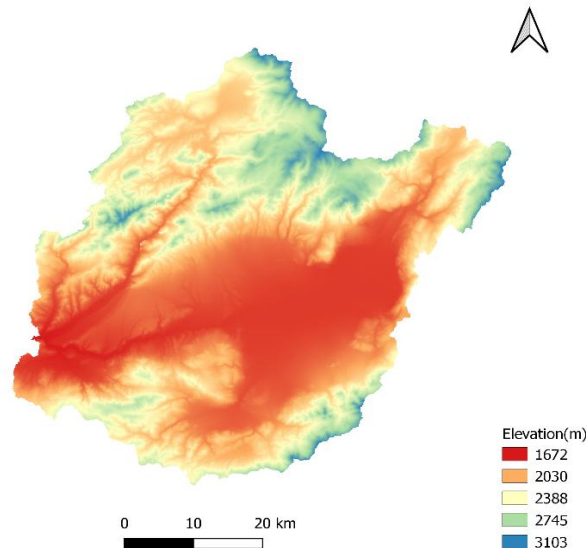
Bu bağlamda artık yağış ayrıştırma sabiti ($X7$), etkili yağışın yüzey akışına ve infiltrasyona bölünmesini doğrudan etkilediği için çok önemli bir role sahiptir. Bu parametre GR modellerinde kilit bir bileşendir ve modelin yağışın akışa dönüşümünü yöneten karmaşık süreçleri simüle etme yeteneğini şekillendirir.

Bu çalışmanın temel amacı, özellikle (Edijatno et al., 1999) tarafından öngörüldüğü üzere, hidrolojik modellemede artık yağış ayrıştırma katsayısının ($X7$) sabitliğine ilişkin geleneksel varsayımı eleştirel bir şekilde incelemektir. Tarihsel olarak $X7$ sabit bir parametre olarak kabul edilmiş, özellikle Fransa'daki çeşitli havzalarda yapılan çalışmalar üzerine 0,9 olarak kabul görmektedir. Ancak araştırmamız, bu sabit değer in orijinal çalışmanın kapsamı dışındaki çeşitli havzalar için evrensel olarak geçerli olmayabileceğini öne sürerek bu geleneksel bakış açısını sorgulamak üzerinedir. Temel amacımız, artık yağış ayrıştırma katsayısını ($X7$) serbest bırakmanın sonuçlarını titizlikle araştırmak ve bu parametredeki değişikliklerin hidrolojik modellerin performansını nasıl etkileyebileceğini anlamaktır. Bu araştırma boşluğunu ele alarak, hidrolojik modellerin, özellikle de GR6J modelinin farklı coğrafi bağlamlarda uyarlanabilirliği ve genelleştirilebilirliği konusunda değerli içgörüler

sunmayı amaçlıyoruz. Bu araştırma, hidrolojik simülasyonların doğruluğunu iyileştirme ve çeşitli havza alanlarındaki yağış-akış süreçlerini yöneten çeşitli dinamikler hakkındaki anlayışımızı geliştirme potansiyeline sahiptir.

1. ÇALIŞMA ALANI

Çalışma alanı olarak kullanılan Yukarı Fırat Bölgesinden Karasu Havzası, yaklaşık 2886 km²'lik bir yüzölçümüne ve 1675 m rakıma sahiptir (Yılmaz & Onoz, 2020). Seçilen çalışma alanı olan Yukarı Karasu Havzası, Fırat Nehri'nin kaynağına karşılık gelmektedir. Kargapazar Dağları'nın kuzeybatı yamaçları ile Dumlu Dağları'nın güney yamaçlarından toplanan suların birleşmesiyle oluşan Karasu Nehri, Fırat Nehri'nin kollarından biridir. Erzurum Ovası'nın tabanında doğudan batıya doğru akan nehir, kaynakları Ilıca yakınlarındaki Palandöken'de bulunan Daphan Nehri ve Aşkale'nin doğusundaki Serçeme Deresi tarafından beslenir. Batıya doğru devam eden nehir, Tercan havzasında hem sağ hem de sol kıyılardan gelen akarsuları aldıktan sonra Sansa Boğazı yoluyla çalışma alanından çıkar. Erzurum ve çevresindeki yüksek rakımlarda yağışın belirgin özelliği kar yağışının baskın olmasıdır. Önemli bir kısmı kar olarak düşen yağış biçimindeki bu farklılık, yağışın birincil yağış biçimi olduğu alanlara kıyasla nehirlerin beslenme ve rejimlerindeki farklılıklara katkıda bulunmaktadır (Karadogan & Gunek, 2000). Yukarı Karasu Havzası'ndaki bu coğrafi çeşitlilik, farklı iklimsel özellikleriyle birleştiğinde, nehirlerinin benzersiz hidrolojik davranışına katkıda bulunur. Bu çalışmadaki araştırma, bu coğrafi ve hidrolojik özelliklerin inceliklerini ortaya çıkarmaya ve artık yağış ayrıştırma katsayısının sabit olarak test edildiği havzalardan farklılaşmaya, bu özel bağlamda ayrıştırma katsayısını (X7) değiştirmenin potansiyel etkisini vurgulamaya odaklanmaktadır.



Şekil 1. Yukarı Fırat Bölgesi, Karasu Havzası

Veri

Çalışmada kullanılan veriler, Yukarı Karasu Havzası üzerinde yağış ve sıcaklık gibi yüksek çözünürlüklü meteorolojik değişkenler sağlayan ERA5 reanaliz veri setlerinden elde edilmiştir. Ek olarak, Türkiye'deki E21A054 numaralı akım gözlem istasyonundan alınan akım gözlemleri kullanılmıştır. ERA5 ve E21A054 veri setlerinin entegre edilmesi, hassas hidrolojik modellemeye olanak tanıyarak doğru simülasyonları ve çalışma alanındaki su dinamiklerine ilişkin bilinçli içgörülerini kolaylaştırmaktadır.

2. MODEL YAPISI

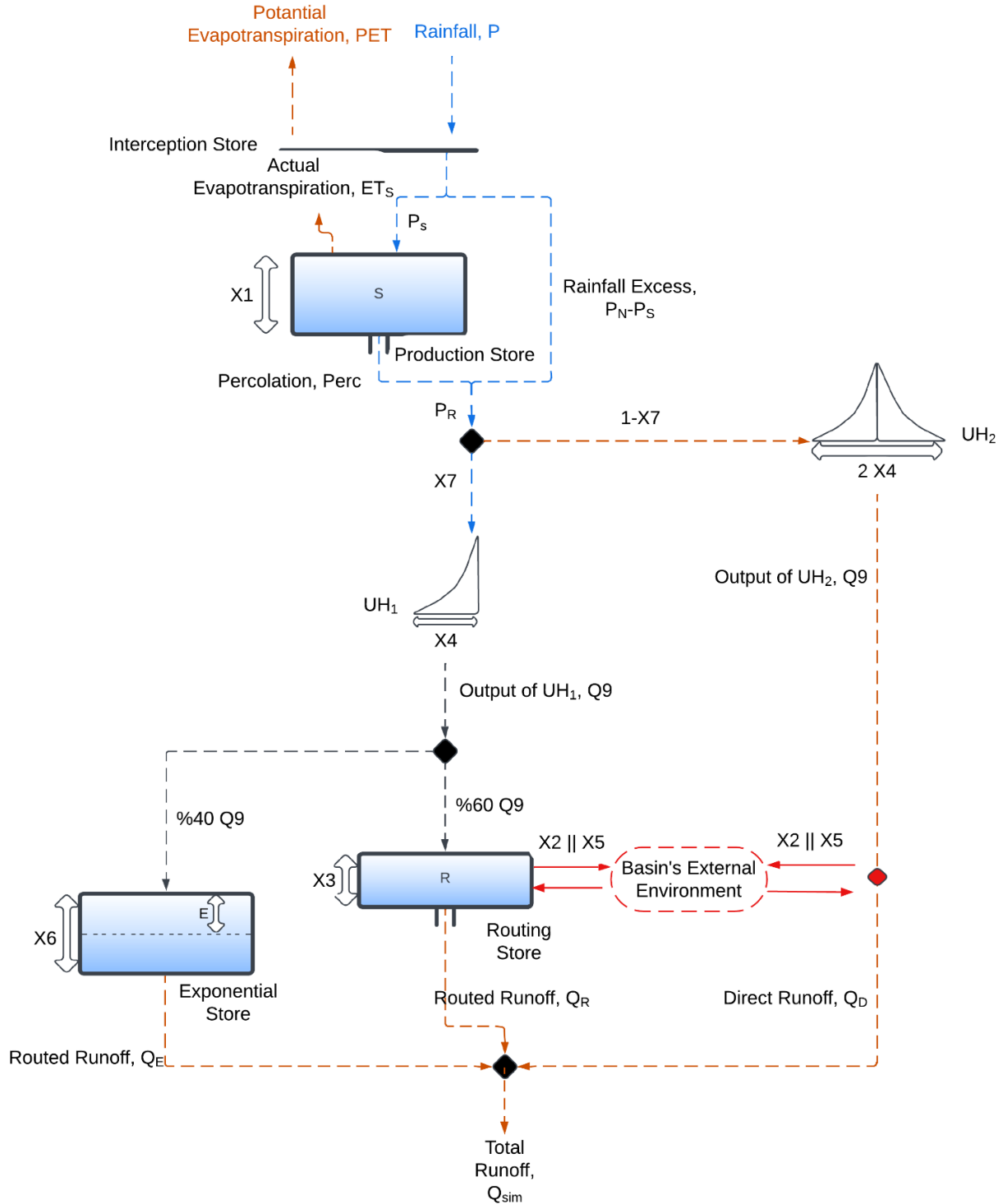
Bu çalışmada kullanılan hidrolojik model olan Genie Rural 6-parameter Journalier (GR6J), havza ölçeğinde günlük yağış-akış rutinini simüle etmek için yağış (P) ve potansiyel evapotranspirasyon (PET) gibi iki girdi değişkenini dikkate alan GR4J modelinin değiştirilmiş bir versiyonudur. GR4J, GR3J modeline dayalı olarak tanımlanan dört parametrelili bir depolama tipi konsept modeldir (Perrin, 2002). INRAE-Antony (HYCAR Araştırma Birimi, Fransa) tarafından geliştirilen GR6J'nin parçalı yapısı, mekansal değişkenliğin temsilini basitleştirerek onu hem çok yönlü hem de çeşitli hidrolojik bağlamlarda yaygın olarak uygulanabilir hale getirmektedir. Modelin temelinde, arazi örtüsü, toprak özellikleri ve topografyayı dikkate alarak yağışı akışa dönüştürme kabiliyeti yatmaktadır. Bu, GR6J'nin havzanın hidrolojik tepkisinin kapsamlı bir temsilini sunmasını sağlar.

GR6J'nin ayırt edici bir özelliği, mevsimsel kar birikimi yaşayan bölgeler için çok önemli olan kar erime modülüne (CemaNeigre) sahip olmasıdır. Bu modül, kar erimesinden kaynaklanan kademeli su salınımını ustalıkla yakalayarak modelin çeşitli iklim koşullarına uygunluğunu sağlar. Modeldeki yönlendirme süreçleri, suyun nehir ağı boyunca hareketini simüle ederek yüzey akışının mekansal dağılımına ilişkin bilgiler sağlar. Ayrıca GR6J, yağışın yüzey akışına ve sızmaya bölünmesi üzerindeki öncül koşulların etkisini kabul ederek toprak nem dinamiklerini hesaba katar. Modelin yapısı **Şekil 2**'de gösterilmiştir.

Modelin parçalı yapısı, simülasyonlarını gözlemlenen hidrolojik verilerle uyumlu hale getirmek için parametrelendirme ve kalibrasyon gerektirmektedir. Etkili yağışın bölünmesini belirleyen bölme katsayısı (X7) dahil olmak üzere temel parametreler, kalibrasyon araçlarıyla kalibre edilerek en iyi NSE değerini veren parametreler bulunur. Bu kalibrasyon, modelin doğruluğunu artırır ve çalışma alanının belirli özelliklerine uyarlanabilirliğini sağlar.

(Klemeš, 1986) tarafından önerilen bölünmüş örneklem test şeması model performansını değerlendirmek için kullanılmıştır. Her bir havza için yağış (P), potansiyel buharlaşma (PE) ve akış verilerinin mevcut olduğu

dönem benzer uzunlukta iki yarıya (P1 ve P2) bölünmüştür ve bir yarısı kalibrasyon için kullanılırken diğer yarısı validasyon için kullanılmıştır.



Şekil 2. GR7J Model Yapısı

Kar Modülü

Karasu Nehri havzası yılın neredeyse yarısı boyunca geniş kar alanlarıyla kaplıdır; bu nedenle, kar erimesinin akışa dönüşmesi hidrolojik mekanizması toplam yıllık akış için önemlidir. Hidrolojik çalışmalarda, kar erimesini simüle etmek için Enerji dengesi yöntemi veya derece-gün faktörü yöntemi kullanılmıştır. Enerji dengesi denklemi önemli bir parametre bilgisi gerektirdiğinden, kar erime akışını simüle etmek için genellikle derece-gün faktörü yöntemi benimsenmektedir. Bu çalışmada Hymod, HBV ve GRJ6 modelleri için geliştirilen derece-gün faktörü yöntemi kullanılmıştır. Derece gün yönteminin temel denklemi şöyledir:

$$S_m = DD(T - T_0)$$

Burada, S_m günlük kar erimesini, DD derece-gün faktörünü, T ortalama günlük sıcaklığı ve T_0 erimenin gerçekleşmesi için kritik sıcaklığı ($^{\circ}\text{C}$) temsil etmektedir.

Kalibrasyon

Hidrolojik modellerin kalibrasyonu, gerçek dünya koşullarının simülasyonunda doğruluk ve güvenilirliklerinin sağlanmasında kritik bir aşamadır. Bu çalışmada, hidrolojik modelin performansını artırmak için güvenilir bir kalibrasyon aracı olan PEST aracı kullanılmıştır. PEST, simüle edilen çıktılar ile gözlemlenen hidrolojik veriler arasında mümkün olan en yakın eşleşmeyi elde etmek için model parametrelerini verimli bir şekilde ayarlamak üzere tasarlanmış, yaygın olarak tanınan bir optimizasyon aracıdır.

PEST'i diğerlerinden ayıran şey, kalibrasyon sürecine sofistike yaklaşımdır. Bir ters modelleme aracı olarak çalışır ve model tahminleri ile gerçek ölçümler arasındaki farkları en aza indirmek için parametre değerlerini yinelemeli olarak iyileştirir. PEST, Gauss-Marquardt-Levenberg yöntemi de dahil olmak üzere çeşitli optimizasyon tekniklerini kullanarak model parametrelendirmesi için esnek ve uyarlanabilir bir platform sağlar.

PEST'in gücü, hidrolojik modellerin doğasında bulunan karmaşık, yüksek boyutlu parametre uzaylarını ele alma yeteneğinde yatmaktadır. Optimum parametre setlerini belirlemek için geniş çözüm uzayında verimli bir şekilde gezinerek modelin çalışma alanının hidrolojik davranışının nüanslarını doğru bir şekilde yakalamasını sağlar. Ayrıca PEST, kalibrasyon sürecinin Ortalama Hatanın Karekökünü (RMSE) en aza indirme veya Nash-Sutcliffe Verimliliğini (NSE) en üst düzeye çıkarma gibi belirli performans ölçütlerine göre uyarlanmasına olanak tanıyan çeşitli amaç işlevlerinin dahil edilmesini sağlar.

Bu çalışma bağlamında PEST, artık yağış ayrıştırma katsayısı (X7) de dahil olmak üzere hidrolojik modelin parametrelerine ince ayar yapmak için kullanılmıştır. PEST tarafından kolaylaştırılan iteratif optimizasyon

süreci sayesinde model, Karasu Havzası'nın kendine has özelliklerine göre kalibre edilerek havzanın hidrolojik tepkilerinin daha hassas bir şekilde temsil edilmesi sağlanmıştır.

Pest içinde kalibrasyon algoritması olarak ise, Karıştırılmış Karmaşık Evrimsel Algoritma olarak adlandırılan (SCE-UA) algoritması kullanılmıştır. Arizona Üniversitesi'nde geliştirilen SCE-UA, model parametrelerine ince ayar yapmak ve hidrolojik süreçlerin simülasyonunda modelin performansını artırmak için tasarlanmış güçlü bir optimizasyon algoritmasıdır.

SCE-UA, doğal seçim mekanizmalarından esinlenen evrimsel algoritma prensiplerine göre çalışır. Potansiyel çözümlerin (parametre setleri) evrimleştiği ve optimal bir konfigürasyona ulaşmak için yinelemeli olarak adapte olduğu popülasyon tabanlı bir yaklaşım kullanır. SCE-UA'yı diğerlerinden ayıran şey, popülasyonun alt kümeleri olan kompleksleri karıştırmaya yönelik benzersiz mekanizmasıdır. Bu karıştırma, keşif-kullanma dengesini geliştirerek algoritmanın en uygun konfigürasyon için parametre uzayını verimli bir şekilde aramasına olanak tanır.

Kalibrasyon süreci, SCE-UA'nın simüle edilmiş model çıktılarına gözlemlenen hidrolojik verilerle karşılaştırarak farklı parametre setlerini yinelemeli olarak değerlendirmesini içerir. Algoritma daha sonra bu parametre setlerini birbirini takip eden simülasyonlar boyunca iyileştirir ve kademeli olarak optimum değerlere yakınsar. Bu iteratif evrim, karıştırma mekanizmasıyla birlikte SCE-UA'nın karmaşık ve çok boyutlu parametre uzaylarında etkili bir şekilde gezinmesini sağlar.

SCE-UA algoritmasının, yağış-akış modellerinin kalibrasyonu da dahil olmak üzere hidrolojik modelleme uygulamalarında özellikle etkili olduğu kanıtlanmıştır. Çok yönlülüğü, uyarlanabilirliği ve karmaşık optimizasyon ortamlarını ele alma yeteneği, onu hidrolojik modellerinin doğruluğunu ve güvenilirliğini artırmak isteyen araştırmacılar ve hidrologlar için değerli bir araç haline getirmektedir.

3. METODOLOJİ

(Klemeš, 1986) tarafından önerilen bölünmüş örneklem test şeması model performansını değerlendirmek için kullanılmıştır. Her bir havza için yağış (P), potansiyel buharlaşma (PE) ve akış verilerinin mevcut olduğu dönem benzer uzunlukta olmak üzere (1983-1992) - (1994-2004) periyotlarında iki yarıya (P1 ve P2) bölünmüştür. 1983-1992 kalibrasyon periyodu olarak kullanılırken 1992-2004 periyodu ise validasyon periyodu olarak kullanılmıştır.

Kalibrasyon sürecinde model 3 farklı durum için ayrıca kalibre edilmiştir. Öncelikle artık yağış ayrıştırma katsayısının sabit olarak kabul edildiği GR6J modelinin 6 parametresi kalibre edilmiştir. Daha sonra kalibre edilen bu 6 parametre sabit tutularak yalnızca X7 parametresi serbest bırakılmıştır. Son olarak tüm parametreler

serbest olacak şekilde GR7J modeli kalibre edilmiştir. Bu bağlamda PEST kalibrasyon aracı ve SCE-UA optimizasyon algoritması kullanılarak kalibre edilen 7 parametre aşağıdaki şekildedir:

X1 : Üretim deposu kapasitesi [mm],

X2: Havzalar arası değişim katsayısı [mm/d],

X3: Yönlendirme deposu kapasitesi [mm],

X4: birim hidrograf zaman sabiti [d],

X5: havzalar arası değişim eşiği [-],

X6: Üstel depoyu boşaltma katsayısı [mm],

X7: Artık yağış ayrıştırma katsayısı [-]

Amaç Fonksiyonu

Nash-Sutcliffe Verimliliği (NSE), hidrolojik modellemede yaygın olarak kullanılan bir ölçüttür ve model kalibrasyonu sırasında bir amaç fonksiyonu olarak hizmet eder (Nash & Sutcliffe, 1970). Bu verimlilik ölçütü, model tarafından üretilen simüle edilmiş değerleri gözlemlenen verilerle karşılaştırarak modelin performansının nicel bir değerlendirmesini sağlar. NSE, simüle edilen değerlerin temel bir ölçütle, tipik olarak ortalama gözlemlenen değerle karşılaştırıldığında göreceli doğruluğunu değerlendirerek hesaplanır. Formül şu şekilde ifade edilir:

$$NSE = 1 - \frac{\sum_{i=1}^n (Q_{obs,i} - Q_{sim,i})^2}{\sum_{i=1}^n (Q_{obs,i} - \overline{Q_{obs}})^2} = 1 - \frac{E}{E_0} \quad (1)$$

Bu denklemden n, zaman adımı sayısı, $Q_{obs,i}$ ve $Q_{sim,i}$ sırasıyla i zaman adımında gözlenen ve simüle edilen akışlardır.

$\overline{Q_{obs}}$ seçilen dönem boyunca gözlenen akışların ortalamasıdır. E ve E_0 sırasıyla ortalama karesel hata ve gözlenen akışların varyansdır. NSE endeksi $[-\infty; 1]$ aralığında değerler alır; 1 mükemmel simülasyonu, 0 ise ortalama gözlenen akışa eşit sabit bir akışa eşdeğer bir simülasyonu gösterir.

Hassasiyet Analizi

Hassasiyet analizi, model parametrelerinin hidrolojik modellerin genel performansı üzerindeki etkisinin anlaşılmasında çok önemli bir rol oynamaktadır. Bu çalışma kapsamında, hassasiyet analizi için Parametre Tahmini (PEST) aracı kullanılmış ve normalleştirilmiş duyarlılık temel bir ölçüt olarak kullanılmıştır.

Normalleştirilmiş hassasiyet, her bir model parametresinin amaç fonksiyonu, bu durumda Nash-Sutcliffe Verimliliği (NSE) üzerindeki göreceli etkisini ölçen bir ölçüdür. PEST, diğer parametreleri sabit tutarken münferit parametreleri sistematik olarak değiştirir ve amaç fonksiyonunda ortaya çıkan değişiklikleri gözlemler. Hassasiyet değerleri daha sonra, büyüklüklerine veya birimlerine bakılmaksızın parametrelerin etkisinin karşılaştırmalı bir değerlendirmesini sağlamak için normalleştirilir.

Süreç, parametre değerlerindeki artımlı değişikliklere ilişkin amaç fonksiyonundaki değişim oranını ifade eden her bir parametre için hassasiyet katsayılarının hesaplanmasını içerir. Normalleştirilmiş hassasiyet, modelin performansını önemli ölçüde etkileyen kritik parametrelerin belirlenmesine olanak tanır. Daha yüksek hassasiyet değerlerine sahip parametreler, model çıktısı üzerinde daha büyük bir etkiye işaret ederek kalibrasyon sürecindeki önemlerini vurgular.

Bu çalışma, PEST'te normalleştirilmiş hassasiyet ile hassasiyet analizi yaparak, model davranışının temel belirleyici parametreleri hakkında değerli bilgiler edinmektedir. Sonuçlar, Yukarı Karasu Havzası'ndaki hidrolojik süreçlerin simülasyonunda gelişmiş model doğruluğu ve güvenilirliği için en etkili parametrelere odaklanmaya rehberlik ederek kalibrasyon stratejisini güçlendirir. Bu bağlamda modele etkisinin araştırıldığı X7 parametresinin, diğer parametrelere kıyasla model çıktıları üzerinde ne kadar etkili olduğu da test edilir.

4. SONUÇLAR

Artık yağış ayırıştırma (X7) parametresinin serbest bırakılmasının etkisinin araştırılması kayda değer bulgular ortaya koymuştur. X7 model parametresinin serbest bırakılmasının etkisinin araştırılması kayda değer bulgular ortaya koymuştur. Kalibrasyon aşamasında Nash-Sutcliffe Verimliliği (NSE) değeri 0,5563'ten 0,5671'e hafif bir artış göstererek simüle edilen ve gözlemlenen debiler arasında daha iyi bir uyum olduğunu göstermiştir. Benzer şekilde, validasyon aşamasında NSE değeri 0.3616'dan 0.3682'ye çıkarak X7 parametresinin ayarlanmasının olumlu etkisini bu süreçte de göstermiştir. GR6J ve GR7J olarak çalıştırılan modellerin kalibre edilmiş parametreleri ve bu parametreler ile birlikte elde edilen NSE değerleri



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Tablo 1'de gösterilmiştir. İki model arasındaki farklılığın, yüksek akım değerlerinde ortaya çıktığı **Şekil 6**'da anlaşılmaktadır.

Tablo 1. Model Sonuçları

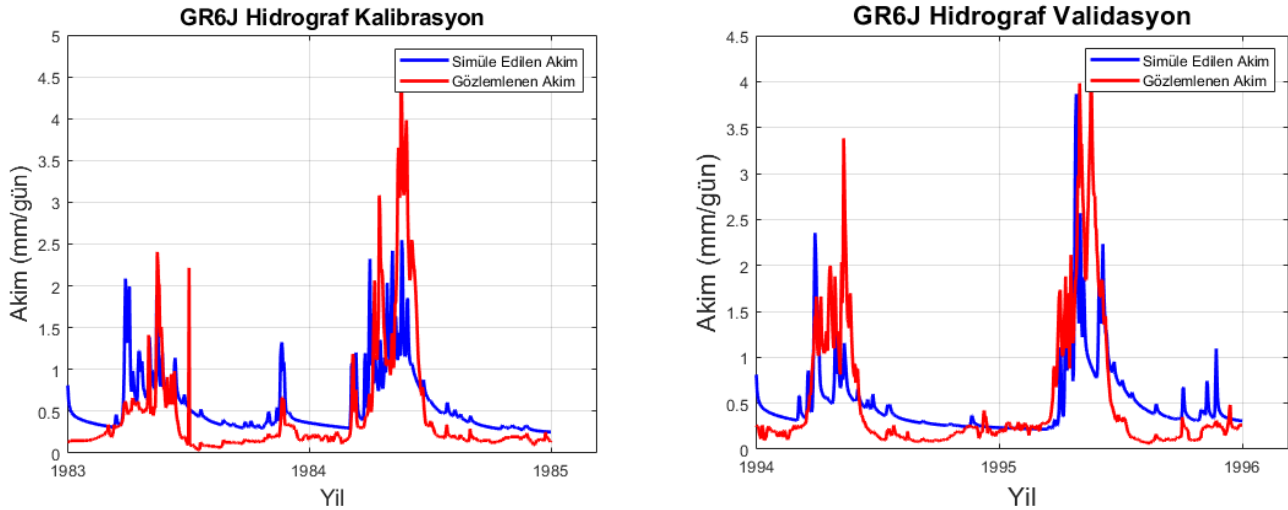
Model	X1	X2	X3	X4	X5	X6	X7	NSE	
								Kalibrasyon	Validasyon
GR6J	531.3044	-0.0962	292.8410	2.3114	0.9117	0.5591	0.9000	0.5563	0.3616
GR7J	526.0439	-0.0962	292.8412	2.3113	0.9117	0.5591	0.9893	0.5671	0.3682

Hidrolojik modelin performansı üzerindeki tekil etkileri hakkında önemli bilgiler sağlayan hassasiyet analizi yapılmış olup, her bir model parametresinin modele etkisini gösteren sonuçlar **Tablo 2'**de gösterilmiştir.

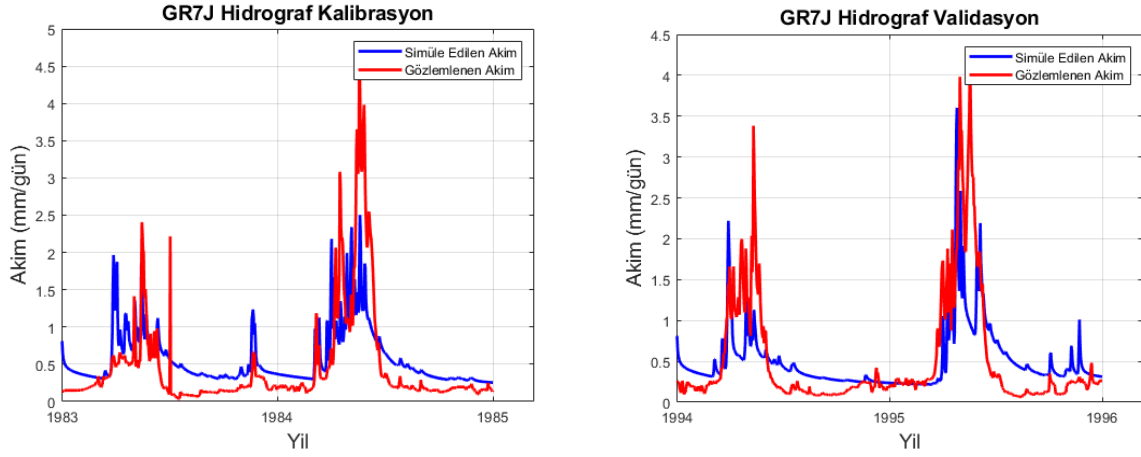
Tablo 2. Hassasiyet Analizi Sonuçları

Parametre	Değer	Hassasiyet	Kesin Değer	Normalleştirilmiş Hassasiyet
X1	632.36	0.000016	0.010	0.167
X2	3.90	0.003080	0.012	0.200
X3	220.35	0.000272	0.060	1.000
X4	1.41	0.000000	0.000	0.000
X5	-0.02	0.476190	0.010	0.167
X6	3.20	0.005310	0.017	0.283
X7	0.90	0.010000	0.009	0.150

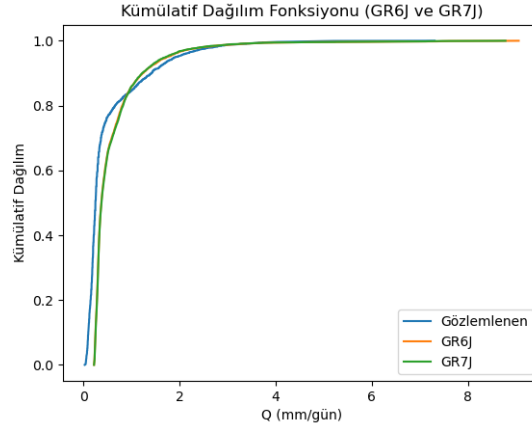
Model performansını görsel olarak değerlendirmek için kümülatif dağılım fonksiyonları, gözlenen ve simüle edilen akımları karşılaştıran dağılım grafikleri ve hidrograflar aşağıda gösterilmektedir.



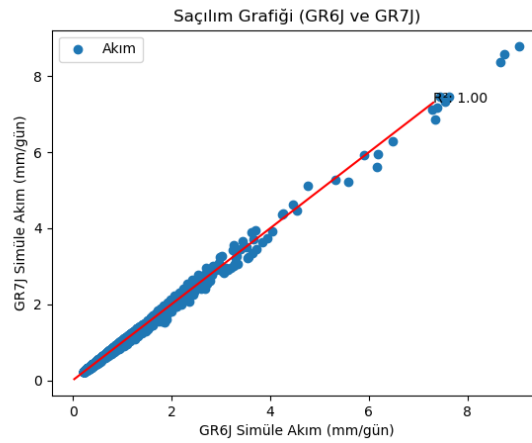
Şekil 3. GR6J, Hidrograf (Kalibrasyon ve Validasyon)



Şekil 4. GR7J, Hidrograf (Kalibrasyon ve Validasyon)



Şekil 5. GR6J ve GR7j, Kümülatif Dağılım Fonksiyonu (CDF)



Şekil 6. GR6J ve GR7J, Akım Saçılım Grafiği



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KARS VE ÇEVRESİNİN KÜLTÜREL MİRAS BAĞLAMINDA ÖNEMİ

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Özet

Kars Bölgesi ve civarı günümüzden salt 950 yıl önce Türklerin Anadolu'ya gelmeleriyle birlikte değil bu tarihlerin çok ötesinde Asya'dan Anadolu'ya, Anadolu'dan Asya'ya göç eden toplumların geçiş merkezi olmuştur. Bu anlamda başta Ani ve Kars olmak üzere bölge Anadolu ve Kafkasya arasında adeta bir kapı konumundadır. Bu özelliği sayesinde ki tarihin çok erken dönemlerinden geçtiğimiz yüzyıl başlarına kadar çok sayıda Kültür varlığı yoğun olarak karşımıza çıkmaktadır.

Başta Kağızman- Camuşlu ve Kars yakınlarındaki Borluk Vadisinde bulunan Kaya üstü resimleri Paleolitik dönem sonları ve izleyen Neolitik dönemden itibaren karşımıza çıkan en önemli kültürel varlıklarımız arasındadır.

Yine bölgede kazıları yapılmamış olsa da çok sayıda İlk Tunç Çağ'dan başlayan bir diğer deyişle dönemin baskın kültürü olan Erken Transkafkas/Karaz Kültürü temsilcisi höyükler bölge tarihi açısından önemlidir.

Orta Çağ'a gelindiğinde Ani Antik Kenti merkez olmak üzere Kars ve yakın çevresindeki Ermeni ve Gürcü Kiliseleri kültürel mirasımızın önemli kalıntıları arasındadır.

Osmanlı Dönemini temsil eden Kars Kalesi eteklerindeki Osmanlı dönemine ait evler ve hamamlar da kültürel miras açısından oldukça önemlidirler.

1877-78 Osmanlı Rus savaşlarıyla bağlantılı olarak inşa edilen Tabyalar ise özgün mimari ve ülkemizde çok az ilimizde bulunan (Çanakkale, Edirne ve Erzurum tabyaları) savunma yapılarına örnek teşkil eden kültürel varlıklarımızdır.

Son olarak Kars şehir merkezindeki çoğu harap durumda olsa da tescillenerek en azından koruma altına alınması gerektiği belgelenmiş olan ızgara tasarımlı kent planına uygulanan ve Baltık mimarisine özgü inşa edilen Eski Rus binaları Kars ve çevresinin kültürel mirasına ait önemli eserler olarak karşımıza çıkmaktadır.

Yukarıda kısaca özetlenen Kayaüstü resimleri, Höyükler, Ermeni/Gürcü kiliseleri, Osmanlı yapıları, Tabyalar ve Kars evleri Kars ve çevresinin olduğu kadar ülkemiz için de zengin kültür mirası örnekleridir.



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

Dolayısıyla taşınmaz kültür varlıkları arasında sayılan değerleri sorunlar ve çözüm önerileriyle birlikte araştırmak, incelemek ve belgelemek bu çalışmanın konusunu oluşturmaktadır.

Anahtar Kelimeler: Kars, Kültürel Miras, Kaya Resimleri, Baltık Mimarisi,

Abstarct

The Kars Region and its surroundings became the transit center of societies migrating from Asia to Anatolia and from Anatolia to Asia, not only with the arrival of the Turks to Anatolia 950 years ago, but also long beyond these dates. In this sense, the region, especially Ani and Kars, is a gateway between Anatolia and the Caucasus. Thanks to this feature, we encounter many cultural assets from the very early periods of history until the beginning of the last century.

The rock paintings found primarily in Kağızman- Camuşlu and the Borluk Valley near Kars are among our most important cultural assets that we have encountered since the end of the Paleolithic period and the following Neolithic period.

Again, although excavations have not been carried out in the region, many mounds representing the Early Transcaucasian/Karaz Culture, which started from the Early Bronze Age, in other words, the dominant culture of the period, are important for the history of the region.

In the Middle Ages, the Armenian and Georgian Churches in Kars and its immediate surroundings, including the ancient city of Ani, are among the important ruins of our cultural heritage.

Houses and baths from the Ottoman period on the outskirts of Kars Castle, which represent the Ottoman Period, are also very important in terms of cultural heritage.

The Bastions, built in connection with the 1877-78 Ottoman-Russian wars, are our cultural assets that serve as examples of original architecture and defensive structures that can be found in very few provinces of our country (Çanakkale, Edirne and Erzurum bastions).

Finally, the Old Russian buildings built in the Baltic architecture, applied to the grid-designed city plan, which is documented to need to be registered and at least protected, although most of them are in ruins in the city center of Kars, appear as important works of cultural heritage of Kars and its surroundings.

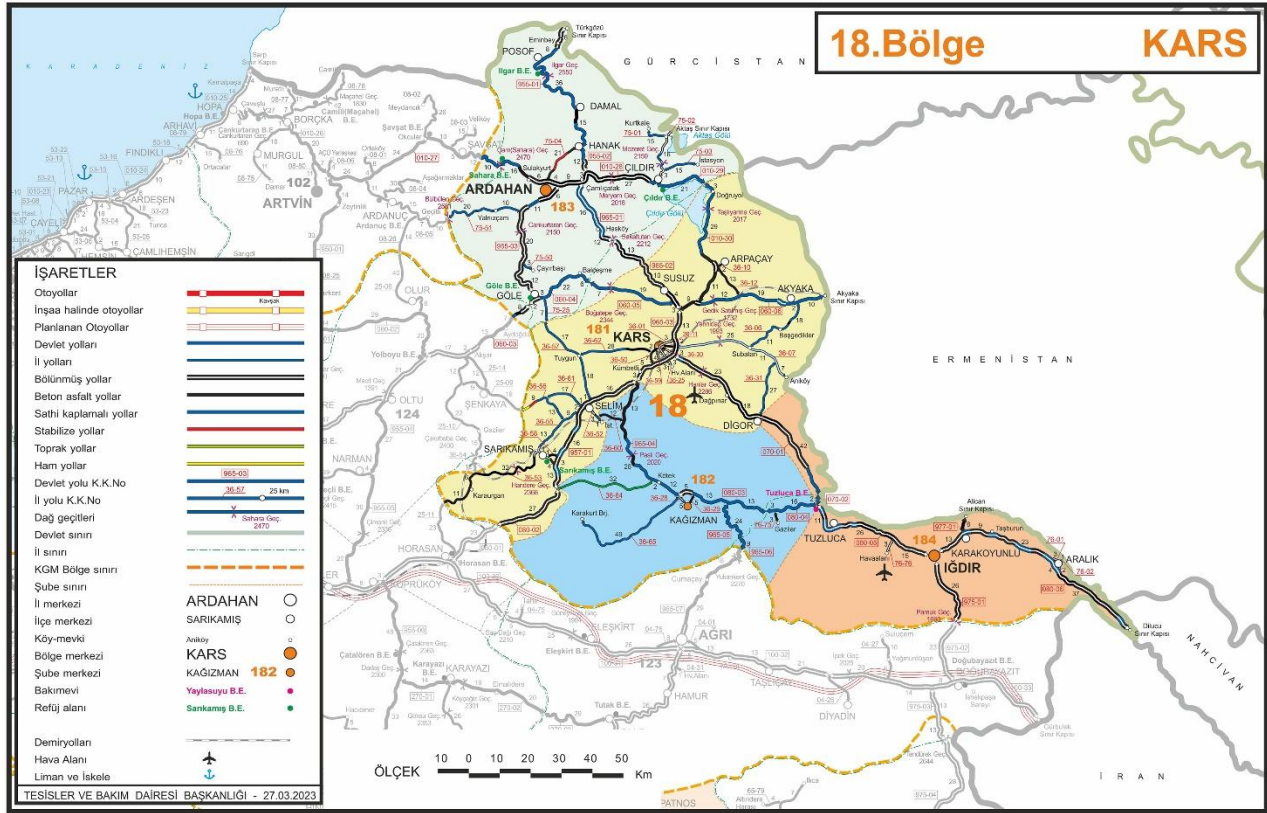
The Rock paintings, Mounds, Armenian/Georgian churches, Ottoman structures, Bastions and Kars houses, briefly summarized above, are examples of rich cultural heritage for our country as well as for Kars and its surroundings.

Therefore, the subject of this study is to research, examine and document the values counted among the immovable cultural assets, together with the problems and solution suggestions.

Keywords: Kars, Cultural Heritage, Rock Paintings, Baltic Architecture

Giriş

Kars İli'nin Tarihi Coğrafyası: Kars, Doğu Anadolu Bölgesinin kuzeyinde stratejik açıdan önemli bir konumdadır. Kars kenti ve çevresi Anadolu'nun doğusunda, Avrupa'dan Orta Asya'ya uzanan kilit bir noktada yer almaktadır. Bu konumuyla Kars, Orta Asya, Kafkaslar ve Anadolu'yla geçiş yolları güzergâhında bulunması nedeniyle önemli bir kavşak ve geçiş kapısı konumundadır. Nitekim tarihi Ani kentinden geçen tarihi İpek yolu da bunun önemli bir göstergesidir.



<https://www.kgm.gov.tr/SiteCollectionImages/KGMimages/Haritalar/b18.jpg> (erişim tarihi 01.02.2024)

Üst paleolitik dönemlere kadar uzanan bölge tarihi Urartu öncesi ilk kez Diauehi ülkesi sınırları içinde kalmaktadır. Kars bölgesiyle ilgili bir diğer adlandırma ise ünlü antik coğrafyacı Strabonda CORZENE olarak geçtiği ileri sürülse de Strabonda böyle bir bilgiye rastlanmaz (Korucu, 2005). Ayrıca, M.Ö. 130-127 yıllarında Kuzey Kafkasya'dan gelen Bulgar Türklerinin Velentur Boyu'nun Karsak Oymağı, Kars iline isim vermiş olduğu da ileri sürülen fikirler arasındadır (Korucu, 2005).

Yine M.S. 192 yılından itibaren Özellikle Bizans Döneminden itibaren Kars Kalesi ve çevresi Kars adıyla anılmaya başlanır.8. yüzyıl Ermeni Tarihçisi Levond, Karuç, Karutz adıyla söz ederken 10. yüzyılda Karutz Kalesi olarak karşımıza çıkar. İlerleyen dönemlerde Bizans İmparatoru Konstantinos Porphyrogenetos

M.S. 913-959 döneminde kentten Kars olarak söz eder (Korucu, 2005). 11-13. yüzyıllar arası Gürcistan tarihinin anlatıldığı kitap ve belgelerde de bölge artık Kars olarak adlandırılmaktadır.

Kars Bölgesi ve civarı günümüzden salt 950 yıl önce Türklerin Anadolu'ya gelmeleriyle birlikte değil bu tarihlerin çok ötesinde Asya'dan Anadolu'ya, Anadolu'dan Asya'ya göç eden toplumların geçiş merkezi olmuştur. Bu anlamda başta Ani ve Kars olmak üzere bölge Anadolu ve Kafkasya arasında adeta bir kapı konumundadır. Bu özelliği sayesinde ki tarihin çok erken dönemlerinden geçtiğimiz yüzyıl başlarına kadar çok sayıda Kültür varlığı yoğun olarak karşımıza çıkmaktadır. Bu kültür varlıkları ki aynı zamanda ülkemiz ve Kars açısından çok değerli kültür mirasımız anlamına gelmektedir.

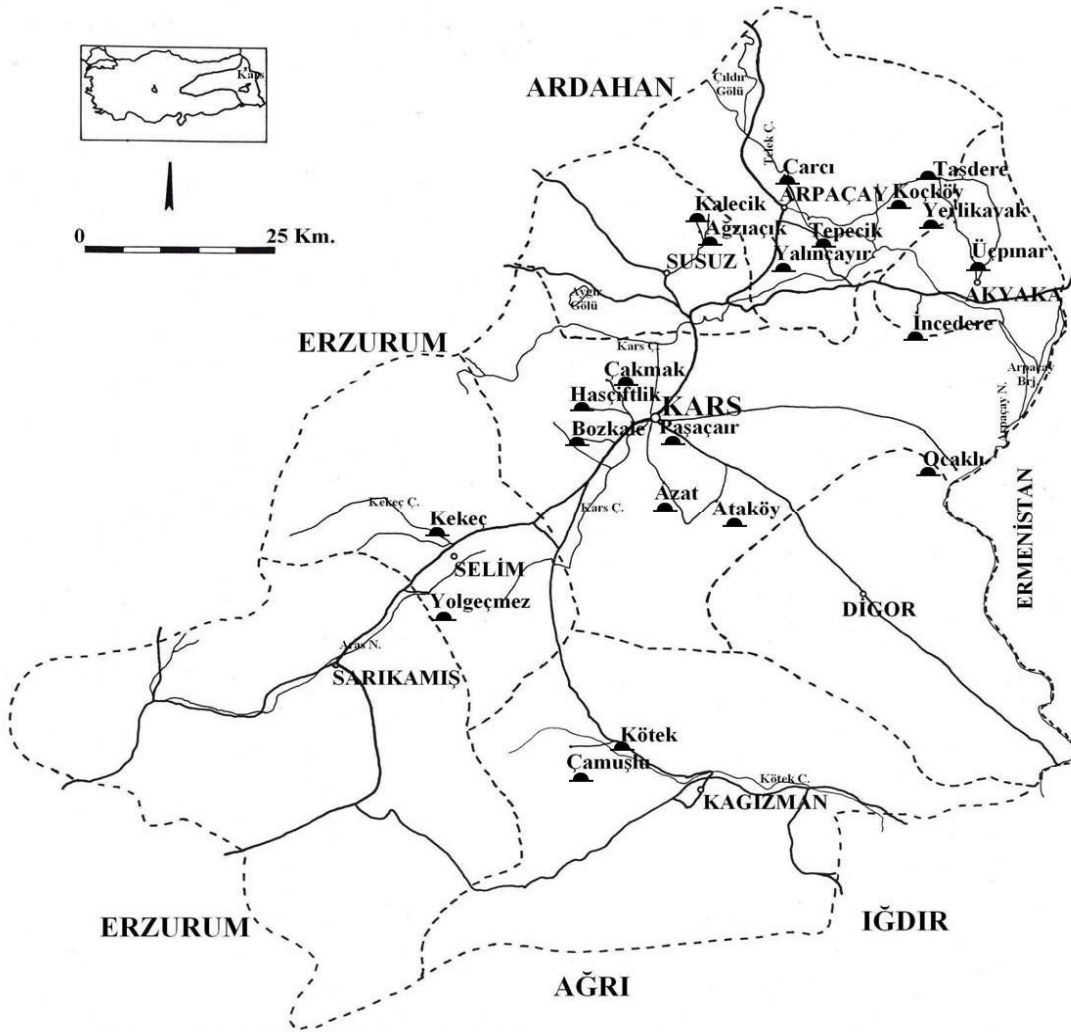
1. Kaya Üstü Resimleri- Kaya Panoları

Hakkâri, Van gibi (Tümer, 2017) ağırlıklı olarak Doğu Anadolu Bölgesinde rastlanan ve özellikle de Kars yöresine zenginlik katan kayaüstü resimleri, Kaya panoları kronolojik açıdan erken buluntular olması bakımından önemlidir.

Kağızman- Camuşlu (Ceylan, 2008) ve Kars yakınlarındaki Borluk Vadisinde (Yardımcıel, 2016) ve Susuz Doyumlu'da bulunan (Günaşdı, 2016) Kaya üstü resimleri Paleolitik dönem sonları ve izleyen Neolitik dönemden itibaren karşımıza çıkan en önemli kültürel varlıklarımız arasındadır. Özellikle dağlık ve kayalık bölümlerde ancak aynı zamanda insanoğlu için de yaşamını idame ettirmeye elverişli, korunaklı su kaynaklarına yakın konumda yer almaktadır. Kaya resimleri tarih öncesi çağlarda özellikle Üst Paleolitik dönem ve sonrasında bir diğer deyişle Avcılık ve toplayıcılık döneminde karşımıza çıkan Orta Asyada örneklerine fazla rastladığımız oradan Azerbeycan üzerinden dağlık Doğu Anadolu bölgemize uzanan çok geniş bir coğrafyada görülür. Söz konusu resimler üzerinde çoğunlukla av hayvanları konu edilmiş bunlar arasında geyik ve yaban domuzları oldukça yaygındır. Dönemin insanoğlu için vazgeçilmez yaşam kaynağı olan av hayvanlarını resmetmek avın bereketli olmasına da yöneliktir.

2. Höyükler

Bölgede kazıları yapılmamış olsa da çok sayıda İlk Tunç Çağdan başlayan bir diğer deyişle dönemin baskın kültürü olan Erken Transkafkas/Karaz Kültürü temsilcisi höyükler bölge tarihi açısından önemlidir.



Kars İli Höyükleri (Korucu, 2005).

Bunların en başında ise Kars Kent merkezine yaklaşık 5 km. mesafede bulunan Azat höyük gelmektedir. Azat höyük başta olmak üzere Kars ve ilçelerinde bulunan onlarca höyük Kuzey Doğu Anadolu Bölgesi tarihine ve kültürel mirasına ışık tutacak önemli yerleşimlerdir (Korucu, 2005).

3. Ani Ören Yeri

Ani antik kentinin ülkemiz için önemi ortadadır. Çünkü bugünkü kalıntılarıyla ülkemiz, bölgemiz ve Kars için ünik bir Orta Çağ Kenti durumundadır. Bu önemi sayesinde 15 Temmuz 2016 tarihinde UNESCO tarafından Dünya Kültür Mirası olarak tescillenmiştir. Dünya Kültür mirası olarak ilan edilmesi hem bölgemize hem de Kars'a büyük oranda katkı sağlayacaktır. Ani de Arkeolojik Kazılar 130 yıl öncesinden (Arslan, 2022), Rus Bilimadamı Nikolay Marr ile birlikte başlamış, zaman zaman ara verilmekle birlikte günümüze kadar devam etmiştir. 1964-67 Arası Kemal BALKAN, 1989-2005 arası Beyhan KARAMAĞARALI, daha sonra Yaşar ÇORUHLU ve 2011'den 2019'a kadar Fahriye BAYRAM tarafından gerçekleştirilmiştir. Günümüzde

ise, Kafkas Üniversitesi Sanat Tarihi Bölümünden Muhammet ARSLAN başkanlığındaki bir ekip tarafından büyük bir ivme kazanmış durumda devam etmektedir.



Resim. Ani Ören Yeri Hava Fotoğrafi

Ani Ören Yerinde kalıntıları izlenebilen Selçuklu Dönemine ait 1064 Tarihli Ebul Menucehr camii, Büyük ve Küçük Hamam, Kayalara oyulmuş kiliseler, Arpaçay Vadisini Birbirine bağlayan İpek Yolu Köprüsü Gagik Kilisesi, Selçuklu Sarayı, Fethiye Camisi olarak da bilinen Büyük Katedral, Genç Kızlar Kilisesi, Tigran Honest Kilisesi, Polatoğlu Kilisesi, Rahibeler Manastırı Selçuklu Dönemi Çarşı ve Konutları (Arslan, 2022) gibi çok sayıda yapı ve yapı kalıntılarıyla Kültürel mirasımıza ışık tutmaktadır.



Resim. Ani Ören Yeri çeşitli görünüm



Resim. Ani Ören Yeri çeşitli görünüm (Anadolu Ajansından).

Ani’de bulunanların yanı sıra Dığor, Kağızman ve diğer bölgelerindeki Kiliseler de Kültürel mirasımızın önemli birer temsilcileridir ve üzerlerinde gerekli ayrıntılı incelemelerin yapılp bilim dünyasına ve kültürel zenginliklerimiz arasına katılmalıdır.

4. Kars Kalesi ve Çevresindeki Osmanlı Yapıları

Kökeni Muhtemelen Urartu dönemine dek inen Kars kalesi ve eteklerinde bugün yok olma tehlikesiyle karşı karşıya bulunan aralarında Hamam, Köprü ve camilerin bulunduğu alan yine 19.yüzyıl Osmanlı mimarisini yansıtan konak ve konutlar Kars Kalesi ve yakın çevresinin disiplinler arası çalışmalarla ortaya çıkarılacak projelerle bir an önce ülkemiz ve Kars turizmine kazandırılmak zorundadır.



Resim. Kars Kalesi ve Osmanlı Dönemi mimari doku

Resim. Kale ve çevresi, Ö. Beşli den



Resim. Kale ve etrafının yeni çevre düzenlemesi (Ö. Beşli 'den)

5. Kars Merkezdeki Baltık Mimarisini Temsil Eden Kent Dokusu

Kars şehir merkezindeki çoğu harap durumda olsa da tescillenerek en azından koruma altına alınması gerektiği belgelenmiş olan ızgara tasarlı kent planına uygulanan ve Baltık mimarisine özgü inşa edilen Eski Rus binaları Kars ve çevresinin kültürel mirasına ait önemli eserler olarak karşımıza çıkmaktadır.



Resim. Fethiye Cami (Ö. Beşli 'den)



Resim. Fethiye Cami 1930 lu yıllar (Foto Çilem)



Resim. Baltık Mimarisi Örnekleri





Resim. Baltık Mimarisi Örnekleri (<https://kars.ktb.gov.tr/TR-54889/xixyy-baltik-mimari-ornekleri.html>)

6. Tabyalar

1877–78 Osmanlı Rus savaşlarıyla bağlantılı olarak inşa edilen Tabyalar ise özgün mimarisi ve ülkemizde Çanakkale, Edirne ve Erzurum gibi çok az ilimizde bulunan savunma yapılarına örnek teşkil eden kültürel varlıklarımızdır (Ülkü, 2007). Bunlardan Kent merkezinde bulunan Kanlı Tabya Harp Tarihi müzesine dönüştürülmüş, diğeri ise Peynir müzesi olarak restore edilip değerlendirilmiştir. Böylece her iki tabya Kars'ın kültürel mirasına önemli ölçüde değer katmaktadır. Kent çevresindeki hakim tepelerde bulunan yaklaşık 30 civarındaki tabya ise günümüzde harap durumdadır.

7. Sarıkamış Katerina Av Köşkü

Baltık mimarisi tarzında 19. yy. sonlarında inşa edilmiştir. Günümüzde harap ve atıl durumda bulunmaktadır. Tamamen tomruk tarzında ahşaptan inşa edilen köşk çivi kullanmadan imal edilmiş olmasıyla önemlidir. Bir an önce restore edilerek kamu adına kullanıma sunulması kültürel mirasa sahip çıkma aşıcısından gereklidir.



Resim. Sarıkamış Katerina Av Köşkü



Resim: Sarıkamış, Şehitlerimiz anısına yapılan Kardan Heykeller (Ö. Beşli 'den)

Sonuç

Yukarıda kısaca özetlenen Kaya üstü resimleri, Höyükler, Ani Ören Yeri ve oradaki Ermeni, Gürcü kilise kalıntılarının yanında günümüzdeki kazılarla daha ön plana çıkan Selçuklu Dönemine ait Camiler,



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Hamamlar Çarşısı ve Konutlar önemli ve dikkat çekicidir. Bunlardan başka il sınırları içerisinde yer alan çok sayıdaki Ermeni/Gürcü kilisesi, Osmanlı yapıları, Tabyalar ve Rus Mimarisi olarak adlandırılan Kars evleri, Fauna, Flora ve somut olmayan Kültürel miras açısından da bir o kadar zengin özellikler taşıyan değerleri yanında Kars Kaşar peyniri ile Kars Kazı gibi çok sayıdaki Kars ve çevresinin olduğu kadar ülkemiz için de zengin kültür mirası örnekleridir. Bu değerlere sahip çıkmak, koruyup kollamak bizim asli görev ve sorumluluklarımız olmalıdır.

NOT: Bu bildiriyle küçük ve özet olarak değindiğim Kars'ın Kültürel Mirası konulu bildiri tarafımdan geniş çaplı kitap olarak çalışılmaktadır.

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EFFECT OF DIFFERENT ANNEALING TEMPERATURES ON MECHANICAL, TRIBOLOGICAL, AND ADHESION PROPERTIES OF TiAlNiV-(N) HIGH ENTROPY ALLOY FILMS

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Abstract

High-entropy alloys (HEA) are composed of five or more elements in equimolar or near-equimolar proportions, with composition ratios ranging between 5% and 35% for each constituent element. These alloys exhibit very high mechanical and tribological performance due to their high configurational entropy. It also has good oxidation and corrosion resistance. Thanks to these exceptional properties, HEAs find applications in diverse fields, including machining, aviation, medicine, and nuclear science. In this research, TiAlNiV-(N) HEA films were deposited on D2 tool steels utilizing a closed-field unbalanced magnetron sputtering system. In order to obtain crystal structure formations in the produced films, annealing processes were applied at different temperatures, ranging from 750 to 900 °C. Subsequently, an examination was conducted to evaluate the structural, mechanical, tribological, and adhesion properties of these films. When the XRD patterns of the annealed films were examined, the presence of strong TiN (200) and VN (200) crystal structures was detected. SEM cross-sectional images showed that the film exhibited a thickness of 1.84 µm. The atomic ratio of each element contributing to the chemical composition of the film was in the range of 5–35%, essential for the formation of the HEA structure. HEA films exhibited significant changes depending on the variations in heat treatment temperature. The film annealed at 850 °C had the highest hardness (25.7 GPa), lowest surface roughness (0.22), lowest ratios (0.44), and lowest wear ($2.45 \times 10^{-5} \text{ mm}^3/(\text{N.m})$). The results of the scratch test showed that the heat treatment had a significant effect on the adhesion performance of the films. Due to the increasing annealing temperature, the film annealed at 900 °C maintained its integrity up to the critical load value of 80 N.



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Keywords: High entropy alloy, Magnetron sputtering, Wear, Adhesion,

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YENİ BİR TEKNOLOJİ: METAL TOZU ATOMİZERİ, ATO

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Özet

Bu çalışma, eklemeli imalat alanında ihtiyaç duyulan miktar ve kalitede toz üretiminin yapılabilmesini sağlayan, ultrasonik atomizasyon teknolojisi ile metal tozu üreten ATO sistemini tanıtmaktadır.

Toz üretimi, eklemeli imalatın temel taşlarından biri olarak endüstride yenilikçi ürünlerin geliştirilmesine ve daha verimli üretim süreçlerinin oluşturulmasına katkı sağlamaktadır. Metal tozu üretiminde temel bir dönüşüm sağlayan ultrasonik atomizasyon, endüstriyel ve bilimsel alanda öneme sahiptir. Ultrasonik atomizasyonun özelliği metal tozu üretiminde hassasiyetin artırılmasına ve gelişmiş malzeme özelliklerinin elde edilmesine olanak tanır. Türünün ilk kompakt makinesi olan bu yenilikçi teknoloji, hammaddeyi elektrik arkı ile eriterek, ergiyik metal malzemeleri ince partiküllere dönüştürme sürecini yüksek frekansta titreşen ultrasonik dalgaların yardımıyla gerçekleştirir. Bu yöntem metal malzemelerin homojen, istenilen boyutta ve küresel partiküller halinde üretilmesini mümkün kılar. Geniş bir malzeme yelpazesini düşük üretim maliyetiyle atomize etme yeteneğine sahip olması, hazırlanan toz miktarına yönelik minimum bir kısıtlamanın olmaması bu teknolojiyi avantajlı hale getirmekte, küçük ve orta ölçekli işletmelerin malzeme işlemeye kolayca erişim sağlamasına olanak tanımaktadır.

Anahtar Kelimeler: Metal Tozu, Ultrasonik Atomizasyon, ATO.



A NEW TECHNOLOGY: METAL POWDER ATOMIZER, ATO

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Abstract

This study introduces the ATO system that produces metal powder with ultrasonic atomization technology, which enables the production of powder in the quantity and quality needed in the field of additive manufacturing.

As one of the cornerstones of additive manufacturing, powder production contributes to the development of innovative products and more efficient production processes in the industry. Ultrasonic atomization, which provides a fundamental transformation in metal powder production, is of industrial and scientific importance. The special feature of ultrasonic atomization is that it allows for increased precision in metal powder production and improved material properties. The first compact machine of its kind, this innovative technology uses ultrasonic waves vibrating at high frequency to transform molten metal materials into fine particles by melting the raw material with an electric arc. This method makes it possible to produce metal materials in homogeneous, spherical particles of the desired size. The ability to atomize a wide range of materials at low production cost, with no minimum restriction on the amount of powder prepared, makes this technology advantageous and allows small and medium-sized enterprises to easily access material processing.

Keywords: Metal Powder, Ultrasonic Atomization, ATO.

Giriş

Ticari olarak mevcut tozların çok sınırlı olması ve bu durumun ilerlemeyi kısıtlaması, ayrıca daha küçük siparişlerin uzun sürelerde gerçekleşmesi ve yüksek hammadde maliyetleri nedeniyle mevcut atomizasyon yöntemlerinin etkin bir çözüm sunamadığı görülmüştür. Gaz, su veya plazma atomizasyon gibi mevcut toz üretim süreçleri genellikle kütle üretimine odaklanmıştır, bu da istenilen özelliklere sahip yeni toz bileşimlerinin bulunabilirliğini sınırlamaktadır (Sajbura ve Sokolowski, 2023). Amazemet (rePowder) ve Blue Powder Induction (Ultrasonic Atomizer AUS 500) gibi şirketler, hızlı ve küçük miktarlarda metal tozu elde etmek amacıyla ultrasonik atomizasyon yöntemiyle çalışabilen makineler imal etmektedir. Türünün ilk kompakt makinesi olan ATO, Polonya merkezli bir şirket olan 3D Lab firması tarafından üretilmiştir.

Uluslararası patentlerle korunan, alüminyum, titanyum, paslanmaz çelik ve değerli metaller gibi çeşitli malzemeleri atomize etme yeteneğine sahip ATO, ultrasonik atomizasyon yöntemiyle, 20 ila 100 µm çapında küresel parçacıkların oluşturulmasını sağlamaktadır. Üretilen metal tozunun boyutu kullanılan ultrasonik frekanstan etkilenmektedir; yüksek frekansta daha küçük partiküller, düşük frekansta ise daha büyük partiküller oluşmaktadır. Viskozite, yoğunluk, ultrasonik genlik ve atomizer tasarımı gibi faktörler de partikül boyutu ve dağılımını etkilemektedir.

Geniş bir malzeme yelpazesini düşük üretim maliyetiyle atomize etme yeteneğine sahip olması ve hazırlanan toz miktarına yönelik minimum bir kısıtlamanın olmaması bu teknolojiyi avantajlı hale getirmekte, küçük ve orta ölçekli işletmelerin malzeme işlemeye kolayca erişim sağlamasına olanak tanımaktadır (Scott, 2018). Bu makine Türkiye'de ilk kez Gazi Üniversitesi Eklemeli İmalat Teknolojileri Uygulama ve Araştırma Merkezi (EKTAM) tarafından kullanılmaktadır. EKTAM, Türkiye'nin savunma sanayi ve havacılık alanlarındaki malzeme üretim potansiyelini artırmayı ve yenilikçi malzeme araştırmalarına katkıda bulunmayı amaçlamaktadır. Bu cihaz teknolojik yenilikleri desteklemenin yanı sıra üniversite-sanayi işbirliği açısından da önemli bir adımı temsil etmektedir.

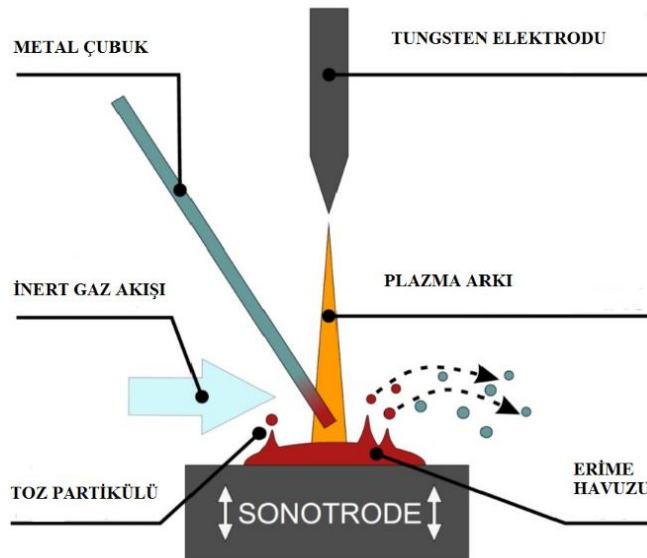
ATO Sisteminin Çalışma Prensibi

Tüketilmeyen bir elektrot ile sonotrode arasında elektrik arkı oluşturulur. Tel, çubuk veya granül şeklindeki hammadde, sonotrode' un sıcak ucuna doğru sürekli olarak itilir. Ergiyik metal havuzuna ulaşan ultrasonik dalgalar istenilen çapa sahip damlacıkların oluşmasını sağlar. Soğutulmuş inert gaz akışına belirli bir kinetik enerjiyle atılan damlacıklar konveksiyon ve ısı ışıma süreçleriyle soğur ve katlaşır. Isınan inert gaz akışıyla birlikte toz partikülleri siklon adı verilen bir ayırma birimine taşınır. Siklonun içinde aşağıya doğru hareket eden ve ağırlıkları nedeniyle dibe çöken toz partikülleri siklonun altında bulunan bir kaptan toplanır. Siklondaki gaz birkaç mikron büyüklüğündeki toz parçacıklarından arındırılır, soğutulur ve önceki aşamaya geri

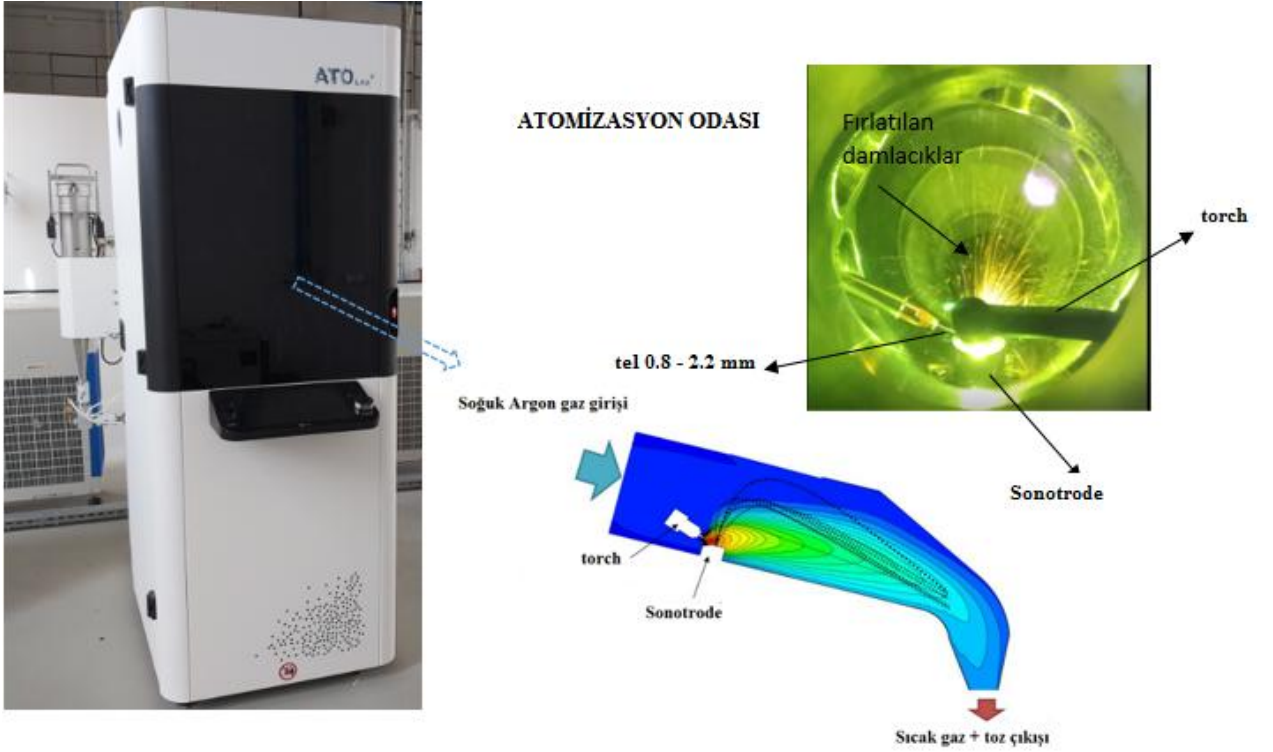
dönme üzere dolaşıma alınır (Grzelak vd., 2022; Balasz vd., 2023). Şekil 1’de ATO sisteminin Ultrasonik Atomizasyon (UA) prensibi görülmektedir. Şekil 2’de ise torch (ortada), sonotrode (altta) ve hammaddenin (sol) yerleşimi görülmektedir. Burada anlatılan işlem - 3D Lab firması tarafından hazırlanan “Ato Lab+ product review - small scale atomizer for reactive metal materials” başlıklı videodan (3D Lab, 2019) izlenebilir. Cihazın genel özellikleri Tablo 1 de verilmiştir.

Tablo 1. ATO Lab+ Genel Özellikleri (Bielecki vd., 2021)

Giriş malzemesi	Tel (standart) : Ø 0,82 ila 2,2 mm Çubuk: Ø 10 mm'ye kadar
Sistem verimliliği	Saatte 0.3 litreye kadar toz
İşlem sırasında O ₂ seviyesi	<10 ppm
Ultrasonik frekans	35 kHz (+ olası yükseltme ile daha yüksek kHz ve daha ince toz)
Makine ağırlığı (kutusuz)	700 kg
Boyut (YxGxD)	1994 x 813 x 1138 mm
Çevrim Dışı Araçlar	Sıkıştırılmış hava istasyonu, inert gaz kaynağı, güç kaynağı, ultrasonik temizleyici, elek süzgeci, su soğutucu



Şekil 1. ATO ultrasonik atomizasyon şeması (Hinrichs vd., 2021)



Şekil 2. Atomizasyon odası (EKTAM, 2023; Bielecki, 2021)

Ultrasonik atomizasyon ile üretilen tozlar gaz atomizasyonu ile elde edilen tozlarla karşılaştırıldığında daha dar partikül boyut dağılımı aralığına ve yüksek küresellik özelliğine sahiptir. Tozların yüksek küresellikteki geometrileri akışkanlık değerlerinde artışa ve ulaşabilecekleri en yüksek yüzey alanı değerlerine sahip olmalarını sağlamaktadır. Bu sayede tozların eklemeli imalat uygulamalarında daha iyi ısı absorpsiyonu sağlaması enerji kullanımındaki verimi yükseltmektedir (Akyıldız vd., 2023).

ATO Sistemi Kullanılarak Yapılan Çalışma Örnekleri

Metal tozlarının kalitesi ve özellikleri eklemeli imalat için vazgeçilmez bir öneme sahiptir. Farklı atomizasyon yöntemleri ve koşulları istenen toz özelliklerine ulaşmak için dikkatlice seçilir ve optimize edilir. Metal tozlarının üretimi için yapılan tüm ultrasonik atomizasyon yöntemlerinde özgün özel tasarlanmış laboratuvar ekipmanları kullanılırken, Hinrichs ve diğerleri (2021), önceki çalışmalardan farklı olarak ATO ticari ürününü ilk kez kullanmışlardır. Bu çalışmada, Mo-20Si-52.8-Ti (% ağırlık) bileşimine sahip tozlar, elektrot indüksiyon gaz atomizasyonu (EIGA) ve ultrasonik atomizasyon yöntemleriyle üretilmiştir. Üretilen tozlar, boyut dağılımı, küresellik, mikroyapı ve faz bileşimi, kimyasal bileşim ve ara boşluk kirlenme içeriği gibi çeşitli özellikler açısından karşılaştırılmıştır. Her iki işlemle de eklemeli imalat için gereksinimleri karşılayan tozlar üretilmiştir. ATO Lab cihazının kullanıldığı başka bir çalışma Grzelak ve diğerlerine (2022) aittir.

Ultrasonik Atomizasyon ve Plazma Ark Gaz Atomizasyonu (PAGA) yöntemleriyle elde ettikleri AISI316L çelik tozlarını karşılaştırmışlar ve bu tozları kullanarak eklemeli imalatla test numuneleri üretmişlerdir. Yaptıkları çalışma her iki tozun parçacık özelliklerindeki farklılıkları analiz etmeyi amaçlamıştır. Sonuçlar her iki yöntemin de benzer özelliklere sahip malzeme sağlama potansiyelini doğrulamaktadır. Bałas ve diğerleri (2023) ise ultrasonik atomizasyon ve gaz atomizasyonu ile üretilen Ti6Al4V tozlarını karşılaştırmışlardır. Bu çalışmada, ATO sistemi kullanılarak üretilmiş olan Ti6Al4V tozu üzerinde kapsamlı bir inceleme gerçekleştirilmiştir. Sonuçlar ultrasonik atomizasyon yöntemiyle elde edilen Ti6Al4V tozunun büyük ölçekli gaz atomizasyon tesislerinde elde edilen tozlara benzer veya daha iyi kalitede olduğunu göstermektedir. Monti ve diğerleri (2023), Al-5.0Cu-3.0Ti-1.5Cr-1.3Fe [% ağırlık] oranında yeni bir alaşımın Laser Toz Yatağı Füzyonu (Laser Powder Bed Fusion - LPBF) ile başarıyla üretildiğini gösterdikleri çalışmalarında alaşımı ATO cihazı ile başarılı bir şekilde atomize etmişlerdir.

Bielecki ve diğerleri (2021) yaptıkları çalışmada ultrasonik ve gaz atomizasyonu yöntemleri ile üretilen AISI 316L ve Ti6Al4V tozlarının fiziksel özelliklerini karşılaştırmışlardır. Gaz atomizasyonu (EIGA) ile üretilen AISI 316L çeliğinin küreselliği 0.75 iken ultrasonik atomizasyonla üretilende bu değer 0.89 dur. Ti6Al4V tozunun küreselliği ise gaz atomizasyonu ile üretildiğinde 0.76 iken ultrasonik atomizasyonla üretildiğinde 0.90'dır. Tozların küresellik değeri 1'e yaklaştıkça ideal küreye yakın bir morfolojide toza sahip olunmaktadır.

Yukarıdaki çalışmalar, bu sistem kullanılarak üretilen tozların yüksek kalitede özelliklere sahip olduğunu göstermektedir.

Sonuç

Bu çalışma, ATO Metal Tozu Atomizeri' nin endüstriyel uygulamalardaki potansiyelini ve malzeme araştırmalarındaki katkılarını vurgulayarak, metal tozu üretimindeki yeni bir dönemin kapılarını aralamaktadır. Çalışmalar incelendiğinde, ultrasonik atomizasyon yöntemi ile üretilen tozların morfolojisinin daha iyi olduğu görülmektedir.

ATO sistemi, hammaddeyi elektrik arkı ile ergitme ve ergimiş metal havuzundan atomizasyon gerçekleştirme yeteneğine sahiptir. Bu sistem toz üretimini düşük basınçta gerçekleştirir, böylece inert gaz tüketimini ve atomizasyon odası karmaşıklığını gaz atomizasyon yöntemine kıyasla önemli ölçüde azaltır. Üretimde çok daha fazla işe yarayan ince toz elde edilmesi ve saf argon gazının tüketiminin düşük seviyede olması ultrasonik atomizasyon yöntemini gaz atomizasyonuna göre maliyet açısından rekabetçi bir seçenek haline getirmektedir. Geniş bir malzeme yelpazesini atomize edebilmesi ve hazırlanan toz miktarına yönelik minimum bir kısıtlamanın bulunmaması onu avantajlı kılmaktadır.



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY,2024

Eklemeli imalat, modern endüstrinin dönüşümünde kilit rol oynamaktadır ve toz üretimi bu yenilikçi süreçte önemli bir yer tutmaktadır. Yeni malzeme ve yapıların geliştirilmesi, toz üretiminin derinlemesine anlaşılmasını ve uygulanmasını gerektirmektedir. Bu nedenle, toz üretimi konusundaki araştırma ve geliştirme faaliyetlerinin, eklemeli imalat alanında gelecekteki inovasyonları şekillendirmedeki kritik rolünü vurgulamak önemlidir.

Teşekkür

Bu çalışmanın gerçekleştirilmesinde sağladığı altyapı ve destekten dolayı Gazi Üniversitesi Eklemeli İmalat Teknolojileri Uygulama ve Araştırma Merkezine teşekkür ederiz.



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EXPERIMENTAL INVESTIGATION ON THE COMPRESSIVE STRENGTH OF EPOXY COMPOSITES REINFORCED WITH GRAPHENE NANOTUBES

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Abstract

Filled epoxy-based materials are used in many areas, from building materials to sports equipment. It is basically produced by adding powders into epoxy to improve the desired properties of the composite material. Graphene nanotubes, on the other hand, can be used to improve the durability, strength and many other properties of materials. Graphene nanotube is especially important in applications where lightweight and strong materials are demanded. In this study, graphene nanotubes, which have very high mechanical strength, were dispersed into epoxy and graphene nanotube-filled epoxy-based composites were produced. Pores and air bubbles were prevented by using vacuum technique during production. In order to distribute the graphene nanotube homogeneously in the epoxy, first the graphene nanotube was added into the epoxy and mixed mechanically for ten minutes, and then this mixture was mixed ultrasonically for fifteen minutes in an ice bath. Then, the hardener was added to the mixture and mixed mechanically for five minutes and ultrasonically for five minutes. The prepared slurry was poured into molds, taken into a vacuum tank and air evacuated. The sample geometry was determined and curing was achieved according to ASTM D695 standards. To reveal the effect of graphene nanotube on the compressive strength of epoxy-based composite material, unreinforced and 3, 6, 9 % graphene nanotube reinforced epoxy-based composites were produced. These composite materials were subjected to compression tests and stress strain curves were drawn to determine their mechanical properties. According to the results obtained, ultimate strength were revealed. Accordingly, while the unreinforced sample showed 12.21 MPa ultimate strength, the 3% reinforced composite showed 33.21 MPa ultimate strength. These results are 32.27 MPa and 29.51 MPa for 6% and 9%, respectively. As can be seen, graphene nanotube filling increased the strength of the epoxy-based material and small decreases were detected as the reinforcement ratio increased. Apart from this, when the macro damage images were examined, it was determined that the graphene nanotube contribution caused ductility in the sample and prevented the sample from disintegrating and disintegrating.

Key words: Compressive strength, epoxy based composite, graphene nanotube, ultrasonic mixture



THE INVESTIGATION OF THE CORROSION EFFECT OF ISTANBUL SEAWATER USING INDUCTIVE SENSORS

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Özet

Bu projede İstanbul Deniz suyunun korozyona olan etkisi, endüktif sensör kullanılarak ölçülebilirliği incelenmiştir. Metallerin manyetik alanı etkilemeleri ve bu etkinin ölçülmesinden yola çıkılmıştır. Metallerin korozyona uğraması bu etkiyi değiştirmektedir. Korozyon sebepli değişimin endüktif sensör ile ölçülebilirliği incelenmiştir. Endüktif sensörle korozyon tespitinin bilinen yöntemlerden farkı; yenilikçi, çok daha ucuz ve hızlı sonuç vermesidir.

Metal malzemelerde sıcaklık, oksijen ve nemin etkisiyle oluşan oksitlenmeye korozyon denir. İstanbul'un denize oldukça fazla sınırının olması denizin korozyon etkisini artırmaktadır.

Projede "SAE J2334 Kozmetik Korozyon Testi" baz alınarak özelleştirilmiş bir korozyon çevrimi oluşturulmuştur. Bu çevrime bağlı çevre koşullarını simüle eden elektromekanik bir cihaz oluşturulmuştur. 24 saati kapsayan ve 3 fazdan oluşan çevrimde 1. faz sıcaklık 50 °C ve 100% RH nem 6 saat boyunca, 2. faz deniz suyu ile spreyleme 15 dakika ve 3. faz kurutma 60 °C ve 50% RH nem- 17 saat 45 dakikadır. 1040 malzeme bu ortamda oluşturulan takvime göre 8 gün korozyona uğratılmıştır. Bu cihaz kullanılarak elde edilen numune malzemeler endüktif sensör ve CNC tezgâh kullanılarak ölçülmüştür. Voltaj (V) cinsinden ölçülen veriler bilgisayara aktarılmıştır. Bu veri MATLAB'da işlenerek anlamlı grafiklere çevrilmiştir. Sırasıyla seçilen 4 numunenin verileri; Birinci numune 192 saatte 1.7254 Volt, ikinci numune 120 saatte 2.1562 Volt, üçüncü numune 48 saatte 2.3434 Volt ve dördüncü korozyona uğramayan numune 2.7472 V olarak veri okunmuştur.

Metal malzemedeki korozyon miktarındaki değişim manyetik alanı etkilemektedir. Bu etkideki değişim endüktif sensör kullanılarak tespit edilebilmiştir.

Anahtar Kelimeler: İstanbul Deniz Suyu, Endüktif Sensör(DW-Ax-509-M8-39x), 1040 Çelik Malzeme(Numune), SAE J2334 Korozyon Test Standardı, Korozyon(paslanma), Ludre VTK 1050

Abstract

In this project, the corrosive effect of Istanbul seawater on metals was investigated using inductive sensors. The study is based on the interaction of metals with the magnetic field and the measurement of this interaction. The corrosion of metals alters this effect and the detectability of corrosion-induced changes has been explored using inductive sensors. The distinctive aspect of corrosion detection with inductive sensors lies in its innovative, significantly more cost-effective and faster results compared to conventional methods (Experiment Method Based on Weight Loss, Potential Maps as a Method for Detecting Corrosion Damage, etc.).

A customized corrosion cycle was established in the project, based on the "SAE J2334 Cosmetic Corrosion Test." Utilizing this cycle, an electromechanical system simulating environmental conditions was created. The 24-hour cycle, consisting of three phases, includes Phase 1: 6 hours at 50°C and 100% RH humidity, Phase 2: Spraying with seawater for 15 minutes, and Phase 3: Drying at 60°C and 50% RH humidity for 17 hours and 45 minutes. A total of 1040 materials were exposed to corrosion over 8 days according to the established schedule in this environment. The voltage(V) variation due to displacement was measured and the data were transferred to the computer. These data were plotted into graphs by MATLAB software. The time vs voltage data measured respectively; 1.7254 volts in 192 hours for the first sample, 2.1562 volts in 120 hours for the second sample, 2.3434 volts in 48 hours for the third sample, and 2.7472 V for the fourth non-corroded sample.

The variation in the amount of corrosion in metal material is effected by the magnetic field. The detection of the corrosion level in metals using inductive sensors has been presented as an innovative approach.

Keywords: *Istanbul Seawater, Inductive Sensor (DW-Ax-509-M8-39x), 1040 Steel Samples, SAE J2334 Corrosion Test Standard, Corrosion, Ludre VTK 1050.*

Giriş

Metal malzemelerde sıcaklık, oksijen ve nemin etkisiyle oksitlenme meydana gelir. Bu oksitlenme korozyon olarak adlandırılır. Oluşan korozyon birçok problemi beraberinde getirir. İstanbul'un denize oldukça fazla sınırının olması denizin korozyon etkisini artırmaktadır. Deniz suyunun yüksek oranda tuz barındırması da korozyon oluşum hızını oldukça artırmakta ve denizin korozyon etkisinin ölçümü konusunda bilgi yetersizliği bulunmaktadır. Bu araştırmada İstanbul deniz suyunun korozyon etkisi göz önünde bulundurulmaktadır. Marmara Denizinden alınacak numune deniz suyu için;

Aynen düşey sıcaklık dağılımında olduğu gibi, Marmara Denizi'nde tuzluluk düşey dağılımı açısından da üç ayrı su kütlesi bulunduğu bilinmektedir. Bu kütlelerden en üstte yer alan ve kalınlığı yaklaşık 30 m olan yüzey tabakası, özellikle Karadeniz'den gelen nispeten tatlı (Sal%₀18) suların miktarına bağlı olarak değişim gösterir. Yüzey tabakası tuzluluğu ise (Sal%₀) 18-23.5 arasında değişmekte, ara tabaka Sal%₀25-27 ve alt tabaka Sal%₀33.5-36 tuzluluğa sahip bulunmaktadır[1,2,3,4]. (Tablo 1).

Başlama Tarihi: 1962				Emin: E029°:31':23"				Nmin: N40°:11':33"			
Bitiş Tarihi: 2006				Emax: E026°:49':15"				Nmax: N41°:00':37"			
PARAMETRE: SAL				PROJE: GENEL							
DER. (m)	MIN.	MAX.	FARK	ADET	ORT.	S.DEV.	VAR.	SE m.	ORT. DÜZ.	HACİM ORT.	HACİM S.DEV.
0.5	13.12	39.00	25.88	694	22.81	3.656	13.349	0.139	22.81	22.81	3.656
5	13.78	39.02	25.24	647	23.15	3.154	9.935	0.124	23.29	22.97	3.426
10	14.30	39.05	24.75	643	24.06	3.187	10.142	0.126	24.39	23.33	3.389
15	15.40	39.02	23.62	614	26.30	2.998	8.972	0.121	26.35	24.03	3.534
20	16.25	38.98	22.73	599	28.74	3.361	11.280	0.137	28.98	24.91	3.955
25	16.80	38.97	22.17	581	32.15	3.975	15.772	0.165	31.70	26.02	4.741
30	14.00	38.95	24.95	509	33.76	3.826	14.607	0.170	33.75	26.94	5.273
40	18.62	39.30	20.68	437	35.35	3.098	9.575	0.148	35.29	27.72	5.662
50	18.66	39.70	21.04	383	36.69	2.901	8.393	0.148	36.44	28.39	5.989
75	19.21	39.70	20.49	178	37.03	2.617	6.809	0.196	37.05	28.68	6.108
100	26.90	39.60	12.70	103	37.44	1.561	2.413	0.154	37.42	28.85	6.171
150	34.50	38.80	4.30	62	37.75	0.850	0.710	0.108	37.66	28.95	6.209
250	35.10	38.70	3.60	41	37.72	0.839	0.687	0.131	37.78	29.02	6.232
500	35.50	38.70	3.20	26	37.94	0.703	0.475	0.138	37.93	29.06	6.247
750	37.80	38.60	0.80	5	38.13	0.388	0.120	0.174	38.19	29.07	6.250
900	38.50	38.60	0.10	2	38.55	0.071	0.003	0.050	38.44	29.07	6.252

Tablo 0.1 Tuzluluk (Sal%₀) değerlerinin istatistik değerlendirmesi (Artuz&Artuz&Artuz DataBase)

Marmara denizinden deniz suyu alınan yerinin (Sal%₀) 18-23.5 oranlarında tuz ihtiva etmesi korozyona etkisinin oldukça yüksek olduğu gerçeğini gözler önüne sermektedir. Kullanılacak yöntemle denize atılan veya denizin çevresinde bulunan metal malzemelerin (bıçak, tornavida, kerpeten vb.) denize atıldığı andan itibaren geçen paslanma miktarını, geçen süreyi, pratik bir yolla hesaplamak, bunun yanında denize yakın bölgelerde bulunan yapılarıdaki metalin

paslanma süreleri pratik bir yöntemle tespit edilebilir. Deniz taşıtlarında bakımı zor ve pas miktarının tespitinin zor kısımlarındaki pas miktarını sensör aracılığıyla ölçülerek periyodik ve öngörücü bakım maliyetleri düşürülebilecektir. Gerekli paslanma bilgisinin tahribatsız muayene ile tespiti sağlanabilecektir. Bu sayede bir deniz taşıtı için paslanma miktarının tespit edilmesi gereken bölümlerine yalnızca sensör yerleştirilerek oluşan korozyon her an izlenebilecektir.

Bir malzemenin korozyon hızını hesaplamak için maliyetli yöntemler bulunur. Bu klasik yöntemlerden bazıları korozyon sonucunda; Ağırlık Kaybını Esas Alan Deneyler Donatıda korozyonun oluşturduğu kesit kaybını araştırmak için ağırlık kaybından yararlanılarak penetrasyon derinliği belirlenebilir. Bunun için korozif ortamda bekletilen metal numunenin, belirli süre sonunda, yüzeyinde meydana gelen malzeme kaybı tespit edilerek malzemenin ortalama yıllık penetrasyon hızı (1) bağıntısı ile hesaplanır. Bu ifadede P, cm/yıl olarak penetrasyon hızını; WK metalin korozyonla ağırlık kaybını (g); S, korozyona maruz kalan yüzeyi (cm²); t, deney süresini (saat); Δ ise metalin yoğunluğunu göstermektedir [5].

$$P = \frac{W_K}{\Delta.S.t} \times 24 \times 365 \quad (1)$$

Yapısı gereği hassas bir yöntemdir ancak oldukça maliyetli ve yüksek teknoloji ve bilgi birikimine gereksinim duymaktadır. Bir başka yöntem olarak; Potansiyel Haritaları Korozyon hasarının tespitinde yapının korozyona uğrama ihtimalinin çok arttığı aktif bölgelerin gösterildiği potansiyel haritalarından çok sık yararlanır. Bu deney metodunda donatı çeliğinin korozyon aktivitesini belirlemek amacıyla yerinde veya laboratuvarında donatının elektriksel yarı hücre potansiyeli ölçülür [6,7]. Bu yöntemde ise malzemenin elektriksel yarı hücre potansiyeli ölçülür. Benzer biçimde bu yöntemde karmaşıktır ve yüksek donanımlı ekipmanlar gerektirir. Bu projede paslanma miktarının ölçülmesi için deneysel olarak endüktif sensör kullanılacaktır. Endüktif sensörler endüstri 4.0 uygulamalarında, otomasyon sistemlerinde, nesne tanımda, metal cisimleri algılamada, CNC makinalarında, otomat makinalarında, paketleme makinalarında, konveyör sistemlerde sıklıkla kullanılmaktadır. Endüktif sensörler iletken malzemeleri algılama yeteneğine sahiptir. Algılama esnasında metal cisme temas gerektirmez. Kısaca çalışma mantığından bahsetmek gerekirse bu sensörler kendi manyetik alanlarını oluştururlar. Oluşturulan bu manyetik alan dâhiline herhangi bir metal cismin girmesi halinde manyetik alan

değişim gösterir. Değişim sonucu sensörün devreleri etkilenir ve sensor çıkış sinyali üretir. Üretilen bu analog değerler bilgisayar ortamından nümerik değerlere dönüştürülür.

Khorasani ve çalışma arkadaşları (2016) endüktif sensörleri kullanarak kesici takımlarda meydana gelen sehimleri ölçmüşler ve takım esnemesinden kaynaklanan hataların tespit edilmesi üzerine bir çalışma yapmışlardır. Hassas konumlama pozisyonlarındaki sapmaların işlenen form hatası üzerine etkilerini çalışmışlardır[8].

S.M McGill ve arkadaşları 3D Ortopedik eklem hareketlerinin izlenmesinde endüktif sensörleri kullanarak bir çalışma yapmışlardır[9].

Yahya ışık talaşı imalatta online takım durumunun izlenmesi üzerine endüktif sensörler ile bir çalışma yapmış olup takımın konum değişimlerini monitörlemişlerdir. Takım kırılma durumunun önceden tahmini için bir erken uyarı modeli geliştirmişlerdir[10].

X Huove arkadaşları (2008) dile yerleştirilen bir metal piercingin endüktif sensörler ile konumunu kontrol ederek engelli bireylerin kullanabileceği bir çalışma yapmışlardır. Çalışmada kablosuz olarak dil ile bilgisayar kontrol edilebilmiştir[11].

Barkın BAKIR frezelemede talaş oluşumunun ve geometrisinin yüzey pürüzlülüğüne etkilerinin incelenmesi çalışmasında kesme parametrelerinin talaş oluşumuna etkileri çalışılmıştır. Endüktif sensörü kesme anında takım seyimini ölçmek için kullanmıştır.[12]

Endüktif sensörlerin metal malzemelerin cinsine ve içerdiği malzeme özelliklerine bağlı olarak ürettiği çıkış sinyalindeki değişim korozyon miktarını tespit etmek amacıyla kullanılacaktır. Kullanım amacı bakımından endüstride konum bilgisi oluşturmak için kullanılan endüktif sensöre farklı bir açıdan yaklaşım söz konusudur. Korozyon miktarı bilgisayar datasına dönüştürülerek farklı projelerde kıyaslanmak amacıyla kullanılmak üzere saklanabilecektir. Paslanmanın yanı sıra sensörün yapısı gereği metal malzemelerin içeriğinin tespitine yönelik çalışmalar da yine bu projenin ilgi alanında yer almakta olup farklı bir safhası olarak değerlendirilmektedir.

Metallerde oluşan paslanmanın endüktif sensör yardımıyla ölçülebilmesi mümkün müdür? Deniz suyunun paslanmaya olan etkisinin zamana göre değişimini endüktif sensörle tespit etmek mümkün müdür? Endüktif sensörden alınan veriler anlamlı grafiklere dönüştürülüp gözlemlenebilecek mi? Oluşan verilerin bilgisayar algoritmaları derin öğrenme programları

kullanarak işlenmesi ve anlamlı değerler üretmek mümkün müdür? Bu önemli sorular çevresinde gelişen bir araştırma projesidir.

Materyal ve metot

Metal bir malzemeyi paslandırmak için belirli koşulların sağlanması gerekir bunlar temel olarak nem, sıcaklık, oksijen ve ortamdır. Bu koşullar uygun olduğunda malzeme üzerinde gözle görünür şekilde renk değişikliği, doku değişikliği ortaya çıkar. Bu çalışmada belirtmek gerekirse 1040 Çeliği malzemesi ile testler gerçekleştirileceğinden anlatımda bahsi geçen malzeme(numune) bu malzeme baz alınarak dikkate alınmalıdır. Metal malzemelerde oluşan korozyon istenmeyen bir durumdur ve beraberinde sorunlar meydana getirir. Korozyon aslında bir yanma tepkimesidir(oksitlenme) ve geri dönüşü olmayan bir tepkimedir. Korozyon neticesinde malzemenin üzerinden atomik düzeyde kopmalar meydana gelir ve bu kopmalar sonucundan malzemenin kesitinde küçülmeler oluşur. Üretilen bir iş parçasının dayanımı, statik ve dinamik mukavemet özellikleri kesit alanında azalmadan dolayı düşecektir. Bizler ürettiğimiz malzemenin dayanımını doğru bir şekilde hesaplamış ve üretmiş olsak dahi bu dayanımın muhafaza edilmesi de yine büyük önem arz etmektedir.

Korozyon zamanla doğrudan ilişkili bir süreçtir. Bir iş parçasının korozyona uğratılması çalışacağı ortamla doğrudan ilişkilidir ve bu doğrultuda çalışacağı ortamda bekletilerek yapılacak bir test en doğru sonucu verecektir ancak bu seneler süreceğinden mantıklı bir yöntem değildir. Korozyon standartları bir malzemenin çalışacağı ortam şartlarını taklit ederek oluşturulan bir ortamda malzemenin hızlandırılmış korozyon testine uğratılarak senelerce sürececek olan bir korozyon sürecini aylara hatta günlere düşürmektedir. Malzemedeki paslanma miktarının zamana göre değişimi birçok etmene bağlıdır ve bu etmenlerin hepsi çalışılan ortama göre değişiklik göstermektedir. Bu hususta yapılan araştırmada farklı şirketler ve ülkelerin standardizasyonları incelenmiş ve farklı ortamlara göre farklı korozyon standartları oluşturulduğu öğrenilmiştir. Korozyon standartlarıyla ilgili olarak belirtmek gerekirse bütün koşulları sağlayan kesin bir standart yoktur. Bununla birlikte geliştirilen standartların da yeni yapılacak testlerdeki gereklilikleri sağlayamamasından dolayı standartlar belirli periyotlarla güncellenmektedir. Bu doğrultuda bu çalışmada SAE J2334 Kozmetik Korozyon Testi baz alınarak özelleştirilmiş bir korozyon çevrimi oluşturulmuştur. Bu çevrim baz alınarak çevre koşullarını sağlamak adına bir elektromekanik sistem oluşturulmuştur. 1040 malzeme bu ortamda oluşturulan takvime göre 8 gün korozyona uğratılmıştır. Korozyona uğrayan bu numune

malzemeler endüktif sensör ve CNC tezgâh kullanılarak oluşturulan düzeneğe ile hassas bir şekilde korozyon miktarı bilgisayar datasına çevrilmiş ve bu data MATLAB programında anlamlı grafiklere çevrilmiştir. Bu işlemler uzun bir süreci kapsamaktadır. Bu noktada anlatım ve anlaşılması kolay olması adına belirli bölümlere ayrılarak anlatılacaktır. Bölümler;

- Paslandırma cihazının geliştirilmesi,
- Numunelerin temin edilmesi ve korozyona uğratılması,
- Oluşturulan numune malzemelerin endüktif sensör ile veri toplanması.
- Grafiklerin elde edilmesi ve yorumlanmaları şeklindedir.

Paslandırma Cihazının Geliştirilmesi

Bu projedeki kullanılan paslandırma cihazı temelde SAE J2334 Kozmetik Korozyon Testi temel alınarak geliştirilmiştir. Düzeneğin geliştirilmesi aşamasında birden fazla malzeme kullanıldığı için bu malzemelerin doğru bir şekilde çalıştığından emin olmak ve sistemin istenen verimi sağlayabilmesi için sürekli iyileştirmeler yapılarak son ürüne ulaşılmıştır. Bu doğrultuda geliştirilen ilk prototip daha basit yapıdadır ve istenen verimi verememesinden dolayı ikinci bir cihaz tasarımına gidilmiştir.

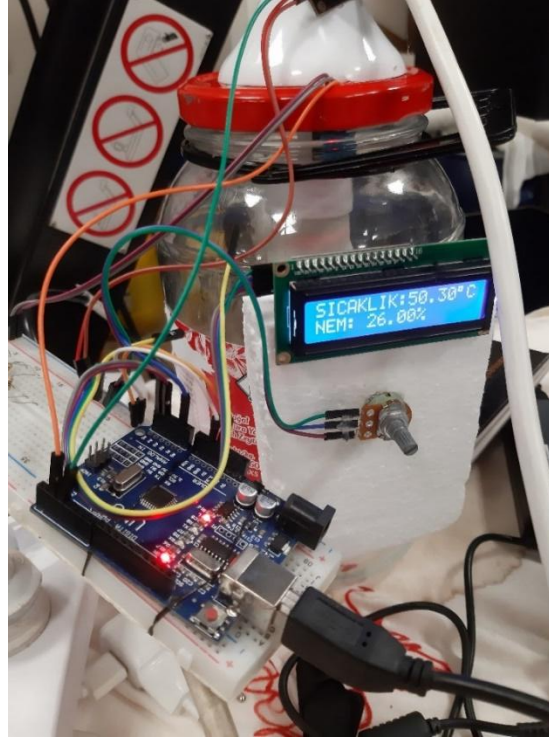
Geliştirilen cihaz elektromekanik bir sistem olup birden fazla adımda üretilmiştir.

Bunlar;

- Elektronik modüller ve eyleyiciler
- Montaj ve sistemin geliştirilmesi
- Algoritma ve yazılım geliştirilmesi

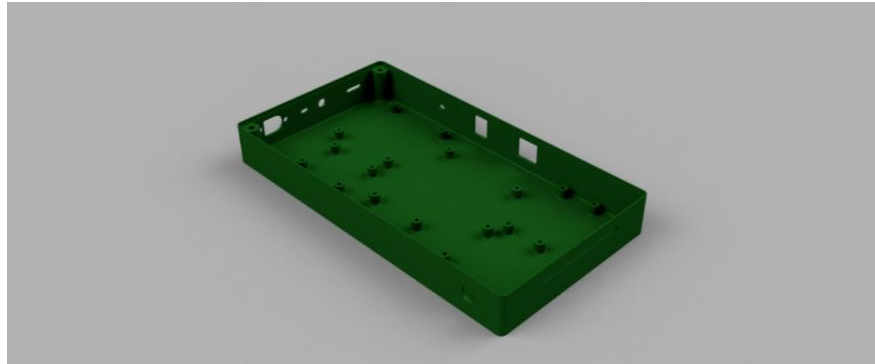
Elektronik montaj ve sistemin geliştirilmesi

Bu aşamada ilk önce malzemeler ayrı ayrı test edilmiştir. Ardından bir prototip yapılmıştır. Prototipte bazı eksiklikler gözlemlenmiş bunun sonucunda bazı ekleme ve çıkarmalara gidilmiştir. İlk prototip Şekil 0.1 da gözüktüğü gibidir. Burada oluşturulan kontrol ünitesi test amaçlı cam bir kavanoza montajlanmış gerekli şartların sağlanması için kodların yazılmasına geçilmiştir. Bu sistem sonradan değişmiştir.

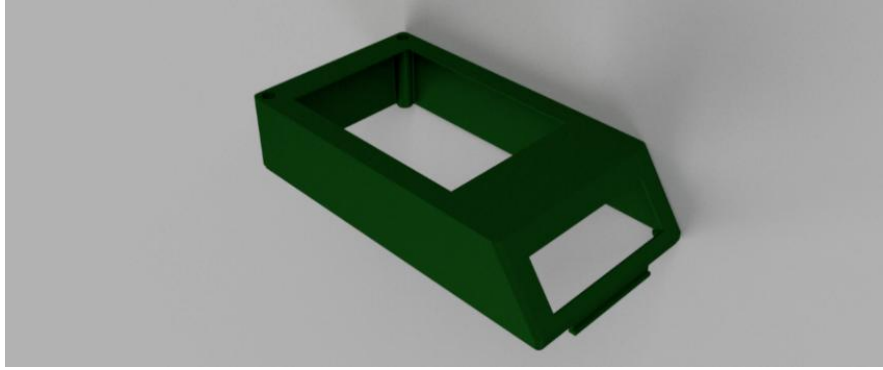


Şekil 0.1 Prototip ünite

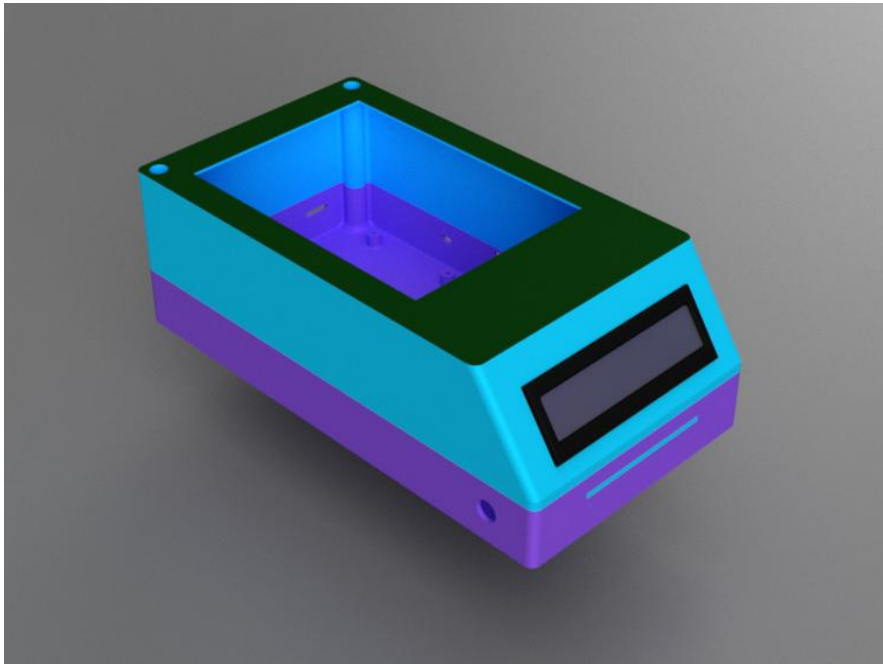
Oluşturulan ilk tasarıma sonradan farklı modüllerin bağlanması ile beraber parça sayısı artmıştır. Karmaşanın önüne geçmek, elektronik sistemin bir arada tutması ve sorunsuz çalışmasını sağlayabilmek için bir hazne tasarlanıp bunu 3D yazıcıyla üretilmesi gerçekleştirilmiştir. Hazne iki ayrı parçadan oluşacak şekilde tasarlanmıştır. LCD ekran üst kısmında diğer bileşenler alt kısımda konumlandırılmıştır. Kablo bağlantıları giriş çıkışlar için alt haznede delikler bırakılmıştır. CAD olarak çizilen parçalar 3D yazıcı ile basılmış ve montajı yapılmıştır.



Şekil 0.2 Hazne alt parça

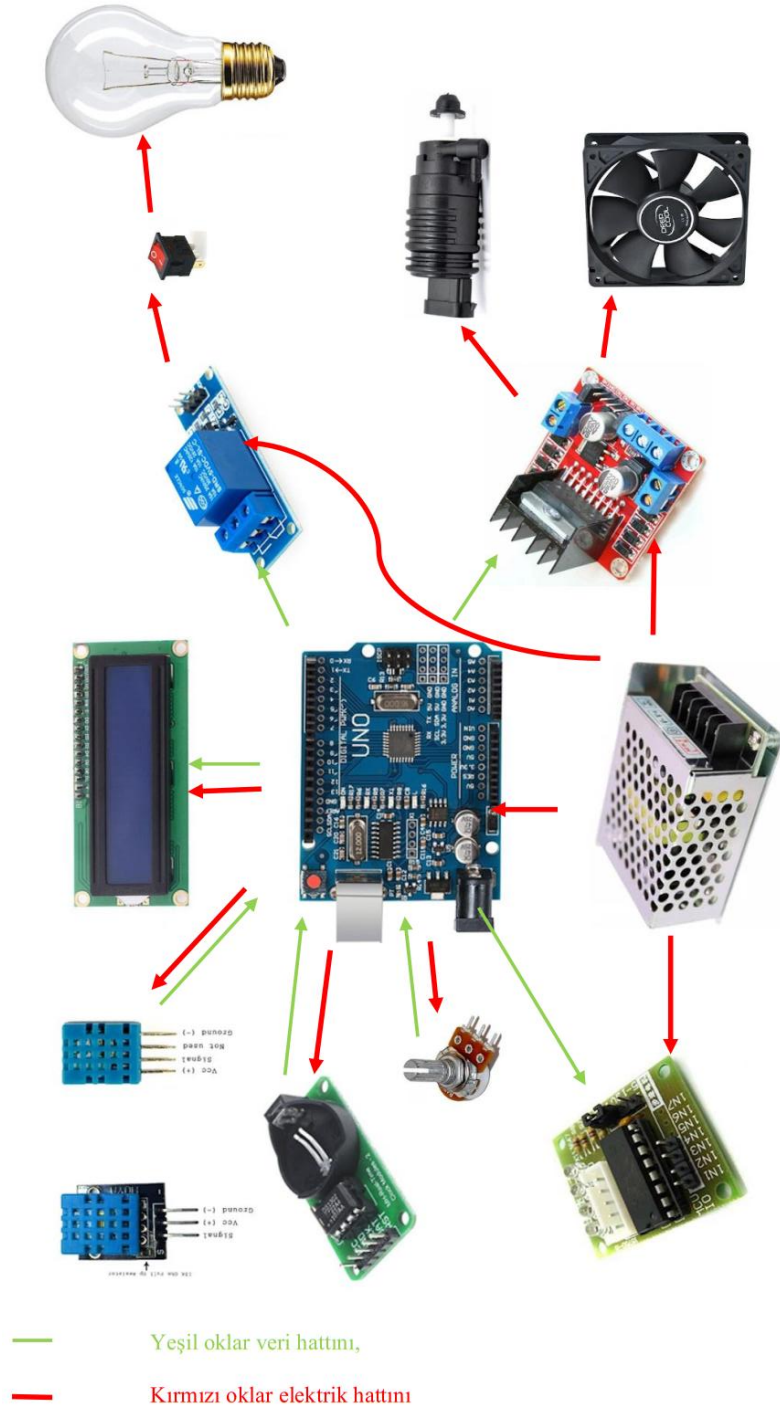


Şekil 0.3 Hazne üst parça



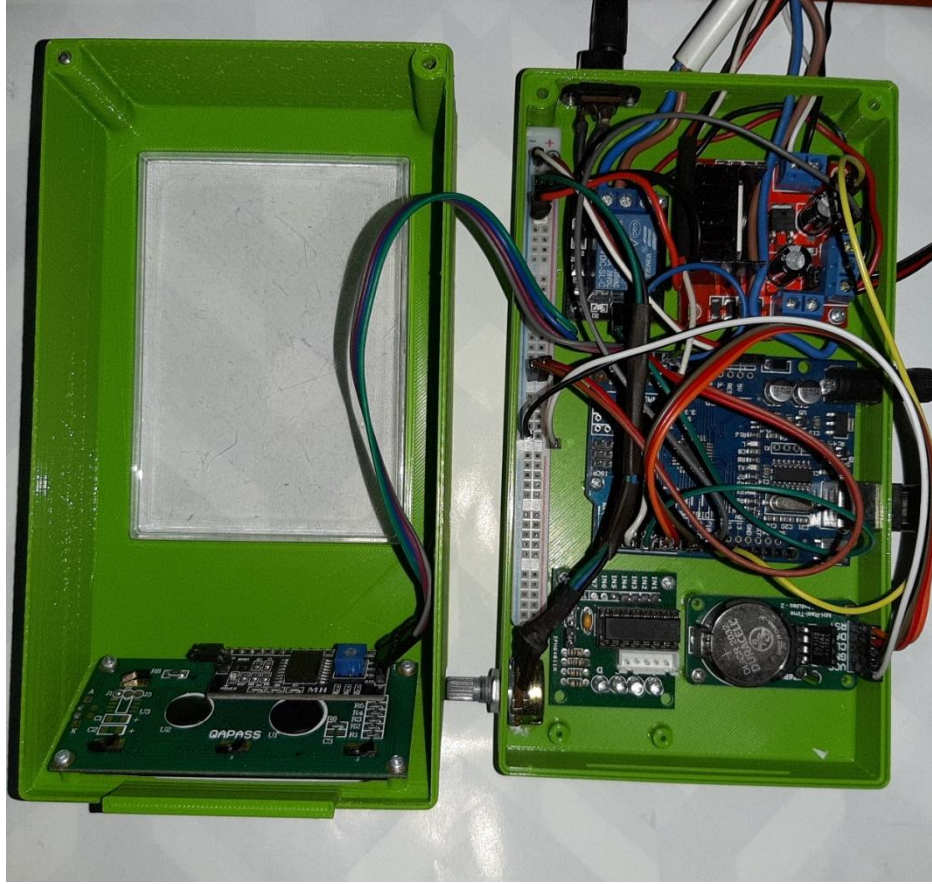
Şekil 0.4 Hazne montaj

Bağlantı Şematığı



Şekil 0.5 Elektronik Devre Şeması

Üretilen elektronik kontrol ünitesi kutusu ve elektronik sistem montajlanmıştır. Montajın son hali ve elektrik kablo tertibatı Şekil 0.6 da görülmektedir.



Şekil 0.6 Elektronik kutusu montajlanmıştır

Tüm modüller M3 vidalarla ilgili yerlere vidalanmıştır. Şekil 0.6'da görüldüğü gibi elektronik bağlantılar için jumper kablolar kullanılmıştır. Tüm bileşenlere gerekli olan 5 V ve GND bağlantıları arduino üzerinde yetersiz sayıda olduğundan bu çıkışlar bir breadbordun ikili hattı kullanılarak çoğaltılmış ve sisteme eklenmiştir. Hazneyi oluşturan iki parçadan üst kısmın ortası transparan şekilde tasarlanmıştır. Bu sayede iç kısım gözlemlenerek olası bağlantı sorunları kontrol edilmesi ve şık görünüm amaçlanmıştır. Bunun yanında bu iki parça yalnızca iki adet vida somun ile bağlanacak şekilde tasarlanmıştır. Haznenin arka kısmında 12 V giriş portu bulunmaktadır. Buraya bağlanan 12 V arduinonun besleme portuna doğrudan kablo ile kalıcı olarak da bağlanabilir. Ancak arduinonun gerekirse sökülebilir olması için soketli olarak yapılmıştır. Arduino hazneden çıkarılmadan programlanabilecek şekilde USB portu için bir yuva

açılmıştır. Bu sayede programda yapılacak değişiklikler doğrudan USB kablo üzerinden karta yüklenmesi mümkündür.

Sistemin nem ve sıcaklık koşullarının sağlandığı hazne kısmı standartlardaki tasarımlar baz alınarak iç içe geçmiş iki kapalı kutudan oluşmaktadır. Bu kutulardan iç kısımdakinin içerisine akor ampul, sprey ve fan yerleştirilmiş vaziyettedir. Standartta belirtilen faz koşullarını sağlayabilmek için sensörlerden gelen verilere göre akor ampul, sprey ve fan çalıştırılarak sistem koşulları istenen şartlara getirilmektedir. Sistem oluşturulurken baz alınan yapı Şekil 0.7’de gösterilmiştir.

Annex A
(informative)

Example schematic diagram of one possible design of spray cabinet with means for optional treating fog exhaust and drain

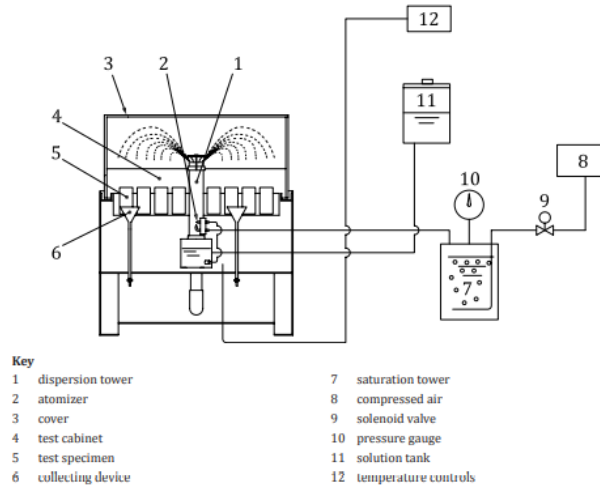
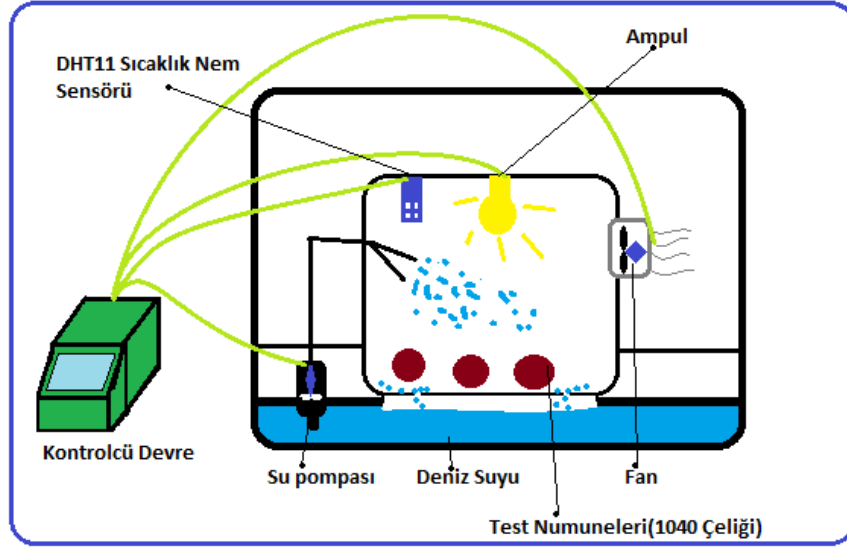


Figure A.1 — Schematic diagram of one possible design of spray cabinet (front view)

Şekil 0.7 Paslandırma ünitesi örnek diyagram

Oluşturulan sistemin şematik tasarımı Şekil 0.8 gibidir.

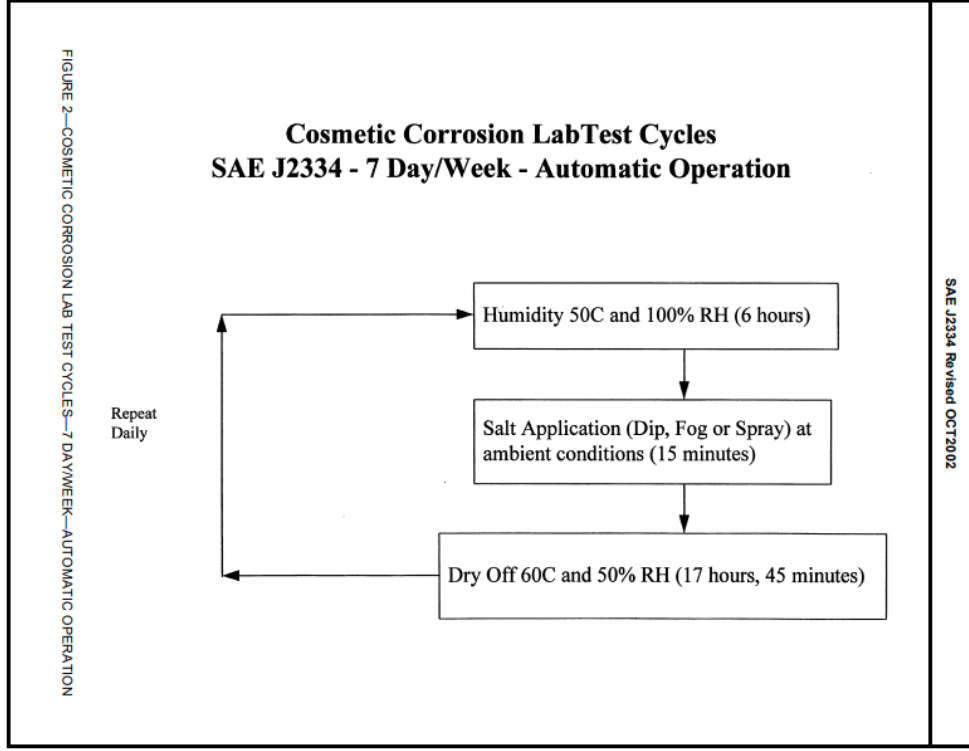


Şekil 0.8 Paslandırma ünitesi şematik gösterim

Oluşturulan bu sistemde iç kısımda bulunan kabın sıcaklık bakımından iyi yalıtılması için alüminyum folyo ile kaplanmıştır.



Şekil 0.9 Alüminyum folyo kaplı kapalı kap



Şekil 0.11 Bir günlük korozyon çevrimi

24 saatlik bir döngüyü ifade eden bu çevrimde kendini tekrar eden 3 faz bulunmaktadır. Bu noktada tekrar belirtmek gerekirse teste “Salt Application” olarak bahsi geçen korozyon katalizörü bizim testimiz için İstanbul deniz suyu olarak belirtilmiştir. Uygulama şekli ise spreylemedir.

Bunlar;

- Sıcaklık 50 °C ve 100% RH nem- 6 saat
- Deniz suyu ile spreyleme- 15 dakika ve
- Kurutma 60 °C ve 50% RH nem- 17 saat 45 dakika

Bu şartlar kabul edilerek Arduino IDE yazılımı üzerinde yazılım geliştirilmiştir. Bu uzun bir süreçtir ve yazılım son halini alana dek birçok kez değişime uğramıştır.

Paslandırma ünitesinin nihai hali yazılımın sisteme yüklenmesiyle gerçekleştirilmiştir. Bu aşamadan sonra paslandırma işlemi başlamıştır. Paslandırma ünitesini son hali Şekil 0.12 gösterilmiştir.

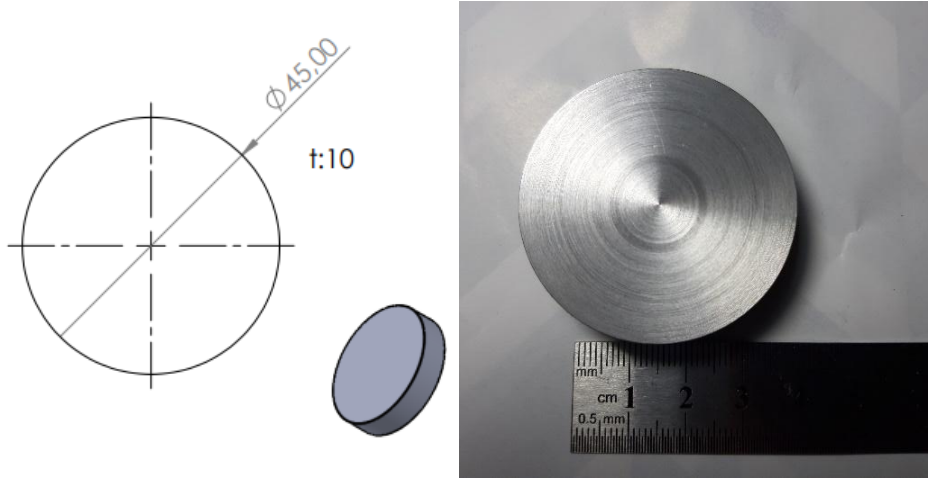


Şekil 0.12 Paslandırma ünitesi son hali

Bu Şekil 0.12 gösterildiği gibi kontrol ünitesi kablolarla sisteme bağlanmıştır. Bu noktada bir sinyal kablosu spreyleme işlemini gerçekleştiren su pompasına, bir sinyal kablosu fana, bir sinyal kablosu da DHT11 sensörüne gitmektedir. Akor ampule gelen elektrik doğrudan şebekeden gelmekte ve röle ile kontrol edilmektedir. Arduino ve diğer bileşenlere ise şebekeden gelen elektrik güç kaynağı üzerinden 12 V DC akıma dönüştürülerek sistemi besleyecek şekilde bağlanmıştır.

Numunelerin belirlenmesi edilmesi ve korozyona uğratılması

Paslandırma ünitesi tamamlandıktan sonra numuneler temin edilmiştir. Bu numuneler Ø45 çubuk yapıdaki 1040 çelik malzemesinden torna tezgâhında 10 mm uzunluğunda dilimler kesilerek oluşturulmuşlardır.



Şekil 0.13 1040 Çeliği numune ve ölçüleri

Numune malzemeler temin edildikten sonra paslandırma işlemi için takvim oluşturulmuştur. 8 günlük bir paslandırma süreci gerçekleştirilmiştir ve bu süre zarfında her gün SPREY fazından önce bir numune eklenerek malzemeler korozyona uğratılmıştır. Bu süreç Şekil 0.14 de ifade edilmiştir.

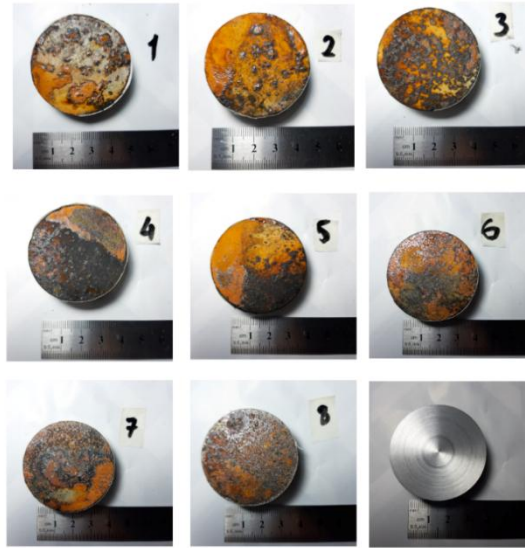


Şekil 0.14 Paslandırma süreci

Tablo 0.2 Numune Korozyon Süreleri Tablosu

Korozyon Takvimi	Başlangıç günü	Bitiş günü	Toplam süre
Numune 1	02.01.2021	10.01.2021	8*24= 192 saat
Numune 2	03.01.2021	10.01.2021	7*24= 168 saat
Numune 3	04.01.2021	10.01.2021	6*24= 144 saat
Numune 4	05.01.2021	10.01.2021	5*24= 120 saat
Numune 5	06.01.2021	10.01.2021	4*24= 96 saat
Numune 6	07.01.2021	10.01.2021	3*24= 72 saat
Numune 7	08.01.2021	10.01.2021	2*24= 48 saat
Numune 8	09.01.2021	10.01.2021	1*24= 24 saat

Şekil 0.15 Korozyon süreci tamamlanan numuneler



Şekil 0.16 Korozyon süreci tamamlanan numuneler

Oluşturulan numune malzemelerin endüktif sensör ile veri toplanması

Veri toplamak için yerli üretim veri toplama kartı kullanılmıştır. Ludre VTK1050 ile yapılan veri toplama işlemi için M8 0-4 mm aralığında ölçüm yapabilen endüktif sensör kullanılmıştır. Ölçüm düzeneğini oluşturan parçalar sırasıyla;

- Ludre VTK1050 veri toplama kartı
- Endüktif sensör
- Bilgisayar ve veri kayıt yazılımıdır.

Ludre VTK1050 veri toplama kartı

Yerli üretim bir karttır. Üzerinde aynı anda 3 farklı sensörden veri toplamasına imkân sağlayan giriş portları vardır. Bilgisayara bağlandıktan sonra ilgili veri kayıt yazılımı ile saniye başına 300 veri toplama kapasitesine sahiptir.



Şekil 0.17Ludre VTK1050 Veri toplama kartı

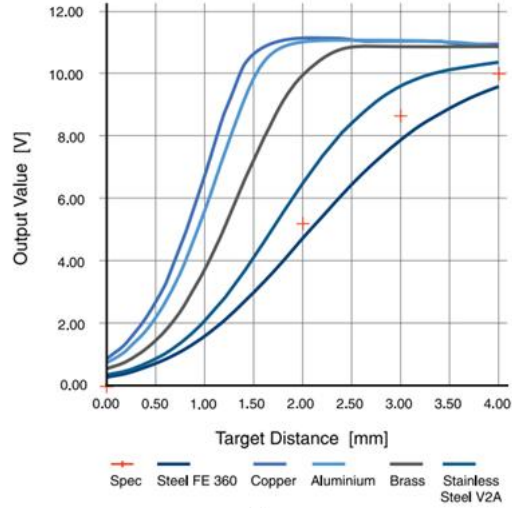
Endüktif sensör

Endüktif sensörler metal malzemelere yaklaştırıldıklarında değişken sinyal üreten sensörlerdir. Sensör içerisinde bir manyetik alan oluşturan sargı ve oluşan manyetik alana göre çıkış voltajı üreten diğer bir sargıdan oluşmaktadır. Çalışma aralığına gelen metal malzemenin uzaklığına ve cinsine bağlı olarak üretilen voltaj genliği değişmektedir. Bu çalışmada kullanılan sensörün bilgi kağıdında verilen çalışma aralıkları Şekil 0.17’de gösterilmiştir. Sensör metal malzemeye yaklaştıkça oluşan voltaj azalmaktadır. Aynı zamanda korozyon gibi malzemenin yapısında değişiklik meydana getiren durumlarda da sensörden okunan değerler değişmektedir.

Bu çalışmada DW-Ax-509-M8-39x model M8 0-4 mm ölçüm aralığına sahip hassas bir endüktif sensör kullanılmıştır(Şekil 2.28 b).



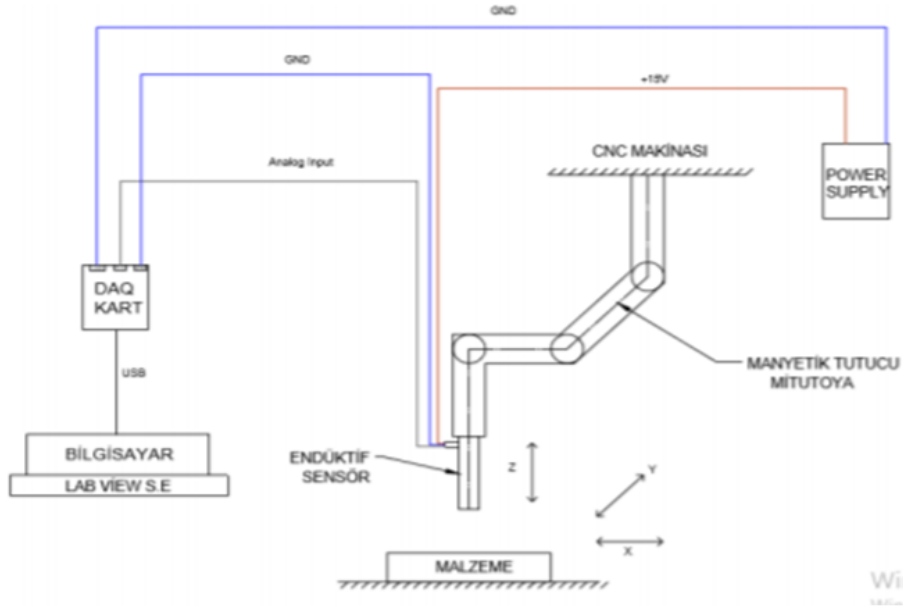
a. Endüktif sensör



b. Ölçüm aralığı

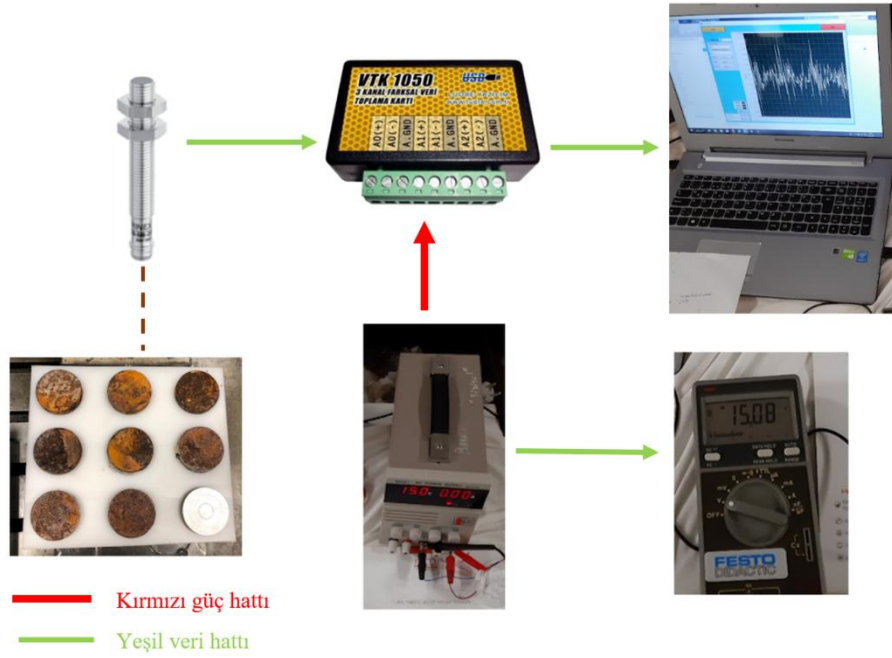
Şekil 0.18 Endüktif sensör ve Ölçüm aralık grafiği

Veri toplama işlemini gerçekleştirmek için endüktif sensör Ludre VTK1050 kartı bağlantısı yapılarak bilgisayarda program ile haberleştirilmesi yapılmıştır. Bu bağlantının şematığı Şekil 0.18 da gösterilmektedir.



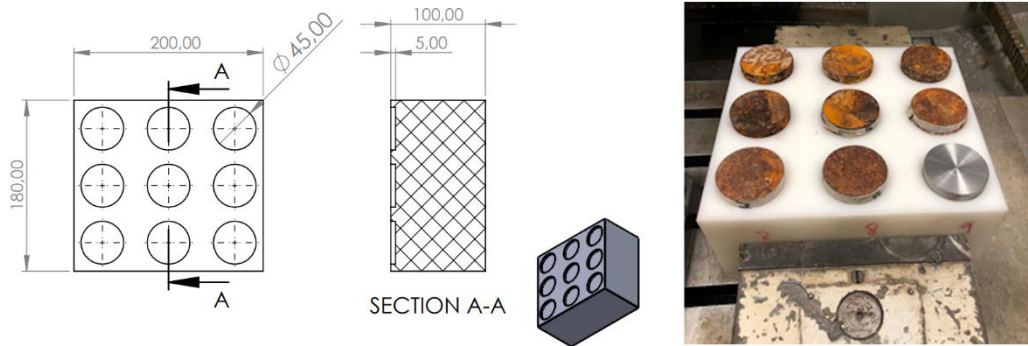
Şekil 0.19 Veri Toplama Düzenegi Şematik Gösterimi (BAKIR, 2012)

Sistem endüktif sensörün çalışması için Ludre veri toplama kartına 15 V ile beslenerek çalıştırılmaktadır. Güç kaynağı üzerinden 15 V ayarlanmıştır ve emin olmak için multimetre ile de ölçüm yapılarak sistemin çalışmasından emin olunmuştur.



Şekil 0.20 Veri Toplama düzeneği Parçalar ve veri Akışı

Korozyona uğrayan numuneler CNC tezgâh kullanılarak hassas bir şekilde ölçülmüşlerdir. CNC tezgâha numuneler doğrudan bağlanamayacağı için ve ölçümün daha kolay yapılması adına bir fikstür tasarlanmış ve delrin malzemedan üretilmiştir. Dikdörtgen prizma yapıdaki delrin malzeme CNC frezede 9 adet yuva açılarak numunelerin yerleştirilmesine uygun hale getirilmiştir. Endüktif sensör yapısı gereği manyetik alan kullanarak çalışan bir sensördür ve metal malzemeler ölçümü etkileyebilmektedir. Bu noktada delrin malzeme ile oluşturulan fikstür ölçümün sağlıklı yapılması açısından avantaj sağlamıştır. Oluşturulan fikstür üzerine numuneler sırasıyla yerleştirilmiş ve CNC tezgâha mengene yardımıyla sabitlenmiştir.



Şekil 0.21 Fikstür Ölçüleri ve Numune Malzemeler

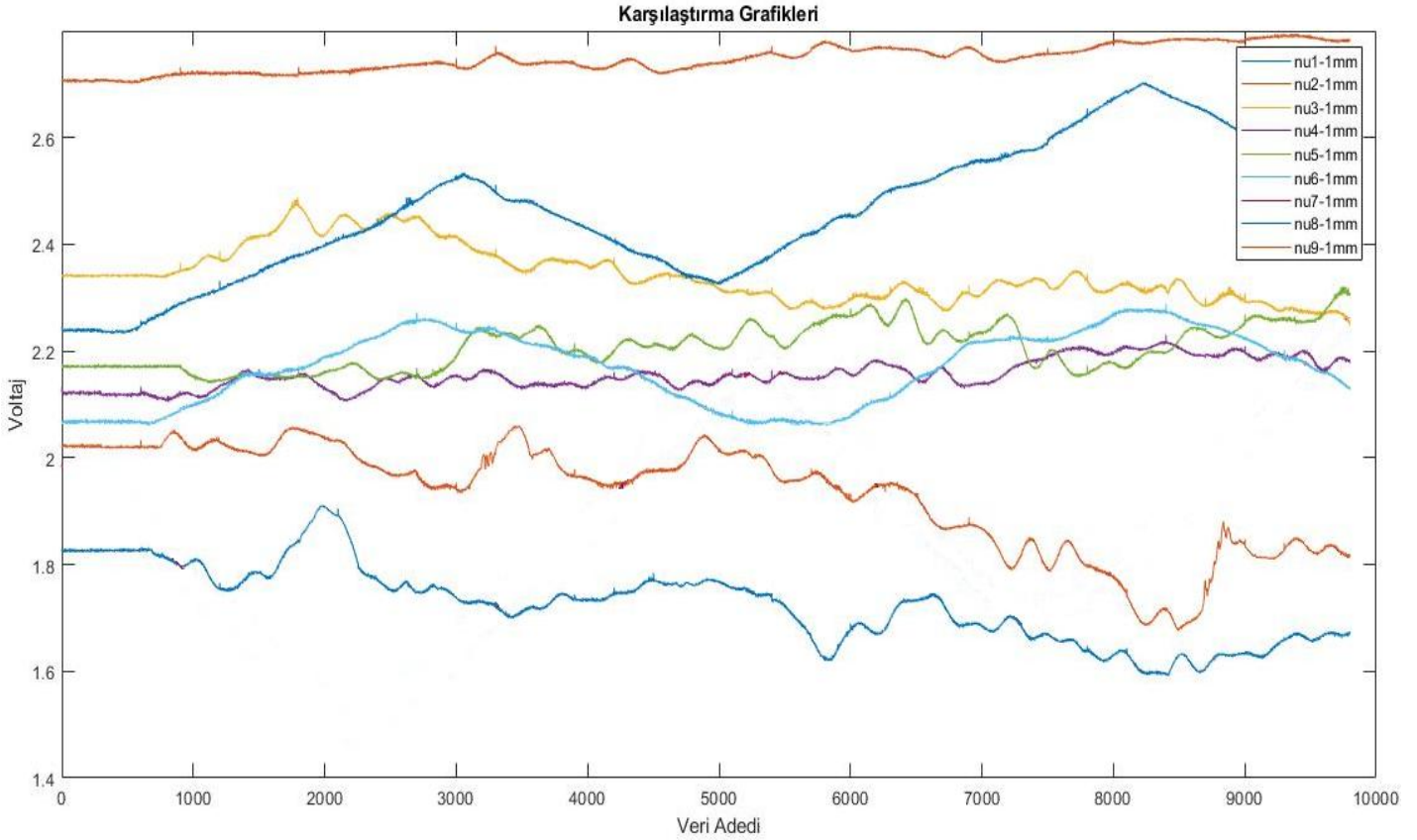


Şekil 0.22 Veri Toplama Düzeneği

Oluşturulan düzenek CNC tezgâha bağlanmıştır. Mastercam programında numuneler üzerinde gezen bir post hazırlanmış ve endüktif sensörün numune parça üzerinde tarama yaparak veri toplama işlemi yapılmıştır. Her bir numuneden 1, 2 ve 3 mm yüksekliklerinden veri alınarak testlerin tutarlılığı sağlanmıştır.

Grafiklerin elde edilmesi ve yorumlanmaları

Endüktif sensör ile numunelerden toplanan veriler veri kayıt programıyla bilgisayar kaydedilmiştir. Saniyede 300 adet verinin kaydedildiği çalışmada bir numune için 9800 veri elde edilmiştir. Bu veriler MATLAB yazılımında grafikler oluşturulmuştur. 9 numune için ayrı veriler toplanmış ve bir grafik üzerinde görselleştirilmişlerdir.



Şekil 0.23 Karşılaştırma Grafiği

Çalışmada elde edilen veriler voltaj değerleridir ve 0 ile 12 V aralığında çıktılardır. Bu değerlerin ortalamaları alınarak Tablo 2.2 gösterilmiştir. Buradan da anlaşılacağı gibi zamana bağlı olarak numunelerde ölçülen Voltaj değeri gözle görülür şekilde düşmektedir. Endüktif sensör ile yapılan bu çalışmada korozyon ölçüm yöntemi olarak endüktif sensörün kullanılması amaçlanan başarıya ulaşmıştır.

Bu çalışmada 3 farklı ölçüm yapılmıştır ve ölçümler sonucunda elde edilen ortalama zamana bağlı olarak ölçülen ortalama voltaj değerleri Tablo 0.2'deki gibidir.

Korozyon Takvimi	Toplam süre [Saat]	Ölçülen Gerilim Ortalaması[V]
Numune 1- 1mm	192	1.7254
Numune 2- 1mm	168	1.9303
Numune 3- 1mm	144	1.8599
Numune 4- 1mm	120	2.1562
Numune 5- 1mm	96	2.2069
Numune 6- 1mm	72	2.1694
Numune 7- 1mm	48	2.3434
Numune 8- 1mm	24	2.4635
Numune 9- 1mm	0	2.7472

Tablo 0.2 Numune Süre ve Ortalama Ölçülen Genlik(V)

SONUÇLAR

Yapılan çalışmada korozyon ölçüm yöntemlerine alternatif bir yöntem olarak endüktif sensör kullanılmıştır. Araştırma yeni yapılacak çalışmalara ön ayak olabilecek düzeydedir. Geliştirilen yöntemin uygulama sahası çok geniştir ve uygulamaya çok elverişli yapıdadır. Seri üretim ile mekanizmalar üretilebilir. Bulut sistemleri ile bir yer altı akaryakıt hattı, açık denizlerdeki gemi gibi sistemlerin korozyon değerleri uzaktan ölçülebilir. Aynı zamanda deniz üzerinde yapılacak olan petrol, doğalgaz sondaj yapılarının uzun vadede denetimi için uygulanabilirliği söz konusudur.

Bu çalışmada elde edilen verilerle bir kontrol algoritması oluşturulabilir. 1040 malzemesi için geçerliliği olan bu verilerle paslanma süresinin tespitine yönelik veri işleme sistemleri kurulabilir. Bu sayede örneğin bir malzemenin kıyaslama yoluyla oluşturulan algoritmalar kullanılarak korozyon süresi tahmin edilebilir. Aynı zamanda tasarlanan bir elektromekanik sistem ile bu sistemler birleştirilerek veri bankası oluşturmak için düzenek tasarlanabilir.

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INVESTIGATION OF THE EFFECTS OF INTELLIGENT MACHINE FEATURES IN CNC MACHINES USED IN HIGH PRECISION MACHINING ON FORM ERRORS IN THE MACHINING OF FREEFORM SURFACES

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Abstract

Freeform surfaces are used extensively in today's aerospace, automotive, energy and transportation industries due to their superior aerodynamic properties. High aerodynamic properties lead to the need for parts with complex geometries. For this reason, freeform surfaces consist of a complex geometry formed by parametric curves. Depending on the design of freeform surfaces, production precision increases and the selection of optimum production parameters becomes important. In the production process of freeform surfaces, general process parameters such as cutting speed, feed rate, depth of cut, as well as precision machining codes on CNC machines, also affect the final part quality. In the literature, there are many studies on the surface quality of machined parts using general process parameters. However, there is no study on the use of precision machining codes and methods. For this reason, a study was conducted on the effect of the use of intelligent machine features on the surface quality of parts in the machining of freeform surfaces. In the study, airfoils, which are called 2D cross-sections of parts frequently used in transportation and energy fields such as propellers, rudders and sails, were taken into consideration. The experiments were carried out by Taguchi experimental design method based on L9 orthogonal matrix. Depth of cut (0.01-0.05-0.1 mm), feed rate (100-120-150 mm/min) and cutting speed (100-120-150 m/min) were selected as control factors and levels. As a result of the experiments, the three parts with the most form errors were identified and these parts were remachined using precision machining codes. Then, the improvements in the form defects of the parts were checked. As a result of the study, it was seen that the use of precision machining codes and methods in the machining of freeform surfaces has a positive effect on form defects and increases the surface quality of the part.

Keywords: freeform surfaces; form errors; intelligent machine features; high precision machining

1. Introduction

Freeform surfaces are frequently used in the production of parts with high aerodynamic properties. For this reason, the use of freeform surfaces is increasing in today's aerospace, automotive, energy and transportation industries. However, the geometries of freeform surfaces designed using parametric curves and three-dimensional surfaces can be quite complex. The complex geometry of freeform surfaces depending on the design increases the manufacturing precision. In order to increase the manufacturing accuracy, various algorithms have been developed for the machining of freeform surfaces. Choi and Banerjee developed a product accuracy based tool path generation algorithm for freeform surfaces. The algorithm consists of two parts: feed step function and roughness height value [1]. Erdim et al., developed a mathematical model of form error and cutting force in the machining of freeform surfaces. In addition to this prediction model, a new cutting force model based on the feed rate planning technique was developed, which is compared with the metal removal rate used in feed optimization [2]. Abbas developed an NC tool path algorithm for machining freeform surfaces. For this purpose, he created a Bezier surface according to the control points he determined. Bezier curves were utilized in the manufacturing of this surface [3]. Can and Ünüvar developed a new toolpath method for manufacturing three-dimensional (3D) curves created from a two-dimensional (2D) image traced on a freeform surface on a five-axis CNC machine. They found that deviations of less than 0.00025 between the calculated surface and the normal of the physical surface [4]. Agrawal et al. implemented a master toolpath algorithm and a common roughing strategy for machining freeform surfaces with a ball nose end mill [5]. In addition to these studies, Farouki et al. investigated the machining of freeform surfaces on five-axis CNC milling machines. They focused on tool path generation, tool orientation and tool geometry selection for machining surfaces [6].

General process parameters such as cutting speed, feed rate, tool path, chip depth are very important in the production of freeform surfaces. These parameters ensure part quality up to a point after production. In addition to general process parameters, the use of precision machining codes and methods will be effective in producing parts with higher surface quality. There are many studies in the literature on the surface quality of parts machined using general process parameters. However, there is no study on the use of precision machining codes and methods in part production. For this reason, a study was conducted on the effect of the use of smart machine features on the surface quality of parts in the machining of freeform surfaces. In the study, airfoils, which are called 2D cross-sections of parts frequently used in transportation and energy fields such as propellers, rudders and sails, were taken into consideration. The surface quality of the parts produced as a result of experimental studies using precision machining codes and methods were analyzed.

2. Materials and Methods

2.1. Material

Al 7075 alloy, which is widely used in many industrial areas such as transportation, medical and electronics industries, was used as the material in the experimental studies. The chemical composition values of Al 7075 are shown in Table 1.

Table 1. [%] chemical composition values of Al 7075 material.

Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti
0,0567	0,2763	1,4024	0,0108	Şub.38	0,2009	6,0294	0,0778
B	Na	Ca	Ni	Pb	I	Sn	Co
0,0007	0,0018	0,0052	0,0027	0,0015	0,0002	0,00023	0,00035
V	Sb	Sr	Be	Hg	Zr	Bi	Al
0,0013	0,0007	0,00001	0,00072	0,00056	0,00078	0,0002	89,5

2.2. Method

Airfoil (Aircraft Wing Profile), which is frequently used in the aviation industry and is very sensitive to be machined, was used as the test piece in the studies. The specified NACA2412 airfoil information was obtained from the Airfoil database search site. Rough, semi- finishing and finishing processes were carried out using computer aided manufacturing (CAM) program. The same tools were used for roughing and semi-finishing of nine parts. However, in the finishing processes, the tool was changed every three parts. The reason for this is to minimize the form errors caused by the tool. The results obtained were evaluated using Taguchi experimental design. The form defects occurring in the parts after production were analyzed using Coordinate Measuring Machine (CMM). As a result of the analysis, the parts with the highest form defects were identified. These parts were re-machined using advanced machining technologies. From the results obtained, the effects of advanced machining technologies on form defects were analyzed. Figure 1 shows the experimental flow chart used in the study.

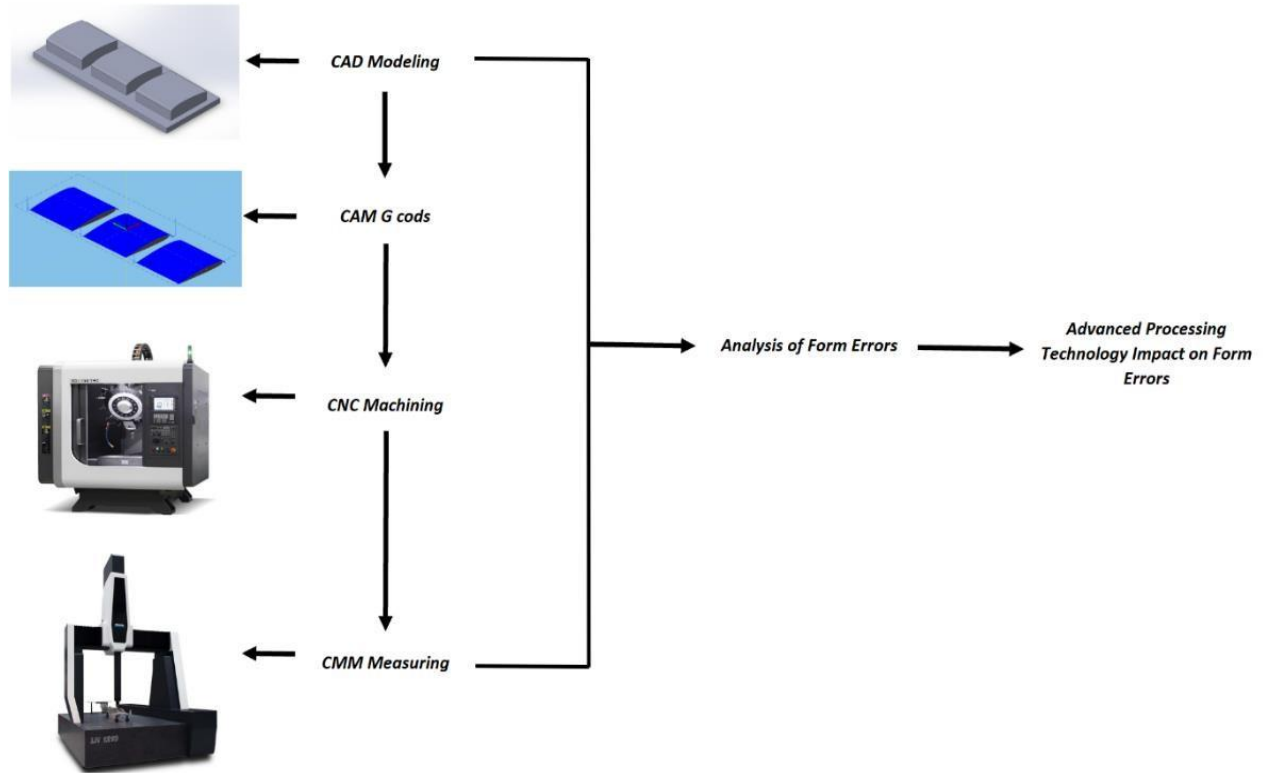


Figure1.Experiment Flowchart

2.2.1. CNC Machine

The Komatech KT420 machine used in the experimental studies is capable of three axis linear and circular interpolation with ISO format programming in metric and inch units (Figure 2). The control unit is Mitsubishi M80.



Figure 2.CNC Machine Used in the Experiments

2.2.2 Cutting Tools

Flat and spherical end mills were used for machining the surfaces. In the literature study on the machining of freeform surfaces, it was understood that roughing, intermediate roughing and finishing were used. The cutting tools used were $\varnothing 10$ end mills, $\varnothing 10$ and $\varnothing 6$ spherical end mills (Figure 3).

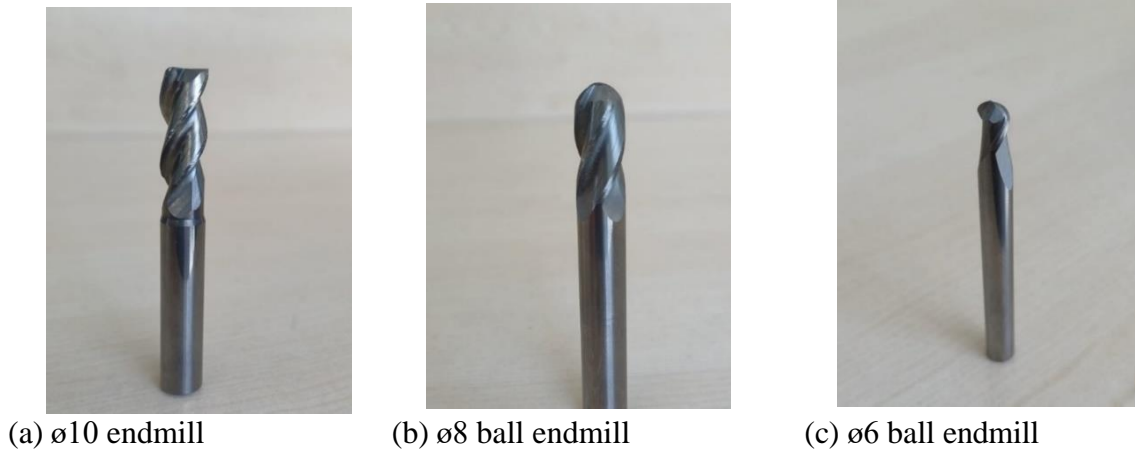


Figure 3. Cutting Tools Used; (a) $\varnothing 10$ endmill (b) $\varnothing 8$ ball endmill (c) $\varnothing 6$ ball endmill

2.2.3. Advanced Processing Technologies

The precision processing codes and methods used in the experimental studies are as follows.

GEOMETRY COMPENSATION FUNCTION: G61.1

The geometry compensation function (G61.1) is used to reduce classical geometry errors caused by the delay of compensation circuits and servo systems (Figure 4).

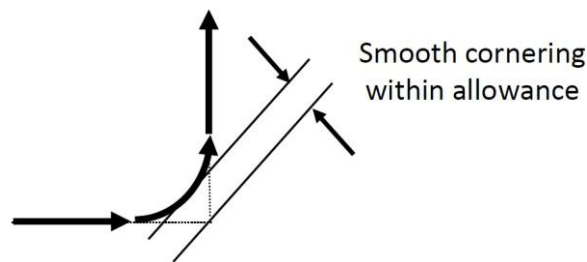


Figure 4. Smooth Corner Control

HIGH SPEED - HIGH SENSITIVITY CONTROL MODE I, II, III

This function runs a machining program that approaches a freeform surface with micro-segments at high speed

and high accuracy. This is effective in increasing the speed of machining patterns of a freeform surface (Figure 5).

- G05 P1000 → High Speed - High Precision Control Mode 2 Active
- G05 P0 → High Speed - High Precision Control Mode 2 Off

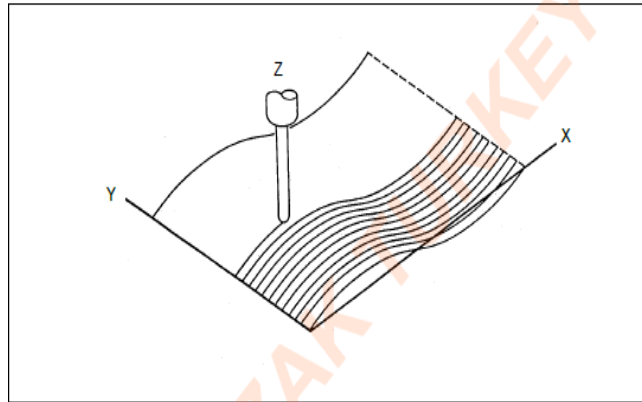


Figure 5. High Speed Machining Mode

Spline Interpolation; G05.1 Q2/Q0

This function automatically generates a spline curve that passes through a series of points commanded by the micro-machining program and interpolates the path along this curve. This enables high speed and high accuracy machining to be achieved (Figure 6).

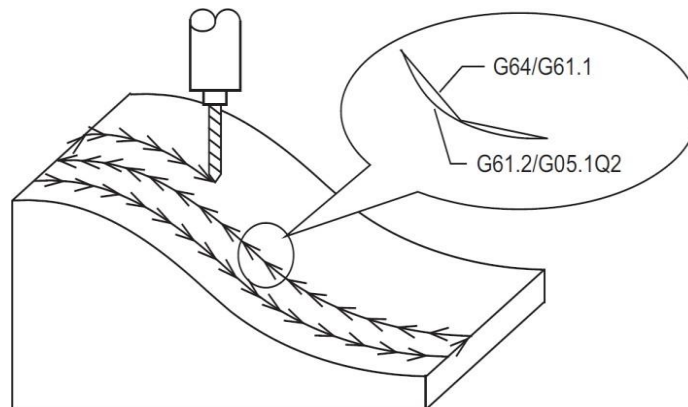


Figure 6. Spline Interpolation

2.2.3. Free Shaped Surface

Airfoils used in aircraft are identified according to their shape and characteristics by a series of numbers developed by the American National Aerodynamic Advisory Committee (NACA) and followed by "NACA". The NACA2412 airfoil used in the experiment was downloaded from the ULUC Airfoil Coordinates Database (Figure 7). Different scallop height values were used in the experimental studies. Scallop height is an important parameter in measuring the surface quality of a component produced on CNC machines (Figure 8).

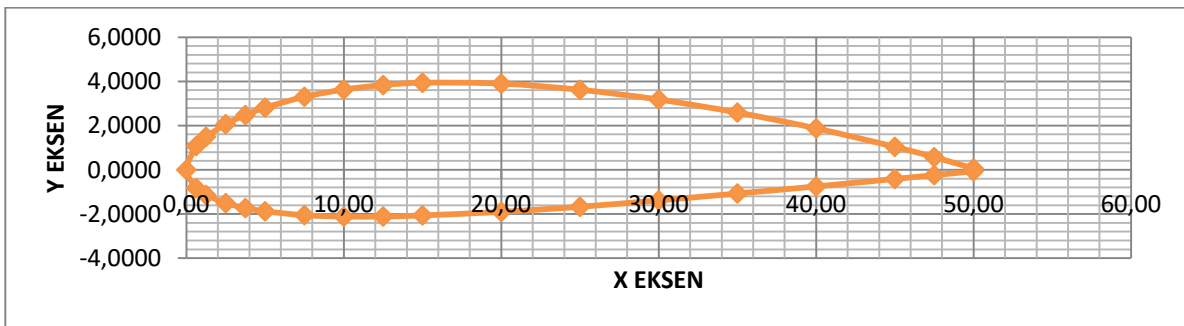


Figure 7. NACA2412

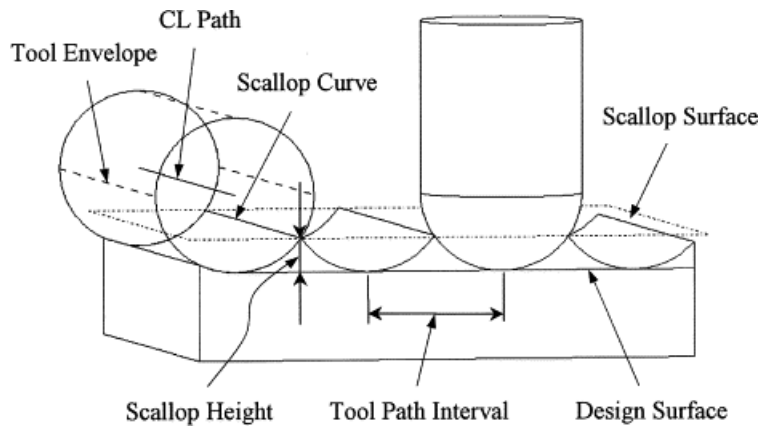


Figure 8. Scallop Height

2.2.4. Processing Method

The experimental parts were machined in 3 stages as rough, semi-finished and finished (Figure 9-11).

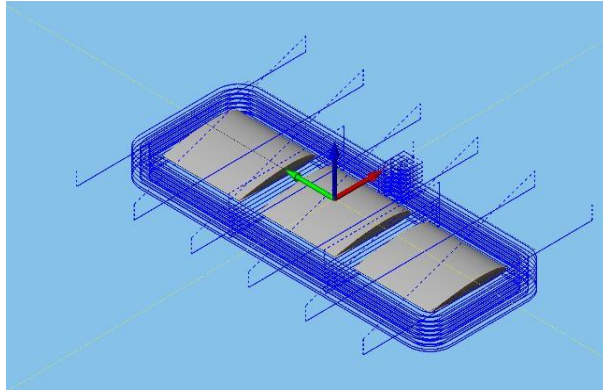


Figure 9. Rough Machining

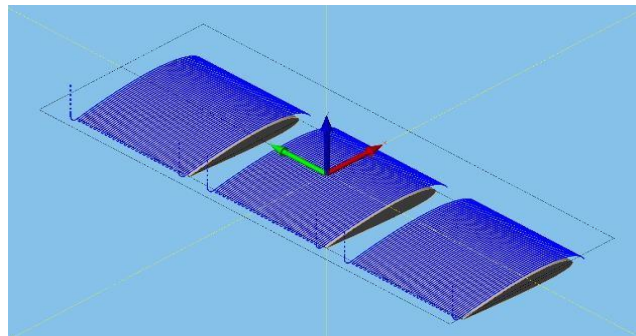


Figure 10. Semi-Finish Machining

Different machining parameters than cutting parameters were used when creating the tool path in finish machining. Different values of cutting width (mm), cutting speed m/mm, feed rate mm/min, machining strategy and fixed step over parameters were used.

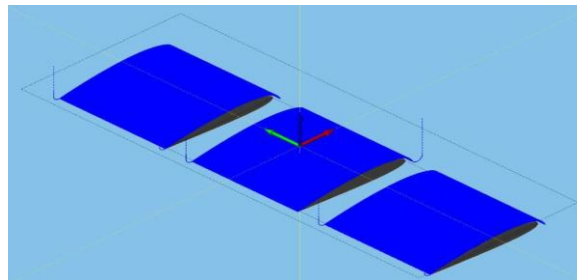


Figure 11. Finish Machining

2.2.5. CUTTING PARAMETERS

The cutting parameters used in the experimental study are given in Table 2.

Table 2. Finish Machining Cutting Parameters

Cutting Parameters	Level 1	Level 2	Level 3
Radial Depth of Cut - a_e (mm)	0,1	0,05	0,01
Feed rate (mm/min)	150	120	100
Cutting speed (m/min)	150	120	100
Machining Strategy	Zigzag	Zigzag	Zigzag
Depth of Cut - a_p (mm)	0,8	0,8	0,8

2.2.6. Taguchi Experiment Design

Experiments were carried out using the Taguchi experimental design method using the L9 orthogonal array (Table 3). Zigzag will be used as the processing strategy in the experiments.

Table 3. Taguchi L9 Orthogonal Experimental Design

Experiment no	A	F	V	Machining Strategy	Step over
Part 1	1	1	1	Zigzag	0,8
Part 2	1	2	2	Zigzag	0,8
Part 3	1	3	3	Zigzag	0,8
Part 4	2	1	2	Zigzag	0,8
Part 5	2	2	3	Zigzag	0,8
Part 6	2	3	1	Zigzag	0,8
Part 7	3	1	3	Zigzag	0,8
Part 8	3	2	1	Zigzag	0,8
Part 9	3	3	2	Zigzag	0,8

2.2.7. CMM Measurement

The measurements of the parts machined on the Komatech CNC machine were made on the Wenzel CMM machine (Figure 12). Revo 5 axis measurement system of Renishaw company was used in the CMM machine. Measurements were made by form structure scanning method. There are a total of 138 (6x23) measurement points for 1 piece.



Figure 12. Wenzel 3D Gantry Cmm

3. Results and Discussion

3.1. Block No. 1 Measurement Results and Form Error Analysis

The same scallop height was used in the finish machining of the 3 parts in block number 1. The scallop height used is 0,000416696 mm.

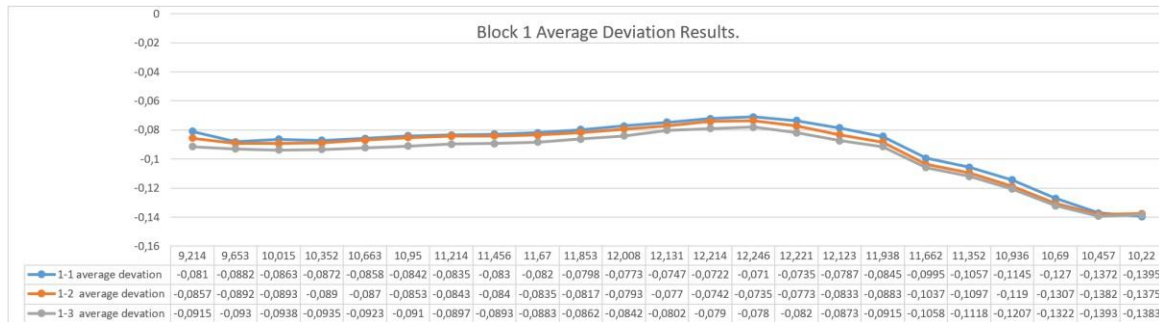


Figure 13. Block 1 Average Deviation Results.

3.2. Block 2 Measurement Results and Form Error Analysis

The same scallop height was used in the finish machining of the 3 parts in block number 2. The scallop height value used is 0,000104168 mm.

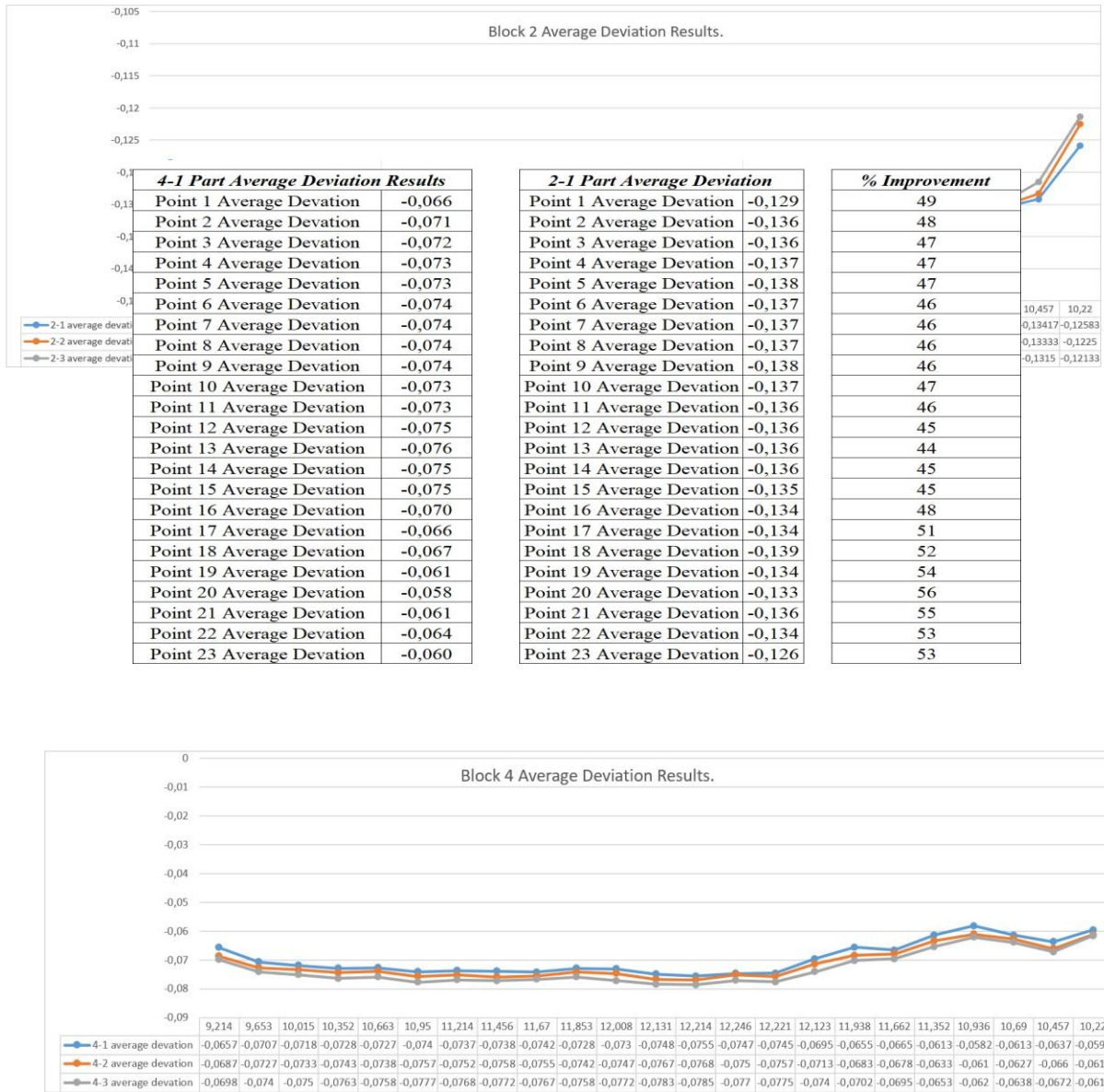


Figure 14. Block 2 Average Deviation Results.

3.3.Results of the Part Machined with Precision Machining Commands and Analysis of Form Defects

Block 2 was found to have the highest number of form defects among the 3 blocks processed. A new block was machined using the cutting conditions used in the machining of block 2. In this new block machining, the high-speed- high-precision control mode II (G05 P1000), overlay function and spline interpolation (G05.1 Q2/Q0) commands were actively used. These commands activated the intelligent machining modes on the machine tool.

Figure 16. Block 4 Average Deviation Results.

After the analysis, it was determined that the effects of intelligent machining machine features on the form defects occurring in the machining of freeform surfaces were positive. It was seen that there was a significant improvement in form defects when the features were used.

Figure 17. Percentage improvement of 2-1 part

4-2 Part Average Deviation Results		2-2 Part Average Deviation		% Improvement
Point 1 Average Deviation	-0,069	Point 1 Average Deviation	-0,132	48
Point 2 Average Deviation	-0,073	Point 2 Average Deviation	-0,134	46
Point 3 Average Deviation	-0,073	Point 3 Average Deviation	-0,135	46
Point 4 Average Deviation	-0,074	Point 4 Average Deviation	-0,137	46
Point 5 Average Deviation	-0,074	Point 5 Average Deviation	-0,137	46
Point 6 Average Deviation	-0,076	Point 6 Average Deviation	-0,135	44
Point 7 Average Deviation	-0,075	Point 7 Average Deviation	-0,134	44
Point 8 Average Deviation	-0,076	Point 8 Average Deviation	-0,136	44
Point 9 Average Deviation	-0,076	Point 9 Average Deviation	-0,138	45
Point 10 Average Deviation	-0,074	Point 10 Average Deviation	-0,137	46
Point 11 Average Deviation	-0,075	Point 11 Average Deviation	-0,136	45
Point 12 Average Deviation	-0,077	Point 12 Average Deviation	-0,136	44
Point 13 Average Deviation	-0,077	Point 13 Average Deviation	-0,136	43
Point 14 Average Deviation	-0,075	Point 14 Average Deviation	-0,136	45
Point 15 Average Deviation	-0,076	Point 15 Average Deviation	-0,137	45
Point 16 Average Deviation	-0,071	Point 16 Average Deviation	-0,135	47
Point 17 Average Deviation	-0,068	Point 17 Average Deviation	-0,135	49
Point 18 Average Deviation	-0,068	Point 18 Average Deviation	-0,141	52
Point 19 Average Deviation	-0,063	Point 19 Average Deviation	-0,136	53
Point 20 Average Deviation	-0,061	Point 20 Average Deviation	-0,135	55
Point 21 Average Deviation	-0,063	Point 21 Average Deviation	-0,136	54
Point 22 Average Deviation	-0,066	Point 22 Average Deviation	-0,133	51
Point 23 Average Deviation	-0,061	Point 23 Average Deviation	-0,133	54

Figure 18. Percentage improvement of 2-2 part

4-3 Part Average Deviation Results		2-3 Part Average Deviation		% Improvement
Point 1 Average Deviation	-0,070	Point 1 Average Deviation	-0,142	51
Point 2 Average Deviation	-0,074	Point 2 Average Deviation	-0,142	48
Point 3 Average Deviation	-0,075	Point 3 Average Deviation	-0,144	48
Point 4 Average Deviation	-0,076	Point 4 Average Deviation	-0,144	47
Point 5 Average Deviation	-0,076	Point 5 Average Deviation	-0,144	47
Point 6 Average Deviation	-0,078	Point 6 Average Deviation	-0,143	45
Point 7 Average Deviation	-0,077	Point 7 Average Deviation	-0,143	46
Point 8 Average Deviation	-0,077	Point 8 Average Deviation	-0,144	46
Point 9 Average Deviation	-0,077	Point 9 Average Deviation	-0,144	47
Point 10 Average Deviation	-0,076	Point 10 Average Deviation	-0,144	47
Point 11 Average Deviation	-0,077	Point 11 Average Deviation	-0,143	46
Point 12 Average Deviation	-0,078	Point 12 Average Deviation	-0,141	45
Point 13 Average Deviation	-0,079	Point 13 Average Deviation	-0,141	44
Point 14 Average Deviation	-0,077	Point 14 Average Deviation	-0,142	46
Point 15 Average Deviation	-0,078	Point 15 Average Deviation	-0,142	46
Point 16 Average Deviation	-0,074	Point 16 Average Deviation	-0,138	46
Point 17 Average Deviation	-0,070	Point 17 Average Deviation	-0,137	49
Point 18 Average Deviation	-0,070	Point 18 Average Deviation	-0,143	52
Point 19 Average Deviation	-0,065	Point 19 Average Deviation	-0,137	52
Point 20 Average Deviation	-0,062	Point 20 Average Deviation	-0,135	54
Point 21 Average Deviation	-0,064	Point 21 Average Deviation	-0,135	53
Point 22 Average Deviation	-0,067	Point 22 Average Deviation	-0,132	49
Point 23 Average Deviation	-0,062	Point 23 Average Deviation	-0,121	49

Figure 19. Percentage improvement of 2-3 parts

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As a result of using G05 P10000 (High Speed - High Precision Control Mode Active) and G05.1 Q2 (Spline Interpolation Mode Active) commands, improvements between 56% and 45% in the 1st part, 57% and 45% in the 2nd part, 56% and 46% in the 3rd part were achieved. High Speed - High Precision commands improved the form errors by 50% on average.

4. Conclusions

When the CMM reports of the experimental study were examined, it was determined that the CNC machine used in the experiment had good precision and repeatability. For each block, 4 separate Ø 6 sphere tools were used. In this way, it was aimed to minimize the form errors due to tool wear. According to the CMM report results, it was seen that the form defects of the parts machined in block 1 and block 3 were low. It was determined that the cutting conditions used in the machining of these parts had little effect on the form defects. In block 2, it was determined that the form defects were high and the effect of the cutting conditions used on the form defects was high. Block 4, which was machined using block 2 cutting conditions and G05 P10000 (High Speed-High Accuracy Control Mode Active) and G05.1 Q2 (Spline Interpolation Mode Active) codes, showed a noticeable improvement in form errors.

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SİLİKON BAZLI POLİMER KAPLAMA PROSESİ İLE JAKAR İPLERİNDE UZUN SÜRELİ DAYANIKLILIK VE PERFORMANS

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Özet

Tekstil ürünlerinde özgün ve detaylı desenlerin üretimini mümkün hale getiren jakar ipleri yüksek mukavemetli teknik özelliklere sahiptir. Jakar ipleri, karmaşık desenlerin yüksek hassasiyetle üretilmesini sağlamakta ve gerekli olan makine ayarlarına yönelik farklı özelliklerde tercih edilmektedir. Bu noktada, jakar iplerine uygulanan kaplama prosesi, sadece özgün desenlerin üretilmesine değil, aynı zamanda iplerin dayanıklılığını, kullanım ömrünü ve renk kalitesini artırmaya yönelik kapsamlı bir strateji sunmaktadır. Teknik gerdirme işlemi, ipliklere belirli bir gerilim uygulanarak kaplama malzemesinin düzgün dağılmasını ve mükemmel bir kaplama sağlanmasını hedefler. Bu esnada jakar ipleri fiksasyon (sabitlenme) işlemine tabi tutulur. Bu adım, kaplama malzemesinin ipliklere tam olarak bağlanmasını sağlar. Jakar makinesinin çalışması esnasında, ipler arasındaki sürtünmeden dolayı jakar iplerinin kopma süreci hızlanmaktadır. Uygulanan kaplama işlemi ile, jakar iplerinin iplik mukavemetleri artırılarak kullanım ömrü uzatılmaktadır. İplerin kullanım ömrü sürtünme dayanımı ve mukavemetlerine bağlı olarak değişmektedir. Bu çalışma, tekstil endüstrisindeki jakar iplerinin ömrünü uzatma amacı ile farklı kaplama proseslerinin etkilerini değerlendirmektedir. Çeşitli silikon bazlı polimer emülsiyonu kaplama işlemi uygulanan jakar ipleri üzerinde yapılan testler, kaplamanın jakar iplerinin mukavemetini ve kullanım ömrünü değiştirdiğini göstermektedir. Bu süreçte kullanılan malzemeler, kurutma, fikseleme ve teknik gerdirme prosesleri üzerinde yapılan detaylı analizler, jakar iplerinin mukavemet ve sürtünme dayanımını artırmada etkili olduklarını ortaya koymaktadır. Bu çalışmanın sonuçları, tekstil endüstrisinde jakar iplerinin performansını optimize etmek için yeni kaplama stratejileri ve malzemeleri geliştirmeye yönelik gelecekteki araştırmalara yol gösterici olacaktır.

Anahtar Kelimeler: Jakar ip, silikon bazlı polimer, dayanıklılık



INVESTIGATION OF THE DURABILITY AND PERFORMANCE OF JACQUARD CORDS SUBJECTED TO DIFFERENT SILICONE-BASED POLYMER EMULSION COATING PROCESSES

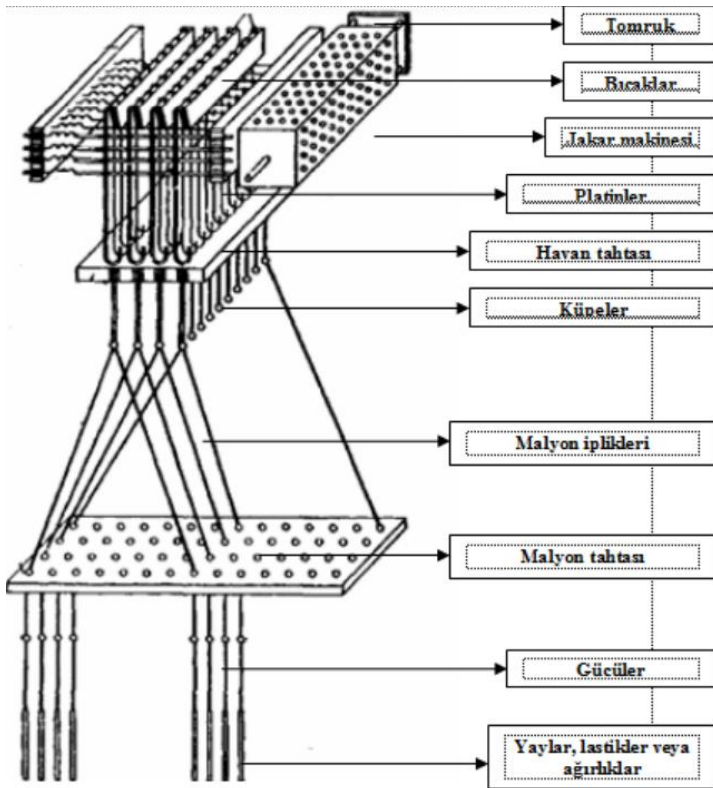
Abstract

Jacquard cords, possessing high-strength technical specifications, make possible the production of unique and detailed patterns in textile products. Jacquard cords ensure the high-precision manufacturing of complex patterns and are preferred for different machine settings. At this point, the coating process applied to jacquard cords not only enables the production of unique patterns but also presents a comprehensive strategy to enhance the durability, lifetime, and color quality of the cords. The technical tensioning process aims to apply a specific tension to the cords, ensuring the even distribution of the coating material and achieving excellent coverage. During this process, jacquard cords go through a fixation process, allowing the coating material to bond thoroughly with the cords. The operation of the jacquard machine accelerates the thread breakage process due to friction between the cords. Through the applied coating process, the tensile strength of jacquard cords is increased, their lifetime is extended. The lifetime of cords varies depending on friction resistance and tensile strengths. This study evaluates the effects of different coating processes on extending the lifetime of jacquard cords in the textile industry, aiming to extend their lifetime. Tests conducted on jacquard cords subjected to various silicone-based polymer emulsion coating processes show that the coating changes the strength and lifetime of jacquard cords. Detailed analyses of the using materials, drying, fixation, and technical tensioning processes demonstrate their effectiveness in increasing the strength and friction resistance of jacquard cords. The results of this study will guide future research in developing new coating strategies and materials to optimize the performance of jacquard cords in the textile industry.

Keywords: Jacquard cords, silicon-based polymer, strength

1.GİRİŞ

Jakar makineleri, normal dokuma makinelerinin jakar makinesi eklenmiş şeklidir. Bu makineler sayesinde, dokuma kumaşlardaki dikey ve yatay olarak bulunan çözgü ve atkı iplikleri birbirlerine otomatik olarak kaldırılıp geçirildiği için karışık desenler kolaylıkla örülebilmektedir. (Dracup, 1951) (R.H.Gong, 2011) Bu jakar iplerinin çok sayıdaki çözgü ipliğini ayrı hareket ettirebilmesi sayesinde mümkün olmaktadır. (MİLLİ EĞİTİM BAKANLIĞI, 2011) Dokuma makinesiyle jakar makinesini birleştiren jakar ipleri yüksek mukavemetli teknik özelliklere sahip olup harniş ipi, gücü iplikleri olarak geçmektedir. (Tekstil Sayfası, 2024) (Türkiyenin Tekstil Portalı, 2023) Gerekli olan makine ayarlarına yönelik farklı özellikli jakar ipleri tercih edilmektedir.



Şekil 24. Jakar Makinesinin Şematik Görünüşü (MİLLİ EĞİTİM BAKANLIĞI, 2011)

Jakar makinelerinin başarılı çalışması, doğru jakar iplerinin kullanımını gerektirmektedir. Bunun için de doğru tasarım ve malzeme seçimi, uygun proses seçimi, kaliteli sonuçların elde edilmesini sağlamaktadır. Malzeme seçiminde genelde polyester, viskon, naylon gibi malzemeler tercih edilmektedir. Jakar iplerinin kullanımı sırasında karşılaşılan sorunlar arasında aşınma, yıpranma, renk solması ve kopma gibi faktörler bulunmaktadır. Proses seçimi, ipin tasarımı için de örgü ve bitirme aşamasında jakar ipinin teknik özelliklerinin iyi olması ve sayılan sorunlara çözüm olması için yüksek hassasiyet gerekmektedir.

2. MATERYAL VE METOT

Jakar makinesinin çalışması esnasında, ipler arasındaki sürtünmeden dolayı jakar iplerinin kopma süreci hızlanmaktadır. Jakar iplerinin makineye takma işlemi çok zorlu ve işçilik gerektiren bir işlem olduğundan jakar iplerinin takıldıktan sonra olabildiğince uzun süreli durması, işlevini yerine getirmesi istenmektedir. Bu sebeple jakar iplerinin uzun ömürlü olması için örgü ve bitirme çalışmaları yapılmaktadır. Uygulanan kaplama işlemi ile, jakar iplerinin sürtünme dayanımları artırılarak kullanım ömrü uzatılmaktadır.

Bu projede, silikon bazlı polimer kaplama prosesi ile jakar iplerinde uzun süreli dayanıklılık ve performansının incelenmesi için ilk olarak üç farklı jakar ipi örülmüştür, sonrasında örülen bu üç ip, üç farklı bitirme prosesinden 2 farklı içeriği olan kimyasalla geçilmiştir. Son olarak bu ipler performanslarının incelenmesi için kopma ve portatif olarak tasarlanan sürtünme test cihazlarında test edilerek sonuçları karşılaştırılmıştır.

2.1. Örgü Prosesi

Örgü işlemi en az üç veya daha fazla ipliğin çapraz olarak birbirine geçirilmesi işlemidir. (Y.Kyosev, 2015) Kullanılan makinedeki kukla sayısı, ipliklerin geliş şekli, makinedeki ayarlar ile sağlanan iplerin örgü sıklığı gibi faktörler örülen ipin şeklini belirler.

Bu çalışmada jakar ipleri, 16 kuklalı tres örgü makinelerinde 250 denye ve 420 denye polyester ile farklı örgü sıklığında örülerek üretilmiştir.

Tablo 3. Jakar İpi Örgü Faktörleri

	1. Jakar	2. Jakar	3. Jakar
Malzeme	Polyester	Polyester	Polyester
İpliğin Denyesi	420 d	250 d	460 d
Kukla sayısı	16	16	16
Bir İnçteki Örgü Sayısı	30-40	30-40	30-40

2.2. Bitirme Prosesi

Bitirme prosesi esnasında uygulanan kaplama işlemi iplerin ömrünü, dayanıklılığını ve renk kalitesini arttırmak için ideal bir yöntemdir. Teknik gerdirme işlemi esnasında uygulanan gerilim, kaplama malzemesinin düzgün dağılıp kaplanmasını sağlamaktadır. İpin giyilebilirliği elyafın ve kaplama malzemesinin özellikleriyle ve ipin yapısıyla ilişkilidir. Ayrıca proses esnasındaki makine sıcaklığı da kaplama işleminin kalitesini ve sonuçta çıkan ürünün mekanik özelliklerini etkilemektedir. (Kaifang Xie, 2019)

Bu çalışmada, jakar iplerinin dayanıklılığını arttırmak, performansını iyileştirmek için ve silikon bazlı polimerin etkisini gözlemlemek için kaplama aşamasında silikon bazlı polimer içeren kimyasal kaplama ve silikon bazlı polimer içermeyen kimyasal kaplama kullanılmıştır.

Silikon bazlı polimer kaplama prosesi, jakar iplerinde uzun süreli dayanıklılık ve performans sağlar. Bu kaplama, iplerin yüzeyinde oluşabilecek aşınma ve yıpranmayı önleyerek iplerin ömrünün uzatılmasını sağlar. Ayrıca, kaplama ipin renginin solmasını da engeller ve renklerin daha uzun süre canlı kalmasını sağlar.

Tablo 4. Kaplama İşlemi Esnasında Uygulanan Kimyasallar

KİMYASAL TABLOSU	Polywax	Silikon bazlı polimer
Karışım A	%20-25	-
Karışım B	%10-12	%10-12

Kaplama esnasında, ipe farklı sıcaklık ve gerdirme ayarları yapılan makinede üç farklı proses ile farklı içerikteki iki kimyasal uygulanmıştır.

Tablo 5. Bitirme Prosesi Parametreleri

	Proses 1	Proses 2	Proses 3
Kurutma sıcaklığı (°C)	130	130	130
Fikse sıcaklığı (°C)	190	200	180
Gerdirme yükleri (kg)	3-5	15-20	15-20

Jakar iplerinin ömründe yuvarlaklığı da etkili olup yassılıkları arttıkça daha kısa ömürlü olmaktadır. Gerdirme ayarları da iplerin yuvarlaklığında etkili olduğundan dayanıklılığı azalmaması için gerdirme ayarlarında daha yüksek değerler tercih edilmemiştir. Aksi takdirde, ipin yassılığı artacak ve dayanıklılığı azalarak daha kısa sürede kopma gerçekleşecektir.

2.3. Test Süreci

Bütün prosesler sonucunda jakar iplerine kopma ve sürtünme testi yapılmıştır. Jakar iplerinin jakar makinesinde takılı olduğu pozisyonu modellemek için, iplerin 50 derecelik bir açıyla sürtüldüğü şekilde tasarlanan portatif bir sürtünme makinesinde sürtünme testi gerçekleştirilmiştir. Sürtünme ömrünü kısa sürede öğrenmek için 2 kg ağırlığa bağlanan ipler, dakikada 90 kez sürtünecek şekilde makine ayarı yapılmıştır. Bu sayede normal şartlar

altında bir yılı bulan kopma ömrü kısaltılarak sonucun daha kısa sürede alınıp ömrü üzerine etkisinin öğrenilmesi sağlanmıştır.

3.SONUÇLAR VE TARTIŞMA

3.1. Sürtünme Testi Sonuçları

Tablo 6. Proses 1- Sürtünme Testi Sonuçları

	Maximum Sürtünme Değeri (Cycle)		
	1.Jakar İpi	2.Jakar İpi	3.Jakar İpi
Karışım A	2130	2130	12520
Karışım B	4400	4450	14075
Artış Oranı (%)	106.6	108.9	12.4

Tablo 7. Proses 2- Sürtünme Testi Sonuçları

	Maximum Sürtünme Değeri (Cycle)		
	1.Jakar İpi	2.Jakar İpi	3.Jakar İpi
Karışım A	2684	1749	13615
Karışım B	10450	7420	15702
Artış Oranı (%)	289	324	15

Tablo 8. Proses 3- Sürtünme Testi Sonuçları

	Maximum Sürtünme Değeri (Cycle)		
	1.Jakar İpi	2.Jakar İpi	3.Jakar İpi
Karışım A	2618	1540	5437
Karışım B	5897	5769	12680
Artış Oranı (%)	125	274,6	133,2

Sürtünme testi sonuçlarına bakıldığında her proseste 1. ve 2. jakar ipinin yüzdesel olarak ömrünün daha fazla arttığı gözlemlenmektedir ama sonuç olarak bakıldığında ömrü en uzun olan ipin 3. ip olduğu görülmektedir. Her proseste ve her ip üzerinde en iyi sonucu tüm denemelerde Karışım B vermiştir. Bu da silikon bazlı polimer kaplamanın etkisini göstermektedir.

3.2 Kopma Mukavemeti Testi Sonuçları

Tablo 9. 1. Prosesten Geçen İplerin Kopma Testi Sonuçları

Prosesler	Kopma Mukavemeti Değeri @Fmax (N)		
	1.Jakar İpi	2.Jakar İpi	3.Jakar İpi
Karışım A	377.6	633.5	637.4
Karışım B	403.1	644.3	630.6

Tablo 10. 2. Prosesten Geçen İplerin Kopma Testi Sonuçları

	Kopma Mukavemeti Değeri @Fmax (N)			Artış Oranı (%)
	1.Jakar İpi	2.Jakar İpi	3.Jakar İpi	
Karışım A	376.6	629.6	597.2	% 0,55
Karışım B	402.1	644.3	600.5	

Tablo 11. 3. Prosesten Geçen İplerin Kopma Testi Sonuçları

	Kopma Mukavemeti Değeri @Fmax (N)		
	1.Jakar İpi	2.Jakar İpi	3.Jakar İpi
Karışım A	367.7	619.8	600.2
Karışım B	361.9	637.4	597.2

4.SONUÇ

Yapılan test sonuçları ile uygulanan kaplama işleminde kullanılan kimyasalın ve gerdirme ayarlarının jakar iplerinin mukavemet değerlerine ve ömürlerine örgü yapısıyla birlikte etkili olduğu gözlemlenmiştir.

En uygun prosesin özellikle 1. ve 2. jakar iplerinde sürtünme dayanımını yaklaşık %300 olarak arttıran Proses 2- Karışım B olduğu sonucuna ulaşılmıştır. Bu sonuç ile silikon bazlı polimer kaplamanın etkisi de açıkça gözlemlenmiştir.

Jakar iplerinin kaplama ve teknik gerdirme süreçlerine ilişkin araştırma sonuçları, bu süreçlerin genişletilebilir ve iyileştirilebilir olduğunu ortaya koymaktadır. Çalışmada elde edilen bulgular, bu alandaki potansiyeli daha fazla araştırma ve geliştirme ile açığa çıkarma fırsatlarını vurgulamaktadır.



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1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

POLİPROPİLEN GERİ DÖNÜŞÜMÜNDE KULLANILABİLECEK KATKI MADDELERİ İLE ORJİNAL HAMMADDE ÖZELLİKLERİNDE GERİ DÖNÜŞÜMLÜ POLİPROPİLENİN ELDE EDİLMESİ

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Özet

Geri dönüşüm ile elde edilen polipropilenlerin ele alındığı bu tez çalışmasında, katkı maddeleri ile hazırlanan geri dönüştürülmüş polipropilen ve orijinal hammadde ile üretilen polipropilen plastik malzemelerin özellikleri araştırılıp, ortaya koyulan sonuçlar birbirleri ile kıyaslandı.

Geri dönüştürülmüş polipropilenlerin hazırlanma sürecinde, katkı maddeleri olarak, şişirici, antioksidan, antistatik, çilek kokusu, mukavemet artırıcı, uv stabilizatör ve wax ile belirli yüzdelik kullanım oranlarında çalışıldı. Plastik malzemelerin üretilme işlemi plastik enjeksiyon yöntemi ile gerçekleştirildi ve böylece, homojen karışımlar sağlanarak numuneler üretildi. Farklı katkı oranlarıyla yapılan üretimler sonucu elde edilen numunelere, katkısız geri dönüşüm polipropilen numunelerine ve orijinal hammadde ile elde edilen numunelere yoğunluk, eriyik akış hızı, kül tayini ve TGA-DSC testleri uygulanarak kimyasal ve mekanik özellikleri incelendi.

Yapılan testler sonucunda elde edilen verilere göre, katkılı hammaddeler arasında yoğunluğu $0,92 \text{ g/cm}^3$ olan, orijinal polipropilen hammaddeye en yakın değere sahip olan plastik malzemenin %2 şişirici katkılı geri dönüştürülmüş polipropilen olduğu belirlendi. Katkılı geri dönüşüm hammaddeleri arasında en yüksek erime akış hızı değerlerine sahip malzemelerin %3 ve %6'lık wax katkılı malzemelerin olduğu saptandı. Minimum dolgu yüzdesine sahip katkı %3 çilek kokusu olurken (Kül yüzdesi: %2,52), maksimum dolgu yüzdesine sahip katkı %6 antistatik (Kül yüzdesi: %7,12) olduğu ortaya koyuldu. TGA-DSC testlerinde, sırası ile, sıcaklığa bağlı olarak meydana gelen ağırlık ve ısı kapasitesi değişimlerinde katkılı hammaddelerin katkısız hammaddeye göre küçük oranlarda iyileşme gösterdiği gözlemlendi.

Geri dönüşüm aşamalarıyla üretilen polipropilenler ile uyumlu katkı maddelerinin son ürün özelliklerinin orijinal hammadde özelliklerine yakın olup olmadığı incelendi ve geri dönüşüm içeriğinin ve oranının bu duruma etkisi saptandı.

Anahtar Kelimeler: Geri Dönüşüm, Enjeksiyon, Polipropilen, Katkı Maddeleri, TGA-DSC Testi. Mekanik Özellikler



AKILLI ŞEBEKELERDE ENERJİ DEPOLAMADA KULLANILAN BATARYA KARAKTERİSTİKLERİNİN İRDELENMESİ

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Özet

Akıllı şebekeler, enerji talebinin dalgalanması ve yenilenebilir enerji kaynaklarının değişken doğası gibi zorluklarla karşı karşıyadır. Bu nedenle, enerji depolama sistemleri, enerjiyi depolayarak ve gerektiğinde geri vererek şebekeye esneklik sağlamaktadır. Bu makale, akıllı şebekelerde enerji depolamada kullanılan bataryaların karakteristiklerini incelemektedir. Özellikle enerji depolama sistemlerindeki Lityum Demir Fosfat (LFP) kimyasındaki bataryanın deşarj hızına ve döngü sayısına bağlı yaşlanması, sıcaklığa bağlı takvimsel yaşlanması, depolama gerilimine bağlı yaşlanması ve şarj/deşarj aralığına bağlı olarak yaşlanması üzerinde durulmaktadır. Makale, şebeke tipi enerji depolamada kullanılan LFP batarya kimyasının karakteristiğinin anlaşılmasını sağlayarak akıllı şebekelerde enerji depolama için bataryaların sisteme doğru entegrasyonuna yardımcı olmayı amaçlamaktadır. Bu bilgiler, enerji şebekelerinin daha sürdürülebilir ve verimli bir şekilde yönetilmesine katkıda bulunabilir. Ayrıca bataryaların ikinci yaşam döngüsü, sürdürülebilirliğe etkisi, güvenliği ve geri dönüşümü konularını ele almaktadır. Bataryalar, enerji depolama teknolojilerinde önemli bir rol oynamaktadır ve çeşitli uygulamalarda kullanım süresi sona erdiğinde, çevresel etkileri ve atık yönetimi konuları önem kazanmaktadır. Makalede, bataryaların ikinci yaşam döngüsüne odaklanılmaktadır. Bu, bataryaların ilk kullanım süresi sona erdikten sonra başka bir amaç için yeniden kullanılması anlamına gelir. Örneğin, elektrikli araç bataryaları, enerji depolama sistemlerinde veya güneş enerjisi tesislerinde ikinci bir yaşam döngüsüne sahip olabilir. Bu yaklaşım, bataryaların ömrünü uzatırken, kaynakların daha verimli kullanılmasını sağlar.

Anahtar Kelimeler: Akıllı Şebekeler, Enerji Depolama Sistemleri, Yenilenebilir Enerji Kaynakları, Bataryalar, LFP



EXAMINATION OF BATTERY CHARACTERISTICS USED IN ENERGY STORAGE IN SMART GRIDS

Abstract

Smart grids face challenges such as the fluctuation of energy demand and the variable nature of renewable energy sources. Therefore, energy storage systems provide flexibility to the grid by storing energy and returning it when necessary. This article examines the characteristics of batteries used for energy storage in smart grids. Especially the aging of the battery in Lithium Iron Phosphate (LFP) chemistry in energy storage systems depending on the discharge rate and number of cycles, calendar aging depending on temperature, aging depending on storage voltage and aging depending on the charge/discharge interval are emphasized. The article aims to help the correct integration of batteries for energy storage in smart grids by providing an understanding of the characteristics of LFP battery chemistry used in grid-type energy storage. This information can contribute to more sustainable and efficient management of energy grids. It also addresses the second life cycle of batteries, their impact on sustainability, safety and recycling. Batteries play an important role in energy storage technologies, and at the end of their useful life in various applications, their environmental impact and waste management issues become important. The article focuses on the second life cycle of batteries. This means reusing batteries for another purpose after their initial lifespan has expired. For example, electric vehicle batteries can have a second life cycle in energy storage systems or solar installations. This approach extends the life of batteries and ensures more efficient use of resources.

Keywords: Smart Grids, Energy Storage Systems, Renewable Energy Sources, Batteries, LFP

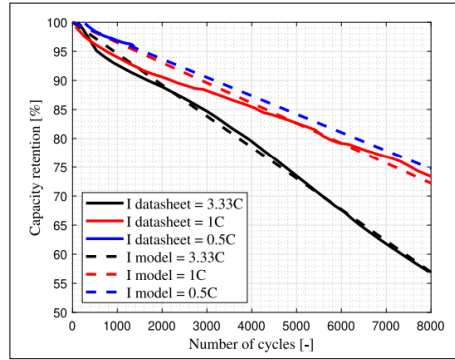
GİRİŞ

Bataryaların akıllı şebekelerdeki potansiyeli, şebeke işletimi için uygun maliyetli ve güvenilir çözümler sunma yeteneklerinden açıkça anlaşılmaktadır. Batarya teknolojilerinin sürekli gelişimi, akıllı şebeke uygulamalarının geleceğinin şekillenmesinde belirgin rol oynayacaktır. İletişim teknolojilerindeki gelişmelerden, siber güvenlik önlemlerinden ve yenilenebilir enerji kaynaklarının entegrasyonundan yararlanan akıllı şebekeler, sürdürülebilir ve verimli enerji dağıtımının sağlanmasında etkin bir rol oynamaya hazırlanmaktadır. Geleceğin akıllı şebekesi, potansiyel siber saldırılara karşı korunmak için sağlam siber güvenlik önlemleri gerektirecektir (Tufail et al., 2021). Akıllı şebekelerin geleceği, çok çeşitli teknolojik gelişmeler ve yeniliklerle şekillenmektedir. Bunlar arasında gelişmiş üretim, bilgi ve iletişim teknolojilerinin birleştirilmesi, uydu iletişiminin rolü, akıllı şebeke iletişim teknolojileri ve küçük ölçekli yenilenebilir enerji kaynakları ile akıllı güç elektroniği tabanlı çözümlerin entegrasyonu yer almaktadır. Bu gelişmelerin mevcut elektrik şebekesini önemli ölçüde iyileştirmesi ve küresel olarak artan güç talebine çözüm sunması beklenmektedir.

YAŞLANMA VE KAPASİTE DÜŞÜŞÜ

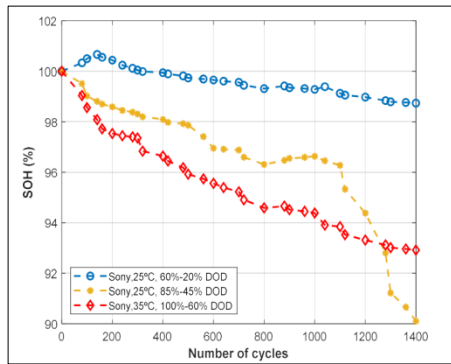
Bataryaların yaşlanması; şarj/deşarj gerilimi, şarj durumu, sürekli şarj akımı, süreklideşarj akımı, takvimsel yaşlanma, iyonların taşınması, sıcaklık ve dendrit (Bataryanın şarj vedeşarj döngüleri sırasında metal elektrotun yüzeyinde oluşan iğne benzeri yapılarıdır. Bu dendritler kısa devreye neden olabilir, bataryaların döngü stabilitesini azaltabilir ve güvenlik tehlikeleri oluşturabilir.) oluşumu gibi çeşitli faktörlerden etkilenen karmaşık bir süreçtir.

Enerji Depolama Sistemlerinde (Battery Energy Storage System, BESS) sıklıkla tercih edilen LFP (Lityum Demir Fosfat) bataryanın Najera ve arkadaşları (2023) tarafından yapılan farklıdeşarj hızlarındaki yaşlanma testinin sonucu ve model tahmini Şekil 25’de verilmiştir. 8000 döngünün sonunda; 3.33C hızında (Bataryalardaki C hızı, bataryanın kapasitesine oranla ne kadar hızlı şarj edilebileceğini veyadeşarj edilebileceğini ifade eder.)deşarj olan bataryanın kapasitesi %57’ye, 1C hızındadeşarj olan batarya modelinin kapasitesi %72’ye, 0.5C hızındadeşarj olan batarya modelinin kapasitesi ise %75’e düşmüştür. Bu çalışmadeşarj hızının yaşlanmaya etkisini göstermektedir. Çünkü şarj-deşarj döngüsü sırasında bataryanın elektrotunun yüzeyi çevrim sırasında sürekli olarak çatlar ve yaşlanır, bu da bataryanın ömrünü etkiler (Zhang et al., 2021).



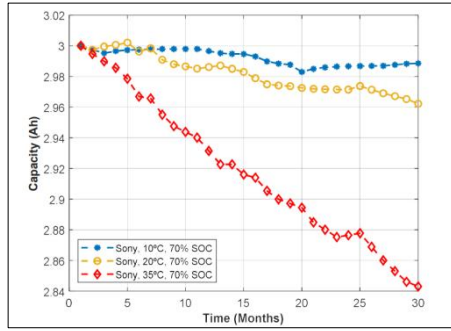
Şekil 25. Sony marka LFP Bataryanın Deşarj Hızına ve Döngüye Bağlı Yaşlanması (23°C) (Nájera et al., 2023)

Şarj ve deşarj geriliminin yaşlanmaya etkisi büyüktür. Şekil 26’de deşarj derinliği %40 olacak şekilde üç farklı gerilim aralığında şarj/deşarj yapılan LFP bataryanın sağlığı gösterilmektedir. 1400 döngünün sonunda %60-%20 arasında şarj/deşarj olan bataryanın sağlığı %99’a, %85-%45 arasında şarj/deşarj olan bataryanın sağlığı %90’a, %100-%60 arasında şarj/deşarj olan bataryanın sağlığı %93’e düşmüştür.



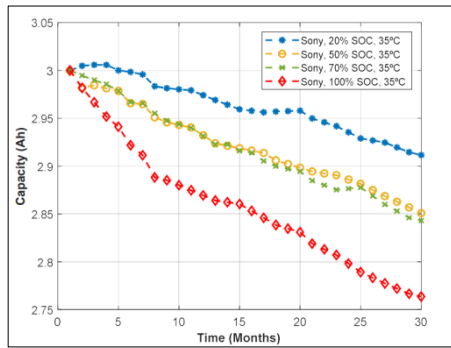
Şekil 26. Sony marka LFP Bataryanın Şarj Deşarj Aralığına Bağlı Yaşlanması (Ali et al., 2023)

Ortam sıcaklığının batarya yaşlanmasına etkisinin incelendiği çalışma Şekil 27’te gösterilmiştir. %70 şarj durumunda ve 3Ah kapasiteye sahip olan bataryanın 30 ay sonundaki kapasitesi; 10°C’de saklananın 2.99Ah, 20°C’de saklananın 2.96Ah, 35°C’de saklananın 2.84Ah’tır. Yüzde olarak ise 10°C’de saklananda %0.33, 20°C’de saklananda %1.33, 35°C’de saklananda %5.33 kapasite kaybı yaşamıştır. Ortam sıcaklığı arttıkça kapasite kaybı artmıştır. Yüksek sıcaklıklara ve dahili ısı oluşumuna maruz kalmak, hızlı kapasite bozulmasına yol açarak lityum bataryanın eskimesine neden olur (Zhang et al., 2023).



Şekil 27. Sony marka LFP Bataryanın Sıcaklığa Bağlı Takvimsel Yaşlanması (Ali et al., 2023)

Şarj yüzdesinin ömre etkisi Şekil 28’te gösterilmektedir. 3Ah kapasiteye sahip olan bataryanın 30 ay sonundaki kapasitesi; %20 şarj yüzdesine sahip olanın 2.91Ah, %50 şarj yüzdesine sahip olanın 2.85Ah, %70 şarj yüzdesine sahip olanın 2.84Ah, %100 şarj yüzdesine sahip olanın 2.76Ah’tır. Uzun süreli depolama durumunda şarj yüzdesi ne kadar az olursa kapasite kaybı o kadar az olduğu görülmektedir.



Şekil 28. Sony marka LFP Bataryanın Depolama Gerilimine Bağlı Yaşlanması (Ali et al., 2023)

BATARYALARIN İKİNCİ YAŞAM DÖNGÜSÜ, SÜRDÜRÜLEBİLİRLİĞE ETKİSİ VE GERİ DÖNÜŞÜMÜ

Kullanılmış bataryaların enerji depolama sistemlerinde yeniden hayat bulmasıyla maliyetleri düşürme, enerji verimliliğini artırma ve sürdürülebilirlik hedeflerine katkı sağlama potansiyeline sahiptir. Elektrikli araç bataryaları büyük endüstriyel enerji depolama sistemlerinde kullanılarak fabrikalarda veya büyük binalarda enerjiyi depolayabilir. Kamarulazam ve arkadaşları (2022) kullanılmış elektrikli araç bataryalarının sabit enerji depolama sistemlerinde kullanılmasını önermiş ve bu bataryaların elektrikli araçlar için uygun olmasa da akıllı şebeke uygulamalarında hala değerli varlıklar olarak hizmet verebileceğini göstermiştir. Kullanılmış elektrikli araç bataryalarının sabit enerji depolama uygulamaları için yeniden kullanılması sera gazı emisyonlarında önemli bir azalma sağlayabilir. Bataryanın yeniden kullanımı için uygun test/değerlendirme yöntemlerinin geliştirilmesi ikincil kullanım açısından kritiktir. Enerji depolama sistemlerine entegre olabilen bataryalar, kullanılmış bataryaların ikinci bir yaşam döngüsüne geçmesini sağlar. Elektrikli araçlardaki bataryaların 2030

ylına kadar tek başına kısa vadeli şebeke depolama talebini karşılayabileceği öngörülmekte, bu da onların sabit enerji depolama potansiyelini göstermektedir (Xu et al., 2023).

Bataryaların elektrikli araçların ve akıllı şebeke sistemlerinin bir parçası olarak kullanılması fosil yakıtlara bağımlılığı azaltacak bir yöntem olarak belirtilmiştir (Crossland et al., 2020). Bu geçiş öncelikle sera gazı emisyonlarını azaltma ihtiyacından ve sınırlı fosil yakıt rezervlerinden kaynaklanmaktadır. Akıllı şebekeye bağlı yenilenebilir enerji kaynaklarının bataryayla birlikte kullanımı CO₂ emisyonlarını ve fosil bazlı kaynaklara bağımlılığı azaltmak için gerçekçi bir çözüm olarak görülmektedir (Aragon-Aviles et al., 2020). Elektrik şebekelerini, iletişim ağlarını, özel donanımları ve hesaplamalı zekayı birleştiren akıllı şebekeler; enerji üretimi, dağıtımı, depolanması, tüketiminin izlenmesine, kontrolüne ve yönetimine olanak sağlayarak karbon ayak izinin azaltılmasına katkıda bulunur (Jihen et al., 2022). Bataryaların ömrü sınırlıdır ve kullanıldıktan sonra nasıl değerlendirileceği düşünülmelidir. Ömrünü tamamlamış bataryaların geri dönüşüm süreci çevre kirliliğini önlemek ve değerli kaynakları geri kazanmak açısından son derece önemlidir.

Elektrikli araçlarda ve enerji depolama sistemlerinde bulunan bataryalarda meydana gelen yangınlar batarya pazarını olumsuz etkilemiştir (Jung et al., 2022). Lityum-iyon batarya sistemlerinin yangın ve patlamalarla termal kontrolden çıkma ihtimali giderek artan bir endişe haline gelmiştir (Li et al., 2022). Ayrıca yüksek çalışma sıcaklıkları da bataryanın kalıcı olarak bozulmasına neden olabilir ve yangın riskini artırabilir (Yang et al., 2020). Bataryaların güvenliği ve bakımı, uzun ömürlü ve verimli bir performans sağlamak açısından kritiktir. Wu ve arkadaşları (2021) bu zorlukların üstesinden gelmek amacıyla enerji depolama şebekelerinin güvenli çalışmasını sağlamak için termal-elektriksel özelliklere dayalı kapsamlı erken uyarı stratejileri geliştirmeye çalışmışlardır. Niu ve arkadaşları (2023) enerji depolama sistemlerinin güvenliğini artırmak için batarya yangınlarını önleyecek ve söndürecek malzeme ve teknolojilerin geliştirilmesini araştırmışlardır. Enerji depolama sistemlerindeki yangın riskini ve olası olumsuz etkilerini azaltmak için tasarım aşamasında doğru/güvenilir batarya hücresi seçimi, iyi tasarlanmış batarya sistemi, yangın algılama ve söndürme sistemlerinin bulunması önemlidir. Yangın riskini azaltmak için bataryaların uygun havalandırma, izolasyon ve yangın engelleme önlemleriyle çevrili olduğundan emin olunmalıdır. Batarya depolama alanlarına yangın algılama ve söndürme sistemleri entegre edilmelidir.

SONUÇ ve ÖNERİLER

Makalede akıllı şebekelerde enerji depolama sistemlerinde sıklıkla kullanılan özellikle LFP bataryaların karakteristikleri incelenmiştir. Bu bataryaların deşarj hızına, döngü sayısına, sıcaklığa, depolama gerilimine ve şarj/deşarj aralığına bağlı olarak nasıl yaşlandığı üzerinde durulmuştur. Deşarj hızının etkisini görmek için LFP



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kimyasındaki batarya binlerce kez şarj/deşarj edilmiştir vedeşarj hızı arttıkça kapasite düşüşünün arttığı tespit edilmiştir. Döngü sayısı arttıkça batarya kapasitesinin azaldığı görülmüştür. Çünkü şarj-deşarj döngüsü sırasında bataryanın elektrotunun yüzeyi çevrim sırasında sürekli olarak çatlar ve yaşlanır. Ortam sıcaklığı arttıkça kapasite kaybı artmıştır. Çünkü yüksek sıcaklıklara ve dahili ısı oluşumuna maruz kalmak, hızlı kapasite bozulmasına yol açarak bataryanın eskimesine neden olur. Uzun süreli depolama durumunda şarj yüzdesi ne kadar az olursa kapasite kaybının o kadar az olduğu saptanmıştır. Şarj/deşarj aralığının etkisini anlamak içindeşarj derinliği %40 olacak şekilde batarya 1400 kere şarj/deşarj edilmiştir ve en sağlıklı şarj/deşarj aralığının %60-%20 olduğu belirlenmiştir. Enerji depolama sistemlerinin tasarımında, bataryaların verimli bir şekilde kullanılmasını sağlayacak kontrol ve yönetim stratejilerini uygulanmalıdır. Ayrıca, bataryaların ikinci yaşam döngüsü için kullanılmış bataryaların enerji depolama sistemlerinde yeniden hayat bulmasıyla sürdürülebilirlik hedeflerine katkı sağlanmalıdır.

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YENİLENEBİLİR ENERJİ SİSTEMLERİNDE ENERJİ DEPOLAMA

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Özet

Dünyadaki enerji talebinin artışıyla birlikte yeni arayışlar içerisine girilmiştir, mevcut sistemin akıllı şebekelere dönüşmesi ve yenilenebilir enerji kaynaklarının katılımıyla daha verimli şebeke modelleri oluşturulmuştur. Kullanılan bu modelde enerji depolamanın önemli bir yere sahip olduğu bilinmektedir. Bataryalar, yenilenebilir enerji kaynaklarından elde edilen enerjinin depolanmasında ve talep-zirve dönemlerinde enerji sağlamada önemli rol oynamaktadır. Yenilenebilir enerji kaynaklarından güneş enerjisi, rüzgâr enerjisi, jeotermal enerjisi, dalga enerjisi vb. enerji kaynaklarından talep-zirve döneminde kullanılmak üzere tercih edilmektedir. Çünkü enerji talebinin düşük olduğu zamanlarda enerjiyi depolayarak talebin yüksek olduğu zamanlarda ise enerjiyi şebekeye vererek dengeyi sağlar.

Bu çalışma, akıllı şebekelerde enerji depolamada kullanılan bataryaların farklılıklarını ele almaktadır. Bu teknoloji, yenilenebilir enerji kaynaklarının daha etkin kullanılmasını sağlar. Bu durum enerji talebinin yönetilmesine yardımcı olurken ekonomi üzerinde de değerli etkileri bulunmaktadır. Yapılan kapsamlı araştırmalar, akıllı şebekelerin geliştirilmesinde ve uygulanmasında bataryaların kritik katkısının altını çizmektedir. Şebeke istikrarı, yenilenebilir enerji entegrasyonu ve verimli enerji yönetimindeki çeşitli uygulamalar için bataryaların akıllı şebeke sistemlerinde enerji depolamanın temel taşı olduğu görülmektedir. Bunun yanı sıra bataryaların üretimi, kullanımı ve geri dönüşümü noktalarında çevreyle uyumlulukları araştırmaların devam ettiği bir süreç olduğu bilinmektedir.

Anahtar Kelimeler: Akıllı Şebekeler, Enerji Depolama Sistemleri, Yenilenebilir Enerji Kaynakları, Bataryalar



ENERGY STORAGE IN RENEWABLE ENERGY SYSTEMS

Abstract

With the increase in energy demand in the world, more efficient grid models have been created with the transformation of the existing system into smart grids and the participation of renewable energy sources. It is known that energy storage has an important place in this model used. Batteries play an important role in storing energy obtained from renewable energy sources and providing energy during demand-peak periods. Among the renewable energy sources, solar energy, wind energy, geothermal energy, wave energy, etc. It is preferred to be used during the demand-peak period from energy sources. Because it provides balance by storing energy when the energy demand is low and giving it to the grid when the demand is high.

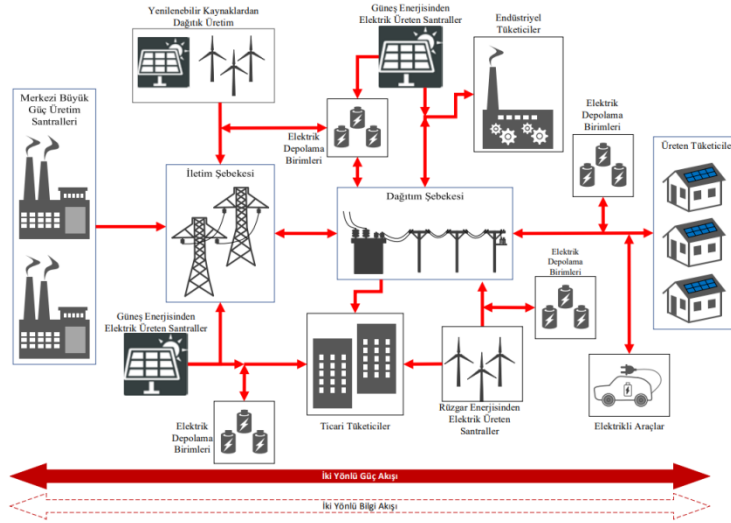
This study discusses the differences of batteries used in energy storage in smart grids. This technology enables more efficient use of renewable energy resources. While this helps manage energy demand, it also has significant effects on the economy. Extensive research underlines the critical contribution of batteries in the development and implementation of smart grids. Batteries appear to be the cornerstone of energy storage in smart grid systems for various applications in grid stability, renewable energy integration, and efficient energy management. In addition, it is known that research on the environmental compatibility of batteries in terms of their production, use and recycling is an ongoing process.

Keywords: Smart Grids, Energy Storage Systems, Renewable Energy Resources, Batteries

GİRİŞ

Dünya nüfusunun 8.5 milyara doğru ilerlediği günümüzde enerjiye olan talepler de her geçen gün artmaktadır. Tüketicilerin talep artışı sebebiyle güç tüketimi de yükselmektedir. Güç sisteminde kalp görevi gören sistem, elektrik şebekesi olarak bilinmektedir. Konvansiyonel şebekeler 19. yüzyılda tasarlanmıştır ve konvansiyonel elektrik şebekelerinde tek taraflı olarak tüketici talebi dikkate alınmaktadır. Tüketici talebine göre üretim santrallerinin devreye alınıp çıkartılması vasıtasıyla elektrik enerjisi üretiminin kontrolü sağlanmaktadır. Bu durum yüksek talep anlarında enerji birim fiyatında ön görülemeyen maliyetleri getirmektedir. Bu olumsuz şartların ortadan kaldırılması düşüncesiyle tüm dünyada akıllı şebeke modeli üzerinde çalışmalar yoğunlaşmıştır. Akıllı şebeke, mevcut elektrik şebekelerine gelişmiş otomasyon ve bilgi iletişim teknolojilerinin entegrasyonudur. Akıllı şebekeler; mevcut güç şebekesinin zayıf ve verimsiz yönlerinin üstesinden gelmek için tasarlanan, bilgi ve iletişim teknolojileri tabanlı güç şebekeleridir. Böylece üretici ve tüketici arasında çift taraflı talepler dikkate alınmaktadır. Alınan bu taleplerle mini santrallerin (yenilebilir enerji kaynaklı) devreye alınması pik noktalarında enerji talebinin maliyetini istikrarlı hale getirmiştir. Özellikle güneş enerjisinin ve rüzgâr enerjisinin zamana göre değişkenlik göstermesinin akıllı şebekenin stabil çalışabilmesi amacıyla bataryalarda enerji depolaması ve bu depolanan enerjinin pik noktalarda devreye alınmasıyla çözüme kavuşturulmuş olduğu gözlenmektedir. Dünyada bu durumun çözümü için akıllı şebeke modelleri oluşturulmuştur ve bu model içerisine yenilenebilir enerji kaynakları entegre edilerek maliyetlerin düşürülmesi, çevreye etkilerinin azaltılması, böylelikle küresel ısınmanın etkilerinin azaltılması amaçlanmaktadır. Akıllı şebeke sayesinde tüketiciler, kendi enerji tüketimleri üzerinde daha fazla kontrol sahibi olmaktadır ve talep cevabında tüketicilerin aktif katılımına imkân sağlamaktadır. Akıllı şebekelerde bataryalar, enerji talebinin yoğun olduğu saatlerde enerji tüketimini dengelemek için kullanılmaktadır.

Tüm gelişmiş ülkelerde konvansiyonel şebekenin yerini almakta olan akıllı şebekeler mevcut şebeke üzerinde geniş kapsamlı bir değişim meydana getirilmeden verimin artırılmasını sağlayan bir sistemdir. Enerji talebi ve üretimi arasındaki dengesizlikleri yönetmek, enerji verimliliğini artırmak ve yenilenebilir enerji kaynaklarının kullanımını optimize etmek için bataryaların kullanımı giderek daha yaygın hale gelmektedir (Abdulsalam et al., 2023b). Bu çalışmada akıllı şebekelerde değişken güç talepleri döneminde önceden depolanmış olan batarya sistemleri kullanılarak şebekenin istikrarlı çalışması öngörülmektedir. Enerji depolayacak bataryaların seçiminde mevcut batarya grupları içerisinde birçok kriter dikkate alınarak en ideal batarya seçimi elde edilmeye çalışılmıştır.



Şekil 29. Akıllı Şebeke Blok Diyagramı (Çakmak & Altaş, 2020b)

AKILLI ŞEBEKELERDE BATARYA KULLANIMININ ŞEBEKEYE AVANTAJLARI

Enerji depolama sistemlerinin; özellikle de bataryaların kullanılması, üretim, iletim ve dağıtım da dahil olmak üzere tüm güç sisteminin güvenilirliğini artırmak için gereklidir. Bataryalar, şebekeye daha fazla anlık güç girişini kolaylaştırarak güç kalitesini artırmaktadır ve dağıtılmış üretimi destekler (Bhadane et al., 2022). Bataryaların akıllı şebekelere entegrasyonu; operasyonel esneklik, yenilenebilir enerji kaynaklarının entegrasyonu, pik azaltma, güç kalitesinin iyileştirilmesi, şebeke istikrarı, verimli enerji yönetimi ve ekonomik faydalar dahil olmak üzere çok sayıda avantaj sunmaktadır. Enerji depolama sistemleri, enerji talebinin zirve noktalarını etkili bir şekilde dengeleyip ani enerji taleplerini karşılayarak enerji tüketimini optimize etmede rol oynamaktadır. Rüzgâr ve güneş enerjisi gibi yenilenebilir enerji kaynaklarının kesintili doğalarının etkilerini azaltarak şebekeye entegrasyonunun sağlanmasında bataryaların potansiyeli büyüktür. Batarya depolama sistemlerinin, talebin düşük olduğu dönemlerde fazla enerjiyi etkili bir şekilde depolayabildiğini ve talebin yoğun olduğu dönemlerde bu depolanan enerjiyi şebekeye vererek ek üretim kapasitesi ihtiyacını azaltacağı ve genel sistem verimliliğini arttıracığı bilinmektedir. Enerji depolama sistemlerinin bu yeteneği, yenilenebilir enerjinin şebekeye daha güvenilir ve istikrarlı bir şekilde entegrasyonuna katkı sağlar (Noorollahi et al., 2020).

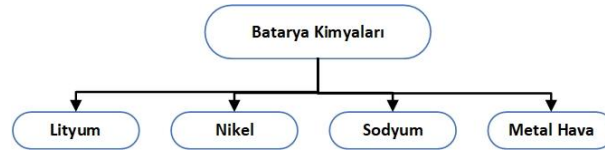
Batarya enerji depolama birimlerinin akıllı şebekelerde konuşlandırılması verimli enerji yönetimine ve enerji maliyetine katkıda bulunur. Bu konuda yapılan birçok yayında öne çıkan nokta verimi en üst düzeye çıkarmak, uygun batarya şarj profilini seçmek, maliyetin uygun olması, etkili ve doğru enerji yönetimi arbitraj yapılmış olması ve çevreye uyumu öne çıkmaktadır (Das et al., 2020; Steffen et al., 2020; Schwenk et al., 2021; Das et al., 2020b; Chaikovskaya, 2020). Enerji maliyetlerini, batarya yaşlanmasını ve CO₂ emisyonunu optimize etmek enerji hizmetleri için ön plandadır; bunlar arasındaki optimizasyon için enerji arbitrajı

önemlidir. Ayrıca enerji depolama sistemlerinin yenilenebilir enerji entegrasyonunun güvenilirliğini, esnekliğini ve istikrarını artırma potansiyeli vurgulanmaktadır. Böylece daha sürdürülebilir ve dayanıklı bir enerji sistemi oluşturulmasına katkı sağlanmaktadır.

AKILLI ŞEBEKELERDE BATARYA KULLANIMININ İRDELENMESİ

Enerji depolama sistemleri, enerjinin depolanması ve gerektiği anda serbest bırakılmasını sağlayarak akıllı şebekelerin temel bir bileşeni haline gelmiştir. Bataryalar, enerji depolama sürecinde elektrik enerjisini kimyasal enerjiye dönüştürerek enerjiyi depolar ve gerektiğinde tekrar elektrik enerjisine dönüştürerek kullanılabilir hale getirir.

Yukarıda ifade edildiği gibi akıllı şebekeye entegrasyonu için uygun kimyadaki bataryanın seçimi, güvenilir ve sürdürülebilir enerji yönetiminin sağlanmasında kritik bir husustur. Şu an piyasada kullanılan bataryaların çoğunu lityum bazlı, nikel bazlı ve kurşun asit bataryalar oluşturmaktadır. Günümüzde batarya yapımında öne çıkan yapım şekilleri silindirik, prizmatik ve kese şeklindedir. Enerji Depolama Sistemlerinde (Battery Energy Storage System, BESS) çoğunlukla sert muhafazaya alınmış prizmatik bataryalar kullanılmaktadır. BESS'lerde kullanılan ana batarya kimyaları Şekil 30'deki blok diyagramla gösterilmektedir.



Şekil 30. BESS'lerde Kullanılan Batarya Kimyalarına Genel Bakış

Kimyasına göre bataryaların farklı türleri vardır ve çoğunlukla katot bileşimine göre sınıflandırılırlar ancak Lityum Titanat Oksit bataryaları anoda göre sınıflandırılır. Piyasadaki en yaygın lityum bataryalar; NCA (Lityum Nikel Kobalt Alüminyum Oksit), NMC (Lityum Nikel Manganez Kobalt Oksit), LFP (Lityum Demir Fosfat), LMO (Lityum Manganez Oksit), LCO (Lityum Kobalt Oksit) ve LTO'dur (Lityum Titanat Oksit). En yaygın kullanılan Nikel tabanlı bataryalar; Ni-MH (Nikel-metal hidrit) ve Ni-Cd'dir (Nikel Kadmiyum). Sodyum tabanlı sık kullanılmaya başlanan batarya ise Na-S'dir (Sodyum Sülfür). Aşağıda anlatılan bataryaların ömrüne, enerji yoğunluğuna, nominal gerilimine, şarj/deşarj C hızına (Bataryalardaki C hızı, bataryanın kapasitesine oranla ne kadar hızlı şarj edilebileceğini veyadeşarj edilebileceğini ifade eder) ve maliyetine ilişkin teknik özellikler



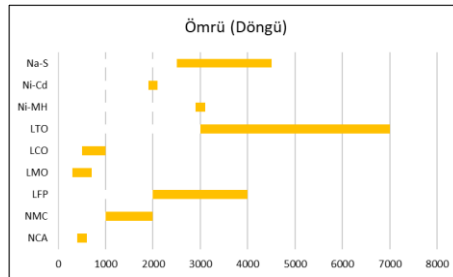
1. BİSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

Tablo 12'de özetlenmiştir.

Tablo 12. Bataryaların Teknik Özellikleri (Khan et al., 2023; Deguenon et al., 2023; Šimić et al., 2021)

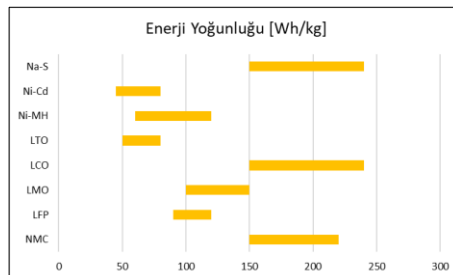
Kimya Tabanı	Lityum						Nikel		Sodyum
	Kimya Adı	NCA	NMC	LFP	LMO	LCO	LTO	Ni-MH	Ni-Cd
Ömrü (Döngü)	500	1000-2000	>2000	300-700	500-1000	3000-7000	3000	2000	2500-4500
Enerji Yoğunluğu [Wh/kg]	200-260	150-220	90-120	100-150	150-240	50-80	60-120	45-80	150-240
Nominal Gerilim [V]	3.6	3.6	3.2-3.3	3.7	3.6	2.4	1.2	1.2	2.3-2.4
Şarj Hızı [C]	0.7	0.7-1	1	0.7-1	0.7-1	1-5	0.5-1	1	-
Deşarj Hızı [C]	1	1-2	1-25	1-10	1	10-30	1	1	-
KWh başına maliyet [USD]	350	360	360	360	600	1005	186-701	745-1424	300-500

Şekil 31'e göre LFP, LTO ve Na-S en yüksek kullanım ömrüne sahiptir (LFP: 2000 ve daha yüksek döngü; LTO: 3000–7000 döngü; Na-S: 2500-4500 döngü).



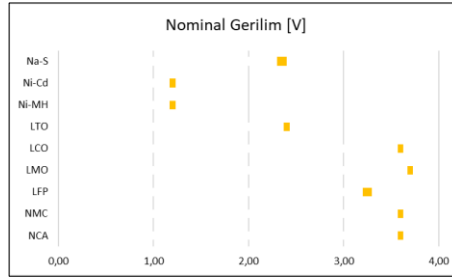
Şekil 31. Ömrü (Döngü)

Şekil 32'e göre NCA, NMC, LCO ve Na-S en yüksek enerji yoğunluğuna sahiptir (NCA: 200–260 Wh/kg; NMC: 150–220 Wh/kg; LCO: 150–200 Wh/kg; Na-S: 150–240 Wh/kg).



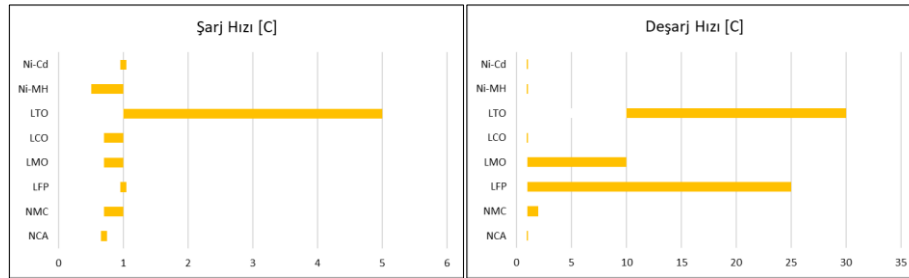
Şekil 32. Enerji Yoğunluğu [Wh/kg]

Şekil 33'e göre gerilimi 3V'den büyük olan kimyalar NCA, NMC, LFP, LMO ve LCO'dur.



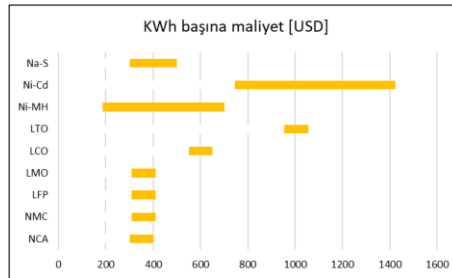
Şekil 33. Nominal Gerilim [V]

Şekil 34'da LFP, LMO ve LTO yüksek şarj/deşarj hızına sahiptir (LFP: 1C şarj ve 1-25Cdeşarj; LMO: 0.7-1C şarj ve 1-10Cdeşarj; LTO: 1-5C şarj ve 10-30Cdeşarj).



Şekil 34. Şarj/Deşarj Hızı [C]

Şekil 35'e göre LCO, LTO ve Ni-Cd en yüksek maliyete sahiptir (LCO: 600 USD/Wh; LTO: 1005 USD/Wh; Ni-Cd: 745-1424 USD/Wh).



Şekil 35. KWh başına maliyet [USD]

NCA bataryalar enerji yoğunluğu açısından iyi performans gösterir. Katot yapısının dengesiz olması sebebiyle büyük yangınlara ve olası patlamalara yol açacak şekilde termal kaçaklara karşı hassastır. NCA bataryalarının güvenlik kaygıları nedeniyle NMC bataryalar geliştirilmiştir. Manganez hücrenin güvenliğini artırır. NMC tabanlı bataryalar; yüksek ömre, iyideşarj hızına sahiptir. Bu kimyanın güvenliği ve maliyeti hâlâ endişe vericidir. Dengeleme sistemi ile Batarya Yönetim Sisteminin (Battery Management System, BMS)

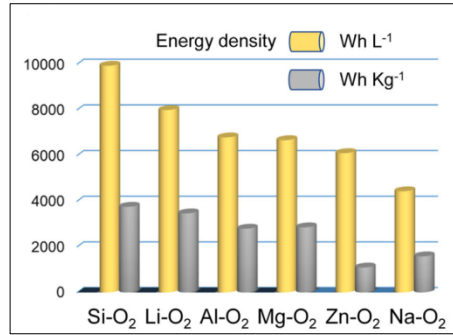
kullanımı hala zorunludur. **LFP**, en ucuz katot malzemelerinden biridir. LFP; yüksek sıcaklıklarda NCA'dan ve NMC'den daha karardır. LFP hücrelerin düşük sıcaklıklarda performansının oldukça düştüğü gözlemlenmiştir. LFP bataryalar diğer lityum iyon kimyalarından daha güvenli olmasına rağmen güvenlik hala bir endişe kaynağıdır ve hücreler arasındaki dengesizlik hala bir sorundur. BMS kullanımı hala zorunludur. Verimlilik analizi, yüksek enerji yoğunluğu, uzun çalışma ömrü ve güvenilirliği nedeniyle lityum demir fosfat bataryaların akıllı şebekelere uygunluğundan bahsedilmiştir (Ekici et al., 2021; Hu et al., 2022). **LMO** hücreleri çok düşük iç dirence sahiptir ve yüksek akım sağlayabilir. LMO; düşük maliyetli ve yüksek güvenlidir fakat ömrü ve yüksek sıcaklık performansı zayıftır. **LCO**, uzun çevrim ömrü ve yüksek enerji yoğunlukları ile karakterize edilen olgun bir batarya teknolojisidir. Lityum kobaltın dezavantajı ise nispeten kısa ömür ve düşük termal kararlılığa sahiptir. **LTO**, lityum iyon hücreler için en güvenli anot malzemesidir. Şarj ve deşarj sırasında hacim değişikliği olmadığından LTO kimyasındaki batarya maksimum döngüsel stabilite sergiler. LTO bataryalar hızlı şarj edilebilir ve 10C'lik yüksek deşarj hızı sağlayabilir. Ömür döngüsü normal Li-ion bataryalardan daha yüksektir. LTO düşük sıcaklıkta mükemmel deşarj özellikleri sergiler. Enerji yoğunluğu ve nominal gerilimi ise düşüktür.

Nikel tabanlı bataryalar dengesizliğe karşı daha güvenli olma eğilimindedir. Dolayısıyla dengeleme sistemlerine gerek olmadığı için kontrol elektroniği çok daha ucuzdur ancak nikel bataryalar aynı koşullar altında Li-ion bataryalardan daha az enerji verimlidir. **Ni-MH** bataryalar daha iyi sürekli deşarj hızı ve hizmet ömrüne sahip olması nedeniyle esas olarak kurşun asit bataryaların yerine kullanılır. Ni-MH tabanlı bataryalar, Li-ion tabanlı bataryalardan daha ağır ve hantal olduğundan enerji yoğunluğunun önemli olduğu uygulamalarda tercih edilmez. **Ni-Cd** bataryalar uzun çevrim ömrüne sahiptir ve bakım gerektirmez. Bu kimya iyi güvenliği ile bilinir. Fakat nominal gerilim değeri 1,2 V'dir. Ni-Cd bataryalar, Li-ion bataryalara göre daha az enerji yoğunluğuna sahiptir ancak yaşlanması yavaştır.

BESS'in en büyük dar boğazlarından biri lityum gibi aktif element eksikliğidir. Sodyum elementi ise bol bulunmaktadır, ekstraksiyonu lityuma göre ucuzdur. Bu nedenle sodyum anotlu bataryalar ilgi çekicidir. **Na-S** bataryalar uygun maliyetli bir çözümdür. Bu teknoloji, ticari olarak kullanılan lityum iyon bataryalarla karşılaştırıldığında performansı hakkında güvenilir sonuçlar çıkaracak kadar yeterince araştırılmamıştır, ancak oda sıcaklığındaki Na-S bataryalar yaşlanma sorunlarına karşı umut vericidir.

Hangi batarya türünün tercih edileceği; enerji depolama sisteminin ihtiyacına, maliyet faktörüne, performans gereksinimine ve kullanım senaryosuna bağlı olarak değişmektedir. Her batarya türünün avantajları ve dezavantajları bulunduğundan spesifik gereksinimleri göz önünde bulundurularak enerji depolama sistemine en uygun batarya tipi seçilmelidir. Yakın gelecekte metal hava bataryaların ticarileşmesi için üreticiler

çalışmalarına devam etmektedir (Li et al., 2022). Diğer kimyalarla karşılaştırıldığında metal-hava bataryaları, oksijen hücrede depolamadığından daha fazla teorik enerji yoğunluğuna sahiptir. Lityum-hava kimyası, yine lityum tabanlı olan lityum-iyon kimyasına kıyasla daha yüksek enerji yoğunluğuna sahip olduğundan akıllı şebeke uygulamaları için potansiyele sahiptir. Ancak metal hava kimyasının akıllı şebeke sistemlerinde etkili bir şekilde kullanılabilmesi için dentrit (Bataryanın şarj ve deşarj döngüleri sırasında metal elektrotun yüzeyinde oluşan iğne benzeri yapılardır. Bu dendritler kısa devreye neden olabilir, bataryaların döngü stabilitesini azaltabilir ve güvenlik tehlikeleri oluşturabilir.) oluşumu ve elektrolit kararsızlığı gibi zorlukların çözülmesi gereklidir (Gao et al., 2020). Metal hava bataryaların enerji yoğunluğuna ait teknik özellikler **Şekil 36**'te özetlenmiştir. Tabloya göre Si-O₂ ve Li-O₂ en yüksek enerji yoğunluğuna sahiptir (Si-O₂: 3750 Wh/kg; Li-O₂: 3460 Wh/kg).



Şekil 36. Çeşitli Metal-Hava Bataryaların Teorik Enerji Yoğunluğu (Sun et al., 2022)

SONUÇ VE ÖNERİLER

Akıllı şebekeler enerji sektöründe değerli bir değişimi temsil etmektedir ve enerji depolama sistemleri bu dönüşümün ayrılmaz bir parçası haline gelmiştir. Bataryalar; enerji depolama, şebeke desteği, yenilenebilir enerji entegrasyonu ve sürdürülebilir uygulamalar için çözümler sunarak akıllı şebekelerin etkin işleyişinin anahtarıdır. Yeni batarya teknolojileri daha verimli enerji depolama ve daha uzun ömürlü bataryalar sunmaktadır. Akıllı şebekelere enerji depolama sistemlerinin entegre edildiğinde çift yönlü arz-taleplerin şebekede olumsuzluk yaratmayacak şekilde karşılanması öngörülmüştür.

Çalışmada elde edilen sonuçlarda BESS'lerde kullanımı öne çıkan NCA, NMC, LFP, LMO, LCO, LTO, Ni-MH, Ni-Cd, Na-S kimyaları incelenmiştir. Bu bataryaların üstünlükleri değerlendirilirken yüksek kullanım ömründen dolayı LFP, LTO ve Na-S; yüksek enerji yoğunluğundan dolayı NCA, NMC, LCO ve Na-S; yüksek şarj/deşarj hızına sahip olduğundan LFP, LMO, LTO ve Na-S; nispeten düşük maliyete sahip olduğundan Na-S, Ni-MH, LMO, LFP, NMC ve NCA tercih edilmektedir. Ayrıca yeni teknoloji metal hava bataryaların yakın



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gelecekte ticarileşmesiyle akıllı şebeke sistemlerinin daha verimli ve kusursuz hale gelmesine yardımcı olacaktır.

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ENDÜSTRİYEL BİR ÜRÜNÜN PLASTİK ENJEKSİYON YÖNTEMİ İLE ÜRETİMİNİN MEKANİK VE ISIL ANALİZİ

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Özet

Plastik enjeksiyon yöntemi, termoplastik malzemelerin belirli bir kalıp içine eritilerek enjekte edilmesi işlemidir. Bu yöntem genellikle seri üretim süreçlerinde kullanılır ve birçok endüstride yaygın olarak uygulanır. Plastik enjeksiyon işlemi genellikle polipropilen, polietilen, polistiren gibi termoplastik malzemelerle gerçekleştirilir. Plastik enjeksiyon, genellikle hızlı, uygun maliyetli ve yüksek hassasiyetli üretim sağladığı için otomotiv endüstrisi, tüketici elektroniği, tıbbi cihazlar, ambalaj endüstrisi, ev aletleri, oyuncak endüstrisi ve inşaat malzemeleri gibi birçok endüstriyel sektörde tercih edilen bir üretim yöntemidir. Plastik enjeksiyon ile üretimin mekanik ve ısıl analizi, malzemenin kalite kontrolü, tasarım iyileştirmeleri ve üretim sürecinin optimize edilmesi gibi işlemler için önemli bir aşamadır. Bu çalışmada, polipropilen bir malzemenin üretilen sprej tetiğinin plastik enjeksiyon yöntemi ile üretimi, mekanik ve ısıl olarak analiz edilmiştir. Bu süreçteki kalıplama ve enjeksiyon aşamalarının Moldex3D paket programı kullanılarak analizi gerçekleştirilmiştir. Belirlenen enjeksiyon basıncı, ütüleme basıncı, dolum süresi, ütüleme süresi, soğutma süresi, soğutucu akışkan debisi, yolluk tasarımı, enjeksiyon sıcaklığı ve kalıp sıcaklığı gibi birçok parametre kullanılarak dolum analizi gerçekleştirilmiş ve ürünün mekanik ve ısıl davranışları incelenmiştir. Sonuç olarak, ürünün çıkarılma aşamasında parça üzerindeki çökme değerinin 0,05 mm değerinin altında olduğu ve hacimsel çekme değerinin de %5 oranının üzerine çıkmadığı görülmüştür. Ayrıca maksimum parça sıcaklığının 43,9 °C olduğu ve malzemenin donma sıcaklığının altında olduğu görülmüştür.

Anahtar Kelimeler: Plastik enjeksiyon, termoplastik, Moldex3D



MECHANICAL AND THERMAL ANALYSIS OF THE PRODUCTION OF AN INDUSTRIAL PRODUCT USING THE PLASTIC INJECTION METHOD

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Abstract

Plastic injection method is the process of melting and injecting thermoplastic materials into a specific mold. This method is often used in mass production processes and is widely applied in many industries. Plastic injection process is generally carried out with thermoplastic materials such as polypropylene, polyethylene and polystyrene. Plastic injection is a preferred production method in many industrial sectors such as the automotive industry, consumer electronics, medical devices, packaging industry, household appliances, toy industry and construction materials, as it generally provides fast, cost-effective and high-precision production. Mechanical and thermal analysis of plastic injection production is an important stage for processes such as material quality control, design improvements and optimization of the production process. In this study, the production of a spray trigger made of a polypropylene material by plastic injection method was analyzed mechanically and thermally. The molding and injection stages in this process were analyzed using the Moldex3D package program. Filling analysis was carried out using many parameters such as specified injection pressure, ironing pressure, filling time, ironing time, cooling time, refrigerant flow rate, runner design, injection temperature and mold temperature, and the mechanical and thermal behaviors of the product were examined. As a result, it was observed that the collapse value on the part during the product removal phase was below 0.05 mm and the volumetric shrinkage value did not exceed 5%. It was also observed that the maximum part temperature was 43.9 °C and was below the freezing temperature of the material.

Keywords: Plastic injection, thermoplastic, Moldex3D



PIROMETALURJİK ALTIN RAFİNASYONUNDA FARKLI SAFSIZLIK GİDERME MEKANİZMALARININ İNCELENMESİ

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Özet

Altın alaşımı hurdaları bazı hidrometalurjik ve elektrolitik geri dönüşüm işlemleriyle başarıyla geri kazanılabilir. Bununla birlikte, eğer pirometalurjik yöntemin verimliliği artırılabilirse, mücevher üreticileri için geri dönüşüm daha az zaman alıcı ve daha uygun maliyetli olacaktır. Pirometalurjik geri kazanım tam olarak bir arıtma işlemi değildir. Hurda mücevher alaşımlarının, yeni mücevher alaşımlarına yeniden alaşımlanmaya uygun temiz altın-gümüş-bakır alaşımına dönüştürülmesi amaçlanıyor. Altın geri dönüşümünde proses hurdası ve eski hurda olarak adlandırılan iki tür hurda vardır. Proses hurdası hiçbir zaman bitmiş ürüne dönüşmez ve kullanılmadan yeniden eritilmek üzere rafineriye geri döner. Madeni paralar basıldıktan sonra metal levhanın kenarları, mücevherlerin cilalanması ve gravürlenmesinden elde edilen talaşlar hurdanın işlenmesine örnek olarak verilebilir. Eski hurda, bitmiş ürünlerden elde edilen altın içeren alaşımdır. En büyük miktarda eski hurda mücevherlerden geliyor. Safsızlıklar, kütle fraksiyonundaki altın miktarını azaltarak altının saflık sorunlarına neden olur ve sert yabancı maddeler, sert noktalara neden olabilir, bu da son ürünün çizilmesine ve kötü yüzey kalitesine neden olabilir. Altın alaşımlarında Co, Zn, Cr, Fe, Si, Ni vb. oksidasyon reaksiyonları ile giderilebilen safsızlık elementleri bulunur. Ayrıca tane inceltici ana alaşımlardan kaynaklanan ve yeterince reaktif olmayan PGM intermetalikleri de vardır. Oksitlenme reaksiyona girmeyen safsızlıkların uzaklaştırılması daha karmaşıktır ve bunlar için fiziksel uzaklaştırma yöntemlerinin kullanılması gerekir. Bu çalışmada gaz temizleme ve CuO ilavesi yoluyla safsızlıkların oksitlenmesi, pirometalurjik altın rafinasyonu sırasında Boraks ($\text{Na}_2[\text{B}_4\text{O}_5(\text{OH})_4] \cdot 8\text{H}_2\text{O}$) işleminin safsızlaştırma mekanizması araştırılmıştır. Oksidasyon reaksiyonları, elementlerin oksijene afinitesi, cürufların absorbe etme ve çözme yetenekleri tartışılmıştır. Baz metaller için ana giderim mekanizmasının oksidasyon ve cüruf oluşumu iken, Boraks'ın giderim mekanizmasının temel olarak kimyasal çözünme ve katı parçacıkların fiziksel olarak hapsedilmesi olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Safsızlıklar, Altın Rafinasyonu, Pirometalurji



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LANSAT-8 GÖRÜNTÜLERİ KULLANARAK YANMIŞ ORMAN ALANI TESPİTİ: MARMARİS ÖRNEĞİ

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Özet

Bu çalışma, Muğla ilinin Marmaris ilçesinde 21.06.2022 meydana gelen orman yangınında meydana gelen hasarın uydu görüntüleri kullanılarak belirlenmesi amacıyla gerçekleştirilmiştir. Klasik yöntemlerle, arazi üzerinde yapılan yüksek maliyetli ve zaman alan tespit çalışmalarının yerine gelişen teknoloji ile belirli hassasiyet ve doğrulukta sonuçların çok daha ekonomik, hızlı ve risksiz şekilde yapılabilirliği sağlamak adına Uzaktan Algılama(UA) yöntemleri kullanılarak kaç hektarlık ormanlık alanın yandığını tespit edilmiştir.

17.08.2022 tarihinde çekilen Lansat-8 uydu görüntüsünde keskinleştirme ve Atmosferik düzeltmeler QGIS programı yardımıyla yapılarak 30 x 30 metre piksel çözünürlüğü olan uydu görüntüsünün piksel çözünürlüğü 15 x 15 metre düşürülmüştür. Ayrıca kontrol noktaları oluşturulurken çalışma alanına ait 2022 yılı hava fotoğrafları kullanılmıştır. Çalışma alanı üzerinde 7 sınıf oluşturularak toplam 200 kontrol noktası girilmiştir. Yanmış alanların tespiti amacıyla, oluşturulan yedi adet eğitim kümesi (Sık Orman, Seyrek Orman, İlk Yanan Bölge, Ölü Orman, Son Yanan Bölge, Toprak Alan, Su Alanı) kullanılarak denetimli sınıflandırma gerçekleştirilmiştir. Elde edilen sonuçlara uygulanan doğruluk analizi sonucunda %72 oranında bir genel doğruluk elde edilmiştir.

Anahtar Kelime: Uzaktan Algılama, Landsat 8, Orman yangını



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FUTURE TRENDS IN PAVEMENT ROUGHNESS DIAGNOSIS: LEVERAGING SMARTPHONE APPLICATIONS

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Abstract

Road infrastructure serves as the backbone of transportation systems, influencing vehicle performance, fuel efficiency, and overall road safety. One critical aspect of road quality assessment is the pavement roughness diagnosis, a parameter pivotal for maintaining optimal driving conditions. Traditional methods of measuring pavement roughness, primarily based on manual surveys or specialized equipment, have inherent limitations in terms of cost, accessibility, and efficiency. In response to these challenges, recent advancements in technology have paved the way for a transformative approach—utilizing smartphone applications for pavement roughness diagnosis. This paper explores the recent trends in pavement roughness, specifically focusing on the International Roughness Index (IRI), and investigates the potential of smartphone applications in transforming the way we assess road conditions. The literature review examines historical approaches, recent advancements, methodologies, case studies, challenges, and concludes with recommendations for future research. In an era where technology continually reshapes conventional practices, the integration of smartphones into pavement roughness assessment holds the promise of not only enhancing efficiency but also democratizing data collection. As we navigate through this discussion, the merits, challenges, and future prospects of smartphone applications in the context of pavement roughness diagnosis will unfold, paving the way for a new paradigm in pavements evaluation.

Keywords: Roughness, Pavements, Road Condition, Serviceability



YOL ÜSTYAPI PÜRÜZLÜLÜĞÜ TEŞHİSİNDE GELECEKTEKİ EĞİLİMLER: AKILLI TELEFON UYGULAMALARINDAN YARARLANMA

Özet

Yol altyapısı, ulaştırma sistemlerinin ana omurgasını oluşturmakta, araç performansı, yakıt verimliliği ve genel yol güvenliğini etkilemektedir. Yol yüzeyinin pürüzlülüğünün tespiti ise, yol kalitesinin değerlendirilmesinde kritik bir yöntem olup, optimum sürüş koşullarını sağlamada esas alınan bir parametre olarak kullanılmaktadır. Yol pürüzlülüğünü ölçmede geleneksel yöntemler genellikle manuel çalışmalara veya özel ekipmanlara ihtiyaç duymakta, bu da maliyet, erişilebilirlik ve verimlilik açısından doğal kısıtları beraberinde getirmektedir. Teknolojideki son gelişmeler, yol yüzeyi pürüzlülüğünün tespitinde bu zorluklara yanıt olarak, akıllı telefon uygulamalarının kullanılmasını sağlayan dönüştürücü bir yaklaşımın kapılarını açmıştır. Bu bildiride, özellikle Uluslararası Pürüzlülük İndeksi'ne (IRI) odaklanılarak, yol yüzeyi pürüzlülüğündeki son eğilimler irdelenmiş ve yol koşullarını değerlendirme şeklimizi dönüştürmede, akıllı telefon uygulamalarının potansiyeli araştırılmıştır. Literatür taraması, tarihsel değişim, son gelişmeler, metodolojiler, vaka çalışmaları, zorluklar irdelenmiş ve gelecekteki araştırmalar için önerilerde bulunulmuştur. Teknolojinin sürekli olarak geleneksel uygulamaları şekillendirdiği bir dönemde, akıllı telefonlar ile yol yüzeyi pürüzlülüğünün entegrasyonu, sadece verimliliği artırmayacak, aynı zamanda veri toplamanın demokratikleştirilmesini de sağlanmış olacaktır. Bu değerlendirme sürecinde, akıllı telefon uygulamalarının yol yüzeyi pürüzlülüğünün tespiti bağlamında avantajları, kısıtları ve gelecekteki perspektifleri tartışılacak, üstyapı değerlendirmesinde yeni bir paradigma ortaya çıkmış olacaktır.

Anahtar Kelimeler: Pürüzlülük, Yol Yüzeyi, Yol Durumu, Hizmet Kalitesi

INTRODUCTION

Pavement roughness plays a crucial role in vehicle maintenance, fuel consumption, and road safety. Traditional methods of assessing road conditions have limitations, prompting the need for more efficient and accessible techniques. This paper explores the utilization of smartphone applications in the pavement roughness diagnosis, particularly emphasizing the significance of the IRI, and it delves into the evolving landscape of pavement roughness assessment, focusing on the IRI as a standardized measure. The advent of smartphones equipped with sophisticated sensors, including accelerometers and GPS, presents an opportunity to revolutionize the way analyzing road surface data. By harnessing the ubiquitous nature of smartphones, this approach not only enhances accessibility but also introduces a cost-effective and scalable solution for pavement roughness evaluation. The literature review will scrutinize traditional methodologies, shedding light on their limitations and setting the stage for the introduction of smartphone-based approaches. The subsequent sections will delve into recent trends, methodologies, case studies, and challenges associated with the integration of smartphone applications in pavement roughness. Through this review, we aim to provide insights into the potential of smartphone technology to redefine how we understand and evaluate road conditions.

LITERATURE REVIEW

Historical Development of IRI

The concept of pavement roughness assessment has deep roots in the development of the IRI, a standardized measure that quantifies the unevenness of road surfaces (Gillespie et al., 1980, Sayers et al., 1986). Introduced in the late 1970s by the World Bank, IRI quickly gained global recognition as a valuable metric for evaluating road quality. Its widespread adoption stems from its ability to provide a quantitative and uniform representation of road surface conditions, aiding in decision-making processes related to infrastructure maintenance and improvement.

Traditional Methods and Limitations

Historically, pavement roughness assessment relied on traditional methods such as manual surveys or specialized equipment like profilometers. These methods, while offering valuable insights, are inherently constrained by factors such as high cost, limited spatial coverage, and the need for specialized personnel (Cruz et al., 2005). Moreover, the periodic nature of these assessments often leads to gaps in data, hindering real-time monitoring and timely intervention in road maintenance.

Significance of Pavement Roughness

The importance of accurate pavement roughness assessment cannot be overstated. Beyond its direct impact on vehicle comfort, pavement roughness influences fuel consumption, maintenance costs, and, most importantly, road safety (Múčka, 2017). Understanding the historical context of pavement roughness evaluation sets the stage for the exploration of contemporary solutions that address the limitations of traditional approaches. The past decade has witnessed a transformative shift in pavement roughness assessment through the integration of smartphone applications (Islam et al., 2014, Hanson et al., 2014, Hossain et al., 2021, Ahmed et al., 2022). Leveraging the ubiquity of smartphones, researchers and practitioners have explored the potential of these devices equipped with accelerometers, GPS, and other sensors as a means to collect road surface data more efficiently and affordably.

Methodologies and Technologies in Smartphone Applications

Smartphone applications for pavement roughness diagnosis employ innovative methodologies and technologies. Accelerometers, for instance, enable the measurement of vehicle-induced vibrations, providing data that can be translated into pavement roughness metrics (Aleadelat et al., 2018, Hossain et al., 2019). GPS sensors complement this by offering geospatial information, contributing to a comprehensive understanding of road conditions. The combination of these technologies in smartphone applications promises a scalable and cost-effective solution for widespread pavement roughness assessment.

Comparison with Traditional Approaches

Several studies have compared the results obtained through smartphone applications with those derived from traditional methods (Bisconsini et al., 2018, Hossain et al., 2021, Alatom et al., 2021). These comparisons highlight the accuracy and reliability of smartphone-based approaches, indicating their potential to supplement or even replace conventional techniques. The shift towards real-time data collection and continuous monitoring sets smartphone applications apart, offering a dynamic and responsive approach to pavement roughness assessment.

As we traverse the historical landscape of pavement roughness assessment, the literature suggests a growing recognition of the limitations of traditional methods and a simultaneous enthusiasm for the transformative potential of smartphone applications.

RECENT TRENDS

Recent trends in pavement roughness diagnosis have witnessed a notable shift towards the integration of smartphone applications, leveraging the advancements in mobile technology to redefine how we assess and monitor road conditions.

Smartphone-Based Data Collection

A significant trend involves the use of smartphones equipped with various sensors for efficient data collection. Accelerometers, GPS, and gyroscopes embedded in smartphones provide a wealth of information regarding road surface conditions and vehicle-induced vibrations (Islam et al., 2014, Hanson et al., 2014, Bisconsini et al., 2018, Hossain et al., 2021, Alatoon et al., 2021, Ahmed et al., 2022). This approach offers a dynamic and real-time alternative to traditional methods, enabling continuous monitoring and reducing the reliance on periodic surveys.

Machine Learning Algorithms

Recent studies highlight the integration of machine learning algorithms for pavement roughness assessment (Bashar & Torres-Machi, 2021, Damirchilo et al., 2021). These algorithms enhance the accuracy of roughness calculations by analyzing large datasets and adapting to varying road conditions. Machine learning models can learn from the data collected through smartphones, improving their predictive capabilities and providing more nuanced insights into road surface conditions.

Crowdsourced Data and Citizen Science

An emerging trend involves the utilization of crowdsourced data through smartphone applications, engaging citizens in pavement roughness monitoring (Medina et al., 2020, Mirtabar et al., 2022). Citizen science initiatives encourage users to contribute road condition data during their daily commutes, creating a vast and decentralized dataset. This collaborative approach not only enhances data coverage but also fosters community involvement in infrastructure maintenance.

Integration with Geographic Information Systems (GIS)

Recent advancements include the integration of smartphone-derived pavement roughness data with Geographic Information Systems (GIS) (Abulizi et al., 2016). This integration enhances the spatial analysis of road conditions, allowing for a more comprehensive understanding of the variability in roughness across different

geographical areas. GIS applications provide valuable tools for visualizing, analyzing, and interpreting the collected data in a geospatial context.

Multi-Sensor Fusion

Another notable trend involves the fusion of data from multiple sensors within smartphones to improve the overall accuracy of pavement roughness measurements (Chen et al., 2016). Integrating data from accelerometers, GPS, and other sensors allows for a more comprehensive and holistic assessment of road conditions, taking into account various factors that contribute to pavement roughness.

These recent trends collectively reflect a paradigm shift towards more dynamic, accessible, and data-driven approaches in pavement roughness diagnosis. The integration of smartphones, machine learning, crowdsourcing, GIS, and multi-sensor fusion not only addresses the limitations of traditional methods but also opens new avenues for research and innovation in the field of transportation infrastructure assessment.

CHALLENGES AND LIMITATIONS

While the integration of smartphone applications in pavement roughness diagnosis presents promising advancements, several challenges and limitations must be considered to ensure the reliability and accuracy of the collected data.

Data Accuracy and Calibration

One of the primary challenges lies in ensuring the accuracy of data collected through smartphones. Variability in sensor quality and calibration across different devices can lead to inconsistencies in measurements. Establishing standardized calibration procedures and ensuring the accuracy of smartphone sensors remain critical to mitigating this challenge.

Standardization of Methodologies

The absence of standardized methodologies for pavement roughness assessment using smartphone applications poses a significant challenge. Varying approaches among researchers and application developers make it challenging to compare results across different studies. Establishing industry-wide standards for data collection, processing, and analysis is imperative for achieving consistency and comparability in pavement roughness evaluations.

Heterogeneity in Smartphone Sensor Capabilities

Smartphones on the market exhibit a wide range of sensor capabilities, leading to heterogeneity in data collection. Some devices may have more advanced sensors, while others may lack precision. Addressing this heterogeneity requires developing algorithms and methodologies that can adapt to the diverse sensor configurations of different smartphones, ensuring accurate and reliable results across devices.

Environmental Factors and External Influences

Pavement roughness diagnosis can be influenced by environmental factors and external interferences such as weather conditions, traffic density, and road construction activities. Smartphones may capture variations in road conditions that are not solely related to roughness, making it challenging to isolate the specific factors contributing to the measurements. Developing algorithms capable of filtering out extraneous influences is crucial for obtaining accurate assessments.

Privacy and Security Concerns

The use of smartphones for pavement roughness diagnosis raises privacy and security concerns, particularly when crowdsourced data or location information is involved. Striking a balance between data collection for research purposes and protecting user privacy is a complex challenge. Implementing robust data anonymization and encryption measures is essential to address these concerns and build trust among users.

Limited Coverage and Representativeness

Smartphone-based pavement roughness diagnosis relies on user participation, leading to potential gaps in coverage, particularly in less-populated or remote areas. Ensuring the representativeness of data across diverse geographical locations and road types requires targeted efforts to engage users in a wide range of environments.

Navigating these challenges and limitations is essential for realizing the full potential of smartphone applications in pavement roughness diagnosis. Researchers, developers, and policymakers must collaborate to address these issues, fostering the development of robust methodologies and ensuring the widespread applicability of smartphone-based approaches in enhancing our understanding of road conditions. Despite these challenges, the benefits and transformative potential of this technology make it a compelling avenue for further exploration and refinement.



CONCLUSION

In conclusion, the integration of smartphone applications in pavement roughness diagnosis, particularly focusing on the IRI, represents a transformative shift in how we assess and monitor road conditions. The historical development of IRI laid the groundwork for a standardized metric that significantly influenced infrastructure maintenance decisions. Traditional methods, while informative, face limitations in terms of cost, accessibility, and efficiency, prompting the exploration of alternative approaches. Recent trends in pavement roughness diagnosis using smartphones showcase innovative methodologies and technologies. Accelerometers, GPS sensors, machine learning algorithms, crowdsourced data, and multi-sensor fusion have collectively contributed to more dynamic and real-time assessments. These trends have the potential to revolutionize the field by providing scalable, cost-effective, and accessible solutions for continuous pavement roughness monitoring. However, navigating challenges such as data accuracy, standardization, sensor heterogeneity, environmental influences, and privacy concerns is imperative for the successful implementation of smartphone-based approaches. Overcoming these challenges will require collaborative efforts from researchers, developers, and policymakers to establish standardized methodologies, enhance sensor calibration, and address privacy and security considerations.

RECOMMENDATIONS

- Establish industry-wide standards for pavement roughness assessment using smartphone applications. Encourage collaboration among researchers, application developers, and policymakers to ensure consistency in data collection, processing, and analysis methodologies.
- Develop and implement standardized calibration procedures for smartphone sensors to enhance data accuracy. Investigate technologies that improve sensor precision and reduce variability across different devices.
- Explore further integration of machine learning algorithms to enhance the predictive capabilities of smartphone applications. Continuously train models with diverse datasets to improve accuracy and adaptability to varying road conditions.
- Develop algorithms capable of filtering out environmental factors and external influences to isolate pavement roughness measurements. Consider the integration of additional sensors to account for variations caused by factors beyond road surface conditions.
- Implement robust privacy safeguards to address concerns related to user data and location information. Incorporate anonymization and encryption measures to protect user privacy while still allowing for valuable data collection.



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- Implement targeted engagement strategies to ensure a representative dataset across diverse geographical locations and road types. Encourage citizen participation through educational campaigns and incentives to enhance data coverage.
- Encourage further research and innovation in the field of smartphone-based pavement roughness diagnosis. Explore emerging technologies, such as 5G connectivity and advanced sensors, to continually improve the capabilities of smartphone applications.

By addressing these recommendations, stakeholders can collectively contribute to the refinement and widespread adoption of smartphone applications in pavement roughness diagnosis. The potential benefits of scalable, real-time monitoring and the democratization of data collection underscore the importance of overcoming current challenges. With concerted efforts, the integration of smartphones into road infrastructure assessment can usher in a new era of efficiency, accessibility, and effectiveness in maintaining and improving our transportation networks.

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A NONLINEAR ANALYSIS OF EXCAVATION STEPS FOR NATM TYPE TUNNEL WITH THE FINITE ELEMENT METHOD

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Abstract

With the rapid population growth in the developing world, people's needs such as energy, transportation, and drinking water are also rapidly increasing. The obligation to meet these requirements has brought about the necessity of actively using the underground as well. Overcoming these difficulties is only possible with the use of tunnels and underground openings. Tunnels are very difficult structures to analyze due to the complexity of their geometry and the loads on top of them, as well as the properties and mutual interactions of rock and cover materials. The stability of any underground structure is the most important question for designers during and after excavation because any type of collapse can destroy large sections of a finished tunnel, causing costly repairs and time loss. Therefore, preliminary design is of great importance. The risky situations in tunnel works are caused by unexpected factors arising from the difficulty and regulations of the environmental conditions in which the tunnel will be opened. For this reason, the tunnel structure, which is very complex from a geometric point of view, can be statically modeled together with heterogeneous material properties by using the finite element method in today's engineering and tunneling efforts. In this paper, the effects of the excavation steps on the deformities that occur due to the load with the New Austrian Tunneling Method (NATM) were studied. In this context, tunnel design was carried out using the TUNAPLUS SMAP 3D finite element program, which works according to NATM principles.

Keywords: Tunnel design, NATM, Excavation Steps, Deformations, Finite element method.



NATM TİPİ BİR TÜNEL İÇİN KAZI ADIMLARININ SONLU ELEMANLAR YÖNTEMİYLE DOĞRUSAL OLMAYAN BİR ANALİZİ

Özet

Gelişen dünyada hızlı nüfus artışıyla birlikte insanların enerji, ulaşım, içme suyu gibi ihtiyaçları da hızla artıyor. Bu gereksinimlerin karşılanması zorunluluğu yer altının da aktif olarak kullanılması zorunluluğunu beraberinde getirmiştir. Bu zorlukların aşılması ancak tünellerin ve yer altı açıklıklarının kullanılmasıyla mümkündür. Tüneller, geometrilerinin karmaşıklığı ve üzerlerine gelen yüklerin yanı sıra kaya ve örtü malzemelerinin özellikleri ve karşılıklı etkileşimleri nedeniyle analizi oldukça zor yapılardır. Herhangi bir yeraltı yapısının stabilitesi, kazı sırasında ve sonrasında tasarımcılar için en önemli sorunlardan biridir. Çünkü herhangi bir çökme, bitmiş bir tünelin büyük bölümlerini tahrip edebilir, bu da maliyetli onarımlara ve zaman kaybına neden olabilir. Bu nedenle ön tasarım büyük önem taşımaktadır. Tünel çalışmalarında riskli durumlar, tünelin açılacağı çevre koşullarının zorluğu ve mevzuatından kaynaklanan beklenmedik faktörlerden kaynaklanmaktadır. Bu nedenle geometrik açıdan oldukça karmaşık olan tünel yapısı, günümüz mühendislik ve tünelcilik çalışmalarında sonlu elemanlar yöntemi kullanılarak heterojen malzeme özellikleriyle birlikte statik olarak modellenebilmektedir. Bu bildiride Yeni Avusturya Tünel Açma Yöntemi (NATM) ile yapılan bir tünelde, kazı aşamalarının yüke bağlı olarak oluşan deformasyonlara etkisi incelenmiştir. Bu kapsamda NATM prensiplerine göre çalışan TUNAPLUS SMAP 3D sonlu elemanlar programı kullanılarak tünel tasarımı yapılmıştır.

Anahtar Kelimeler: TUNAPLUS SMAP 3D, Tünel tasarım yöntemleri, Düşey deformasyon, Kaya zeminde tünel tasarımı, Sonlu elemanlar yöntemi.

1. GİRİŞ

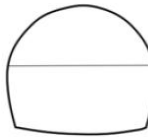
Yerkabuğunun mühendislikteki amaçlarına uygun olarak yapılan tanımında, ortamların davranışını farklılaştıran zemin durumları belirleyici olmaktadır. Bu nedenle, zeminler farklı isimler ile sınıflandırılmakta ve hidrolojik, fiziksel, kimyasal, mekanik ve sismik davranışlarını belirleyen özellik, nitelik ve koşulları sayısal olarak belirtilmeye çalışılmaktadır. Tünel kazıları bu farklı nitelik ve davranıştaki zemin ortamlarında gerçekleştirilmekte ve dolayısıyla, tünel projeleri zemin ve kaya mekaniği konularıyla iç içe çalışmaktadır. Günümüzde tünel teknolojisi, ulaştırma ve lojistik hizmetlerinin daha hızlı gerçekleşmesi için en çok tercih edilen ulaştırma türlerinden biri haline gelmiştir (Adlım vd., 2022). Ancak, yüzey çökmesi tünel kazısı ile ilişkili en önemli risk faktörlerinden biri olarak ortaya çıkmaktadır. Özellikle zayıf zemin koşullarında inşa edilen sığ bir tünel olduğunda, statik yükün yanı sıra sismik yükün de etkisi büyük olmaktadır. Imteyaz ve Mishra (2023) çalışmalarında sonlu eleman tabanlı bir yazılım olan ABAQUS kullanarak, kaya ortamında ayrıntılı bir analiz yaparak, bu etkileri derecelendirmişlerdir. Sayısal model deneysel olarak doğrulanmış ve ayrıca farklı kaya türleri için deformasyon ölçümü yapılmıştır. Sıvılaşıma potansiyeli yüksek olan zeminlerde yeraltı yapılarının sismik tepkisinin araştırılması, metro istasyonları gibi yer altı yapıları için dinamik analiz yöntemleri kullanılarak yapılmıştır. Bu tarz tüneller için ise elasto-plastik yapı modelleri kullanılmaktadır (Bao vd., 2017); (Banerjee & Chakraborty, 2018); (Nariman vd., 2019); (Zheng vd., 2021). Zhu vd. (2021) çalışmalarında yeraltı yapıları için dört tane sismik tepki analizi yönteminin etkinliğini değerlendirmeyi amaçlamışlardır. Adlım vd. (2022) dört tabakalı bir kaya formasyonunda ve yeraltı suyu etkisinde bulunan, at nalı veya yumurta şeklinde tasarlanan, NATM tekniği ile kademeli olarak açılacak olan tünellerin üç boyutlu ve doğrusal olmayan davranışları sonlu elemanlar yöntemi ile analiz etmişlerdir. Kazı adımlarına göre farklı yükleme koşullarına maruz kalan taç ve tünel çevresinde meydana gelen kalıcı deformasyonlar ayrıntılı olarak incelenmiştir. Pazeres vd., (2012) çalışmalarında Sınır Elemanları Yöntemi kullanılarak, NATM tünel inşaatının simülasyonuna yeni bir yaklaşım sunmuşlardır. Bu yeni yaklaşım kazı yüzeyinin, olası plastik bölgelerin ve tünel kaplamasının ayrıklaştırılmasını gerektirmektedir. Kaya kütesinin tamamı Sınır Elemanları Yöntemi ile temsil edilirken, Sonlu Elemanlar Yöntemi yalnızca tünel kaplamasını temsil etmek için kullanılmıştır (Karakus vd., 2000).

Sığ derinlikteki yeraltı yapılarında meydana gelen büyük deformasyonlar, tünel inşaatı sürecinde, özellikle de tünelin zayıf bölgelerinden gerçekleşmesi durumunda, mühendislik güvenliği açısından her zaman bir tehdit oluşturmaktadır (Mishra vd., 2018). Geçmişten günümüze kadar farklı tünel açma metodolojileri ve farklı kaya sınıflama metotları geliştirilmiştir. Düzenli jeolojik yapıya sahip bölgelerde kaya kalitesinin sayılarla ifade edildiği ve kaya kütle davranışının formülle tahmin edildiği kaya sınıflama sistemleri geliştirilirken, jeolojik yapının büyük değişkenlikler gösterdiği bölgelerde, NATM gibi esnek yapım metotları ve kazı sırasında kaya davranışını esas alan kaya sınıflama yöntemlerine ihtiyaç duyulmuştur. NATM geleneksel tünel açma yöntemlerine göre

birçok avantajı nedeniyle tünel inşaatı için çok cazip hale gelmiştir. Tüneller, geometrilerinin ve üstlerine gelen yüklerin karmaşıklığı, kaya ve kaplama malzemelerinin özellikleri ve karşılıklı etkileşimleriyle analizi oldukça zor yapılardır. Herhangi bir yeraltı yapısının stabilitesinin bozulması, kazı sırasında ve sonrasında tasarımcılar için en önemli risklerden biridir. Herhangi bir tür çökme, bitmiş bir tünelin büyük bölümlerini tahrip ederek yüksek maliyetli onarımlara ve zaman kaybına neden olabilir. Bu nedenle ön hesaplamalar büyük önem taşımaktadır. Ana kayanın sığ kısımlarındaki mekanik özelliklerin ve gerilme durumunun daha iyi anlaşılmasıyla, belirli bir inşaat sahasında hangi faktörlerin önemli olduğunu belirlemek ve böylece ön araştırmaların ve tünel inşaatının maliyet verimliliğini artırmak mümkün olabilmektedir (Töyrä, 2006). Bu çalışmada TUNAPLUS SMAP 3D sonlu elemanlar programı kullanılarak parametrik bir tasarım ve analiz yapılmıştır. TUNAPLUS SMAP 3D yazılımı NATM tünel tasarımı için geliştirilmiş bir analiz programı olup, doğrusal olmayan üç boyutlu sistemlerin hesaplanmasında kullanılan sonlu elemanlar programıdır.

2. PARAMETRİK TASARIM

TUNA PLUS SMAP 3D programının çalışabilmesi ve analiz yapılabilmesi için tüm tasarım değişkenlerinin “.DAT” uzantılı bir metin hazırlama sağlayıcısında hazırlanması gerekmektedir. Şekil 1 ve Tablo 1’de tasarlanan tünel geometrisi için girdi verileri görülmektedir. Kazı adımı NATM prensiplerine göre 22 adımda gerçekleştirilmiştir (Şekil 2). Tünellerin tasarlanmış olduğu kaya ortamı dört farklı katmandan oluşmaktadır ve bu katmanlarda yer altı suyu basıncı yüzeyden itibaren 10 metre ve sonrasında başlamaktadır. Bu bilgiler doğrultusunda tasarlanan tünellerin tamamen su altında inşa edileceği görülmektedir. Kaya ortamı yüzeyden itibaren bozulmuş zemin, bozulmuş kaya, yumuşak kaya ve sağlam kayadan oluşmaktadır.

	Malzeme türü	γ [t/m ³]	K_0	E [t/m ²]	ν	φ [°]	C [t/m ²]	τ [t/m ²]	
H1=3.15 m	Weathered Soil	1,90	0,50	2,10×103	0,33	30	3	20	HT= 17 m
H2=3.225 m	Weathered Rock	1,90	0,43	5×103	0,30	35	30	30	
H3=2.625 m	Soft Rock	2,40	0,33	2×104	0,25	40	70	40	
H4=39.94 m									HL= 30 m
	Hard Rock	2,55	0,25	2×105	0,20	45	100	50	
W=60 m									

Şekil 1. Kaya ortamı ve özellikleri

Tablo 1. Taşıyıcı elemanların özellikleri

Malzeme türü	γ [t/m ³]	K_0	E [t/m ²]	ν	φ [°]	C [t/m ²]	τ [t/m ²]
Püskürtme beton	2.4	0	1,50×106	0,20	30	500	100
Donatılı final kaplama	2.5	0	2,10×106	0,20	30	500	300
Donatı			2,10×107	0,20			

Yukarıdaki şekil ve çizelgede zemin ve taşıyıcı eleman indeks özellikleri verilmektedir. Bu parametreler;

γ [t/m³] = Zeminin birim hacim ağırlığı

RK_0 = Sükunetteki toprak basıncı

E = Elastisite modülü

ν = Possion oranı

φ = İçsel sürtünme açısı

C = Kohezyon

τ = Çekme gerilmesi

şeklindedir.

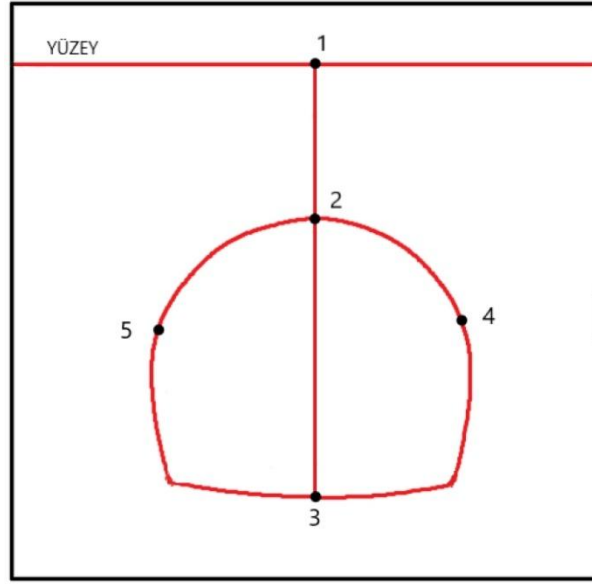
Tasarlanan tünelde kazı çalışmaları, geleneksel NATM tekniğine uygun olarak 22 adımda gerçekleştirilmektedir (Şekil 2).



Şekil 2. Tasarlanan tünelin kazı adımları

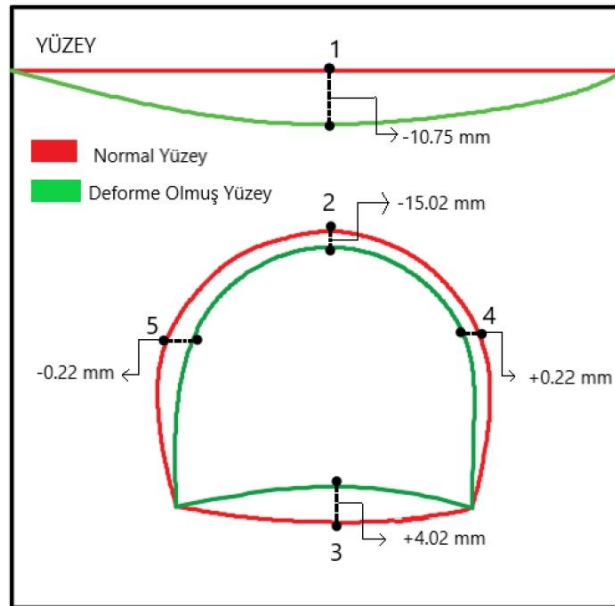
3. ANALİZ SONUÇLARI

Tünel tasarımında suyun oluşturduğu etki de dikkate alınarak, hesaplanan deformasyon noktaları Şekil 3'te gösterilmektedir.



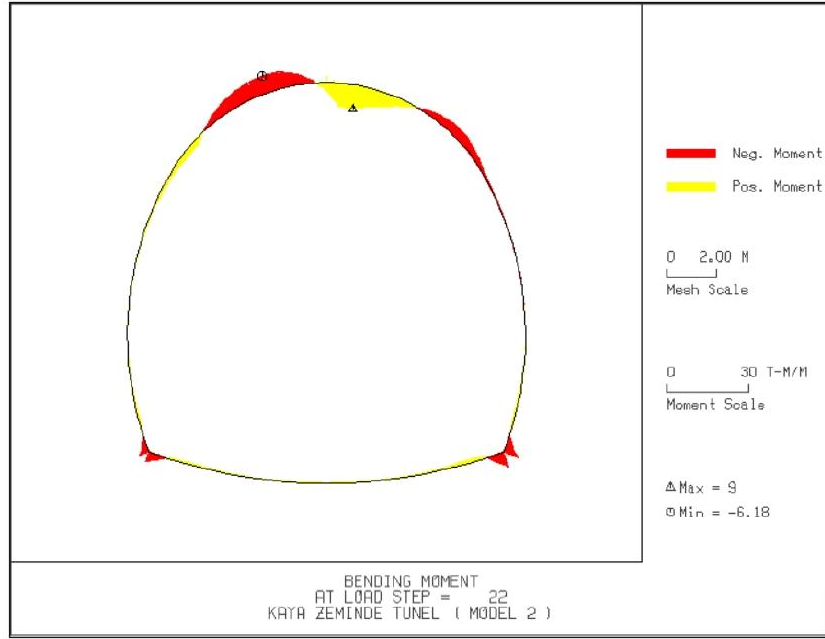
Şekil 3. Ölçüm alınan deformasyon noktaları

Tünelin taç kısmında oluşan deformasyon miktarı $-15,02$ mm olarak hesaplanmıştır. Bu durum, tünelin merkez noktasına doğru bir iç kapanma yaptığını göstermektedir. Yüzey kısmında, yani 1 numaralı deformasyon noktasında oluşan düşey deformasyon miktarı $-10,75$ mm olarak hesaplanmış ve bu durum, yüzeyden tünel merkezine doğru bir oturma oluştuğunu göstermektedir. Şekil 4'te ortaya çıkan deformasyon değerleri ve kesitte deformasyonlar sonucu oluşan şekil değişimleri gösterilmiştir.



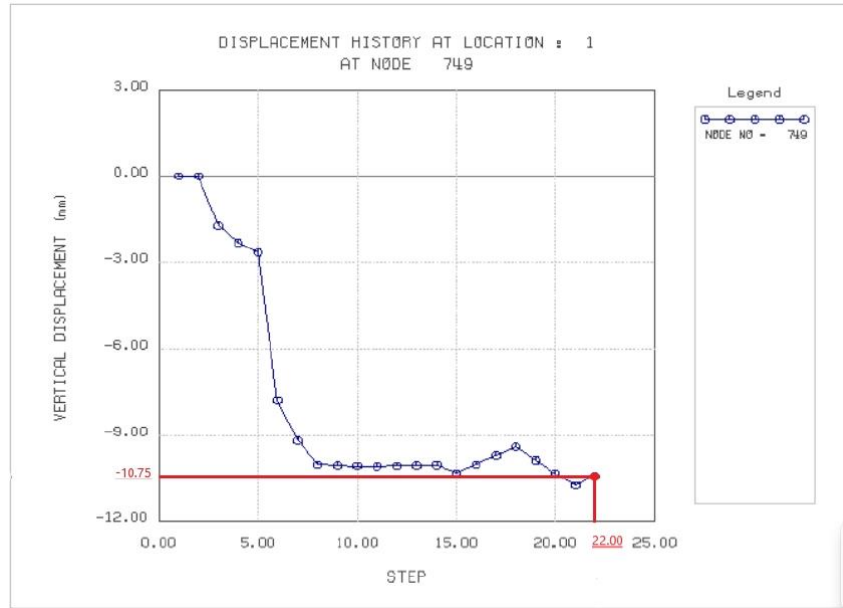
Şekil 4. Şekil değişimi ve deformasyon miktarları

Grafik seçeneklerinden, hesaplanan moment dağılımı grafiği Şekil 5'te gösterilmektedir.



Şekil 5. Tünel final kaplamasında meydana gelen moment değişimi

PLOT-XY den elde edilen grafik donelerine göre, 1 numaralı düğüm noktasına ait düşey deformasyonlar Şekil 6'da gösterilmektedir.



Şekil 6. 1 numaralı düğüm noktasına ait kazı adımı-deformasyon değişimi

4. SONUÇ VE ÖNERİLER

- Zorlu ve karmaşık olan mühendislik problemleri günümüzde bilgisayar programlarının gelişimi ile kolay çözülebilir hale gelmiştir. Geliştirilen bilgisayar yazılım programlarından bu çalışmada kullanılan sonlu

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elemanlar yöntemi ile tasarlanan tünel geometrisi, kolay bir şekilde analiz edilip ayrıca birçok parçaya bölünüp, bu sayede parametrelerin sayısal olarak hesaplanması da kolay ve hızlı bir şekilde sağlanmıştır.

- Sonlu elemanlar programı olan TUNA PLUS SMAP-3D de tasarlanmış olan tünellerin analiz sonuçlarının son adımı 22. adımdır. Bu adımda değerlendirmelerin yapılmasının sebebi, artık son adımda tünelin tüm kazı aşamalarının tamamlanmış, zemin içerisinde bir boşluk oluşmuş ve en kritik etkilerin oluşacağı adım olmasıdır.
- Analizlerden elde edilen kesit tesirleri, tasarımda kullanılan beton sınıfının basınç ve çekme değerleri hakkında bilgi almamıza yardımcı olmaktadır.
- Hesaplanan tüm bu değerleri arttırmak veya azaltmak için bazı çözümler sunulabilir ve bu çözümler değerlendirilirken, tasarlanan tünelin şeklinde, kullanılan betonun uygunluğunda, kullanılan kaya bulonlarının cinsinde, sayısında ve çaplarında, örtü yükü ve destek sistemlerinde farklılıklar yapılarak istenilen koşullarda olması sağlanabilir.
- İnşaat aşamasına geçtiğimizde zaman, maliyet, güvenlik, kolaylık vb. nedenlerle değişiklikler gerekebilir. Bu bağlamda tasarımcının kullandığı parametreler, önerilen çözümlerde referans alınarak değişiklikler yapılabilir. Hesaplanan düşey deformasyon ve konverjans değerleri, şartnamede belirtilen seviyeyi aşarsa, bu değeri azaltmak için çalışmada kullanılan kaya bulonlarının çapları artırılabilir, sayıca fazla kullanılabilir, ek destek sistemleri devreye sokulabilir, beton sınıfında değişiklik yapılabilir veya kullanılan tünel geometrisi değiştirilebilir.

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MERKEZİ RADYAL YÜK ALTINDA ELASTİK KENAR KISITLAMALI EĞRİSEL KABUKLARIN DÜZLEM İÇİ BURKULMASI

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Özet

Bu çalışma, merkezi bir radyal yük etkisi altında elastik kenar sınırlamalı eğrisel kabukların elasto-plastik burkulma davranışını deneysel olarak araştırmaktadır. Elastik kenar sınırlamalarının yük taşıma kapasitesi üzerindeki etkisini karakterize etmek için çeşitli tasarım parametreleri ifade edilmiştir. Çok değişkenli kabuk parametrelerinden oluşan bir fonksiyon olarak bir indirgeme faktörü taslağı önerilmiştir. Bu taslak, elastik kenar sınırlamalarının neden olduğu, yapının yük taşıma kapasitesindeki azalma miktarını değerlendirmektedir. Ek olarak, indirgeme faktörü denkleminde referans değer olarak kullanılacak, sabit kenar koşulları altında eğrisel bir kabuğun yük taşıma kapasitesini tahmin edebilen bir öneri de sunulmuştur. Ayrıca, elastik, elasto-plastik ve plastik burkulma oluşumu için koşullar, normalleştirilmiş parametreler yardımıyla tanımlanmıştır. Bununla birlikte, elastik kenar kısıtlamalarının eğrisel kabukların limit yük üzerine olan etkisinin yanı sıra deformasyon şekilleri üzerindeki etkisi incelenmiştir. Sonuçlar, elastik kenar kısıtlama rijitliğinin, düzlem içi yükleme altındaki eğrisel kabukların yük taşıma kapasitesi üzerindeki etkisini göstermektedir. Benzerlik parametreleri türetilmiş ve bu sayede hem önerilen ifadeler çalışma aralığındaki tüm eğrisel kabuk konfigürasyonlarını kapsayacak hem de bu yaklaşım sayesinde büyük sistemlerin davranışları küçük ölçekli modelleri vasıtasıyla deneysel olarak simüle edilebilecektir. Bu durum büyük sistemler için deney yapılabilmesine olanak sağlarken aynı zamanda sonlu elemanlar analizlerinin sürelerinin azaltılmasına imkân sunacaktır. Daha da ötesi, önerilen taslak ifadeler doğrudan kullanıldığında, bir tasarımcı için, deneysel ya da sayısal çözümlere gerek duyulmadan sistem karakterizasyonunun yapılmasını sağlayabilecektir.

Anahtar Kelimeler: Eğrisel kabuk, Burkulma, Elastik sınır koşulu

Abstract

This study plans to investigate the elasto-plastic buckling behavior of curved shells with elastic edge restraints under the action of a central radial load, both numerically and experimentally. Various design parameters were expressed to characterize the effect of elastic edge restraints on load bearing capacity. A reduction factor equation draft was proposed as a function of multivariate shell parameters and this equation evaluates the amount of reduction in load bearing capacity of the structure caused by elastic edge constraints. Additionally, an equation draft that can predict the loadbearing capacity of a curved shell under clamped edge conditions, which is used as a reference value in the reduction factor equation, was also be presented. In addition, conditions for elastic, elasto-plastic and plastic buckling was described with the help of normalized parameters. In addition, the effects of elastic edge constraints on the limit load of curved shells as well as on the deformation shapes were investigated separately. The results show the effect of elastic edge restraint stiffness on the load bearing capacity of curved shells under in-plane loading. In addition, similarity parameters were derived so that both the proposed expressions cover all curved shell configurations in the range of the study, and, thanks to this approach, the behavior of large systems can be simulated experimentally by means of small-scale models. This allows experiments for large systems, while at the same time reducing the time of finite element analysis. Moreover, when the proposed draft expressions are used directly, it will enable a designer to characterize the system without the need for experimental or numerical solutions.

Keywords: Curved plate, Buckling, Elastic restraint

Giriş

Kabuk yapılar genellikle mekanik, inşaat ve havacılık gibi birçok mühendislik alanında kullanılmaktadır. Bu tür yapılar hem basma hem de eğilme türlerindeki yüklere sıklıkla maruz kalmaktadır. Burkulma ise bu yapılarda birçok yükleme koşulu için birincil aksama ya da iş görmezlik nedenidir. Bir kabuk yapının burkulma olgusuna neden olan çeşitli faktörler arasında bulunan sınır koşullarının durumu, yükleme tipi ve kusurlar (geometrik ve malzeme) ile birlikte burkulma davranışının ortaya çıkmasında rol oynayan en önemli parametrelerdir. Özellikle eğrisel kabuklar, dairesel kemerler, plaka, silindirik kabuk parçası vb. şeklindeki yapıların stabilitesi, sınır koşullarına oldukça duyarlıdır. Kabuk yapıların uygulamasında, kabuk uçlarının/kenarlarının tamamen sınırlandırılması, kısmi elastik kısıtlamalara kıyasla teorik olarak en yüksek limit yükleri sağlar. Bununla birlikte, kabuk yapıların elastik temelleri, otoyollar için rijit betonarme kaplama alt yapısı, elastomerik mesnetler üzerine oturan köprü alt yapısı, binalar için açık temeller, yanal ve düşey yüklü kazıklar, zemin profilindeki tüneller vb. cıvatalı, kaynaklı veya yapıştırıcı bağlantıların çoğu teoride rijit tipte bağlama yöntemine girse de pratikte belirli bir elastik rijitlik ile elastik bir tutucu gibi davranırlar. Bu bağlamda, sunulan çalışmanın sonuçları, yukarıda bahsedildiği gibi bir eğrisel kabuk profiline sahip kabuk yapısı için yardımcı olacaktır.

Çeşitli sınır koşullar (basit mesnetli, tam kenetlenmiş ve belirli bir yönde dönel olarak kısıtlanmış vb.) mevcut literatürde yaygın olarak deneysel ve teorik olarak incelenmiştir. Örneğin, düzlem içi sınır koşullarının plakaların elastik burkulma davranış üzerindeki etkisi Prajapat vd. tarafından dikkate alınmış, Beerhorst ve Babu ise iki zıt kenarın düzlem iç yüklenmesini çalışmıştır. Çalışmada, Mindlin plakalarının lineer burkulması için belirli varsayımlara dayalı olarak kapalı formda yaklaşık bir çözüm önerilmiştir. Bası yüklemeleri altında çalışan ve farklı sınır koşullarına sahip silindiri kabukların yerel burkulması ise Evkin vd. tarafından teorik ve deneysel olarak araştırılmıştır. Çoklu yükleme (eksene sıkıştırma ile birlikte dış basınç) etkisi altında daha karmaşık sınır koşullarına sahip bir sistem için Wang vd. deneysel bir çalışma sunmuştur.

Mevcut birçok çalışma, öncelikli olarak, plakaların ve kabuk parçalarının burkulma tepkisini incelemek için teori türetimlere odaklanmaktadır. Huang ve Qiao, elastik kenar sınırlamaları olan kavisli kirişlerin kritik burkulma yükü içi yarı analitik bir çözüm sunmaktadır. Atay ve Coşkun, elastik sınır koşulları ile burkulma yüklerinin analitik çözümünü varyasyon yineleme yöntemini kullanarak Euler kolonlarına kadar genişletmiştir. Pang vd. Jacobi polinomların kullanarak rastgele seçilmiş sınır koşullarına sahip kompozit lamine silindirik kabukları incelemiştir. Duc ve Thang kayma deformasyon teorisine dayalı olarak düzgün bir radyal yük altında elastik kısıtlamalarla çevrelenmiş ince dairesel silindirik kabukları araştırmışlardır. Kritik yük/gerilme denklemlerinin tespiti için yapılan kapalı formdaki teorik çözümler çoğunlukla bir elastik burkulma senaryosu

ve ideal sınır koşullarını (sabit ya da ankastre gibi) dikkate alarak yapılabilmektedir. Fakat kabuk yapıların yük taşıma kapasitesi için analitik ifadeler geliştirirken, bu idealleştirme konsepti (küçük deformasyonlar, elastik malzeme modeli vb.), gerçek durum esas alındığında yüksek bir sapmaya yol açabilir. Buna karşın, Yang vd. ise özel bir kabuk geometrisi için kenarlarında dönme serbestliği olmayan söz konusu yapının geometrik olarak doğrusal olmayan (küçük deformasyon kabulü olmayan) burkulma analizini gerçekleştirmiştir. Devam çalışmalarında ise bu prosedürü tüm kenarları dönmeye karşı elastik olarak kısıtlanmış takviye elemanlı dikdörtgen plakalara kadar genişletmiştir.

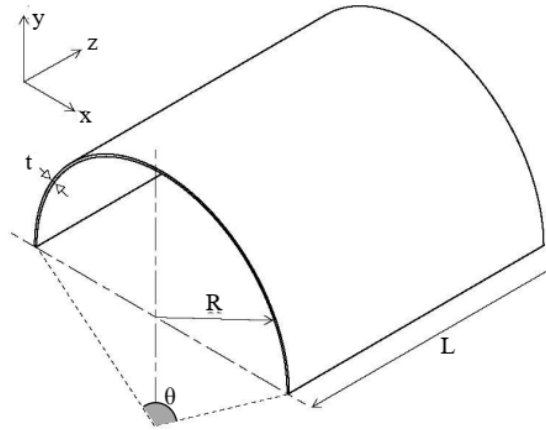
Kabuk yapıların elastik olarak kısıtlanmış burkulma problemi ile ilgili yayınlanmış ek çalışmalar (Liv d., Hung vd., Rezajee-Pajand vd., ve Bagherizadeh vd.) olmasına rağmen, radyal yükleme altında açık kesitli eğrisel kabuk segmentleri için burkulma yükü üzerindeki elastik kenar kısıtlama etkisinin teorik bir çıktısı henüz tam anlamıyla açıklanamamıştır. Açık kesitli eğrisel kabukların bir yapısal uygulaması olarak yükleri radyal yönde taşıyan yarı silindir geometrisi verilebilir. Bu tip kabuk yapılarda genellikle düzlem içi ve düzlem dışı burkulma hasarı gözlenir. Her iki durumda da elastik malzeme özellikleri dikkate alınarak burkulma yükleri için kapalı formulu çözümler Shafiee vd. tarafından sunulmuştur. Pi vd. çeşitli açık kesitli ince duvarlı bölümlerin stabilitesini incelemiş ve Zingoni vd. ise düzgün radyal yükleme altında parabolik ve dairesel açık kabuk segmentlerini çalışmıştır. Zhang vd. üniform dış basınç altında toroidal kabuk parçalarını araştırmışlardır. Düzgün radyal yüklere maruz kalan açık kesit kabuk segmentlerinin elastik burkulması kapsamlı bir şekilde incelenmiş ve belirli varsayımlara dayalı olarak burkulma yükleri için kapalı form çözümler elde edilmiştir.

Kabuk yapıların burkulma yükleri, malzeme plastisitesi, doğrusal olmayan geometri ve düzgün olmayan sınır koşulları gibi çeşitli faktörlerden büyük ölçüde etkilenir. Bu nedenle, pratikte açık kesit kabuk segmentlerinin gerçek burkulma yüklerinin tahmininde bu faktörlerin dikkate alınması gerekliliğine dikkat edilmelidir. Kabuk yapı malzemesinin mekanik özelliklerinin, tasarım burkulma yükü ve burkulma sonrası davranışı üzerindeki etkisi, Lykhachova ve Evkin tarafından aksel yükleme altındaki silindirler için analiz edilmiştir. Pi ve Bradford, Tang vd. merkezi bir yüke maruz kalan ince duvarlı segmentlerin doğrusal olmayan elasto-plastik burkulma analizini sunmuşlardır. Zhang vd. ve Chengyi vd. ise aynı yükleme senaryosunu dairesel kemer yapılarının düzlem içi elastik burkulmasını araştırmıştır. Yine benzer yükleme durumlarında teorik burkulma yükü değerlendirmesi Sofiyev, Zhang vd., Hassan vd., ve Liu vd. tarafından verilmiştir. Ayrıca, kabuk burkulma problemleri için sayısal modellemeye ve yaklaşık güncel analitik yöntemlere odaklanan çeşitli yaklaşımlar Hu vd., Hu vd., Wang vd., Zhou vd. ve Dastierdi vd. tarafından rapor edilmiştir. Bu çalışmalar da yaratıcı analitik yöntemler ve optimizasyon rutinleri aracılığıyla alandaki ilerlemenin kapsamlı bir görünümünü sunarlar.

Yukarıda bahsedilen çalışmaların çoğunda, kabuk segmentlerin elastik burkulma yüklerini yöneten ana denklemleri elde etmek için temel kabuk teorilerini kullandığı görülebilir. Rastgele bir kabuk yapısı için gerçekçi bir burkulma yükü tahmini gerçekleştirmek için doğrusal olmayan geometri, doğrusal olmayan malzeme davranışı ve değişken sınır koşulları faktörlerini aynı anda değerlendirilmesi gerekir. Bilindiği kadarıyla, mevcut literatürde yukarıda belirtilen faktörlerin her birinin etkisini içeren ve açık kesit kabuk segmentleri için kapsamlı burkulma yükü ifadeleri geliştiren bir çalışma bulunmamaktadır. Bu çalışma, merkezi bir radyal yüke maruz kalan açık kesit eğrisel kabuk segmenti için kabuğun düzlem içi burkulma yükünün, elastik kenar kısıtlamaları ve doğrusal olmayan geometriyi hesaba katarak incelenmesini sunmaktadır.

Malzeme ve Metot

Çalışmada söz edilen eğrisel kabuk yapının geometrisi ve boyutları Şekil 1'de şematik olarak gösterilmiştir. Bir eğrisel kabuğun tanımında, yay merkez yarıçapı R , kabuk kalınlığı t , yay segmentinin derinliği L ve yay açısı θ olarak gösterilen dört bağımsız geometrik parametre bulunmaktadır. Kabukların düzlem içi burkulma testleri için planlanan fikstür boyutları ve pres kafası ebatları dikkate alındığında kabuklar için merkez yay yarıçapının $R=62,5\text{mm}$, segment derinliği $L=10\sim 125\text{mm}$, yay açısının $\theta=15\sim 90^\circ$ ve standart çelik sac kalınlıklarına bağlı olmak üzere $R/t= 100\sim 300$ arasında kalmaktadır. Ayrıca detayları daha sonra verilecek olan deney fikstürü sayesinde birbirinden farklı kenar rijitliğine sahip ortam hazırlanarak kenar hareketleri tamamen kısıtlı ve tamamen serbest aralığında kalan farklı sınır şartları oluşturulacaktır.

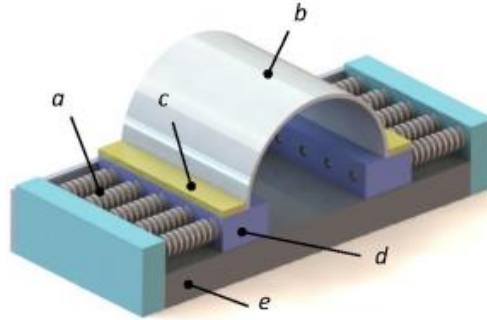


Şekil 37. Eğrisel Kabuk Geometrisi

DeneySEL burkulma testleri için eğrisel kabuk numuneleri, çelik sac levhalardan merdane yardımıyla şekillendirilerek üretilmiştir. Bu tür malzemeler, binalar, diğer yapılar, borular ve ince duvarlı yapılar gibi çeşitli uygulamalarda yüksek hacimli bir kullanıma sahiptir. Seçim yapılırken, kabuk malzemesi akma

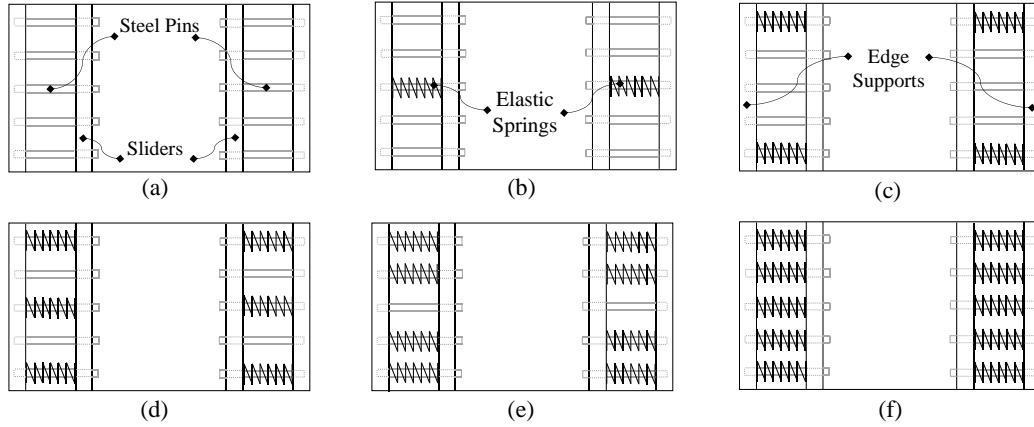
noktasına ve burkulma oluşumuna ulaşmadan önce, elastik kenar sınırlamalarının etkilerini belirgin bir şekilde yakalamak için istenen elastik şekil değiştirmesine imkân tanınmasına dikkat edilmiştir.

Eğrisel kabukların düzlem içi burkulma yüklerini doğru bir şekilde elde etmek ve elastik kenar sınırlamalarının etkisini ortaya çıkarmak için, Şekil 2’de gösterilen özel üretilmiş bir deneysel test fikstürü ile yer değiştirme kontrollü bir pres kullanılmıştır. Eğrisel kabuk numunelerinin uzunluğu boyunca dikey yönde radyal yükleme oluşturabilmek için 15mm yarıçaplı bir silindir yükleme fikstürü üretilmiştir. Ayrıca statik yükleme koşullarını sağlamak ve test numunelerinin gerinim hızı etkilerini en aza indirmek için, yük, 2mm/dak kafa hızında yükleme fikstürü aracılığıyla uygulanmıştır. Elastik sınır koşullarının doğru bir şekilde uygulandığından emin olmak adına Şekil 2’de gösterilen fikstür, elastik yaylar, numune tutucu, kayıcı destek, çerçeve ile yayların ve kayıcı desteğin hareketini kılavuzlayacak çelik pimlerden oluşturulmuştur. Bu düzenek, paralel yay düzenlemeleri aracılığıyla aynı elastik baskı yayları kullanılmasına rağmen farklı elastik kısıt değerlerinin ayarlanmasına olanak tanımaktadır.



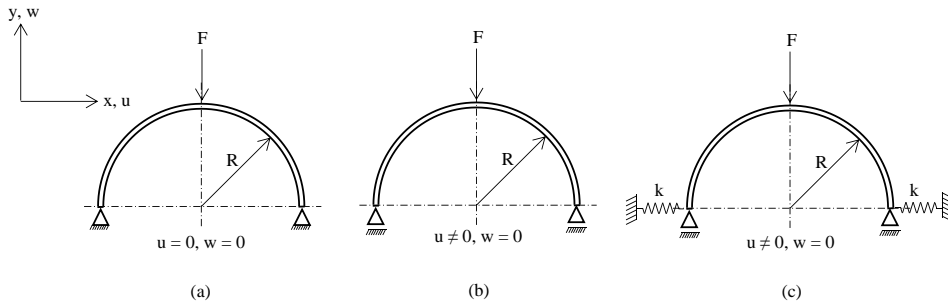
Şekil 2. Elastik Kenar Kısıtlanmalı Test Fikstürü

Bununla birlikte, elastik kenar kısıtlamasının neden olduğu yanal kuvvetin düzgün dağılımını sağlamak için test fikstürünün tasarımında alternatif iyileştirmeler yapılmıştır. İlk olarak, kaydırıcının delikleri ile destek arasına yağlanmış ve taşlanmış çelik pimler sıkıca monte edilmiş, bu da kaydırıcının yanal yönde serbestçe hareket etmesini sağlarken, dönüşünü kısıtlayacaktır. İkinci olarak, yaylar, Şekil 3’te görülebileceği gibi, tekdüzeliğe katkıda bulunmak için çelik pimler etrafında her bir düzenleme için simetrik olarak konumlandırılmıştır. Düzlem içi burkulma testleri, verilen konfigürasyonlar için üç tekrarlı olarak yapılmıştır. Deneysel bir adet yük hücresi, yatay ve dikey pozisyonda konumlandırılan deplasman ölçerler vasıtasıyla hem kuvvet hem de yer değiştirme verileri toplanmıştır.



Şekil 3. Deney Tasarımı

Şekiller 4a, 4b ve 4c, sırasıyla sabit, serbest ve elastik kısıtlama durumları için deney sisteminde kullanılacak olan sınır koşullarını $\theta=90^\circ$ için temsili olarak göstermektedir. Her durumda, eğrisel kabukların uzunlamasına kenarlarının dönüşü, z eksenini etrafında sınırlandırılmıştır. Şekil 4'de, temas noktalarında rijit silindir parçası tarafından uygulanan dikey F kuvveti, kabuğun derinliği boyunca z -yönünde düzgün olarak dağıtılmış bir çizgisel yük olarak ifade edilmiştir. Bu nedenle, eğrisel kabuk modelinin bir düzlemsel-gerinim problemi olduğu varsayılmış ve burkulma yükleri kabuğun birim derinliği başına yük olarak ifade edilmiştir. Benzer şekilde, elastik yayların tepki kuvvetleri de kabuğun uzunluğu boyunca, z -yönünde etki edecek olup burkulma değerlendirmesi için birim uzunluk K/L (N/mm^2) için eşdeğer bir yay sertliği önerilmiştir. Burada K , kenar boyunca yerleştirilmiş olan yay sisteminin N/mm cinsinden toplam sertliğidir. Buna karşın, K/L ifadesi bir elastik kısıtlama katsayısı (EKK) olarak önerilmiş ve bundan sonra k ile gösterilecektir.



Şekil 4. Test Konfigürasyonları Şematik Gösterimi

Eğrisel kabuk yapıların burkulma davranışı, büyük ölçüde, sınır koşullarına, elastik kısıtlama katsayısına k , geometri parametrelerine (kabuk kalınlığı t , yarıçap R , uzunluk L ve yay açısı θ), Young modülü E ve akma dayanımı σ_y gibi malzeme özelliklerine bağlıdır. Bununla birlikte, normalize edilmiş kabuk parametrelerinin kullanımı, rastgele (genel geçer) bir eğrisel kabuk konfigürasyonunun burkulma yükü tahmini için matematiksel

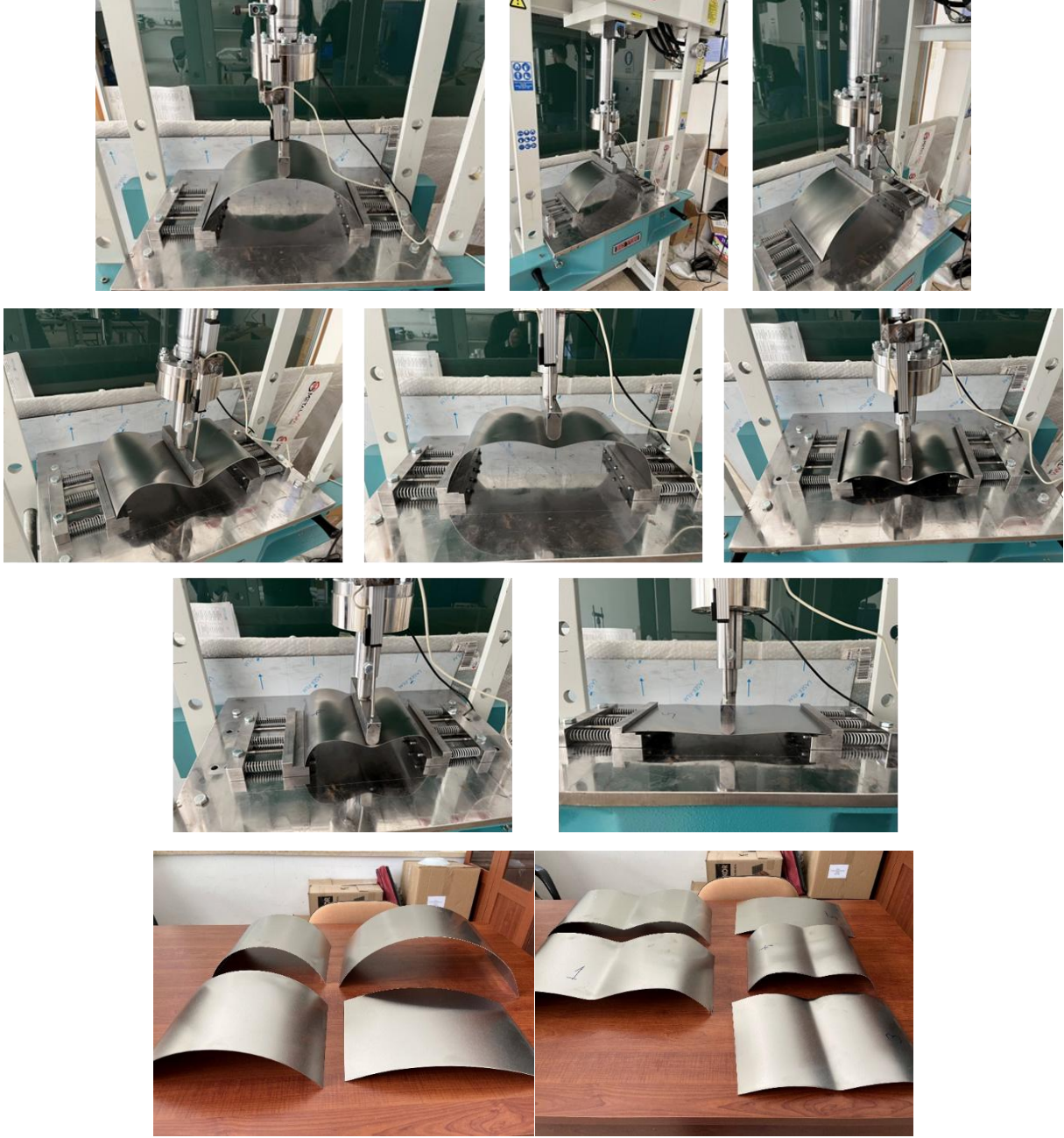
ifadeler geliřtirmede daha uygun ve karřılařtırılabilir. Bu amaçla, eğrisel kabuk sistemi için boyutsuz parametreler yarıçap-kalınlık oranı R/t , akma dayanımı-Young modül oranı σ_y/E ve EKK-Young modül oranı k/E olarak seçilmiřtir. Düzlem-gerinim yaklařımı durumunda burkulma yükü L uzunluęu ile lineer olarak deęiřtięi için z -yönünde birim derinlik için çalıřma yapılmıřtır. Özellikle $k=0$ (serbest mesnet) ile $k=\infty$ (sabit mesnet) arasında elastik kenar kısıtlama kořulları, burkulma yükü sabit mesnetteki deęere ulařana kadar uygun bir artıř boyutu ile arařtırılmıřtır.

Bulgular ve Tartıřma

Bu kısımda ön çalıřma sonuçlarından elde edilen bazı deney numunelerine ait bulgular deęerlendirilmiřtir. Bununla birlikte parametrik çalıřmalar halen devam etmektedir. Őekil 5'te üretimi gerçekteřtirilen fikstür ve yapılan bazı deneylere ait görseller bulunmaktadır. Őekil 6'da ise $L=150\text{mm}$, $\theta=30^\circ$, $t=1\text{mm}$, $R=62.5\text{mm}$ olan numuneler için; K/L sırasıyla $S_1=0.105\text{ N/mm}^2$, $S_2=0.210\text{ N/mm}^2$, $S_3=0.315\text{ N/mm}^2$, $S_4=\infty\text{ N/mm}^2$ ve $S_5=0\text{ N/mm}^2$ için yük-deplasman eğrilerini göstermektedir. Őekil 5 ve 6'dan görülebileceęi gibi, eğrisel kabuk segmenti, standart olmayan bir yapı örneęi olduęundan (yükleme altında membran gerilmelerden ziyade eğilme gerilmelerinin baskın karakter sergiledięi), her konfigürasyon için kararlı bölgede doęrusal olmayan bir denge yolu elde edilmiřtir. Geometri, yükleme ve sınır kořulları ile ilgili olarak standart olmayan yapıların doęası gereęi yükleme bařladıęı ilk andan itibaren yapı üzerinde ekstra eğilme etkileri meydana gelir. Dolayısıyla, doęrusal olmayan denge yolları hem kararlı hem de kararlı olmayan bölgelerde ortaya çıkar (stabilite kaybı öncesi ve sonrası), çünkü bu tarz yapılarda yüklemenin bařlangıcından itibaren meydana gelen bir eğilme etkisinin sonucu olarak yapının geometrik rijitlięi düřmektedir. Bu nedenle, kararlı bölgedeki geometrik rijitlik, standart olmayan yapıların burkulma tepkisinde baskın bir etkiye sahiptir. Bu durum söz konusu problemin analitik çözümlerinin yapılamamasına ve matematiksel modellenmesine karmařık hale gelmesinin bařlıca sebebidir.

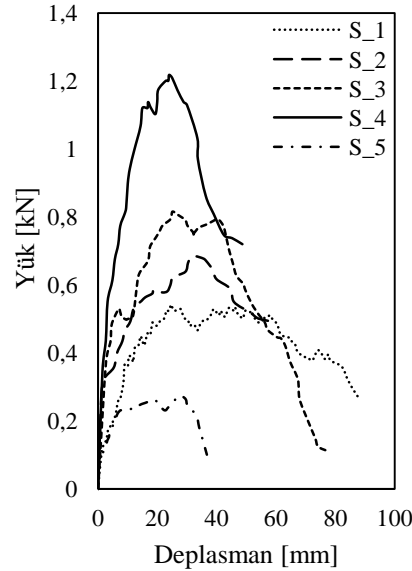
Burkulma sonrası (postbuckling) bölgelerde, elastik kenar kısıtlama parametreleri k_0 'den k_∞ 'ye kadar yük tařıma kapasitesinde keskin deęiřiklik gözlenmemiřtir (bkz. Őekil 6). Bu durum standart olmayan yapılar için klasik bir snap-through burkulma davranıřı olarak deęerlendirilebilir. Bu burkulma davranıřında, eğrisel kabuk kendi zıt konumuna doęru deforme olur ve limit yük noktasının ötesinde yüklemeye devam edilirse, x eksenine göre simetrik bir Őekle sahip olacak Őekilde stabilitesini kaybeder. Roylance, bu tür bir deformasyonun, membran gerilimi tamamen baskın olmayan (non-standard structure) ince duvarlı yapılar için tipik ve yapının Őeklinden dolayı bu burkulma davranıřında eğilme gerilmesi baskın olduęunu ifade etmiřtir. Bu tür kabuk yapılarının eğilme gerilmeleri için analitik ifadeler Calladine tarafından sunulmuřtur. Ayrıca genel olarak, radyal yüklemeye altında çalıřan eğrisel kabukların burkulma davranıřı, yine Flügge tarafından tanımlanan

eğilme stresi dağılımlarından kaynaklanan eğilme deformasyonlarına oldukça benzerdir. Elastik kenar sınırlamaları ise bu bahsedilen burkulma ve eğilme deformasyonlarını birbirinden ayırt etmede zorluğa neden olan ve ekstra eğilme stresini ortaya çıkaran ek bir faktördür. Bu eğilme tepkisi, Zingoni tarafından serbest, sabitlenmiş ve ankastre durumlar için analitik ifadelerle gösterilmiştir.



Şekil 5. Test numuneleri montajı ve deney süreci

Elastik kenar sınırlamalı eğrisel kabuklarda, uygulanan radyal F yükü ile elastik kenarlardaki yatay reaksiyonu arasında bir orantı vardır. Yükleme sırasında elastik kenarın yatay tepkisi artar, bu da kabuğun kenarında x yönünde öteleme eğilimi yaratır. Kaymadaki aşamalı bir artış, uygulanan F yükünün daha yüksek yatay bileşenlerine yol açar. Yavaş yavaş, bu süreç yapıda bir snap-through (flambaj) ile sonuçlanabilir. Ayrıca, yatay öteleme arttıkça yapının geometrisi eliptik bir şekle yaklaşır bu da nihayetinde daha yüksek eğilme gerilimi ve daha düşük geometrik rijitlik ortaya çıkarır. Bu davranış, limit yük (F_{lim}) ile yatay öteleme arasındaki sıkı ilişkinin bir göstergesi olup stabilite kaybının gerçekleşmesine katkıda bulunur. Sonuç olarak, eğrisel kabuğun alt kenarının x -doğrultusunda hareket etmeye kısıtlandığında, F_{lim} , değerinin, yüksek ölçüde arttığı net olarak gözlemlenmiştir. Bu nedenle, beklendiği gibi, deneysel olarak test edilen numunelerin yük taşıma kapasitesi, yanal arttıkça artmıştır.



Şekil 6. Yeni Test Düzenegi ve Deneysel Sonuřlar

F_{ref} tamamen kısıtlanmış kenar koşulunun limit yükünü gösterdiği yerde, a, b, c ve d sabitlerinin pozitif gerçek sayılar olması beklenmektedir. Elastik kenar sınırlamalarının limit yük üzerindeki etkisini değerlendirmek için bir azaltma faktörü $\varphi = F_{lim}/F_{ref}$ tanımlanmıştır. Ayrıca, matematiksel burkulma ilişkileri geliřtirmek için normalleştirilmiş elastik kısıtlama katsayısı $\zeta = k/E$ ve malzeme plastisite faktörü (MPF) $\varepsilon_p = \sigma_y/E$ tanıtılmıştır. Bu deęerler ön alıřma sonucunda elde edilmiş olup tahmini olarak matematiksel model ierisinde alıřtığı görülen iliřkilerdir. Uygun modelin ařağıdaki şekilde tanımlanması gerektięi görülmüřtür.

$$F_{ref} = f(E, \sigma_y, R/t) = E^a \sigma_y^b (R/t)^c \theta^d$$

İndirgeme faktörü φ için bir iliřki tanımlamak için daha önce bahsedildięi gibi ζ , ε_p , θ ve R/t 'nin etkisi dikkate alınmalıdır. φ ve ζ arasındaki iliřki, φ 'nin asimptotik davranıřından dolayı rasyonel bir fonksiyonla

temsil edilebilirken, ε_p ve R/t ise bir üs fonksiyonu ile ilişkiye dahil edilebilecektir. Bu durumda, indirgeme faktörünü hesaplamak için aşağıdakine benzer bir denklemin önerilmesi planlanmaktadır.

$$\varphi = F_{lim} / F_{ref} = ((\xi + \varepsilon_p^A (R/t)^{-B}) / (\xi + \varepsilon_p^C (R/t)^{-D})) \theta^E$$

Yukarıda belirtilen ifadelerin limiti yük ve indirgeme katsayısı için tahmin yapabilme yeteneğinin var olduğu kanısı oluşmasına rağmen ilgili katsayıların (a,b,c,d,A,B,C,D,E) en az hata ile çalışabilmesi için istatistiki ve sayısal analizler devam etmekle birlikte, farklı yay açısına sahip eğrisel kabuk konfigürasyonların üretimine ve analizlerine devam edilmektedir.

Sonuç ve Öneriler

Bu çalışmada, merkezi bir radyal yük altında eğrisel kabukların burkulma davranışına elastik kenar kısıtlamalarının etkisi sayısal ve deneysel olarak incelenmiştir. Yarıçap-kalınlık oranı R/t , malzeme plastiklik faktörü $\varepsilon_p = \sigma_y / E$ ve elastik kısıtlama faktörü $\xi = k/E$ gibi tasarım parametrelerinin eğrisel kabukların yük taşıma kapasitesi üzerindeki etkileri çalışılmıştır. En önemlisi, burkulma ifadeleri geliştirilmiş ve sayısal ve deneysel sonuçlarla uyumluluğu incelenmiştir. Sonuç olarak, mevcut çalışmadan çıkarılabilecek sonuçlar aşağıdaki gibidir:

- Elastik kenar durumunu ve malzeme plastisitesini karakterize etmek için sırasıyla ξ ve ε_p olmak üzere iki içsel parametre tanıtılmıştır. ξ sıfırdan sonsuza doğru arttıkça, yapının yük taşıma kapasitesi artan bir trendle asimptotik bir değere yaklaşır (burada $F_{lim} = F_{ref}$ ve $\varphi = 1$). Sonuçlar, elastik kenar kısıtlamalarının sertliği ile ilgili olan, kabuk kenarlarının x yönünde yer değiştirmesinin, eğrisel kabukların yük taşıma kapasitesinde önemli değişikliklere yol açtığını göstermektedir. Ayrıca ε_p değerleri yükseldikçe, elastik burkulma oluşana kadar limit yük üzerinde olumlu bir etki gözlenmektedir. R/t 'nin denge yollarının şekillenmesinde önemli bir rol oynadığı ve artması limit yükü önemli ölçüde düşürdüğü bulunmuştur.

- Sabit uç koşullarına referans olarak, elastik kenar kısıtlamalı yapının yük taşıma kapasitesindeki azalma miktarını tahmin etmek için bir indirgeme faktörü φ tanıtıldı. Elastik kenar tutucuların doğrudan φ - ξ diyagramı ile karakterize edilebileceği tespit edilmiştir.

- İstatistiksel yaklaşımlar ile, F_{lim} , φ ve F_{ref} denklemlerinin oldukça doğru tahminler yapabileceği sonucuna varılmıştır. Denklemlerin geçerliliği, her bir tasarım parametresinin aralığından bağımsız olarak, rastgele seçilen konfigürasyonlara dayalı olarak global olarak da doğrulanabileceği tahmin edilmektedir.

Teşekkür

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AÇIK DENİZ RÜZGAR ÇİFTLİKLERİNİN ÇEVRESEL ETKİLERİNİN DEĞERLENDİRİLMESİNDE SENTINEL-3 VERİSİNİN KULLANIMI: HORNS 1 REV AÇIK DENİZ ÇİFTLİĞİ ÖRNEK OLAY İNCELEMESİ

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Özet

Son yıllarda yenilenebilir enerjiye olan talebin artması, açık deniz rüzgar santrallerinin genişlemesini yoğunlaştırdı. Sürdürülebilir elektrik enerjisi tedariği konusunda umut verici bir beklenti olmasına rağmen, bu tesislerin çevresel etkileri konusunda hala bir anlayış eksikliği var. Bu çalışmanın amacı, Sentinel-3 cihazı ile uydu verilerini kullanarak Horns1 Rev açık deniz rüzgâr çiftliği konumları için çeşitli zaman aralıklarında çevresel gözlemleri değerlendirmek ve geniş bir yelpazede atmosferik ve deniz yüzeyi yüksekliği anormallikleri, dalga yüksekliği, rüzgâr hızı, deniz yüzeyi sıcaklığı ve deniz yüzeyi rengi gibi oşinografik parametreleri sağlamaktır. Parametrelerde izlenen değişiklikler ve eğilimler, bulguları değerlendirmek için istatistiksel yöntemlerle birleştirilmiş gelişmiş uzaktan algılama teknikleri kullanılarak tespit edilmiştir. Multidisipliner bir yaklaşım kullanan bu çalışmanın önemi, çevreyi etkileyebilecek olayların kapsamlı bir şekilde anlaşılmasını sağlamak için uydu tabanlı teknolojik verilerin çevre bilimiyle bütünleştirilmesinden kaynaklanmaktadır. Bu araştırma sırasında, açık deniz kalkınma enerjisi için sürdürülebilir politikalara ilişkin eyleme dönüştürülebilir görüşler oluşturmaya çalışılmaktadır. Bu araştırmadan beklenen sonuçlar, çevresel sonuçların ayrıntılı bir şekilde anlaşılmasını sağlayacak ve açık deniz rüzgar enerjisi operasyonlarının gelecekteki kurulumu veya planlanması için gerekli olacaktır.

Anahtar Kelimeler: Açık deniz rüzgâr çiftliği, çevresel etkiler, deniz ekosistemleri, uydu altimetre verisi, açık deniz yenilenebilir enerji



THE USE OF SENTINEL-3 DATA TO ASSESS THE ENVIRONMENTAL IMPACTS OF OFFSHORE WIND FARMS: A CASE STUDY OF THE HORNS 1 REV OFFSHORE WIND FARM

Abstract

The increasing demand in recent years for renewable energy has intensified the expansion of offshore wind farms. Although there is a promising expectation for sustainable electric power provision, there is still a lack of understanding of the environmental impacts of these installations. The purpose of this study is to use satellite data with the Sentinel-3 instrument to assess environmental observations over multiple periods of time for Horns1 Rev offshore wind farm locations and to provide a wide range of atmospheric and oceanographic parameters, like sea surface height anomalies, wave height, wind speed, sea surface temperature, and sea surface color. Monitored changes and trends in parameters will be detected using advanced remote sensing techniques combined with statistical methods to evaluate the findings. The importance of this study comes from the efficacy of using a multidisciplinary approach integrating the satellite technology data with the environmental science to produce a comprehensive understanding of phenomena that may affect the environment. During this research, it is sought to build actionable views of the sustainable policies for offshore development energy. The results expected from this research will offer nuanced comprehension of the environmental consequences and will be essential for the future installation or planning of offshore wind energy operations.

Keywords: Offshore wind farms, Environmental impacts, Marine ecosystems, Satellite altimetry data, Offshore renewable energy

1. INTRODUCTION

The research discusses the environmental assessment field specifically the Horns Rev 1 Offshore Wind Farm, which one the remarkable offshore projects in the realm of the renewable energy. The Horns Rev 1 established in 2002 presenting the largest offshore wind farm in the world at that time, after that the Horns wind farm extended to multiple wind farms to become Horns Rev 2 and Horns Rev 3. With its impressive installed capacity of 160MW Horns Rev 1 gained the worldwide attention. located at $55^{\circ} 30' 11.52''$ N and $7^{\circ} 47' 46.931''$ E with 14 km off the Danish coast Figure 1.1, this wind farm presents also an environmental topic to be assessed.



Figure 1.1 "Horns Rev 1 (Hassoine et al, 2021)"

The Horns Rev 1 parallelogram layout is notable with a spacing between the turbines varying according to the wind direction, which provides a valuable aspect of contributing to the study. The sides aligned at 270° and 353° are spaced $7D$ (560 m) apart, while the diagonals, set at 221° and 312° , extend $9.4D$ (750 m) and $10.4D$ (833 m) respectively (Hassoine et al, 2021) Figure 1.2. The unique arrangement of the wind farm, with the operational history of more than two decades could provide abundant data for assessing environmental impacts on long-term.

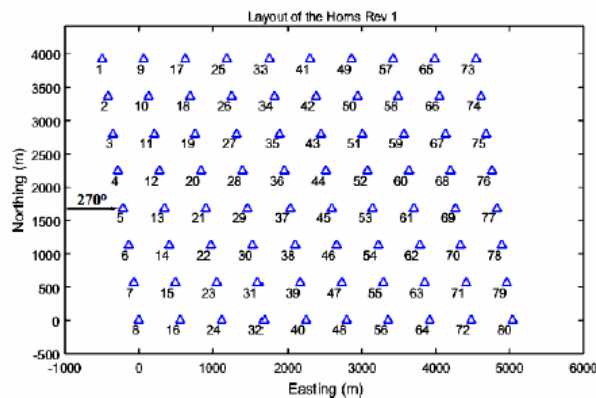


Figure 1.2 "Layout of the Horns Rev 1 (Hassoine et al., 2021) "

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The aim of the study is to utilize the Sentinel-3 satellite data effectively in order to evaluate potential environmental impacts of the Horns Rev 1 Offshore Wind Farm. This includes a different oceanographic and atmospheric parameters to study detailed analysis that could be influenced by the operation of the wind farm. The seek of the study ro reveal the ecological implications by examining the changes in the following parameters on offshore wind farm, which will contribute to enhancing our understanding of their environmental ramifications.

The study The study employs remote sensing techniques by utilizing data from Sentinel-3 instruments such as SLSTR (Sea and Land Surface Temperature Radiometer), and OLCI (Ocean and Land Colour Instrument). These instruments in terms of measuring parameters in environmental matter are highly skilled. Starting with SLSTR instrument involves measuring sea surface tempreture, which is an essential indicator of health of the marine ecosystem. The other one is OLCI instrument, which provides data about the concentration of chlorophyll and the total suspended matter, that can provide changes in the biological and chemical aspects in the marine environment.

After analyzing data from previous instruments collaboratively, the aim of the study is to present clear prespective of environmental impacts around Horns Rev 1. This study shows an attemp to blend satellite technology with environmental science.

Sentinel-3 is an Earth observation satellite that has been developed to support multiple applications of the European Space Agency Copernicus Programme in terms of ocean, land, atmospheric, emergency, security and cryosphere applications. The services of the ocean and the land observation are delivered by the joint work of the European Space Agency (ESA) and The European Organization for the Exploitation of Meteorological Satellites (EUMETSAT).

The main goal of Sentinel-3 satellite is to reliably and accurately measure the sea surface topography, the color and the temperature of the sea and land surface. Provided data plays a crucial role in supporting environmental monitoring, ocean forecasting system and climate monitoring. The observations of Sentinel-3 can also facilitate the applications related to vegetation, fire, inland water (such as lake and river water surface height), the cryosphere (e.g. sea-ice and land ice thickness) and the atmosphere. Sentinel-3A went into service on 16 February 2016 and Sentinel-3B was deployed on 25 April 2018.

The satellite Sentinel-3 is equipped with a multiple type of instruments. Each one has distinct technological specifications. In this study, three types of instruments will be used: Ocean and Land Colour Instrument (OLCI), Sea and Land Surface Temperature Radiometer (SLSTR). Details are given as following:

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1 - Ocean and Land Colour Instrument (OLCI): The technical characteristics of this instrument include a swath of 1,270 kilometers width, with a push-broom imaging spectrometer that consists of five cameras (Anon n.d.-h).

2 - Sea and Land Surface Temperature Radiometer (SLSTR): This instrument is a scanning imaging conical radiometer that utilizes the along-track scanning dual-view technique. The instrument has a horizontal coverage of 1,420 km (directly beneath the satellite) / 750 km (opposite direction), with a resolution of 500 m visible and shortwave infrared (VIS, SWIR) and 1 km midwires infrared and thermal infrared (MWIR) in terms of spatial sampling, that includes a range of nine bands ranging from 0.55 to 12 μm . The noise equivalent temperature difference (NETD) is 50 millikelvin (mK) at a temperature of 270 Kelvin (K) using thermal infrared (TIR) imaging. The satellite has a launch mass of 90 kg, occupies a volume of 2.116 m³. Sentinel-3A was launched on February 16, 2016, and Sentinel-3B was subsequently launched on April 25, 2018, where it is designed to operate for 7.5 years, but with added consumables it could be extended to 12 years (ESA - Facts and Figures, n.d.; Sentinel-3 - Instrument Payload - SLSTR - Sentinel Online - Sentinel Online, 2023)..

2. METHODOLOGY

2.1 RESEARCH DESIGN

Primarily the study is exploratory and descriptive in form, aiming methodically to gather satellite data to assess the surrounding environment of the Horns Rev 1 and examining possible impacts of the wind farm. In order to understand the correlations or relations between the observed changes and the operation of the wind farm, and to achieve the objective of this study in our spotted area, a comprehensive monitoring, assessment and analysis from the retrieved data was conducted. The quantitative data has been provided by Copernicus Marine Service from Sentinel-3 through the instruments of SLSTR and OLCI, that were used in this empirical study (Sentinel-3 - Instrument Payload - Sentinel Online - Sentinel Online, 2023).

Regarding temporal reach, the data spans from January 2021 to July 2023, providing considerable amount of time for the short-term and long-term trends analysis of investigation. The data availability for the parameters used in the study starts from January 2021 to mid-2023, since Sentinel-3 satellite data starts in 2021 for the related parameters (EUMETSAT, 2022). The given time frame limitation means that the study may not include long-term patterns before 2021. The spatial focus of the study is the area surrounding the Horns Rev 1 Offshore Wind Farm. The research questions are: “Which observations can be detected in the parameters of the wind speed, sea surface height, wave height and the remaining parameters around the Horns Rev 1”, and “Are there any following environmental impacts correlated with the wind farm operation?”



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The data retrieved from OLCI and SLSTR instruments had some constraints. Specifically, when we visualized the data for our parameters e.g., sea surface temperature, chlorophyll concentration (Chl), the view was covered with clouds, which mostly obscured the visualization of the data. The study will assume that periods without noticeable cloud cover will represent a sample of environmental conditions. However, we should know that periods with heavy cloud cover could contain unreachable significant environmental data.

2.2 DATA SOURCE (COPERNICUS MARINE SERVICE)

The Copernicus Marine Service, which is the main data source for this study, is an essential part of the European Union's Copernicus Earth observation program. The service is well-known globally for providing reliable and extensive marine data, which is essential for monitoring an assessment in environmental researches (Anon n.d.-c). The focus of this study is the using of Sentinel-3 data with OLCI and SLSTR instruments, which are accessible through the Copernicus Marine Service. These instruments offer abundant information that is crucial for the environmental impacts assessment, including wind speed, sea surface height, wave height, chlorophyll concentration, total suspended matter and sea surface temperature.

2.3 DESCRIPTION OF SENTINEL-3 INSTRUMENTS: SLSTR, AND OLCI

Sentinel-3, which is a part of the Copernicus Programme, has been provided with advanced instruments, such as the Sea and Land Surface Temperature Radiometer (SLSTR), and the Ocean and Land Colour Instrument (OLCI). Each one of these instruments serves a vital function in environmental studies and they are specifically suitable in monitoring and assessing the structures in marine ecosystem.

SLSTR instrument has been developed in order to assess sea surface temperature (SST) accurately. SST considered as an indicator for the ecological health of the marine ecosystem and can be influenced by the offshore constructions which will be examined in this study. Additionally, the versatility and precision of the instrument are observed through detecting changes as well in land surface temperature, although not directly pertinent to this study (Sea Surface Temperature Services | EUMETSAT, 2023).

OLCI is equipped to capturing imagery with high-resolution which provides detailed visual representations of both oceanic and land coloration. In this study, the interest pertains to assessing OLCI's capability in seawater to quantify chlorophyll concentration and total suspended matter. The variations in chlorophyll and total suspended matter can be led to changes in primary production and sediment dynamics, which may be linked to the existence and operation of the wind farm (Sentinel-3 Ocean and Land Colour Instrument | EUMETSAT, 2023).

2.4 PARAMETERS OF INTEREST

The assessment of the environmental impacts of the Horns Rev 1 offshore wind farm in this study originates from a set of key parameters which is the objective of this study to examine them. Each parameter of them provides distinct perspective in analyzing marine environment. Parameters of interest are sea surface height, chlorophyll concentration, and the details of each parameter are given below, respectively.

Sea Surface Temperature (SST) plays a vital role as being one of the pertinent parameters in assessing maritime ecosystem health condition. It exerts an influence on some biological activities like the growth of plankton and possibly affect the entire distribution of marine species in general. By monitoring SST changes in the determined spot, the impact of offshore wind farm on the local marine temperature can be explained, which can lead to a cascading ecological impact (Sea Surface Temperature Services | EUMETSAT, 2023).

Chlorophyll concentration in the oceanic environment is a fundamental indicator of the phytoplankton abundance in the ecosystem, interconnected directly to the health and productivity of marine life. Detected variations in chlorophyll levels in the vicinity of our studied area can suggest modifications in primary productivity and, this can be attributed to water movements or changes in the flow of nutrients caused by the structures of the wind farm (Chlorophyll | Ocean Tracks, 2023).

2.5 DATA COLLECTION PROCESS

Data will be retrieved and extracted from Copernicus Marine Service (Data Viewer | WEKEO, 2023).. Different parameters from the provider will be gathered at different level of frequencies according to the accessibility (annually for some, bi-annually for others) in order to target both current and environmental changes that is occurring gradually. Conducting a query on the Copernicus Marine Service dataset will be the initial step. This step entails implying geographic coordinates of the Horns Rev 1 location by specifying the wanted time frame, which will be from January 2021 to the mid-2023. The subsequent steps for this study will be involve visualizing the outcomes and evaluating the efficacy of these visualization for the study, after that we will analyze the findings.

The retrieving data process in our study was designed to utilize the Sentinel-3 satellite instruments which are: SLSTR and OLCI, and our parameters of interest are the wind speed, sea surface height, wave height, sea surface temperature, concentration of chlorophyll and total suspended matter.

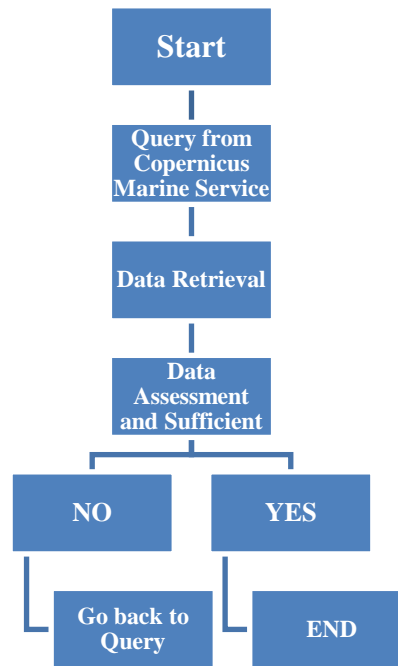


Figure 2.5.1 "Flow Chart of the Data Collection Steps"

2.6 DATA PROCESSING AND VISUALIZATION

The data instruments OLCI and SLSTR, that are covering chlorophyll concentration and sea surface temperature were processed and subsequently visualized using the Sentinel Application Platform (SNAP). SNAP software has been designed specifically for processing data acquired by Sentinel satellites and possesses a multiple of tools and features that aid in analysis and accurately visualizing the specific parameters (SNAP – STEP, 2023). The choosing of SNAP was performed according to the compatibility of their features for the respective dataset in our study, in order to ensure that data visualization process was at a satisfactory level of accuracy and broad of insight.

3. DATA ANALYSIS AND RESULTS

3.1 SEA SURFACE TEMPERATURE (SST)

The following is the assessment of Sea surface temperature data (SST) on the Horns Rev 1 offshore wind farm, and the surrounding areas for the following years of 2021, 2022 and 2023. In July 16, 2021, SST readings shows in average 16.7°C in the Horns Rev 1 location. In the vicinity areas, the values varied from 15.8°C to 16.6°C. In contrast, areas outside the Horns Rev 1 location exhibited slightly higher SSTs, ranging from 17.7°C to 18.2°C. As shown in the Figure 3.1.1, the selected pixel point Pin 1 (pixel spacing: 900 m 800 m) represents the sea surface temperature at Horns Rev 1, which is located at coordinates (7°48'44" E, 55°28'04" N) was recorded as 16.77°C.

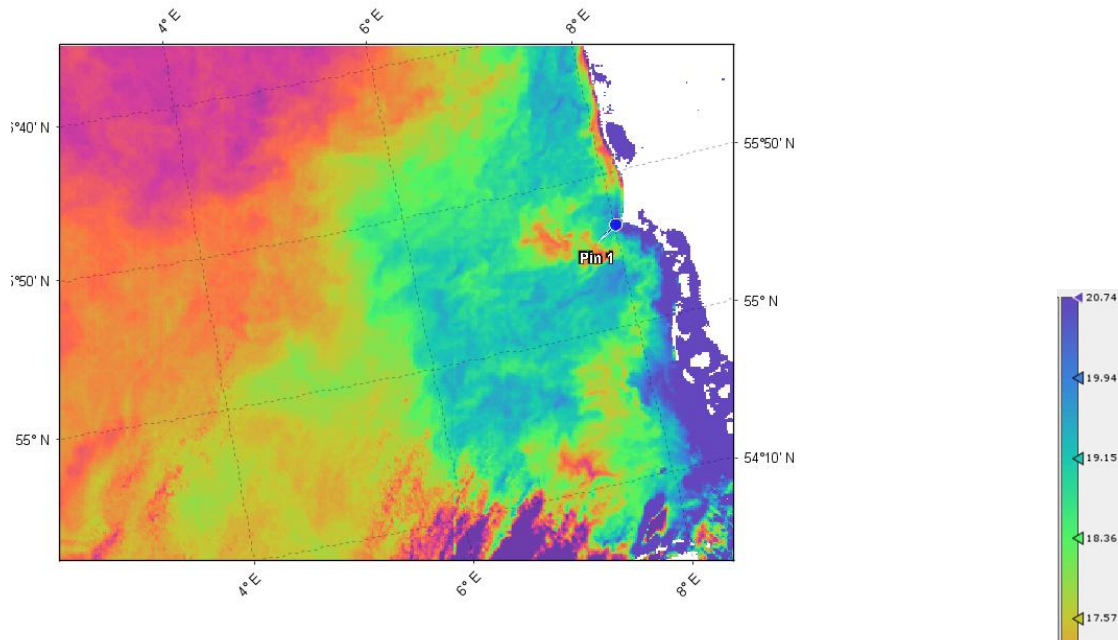


Figure 3.1.1: " SST Data for July 2021". The location of Pin 1 is shown at the right figure.

In July 13, 2022, SST along the coast up to the wind farms ranged between 16.1°C to 17.5°C and it is spotted as 16.1°C at Horns Rev 1 location, then SST recorded a tendency of decreasing temperatures farther away from the coast and wind farms, toward 15°C (Figure 3.1.2).

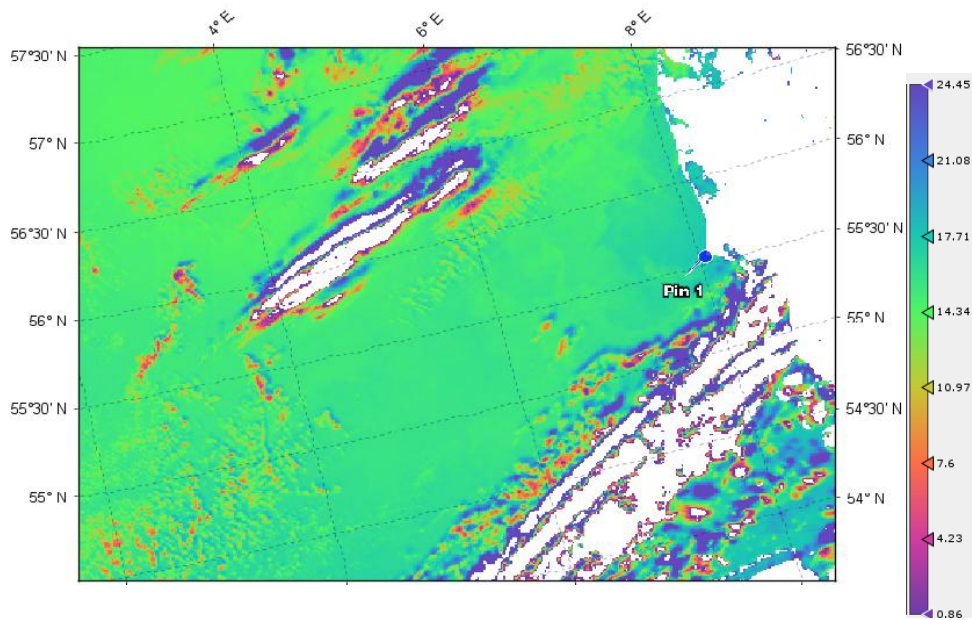


Figure 3.1.2: " SST Data for July 2022"

In June 13, 2023, at Horns Rev 1, SST was measured as 12.45°C, whereas 13.4°C was reported at the adjacent of the wind farms. The surrounding marine area showed values up to 14.5°C, with some localized value spots reaching up to 15°C Figure 3.1.3.

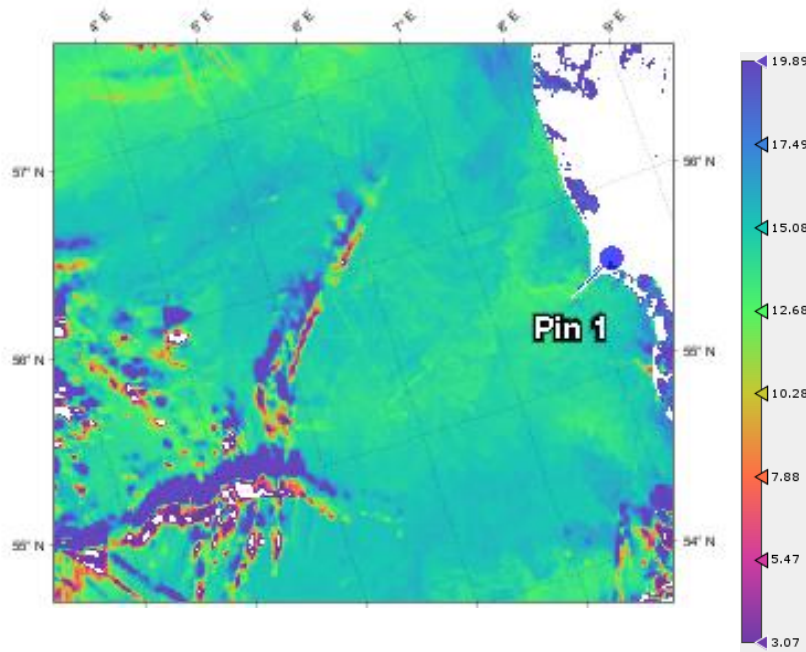


Figure 3.1.3: " SST Data for July 2023"

The observed SST differentiation around Horns Rev 1 and its nearby offshore wind farms, could be influenced by a number of factors, including but not limited to the wind farm operations, the conditions of regional oceanographic, and climatic trends. Offshore wind farms have the potential to cause the localized cooling effects on SST through the alteration of the wind speed and the turbulence (Dörenkämper et al, 2015). Also Christiansen et al. (2022) reported that simulations and observations have shown the formation of large-scale hydrodynamic structures as a result of offshore wind farm wakes, which can lead to mean sea surface temperatures variations and primarily increases in the vicinity of offshore wind farms.

3.2 CHLOROPHYLL (CHL)

Chlorophyll (Chl) concentration indicates the abundance of phytoplankton in marine environment. Phytoplankton is a main producer in the marine food web, and the concentration of it has implications on marine ecology, such as carbon cycling and water quality. The differences in Chl concentration could be attributed to many factors, e.g. sunlight, nutrient availability and even physical disturbances such as precipitation events and vertical mixing (Kaya et al, 2018; Kim et al, 2014). According to the first recorded data in 16/07/2021 (Figure 3.2.1), Chl concentration is recorded 5 mg.m^{-3} at Horns Rev 1 coordinates, ranges between 2.1 to 4.19 mg.m^{-3} around Horns Rev 1 location and decreases as moving farther from the coast. The recorded data suggest an average abundance of phytoplankton. The value decreases as going away from the coast point out to the terrestrial nutrient influx, which leads to higher values of phytoplankton near the coastal areas (Carstensen, Conley, et al, 2006).

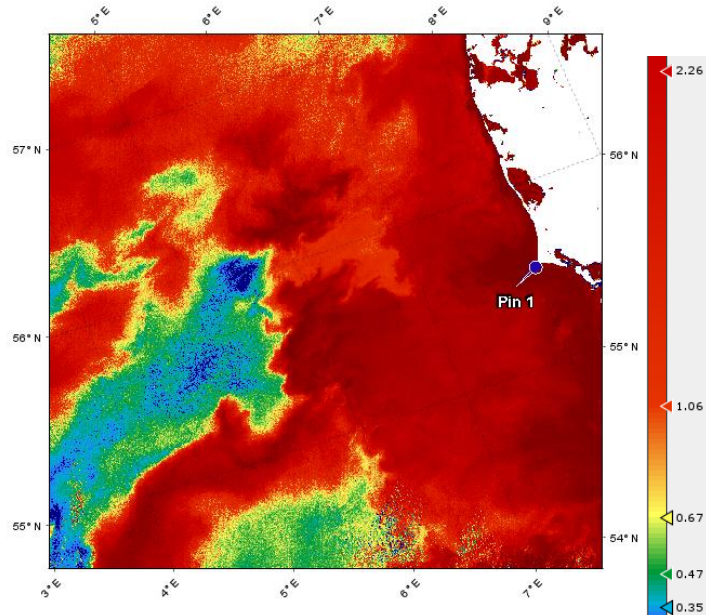


Figure 3.2.1: " CHL Data for July 2021" pixel spacing here 290 m 280 m

In 13/07/2022, CHL concentration is up to 5 mg.m^{-3} in Horns Rev 1 wind farm location, and according to the map areas free of the wind farm structures, the concentration decreases to 3.3 mg. m^{-3} (Figure 3.2.2). After a year, the value of the recorded data has increased. The observed higher concentration in the wind farm area comparing to the surrounding areas could indicate that the existence of these offshore structures might be influencing the conditions of the local marine environment. Wind turbine structures such as the turbine foundations can produce local turbulence and potentially result in nutrient upwelling, causing to the localized blooms of the phytoplankton (Q. P. Li et al, 2016).

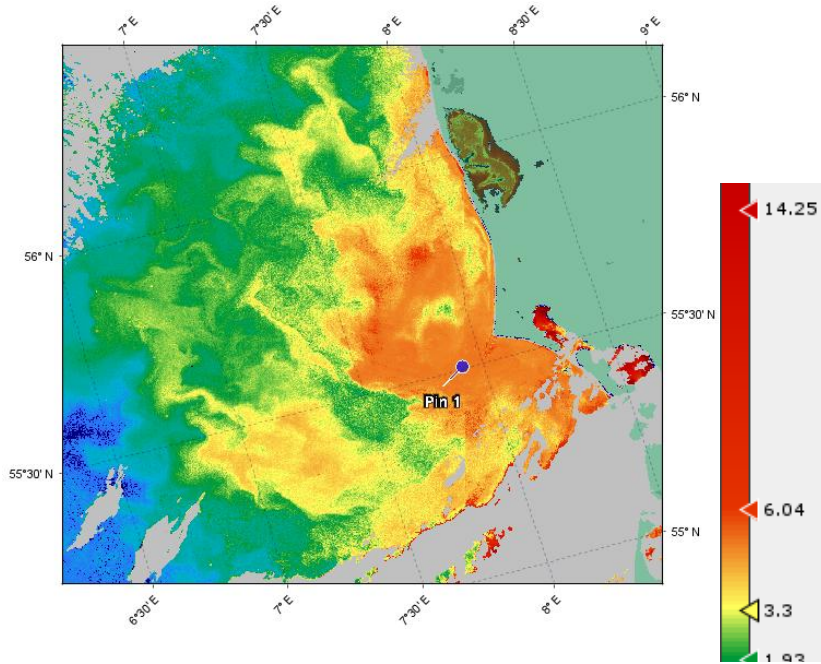


Figure 3.2.2: " CHL Data for July 2022"

In 13/06/2023, CHL concentration is up to 2.12 mg. m⁻³ in Horns Rev 1 location, and decreases pointedly to 0.6 mg.m⁻³ at the outside of the wind farm structure areas and as farther from the coast (Figure 3.2.3).

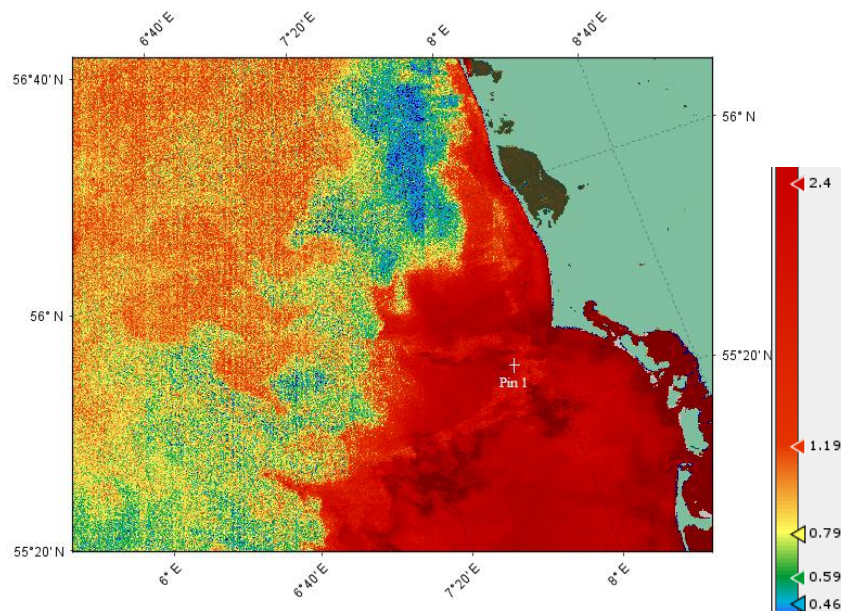


Figure 3.2.3: " CHL Data for June 2023"

The notable drop in CHL concentration in 2023 for both in and outside the wind farm region, points to a wider regional shift in the phytoplankton abundance. This could be attributed to the factors like altered water

temperature, decreased nutrient availability, improved water clarity or even some natural variation in the phytoplankton population. Clear water allows more sunlight to penetrate into the water column, which will increase photosynthesis and the growth of phytoplankton. Conversely, when suspended particles or algae blooms cause water to be less clear because of their presence, less sunlight can reach to the phytoplankton. Changes in water temperature as we saw in SLSTR section also can influence phytoplankton abundance and chlorophyll concentration. Warmer temperatures can directly affect the physiological processes of the phytoplankton (Valenti et al, 2016).

4. DISCUSSION

4.1 OVERALL EVALUATION OF SST:

The data starting from 2021 suggests a possible warming effect outside the immediate vicinity of the wind farms. The attribution of this could be to a number of regional dynamics, such as altered surface currents or wind mixing being reduced due to existing of wind farm structures. Platis et al., (2018) carried out a study that gave the first in situ proof of wakes in the distant field behind the offshore wind farms. They observed temperature rises in the rotor layer downwind of the wind farms under the stable stratified conditions. The temperature rises are attributed to the increased vertical mixing brought on by the turbulence generated by the wind turbine rotor, which may have an impact on the warming effect outside the immediate wind farm area. However, it should be noted that natural variability, such as atmospheric conditions and solar radiation, could also contribute to the differences in SST. In 2022 and 2023, the recorded drop in SST as going far from the wind farms and the coast could point out the cooling influence of the wind farm, which could be the consequence of the water mixing by the wind turbine's operation. This is in line with findings from other studies where offshore wind farms have influenced the local hydrodynamics and the temperature distributions.

It is important to analyze the interpretation of the data given on offshore wind farms carefully, as they have the potential of impact both direct and indirect on marine environments. Direct impacts could include physical changes like temperature, whereas indirect impacts might involve alterations in the distribution of the species and the marine ecosystem. Akhtar et al. (2022) mentioned that offshore wind farms can also lessen the amount of heat transfer from the ocean to the atmosphere in the area of large wind farms, leading to rising the temperature in the atmospheric layers below the hub height. However, by the end of the century this increase is much less than the interannual climate variability and the climate change signal. The SST data given for Horns Rev 1 offshore wind farm shows interesting insights into the possible environmental impacts of the offshore wind farms on local SST. Even though these data imply minor SST shifts in and around the wind farm areas,

long term comprehensive studies are required to completely understand the implication of the findings and to determine role wind farms play towards temperature variations.

4.2 OVERALL EVALUATION OF CHL:

The observed variations in CHL concentration through the timeframe spanning from January 2021 to July 2023 can refer to several environmental impacts. Alters in phytoplankton concentration can affect the food web dynamic by affecting the availability of food for higher trophic levels, like small fish and zooplankton (Jeppesen et al, 2000). High concentration of CHL, if sustained, can degrade water quality by increasing organic matter decomposition, leading to hypoxic or anoxic conditions, which could put marine life in danger (Jeppesen et al, 2000). Furthermore, for carbon cycling the phytoplankton are pivotal, and with fluctuations in their abundance, the carbon flux in the marine environment will be influenced (Zheng et al, 2021).

5. CONCLUSION

Based on the analysis we have made, it is clear that Horns Rev 1 Offshore Wind Farm has discernible environmental impacts over the surrounding region that cover over approximately 300 km spanning from 55.7 N to 58.4 N. By using Sentinel-3 satellite data and the enhanced features provided by them, like high quality, accuracy, and multidimensional data, which are alignment with the goals of our research the study has produced some key findings that are pivotal in order to understand the multifaceted aspects of the impacts. For example, SST data consistently shows that the wind farm has lower temperatures, suggesting alteration in the surface currents caused by the presence of the wind farm. On the biological aspects, the study reveals high concentration of Chlorophyll within the area of the wind farm. The raised levels of Chlorophyll might affect the water quality.

The overall cross-analysis for the whole parameters can suggest several points. The integration of the previous parameters illustrates the offshore wind farm and its marine environment complex relationship. First the structures of the wind farm have impacts on local hydrodynamics, which resulted in changes in water temperatures, wave heights, and potential changes in nutrient distribution and water clarity. For CHL, data reveal short-term disturbances and ecological shifts in potential long-term. The output findings highlight the importance of adapting a management strategy and continuing monitoring to mitigate the impacts of sustainable energy harnessing process in the offshore structures. In the end, the overall conclusion indicates that while the wind farm is producing energy effectively, the presence of the structures significantly alters the local marine environment and the atmospheric conditions.



6.ACKNOWLEDGMENT

I would like to express my gratitude to Sevil Deniz Yakan Dündar at Istanbul Technical University (ITU) for her invaluable guidance and support throughout this research. Additionally, I wish to acknowledge that this paper is a part of my MSc thesis work conducted under her supervision at the Offshore Engineering Program at the ITU Graduate School.



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AKILLI ŞEBEKELERDE KAYIP-KAÇAK ANALİZİ VE KONTROLÜ

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Özet

Bu çalışmada; enerjiyi tüketiciye kesintisiz verebilmek ve daha verimli kullanmak için yeni nesil elektrik güç sistemleri olarak adlandırılan akıllı şebekeler yani (Smart Grid) ile ilgili çalışmalar yer almaktadır. Akıllı şebekelerin ülkemizde uygulandığı bir pilot bölgede kayıp-kaçak analizi ve kontrolü yapılmıştır. Bu doğrultuda, 3 yıllık ölçüm takibi yapılmıştır. 2018 yılında Akıllı şebeke uygulamaları başlamadan önce ölçülen enerji 80.162.980 kwh, 2019 yılında 92.958.724 kwh, 2020 yılında 105.375.317 kwh olduğu tespit edilerek faturalandırma artışı %24 olduğu belirlenmiştir. Artan enerji talebine bağlı olarak bölgedeki toplam abone sayısı 2018 yılında 42939, 2019 yılında 44286, 2020 yılında 45245 olduğu görülerek %5 lik bir artış olmuştur. Her ay düzenli oluşturulan fatura sayıları yıllara göre sıralandığında 2018 yılında 279493, 2019 yılında 292577, 2020 yılında 317187 adet fatura oluşturulmuştur. Buna bağlı olarak kayıp kaçak oranları 2018 yılında %74,11 iken 2019 yılında %68,62, 2020 yılında %55,42 akıllı şebekeler ile kayıp kaçığın azaltıldığı görülmüştür.

Anahtar Kelimeler: Akıllı şebekeler, Kayıp Kaçak, Elektrik Enerjisi



LOSS-LEAKAGE ANALYSIS AND CONTROL IN SMART GRIDS

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Özet

In this study; In order to provide uninterrupted energy to the consumer and to use it more efficiently, studies on smart grids (Smart Grid), which are called new generation electrical power systems, are included. In a pilot region where smart grids are applied in our country, loss-leakage analysis and control were carried out. In this direction, 3-year measurement follow-up was carried out. In 2018, the energy measured before the start of Smart Grid applications was 80,162,980 kwh, in 2019 92,958,724 kwh, in 2020 105,375,317 kwh, and it was determined that the billing increase was 24%. Depending on the increasing energy demand, the total number of subscribers in the region was 42939 in 2018, 44286 in 2019 and 45245 in 2020, resulting in an increase of 5%. When the number of invoices created regularly every month is sorted by years, 279493 invoices were created in 2018, 292577 in 2019, and 317187 in 2020. Accordingly, while the loss and leakage rates were 74.11% in 2018, 68.62% in 2019 and 55.42% in 2020, it was seen that loss and leakage were reduced with smart grids.

Anahtar Kelimeler: Smart Grids, Loss and Leakage, Electric Energy



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

**BUĞDAYDA SARI PAS HASTALIĞININ TESPİTİNE YÖNELİK DERİN ÖĞRENME
MODELLERİNDE EVRİŞİM KATMANI SAYISI VE AKTİVASYON FONKSİYONLARININ
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Özet

Buğday, insanlık tarihinin temel besin kaynaklarından ve ülkemizde tarım sektörünün önde gelen ürünlerinden biridir. Ancak bu değerli tahılın üretim sürecinde karşılaşılan riskler, özellikle sarı pas gibi yaygın hastalıkların zamanında ve doğru bir şekilde tespit edilmemesi durumunda üretimde düşüşe yol açabilmektedir. Bu tür tarımsal hastalıklar buğday tarlalarında ciddi hasara yol açarak tarımsal verimliliği ve ürün kalitesini olumsuz etkileyebilir. Geleneksel tespit yöntemleri genellikle zaman alıcı ve uzmanlık gerektiren süreçler içerir. Bu nedenle, modern teknolojiler ve yapay zeka tabanlı çözümler, buğdaydaki hastalıkların hızlı, verimli ve doğru tespiti için önemli bir potansiyele sahiptir. Bu gelişmeler, verimliliği artırmak ve üreticilere daha iyi karar verme yetenekleri sağlamak için tarım sektöründe önemli bir dönüşümün habercisidir. Bu bağlamda, derin öğrenme modelleri buğdayda sarı pas hastalığının tespiti ve sınıflandırılmasında önemli bir avantaj sağlamaktadır. Bu çalışmada, derin öğrenme modellerinin performansını etkileyen ana faktörlere



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odaklanılmaktadır. Çalışmada katman sayısı ve aktivasyon fonksiyonu değişkenlerinin derin öğrenme yöntemleri ile sınıflandırma süreçleri üzerindeki etkileri detaylı olarak incelenmiştir. Çalışma sonucunda en yüksek sınıflandırma doğruluğu %95,33 ile SELU aktivasyon fonksiyonunu kullanan 5 katmanlı CNN modeli elde edilmiştir.

Anahtar Kelimeler: Buğday, Sarı Pas, Derin Öğrenme



INVESTIGATION OF THE EFFECT OF THE NUMBER OF CONVOLUTION LAYERS AND ACTIVATION FUNCTIONS ON CLASSIFICATION IN DEEP LEARNING MODELS FOR THE DETECTION OF YELLOW RUST DISEASE IN WHEAT

Abstract

Wheat is one of the main food sources of human history and one of the leading products of the agricultural sector in our country. However, the risks encountered during the production process of this valuable grain, especially if common diseases such as yellow rust are not detected in a timely and accurate manner, can lead to a decrease in production. Such agricultural diseases can cause serious damage to wheat fields, which can negatively impact agricultural productivity and product quality. Traditional detection methods often involve time-consuming and specialized processes. Therefore, modern technologies and AI-based solutions have significant potential for fast, efficient and accurate detection of diseases in wheat. These developments herald an important transformation in the agricultural sector to increase productivity and provide producers with better decision-making capabilities. In this context, deep learning models provide a significant advantage in the detection and classification of yellow rust disease in wheat. In this study, we focus on the main factors affecting the performance of deep learning models. In the study, the effects of the number of layers and activation function variables on the classification processes with deep learning methods were examined in detail. As a result of the study, the highest classification accuracy of 95.33% was obtained with a 5-layer CNN model using the SELU activation function.

Keywords: Wheat, Yellow Rust, Deep Learning

1. GİRİŞ

Buğday (*Triticum sp.*) insanlık tarihi boyunca en önemli besin kaynaklarından biri olup, dünya genelinde ve ülkemizde yaygın olarak üretilen ve tüketilen bir tahıl ürünüdür. Buğdayın adaptasyon kabiliyetinin yüksek olması, ekimden hasada kadar geçen süreçlerin diğer ürünlere kıyasla nispeten daha kolay olması ve günlük kalori ihtiyacının önemli bir kısmını karşılaması nedeniyle dünya genelinde en çok ekilen ve üretilen tarımsal ürünler arasında yer almaktadır [1]. Ancak, buğday üretimini etkileyen faktörler arasında iklim koşulları, coğrafi şartlar, hatalı tarımsal uygulamalar gibi abiyotik faktörler ve zararlılar, yabancı otlar, hastalıklar gibi biyotik faktörler bulunmaktadır. Bu faktörler, buğday üretim sezonunda verim ve kalite parametrelerini etkileyerek üretimi sınırlamaktadır. Dünya genelinde ve ülkemizde buğday üretimini ve kalitesini sınırlayan önemli biyotik faktörlerden biri sarı pas hastalığıdır [2]. Yaz sporları, *Septoria*'nın piknidiyal evresinden daha erken oluşur ve sezon sonunda kış sporlarına dönüşür. Bu durum, sarı pasın ortaya çıkış zamanı ve diğer hastalıkların belirtileriyle karıştırılmasına neden olabilir. Sarı pas hastalığının tespiti ve takibi genellikle uzman araştırmacılar tarafından yapılır. Ancak, insan faktörü ve hastalığın manuel olarak değerlendirilmesinin objektif olmaması, ürünleri riske atabilir. Bu nedenle, sarı pas hastalığının farklı aşamalarda doğru bir şekilde tespiti için otomatik karar destek sistemlerine olan ihtiyaç giderek artmaktadır. Teknolojinin ilerlemesiyle birlikte, yapay zeka, bitki hastalıklarının tespiti ve önlenmesinde kullanılmaya başlanmıştır [3]. Bu kapsamda, makine öğrenmesi özel bir dalı olan derin öğrenme, büyük veri analiziyle karmaşık örüntüleri tanıma yeteneğiyle dikkat çekmektedir. Buğday üretiminde risk faktörlerini ele almak ve sarı pas hastalığının tespitini geliştirmek için yapılan çalışmalar, yapay zeka ve derin öğrenme algoritmalarının bitki hastalıklarının tespitinde etkili olabileceğini göstermektedir. Bu bağlamda, buğday üretimini optimize etmek ve hastalıklarla mücadele etmek için ileri teknolojilerin kullanımı önemli bir araştırma alanı haline gelmiştir.

Sarı pas hastalığının buğday yapraklarında derin öğrenme algoritmalarıyla tespiti üzerine birçok literatür çalışması bulunmaktadır. Yapılan literatür taraması sonucunda altı farklı araştırma incelenmiştir. Long ve diğerlerinin yaptığı bir çalışmada, MobilNet InceptionV3, VGG16, Xception, Creal Conv gibi derin öğrenme modelleri, sarı pas, kahverengi pas, külleme, *septoria* hastalıkları ve sağlıklı buğdayları içeren 5 sınıflı bir veri kümesinde test edilmiştir. Analiz sonuçlarına göre, Creal Conv modeli %97,5 başarı oranıyla birinci sırayı almıştır [4]. Mi ve diğ. tarafından yürütülen bir çalışmada, sarı pas hastalığının şiddetini derecelendirmek amacıyla DenseNet ve C-DenseNet gibi derin öğrenme modelleri kullanılmıştır. Sınıflandırma sürecinde C-DenseNet modeli, %97,99 doğruluk oranı ile en yüksek başarıyı elde etmiştir [5]. Bukhari ve ark., buğday yapraklarında sarı pas patojenini sağlıklı, duyarlı ve dirençli olarak sınıflandırmışlardır. Watershed, Grab Cut, U2-Net, ResNet18 modelleri test edilmiş ve en yüksek doğruluk oranı %96 ile U2-Net modeli tarafından sağlanmıştır [6].

Bu çalışmada, buğday yaprak hastalıklarının tespitinde kullanılan derin öğrenme yöntemleri üzerinde katman sayısı ve aktivasyon fonksiyonu etkileri incelenmiş ve sonuçlar değerlendirilmiştir. Makalenin geri kalanında, ikinci bölümde çalışmada kullanılan veri seti, gerçekleştirilen ön işleme ve çalışmada kullanılan yöntemler anlatılmaktadır. Üçüncü bölümde sonuçlar ve tartışma sunulmuştur. Son bölümde ise elde edilen sonuçlardan ve çalışma sonrasında yapılması planlanan çalışmadan bahsedilmektedir.

2. MATERYAL VE METOT

Bu çalışmada, 2023-2024 üretim sezonunda Sivas Bilim ve Teknoloji Üniversitesi Tarımsal Ar-Ge Merkezi'nde yetiştirilen farklı buğday genotiplerinden elde edilen sağlıklı ve sarı pas hastalığı görüntüleri kullanılmıştır.

2.1. Veri Seti

Çalışmada kullanılan veri seti sarı pas ile enfekte olmuş buğday yaprakları ve sağlıklı yapraklar olmak üzere iki ana kategoriye ayrılmıştır. Tüm görüntüler yüksek çözünürlükte JPG formatında kaydedilmiştir. Derin öğrenme modellerinin daha kesin sonuçlar üretebilmesi amacıyla, veri sayısı yapay verilerle artırılmıştır. Veri sayısını artırmak için orijinal görüntüler 90° ve 180° döndürülerek yeni görüntüler elde edilmiştir. Orijinal veri kümesindeki görüntü sayısı ile veri artırma işlemi sonrası güncel görüntü sayısı, Tablo 1'de detaylı olarak gösterilmiştir.

Tablo 1. Veri setindeki görüntü sayıları

Kategori	Orijinal görüntü sayısı	Veri artırma sonrası görüntü sayısı
Sarı Pas	1572	1572
Sağlıklı	377	897
Toplam	1949	2469

Veri setinin sağlıklı ve sarı pas ile enfekte olmuş buğday yaprakları sınıflarından birer örnek görüntü Şekil 1'de sunulmuştur.



(a) Sağlıklı buğday yaprağı

(b) Sarıpas ile enfekte olmuş
buğday yaprağı

Şekil 1. Veri setinden görüntüler

Veri artırma işlemleri sonrasında elde edilen veri seti derin öğrenme tekniklerinde kullanılmak üzere test ve eğitim veri setlerine ayrılmıştır. Bu aşamada ön işleme sonrası elde edilen veri setinin %80'i eğitim, %20'si ise test için ayrılmıştır.

2.2. Evrişimli Sinir Ağları

Evrişimli Sinir Ağı (ESA), görsel verileri analiz etmek üzere geliştirilmiş, derinlemesine bir yapıya sahip olan bir ileri beslemeli sinir ağıdır. Genellikle sınıflandırma, nesne algılama, segmentasyon ve görüntü oluşturma gibi çeşitli bilgisayarla görme görevlerinde kullanılır [7,8]. Bir ESA'nın tasarımında katman sayısı ve aktivasyon fonksiyonlarının seçimi kritik bir rol oynamaktadır. Katman sayısı, ağıın karmaşıklığını belirler ve aşırı uyum riskini etkileyebilir. Aktivasyon fonksiyonları ise, nöron çıkışlarını belirleyerek modelin öğrenme kabiliyetine önemli bir etki yapar. Bu fonksiyonlar, ağıın genel performansını ve öğrenme sürecini etkiler. Bu parametrelerin doğru bir şekilde seçilmesi, ESA'nın etkin ve başarılı bir şekilde görsel veri analizi yapabilmesini sağlar.

- Katman Sayısı:

Evrişimli Sinir Ağları (ESA), temelde girdi, evrişim, havuzlama, tam bağlantılı ve çıktı katmanlarından oluşan bir yapıya sahiptir. Bu ağ yapısı, görsel verileri analiz etme yeteneğine sahiptir. Evrişim katmanı, veriler üzerinde filtreler uygulayarak özelliklerin çıkarılmasını sağlar. Havuzlama katmanı ise özellik haritalarının boyutunu azaltarak hesaplama karmaşıklığını düşürür. Tam bağlantılı katman, öğrenilen özelliklere dayalı olarak sınıflandırma veya tahmin yapmak üzere çıkarılan özellikleri çıktı katmanına bağlar. Evrişimsel sinir ağlarının katman sayısı, ağıın karmaşıklığını belirler ve daha fazla katman, derin özelliklerin öğrenilmesine

olanak tanırken aynı zamanda aşırı uyuma yol açabilir. Bu nedenle, uygun sayıda katman seçimi, ağın dengeli ve etkili bir şekilde çalışmasını sağlamak adına kritik bir öneme sahiptir [9]. Bu çalışmada 3,4 ve 5 olmak üzere 3 farklı sayıda katman kullanılarak işlem yapılmıştır.

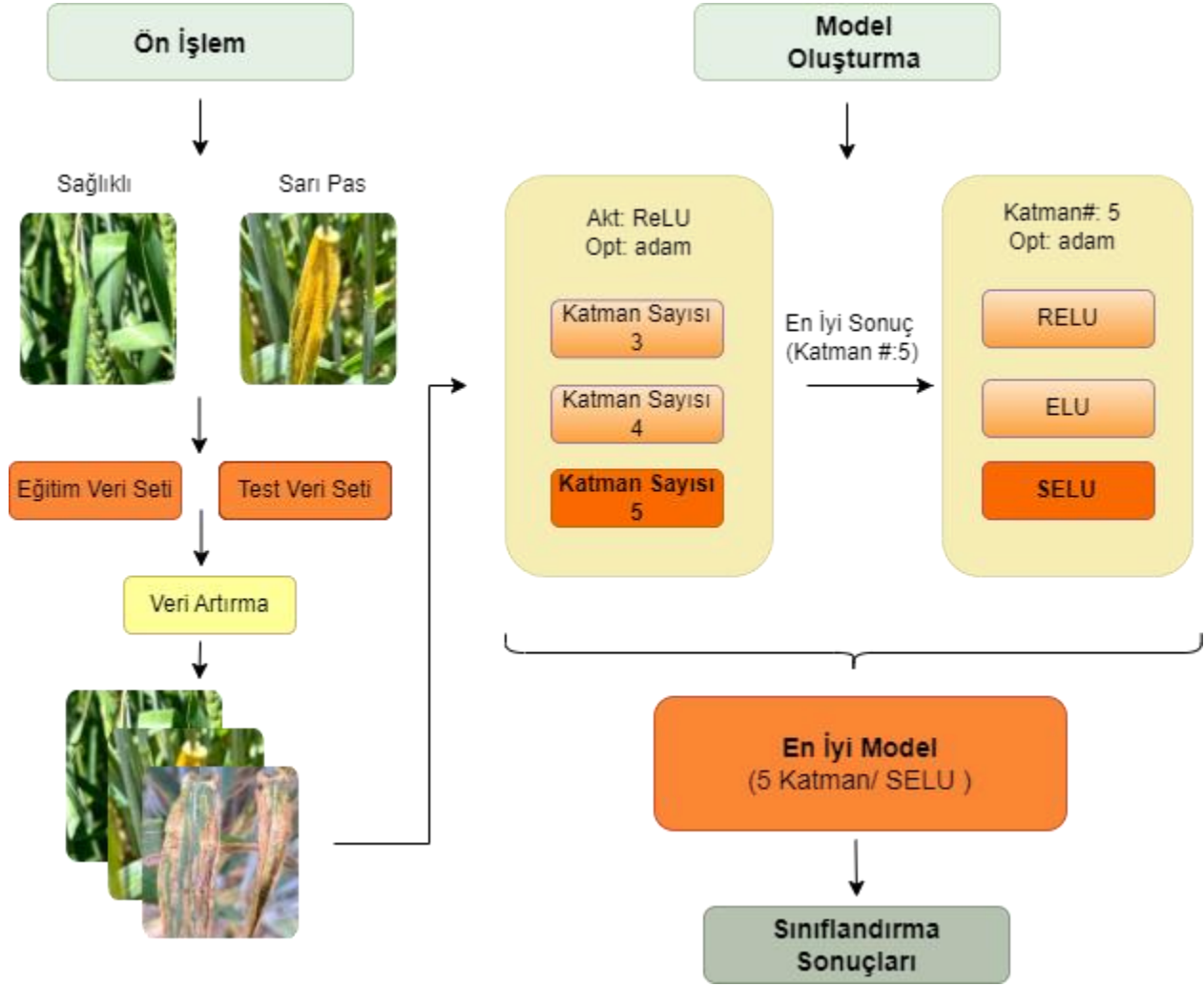
- Aktivasyon Fonksiyonları:

Aktivasyon fonksiyonları, sinir ağlarındaki nöron çıktılarını doğrusal olmayan bir şekilde şekillendirmek için kullanılan matematiksel fonksiyonlardır. Bu fonksiyonlar, ağırlıklı girdi toplamlarını alır ve doğrusal olmayan bir dönüşüm uygulayarak nöron çıktılarını oluşturur. Aktivasyon fonksiyonları, sinir ağlarının karmaşık ilişkiler öğrenmesine yardımcı olur, ayrıca girdileri istenen aralığa sıkıştırarak ağın genel performansını artırır [10]. Özetle, derin öğrenme çalışmalarında uygun mimari ve aktivasyon fonksiyonunun seçilmesi daha başarılı ve yüksek performanslı sonuçlar elde edilmesinde önemli bir role sahiptir [11]. Bu çalışmada ReLU, ELU ve SELU olmak üzere 3 farklı aktivasyon fonksiyonu kullanılmıştır.

3. BULGULAR VE TARTIŞMA

Çalışmada öncelikle 90° ve 180° olmak üzere 2 farklı tipte döndürme işlemi yapılarak veri sayısı artırılmıştır. Bu veri artırma işleminden sonra elde edilen veri seti kullanılarak derin öğrenme yöntemleriyle sınıflandırma işlemleri gerçekleştirilmiştir.

Çalışmada kullanılan model Şekil 2’de sunulmuştur.



Şekil 2. Çalışma modeli

Ön işlemlerden sonra derin öğrenme süreçlerinde katman sayısının etkisini gözlemlemek amacıyla Aktivasyon Fonksiyonu parametresi ReLU olarak sabit tutulmuş ve katman sayısı değiştirilmiştir. Aktivasyon Fonksiyonu ReLU olarak sabit tutulduğunda 3, 4 ve 5. katmanlar için sınıflandırma işlemleri yapıldığında elde edilen sonuçlar Tablo 2'de paylaşılmıştır. Bu sonuçlara göre en yüksek başarının (%94,73) 5 katmanlı modelde elde edildiği görülmektedir. Çalışmanın sonuçları, katman sayısı arttıkça başarının da arttığını göstermektedir. Katman sayısı daha da artırıldığında ise sonuçların sabit kaldığı ve başarının artmadığı görülmektedir. Bu da dengenin sağlanması için uygun katman sayısının seçilmesinin önemini göstermektedir.

Tablo 2. Farklı katman sayısına sahip modelden elde edilen sonuçlar

Katman Sayısı	Aktivasyon Fonksiyonu	Doğruluk (%)
3		90,87
4	ReLU	93,71
5		94,73

Sonrasında ise aktivasyon fonksiyonlarının derin öğrenme yöntemleri üzerindeki etkisi incelenmektedir. Bu amaçla çalışmanın bu kısmında bir önceki aşamada en yüksek başarıya sahip olan katman sayısı olan 5 sabit tutulmuş aktivasyon fonksiyonu ise ReLU, ELU ve SELU olarak değiştirilmiştir. Bu işlemlerden sonra aktivasyon fonksiyonu değişkenine bağlı olarak elde edilen sonuçlar Tablo 3'te paylaşılmıştır.

Table 3. Farklı aktivasyon fonksiyonları ile modelden elde edilen sonuçlar

Katman Sayısı	Aktivasyon Fonksiyonu	Doğruluk (%)
	ReLU	94,73
5	ELU	93,71
	SELU	95,33

Çalışma sonucunda SELU aktivasyon fonksiyonu kullanılan 5 katmanlı evişimsel sinir ağı modelinin diğerlerine göre daha yüksek başarı (%95.33) elde ettiği görülmektedir. SELU aktivasyon fonksiyonu, kendini normalleştirme özelliği ile öne çıkan ve derin öğrenme modellerinde öğrenme sürecini stabil hale getirmeye odaklanan, ayrıca girişleri standart normal dağılıma uygun hale getirerek ağın performansını artırmayı amaçlayan bir aktivasyon fonksiyonudur [12]. Bu özellikleri ile ağın daha iyi genelleme yaparak daha iyi sonuçlar sunmasına yardımcı olmaktadır.

4. SONUÇ

Buğday, küresel ölçekte önemli bir gıda kaynağı olup, sarı pas hastalığı buğday üretimini ciddi şekilde etkileyen bir faktördür. Bu hastalığın doğru bir şekilde tespiti tarım uzmanları için zorlu bir görevdir ve bu nedenle derin öğrenme yöntemleri bu tür hastalıkların teşhisinde kullanılmaktadır. Bu çalışmada, tarımsal görüntülerin sınıflandırılması üzerinde katman sayısı ve aktivasyon fonksiyonu olmak üzere iki önemli faktörün etkisi incelenmiştir. Çalışmanın ilk aşamasında, katman sayısının artmasıyla birlikte sınıflandırma başarısının yükseldiği ancak aşırı uyuma neden olabileceği belirlenmiştir. İkinci aşamada, üç farklı aktivasyon fonksiyonu



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test edilmiş ve SELU'nun en yüksek başarıyı sağladığı tespit edilmiştir. Bu çalışmanın sonucunda, SELU aktivasyon fonksiyonu kullanılarak oluşturulan 5 katmanlı CNN modelinin tarımsal görüntülerde %95,33 doğruluk oranı ile en iyi sınıflandırmayı gerçekleştirdiği belirlenmiştir. Gelecekte, farklı aktivasyon fonksiyonları ve optimizasyon algoritmalarının denenmesiyle başarı oranı artırılacak ve geliştirilecek bu modelin karar destek sistemlerinde kullanılması hedeflenmektedir.

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DOĞRUDAN YABANCI YATIRIMLARIN CO2 SALINIMI ÜZERİNDEKİ ETKİSİ

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Özet

Doğrudan yabancı yatırımlar, ülkeler arasında teknolojik ve yönetsel bilgi transferi sağlayarak ekonomik büyümeye katkıda bulunur. Ülkeler yabancı yatırım aldıkça endüstriyel yapılarında, enerji tüketim oranlarında ve ekonomik faaliyetlerinde sıklıkla değişiklikler yaşanır. Bu da daha çevre dostu teknolojilerin benimsenmesiyle olumlu, artan sanayileşme ve enerji tüketimi nedeniyle olumsuz olarak çevresel sürdürülebilirliği etkileyebilir.

Çevresel sürdürülebilirlik hava kirliliği, su kirliliği, atık yönetimi ve biyoçeşitliliğin korunması gibi konuları ele alarak çevre sorunlarını en aza indirmeye odaklanır. İnsan faaliyetlerinin çevre üzerindeki etkisinin çevreye olan olumsuz yansımaları, toplum üzerinde bir farkındalık yaratmaya başlamıştır. Artan çevre problemleri, sürdürülebilir çevrenin şimdiki ve gelecek nesillerdeki devamlılığını tehdit altında bırakmıştır. Özellikle iklim değişikliğinin etkilerini yoğun olarak yaşadığımız günümüzde, çevresel duyarlılık hakkında toplumsal bilinç oluşturmak oldukça önemlidir.

Bu çalışmanın amacı finansal araç olarak önem taşıyan doğrudan yabancı yatırımların çevreye yaydığı karbondioksit oranı hakkında araştırma yaparak çevresel sorunlara ışık tutmaktır. Yapılan çalışmada 2022 yılı içerisinde en fazla karbondioksit salınım oranına sahip 19 ülkenin karbondioksit salınım oranı, doğrudan yabancı yatırım miktarı, ekonomik gelişim, enflasyon oranı ve kentsel nüfus oranı değişkenleri panel veri analizi yöntemleri kullanılarak incelenmiştir. Araştırma bu ülkeler için 1996 ve 2022 yılları arasındaki verileri kapsamaktadır. Yapılan analizler sonucunda, doğrudan yabancı yatırımların karbondioksit salınımına etkisinin istatistiksel olarak anlamlı ve pozitif olduğu gözlemlenmiştir. İncelenen ülkelerde doğrudan yabancı yatırımın artmasının karbondioksit salınımını arttırdığı sonucuna ulaşılmıştır.

Çevresel sürdürülebilirliğin devamlılığı yerel, ulusal ve küresel bir mücadele gerektirmektedir. Sürdürülebilir bir gelecek sağlamak için küresel iş birliği ve politika girişimleri şarttır.

Anahtar Kelimeler: CO2 Salınımı, Çevresel Sürdürülebilirlik, DYY



THE EFFECT OF FOREIGN DIRECT INVESTMENTS ON CO2 EMISSION

Abstract

Foreign direct investments contribute to economic growth by providing technological and managerial knowledge transfer between countries. As countries receive foreign direct investment, there are frequent changes in their industrial structures, energy consumption rates and economic activity. This could impact environmental sustainability, positively through the adoption of more environmentally friendly technologies, and negatively through increased industrialization and energy consumption.

Environmental sustainability focuses on minimizing environmental problems by addressing issues such as air pollution, water pollution, waste management and biodiversity conservation. The negative reflections of the impact of human activities on the environment have begun to raise awareness in society. Increasing environmental problems have threatened the continuity of the sustainable environment for present and future generations. Especially today, when we are experiencing the effects of climate change intensively, it is very important to raise social awareness about environmental sensitivity.

The aim of this study is to shed light on environmental problems by conducting research on the carbon dioxide rate emitted by foreign direct investments, which are important as financial instruments. In this study, the variables of carbon dioxide emission rate, foreign direct investment, gross domestic product, inflation rate and urban population rate of 19 countries with the highest carbon dioxide emission rate in 2022 are analyzed using panel data analysis methods. The study covers the data between 1996 and 2022 for these countries. As a result of the analysis, it is observed that the effect of FDI on carbon dioxide emissions is statistically significant and positive. It is concluded that an increase in foreign direct investment increases carbon dioxide emissions in the countries analyzed.

Environmental sustainability requires a local, national and global challenge. Global cooperation and policy initiatives are essential to ensure a sustainable future.

Keywords: CO2 Emission, Environmental Sustainability, FDI

1. Giriş

İnsan faaliyetlerinin çevre üzerindeki etkisi, toplum üzerinde bir farkındalık yaratmıştır. Artan çevre problemleri, sürdürülebilir çevrenin şimdiki ve gelecek nesillerdeki devamlılığını tehdit altında bırakmıştır. Bilim insanları, çevreci ve siyasetçilerin büyük bir kısmı iklim değişikliğini 21. yüzyılda doğa ve insanlığın karşı karşıya olduğu en büyük tehdit olarak görmektedir (İğci & Çobanoğlu (2019)). İklim değişikliği; küresel ısınma, aşırı doğa olayları, eriyen buzullar ve yükselen deniz seviyeleri, ekosistemdeki değişimler ve

biyoçeşitlilik kaybı ve su kıtlığı gibi birçok probleme neden olmaktadır. Bu sorunlara global çözümler üretilebilmesi için uluslararası iş birliği sağlanmalıdır.

Yeşil finans kavramı da artan çevre sorunları ile ortaya çıkmıştır. Yeşil finans, çevresel sürdürülebilirliğin önemseyen, düşük karbon salınımına neden olan ve çevre dostu bir ekonomiye katkı sağlayan finansal araçları ifade etmektedir. Yeşil finans, çevre sorunlarının çözümünde ve sürdürülebilir kalkınma hedeflerine ulaşılmasında önemli bir araç olarak görünmektedir. Bu nedenle finansal araçların çevreye olan etkisi üzerindeki araştırmalar son yıllarda artmaya başlamıştır.

Doğrudan yabancı yatırımlar da ülkeler için önemli bir finansal araçtır. Ülkeler arasında teknolojik ve yönetsel bilgi transferi sağlayarak ekonomik büyümeye katkıda bulunur. Ev sahibi ülke için iş hacmi artırarak iş olanakların artmasını sağlar. Ülkeler yabancı yatırımları çektikçe endüstriyel yapılarında, enerji tüketim modellerinde ve genel ekonomik faaliyetlerinde sıklıkla değişiklikler yaşanır. Bu da daha çevre dostu teknolojilerin benimsenmeyle olumlu, artan sanayileşme ve enerji tüketimi nedeniyle olumsuz olarak çevresel sürdürülebilirliği etkileyebilir. İçerdiği avantajlar için birçok ülke ve şirket tarafından yatırım aracı olarak kullanılan doğrudan yabancı yatırımların da çevreye olan etkisi araştırılmalıdır.

Bu çalışmanın temel konusu doğrudan yabancı yatırımların karbon salınımına olan etkisini araştırmaktır. Bu araştırma için 19 ülkenin 27 senelik verileri ekonometrik yöntemlerle analiz edilmiştir. Seçilen 19 ülke 2022 yılında en çok CO2 salınım oranına sahip ülkelerdir.

2. Metodoloji

2.1 Literatür Taraması

Hoffmann (2005) tarafından Nottingham Üniversitesi'nde yapılan araştırmada düşük, orta ve yüksek gelirli 112 ülkenin 1971 ve 1997 yılları arasındaki CO2 salınımı ve DYY miktarları panel veri analizi ile incelenmiştir. Yapılan araştırma sonucunda DYY'nin CO2 salınımı üzerinde arttırıcı etkisi olduğu gözlemlenmiştir.

Lee (2013) tarafından yapılmış çalışmada 19 G20 ülkesinin 1971 ve 2009 yılları arasındaki GSYH, CO2 salınım oranı, DYY, enerji tüketimi ve temiz enerji tüketimi verileri panel veri analizi yöntemleri ile analiz edilmiştir. Yapılan analiz sonucunda DYY miktarının ekonomik gelişim üzerinde istatistiksel olarak anlamlı ve pozitif etkisi olduğu, ekonomik gelişimin CO2 salınım oranı üzerinde arttırıcı etkisi olduğu ve DYY miktarının da CO2 salınımı üzerinde arttırıcı etkisi olduğu gözlemlenmiştir.

Kılıçarslan&Dumrul (2017) tarafından yapılan çalışmada 1974-2013 yılları arasında Türkiye'deki DYY miktarlar ve CO₂ salınımı panel eş bütünleşme analizi izle incelenmiştir. Yapılan çalışmanın sonucunda Türkiye'deki doğrudan yabancı yatırımların karbondioksit salınımı üzerinde pozitif etkisi olduğu ve DYY'deki %1 oranındaki artışın, CO₂ salımında %22 oranında bir artışa neden olduğu gözlemlenmiştir.

Mirziyoyeva & Salahodjaev (2022) tarafından yapılmış çalışmada; 2010 yılında en çok CO₂ salınım oranına sahip 50 ülkenin, 2000-2015 yılları arasındaki CO₂ salınımı, yenilebilir enerji tüketimi, GSYH, demokrasi endeksi, kentsel nüfus, ihracat, DYY ve endüstri oranı verileri panel veri analizi yöntemleri ile incelenmiştir. Çalışmanın sonucunda yenilebilir enerji kaynaklarının kullanımının CO₂ salınımı azalttığı gözlemlenmiştir. GSYIH değerlerinin CO₂ salınımı üzerinde negatif etkisi olduğu, DYY ve kentsel nüfusun CO₂ salınımı üzerinde pozitif ve önemli etkisinin olduğu gözlemlenmiştir.

Lee & Zhao (2023) tarafından yapılan araştırmada 96 ülke için 2000-2020 yılları arasındaki veriler kullanılmıştır. 43 ülke yüksek gelirli, 24 ülke orta-gelirli ve 29 ülke düşük gelirli olarak sınıflandırılmıştır. Bu ülkelere ait CO₂ salınım oranı, toplam nüfus, GSYIH, Ar-Ge harcamaları, insan sermaye endeksi, kentsel nüfus ve DYY değişkenleri STIRPAT model kapsamında analiz edilmiştir. Çalışma sonucunda teknolojideki artışın CO₂ salınım oranını azalttığı, toplam nüfus artışının ise CO₂ salınımını arttırdığı gözlemlenmiştir. Sermaye, kentleşme ve DYY'deki artışın ise CO₂ salınım oranının da azaltıcı etkisi olduğu gözlemlenmiştir.

2.2 Değişkenler

Bu çalışmada Dünya Enerji İstatistiksel İncelemesi 2022 veri setinde en çok CO₂ salınımı yapan 19 ülke kullanılmıştır. Bu ülkeler sırasıyla; Çin, Amerika Birleşik Devletleri, Hindistan, Rusya, Japonya, Endonezya, Suudi Arabistan, Almanya, Güney Kore, Kanada, Meksika, Türkiye, Brezilya, Güney Afrika, Avustralya, İngiltere, Vietnam ve İtalya'dır. CO₂ salınımı bağımlı değişken olarak kabul edilmiştir. Doğrudan yabancı yatırım, kentsel nüfus, gayri safi milli hasıla, enflasyon oranı, mal hizmet ihracatı bağımsız değişken olarak kabul edilmiştir. Kullanılan verilerin 1996-2022 yılları arasındaki değerleri incelenmiştir. Araştırmada kullanılan veriler aşağıdaki gibidir:

CO₂ Salınımı (LNCO₂): Dünya Enerji İstatistiksel İncelemesi 2022 veri setinden alınan değerler kullanılmıştır. Birimi milyon ton oranındadır, araştırmada CO₂ salınım oranı değişkeninin ln fonksiyonu değeri kullanılmıştır.

Doğrudan Yabancı Yatırımlar (LNDYY): Dünya Veri Bankası'ndan alınan veriler kullanılmıştır. İlgili yıla ait doğrudan yabancı yatırım miktarlarını dolar biriminde yansıtmaktadır ve çalışmada ln fonksiyonu değeri kullanılmıştır. DYY yatırım değişkeninde bazı yıllara ait negatif değerler bulunmaktadır. Panel veri analizinde

negatif değer içeren değişkenin ln fonksiyonu alınmadan önce en küçük negatif değeri pozitif yapacak minimum değer tüm DYY değişkenlerine eklenmesi gerekmektedir (Torres-Reyna O., (2007)).

Ekonomik Gelişim Oranı (EGO): Dünya Veri Bankası'ndan alınan veriler kullanılmıştır. Kişi başına düşen gelirin yıllık gelişimi yansıtmaktadır.

Kentsel Nüfus (LNKN): Dünya Veri Bankası'ndan alınan veriler kullanılmıştır. Çalışmada kullanılan ülkelerin 1996-2022 yılları arasındaki kentsel nüfusunu belirtmektedir. Araştırmada kentsel nüfus değişkenin ln fonksiyonu değeri kullanılmıştır.

Enflasyon Oranı (EO): Enflasyon oranı verileri Dünya Veri Bankası'ndan alınmıştır. Araştırmada kullanılan ülkelerin ilgili yıllara ait enflasyon oranlarını yansıtmaktadır.

Model 1:

$$\ln(\text{CO}_2) = \alpha + \beta_1 \ln(\text{DYY})_{it} + \beta_2 \text{EGO}_{it} + \beta_3 \ln(\text{KN})_{it} + \beta_4 \text{EO}_{it} + \varepsilon_i$$

$$i = 1, 2, 3, \dots, 19$$

$$t = 1, 2, 3, \dots, 27$$

Modelde bulunan i değerleri analiz kapsamındaki 19 ülkeye verilen 1'den 19'a kadar olan sayıları ifade etmektedir, t 'ler ise 1996 ile 2022 arasındaki her bir yılı ifade etmektedir. α , sabit terimi ve ε , hata terimini ifade etmektedir. β değerleri bağımsız değişkenlerin katsayılarını ifade etmektedir.

Tanımlayıcı İstatistikler

Tablo 1. Tanımlayıcı İstatistikler

Değişkenler	Gözlem Sayısı	Ortalama	Standart Sapma	Minimum Değer	Maksimum Değer
LNCO2	513	6.5918	0.9815	3.6535	9.3900
LNDYY	513	24.9111	1.1622	2.3025	27.0358
EGO	513	3.2775	3.5727	-13.1267	14.2308
LNKN	513	18.0404	1.1293	4.4067	20.6152
EO	513	7.3262	12.8098	-16.5814	143.6397

Korelasyon Katsayıları

Araştırma modellerinde yer alan bağımlı ve bağımsız değişkenler arasındaki ilişkiyi gösteren korelasyon katsayıları verilmiştir. Araştırma modellerinde yer alan değişkenlerin korelasyon katsayıları 0.80'den yüksek değer almamıştır. Araştırma değişkenleri arasında önemli derecede doğrusal bağlantı bulunmamaktadır.

Tablo 2. Korelasyon Katsayıları

	LNCO2	LDYY	EGO	LNKN	EO
LNCO2	1.000				
LNDYY	0.2689	1.000			
EGO	0.0956	0.0725	1.000		
LNKN	0.6197	0.1858	-0.1264	1.000	
EO	-0.1650	-0.1431	0.0656	-0.0424	1.000

Doğru Tahmincinin Tespiti

Bu bölümde gerçeğe en yakın sonucu veren modelin seçilmesi için araştırma modelleri üzerinde F testi ve LM testi uygulanması gerekmektedir. Bu başlık altında araştırma modellerine uygulanan testler ve sonuçları sunulmaktadır.

Model'de LNCO2 bağımsız değişken; LNDYY, EGO, EO, LNKN bağımsız değişkenlerdir. Doğru yöntemin belirlenmesi için öncelikle F testi ve LM testi yapılmaktadır.

Tablo 3. F Test Sonuçları

Bağımsız

Değişkenler

LNDYY	0.0286 (0.0110) ***
EGO	-0.0365 (0.0039)
LNKN	-0.0037 (0.0011) ***
EO	0.0301 (0.0170) **
cons	5.3737 (0.4108)
F test	201.03
R2	0.2384
Gözlem Sayısı	513

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Tablo 4. LM Test Sonuçları

Bağımsız

Değişkenler

LNDYY	0.0299 (0.0112) ***
EGO	-0.0033 (0.0039)
EO	-0.0037 (0.0011) ***
LNKN	0.0389 (0.0173) **
cons	5.1820 (0.4427)
Chibar2	2806.88
R2	0.2795
Gözlem Sayısı	513

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Model üzerinde klasik model veya sabit etkiler modelinin uygulanmalı olduğuna karar vermek için model F testi ile sınanmıştır. Modelde F test istatistiği sonucu Tablo 3'te görüldüğü gibi 201.03'tür. Bu değer F dağılım tablosundaki F(18, 480) serbestlik derecesi ile F test istatistiği karşılaştırıldığı zaman birim etkilerin tamamının sıfıra eşit olduğu durum reddedilmektedir. (Prob>F = 0.000). Modelde klasik modelin kullanılamayacağına karar verilmiş olup, sabit etkiler modelinin varlığından bahsedilmektedir.

Model üzerinde klasik model ile birim tesadüfi etkiler modelinin uygulanmalı olduğuna karar vermek için LM testi uygulanmıştır. Modelde birim tesadüfi etkinin olmadığı hipotezi sınanmıştır. Modelde LM test

istatistiği sonucu Tablo 4'te görüldüğü gibi ki-kare istatistiği 2806.88'dir. Ki-kare dağılım tablosunda $\chi^2(01)$ serbestlik derecesi ile ki-kare istatistiği sonucu karşılaştırıldığı zaman hipotez $\alpha=0.05$ 'te reddedilmektedir ($\text{Prob}>\chi^2 = 0.000$). LM testinin sonuçlarına göre klasik modelin kullanılamayacağı kabul edilmiştir ve modelde birim rassal etkilerin varlığından söz edilebilir.

Sabit etkiler modelinin sonuçlarının veya rassal etkiler modelinin sonuçlarının dikkate alınması gerektiğine karar verebilmek için Hausman testi uygulanmıştır. Hausman testinde hipotezin kabul edildiği durumda tesadüfi etkiler modelinin kullanılması önerilir; hipotezin reddedildiği durumda sabit etkiler modelinin kullanılması önerilir. Hausman testi sonucu incelendiğinde hipotez $\alpha=0.05$ 'te reddedilmektedir ($\text{Prob}>\chi^2=0.0001$). Model üzerinde yapılan analizde sabit etkiler modelinin sonuçlarının dikkate alınması daha doğru olacaktır.

Çalışmada 1996-2022 yılları arasında 19 ülkedeki veriler CO2 salınım oranı, doğrudan yabancı yatırım, kentsel nüfus, ekonomik gelişim oranı, enflasyon oranı verilerinin dikkate alınmıştır. Model ile yapılan testler sonucunda sabit etkiler modeli dikkate alındığında, DYY ve KN oranındaki artış ile CO2 salınım oranında pozitif bir ilişki olduğu gözlemlenmiştir. Araştırmada elde edilen bu sonuç Mirziyoyeva & Salahodjaev (2022) tarafından 50 ülkenin 2000-2015 yılları arasındaki verileri kullanılarak yapılan çalışmayı ve Hoffmann (2005) tarafından 112 ülkenin 1971 ve 1997 yılları arasındaki verileri kullanılarak yapılan çalışmayı destekler niteliktedir. Enflasyon oranındaki artışın CO2 salınım oranında azaltıcı etkisi olduğu gözlemlenmiştir.

3. Sonuç

CO2 salınımı küresel iklim değişikliğine önemli ölçüde katkıda bulunmakta; çevre, ekosistemler üzerinde önemli derece olumsuz etkilere sahiptir. CO2 salınımı etkilerinin azaltılmasına yönelik çalışmalar, iklim değişikliği ile ilgili hayati önem taşımaktadır. Bu çalışmanın amacı finansal verilerin ve enerji tüketim oranının CO2 salınımına etkisini araştırıp, çevresel sorunlara ışık tutmaktır.

Çalışmada 19 ülke için 1996 ve 2022 yılları arasındaki veriler gözlemlenmiştir. Doğrudan yabancı yatırım, kentsel nüfus, ekonomik gelişim ve enflasyon oranı gibi verilerin CO2 salınımı üzerindeki etkisi araştırılmıştır. Araştırmada kullanılan 3 farklı model panel veri analizi yöntemleri ile test edilmiştir.

Yapılan testler sonucunda DYY miktarında %1 oranında artış olduğunda, CO2 salınımı %2.86 oranında arttırdığı gözlemlenmiştir. KN değerlerinin CO2 salınımı üzerinde arttırıcı etkisi olduğu ve enflasyon oranındaki artışın CO2 salınım oranı üzerinde azaltıcı etkisi olduğu gözlemlenmiştir.

Bu konu hakkında sürdürülebilir bir gelecek sağlamak için küresel iş birliği ve politika girişimleri gereklidir. Sürdürülebilir yatırım uygulamaları, DYY faydalarını arttırırken, CO2 salınımı ve çevresel



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sürdürülebilirlik üzerindeki olumsuz etkileri azaltmada oldukça önemlidir. Sürdürülebilir yatırım uygulamaları desteklenmeli ve dünya çapında benimsenmelidir.



Kaynakça

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ÇALIŞANLARIN ÖDÜLLENDİRME SİSTEMLERİ ALGISI İLE YAŞAM DOYUMU ARASINDAKİ İLİŞKİNİN İNCELENMESİ: ÖZEL BİR VAKIF ÜNİVERSİTE HASTANESİ HEMŞİRE ÇALIŞAN ÖRNEĞİ

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Özet

Bu çalışma, özel bir hastanede çalışan hemşirelerin ödüllendirme sistemleri algısı ile yaşam doyumu arasındaki ilişkiyi incelemeyi amaçlamaktadır. Hemşirelerin çalışma ortamlarında yaşadıkları ödüllendirme sistemlerine ilişkin algıları, genel iş doyum düzeylerini ve yaşam doyumlarını etkileyebilir. Bu nedenle, çalışanların ödüllendirme sistemleri algısı ile yaşam doyumu arasındaki ilişkiyi anlamak, hemşirelerin iş doyumunu artırmak ve çalışma ortamında daha sağlıklı bir çalışma deneyimi sağlamak için önemlidir. Buradan hareketle planlanan çalışma tanımlayıcı ve kesitsel tipte tasarlanmış ve hemşirelerin ödüllendirme sistemlerini algılamaları ile yaşam doyumu arasındaki ilişkiyi belirlemek amaçlanmıştır. Çalışmanın evrenini İstanbul ili sınırları içerisinde faaliyet göstermekte olan özel bir sağlık grubu hastanesindeki hemşireler oluşturmaktadır. Araştırmanın yapıldığı dönemde, insan kaynakları birimi verilerine göre 400 kadrolu hemşire belirtilmiş, örneklem seçimine gidilmeden tüm hemşirelere anket dağıtılmış bunlardan eksiksiz olarak doldurulan 250 hemşirenin anketi araştırmanın örneklemini oluşturmuştur. Çalışmada veri toplama yöntemi olarak üç bölümden oluşan, demografik ve mesleki bilgilerin yer aldığı kişisel bilgi formu, ödüllendirme sistemleri algısı ölçeği ve yaşam doyumu ölçeğini içeren anket kullanılmıştır. Bu çalışmada elde edilen bulgularda ödüllendirme sistemi algısı ile yaşam doyumu arasındaki ilişkide Pearson Korelasyon analizi sonucuna göre, istatistiksel olarak anlamlı, pozitif yönlü ve orta şiddetli bir ilişki tespit edilmiştir ($r=,391$, $p<,01$). Örneklemden hemşirelerin genel olarak ödüllendirme sistemleri algılarının orta düzeyde olduğu ve yaşam doyumunun ortalama düzeyde olduğu görülmüştür. Ödüllendirme sistemi algısı düzeyinin demografik değişkenlere göre incelendiğinde yaş ve eğitim düzeyi faktörlerinin anlamlı olarak yüksek olduğu tespit edilmiştir. Yaşam doyumu düzeyi ile



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demografik deęişkenlere bakıldığında ise; 31-40 yaş, evli olma durumu, gündüz vardiyasında çalışma ve hemşirelik mesleğini isteyerek seçme durumlarında anlamlı olarak yüksek olduğu tespit edilmiştir. Bu sonuçlara dayanarak, bireylerin istihdam deneyimlerinde ödüllendirme sistemi algısının önemli bir rol oynadığı ve bu algının yaşam doyumunun ilişkisi olduğu tespit edilmiştir. Araştırma, ödüllendirme sistemi algısının artırılması ve iyileştirilmesinin, bireylerin yaşam doyumunu olumlu yönde etkileyebileceğini göstermektedir.

Anahtar Kelimeler: Ödüllendirme Sistemleri Algısı, Yaşam Doyumu, Hemşire, Özel Hastane



**INVESTIGATION OF THE RELATIONSHIP BETWEEN EMPLOYEES' PERCEPTION OF
REWARD SYSTEMS AND LIFE SATISFACTION: A PRIVATE FOUNDATION UNIVERSITY
HOSPITAL NURSE EMPLOYEE EXAMPLE**

Abstract

This study aims to examine the relationship between the perception of reward systems and life satisfaction of nurses working in a private hospital. Nurses' perceptions of the reward systems they experience in their work environments may affect their overall job satisfaction levels and life satisfaction. Therefore, understanding the relationship between employees' perception of reward systems and life satisfaction is important to increase nurses' job satisfaction and provide a healthier working experience in the work environment. Based on this, the planned study was designed as descriptive and cross-sectional and aimed to determine the relationship between nurses' perception of reward systems on life satisfaction. The population of the study consists of nurses in a private health group hospital operating within the borders of Istanbul province. During the period when the research was conducted, 400 staff nurses were specified according to the data of the human resources unit, and a questionnaire was distributed to all nurses without selecting a sample. The questionnaires of 250 nurses, which were completely filled out, constituted the sample of the research. In the study, a survey consisting of three parts, a personal information form containing demographic and professional information, a reward systems perception scale and a life satisfaction scale, was used as the data collection method. In the findings obtained in this study, according to the results of Pearson Correlation analysis, a statistically significant, positive and moderate relationship was detected in the relationship between reward system perception and life satisfaction ($r=.391$, $p<.01$). It was observed that the nurses in the sample generally had moderate perceptions of reward systems and life satisfaction was at an average level. When the reward system perception level was examined according to demographic variables, it was determined that the factors of age and education level were significantly higher. When looking at the level of life satisfaction and demographic variables; It was determined that it was significantly higher in cases of age 31-40, being married, working in the day shift and willingly choosing the nursing profession. Based on these results, it has been determined that individuals' perception of the reward system plays an important role in their employment experiences and that this perception is related to life satisfaction. The research shows that increasing and improving the perception of the reward system can positively affect individuals' life satisfaction.

Key Words: Perception of Reward Systems, Life Satisfaction, Nurse, Private Hospital

1.GİRİŞ

Yaşam doyumu kavramı bireyin tüm yaşamını içermekte ve yaşamına dair her şeyi kapsamaktadır. Yaşam doyumu kavramı genellikle iyi olduğunu hissetme ve mutluluk kavramlarıyla da kullanılmaktadır (Arasan ve Başak, 2010). Yaşam doyumu, bireyin hayattan aldığı tatmini ve memnuniyeti ifade eden bir kavramdır. Bu, genel yaşam kalitesi ve psikolojik iyi oluş açısından önemli bir ölçüttür. Yüksek yaşam doyumu, bireyin mental ve fiziksel sağlığını olumlu yönde etkileyebilir, sağlıklı sosyal ilişkilerle ilişkilidir ve motivasyonu artırabilir. Aynı zamanda stresle başa çıkma becerilerini güçlendirebilir, genel yaşam kalitesini artırabilir ve toplumsal katılımı teşvik edebilir. Bu nedenle, yaşam doyumunun artırılması, bireylerin içsel huzurunu güçlendirebilir ve daha sağlıklı, mutlu bir yaşam sürmelerine katkıda bulunabilir. Bu bağlamda, bireylerin kendi yaşamlarını değerlendirmeleri ve yaşam doyumlarını artırmak için gerekli değişiklikleri yapmaları önemlidir (Kanten ve Kanten, 2015). Bireyler, hem iş yerlerinde hem de sosyal ilişkilerde giderek daha büyük bir etkiye sahip olmaktadır. Kişilerin duygusal durumu, algıları ve mutluluk gibi psikolojik unsurlar, gün geçtikçe organizasyonların vazgeçilmez birer bileşeni haline gelmektedir. Bu bağlamda, iş yerlerinde çalışan bireylerin memnuniyeti, yaşam doyumu ve üretkenliği açısından kritik bir rol oynamaktadır (Yılmaz ve Sünbül, 2009).

Ödüllendirme sistemleri, işverenlerin çalışanları motive etmek, performanslarını teşvik etmek ve doyum düzeylerini artırmak amacıyla kullandıkları bir dizi politika ve uygulamalar bütünüdür (Yürür, S. 2005). Bu sistemler, çalışanların başarılarını tanımak, motivasyonlarını ilerletmek ve özendirmek için maddi veya manevi ödüller sunmayı içerir (Deeprise, D. 1994). İhtiyaç duydukları eğitilmiş, yetenekli, nitelikli ve motive çalışanları sağlayarak kuruluşların stratejik ve kısa vadeli hedeflerine ulaşmalarına yardımcı olmak, çalışanlara kurum beklentilerini, hedef ve performansa yönelik bilgilendirmelerin düzenli olarak yapılmasını sağlamak, kurumda dönüşümü desteklemek ve hangi davranışların sergilenmesinde ödüllendirme sağlanacağını belirtilerek istenen çalışan performansı süreçlerine teşvik etmek, ekip ödüllendirmesine gidilerek ekip çalışmalarını arttırmak, maddi olmayan ödüller ile istek, doyum ve motivasyon konusunda çalışanları desteklemek de ödüllendirme sistemi amaçları arasında yer alabilir. Bu çalışma, özel bir hastanede çalışan hemşirelerin ödüllendirme sistemleri algısı ile yaşam doyumu arasındaki ilişkiyi incelemeyi amaçlamaktadır. Hemşirelerin çalışma ortamlarında yaşadıkları ödüllendirme sistemlerine ilişkin algıları, genel iş doyum düzeylerini ve yaşam doyumlarını etkileyebilir. Bu nedenle, çalışanların ödüllendirme sistemleri algısı ile yaşam doyumu arasındaki ilişkiyi anlamak, hemşirelerin iş doyumunu artırmak ve çalışma ortamında daha sağlıklı bir çalışma deneyimi sağlamak için önemlidir.

2. GEREÇ VE YÖNTEM

Çalışmanın evrenini İstanbul ili sınırları içerisinde faaliyet göstermekte olan özel bir sağlık grubu hastanesindeki hemşireler oluşturmaktadır. Araştırmanın yapıldığı dönemde, insan kaynakları birimi verilerine göre 400 kadrolu hemşire belirtilmiş, örneklem seçimine gidilmeden tüm hemşirelere anket dağıtılmış bunlardan eksiksiz olarak doldurulan 250 hemşirenin anketi araştırmanın örneklemini oluşturmuştur.

Çalışmada üç bölümlü anket ile veri toplama sağlanmıştır. İlk bölümde çalışmacı tarafından bu çalışma için oluşturulan ve katılımcıların demografik ve mesleki bilgilerinin bulunduğu Kişisel Bilgi Formu kullanılmıştır. İkinci bölümde beşli likert tipinde, 21 maddeden oluşan ve iki alt boyuta (yapısal belirleyiciler, süreç belirleyicileri) sahip Ödüllendirme Sistemleri Ölçeği kullanılmıştır. Ölçeğin Yürür, S. (2009) tarafından geçerlilik ve güvenilirliği yapılmıştır. Üçüncü bölümde beşli likert tipinde, 5 maddeden oluşan tek boyutlu Yaşam Doyumu Ölçeği kullanılmıştır. Ölçeğin, Dağlı ve Baysal (2016) tarafından Türkçe geçerlilik ve güvenilirlik çalışması yapılmıştır.

Bu araştırma kapsamında elde edilen verilerin analizleri için IBM SPSS v26 programlarından faydalanılmıştır. Araştırmanın demografik bulguları frekans tabloları aracılığıyla analiz edilmiştir. Araştırma kapsamında kullanılan Ödüllendirme Sistemi Algısı ve Yaşam Doyumu ölçeklerinin güvenilirlik analizleri iç tutarlılık katsayısı olan Cronbach's Alpha (α) ile hesaplanmıştır. Ölçeklere ait normallik analizi için çarpıklık (skewness) ve basıklık (kurtosis) değerleri referans alınmıştır. Ölçeklere ait tanımlayıcı istatistikler için aritmetik ortalama, standart sapma, minimum ve maksimum değer metrikleri kullanılmıştır. Araştırmanın amacını kapsayan ödüllendirme sistemi algısı ile yaşam doyumu arasındaki ilişki ise Pearson Momentler Çarpımı Korelasyon Katsayısı (Pearson Korelasyon) ile analiz edilmiştir. Araştırmanın hipotezi %95 güven aralığında $p < ,05$ noktasında istatistiksel olarak anlamlı kabul edilmiştir.

3. BULGULAR

3.1. Demografik Bulgular

Katılımcıların demografik bulgular Tablo 1'de verilmiştir.

Tablo 1. Demografik Bulgular

Kategori	Değişken	N	%
Yaş	18-25	84	33,6%
	26-30	64	25,6%
	31-45	89	35,6%
	46-60	13	5,2%
	Toplam	250	100,0%
Cinsiyet	Erkek	34	13,6%
	Kadın	216	86,4%
	Toplam	250	100,0%
Medeni durum	Bekar	141	56,4%
	Evli	109	43,6%
	Toplam	250	100,0%
Eğitim düzeyi	Lisans	110	44,0%
	Lise	60	24,0%
	Ön Lisans	44	17,6%
	Yüksek Lisans	36	14,4%
	Toplam	250	100,0%
İş yerindeki pozisyon	Klinik eğitim hemşiresi	17	6,8%
	Sorumlu hemşire	77	30,8%
	Staff hemşire	156	62,4%
	Toplam	250	100,0%
Hangi vardiyada çalışıyorsunuz	Gece	14	5,6%
	Gündüz	109	43,6%
	Gündüz ve gece	127	50,8%
	Toplam	250	100,0%
Hemşirelik mesleğini isteyerek mi seçtiniz	Evet	208	83,2%
	Hayır	42	16,8%
	Toplam	250	100,0%

Araştırmaya toplam 250 kişi katılım göstermiştir. Katılımcıların %33,6'sı 18-25, %25,6'sı 26-30, %35,6'sı 31-45 ve %5,2'si ise 46-60 yaş arasındadır. Katılımcıların %13,6'sı erkek, %86,4'ü kadındır. Katılımcıların %56,4'ü bekar, %43,6'sı evlidir. Katılımcıların %44'ü lisans, %24'ü lise, %17,6'sı ön lisans ve %14,4'ü ise yüksek lisans mezunudur. İşyerindeki pozisyona göre katılımcıların %6,8'i klinik eğitim hemşiresi, %30,8'i sorumlu hemşire ve %62,4'ü ise staff hemşiredir. Katılımcıların %5,6'sı gece, %43,6'sı gündüz, %50,8'i ise gündüz ve gece vardiyasında çalışmaktadır. Katılımcıların %83,2'si hemşirelik mesleğini isteyerek seçtiğini belirtirken, %16,8'i ise istemeyerek seçtiğini belirtmiştir (Tablo 1).

3.2. Ödüllendirme Sistemleri Algısı ve Yaşam Doyumu Güvenilirlik Analizi

Ödüllendirme Sistemi Algısı ve Yaşam Doyumu Ölçeği'ne ait güvenilirlik analizleri için kullanılan Cronbach's Alpha iç tutarlılık katsayısı değerleri Tablo 2'de verilmiştir.

Tablo 2. Ölçeklere Ait İç Tutarlılık (Cronbach's Alpha) Katsayıları

Değişken	Cronbach's Alpha	Madde Sayısı
Ödüllendirme Sistemi Algısı Ölçeği	,943	21
Yaşam Doyumu Ölçeği	,854	5

Araştırma kapsamında kullanılan ölçeklerde elde edilen değerlerin 0,700'ün üzerinde olması nedeniyle araştırma kapsamında kullanılan değişkenlerin iç tutarlılık katsayılarının güvenilir düzeyde olduğunu göstermektedir (56). Araştırma değişkenlerine ait normal dağılım analizi için kullanılan çarpıklık (skewness) ve basıklık (kurtosis) değerleri Tablo 3'te gösterilmiştir.

Tablo 3. Değişkenlere Ait Çarpıklık (Skewness) ve Basıklık (Kurtosis) Değerleri

Ölçek	N	Skewness		Kurtosis	
		Statistic	Std Error	Statistic	Std.Error
Ödüllendirme Sistemi Algısı	250	-,399	,154	,413	,307
Yaşam Doyumu	250	,096	,154	,130	,307

Ölçeklere ait çarpıklık ve basıklık değerlerinin +2 ve -2 arasında olduğu tespit edilmiştir. Dolayısıyla araştırma ölçeklerinin normallik varsayımını karşıladığı söylenebilir (George, D. 2011). Bu nedenle araştırmanın hipotez testleri için parametrik testler kullanılmıştır.

3.3 Tanımlayıcı İstatistikler

Araştırma kapsamında kullanılan ölçeklere ait tanımlayıcı istatistikler Tablo 4'te verilmiştir. Tanımlayıcı istatistiklerin verilmesinde ölçeklere ve maddelerine ait aritmetik ortalamalar, standart sapmalar, minimum ve maksimum değerler kullanılmıştır.

Tablo 4. Tanımlayıcı İstatistikler

Değişken/Madde	Ort.	Ss.	Min.	Maks.
Ödüllendirme Sistemleri Algısı Ölçeği	2,96	,77	1,00	5,00
1- Ödüller, çalışanın yaptığı işin zorluk derecesine göre verilir.	2,88	1,28	1,00	5,00
2- Ödüller, çalışanın yaptığı işin önemine göre verilir.	3,18	1,23	1,00	5,00
3- Ödüller, çalışanların gösterdikleri kişisel gelişime (sahip oldukları bilgi ve beceri düzeyindeki gelişmeye) göre verilir.	3,31	1,19	1,00	5,00
4- Çalışanlara verilecek ödüllerin belirlenmesinde kişinin bireysel olarak gösterdiği çaba esas alınır.	3,45	1,10	1,00	5,00
5- Ödüllerin belirlenmesinde çalışanların ekip olarak gösterdikleri çaba esas alınır.	3,42	1,08	1,00	5,00
6- Ekip performansına göre verilen ödüller ekip üyelerinin katkı düzeyine bakılmaksızın üyeler arasında eşit paylaşılır.	2,92	1,14	1,00	5,00
7- Ekip ödülleri ekip üyelerinin katkı düzeyine göre farklı miktarlarda dağıtılır.	2,86	1,08	1,00	5,00
8- Ekip ödülleri çalışanların farklı ihtiyaçları göz önünde bulundurularak dağıtılır.	2,85	1,18	1,00	5,00
9- Firmamızda çalışanlara verilen ödüller düzenli olarak benzer firmalarla kıyaslanır.	2,79	1,09	1,00	5,00
10- Çalışanlara verilen ödüller, benzer firmaların çalışanlarına verdikleri ödüllerden düşük değildir.	2,47	1,12	1,00	5,00
11- Firmamızda uygulanan ödüllendirme sistemi (örn; verilen ödül türleri) holdinge bağlı tüm firmalarda standart bir biçimde uygulanır.	2,63	1,10	1,00	5,00
12- Çalışanlara verilen ödüller terfi ile birlikte artar.	2,78	1,17	1,00	5,00
13- Çalışanlara farklı ödül seçenekleri sunularak kendi ihtiyaçlarına göre seçim yapma fırsatı tanınır.	2,46	1,13	1,00	5,00
14- Çalışanlar için hangi ödüllerin daha önemli olduğu yönetim tarafından dikkate alınır.	2,66	1,15	1,00	5,00
15- Çalışanların kıdemi arttıkça aldıkları ödüllerin miktarı da artar.	2,63	1,22	1,00	5,00
16- Yönetim, çalışanları işlerinde gösterdikleri performansları hakkında bilgilendirilir.	3,29	1,09	1,00	5,00
17- Çalışanlar kendilerinden ne beklendiği konusunda bilgilendirilir.	3,41	1,06	1,00	5,00
18- Çalışanlar aldıkları ödüller hakkında fikirlerini yöneticilerine söyleyebilirler.	3,16	,98	1,00	5,00
19- Çalışanlar kendi performansları hakkında fikirlerini yöneticilerine söyleyebilirler.	3,28	1,08	1,00	5,00
20- Ödüllerin hangi kriterlere dayalı olarak verildiği tüm çalışanlara açıkça aktarılır.	3,03	1,17	1,00	5,00
21- Ödüllerin kimlere verileceği, neye göre verileceği gibi kararlar verilirken çalışanların da görüşü alınır.	2,78	1,14	1,00	5,00
Değişken/Madde	Ort.	Ss.	Min.	Maks.
Yaşam Doyumu Ölçeği	2,67	,80	1,00	5,00
1- İdeallerime yakın bir yaşantım vardır.	2,64	,98	1,00	5,00
2- Yaşam koşullarım mükemmeldir.	2,39	1,05	1,00	5,00
3- Yaşamımdan memnunum.	2,95	,94	1,00	5,00
4- Şimdiye kadar yaşamdan istediğim önemli şeylere sahip oldum.	3,02	,93	1,00	5,00
5- Tekrar dünyaya gelsem hayatımdaki hemen hemen hiçbir şeyi değiştirmezdim.	2,37	1,09	1,00	5,00

Araştırma kapsamında kullanılan ölçeklere ait genel aritmetik ortalamalar incelendiğinde, Ödüllendirme Sistemi Algısı Ölçeği 'ne ait genel aritmetik ortalamasının 2,96 (ss=,77) ve Yaşam Doyumu Ölçeği 'ne ait genel aritmetik ortalamasının ise 2,67 (ss=,80) olduğu görülmektedir. Elde edilen değerlere göre katılımcıların genel olarak ödüllendirme sistemi algısı ile yaşam doyumu düzeylerinin orta-alt seviyede olduğu söylenebilir.

3.4 Ödüllendirme Sistemleri Algısı ve Yaşam Doymu Arasındaki İlişkinin İncelenmesi

Ödüllendirme sistemi algısı ile yaşam doymu arasındaki ilişkinin incelemesi amacıyla Pearson Korelasyon analizi uygulanmıştır. Analiz sonuçları Tablo 5’te verilmiştir.

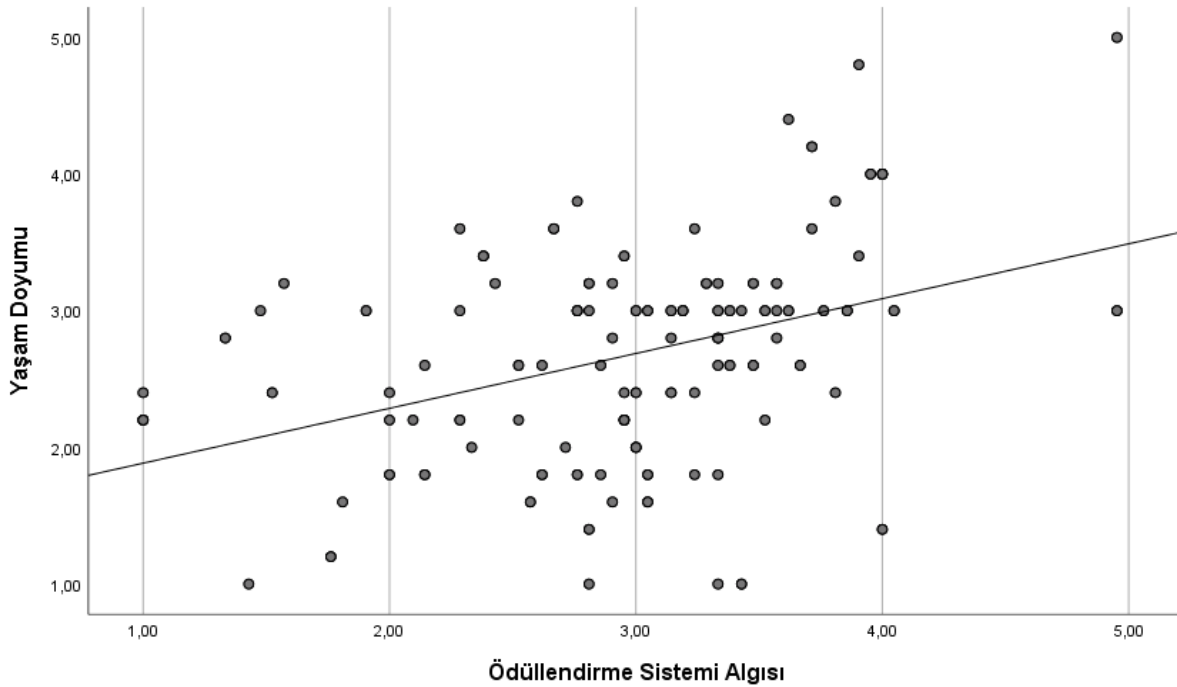
Ödüllendirme sistemi algısı ile yaşam doymu arasındaki ilişkinin incelendiği Pearson Korelasyon analizi sonucuna göre, ödüllendirme sistemi algısı ile yaşam doymu arasında istatistiksel olarak anlamlı, pozitif yönlü ve orta şiddetli bir ilişki tespit edilmiştir ($r=,391$, $p<,01$). Pearson Korelasyon analizi sonuçlarına göre elde edilen yayılım (scatter-dot) grafiği Şekil 1’de verilmiştir.

Tablo 5. Ödüllendirme Sistemi Algısı ile Yaşam Doymu Arasındaki İlişkinin İncelenmesi (Pearson Korelasyon)

Ölçek	Yaşam Doymu
Pearson Correlation (r)	,391**
Ödüllendirme Sistemi Algısı p (anlamlılık)	,000
N	250

Şekil 1’de yer alan yayılım grafiği incelendiğinde ise bireylerin ödüllendirme sistemi algıları ile yaşam doymu düzeyleri arasındaki ilişkinin birlikte hareket ettiği görülmektedir.

Şekil 1. Yayılım Grafiği



Ödüllendirme Sistemleri Algı Düzeyinin Demografik Değişkenlere Göre İncelenmesi

Ödüllendirme sistemi algısı düzeyinin demografik değişkenlere göre incelenmesi amacıyla Bağımsız Örneklem T-Test ve ANOVA analizi uygulanmıştır. Analiz sonuçları Tablo 6’da verilmiştir.

Tablo 6. Ödüllendirme Sistemi Algısı Düzeyinin Demografik Değişkenlere Göre İncelenmesi

Değişken	Kategori	Ort.	Ss.	t/F	p	Fark
Yaş	(1) 18-25	3,23	,74	5,187	,002*	1>2,3
	(2) 26-30	2,87	,72			
	(3) 31-45	2,81	,82			
	(4) 46-60	2,78	,47			
Cinsiyet	(1) Erkek	2,92	,53	-,353	,725	-
	(2) Kadın	2,97	,81			
Medeni durum	(1) Bekar	2,97	,77	,181	,856	-
	(2) Evli	2,95	,78			
Eğitim düzeyi	(1) Lisans	3,12	,68	3,006	,031*	1>3
	(2) Lise	2,89	,74			
	(3) Ön Lisans	2,79	1,07			
	(4) Yüksek Lisans	2,82	,60			
İş yerindeki pozisyon	(1) Klinik eğitim hemşiresi	3,18	,62	,951	,388	-
	(2) Sorumlu hemşire	2,90	,73			
	(3) Staff hemşire	2,97	,81			
Hangi vardiyada çalışıyorsunuz	(1) Gece	3,10	,52	1,477	,230	-
	(2) Gündüz	3,04	,68			
	(3) Gündüz ve gece	2,88	,87			
Hemşirelik mesleğini isteyerek mi seçtiniz	(1) Evet	3,00	,79	1,860	,064	-
	(2) Hayır	2,76	,69			

* p<,05 noktasında istatistiksel olarak anlamlı farklılık.

Ödüllendirme sistemi algısı düzeyinin demografik değişkenlere göre incelendiği analiz sonuçlarına göre, yaşı 18-25 aralığında olan bireylerin ödüllendirme sistemi algısı düzeylerinin, 26-30 ve 31-45 yaş aralığında olanlara göre anlamlı bir şekilde daha yüksek (F=5,187, p<,05), eğitim düzeyi lisans olanların ön lisans olanlara göre anlamlı bir şekilde daha yüksek (F=3,006, p<,05) olduğu tespit edilmiştir. Cinsiyet faktörünün ödüllendirme sistemi algısı düzeyinde anlamlı bir farkı olmadığı tespit edilmiştir. Ödüllendirme sistemi algısı düzeyinin cinsiyet, medeni durum, iş yerindeki pozisyon, vardiya ve hemşirelik mesleğini isteyerek seçip seçmeme durumuna göre anlamlı bir şekilde farklılaşmadığı tespit edilmiştir.

3.5. Yaşam Doyumu Düzeyinin Demografik Değişkenlere Göre İncelenmesi

Yaşam doyumu düzeyinin demografik değişkenlere göre incelenmesi amacıyla Bağımsız Örneklem T-Test ve ANOVA analizi uygulanmıştır. Analiz sonuçları Tablo 7’de verilmiştir.

Tablo 7. Yaşam Doyumunu Düzeyinin Demografik Değişkenlere Göre İncelenmesi

Değişken	Kategori	Ort.	Ss.	t/F	p	Fark
Yaş	(1) 18-25	2,71	,89	3,616	,014*	3>2
	(2) 26-30	2,49	,70			
	(3) 31-45	2,83	,73			
	(4) 46-60	2,26	,78			
Cinsiyet	(1) Erkek	2,68	,63	,029	,977	-
	(2) Kadın	2,67	,82			
Medeni durum	(1) Bekar	2,56	,77	-2,639	,009*	2>1
	(2) Evli	2,82	,80			
Eğitim düzeyi	(1) Lisans	2,67	,90	,018	,997	-
	(2) Lise	2,69	,60			
	(3) Ön Lisans	2,65	,74			
	(4) Yüksek Lisans	2,68	,85			
İş yerindeki pozisyon	(1) Klinik eğitim hemşiresi	2,67	,91	1,596	,205	-
	(2) Sorumlu hemşire	2,81	,83			
	(3) Staff hemşire	2,61	,76			
Hangi vardiyada çalışıyorsunuz	(1) Gece	2,54	,90	3,383	,036*	2>3
	(2) Gündüz	2,82	,85			
	(3) Gündüz ve gece	2,56	,72			
Hemşirelik mesleğini isteyerek mi seçtiniz	(1) Evet	2,72	,80	2,067	,040*	1>2
	(2) Hayır	2,44	,77			

* p<,05 noktasında istatistiksel olarak anlamlı farklılık.

Yaşam doyumunu düzeyinin demografik değişkenlere göre incelendiği analiz sonuçlarına göre; yaşı 31-40 aralığında olanların 26-30 yaş aralığında olanlara göre anlamlı bir şekilde daha yüksek (F=3,616, p<,05), evlilerin bekarlara göre daha yüksek (t=-2,639, p<,05), gündüz vardiyasında çalışanların gündüz ve gece çalışanlara göre daha yüksek (F=3,383, p<,05) ve hemşirelik mesleğini isteyerek seçenlerin istemeyerek seçenlere göre daha yüksek (t=2,067, p<,05) olduğu tespit edilmiştir. Eğitim düzeyine ve iş yerindeki pozisyona göre yaşam doyumunu düzeyinin anlamlı bir şekilde farklılaşmadığı tespit edilmiştir.

4. TARTIŞMA

Yürür, S. (2009) yaptığı çalışmada ödüllendirmenin süreç yönetimi, etkileşimsel ve dağıtımsal adalet algılarını önemli ölçüde etkilediği görülmüştür. Ödüllendirmenin süreç boyutunda çalışanlara ödüllendirme faktörlerinin tam olarak tanıtılması konusunda yeterli bilgi sağlanması ve çalışanın ücret planında karar alma sürecine katılımı gibi iletişim sorunlarının giderildiğinde göz önüne alındığında, adalet etkileşiminin anlamlı olarak etkileneceği sonucuna varılmıştır.

Yine 2005 yılında öğretmenler ile yapılan bir çalışmada (Avşaroğlu, vd., 2005), yaş dağılımına bakıldığında, bireysel başarısızlık, yaşam doyumunu ve mesleki doyumun anlamlı farklılık göstermese de

duyguların tükenmişlik seviyesi ve duyarsızlaşma puan ortalamalarında anlamlı farklılıklar bulunmuştur. Çalışma yılının artması ile yaşam doyumu faktöründe duyarsızlaşma, kişisel başarısızlık ve iş doyumu almada anlamlı farklılık bulunmamışken, duygusal boyutta tükenmede anlamlı farklılıklar saptanmıştır.

Yine hekimler ile yapılan başka bir çalışmada ise tıpkı bu çalışmada olduğu gibi evli olanların bekarlara göre daha yüksek yaşam doyumuna sahip oldukları görülmüştür. (Ünal vd.,2001).

Bununla birlikte, araştırmanın bulguları araştırma kapsamında kullanılan örnekleme ve ölçeklere dayandığından, genelleme yapma konusunda dikkatli olunmalıdır. Daha geniş katılımcı gruplarıyla yapılan benzer çalışmalarla bu sonuçların doğrulanması önerilebilir. Ayrıca, araştırmanın öneriler bölümünde, ödüllendirme sistemi algısının iyileştirilmesine yönelik stratejilerin geliştirilmesi ve uygulanması konusunda önerilerde bulunulabilir.

5. SONUÇ

Bu çalışma, Özel Bir Vakıf Üniversite Hastanesi'nde çalışan hemşirelerin ödüllendirme sistemleri algısı ile yaşam doyumu arasındaki ilişkiyi incelemeyi amaçlamaktadır. Veriler, katılımcıların ödüllendirme sistemleri algısı ve yaşam doyumu düzeylerini ölçmek için kullanılan ölçekler aracılığıyla toplanmıştır.

Bu çalışmanın verilerine göre, araştırma kapsamında kullanılan ölçeklerin iç tutarlılık katsayılarının güvenilir düzeyde olduğu ve normallik varsayımını karşıladığı görülmektedir. Katılımcıların ödüllendirme sistemi algısı ve yaşam doyumu düzeylerinin orta-alt seviyede olduğu belirlenmiştir. Ayrıca, istatistiksel olarak bakıldığında yaşam doyumu ve ödüllendirme sistemi algısı arasında anlamlı, pozitif yönlü ve orta şiddetli bir ilişki tespit edilmiştir.

Ödüllendirme sistemi algısı düzeyinin demografik değişkenlere göre incelendiğinde yaş ve eğitim düzeyi faktörlerinin anlamlı olarak yüksek olduğu tespit edilmiştir.

Yaşam doyumu düzeyinin demografik değişkenler istatistiğine bakıldığında; 31-40 yaş, evli olma durumu, gündüz vardiyasında çalışma ve hemşirelik mesleğini isteyerek seçme durumlarında anlamlı olarak yüksek olduğu tespit edilmiştir.

Bu sonuçlara dayanarak, bireylerin istihdam deneyimlerinde ödüllendirme sistemi algısının önemli bir rol oynadığı ve bu algının yaşam doyumunu etkilediği söylenebilir. Araştırma, ödüllendirme sistemi algısının artırılması ve iyileştirilmesinin, bireylerin yaşam doyumunu olumlu yönde etkileyebileceğini göstermektedir.

Örneklemedeki hemşirelerin genel olarak ödüllendirme sistemleri algılarının orta düzeyde olduğu ve yaşam doyumunun ortalama düzeyde olduğu görülmüştür. Ayrıca, Pearson Korelasyon analizi sonucuna göre,



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yaşam doyumu ve ödüllendirme sistemi algısı arasında anlamlı, pozitif yönlü ve orta şiddetli bir ilişki tespit edilmiştir.

Bu bulgular, özel bir hastanede çalışan hemşirelerin ödüllendirme sistemleri algısının yaşam doyumunu etkilediğini göstermektedir. Daha olumlu bir ödüllendirme sistemine sahip olan hemşirelerin daha yüksek yaşam doyumu düzeylerine sahip olduğu görülmüştür.

Ödüllendirme sistemi; hastane yönetimi, hemşirelerin katılımını teşvik eden, başarıları takdir eden ve adaleti sağlayan bir ödüllendirme sistemi oluşturmalıdır. Performansa dayalı bonuslar, takdir edici sözlü veya yazılı geri bildirimler gibi teşvik edici ödüllendirme yöntemleri kullanılabilir.

Kariyer gelişimi; hemşirelere kariyer gelişimi fırsatları sunulmalıdır. Eğitim ve gelişim programları, yüksek lisans veya doktora desteği gibi imkanlar sağlanarak hemşirelerin mesleki becerilerini geliştirmeleri ve ilerlemeleri desteklenmelidir.

İş yükü ve denge; hastane yönetimi, iş yükünü dengelemek için uygun iş dağılımı ve kaynak sağlama politikaları uygulamalıdır. Hemşirelerin iş-yaşam dengelerini korumalarını sağlamak için esnek çalışma saatleri veya izin düzenlemeleri gibi destekleyici önlemler alınmalıdır.

İletişim ve katılım; hastane yönetimi, hemşirelerin fikirlerini paylaşabilecekleri ve karar süreçlerine katılabilecekleri iletişim kanalları oluşturmalıdır. Hemşirelerin kendilerine sunulan ödüllendirme süreçlerine katılım sağlamalarının hedeflenmesi bu çalışma sonuçlarına dayanılarak adalet anlayışına olumlu yönde etki sayılabılır. Yine hemşirelerin görüşleri ve önerileri dikkate alınarak, kurumsal politika ve uygulamaların geliştirilmesinde aktif bir rol almaları teşvik edilmelidir.

Ayrıca; bilgi ve beceri edinimini kolaylaştırmak için hizmet içi eğitimin kalitesinin artırılması, iletişim, stres yönetimi ve yönetim becerileri konusunda uzmanlaşmış eğitimlerin verilmesi, spor ve düzenli egzersiz gibi faaliyetlere olanak sağlanması hemşirelerin kendilerini daha iyi hissetmelerine yardımcı olabilir.

Bu öneriler, hemşirelerin ödüllendirme sistemleri algısını ve yaşam doyumunu artırarak çalışma motivasyonunu ve memnuniyetini iyileştirilebilir. Hastane yönetimi, bu önerileri dikkate alarak hemşirelerin yaşam doyumunu artırabilir ve sağlık hizmetlerinin kalitesini yükseltebilir.

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İNOVATİF FAALİYETLERDE BENİMSENMİŞ ULUSAL KÜLTÜRÜN ROLÜ

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Özet

İnovatif faaliyetler, bir kurumun ya da bireyin yeni ve orjinal fikirler oluşturma, bu fikirleri uygulamaya geçirme ve mevcut durumu iyileştirme amacı ile yürüttüğü birtakım eylemleri içermektedir. Bu faaliyetlerin sonucunda yeni ürünler, hizmetler, iş süreçleri veya iş modelleri oluşturma çabalarını kapsayan inovasyon meydana gelir. İnovasyon, işletmelerin rekabet güçlerini artırmak için kritik öneme sahip olan kaynaklardan görülmektedir. Ancak, inovasyon süreçleri ve başarıları, yalnızca teknolojik faktörlere değil, kültürel etkenlere de bağlı olabilmektedir. Hofstede'nin kültür sınıflandırmasından, belirsizlikten kaçınma boyutu, bir toplumun üyelerinin belirsizlikten rahatsızlık duyma derecesini ifade eder. Güç mesafesi boyutu; bireylerin eşitsizliği kabullenme seviyesini, erillik boyutu rekabetçilik, güç, başarı ve zenginlik hırsı gibi çatışmaya açık duyguları belirtmektedir. Erillik düştüğünde daha çok iş birliği ve yaşam kalitesine önem veren dişillik artışa geçer. Bireycilik boyutu ise bireylerin kendi kararlarını alma özgürlüğünü, kendi başarılarına, hedeflerine ve çıkarlarına odaklanmalarını ifade etmektedir. Araştırmanın amacı, inovatif faaliyetlerde ulusal kültürün oynadığı rolü inceleyerek, kültürel faktörlerin inovasyon süreçlerini nasıl şekillendirdiğini ve etkilediğini açıklamaktır. Bu amaçla literatür inceleme tekniği kullanılmıştır. Literatür inceleme aşamasında temel olarak ScienceDirect, Emerald Insight, Web of Science ve ABI/Inform Global veri tabanlarında yer alan çalışmalara odaklanılmıştır. Yapılan incelemeler genel olarak kültürel çeşitliliğin inovasyon ekibinin performansı üzerinde önemli bir etkide bulunduğu işaret etmektedir. Bununla beraber, yapılan araştırmaların çoğunlukla ulusal kültür boyutlarından güç mesafesi, belirsizlikten kaçınma ve erillik ile inovasyon arasında negatif yönlü bir ilişki tespit ettiği görülmüştür. Bireycilik ve inovasyon arasında ise pozitif yönlü anlamlı bir ilişki tespiti yoğunluktadır. Bireyci toplumlarda bireylerin, kendi fikirlerini ifade etme konusunda daha özgür hissetmelerinden ve grubun görüşü hakkında endişelenmediklerinden yaratıcılık ve yeniliğin arttığı, yüksek belirsizlikten kaçınmada yenilik risk olarak görülebildiği için azaldığı, erilikte güç arzusu ve hırsın yenilik konusunda hatalara yol açabildiği, güç mesafesinin yüksek olmasının bireyin itiraz güdüsünü ve yeni fikirleri açıklayabilme cesaretini azalttığı araştırmanın temel çıkarımları olarak ifade edilebilir.

Anahtar Kelimeler: İnovasyon, Kültür, Hofstede'nin kültürel boyutları



THE ROLE OF ADOPTED NATIONAL CULTURE IN INNOVATIVE ACTIVITIES

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Abstract

Innovative activities include a number of actions carried out by an institution or individual with the aim of creating new and original ideas, putting these ideas into practice and improving the current situation. As a result of these activities, innovation occurs, which includes efforts to create new products, services, business processes or business models. Innovation is seen as a critical resource for increasing the competitiveness of businesses. However, innovation processes and successes may depend not only on technological factors but also on cultural factors. The uncertainty avoidance dimension, which is Hofstede's culture classification, expresses the level of discomfort with uncertainty among the members of a society. Power distance dimension indicates individuals' level of acceptance of inequality. The masculine dimension indicates conflict-prone emotions such as competitiveness, power, ambition for success and wealth. When masculinity decreases, femininity increases which gives more importance to cooperation and quality of life. The individualism dimension expresses the freedom of individuals to make their own decisions and focus on their own success, goals and interests. The aim of the research is to explain how cultural factors shape and affect innovation processes by examining the role played by national culture in innovative activities. For this purpose, the literature review technique was used. During the literature review phase, the focus was mainly on studies in ScienceDirect, Emerald Insight, Web of Science and ABI/Inform Global databases. The studies generally indicate that cultural diversity has a significant impact on the performance of the innovation team. However, it has been observed that research has mostly detected a negative relationship between national culture dimensions of power distance, uncertainty avoidance, masculinity and innovation. There is a significant positive relationship between individualism and innovation. In individualistic societies, creativity and innovation increase because individuals feel freer to express their own ideas and do not worry about the opinion of the group; in avoiding high uncertainty, innovation decreases because it can be seen as a risk; in masculinity, desire for power and ambition can lead to mistakes in innovation; high power distance reduces the individual's motivation to object. and that it reduces the courage to explain new ideas can be expressed as the main conclusions of the research.

Key words: Innovation, Culture, Hofstede's cultural dimensions

Giriş

Günümüz dünyasında, rekabetin hızla evrildiği bir ortamda, şirketlerin ve toplumların sürdürülebilir başarı elde etmeleri için inovasyon kaçınılmaz bir öneme sahiptir. İnovasyon, yeni fikirlerin, ürünlerin ve iş süreçlerinin yaratılması olarak tanımlanabilir ve bu süreç, genellikle teknolojik ilerlemelerle birlikte anılır. Ancak, inovasyonun sadece teknolojiyle sınırlı olmadığı, aynı zamanda bir kültür ve değerler bütünü ile şekillendiği bir gerçektir. İnovasyonu etkileyen faktörlerin belirlenmesi, ülkelerin yenilikçi ve ekonomik senaryolarının iyileştirilmesine katkıda bulunacak politika ve uygulamaların oluşturulmasına yardımcı olabilecek stratejik bir bilgidir. Bu yönü ile kültürün inovatif faaliyetlerdeki rolünün incelenmesi araştırmanın önemini göstermektedir.

Araştırmada, kültürün inovasyon üzerindeki kritik rolünü incelenmektedir. Kültür, bir topluluğun değerleri, normları, inançları ve davranış biçimlerini yansıtan geniş bir kavramdır (Hofstede, 1980) İnovasyon sürecine etki eden bu kültürel faktörler, şirketlerin veya toplumların nasıl yeni fikirleri benimsediğini, risk aldığını ve değişime nasıl yaklaştığını belirler (Kroenke vd, 2018). Dolayısıyla, kültürün inovasyonu tetikleyen veya engelleyen bir güç olduğunu anlamak, sadece teknolojik gelişmeleri değil, aynı zamanda organizasyonel ve toplumsal düzeyde değişimi anlamak anlamına gelmektedir. Hofstede'nin kültürel boyutları bu bağlamda, çalışmanın inovasyonla ilişkisinde temel çerçeveyi oluşturmaktadır. Literatür taraması şeklinde gerçekleştirilen bu araştırmada ScienceDirect, Emerald Insight, Web of Science ve ABI/Inform Global veri tabanlarında yer alan çalışmalara odaklanılmıştır. İlk aşamada inovasyon ve kültür kavramlarından bahsedilip, Hofstede'nin kültürel boyutları ele alınmış, ardından bu boyutlar ile inovasyon ilişkileri tek tek incelenmiştir. Son olarak inovasyon ve kültür ilişkisi hakkında yapılmış önceki çalışmalara yer verilmiş ve araştırmanın sonucunda kültürün inovasyonu destekleyen bir güç olarak nasıl şekillendirilebileceği ve geliştirilebileceği konusunda çeşitli öneriler de sunulmuştur.

1. İnovasyon

İnovasyon kelimesi, Oxford sözlüğüne göre Latince innovare (yeni yapılmış) kelimesinden türetilerek innovate (değiştirilmiş, yenilenmiş) halini almıştır. İnovasyon, kelime anlamı itibari ile yeni bir yöntem, fikir, ürün yapmanın yollarının tanıtılmasıdır (Oxford Learner's Dictionaries, 2022). İnovasyon, kavram olarak, bir organizasyona yeni fikirlerin, ürünlerin, teknolojilerin veya programların sunulmasını ifade etmektedir (Sisaye, 2003).

İnovasyon işletmelerin rekabet güçlerini artırmada kullanacakları en önemli kaynaklardan birisidir (Drucker, 2001; Bessant, 2002; Yiğit, 2014). İnovasyon terimi, bir ekonomik sisteme getirilebilecek ve üreticiler ile tüketiciler arasındaki ilişkiyi değiştirebilecek yenilikleri içerir. Bu ilişki değişikliği, sistemin ekonomik gelişimi için esastır (Schumpeter & Backhaus, 2003). İnovasyonun temel gereklilikleri aşağıdaki gibi sıralanabilir (Ebstein, 2016);

- İnovasyon, birçok işletme fonksiyonu gibi, belirli araçlar, kurallar ve disiplin gerektiren bir yönetim sürecidir; gizemli değildir.
- İnovasyon, sürdürülebilir, yüksek getiri sağlamak için doğru ölçümü ve ödülleri gerektirir.
- Şirketler inovasyonu büyüme, güçlü rakiplere karşı ayakta durmak ve hatta iş modeli inovasyonu ile teknoloji inovasyonunun kombinasyonlarını kullanarak bir sektörü yeniden tanımlamak için kullanabilirler.

2. Hofstede'nin Ulusal Kültür Boyutları ile İnovasyon

Ulusal kültürel değerler, temel olarak bireycilik-Toplulukçuluk, Güç Mesafesi, Belirsizlikten Kaçınma ve Erillik-Dişillik olmak üzere dört ana boyutta toplanan bileşenleri içermektedir. Hofstede, daha sonraki çalışmalarında Uzun-Kısa Dönem Yönelimi (1994) ile Hoşgörü/Esnelik ve Kısıtlama (2013) boyutlarını ekleyerek ölçeği genişletmiştir. Bu boyutlar genellikle bireylerin topluluğa ne kadar odaklı olduklarını, güç dağılımındaki eşitsizliği ne kadar kabul ettiklerini, belirsizlik karşısındaki tutumlarını ve toplumdaki cinsiyet rolleri konusundaki inançlarını göstermektedir. Boyutlar aşağıdaki gibi özetlenebilir (Azizoğlu, 2011):

- Güç Mesafesi: İnsanların eşitsizlik karşısında benimsedikleri çözümleri temsil eder.
- Belirsizlikten Kaçınma: Toplumun, gelecekteki belirsizlik karşısındaki stres düzeyini yansıtır.
- Bireycilik-Toplulukçuluk: Bireylerin önceliklerini kişisel veya toplumsal düzeyde ifade eder.
- Erillik-Dişillik: Kadın ve erkeğe ait duygusal rol farklılıklarını tanımlar.
- Uzun Vadeli Yönelim-Kısa Vadeli Yönelim: Bireylerin çabalarının geleceğe mi yoksa şimdikiye ve geçmişe mi yönelik olduğunu ifade eder.
- Hoşgörü - Kısıtlama: Bireylerin doğal güdülerini kontrol etme veya tatmin etme tercihlerini yansıtır.

Eşitsizliğe olan kabullenme derecesi arttıkça güç mesafesi yükselmektedir. Yüksek güç mesafesi bulunan ülkelerde, güç genellikle en üst düzeyde birkaç kişide toplanmıştır ve bu kişiler tüm kararları verme yetkisine sahiptir. Diğer bireyler ise sadece alınan bu kararları uygulamakla yükümlüdür (Gegez vd, 2003). Piet (2017)'ye göre, belirsizlikten kaçınmanın yüksek olduğu ülkeler, katı ve farklı fikirlere karşı hoşgörüsüz inanç ve davranış kodlarına sahiptir (Piet, 2017). Riskli durumlardan kaçınırlar. Eril toplumlar da erkeğe atfedilen özellikler toplumun bazı davranış kalıplarına atfedilmiştir. Rekabetçi ve hırslıdırlar. Hataya karşı toleransları da düşüktür. Dışillerde ise daha barışçıl ve refah yaşam odağı ön plandadır (Sargut, 2001). Bireyci kültürde, bireyin kendi ihtiyaçları, grup ihtiyaçlarının üzerinde bir öncelik taşır. Bu tür toplumlarda bireyler özgürlüklerine önem verir ve başkalarının yardımına ihtiyaç duymadan kendi yollarını çizerler. Diğer taraftan, toplulukçu kültürlerde birey, toplumun ihtiyaçlarını ön planda tutar ve kendini grup dinamiklerine uygun bir şekilde ifade eder (Böyükaslan vd, 2016).

Kısa vadeli odaklı toplum kültürlerinde, bireylerin bakış açıları genellikle geçmiş ve mevcut dönemle sınırlıdır. Diğer yandan, uzun vadeli odaklı toplum kültürlerindeki bireyler, geniş ve geleceğe yönelik bir perspektife sahiptirler, dinamik düşünce özellikleri sergilerler (Dalgün, 2011). Toplumlar arasındaki hoşgörü seviyesi yüksek olanlar, bireylerin isteklerini daha özgürce yaşadığı bir ortam olarak nitelendirilebilir. Bu toplumlarda, bireyler kendi yaşamları ve duyguları üzerinde daha fazla kontrol sahibidirler. Diğer yandan, kısıtlayıcı kültürün egemen olduğu toplumlar, kişisel ihtiyaçların tatminini kontrol eden ve sıkı sosyal normlar aracılığıyla düzenlenen bir ortam olarak algılanabilir (Pado ve Tezcan, 2018).

2.1. Bireycilik- Toplulukçuluk ile İnovasyon

Bireyci kültürler, özgürlüğe kolektivist kültürlerden daha fazla değer verir (Herbig ve Dunphy, 1998; Shane, 1993). Bu nedenle, bireyci toplumlarda çalışanlar yeni bir şey denemek için daha fazla fırsata sahiptir. Bir diğer önemli husus ise kolektivist toplumlarda bireyin katkısının daha çok örgüte ait olmasıdır. Ayrıca, yenilik için gerekli bilgi alışverişini teşvik eden bireyci toplumlarda organizasyona sadakate daha az vurgu yapılır (Herbig ve Dunphy, 1998). Williams ve McGuire (2005) tarafından yapılan analizde, bir ülkedeki ekonomik yaratıcılık üzerinde bireyciliğin olumlu bir etkisi olduğu ortaya çıkmıştır.

2.2. Güç mesafesi ile İnovasyon

Düşük güç mesafesine sahip ülkelerin daha fazla yenilik ürettiği gözlemlenmiştir (Shane, 1993). Hiyerarşik yapıları ve liderlerin otoritesini yüksek düzeyde kabul eden bir kültür yaratıcılığın gelişmesi açısından zararlı görülmektedir. Çünkü çalışanların yaratıcılığı kendilerini özerk hissedip yeni şeyler keşfedebilmelerine bağlıdır (Westwood & Low, 2003). Güç mesafesi yüksek bir kültürde bir lider belirli bir yeniliği taahhüt ederse ve bunun nasıl uygulanacağına dair net talimatlar verirse, kültürel bağlam hızlı ve akıcı uygulamayı

kolaylaştırabilir (Westwood & Low, 2003). Yani bu sayede inovasyon için zararlı olarak görülen güç mesafesi kültürü, yaratıcılığa teşvik eden direktiflerle faydalı hale dönüşebilir. Liderin rolü etkili olacaktır.

2.3. Belirsizlikten Kaçınma ile İnovasyon

Yenilik için belirsizlikten kaçınmanın sorunlu bir sonucu, çalışanların yeni fikirleri denemeye cesaret edememeleridir. Çünkü yeni fikirlerin işe yarayıp yaramayacağı konusunda daima bir belirsizlik vardır (Bledow vd, 2011) ve bu onlar için riskli bir durum olarak görülür. Almanya, yüksek derecede belirsizliği ile tanınan bir ülkedir (Hoftede, 1980). Belirsizlikten kaçınan kültürlerdeki liderler, belirsiz bir gelecekte başarılı olmanın gerekliliğine işaret ederek yeniliği teşvik edebilirler (Bledow vd, 2011). Çoğunlukla belirsizlikten kaçınma ve yenilik arasındaki ilişkinin negatif olduğu, yani belirsizlikten kaçınma ne kadar düşüğe yenilik oranlarının o kadar yüksek olduğu bulgulanmıştır. Van Everdingen ve Waarts (2003), yüksek belirsizlikten kaçınmanın şirketlerin gereksiz riskler almayacağı anlamına geldiğini; yenilikleri ancak değerleri piyasada zaten kanıtlanmışsa benimsediklerini ifade etmektedir (Espig, 2022).

2.4. Erillik- Dişillik ile İnovasyon

Dişil toplumlarda odak noktası insanlar ve daha fazlasıdır. Destekleyici iklim daha rahat bulunabilir. Sıcak bir iklim, düşük çatışma, güven ve sosyo-duygusal destek, çalışanların yeni fikirlerle ilgili belirsizlikle başa çıkmalarına yardımcı olur (Nakata ve Sivakumar, 1996). Bu yüzden, erillik kültürü ile yeniliğin başlatılması arasında negatif bir ilişki vardır. Eril toplumlarda şiddetli rekabet ve hata toleransının düşük olması, bireylerin risk alıp yenilik gerçekleştirebilecek cesarete bulunmasına engel olabilir.

2.5. Hoşgörü - Kısıtlılık ve İnovasyon

Yenilikçi işletmelerin inovasyon için gerekli bilgi ve enformasyonu dışarıdan elde edebilecek ve işletme içerisinde bunları inovasyona dönüştürebilecek daha esnek bir yapıya sahip olması gereklidir. Çünkü yeni inovasyon fikirlerinin ortaya çıkarılması ve işletmede çalışanlar tarafından paylaşılması fikirlerin kolayca tartışılabildiği daha esnek bir yapının gerekliliğini zorunlu kılmaktadır (Uzkurt, 2010). Hoşgörü, hayattan zevk almak ve eğlenmekle ilgili temel ve doğal insan dürtülerinin nispeten özgürce tatmin edilmesine izin veren bir toplum anlamına gelir. Kısıtlama, ihtiyaçların tatminini bastıran ve katı sosyal normlar aracılığıyla düzenleyen bir toplumu ifade eder (Hofstede vd, 2010). Yeniliğin başarı ile sonuçlanmaması ihtimalinde örgütte hoşgörü ile karşılaşacağını bile çalışan kendini kısıtlı hissetmeyecektir ve yeniliğe teşvik olacaktır.

2.6. Uzun vadeli odak-kısa vadeli odak ve İnovasyon

Kısa vadeli odağa sahip olan toplumlar, geleneklere büyük saygı gösterirler, gelecek için nispeten küçük bir tasarruf eğilimi gösterirler ve hızlı sonuçlar elde etmeye odaklanırlar. Uzun vadeli yönelimli toplumlarda yönelim insanlar gerçeğin duruma, bağlama ve zamana çok bağlı olduğuna inanırlar (Hofstede vd, 2010). Kısa vadeli odaklanmalar, daha hızlı ve kısa vadeli faydalara odaklanır. Yenilik için sabır ve zaman gereklidir. Dolayısı ile uzun vadeli odak ile yenilik gücü arasında pozitif bir ilişki vardır (Moonen, 2017). Uzun vadeye odaklı kültürler, kısa vade odaklılardan daha inovatif olabilmektedirler.

3. Kültür ve İnovasyon İlişkisi Hakkında Çeşitli Bulgular

Kroenke vd (2018), kültürel faktörlerin yenilikçi performans üzerindeki etkisini vurgulamaktadır. İnovasyon ve kültürün farklı boyutları arasında negatif ve pozitif yönlü ilişki olduğuna dair çeşitli araştırmalar mevcuttur.

Gallego-Álvarez ve Pucheta-Martínez (2020), ulusal kültür ile inovasyona yapılan yatırımlar arasındaki ilişkiyi incelemişlerdir. Düşük belirsizlikten kaçınma, uzun vadeli oryantasyon, yüksek erillik ve düşük bireyselliğe sahip toplumlara ait şirketlerin inovasyona yatırım yapma olasılıklarının daha yüksek olduklarını tespit etmişlerdir.

O'Reilly'nin (1989) araştırmasında, ilaç, tüketici ürünleri, bilgisayar ve imalat sektörlerinden 500 yöneticiye inovasyonu teşvik eden normları sormuş ve elde ettikleri bilgileri yaratıcılığı artırma ve uygulama olarak iki ana kategoriye ayırmıştır. Bu araştırmaya göre, sektör bağımsız olarak, yöneticilerin yaratıcılığı artırmak için en sık vurguladıkları normlar arasında risk alma, değişimi ödüllendirme ve şeffaflık yer alırken, uygulamada ise ortak amaçlar, özerklik ve faaliyetlere olan güven sıklıkla ön plana çıkmıştır. Risk almanın da belirsizlikten kaçınmanın düşük olduğu toplumları temsil ettiği bilinmektedir.

Naranjo-Valencia vd (2011) çalışmalarında, İspanya’da 25’ten fazla çalışana sahip 420 işletme yöneticisiyle bir araştırma gerçekleştirmiş, örgüt kültürü ile ürün inovasyonu arasındaki ilişkiyi anlamaya çalışmıştır. Araştırma sonuçlarına göre, ürün inovasyonunun pozitif hiyerarşi kültürü ile negatif bir ilişkide olduğu görülmüştür. Yani yüksek güç mesafesinin inovasyonu düşürdüğü belirtilebilir.

Raza vd (2020), 13 yılı kapsayan (2001–2013) 49 ülkeden 1.004.620 gözlem setine dayalı olarak çok seviyeli bir analiz gerçekleştirilmiştir. Kurumsal kolektivizm (toplulukçuluk) ve belirsizlik düzeyi azaldığında ve performans yönelimi arttığında girişimci bilişler ile inovatif girişimcilik arasındaki ilişkinin güçlendiğini tespit etmiştir. Çalışma, bireyler uygun kurumsal koşullar altında (ör. fikri mülkiyet hakkı, iş özgürlüğü, kurumsal kolektivizm, belirsizlikten kaçınma ve performans yönelimi) yüksek düzeyde girişimcilik bilincine sahip olduklarında inovasyon yoluyla girişimciliğin arttığını göstermektedir.

Shane (1992), güç mesafesi düşük ve bireyselliğin yüksek olduğu toplumların diğerlerine kıyasla daha inovatif olduğunu vurgulamıştır. Daha sonrasında, Shane (1993) ulusal inovasyon oranlarını 1975-1980 yılları arasında 33 farklı ülkede inceleyerek, bireysellik, güç mesafesi, belirsizlikten kaçınma ve erillik arasındaki ilişkiyi araştırmıştır. Sonuçlar, inovasyon oranları ile belirsizlikten kaçınma ve güç mesafesi arasında negatif, bireysellik ile ise pozitif bir ilişki bulunduğunu göstermiştir.

Espig vd (2022) Hofstede tarafından sunulan farklı ulusal kültür boyutları ile ülkelere göre inovasyon verileri arasındaki ilişkileri incelemeyi ve ulusal kültür boyutlarının hangi özelliklerinin ülkenin daha yenilikçi olmasına katkıda bulunduğunu analiz etmeyi amaçlamışlardır. Çalışmada, analizi gerçekleştirmek için Hofstede'nin ulusal kültür veri tabanından ikincil veriler, Küresel Yenilik Endeksi'nden yenilik göstergelerine ilişkin veriler ve Dünya Bankası veri tabanından nüfus verileri kullanılmıştır. Analiz, 71 ülkeden 2015'ten 2018'e kadar olan verileri içermektedir. Araştırma sonucuna göre ulusal kültürün, inovasyon oranlarını olumlu etkilediği görülmüştür. İnovasyonu artırmak için en elverişli kültürel boyutlar, düşük güç mesafesi, bireycilik, dışillik, belirsizlikten kaçınmanın az olması, uzun vadeli yönelimin ve yüksek hoşgörü olarak belirlenmiştir

SONUÇ

Araştırmanın amacı, ulusal kültürel değerlerin inovasyon ile ilişkisini literatürel olarak incelemektir. Bu amaçla Hofstede'nin ulusal kültürel değer boyutları ele alınmış ve bu boyutlar perspektifinden, kültür ve inovasyon ilişkisi detaylandırılmıştır. Yapılan incelemeler genel olarak kültürel çeşitliliğin inovasyon ekibinin performansı üzerinde önemli bir etkide bulunduğuna işaret etmektedir. Bununla beraber, yapılan araştırmaların çoğunlukla ulusal kültür boyutlarından güç mesafesi, belirsizlikten kaçınma ve erillik ile inovasyon arasında negatif yönlü bir ilişki tespit ettiği görülmüştür. Bireycilik ve inovasyon arasında ise pozitif yönlü anlamlı bir ilişki tespiti yoğunluktadır.



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY,2024

Bireyci toplumlarda bireylerin, kendi fikirlerini ifade etme konusunda daha özgür hissetmelerinden ve grubun görüşü hakkında endişelenmediklerinden yaratıcılık ve yeniliğin arttığı, yüksek belirsizlikten kaçınmada yenilik risk olarak görülebildiği için azaldığı, erillikte güç arzusu ve hırsın yenilik konusunda hatalara yol açabildiği, güç mesafesinin yüksek olmasının bireyin itiraz güdüsünü ve yeni fikirleri açıklayabilme cesaretini azalttığı araştırmanın temel çıkarımları olarak ifade edilebilir. Yapılan incelemeler sonucunda, uzun vade odaklı kültürlerin inovasyona daha yatkın olduğu ve hoşgörü kültürüne yatkın olanların inovasyon konusunda daha girişken oldukları söylenebilir. Diğer önemli bir çıkarım ise, inovasyonu azaltıcı görülen kültürdeki (yüksek güç mesafeli gibi) toplumlarda, etkili bir liderlik tarzı ile bu durumu tersine çevirmenin mümkün olduğu yönündedir. Bu sebeple sonraki çalışmalar için, liderlik tiplerini de dahil ederek inceleme yapılması önerilebilir. Yüksek güç mesafeli toplumlarda liderlerin hiyerarşik gücünü, çalışanlarını yaratıcılığa teşvik ederek kullanması, inovasyonu geliştirmeye yönelik sunulabilecek önerilerdendir.

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Özet

Toplumlarda insana dair tanımlamalar geçmişten günümüze sürekliliğini koruyan ve insanı belli bir kalıba sığdıran ifadeler olmuştur. Hem kadının hem de erkeğin üstlenmesi ve toplumun beklentilerine göre şekillendirmesi gereken rolleri vardır. Toplumsal cinsiyet rolleri olarak ifade edilen bu roller insanın biyolojik cinsiyetinden ayrı olarak değerlendirilmektedir. Toplumsal cinsiyet perspektifiyle kadının ne yapip ne yapamayacağı, kadın için neyin doğru neyin yanlış olduğu kadının iradesi dışındadır. Böyle bir durumda kadının kamusal alanda görünümü imkânsız hale gelmektedir. Bu noktada Türk toplumunda kadını özel alana hapseden sürecin siyaset boyutu önemli görülmektedir. Demokrasinin gereği olan eşit temsil ve katılım hakkı toplumdaki eşitsizliği önleyecek ve demokrasi sorunlarının ortadan kalkması için kıymetli adımlardan biridir. Bu kapsamda adımın gerçekleşebilmesi için toplumsal cinsiyet rollerinin kadını konumlandığı yeri iyi okumak ve toplumsal cinsiyet eşitliğini pekiştirmemek adına önlemlerin alınması ve ilgili politikaların geliştirilmesi toplum düzeni için gerekli görülmektedir. Politika yapıcı aktörlerin kadınları birtakım nedenlere dayanarak siyasetin içine çekme çabası olumlu gelişmeleri de beraberinde getirmiştir. Kadın kolları örgütlenmeleri, cinsiyet kotası gibi parti içi düzenlemeler bu sayede kadının kamusal alanda bulunmasında önemli rol oynamışsa da siyaset alanının her biriminde kadını aktif olarak görmek mümkün olmamaktadır.

Türkiye'deki toplumsal cinsiyet algısının siyaset alanındaki yansımalarının incelendiği bu çalışmada, siyasi katılım, cinsiyet ve toplumsal cinsiyet kavramları, kadının siyasal alandaki yeri ve bu yere erişim sürecindeki oluşumlar, kadının siyasi katılımının önündeki engeller irdelenerek kadının politik alana katılımını destekleyen öneriler sunulmuştur.

Anahtar Kelimeler: Cinsiyet, Toplumsal Cinsiyet, Siyaset ve Kadın, Toplumsal Cinsiyet Rollerini, Siyasette Cinsiyet Kotası



**AN EVALUATION OF THE REFLECTION OF GENDER PERCEPTION OVER
POLITICS IN TURKEY**

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Abstract

Definitions about humans in societies have been expressions that maintain their continuity from past to present and fit humans into a certain mold. Both women and men have roles that they must undertake and shape according to society's expectations. These roles, referred to as gender roles, are evaluated separately from a person's biological sex. From a gender perspective, what a woman can or cannot do, what is right or wrong for a woman is beyond the woman's will. In such a situation, it becomes impossible for a woman to appear in public. At this point, the political dimension of the process that confines women to the private sphere in Turkish society is seen as important. The right to equal representation and participation, which is a requirement of democracy, is one of the important steps to prevent inequality in society and eliminate democracy problems. In this context, to take this step, it is deemed necessary for the social order to carefully read where gender roles position women and to take precautions and develop relevant policies in order not to reinforce gender equality. The efforts of policy-making actors to attract women into politics based on several reasons have brought positive developments. Although internal party regulations such as women's branch organizations and gender quotas have played an important role in the presence of women in the public sphere, it is not possible to see women actively in every unit of the political field.

In this study, which examines the reflection of gender perception in the political field in Turkey, political participation, sex, and gender concepts, women's place in the political field and the formations in the process of accessing this place, obstacles to women's political participation are examined and suggestions that support women's participation in the political field are presented.

Keywords: Sex, Gender, Politics and Women, Gender Roles, Gender Quota in Politics

GİRİŞ

Kadının toplum içindeki konumlandırılışı toplumdaki topluma farklılık göstermektedir. Bu farklılık politik alanda da oldukça göze çarpmaktadır. 20. Yüzyıldan itibaren çağdaş yaşamın temelleri atılmış bununla birlikte kadının siyasal alandaki varlığı görünür hale gelmeye başlamıştır. Her ne kadar kadına seçme seçilme hakkının tanınması ile olumlu gelişmeler olsa da kadının siyasal katılımı istenilen düzeye ulaşamamıştır. Kadının sorumluluğu olarak atfedilen ev içi roller, toplumsal cinsiyet kalıpları kadını eve hapseden, kamusal alanda bulunmasını kısıtlayan ve siyasal katılımının önünde en önemli engellerdir.

“Siyasi katılma, modern sanayileşmiş bir toplum yapısının demokratik bir göstergesidir. Siyasal katılma toplum üyesi bireylerin siyasal sistem karşısında durumlarını, tutumlarını ve davranışlarını belirleyen bir kavramdır” (Kapani, 2009:144). Toplum için demokrasinin varlığı herkes için eşitlik söz konusu olduğunda tartışmasız hale gelmektedir. Kadının kamusal alandan dolayısıyla siyasal alanda var olamaması durumunda o toplumda demokrasiden söz etmek mümkün değildir. Bu kapsamda kadının siyasi katılımı toplumsal eşitliğin sağlanması noktasında oldukça kıymetli ve gereklidir.

”Siyasal temsil açısından önemli çok sayıda parametre olduğu halde, bu parametreler içinde cinsiyet kavramının önemi ayrıdır” (Eser, H. B., & SARIŞAHİN, P, 2016: 39). Cinsiyet kavramı her ne kadar biyolojiyi anımsatsa da bir toplumun ananelerinden ayrı düşünülemez. Cinsiyet süreç içerisinde biyolojiden ayrılarak toplumsal bir hal almıştır. Toplumdaki öğretiler, kadınlık-erkeklik tanımlamaları ve biçilen roller cinsiyeti tek başına biyolojik temellere dayandırmamaktadır. Tam bu nokta kadının siyasi katılımını engelleyen nedenlerin başında gelmektedir. Toplumun dayattığı kurallar, ön yargılar kadını kamusal alandan uzaklaştırdığı gibi politik alandan da yoksun kalmasına sebebiyet vermektedir. Diğer yandan siyasi partilerin kadına yönelik tutumları, tüzüklerinde siyasi katılımını arttıracak maddelerin bulunmaması, kadının siyasette aktif rol oynamasını sağlayan eğitim, gelir, manevi desteğin olmayışı ve kadının bu alanda kendini geliştirme olanağından yoksun oluşu siyasette görünür olma ve kabul görme olasılıklarını azaltmaktadır.

KAVRAMSAL ÇERÇEVE

1- SİYASAL KATILIM

Kavram kadının politik alana katılım sürecinin anlaşılması için önemlidir. Siyasal katılım kavramı ile ilgili siyaset bilimcilerin farklı görüşleri bulunmaktadır. Yapılan tanımların kadının siyasal alandaki varlığını değerlendirmek adına referans sağlayacağı düşünülmektedir.

Kapani (2009:144)'ye göre siyasi katılma demokrasi ile özdeşleşmiş olmak ile modern devletlerin benimsediği bir kavramdır. Demokrasiden bahsedebilmek için her kesime eşit haklar ve fırsatlar yaratmak gerekir. Sadece erkeğin elinde olan siyaset mekanizmasının varlığında demokrasiden söz etmek mümkün değildir.

Ahmet Taner Kışlalı'nın aktarımıyla; siyasal temsil, vatandaşların, hükümetin alacağı kararlar ile uygulamalara tesir etme ve yönetme davranışıdır. Ülke gündeminde varlığını koruyan ve ses getiren konuların başında gelen kadın hakları, kadına şiddet gibi kavramların çoğu politika yapımcıların aldıkları kararlarla bağlantılıdır. Kadınların ülke politikalarını etkileme ve yönetme hali siyasete katılımı ile doğru orantılıdır. (Kışlalı, 1998:183)

Prof. Dr. Musa Taşdelen'in aktarımıyla siyasal temsil, yurttaşların siyasi hayat içinde etkin ve karar alma mekanizmalarına tesir edecek şekilde; yerel ve ulusal seviyede fikir edinip, tutum geliştirip, eylemlerde bulunması manasına gelmektedir (Taşdelen, 2011: 166)

2- BİYOLOJİK CİNSİYET VE TOPLUMSAL CİNSİYET

Biyolojik cinsiyet ve toplumsal cinsiyet kelimelerinin ikisinin de temelinde cinsiyet kavramı yer aldığından bu kavramların her ikisinin de biyolojik temelli olduğu düşünülse de birbirinden farklı anlamları bulunmaktadır. Bu kavramları irdelemek cinsiyet algısının siyasal katılım süreçlerindeki yerini okuyabilmek adına kıymetli olacaktır. Biyolojik anlamda cinsiyet evrensel olanı, doğuştan geleni ifade etmektedir. Toplumsal cinsiyet, farklı zaman dilimindeki sosyokültürel bakışın kadın ve erkeğe yansımalarıdır. Daha açık bir ifade ile cinsiyet, kadın ve erkeğin bedeni yani fizyolojisi üzerinden gelişen bir kavramken, toplumsal cinsiyet ise toplumun yarattığı kadınlık ve erkeklik inşasına odaklanmaktadır. Kadın ve erkek doğuştan farklı bedensel özelliklere sahiptir. Fakat erkeklik ve kadınlık toplum tarafından “verilmiş” nitelikler barındırmaktadır.

Hepşen'in aktarımına göre, “Kadın ve erkek olmak, doğal ve doğuştan olarak adlandırılırken, kadınlık ve erkeklik ise toplumsallaşma süreci ile kültürel bir yapılanmaya işaret etmektedir” (Hepşen, 2010: 14). Bazı teoristlere göre ise toplumsalın takdim ettiği kadınlık ve erkeklik evrensel olması nedeni ile biyolojik temellere dayanmaktadır. Bunu toplumsal cinsiyet rollerine dayandırmak anlamlı olacaktır. Toplumda erkeklik ve kadınlık toplumun kültürel normlarına karşılık gelen ve sonradan kazanılan statülerdir. Bu bağlamda kadınların ve erkeklerin o toplumda göstermesi gereken verilmiş rolleri bulunmaktadır. Kadın ev içi rolleri üstlenirken erkek kamusal alanda mesleki olanaklardan yararlanarak maddi geliri sağlaması gerektir.

SİYASET VE KADIN

Siyasetin temel figürleri arasında kadınların değil de erkeklerin olmasının geçmişe dayanan kökleri bulunmaktadır. Bu durumun bir sorun olarak ortaya çıktığı dönemi insanların yerleşik yaşama geçtiği zamanlara kadar dayandırmak olası olsa da aslında bu durumun, siyaset kurumunun ve kavramının kurum olarak ortaya konulmaya başlandığı Antik Yunan'da somutlaştığı söylenebilir. Birçok araştırmacı ve tarihçi tarafından “Demokrasinin beşiği” olarak addedilen Antik Yunan döneminde demokrasi ve siyasal yaşama katılım kavramlarından bahsedilirken kölelerden sonra kadınlar da bilinçli bir tercihle siyasal yaşama katılımdan uzak tutulmuştur. Tarihsel olarak uzun bir aradan sonra nihayet 17. yüzyıla geldiğimizde ise modern siyasal düşüncenin yapıtaşlarının oluşması sürecinde kadınların eşitliği konusunda da ifadeler ortaya çıktığı başlamıştır. Modern siyasal düşüncenin gelişmesiyle beraber kadınların ilk seçme ve seçilme hakkına 1890'larda Yeni Zelanda'da eriştiği belirtilse de yapılan literatür taramasında birçok argümanda 1902 yılında Avusturalya'nın ilk kez bu hakkı kadınlara verdiği görülmüştür. Türkiye'de ise kadınlara ilk kez 1930 seçimlerinde mahalli seçimlerde seçme ve seçilme hakkı tanınmasının ardından genel seçimlerde milletvekili seçme ve seçilme hakkına dört yıl arayla 1934 yılındaki düzenleme ile kavuşmuşlardır.

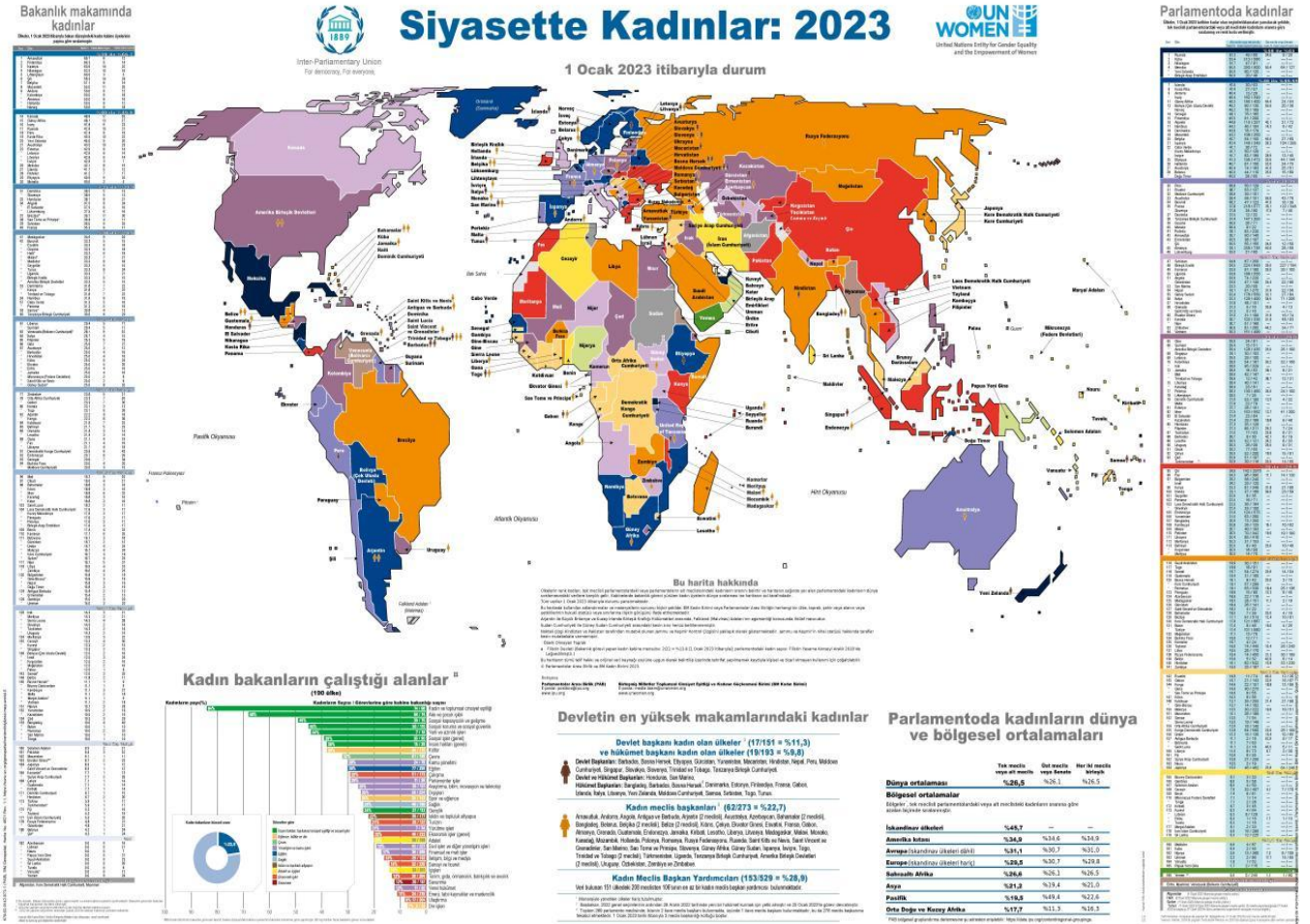
Tablo 1: Dünya Ülkelerinde Kadınlara Seçme Ve Seçilme Haklarının Verildiği Yıllar

• 1893	Yeni Zelanda	• 1950	Hindistan
• 1902	Avustralya	• 1954	Kolombiya
• 1906	Finlandiya	• 1957	Malezya, Zimbabwe
• 1913	Norveç	• 1962	Cezayir
• 1915	Danimarka	• 1963	İran, Fas
• 1917	Kanada	• 1964	Libya
• 1918	Avusturya, Almanya, Polonya, Rusya	• 1967	Ekvator
• 1919	Hollanda	• 1971	İsviçre
• 1920	Amerika Birleşik Devletleri	• 1972	Bangladeş
• 1921	İsveç	• 1974	Ürdün
• 1928	İngiltere, İrlanda	• 1976	Portekiz
• 1930	Güney Afrika	• 1989	Namibya
• 1931	İspanya	• 1990	Batı Samoa
• 1934	Türkiye	• 1993	Kazakistan, Moldova
• 1944	Fransa	• 2005	Kuveyt
• 1945	İtalya	• 2006	Birleşik Arap Emirlikleri
• 1947	Arjantin, Japonya, Meksika, Pakistan	• 2011	Suudi Arabistan
• 1949	Çin		

Kaynak: Infoplease (2019)

Kamusal alanda kadınların erkeklere oranla daha az düzeyde buldukları aşikardır. Siyasal alandaki görünürlükleri kısıtlı olan kadınların ülkelere parlamentodaki temsil durumlarının dünya genelinde (Birleşmiş Milletler Kadın) UNWOMEN tarafından haritalanarak incelenmesi sonucu ortaya

çıkan verilerin 2023 yılına ait sonuçları “Siyasette Kadın 2023” adıyla yayımlandı. “Siyasette Kadın 2023” verilerine göre Dünya genelinde kadın milletvekili oranında ve bakanlık kademesindeki kadın oranının küçüğe olsa artış olduğu görülmektedir. 2021 yılında % 58.82 oranla en yüksek kadın bakanı oranına sahip ülke olan Nikaragua bu oranı 2023 yılındaki raporda toplam 16 bakanının 10’ünün kadın olmasıyla %62.5’a çıkarmış ise de toplam 12 bakanının 8’i kadın olan %66.7 oranlı Arnavutluk, toplam 14 bakanının 9’u kadın olan %64.3 oranlı Finlandiya ve toplam 22 bakanının 14’ü kadın olan %63.6 oranlı İspanya’nın ardından bu kez 4.sıraya gerilemiştir. Ülkelerin kadınlar tarafından yönetilmesi noktasında Avrupa ülkeleri olan Danimarka, Finlandiya, ve İzlanda’nın yönetiminden kadınların sorumlu olduğu görülmektedir.



Harita’ya göre 1 Ocak 2023 itibarıyla monarşiyle yönetilen ülkeler hariç tutularak incelenen 151 ülkede 17 ülkenin devlet başkanı kadın olup bu ülkelerin oranı %11.3 iken bu ülkeler arasında Avrupa’dan Yunanistan, Bosna Hersek, Moldova Afrika’dan Tanzanya, Etiyopya, Asya’dan Nepal, Singapur gibi birbirinden çok farklı ülkeler ilk bakışta göze çarpmaktadır.



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

Hükümet başkanı kadın olan ülkelerin oranı ise incelenen 193 ülkede 19 ülkenin hükümet başkanı kadın olup bu ülkelerin oranı %9.8 iken bu ülkeler de arasında da Avrupa'dan İzlanda, Sırbistan Afrika'dan Tunus, Gabon, Asya'dan Bangladeş gibi yine birbirinden çok farklı ülkeler bulunmaktadır.

“Siyasette Kadın 2023” haritasında belirtildiği üzere dünya genelinde parlamentolarda kadınların temsil oranı tek meclisli veya alt meclisli parlamentolarda %26,5 iken, senato veya üst meclislerde %26,1 ve her iki meclisli birleşik olarak yer alan parlamentolarda ise %26,5'tir.

“Siyasette Kadın 2023” haritası bir önceki hazırlanan harita olan “Siyasette Kadın 2021” yılı haritasıyla karşılaştırıldığında incelenen ülkelerdeki kadın milletvekillerinin oranınının 2021'deki oranı olan %25.5'in 2023 yılında %26.5'e yükseldiği, 2021 yılında ise %20.9 olan parlamentolardaki meclis başkanları içindeki kadınların oranınının 2023 yılında %22.7'ye çıktığı görünmektedir.

Güncel verilere göre 190 ülke içerisinde kadın bakanların küresel oranınının %22.8 olduğu görülmektedir. Bakanlık kabinesinde en yüksek kadın oranına sahip bölgeler ise aynı orana sahip olan (%31.6) ile Avrupa ve Kuzey Amerika 'dır. Hemen arkasında ise aynı oranlara sahip Latin Amerika ve Karayipler (%30.1) yer almaktadır.

Kadınların bakanlık düzeyinde temsilinin en az olarak yer aldığı bölgeler ise aynı orana sahip olan (%10,1) ile Orta ve Güney Asya ve son sırada %8.1 ile Pasifik Adalarıdır. Tüm bölgeler arasında kadınların siyasette temsilinin çoğunluğu anlamında en fazla sayıda ülkeyle yer alan Avrupa'da ise 13 ülkede bakanlık sayılarının kabine üyelerine oranında %50 orandan daha fazla kadının bakanlık koltuklarında oturduğu görülmektedir.

Kadın bakanların küresel olarak temsiliyeti hükümeti oluşturan kabinelerde düşük oranlarda olmasına rağmen, kadınların bakanlık düzeyindeki temsilinin kadınların çalıştığı alanlara oranlanmasıyla kadın bakanların toplumsal cinsiyet eşitliği ile sosyal haklar konularında başat pozisyonlarda yer aldıkları görülmektedir.

Buna karşılık erkekler ise toplumsal cinsiyet konusundaki yaygın düşüncelerin siyasal katılım içerisindeki etkisiyle milli savunma, içişleri, adalet ile ekonomi gibi bakanlıklarda başat rollerde olmayı sürdürmektedir. (UN TÜRKİYE, <https://turkiye.un.org/en/224323-women-politics-map-2023>. Erişim: 27.01.2024)

Türkiye'de ise kadınların siyasette temsili açısından TÜİK'den elde edilen veriler ışığında Türkiye'de cinsiyete göre milletvekili sayısı incelendiğinde 2021 yılında kadın milletvekili sayısının daha

önceki yıllara göre yüksek olduğu ifade edilebilmektedir. Fakat hiçbir dönemde kadın milletvekili sayısı erkek milletvekili sayısına eşit ya da yakın olamamıştır. (TÜİK, 2021. <https://data.tuik.gov.tr/Bulten/Index?p=Istatistiklerle-Kadin-2021-45635>. Erişim: 27.01.2024)

Cinsiyete göre milletvekili sayısı ve Meclisteki temsil oranı, 1935-2021

Number of representatives and proportion of representation of the Assembly by sex, 1935-2021

Yıl Year	Toplam milletvekili sayısı Total number of representative	Temsil oranı Proportion of representation	
		Erkek Male	Kadın Female
1935	399	381	18
1939	429	413	16
1943	455	439	16
1946	465	456	9
1950	487	484	3
1954	541	537	4
1957	610	602	8
1961	450	447	3
1965	450	442	8
1969	450	445	5
1973	450	444	6
1977	450	446	4
1983	399	387	12
1987	450	444	6
1991	450	442	8
1995	550	537	13
1999	550	527	23
2002	550	526	24
2007	550	500	50
2011	550	471	79
2012	548	469	79
2013	548	469	79
2014	535	458	77
2015	550	469	81
2016	550	469	81
2017	539	464	75
2018	600	496	104
2019	589	487	102
2020	584	483	101
2021	582	481	101

TÜİK, İstatistiklerle Kadın, 2021

TurkStat, Women in Statistics, 2021

Ülkemizdeki son dönem milletvekili sandalye dağılımına baktığımızda milletvekillerinin yüzde sekseninden fazla erkek olduğu görülmektedir. Kadının siyasetteki varlığını niceliksel olarak değerlendirilse de önemli olan kadın siyaset yapıcılarının toplumdaki tüm kadınları temsil etme niteliğidir. Kendi sorunu olmayan bir kitlenin parlamentoda o sorunu ilgili nitelikli tartışma yürütmesi ve kamuoyuna bu sorunu benimsetmesi olası değildir. Bu nedenle kadın sorunlarına birebir maruz kalan kadın milletvekili temsillerinin mecliste bulunması gerekmektedir.

Türkiye’de nüfusun yarısından çok azını yüzde 49,9’unu oluşturan kadınların ise nüfusa oranla siyasette temsili ise mecliste ancak yüzde 20 düzeylerine çıkabilmiştir. Üstelik bu temsil düzeyi kadınların

Türkiye’de Cumhuriyet tarihindeki en yüksek temsil yüzdesi olarak açıklanmıştır. Türkiye’de kadınların yerel yönetimlerde temsili ise maalesef çok daha düşük düzeydedir. 2019 yerel seçimlerinde 1.359 belediye başkanlığında 42 kadın (yüzde 3), 20.745 belediye meclis üyeliğinde 2.283 kadın (yüzde 11,01), 1.272 il genel meclis üyeliği 48 kadın (yüzde 3,77), 30 büyükşehir belediye başkanlığında üç kadın (yüzde 10) seçilerek mahalli siyasete katılım gösterebilmiştir. (Uçak E. 2023, <https://www.sivilsayfalar.org/2023/11/22/siyasette-degisimin-itici-gucu-kadin-temsili/>. Erişim: 27.01.2024)

Türkiye’de kadınının seçme ve seçilme hakkı birçok dünya ülkesine göre önce tanındığı belirtilmektedir. Bu atılıma rağmen, kadınlara seçme ve seçilme hakkı tanındığı günden bugüne kadınların temsil oranı mecliste erkeklere yakın veya eşit düzeye hiçbir zaman ulaşamamıştır. Bu durum tanınan hakkın tek başına yeterli olmadığını bunun yanında toplumdaki kalıplaşan toplumsal cinsiyet yargılarının ve toplumun siyasete bakış açısında da dönüşümün gerektiğini göstermektedir.

KADININ SİYASİ KATILIMINDAKİ OLUŞUMLAR

1- KADIN KOLLARI

Toplumsal cinsiyet eşitliğinden bahsedebilmek için her alanda fırsat eşitliğinin gerekliliğini vurgulanmalıdır. Kadın kollarının varlığı kadınların siyasi katılımını olumlu yönde etkilediği bir gerçektir. Kadının siyasi alanda görünürlüğüne sağlayan kadın kolları siyasi parti örgütlenmelerinde partiye daha çok seçmen çekmek ve kadınların siyasi mekanizma içinde var olabilmesi amacıyla kullanılmaktadır. Yakın zamana kadar özellikle muhafazakâr partilerin oluşumundan kaçındığı bu yapının uzun bir tarihsel geçmişi olduğu söylenebilir. Kadın kolları örgütlenmeleri ilk olarak Cumhuriyet Halk Partisi (CHP) tarafından parti tüzüğüne eklenerek resmileştirilmiştir. Kadın kolları oluşumunda parti içindeki kadın-erkek eşitliğini desteklemek ve kadın seçmen kitlesinin partileri bünyesine çekmek hedeflenmiştir. (CHP, 2001)

Adalet ve Kalkınma Partisi’nin (AKP) tüzüğü incelendiğinde partideki kadın kolları örgütlenmesinin ana teşkilatın dışında “ek” olarak varlığını sürdürdüğü görülmektedir. (AK Parti, 2006). Kadın kolları çalışmalarının belli sınırlar içinde yürütülmesi ve kadın kolları başkanının oy hakkına sahip olamaması ise kadının parti içinde ikincil konumunu göstermektedir.

Kadın kollarının ikincilliği durumu mecliste grubu olan siyasi partilerin hemen hepsi için geçerlidir denilebilir. Çünkü bütün bu siyasi partilerde kadın kolları teşkilatları merkez parti yönetimi tarafından istenildiği takdirde her zaman gerekçesiz bir biçimde görevden uzaklaştırılabilmektedir. Parti merkezinin bu tahakkümü karşısında, seçilerek o göreve gelmiş olsa bile kadın kollarının sınırlı bir çalışma alanı olacağı aşıkardır. Bu şekilde çalışmak zorunda olan partilerin kadın kollarının partinin içinde özgül bir

ağırlığa sahip olması ve belirleyici olarak partinin genel politikasını belirlemesi ihtimalinin çok düşük olduğunu söylemek gerekir. Kadın örgütlenmelerinin siyasete kadın kolları aracılığıyla dahil olacağı düşünülse de, ortaya çıkan tabloya bakıldığında siyasal partilerdeki kadın merkezli oluşumların bile kadın iradesine bağlı çalışmalar yürütemediği ifade edilebilmektedir.

2- CİNSİYET KOTASI

Kadınların siyaset alanında eksik temsili göz önünde bulundurulmuş kadınların bu alana katılmasını artırmaya yönelik karar alınmıştır. Bu kararlardan birisi de cinsiyet kotasıdır. Cinsiyet kotası, siyasi alanda dezavantajlı konumda bulunan kadınların siyasal katılım konusunda desteklenerek siyasete erkeklerle eşit oranda katılabilmesine destek olmak amacıyla uygulanan bir sistemdir. Kotanın uygulanmasının yasallaşma sürecine bakıldığında Kuzey Avrupa ülkelerinin partilerinde bununla ilgili düzenlemelerin yapıldığı ve partilerin tüzüklerine eklendiği görülmektedir. Cinsiyet kotasını kadının siyasetteki az temsil oranı düşünülerek yapılan bu uygulama ile siyasi partilerin %30 oranında kadın temsilciyi bünyelerine alması sağlanmak istenmiştir. Her ne kadar bu oran az olarak değerlendirilse de Türkiye’de cinsiyet kotasının partilerce uygulanmadığı görülmektedir. Partiler tüzüklerinde %30’lük cinsiyet kotasını kendi içlerinde aldıkları kararlar doğrultusunda evirebilmektedir. Siyasi partilerin tüzüklerinde pozitif ayrımcılığı sağlayamayan ve kadının aktif temsil hakkını gözetmeyen perspektifler bulanabilmektedir. Bu perspektiflerin aşılabilmesi için bir taraftan etkili politikalarının üretilmesi gerekirken, bir taraftan da hali hazırda var olan politikaların etkili bir biçimde uygulanması gerekmektedir. Örnek vermek gerekirse, cinsiyet kotası politikasının yalnızca aday ve aday adayları listelerinde değil partilerin yönetim ve merkez kademelerinde de uygulanması bir talep olarak ortaya çıkmaktadır. Belirlenen cinsiyet kotaları her aşamada uygulanmadığında, partilerin “vitrinlik” tabiri caizse göstermelik kadın adaylar aracılığıyla temsilde eşitliği sağlama sorumluluğundan kaçındığı görülmektedir.

Dünyanın birçok ülkesinde ve argümanlarında cinsiyet kotasının uygulanabilirliği tartışması yapılmıştır. Kota uygulamasının gerekli olduğu düşüncesinde olan argümanlara göre siyaset mekanizmasındaki bariyerleri kaldırması, kadınların siyasal alandaki yerinin genişletilmesinin ayrımcılığa dayanmadığı, kadınların hayatlarındaki pratikleri ve deneyimleri siyasete yansıtmasının kadın sorunlarını çözümlenecek nitelikte olduğu görüşleri desteklemektedir. Böylece erkek egemen siyaset yerine kadınların ülke ve kendi sorunları ile ilgili fikir üretme hakları yasal bir zemine oturacaktır.

Kota uygulamasına karşı görüş bildiren argümanlara göre ise cinsiyet kotasının ayrımcılığa dayandığı ve bu sebeple demokratik olmadığı, nitelik yerine cinsiyetin önemli görülmesinin olumsuzluklar yaratacağı düşünceleri temel alınmıştır. Cinsiyet kotasına karşı argüman ve düşüncelerin genellikle ataerkil

toplumlarda görüldüğü ifade edilebilir. Ataerkil toplumlar erkek egemenliğin son bulmasından endişe duymaktadır. Kadının kamusal alanda görünür olmasıyla rekabetin artması ve istenilen düzenin bozulması endişesi bu tür karşıt görüşlerin artmasına veya yerini korumasına sebep olmaktadır.

KADININ SİYASAL KATILIMINI ETKİLEYEN FAKTÖRLER

1-EĞİTİM

Kişinin öncelikle kendini bir meslek ile ilişkilendirmesinin en temelinde eğitim gelmektedir. Eğitim bir işle ilgili yetkinliği kanıtlayan en önemli unsurdur. Fakat toplumsal cinsiyet eşitsizliği kadını hedef almaktadır. Kadın eğitim hizmetlerinden erkeklere oranla daha az faydalanmaktadır. Bunun sebebi ise toplumdaki erkek egemen düşüncedir. Türkiye'nin eğitim seviyesi, okuma yazma bilen birey sayısındaki cinsiyet karşılaştırmasına bakıldığında kadınların erkeklere oranla daha düşük seyrettiği görülmektedir. Böyle bir durumda kadının siyasal alandaki temsili söz konusu olamamaktadır.

2-AİLE VE ÇEVRE DESTEĞİ

Kadınların siyasi katılımında aile desteği oldukça önemlidir. Ataerkil aile düzeninde kadının siyasi alanda kendine yer edinmesini bırakın herhangi bir işte çalışmasının önünde aile üyelerinin bariyeri bulunmaktadır. Siyasi bir parti örgütlenmesinde statü sahibi kadınların parti görevlerinde etkin rol oynaması “asıl” sorumluluğu olan ev içi sorumluluklarından uzaklaştığı düşüncesi kadının siyasal alanda aktif bulunuşunu kısıtlamaktadır.

Siyasette rolü olan bir kadının sadece aile değil çevresi tarafından da desteğe ihtiyacı vardır. Fakat erkek egemen toplumda ev içi sorumluluklarının yanında ek roller üstlenen bir kadının zorunlu ve eksiksiz yapması gereken temizlik, çocuk bakımı, yemek gibi hizmetlerin herhangi birindeki düzensizlik hem aile hem de toplum tarafından “kötü anne/eş” eleştirisine neden olmaktadır. Bu noktada kadının tercih yapması gerekmektedir. Anaç özelliklerle donatılan kadın eş ve anne pozisyonundan vazgeçemeyeceği için en kolay olan iş/meslek ya da bu makalede konu alınan siyasal alandaki varlığından vazgeçmek zorunda kalmaktadır.

3-GELİR

Kadının ekonomik güç elde edebilmesi kadın-erkek eşitliği noktasında oldukça önemlidir. Ekonomik geliri ataerkil toplumlarda erkeğin elde etmesi gerekir. Bunun için bir mesleğe sahip olma ve çalışma gibi görevler erkeklere yüklenmiştir. Kadının ise çalışma hayatı yerine ev içine hapsolmesi ekonomik gelir elde etmesini imkânsız kılmaktadır.

Siyasete katılımında gelir düzeyi kişinin bu alanda var olabilmesi için gerekli bir unsurdur. Parti çalışmalarındaki giderler göz önünde bulundurulduğunda belli bir ekonomik kaynağın varlığı olmazsa olmazdır. Kadının ekonomik özgürlüğe sahip olamaması bu alana erişimini güçleştirmektedir. Bu noktada kadınların gerek iş gücüne yeterince katılamaması gerekse iş hayatında olsalar bile iş yaşamından erkeklere kıyasla daha düşük ücret almaları kadınların gelir seviyelerinin düşük kalmalarına neden olmaktadır.

4-PARTİLERİN KADIN ADAY BELİRLEMEDEKİ GENEL TUTUMLARI

Siyasi partilerin birçok yerinde kadınlardan ziyade erkeklerin görevlendirildiği görülmektedir. Bu durumda kadınların siyasette tecrübe kazanma olasılığı azalmaktadır. Her ne kadar kadın kolları, cinsiyet kotası gibi kadınların siyasete atılımını teşvik edici gelişmeler yaşansa da yeterli sayılmamaktadır.

Partilerin aday belirleme de kadınlara öncelik vermemesi veya yapılan listelerin sonlarına eklenmesi ya da hiç eklenmemesi demokratik yapının varlığını sorgulatmaktadır. Parti için yapılan listelerde o parti liderine bağlı olması, maddi güç ilişkilerinin büyük rol oynaması gibi etkenler diğer kadınlara fırsat eşitliği tanımamaktadır. Partilerdeki kadın adayların kadın seçmen çekeceği bakış açısı kadının sadece eklenerek siyasi mekanizmanın içinde oluşunu düşündürmektedir.

5-TOPLUMSAL ÖNYARGILAR

Erkek egemen toplumlarda kadın belli kalıplara sıkıştırılmıştır. Bu kalıplar geçmişten günümüze miras olarak hep kadının üzerinde yer etmiştir. Bunun örneğini siyaset alanında da görmekteyiz. Geleneksel yapı içerisinde aileyi dışı kuşun yapabileceği düşüncesi kadını ev içi faaliyetlerde olmasını zorunlu kılmaktadır. Siyasetin erkek işi olduğu, kadınların duygusal erkeklerin ise mantık ile hareket ettiği siyasetinde mantığa dayanması gerektiği ön yargıları kadınların mantıklarını kullanamayacağı kesin yargısına varmak ile birlikte siyasetin empatiden ve duygudan uzak bir alan olduğunu vurgulamaktadır. Fakat toplumu ilgilendiren birçok sorunun dillendirilmesi empatiyi ve duyguyu içinde barındırmaktadır. Aksi halde bu problemlerin çözümüne ilişkin ortaya öneriler sunmak mümkün değildir. Diğer bir yandan siyasetin içindeki kadınlar ise buldukları erkek egemen alanda yer edinebilmek adına erkeksileşmektedir. Bu durumun toplumdaki algıyı değiştireceği inanılsa da erkeksi kadın özellikleri gösterilmeye çalışılarak kadının “kadın olarak” siyasetteki yeri zayıflatılmaktadır. Örneğin kadınların giyim kuşamlarında bile erkeklerle özdeşleşen kıyafetler giymeleri etek yerine pantolon giymeleri, kadın elbiseleri yerine erkek elbiselerini tercih etmeleri dahası ayakkabı tercihlerinde bile topuklu ayakkabılar yerine erkeklerin giydikleri ayakkabıları kullanmaları oldukça dikkat çekicidir. Dahası saç kesimlerini bile erkeklere benzer şekilde ve yüz hatlarını erkeksi gösterecek şekilde göstermeye çalıştıkları görülmektedir.

6-KADINLARIN SİYASETE İLĞİ DUYMAMASI

Toplumun genelinde meslek edinme, iş yapma ile ilgili önyargılar bulunmaktadır. Ataerkil toplum yapısında daha sık rastlanan bu önyargılar kadın ve erkeğin yapacağı işleri birbirinden ayırmaktadır. Siyasetin erkek işi olduğuna dair söylemler kadınların da benimsediği, ilgi duymaktan çekindiği bir alan haline getirmiştir. Bu noktada kadınların yapabileceği bir meslek, iş, görev alanı olmaktan çıkarılan siyaset, erkek egemen bir yapıya dönüşmüştür. Kadınların siyasi parti içinde olsalar bile erkek siyasetçilerden sık görünür değildir. Böyle bir durumda elinin hamuru ile erkek işine karışılmayacağına dair düşünceler pekiştirilmektedir. Bir başka deyişle gerek toplum gerekse kadınların bizzat kendileri tarafından siyasetin sadece erkekler tarafından bir iş olarak algılanması kadınların siyaset mekanizmalarından uzak durmalarına veya siyasete yabancılaşmalarına neden olmaktadır.

SONUÇ VE ÖNERİLER

Siyaset toplumsal cinsiyet kavramı ile yakından ilişkilidir. Toplumun öğretileri, beklentileri üzerine evrilen gelişen kadın ya da erkeğin bir alanda bulunuşunu yine o toplumun kararları ve çizgileri belirlemektedir. Kadınların hem ulusal hem de uluslararası coğrafyada edinilmiş siyasal hakları olsa dahi siyaset mekanizmasına dahil olmama hatta edilmeme sorunları günümüzde hala varlığını korumaktadır. Kadın kolları, cinsiyet kotası gibi uygulama ve örgütlenmelerinin kadının siyasette aktif rol oynamasında kolaylaştırıcı unsurlar olsa da kadının siyasal alandaki pasifliği gözle görünür niteliktedir. Bu durumun hem kişisel hem toplumsal sebepleri olsa da problemin ana kaynağı toplumsal cinsiyet eşitsizliğinden kaynaklandığı söylenebilir.

Kadının siyasette görünür olmamasında birçok neden olsa da temel nedenler eğitim, aile ve çevre desteği, kadının geliri, partilerin kadınlara yönelik gösterdiği tutum ve düşünce, toplumsal önyargılar ve kadının siyasete olan ilgisizliği olarak belirtilebilir. Bu engeller kadınların kamusal alanda dolayısıyla siyasette var olabilmesinin önündeki kısıtlılıklardır. Kadınların siyaset alanında daha fazla görmek adına aşağıdaki öneriler sunulmuştur.

- Günümüzde eğitim olanakları artsa da hala kırsal alanda kız çocukların/genç kadınların çoğu okula gönderilmemekte ve erken yaşta evlendirilmektedir. Özellikle ebeveynlerin kız çocuklarının eğitimi desteklemelerine yönelik eğitimler verilmedi.
- Siyaset alanında kıymetli unsurlardan birisi maddi gelirdir. Kadının ekonomik değeri elinde bulundurması siyasette yapacağı çalışmaları kolaylaştıracaktır.



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

- İster kadın ister erkek bir çalışma alanında desteklenmeyi beklemektedir. Kadının siyasete atılımı için aile ve çevresinin desteği oldukça önemlidir. Kadının ev işleri ve çocuk bakımı üstlenmesi ve bu sorumlulukları eksiksiz yerine getirmesi beklenmektedir. Aile içinde siyasi alandaki rolü için destek göremeyen kadının istediği atılımı yapması imkansız hale gelmektedir. Bu noktada politika yapıcıların kadınları desteklemek amacıyla iyileştirici öneriler sunması gerekmektedir.
- Toplumdaki “kadının yeri evdir”, “siyaset erkek işidir” gibi kalıp yargılarını yıkmak kadının bu alanda güçlenmesini sağlayacaktır. Gerek partilerin gerekse sivil toplum kuruluşlarının yapacağı projeler bu algıları değiştirecektir.
- Siyasi partilerin kadın örgütlenmeleri kapsamında kurdukları kadın kolları mekanizmasının toplumdaki diğer kadınları siyasete yönlendirmesinde rolü büyüktür. Parti genelinin bu mekanizmaya vereceği her türlü desteğin diğer kadınları bu alana toplamada önemli olacağı görülmektedir.
- Meslek seçimi ve ilgi alanlarını belirlemede toplumsal cinsiyetin ön planda olduğu görülmektedir. Kadınların yapması gereken işler ile erkeklerin yapması gereken işler hep ayrıştırılmıştır. Bu noktada siyasetin erkek ile özdeşleştiği bir toplumda kadının siyasete ilgi duyması beklenemez. Belediyelerin özellikle kadınlar yönelik eğitimler düzenlediği bilinir. Siyasetin ne olduğu nasıl yapıldığı ve bu konuda önemli bir unsur olan hitabetin nasıl sağlanacağı ile ilgili kurs merkezlerinde verilecek eğitimlerin ilgiyi arttıracacağı düşünülmektedir. Ayrıca kadınların ihtiyacı olan rol modellerin yani kadın siyasetçilerin bu konuda kadınlara vereceği destek kıymetli olacaktır.



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

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Özet

Hem dünyada ve hem ülkemizde iş kazaları, tüm sektörler için önemli bir sorunsal olmakla beraber, özellikle inşaat sektörü bu konuda ilk sıralarda yer almaktadır. Türk inşaat sektörü içerisinde yer alan iş sağlığı ve güvenliği (İSG) risk faktörlerinin çok fazla olduğu metro inşaatı projelerinde çalışanların demografik özellikleri ile iş güvenliği performansları, güvenlik iklimi algıları ve işe bağlılıkları arasındaki ilişki araştırılmıştır. Çalışmada İstanbul'da inşaatı devam eden metro projelerinde çalışan 394 kişi üzerinde anket uygulaması gerçekleştirilmiştir. Katılımcılara uygulanan anket dört bölümden oluşmaktadır. Birinci bölümde katılımcıların demografik bilgileri, ikinci bölümde iki alt boyuttan oluşan "Güvenlik performansı ölçeği", üçüncü bölümde iki alt boyuttan oluşan "Güvenlik iklimi ölçeği", son bölümde ise üç alt boyutu olan "İşe bağlılık ölçeği" yer almaktadır. Araştırma bulgularına göre, demografik değişkenlerle ölçekler ve ölçeklerin alt boyutları arasında anlamlı ilişkiler tespit edilmiştir. Kişilerde güvenlik performansı arttıkça güvenlik iklimi ve işe bağlılığın da pozitif yönde artacağı, güvenlik ikliminin artması sonucunda da işe bağlılığın da artacağı sonucuna varılmaktadır.

Anahtar Kelimeler: Güvenlik performansı, güvenlik iklimi, işe bağlılık, metro inşaatı



**SAFETY PERFORMANCE, SAFETY CLIMATE AND JOB COMMITMENT OF METRO
CONSTRUCTION SITE WORKERS**

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Abstract

Both globally and in our country, occupational accidents pose a significant issue for all sectors, with the construction industry, in particular, ranking high in this regard. This study explores the relationship between the demographic characteristics of workers involved in metro construction projects, where there are numerous occupational health and safety (OHS) risk factors and their safety performance, perceptions of safety climate, and job commitment. The research was conducted on 394 individuals working on ongoing metro projects in Istanbul, utilizing a survey questionnaire. The survey consisted of four sections: the first section gathered participants' demographic information, the second section included the 'Safety Performance Scale', the third section featured the 'Safety Climate Scale' and the final section contained the 'Job Commitment Scale'. According to the research findings, significant relationships were identified between demographic variables and scales, as well as between sub-dimensions of the scales. The study concludes that as safety performance increases in individuals, there is a positive correlation with an increase in safety climate and job commitment. Furthermore, it suggests that an increase in safety climate leads to an increase in job commitment.

Keywords: Safety performance, safety climate, job commitment, metro construction

GİRİŞ

Dünyada ve Türkiye’de önemli bir gelişim sağlayan metro ulaşım hatları yaşamı önemli derecede etkilemektedir. Bu ilerlemenin yanı sıra metro hatları kullanım durumuna gelene kadar inşaat aşamasında çok fazla tehlike ve riskler barındırmaktadır. İş kazalarının sıklıkla yaşandığı inşaat sektörünün bir alt kolu olan metro inşaatlarında da çalışanlar için iş sağlığı ve güvenliği (İSG) konusu büyük önem arz etmektedir. Metro şantiyelerinde iş kazalarının azaltılması yönünde İSG ile ilgili uygulamalar yapılmaktadır. Tehlike sınıfları tebliğine göre çok tehlikeli sınıfta yer alan metro inşaatlarında işverenler sadece mevzuatın zorunlu kıldığı kriterler değil aynı zamanda çalışma ortamında güvenlik kültürünün benimsenmesine yönelik faaliyetler gerçekleştirmelidirler. Bununla beraber iş güvenliğinde gösterilen performansında ölçülmesi ve değerlendirilmesi gibi iş kazalarını önleme ya da azaltmada proaktif yaklaşıma uygun çalışmalar yapılmalıdır. İşletmeler işgücü devir düzeyini en az seviyeye indirme çabasındadırlar. Metro inşaatı şantiyelerinde diğer bir sorunsal da işgücü devir hızının yüksek olmasıdır. İSG açısından bakıldığında işgücü devir hızı iş güvenliği ve iş kazalarını olumsuz yönde etkilemektedir (Baysal, 1984). Bu doğrultuda araştırmanın amacını oluşturan metro inşaatında çalışanların demografik özelliklerinin, algıladıkları güvenlik iklimi, güvenlik performansı ve işe bağlılıklarıyla arasındaki ilişkiler incelenmiştir. Aynı zamanda ölçeklerin kendi aralarında olan ilişkilere de bakılmıştır. Güvenlik iklimi, güvenlik performansı ve işe bağlılık kavramlarının tanımlarına aşağıda yer verilmiştir.

Güvenlik kültürünün alt faktörü olan güvenlik iklimi kavramı ilk kez Zohar (1980) tarafından kullanılmıştır. Zohar’a (1980) göre güvenlik iklimi, çalışanların çalışma sahası ve şartlarına yönelik algılarıdır. Güvenlik iklimi, işveren ve çalışanların sahip oldukları değer, tutum ve davranışların işletmede oluşturduğu doğal atmosferdir. Güvenlik iklimi, bir işletmede güvenlikle ilgili emeklerin, çalışanlar tarafından nasıl değerlendirildiğinin bir göstergesidir (Eryılmaz vd., 2019). Çalışanların çalıştıkları ortamın güvenliği, tehlikeler ve çalışma ortamı gibi konulara ilişkin genel algısı olarak da tanımlanabilir. Son 35 yılda yapılan araştırmalar, güvenlik ikliminin, kazalar ve yaralanmalar gibi güvenlik davranışlarının ve güvenlik sonuçlarının önemli bir öngörücüsü olduğunu göstermektedir (Curcuruto ve Griffin, 2016).

Güvenlik performansı, çalışanların güvenlikle ilgili davranışlarının veya güvenlik sonuçlarının gözlemlenmesinden ortaya çıkan bir kavramdır (Christian vd., 2009). Güvenlik performansının iki boyuttan oluşmaktadır: uyum ve katılım. Uyum, güvenlik prosedürlerine bağlı kalmayı ve işi güvenli bir şekilde yürütmeyi içerir. Katılım ise iş arkadaşlarına yardım etmeyi, işyerinde güvenlik programını teşvik etmeyi, inisiyatif göstermeyi ve işyerinde güvenliği iyileştirmek için çaba göstermeyi içerir (Sakallı vd., 2022).

İşe bağlılık ise çalışanların işletmeye ve yaptıkları işe bağlılıklarını, işlerine gereken önemi vermelerini ve bu durumu örgütsel vizyonla bütünleştirmelerini ifade edilmektedir (Balay, 2000). İşe bağlılık üç boyutta

kavramsallaştırılmıştır. Bunlar, dinçlik, işe adanma ve işe yoğunlaşma olarak 3 boyutta ele alınır (Hakanen, Bakker ve Schaufeli, 2006).

YÖNTEM

Araştırmanın amacı

İstanbul'da faaliyet gösteren metro inşaatlarında çalışan 394 kişinin araştırmaya dahil edilerek katılımcıların demografik özellikleriyle güvenlik iklimi algıları, güvenlik performansı ve işe bağlılığı arasındaki ilişki ile bu değişkenlerin kendi aralarındaki ilişkiler incelenmiştir.

Araştırmanın evren ve örnekleme

Araştırmanın evrenini İstanbul'da faaliyet gösteren metro şantiyesindeki firmalar oluşturmaktadır. Evren içerisinde 394 kişi örneklem olarak seçilerek %5 hata payı ve %95 güvenilirlik düzeyi ile örnekleme uygun bulunmuştur.

Veri Toplama Araçları

Katılımcılara yöneltilen anket dört bölümden oluşmaktadır. Birinci bölümde kişisel bilgi formu bulunmaktadır. İkinci bölümde Choudhry vd. (2009) tarafından geliştirilmiş ve Türen vd. (2014) tarafından Türkçeye uyarlanmış Güvenlik İklimi Ölçeği yer almaktadır. Ölçek yönetimin bakış açısı ve kurallar ile iş arkadaşları ve güvenlik eğitimleri olarak adlandırılan iki alt boyut ve 14 maddeden meydana gelmektedir. Üçüncü bölümde Güvenlik Performansı ölçeğine ait sekiz soru bulunmaktadır. Neal vd. (2000) tarafından geliştirilmiş olan ölçeğin Türkçe uyarlaması Sakallı vd. (2022) tarafından yapılmıştır. İki alt boyuttan oluşmaktadır. Bunlar güvenlik uyumu ve güvenlik katılımıdır. Son bölümde ise işe istek duyma, işe adanma ve işe yoğunlaşma olarak üç alt boyuttan oluşan İşe bağlılık ölçeği bulunmaktadır. Ölçek, Schaufeli vd. (2002) tarafından çalışanların işe bağlılıklarını ölçmek için geliştirilmiştir Eryılmaz ve Doğan (2012) tarafından Türkçe uyarlaması yapılmıştır.

Verilerin Analizi

Verilerin analizi için SPSS 23 programı kullanılmıştır. Katılımcıların demografik özelliklerine göre frekans dağılımları yapılmıştır. Veri dağılımının normal bir dağılım gösterip göstermediğinin belirlenmesi için yapılan normallik testlerinden sonra dağılımın parametrik olmayan bir dağılım gösterdiği belirlenmiştir. Ardından demografik değişkenler ile ölçekler arasındaki ilişkinin belirlenmesine yönelik parametrik dağılım göstermeyen veriler için Mann-Whitney U testi ve Kruskal-Wallis H Testi Analizi yapılmıştır. Ölçeklerin alt boyutlarının kendi aralarındaki ilişki ve ölçekler arasındaki ilişkinin belirlenmesi için Spearman Korelasyon Katsayısı Analizi uygulanmıştır.

BULGULAR

Betimsel Analizler

Çalışmaya dahil olan katılımcıların demografik özelliklerine göre frekans dağılımları şöyledir;

Araştırmaya katılan 394 kişinin %72,84'ü (287 kişi) erkek, %27,16'sı (107 kişi) ise kadındır. %23,60'ı (93 kişi) 46-55 yaş arasında, %18,78'i (74 kişi) 18-25 yaş arasında, %27,41'i (108 kişi) 36-45 yaş arasında ve %30,20'si (119 kişi) 26-35 yaş arasındadır. %6,85'i (27 kişi) ilkokul, %8,38'i (33 kişi) ortaokul, %26,90'ı (106 kişi) lise, %43,40'ı (171 kişi) üniversite, %13,45'i (53 kişi) lisansüstü mezunudur. Katılımcıların %1,02'sinin ise (4 kişi) mezuniyeti yoktur. Araştırmaya katılan 394 kişinin %57,1'i (225 kişi) bekar, %42,89'u (169 kişi) ise evlidir. Araştırmaya katılan 394 kişinin %59,64'ünün (235 kişi) çocuğu yok, %40,36'sının (159 kişi) ise çocuğu vardır.

Normallik Testleri

H_0 : Demografik özelliklere ait veri dağılımı normaldir.

H_1 : Demografik özelliklere ait veri dağılımı normal değildir.

Tablo 1 Demografik özelliklerin normallik analizi

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Cinsiyet	,457	394	,000	,556	394	,000
Yaş	,193	394	,000	,871	394	,000
Eğitim	,253	394	,000	,886	394	,000
Medeni Durum	,378	394	,000	,629	394	,000
Çocuk	,391	394	,000	,623	394	,000

Araştırmaya katılan kişi sayısının 394 olması, $n > 50$ olduğundan Kolmogorov-Smirnov Testi sonucuna Tablo 1'e bakıldığında $p=,00$ ve $p<0,05$ olduğundan demografik özelliklere ait değişkenlerin veri dağılımları ,05 anlamlılık düzeyinde normal dağılım şartını sağlamamaktadır. Bu durumda H_0 reddedilir ve H_1 kabul edilir.

Güvenlik performansı ölçeği, güvenlik iklimi ölçeği ve işe bağlılık ölçeği faktörlerinin de veri dağılımları ,05

anlamlılık düzeyinde normal dağılım şartını sağlamamaktadır.

Parametrik Olmayan Karşılaştırma Analizleri

Mann-Whitney U testi

H_0A : Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile cinsiyet arasında anlamlı bir farklılık yoktur.

H_1A : Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile cinsiyet arasında anlamlı bir farklılık vardır.

Tablo 2 Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile cinsiyet arasındaki ilişki

	Güvenlik Katılımı	Güvenlik Uyumu	Yönetimin Bakış Açısı	İş Arkadaşları Güvenlik Eğitimleri	İşe İstek Duyma	İşe Adanma	İşe Yoğunlaşma
Mann-Whitney U	12471,000	13107,000	13900,500	13283,000	14770,500	15123,500	14117,500
Wilcoxon W	18249,000	18885,000	19678,500	19061,000	20548,500	20901,500	19895,500
Z	-2,919	-2,313	-1,455	-2,093	-,583	-,232	-1,237
Asymp. Sig. (2-tailed)	,004	,021	,146	,036	,560	,817	,216

Tablo 2'ye göre güvenlik iklimi faktörlerinden yönetimin bakış açısı faktörü ile cinsiyet arasında anlamlı bir farklılık tespit edilmiştir. Ayrıca işe bağlılık faktörlerinden işe istek duyma, işe adanma ve işe yoğunlaşma faktörlerinin cinsiyet ile arasında anlamlı bir farklılıklar olduğu görülmektedir.

H_0B : Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile çocuk sahibi olup olmama arasında anlamlı bir farklılık yoktur.

H_1B : Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile çocuk sahibi olup olmama arasında anlamlı bir farklılık vardır.

Tablo 3 Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile çocuk sahibi olup olmama arasındaki ilişki

	Güvenlik Uyumu	Güvenlik Katılımı	Yönetimin Bakış Açısı	İş Arkadaşları ve Güvenlik Eğitimleri	İşe İstek Duyma	İşe Adanma	İşe Yoğunlaşma
Mann-Whitney U	18161,500	17001,500	17838,500	17884,500	17261,000	18428,000	18313,000
Wilcoxon W	45891,500	44731,500	45568,500	45614,500	29981,000	31148,000	31033,000
Z	-,486	-1,543	-,766	-,731	-1,287	-,232	-,335
Asymp. Sig. (2-tailed)	,627	,123	,444	,465	,198	,817	,738

Tablo 3'de görüldüğü gibi Güvenlik performansı, güvenlik iklimi ve işe bağlılık faktörleri kişilerin çocuğu olup olmamasına göre anlamlı bir farklılık göstermektedir. $p < ,05$ olduğundan H_0 hipotezi reddedilir.

H_0C : Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile medeni durum arasında anlamlı bir farklılık yoktur.

H_1C : Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile medeni durum arasında anlamlı bir farklılık vardır.

Tablo 4 Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile medeni durum arasındaki ilişki

	Güvenlik Uyumu	Güvenlik Katılımı	Yönetimin Bakış Açısı	İş Arkadaşları Güvenlik Eğitimleri	İşe İstek Duyma	İşe Adanma	İşe Yoğunlaşma
Mann-Whitney U	18971,500	17684,500	17824,500	17327,000	18721,000	18941,000	18871,500
Wilcoxon W	33336,500	43109,500	43249,500	42752,000	44146,000	33306,000	44296,500
Z	-,038	-1,208	-1,068	-1,531	-,262	-,064	-,127
Asymp. Sig. (2-tailed)	,970	,227	,285	,126	,794	,949	,899

Tablo 4'e göre güvenlik performansı, güvenlik iklimi ve işe bağlılık faktörleri kişilerin medeni durumu arasında anlamlı bir farklılık vardır. $p > ,05$ olduğundan H_0 hipotezi reddedilir.

Kruskal-Wallis H Testi Analizi

H_0A : Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile yaş arasında anlamlı bir farklılık yoktur.

H_1A : Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile yaş arasında anlamlı bir farklılık vardır.

Tablo 5 Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile yaş arasındaki ilişki

	Güvenlik Uyumu	Güvenlik Katılımı	Yönetimin Bakış Açısı	İş Arkadaşları Güvenlik Eğitimleri	İşe İstek Duyma	İşe Adanma	İşe Yoğunlaşma
Chi-Square	25,669	26,342	20,311	14,986	8,540	6,881	4,389
df	3	3	3	3	3	3	3
Asymp. Sig.	,000	,000	,000	,002	,036	,076	,222

Tablo 5'de görüldüğü gibi Güvenlik Performansı ve Güvenlik İklimi faktörleri ile kişilerin yaşları arasında anlamlı bir farklılık yoktur. İşe Bağlılık faktörlerinden İşe Adanma ile İşe Yoğunlaşmanın kişilerin yaşları ile arasında anlamlı bir farklılık bulunmaktadır.

H_0B : Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile eğitim durumu arasında anlamlı bir farklılık yoktur.

H_1B : Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile eğitim durumu arasında anlamlı bir farklılık vardır.

Tablo 6 Güvenlik performansı, güvenlik iklimi ve işe bağlılık ile eğitim durumu arasındaki ilişki

	Güvenlik Uyumu	Güvenlik Katılımı	Yönetimin Bakış Açısı	İş Arkadaşları Güvenlik Eğitimleri	İşe İstek Duyma	İşe Adanma	İşe Yoğunlaşma
Chi-Square	19,090	16,820	10,689	8,997	8,669	10,300	2,867
df	5	5	5	5	5	5	5
Asymp. Sig.	,002	,005	,058	,109	,123	,067	,720

Tablo 6'da görüldüğü gibi Güvenlik Performansı faktörleri ile kişilerin eğitim durumu arasında anlamlı bir farklılık yoktur. Güvenlik İklimi ve İşe Bağlılık faktörleri ile kişilerin eğitim durumu arasında ise anlamlı bir farklılık bulunmaktadır.

Spearman Korelasyon Katsayısı Analizi

Korelasyon için araştırmaya konu olan hipotezler aşağıdaki gibidir:

H_{0A} : Güvenlik performansı faktörleri arasında anlamlı bir ilişki yoktur.

H_{1A} : Güvenlik performansı faktörleri arasında anlamlı bir ilişki vardır

H_{0B} : Güvenlik iklimi faktörleri arasında anlamlı bir ilişki yoktur.

H_{1B} : Güvenlik iklimi faktörleri arasında anlamlı bir ilişki vardır.

H_{0C} : İşe bağlılık faktörleri arasında anlamlı bir ilişki yoktur.

H_{1C} : İşe bağlılık faktörleri arasında anlamlı bir ilişki vardır.

H_{0D} : Güvenlik performansı, güvenlik iklimi ve işe bağlılık faktörleri arasında anlamlı bir ilişki yoktur.

H_{1D} : Güvenlik performansı, güvenlik iklimi ve işe bağlılık faktörleri arasında anlamlı bir ilişki vardır.

Tablo 7 Güvenlik performansı, güvenlik iklimi ve işe bağlılık faktörleri arasındaki korelasyon ilişkisi

		Güvenlik Uyumu	Güvenlik Katılımı	Yönetimin Bakış Açısı	İş Arkadaşları Güvenlik Eğitimleri	İşe İstek Duyma	İşe Adanma	İşe Yoğunlaşma
Güvenlik Uyumu	Correlation Coefficient	1,000	<u>,647**</u>	,478**	,416**	,222**	,407**	,231**
	Sig. (2-tailed)	.	<u>,000</u>	<u>,000</u>	<u>,000</u>	<u>,000</u>	<u>,000</u>	<u>,000</u>
	N	394	<u>394</u>	394	394	394	394	394
Güvenlik Katılımı	Correlation Coefficient	<u>,647**</u>	1,000	,514**	,480**	,332**	,456**	,328**
	Sig. (2-tailed)	<u>,000</u>	.	<u>,000</u>	<u>,000</u>	<u>,000</u>	<u>,000</u>	<u>,000</u>
	N	<u>394</u>	394	394	394	394	394	394
Yönetimin Bakış Açısı	Correlation Coefficient	,478**	,514**	1,000	<u>,728**</u>	,499**	,456**	,478**
	Sig. (2-tailed)	<u>,000</u>	<u>,000</u>	.	<u>,000</u>	<u>,000</u>	<u>,000</u>	<u>,000</u>
	N	394	394	394	<u>394</u>	394	394	394
İş Arkadaşları Güvenlik Eğitimleri	Correlation Coefficient	,416**	,480**	<u>,728**</u>	1,000	,493**	,468**	,466**
	Sig. (2-tailed)	<u>,000</u>	<u>,000</u>	<u>,000</u>	.	<u>,000</u>	<u>,000</u>	<u>,000</u>
	N	394	394	<u>394</u>	394	394	394	394
İşe İstek Duyma	Correlation Coefficient	,222**	,332**	,499**	,493**	1,000	<u>,759**</u>	<u>,834**</u>
	Sig. (2-tailed)	<u>,000</u>	<u>,000</u>	<u>,000</u>	<u>,000</u>	.	<u>,000</u>	<u>,000</u>
	N	394	394	394	394	394	<u>394</u>	<u>394</u>
İşe Adanma	Correlation Coefficient	,407**	,456**	,456**	,468**	<u>,759**</u>	1,000	<u>,707**</u>
	Sig. (2-tailed)	<u>,000</u>	<u>,000</u>	<u>,000</u>	<u>,000</u>	<u>,000</u>	.	<u>,000</u>
	N	394	394	394	394	<u>394</u>	394	<u>394</u>
İşe Yoğunlaşma	Correlation Coefficient	,231**	,328**	,478**	,466**	<u>,834**</u>	<u>,707**</u>	1,000
	Sig. (2-tailed)	<u>,000</u>	<u>,000</u>	<u>,000</u>	<u>,000</u>	<u>,000</u>	<u>,000</u>	.
	N	394	394	394	394	<u>394</u>	<u>394</u>	394

Tablo 7'ye göre Güvenlik performansı, güvenlik iklimi ve işe bağlılık faktörleri arasında pozitif yönde anlamlı bir ilişki mevcuttur. Bu durumda tüm bu faktörler için $p < ,05$ olduğundan H_0 hipotezleri reddedilir ve H_1 hipotezleri kabul edilir. Üç ölçeğin de faktörleri arasında bulunan pozitif yöndeki korelasyon ilişkileri incelendiğinde en güçlü pozitif ilişkiler şöyle özetlenebilir;

Güvenlik Performansı faktörlerinin kendi aralarında ($r=647$; $p=,000$) pozitif yönde ve kuvvetli ilişkileri olduğu, bu durumda kişilerde güvenlik uyumunun arttıkça güvenlik katılımının da artacağı tespit edilmektedir.

Güvenlik İklimi faktörlerinin de kendi aralarında ($r=728$; $p=,000$) pozitif yönde ve kuvvetli ilişkileri olduğu, bu durumda da yönetimin bakış açısı arttıkça iş arkadaşları güvenlik eğitimlerinin de artacağı tespit edilmektedir.

İşe Bağlılık faktörlerinin ise yine kendi aralarında pozitif yönde ve kuvvetli ilişkileri olduğu, bu durumda kişilerde işe istek duyma arttıkça işe adanmanın da artacağı ($r=759$; $p=,000$) yine kişilerde işe istek duyma arttıkça işe yoğunlaşmanın da kuvvetli olarak artacağı ($r=834$; $p=,000$) bununla birlikte, kişilerde işe adanma arttıkça da işe yoğunlaşmanın da güçlü yönde artacağı ($r=707$; $p=,000$) tespit edilmektedir.

Bununla birlikte, kişilerde Güvenlik Performansı arttıkça Güvenlik İklimi ve İşe Bağlılığın da pozitif yönde artacağı yine Güvenlik İkliminin artması sonucunda da İşe Bağlılığın da artacağı sonucuna varılmaktadır.

SONUÇ

Güvenlik ikliminin, güvenlik performansı arasındaki ilişki birçok çalışmada ortaya konmaktadır. Araştırmanın sonuçlarıyla paralellik sağlayan çalışmalar mevcuttur. Griffin ve Neal (2000); Cooper ve Philips (2004); Wu vd. (2008); Brondino vd. (2012); Hon vd. (2014); Zohar vd. (2015) çalışmaları sonucunda, güvenlik iklimi ile güvenlik performansı arasında pozitif yönlü anlamlı bir ilişkiler tespit etmişlerdir. Çalışmamızın bulgularıyla uyum göstermektedir.

Güvenlik iklimi ve işe bağlılık arasındaki ilişkide çalışmamızla benzerlik gösteren Michael vd. (2005); Dejoy vd. (2010); Clarke (2010); Haslam vd.'ye (2016) ait çalışmalar bulunmaktadır.

Güvenlik performansı ve işe bağlılık arasındaki ilişkide ise yine çalışmamızın bulguları Parker vd. (2001); Dejoy vd. (2010); Tharaldsen vd. (2010); Nahrgang vd. (2011); Hwang-Bo (2013); Liu vd. (2020) çalışmalarıyla paralellik göstermektedir.

Özellikle iş güvenliği risk faktörlerinin yoğun olduğu inşaat sektöründe mevzuatın şart koştuğu yükümlülüklerin yanı sıra işverenler güvenli bir çalışma ortamı yaratmak için bir güvenlik iklimi oluşturmalı, güvenlik performansı ölçebilecek mekanizmalar geliştirmelidir. Bu bağlamda;

- İşverenler tarafından çalışma ortamında ki İSG önlemleri geliştirilerek üretkenlik artırılabilir, kalite yükseltilir, çalışanın işe ve örgütüne olan bağlılığı artırılabilir.
- İSG uygulamaları ile çalışan kendini güvende hisseder ve bu durumda işe ve örgütüne karşı olan bağlılığı artar.



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- Belli aralıklarda güvenlik performansının ölçülmesi gerekmektedir.
- Çalışanların bilinçlendirilmesi, farkındalıklarının artırılması için örgüt içi ve dışı eğitimlere önem verilmelidir.
- Yöneticiler çalışanlar için bir rol modelidir. Bu sebeple yöneticilerin güvenlik etkinliklerine katılım sağlamaları, güvenlik konusunu devamlı vurgulamaları önem taşımaktadır.
- Çalışanlar da yönetimin düzenlemiş olduğu İSG eğitimlerine tam katılım sağlanmalıdır.
- Çalışanlar tarafından İSG yönerge ve talimatlarına mutlaka uyulmalıdır.

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KARBAZOL TÜREVLERİNİN ORGANİK YARIİLETKEN ÖZELLİKLERİNİN İNCELENMESİ

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Özet

Karbazol bileşiği olan 3,3'-[(E)-eten-1,2-diil]di(9-heksil-9H-karbazol) üç basamakta sentezlenmiştir. Meydana gelen yapı görünür bölge ve morötesi spektroskopisi, kızılötesi spektroskopisi, proton manyetik rezonans spektroskopisi (1H-NMR) ve karbon-13 nükleer manyetik rezonans (13C-NMR) spektroskopik yöntemlerle incelenmiştir. Termal analizler olan termogravimetrik analiz (TGA) ve diferansiyel taramalı kalorimetre (DSC) bileşiğin 410 °C'ye kadar ısıya dayanıklı ve kristal yapılı (T_m= 192.23 °C) olduğunu göstermiştir. Bileşiğin kristal yapısı tek-kristal X-ışını kırınım yöntemiyle ve P21/c uzay grubunda çözülmüştür. Bağ uzunlukları, bağ açıları ve torsiyon açıları literatürdeki benzer yapılı karbazol bileşikleri ile uyumlu olduğu bulunmuştur.

Anahtar Kelimeler: Karbazol Bileşiği, Görünür Bölge ve Morötesi Spektroskopisi, Kızılötesi Spektroskopisi, Proton Manyetik Rezonans Spektroskopisi, Karbon-13 Nükleer Manyetik Rezonans Spektroskopisi.



INVESTIGATION OF ORGANIC SEMICONDUCTOR PROPERTIES OF CARBAZOL DERIVATIVES

Abstract

The carbazole compound 3,3'-[(E)-ethene-1,2-diyl]di(9-hexyl-9H-carbazole) was synthesized in three steps. The resulting structure was examined by visible and ultraviolet spectroscopy, infrared spectroscopy, proton magnetic resonance spectroscopy ($^1\text{H-NMR}$) and carbon-13 nuclear magnetic resonance ($^{13}\text{C-NMR}$) spectroscopic methods. Thermal analyses, thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC), showed that the compound is heat resistant up to $410\text{ }^\circ\text{C}$ and has a crystalline structure ($T_m = 192.23\text{ }^\circ\text{C}$). The crystal structure of the compound was solved by single-crystal X-ray diffraction method and in the P21/c space group. Bond lengths, bond angles and torsion angles were found to be compatible with carbazole compounds with similar structures in the literature.

Keywords: Carbazole Compound, Visible and Ultraviolet Spectroscopy, Infrared Spectroscopy, Proton Magnetic Resonance Spectroscopy, Carbon-13 Nuclear Magnetic Resonance Spectroscopy.

GİRİŞ

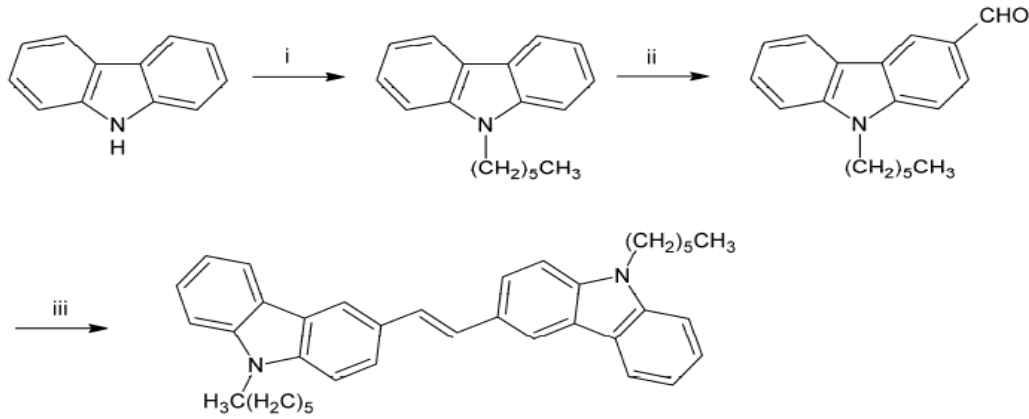
Karbazol bileşikleri, işlevselleştirmedeki çok yönlülükleri, iyi kimyasal ve çevresel kararlılıkları (Abe, 2007), mükemmel yük taşıma yetenekleri vb. nedeniyle dikkat çekmiştir. Polikarbazoller ve türevleri, güneş pilleri (Desbenemonvernay, 1992), anti-korozyon (Grazulevicius, 2003), sensörler (Hu, 2015), foto-voltaik cihazlar (Kochapradist, 2014) gibi çeşitli uygulamalar için sunulan bir heterosiklik iletken polimer sınıfını içerir. Ambipolar konjuge polimer olarak elektron kabul eden fulleren ile karbazol bazlı π -konjuge sistemin sentezini ve karakterizasyonunu ele alınmıştır (Lav, 2012). Polikarbazoller elektrolüminesan uygulamalarda (Lapkowski, 2011) ve ışık yayan diyotlarda (Nie, 2006) ve şarj edilebilir pillerde (Nie, 2012) potansiyel endüstriyel uygulamaları nedeniyle dikkat çeken iyi çevresel kararlılık ve fotoiletkenlik ve elektrokromik özellikler gibi avantajlara sahiptir. Yüksek kaliteli polikarbazoller, %20 vol etil eter içeren bor triflorür dietil eterden hazırlanmıştır (Siove, 2004). Karbazol ve türevleri, yüksek delik taşıma yetenekleri ve güçlü floresansları nedeniyle optoelektronik ve elektroaktif malzemelerin bileşenleri olarak uzun yıllardır bilinmektedir (Saraswathi, 1999). N-süstitüe karbazollerin listesi, polikarbazollerin yan zincirini N-fonksiyonelleştirmek için uygulanan triaril amin ile tamamlanmıştır. Karbazol N-pozisyonunda kolayca işlevselleştirilebilir ve daha sonra diğer monomerlerle kovalent olarak bağlanabilir (Tirapattur, 2003). Karbazol ve türevleri, yüksek delik taşıma yetenekleri ve güçlü floresansları nedeniyle optoelektronik ve elektroaktif malzemelerin bileşenleri olarak uzun yıllardır bilinmektedir (Zhang, 2012). Literatürde karbazol bazlı türevlerin birçok farklı monomer ve komonomer sentezi bulunmaktadır (Wang, 2014

YÖNTEM

3,3'-[(E)-eten-1,2-diil]di(9-heksil-9H-karbazol) sentezi üç basamakta şu şekilde yapılmıştır. 500 mL'lik bir tepkime kabında manyetik karıştırıcı ile çalkalamak suretiyle 9H-karbazol (1.67 g, 0.1 mol) 200 mL aseton da oda sıcaklığında çözülme işlemini takip ederek sıcaklığı buz kovaşında takriben 0 °C'ye düşürüldü ve bu bileşiğe 0.12 mol KOH ekleme yapılmıştır. Tepkime bileşiği bu sıcaklık civarında 30 dakika karıştırıldıktan sonra üzerine 0.12 mol 1-bromoheksan damla-damla ekleme yapılmıştır. Sıcaklık tekrar oda sıcaklığına getirilerek karıştırma işlemi 5 saat sürdü. Daha sonra buz su üzerine dökülerek karışım işlemi bitirildi. Bu karışıma 9-heksil-9H-karbazol deiyonize-su ile vakumlu filtreleme adı verilen bu işlem katıyı sıvıdan çıkarmak amacıyla kullanılan bir ayırma yöntemi ile yıkandıktan sonra kuru havada kurutuldu ve heksan ile kristalleşme işlemi yapıldı (erime noktası 65°C). Buzkovası banyosunda, argon altında 30 mL dimetilformamit ve 12 mmol 40 dak. karıştırılmak suretiyle kompleks bileşiği meydana getirildi. Bu bileşiğe 10 mmol 9-heksil-9H-karbazol katıldı ve 15 saat süreyle 90 °C'de çalkalama işlemi yapıldı. Sonra bu bileşik buz-parçaları üzerine boşaltıldı ham ürün çöktürüldü, sonra vakumlu filtreleme ile süzülde, deiyonize-suyla göçertildi ve açık havada kurumaya

bırakıldı. Kristallenme yoluyla %77 verimle 9-heksil-9H-karbazol-3-karbaldehit açık sarı çubuk kristaller şeklinde meydana geldi.

Şekil 1’de görüldüğü gibi meydana gelen yapı görünür bölge ve morötesi spektroskopisi, kızılötesi spektroskopisi, proton manyetik rezonans spektroskopisi (1H-NMR) ve karbon-13 nükleer manyetik rezonans (13C-NMR) spektroskopik yöntemlerle incelenmiştir. Termal analizler olan termogravimetrik analiz (TGA) ve diferansiyel taramalı kalorimetre (DSC) bileşiğin yapısını inlenmiştir.



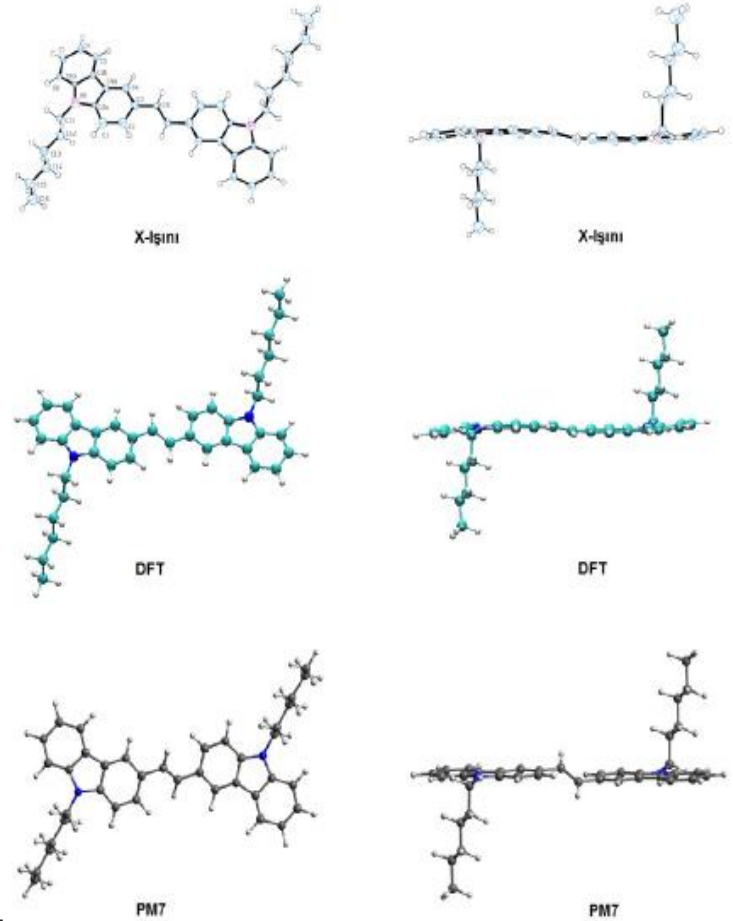
Şekil 1: 3,3'-(E)-eten-1,2-diil]di(9-heksil-9H-karbazol) sentezi.

BULGULAR

3,3'-(E)-eten-1,2-diil]di(9-heksil-9H-karbazol) bileşiğin kristal verileri ayrıntılı bir şekilde Tablo 1’de gösterilmiştir. 3,3'-(E)-eten-1,2-diil]di(9-heksil-9H-karbazol) bileşiğin yapısını tek-kristal X-ışını kırınım yöntemiyle ve hesapsal olarak analiz edilmiştir. Bu yöntemlerle elde edilen yapılar Şekil 2’de gösterilmiştir.

Tablo 1: Açık sarı çubuk kristallerin kristal verileri.

Kristal verileri	
Kimyasal formül	$C_{38}H_{42}N_2$
M_r	263.37
Kristal sistemi, uzay grubu	Monoklinik, $P2_1/c$
Sıcaklık (K)	293
a, b, c (Å)	5.0415 (1), 14.4837 (3), 20.6157 (4)
β (°)	90.292 (1)
V (Å ³)	1505.33 (5)
Z	4
Radyasyon türü	Mo $K\alpha$
μ (mm ⁻¹)	0.07
Kristal boyutu (mm)	0.29 × 0.25 × 0.21
Veri toplanması	
Difraktometre	Bruker APEX2
Absorpsiyon düzeltme	Yok
Ölçülen, bağımsız ve gözlemlenen [$I > 2\sigma(I)$] yansıma sayısı	28211, 3919, 3181
R_{int}	0.032
$(\sin \theta/\lambda)_{max}$ (Å ⁻¹)	0.678
Arttırma	
$R[F^2 > 2\sigma(F^2)]$, $wR(F^2)$, S	0.089, 0.247, 0.89
Yansıma sayısı	3919
Parametre sayısı	253
H-atomu uygulaması	H atomları bağımsız ve zorlamalı karma yöntemlerle artırılmıştır
$\Delta\rho_{maks}$, $\Delta\rho_{min}$ (e Å ⁻³)	0.96, -0.24

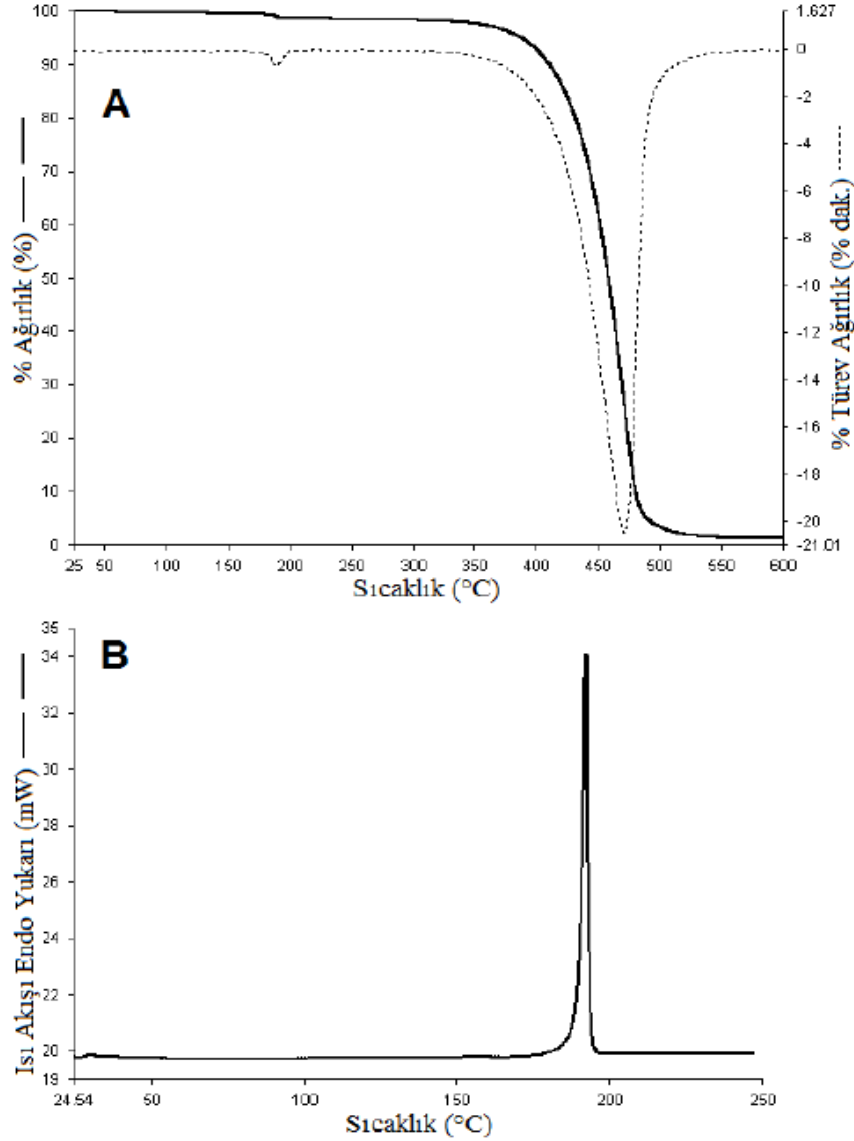


Şekil 2: 3,3'-(E)-eten-1,2-diil]di(9-heksil-9H-karbazol) bileşiğinin deneysel ve teorik yapıları.

Elde edilen karbazol kompleksin termal özellikleri termogravimetrik analiz ve diferansiyel taramalı kalorimetri yöntemleri ile azot altında tahlil edilmiştir. Bu bileşiğin eğrileri Şekil 3'de gösterilmiştir.

SONUÇ

Şekil 3'de diferansiyel taramalı kalorimetriden elde edilen eğriden görüldüğü gibi 3,3'-(E)-eten-1,2-diil]di(9-heksil-9H-karbazol) kristal yapılı olduğu görülmektedir. Bu bileşik 192.23 °C erime noktasına sahiptir. Termogravimetrik analizden elde edilen sonuçlara göre kütle kaybının %10 olduğu sıcaklık 410.65 °C olduğu bulunmuştur. Bu sonuç şunu göstermektedir: Sentezlenen bileşiğin inert atmosferde ısıya dayanıklıdır.



Şekil 3: 3,3'-[(E)-eten-1,2-diil]di(9-heksil-9H-karbazolun) (A) TGA ve (B) DSC eğrileri ((A) TGA and (B) DSC curves of of 3,3'-[(E)-ethen-1,2-diyl]di(9-hexyl-9H-carbazole])

Bileşiğin kristal yapısı tek-kristal X-ışını kırınım yöntemiyle ve P21/c uzay grubunda çözülmüştür. Bağ uzunlukları, bağ açıları ve torsiyon açıları literatürdeki benzer yapıli karbazol bileşikleri ile uyumlu olduğu bulunmuştur.

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KARBAZOL BİLEŞİKLERİNİN KOMPLEKSLEŞMELERİ VE YÜK-TRANSFER KOMPLEKSLERİNİN ÖZELLİKLERİ

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Özet

Karbazol bileşiklerinde bazı yük-transfer komplekslerin fotoiletkenlik davranışlarında karbazol sınıfının yapısına bağlı olarak değişiklikler meydana gelir. Bu değişikliklerden dolayı karbazol bileşiklerinin kompleksleşmeleri üzerinde araştırmalar yapmak önemlidir. Bu amaçla içerisinde karbazol taşıyan ürünler sentezlenmiş ve bunların oluşturduğu yük-transfer komplekslerinin özellikleri incelenmiştir. Bu çalışmada 3,6-di(karbazol-9-il)-9-etilkarbazol ve 3,6-di(karbazol-9-il)-9-heksilkarbazol ile 1,n-di[3,6-di(karbazol-9-il)karbazol-9-il]alkanların tetrasiyanoetilen ve tetranitrometan ile kompleksleşme özellikleri incelenmiştir. Donör ve akseptör komplekslerinin mavi ve mor karışımı renk oluşturdukları gözlemlenmiştir.

Anahtar Kelimeler: Karbazol Bileşikleri, Yük-Transfer Kompleksleri, Donör ve Akseptör Kompleksleri

COMPLEXATIONS OF CARBAZOL COMPOUNDS AND PROPERTIES OF CARGO-TRANSFER COMPLEXES

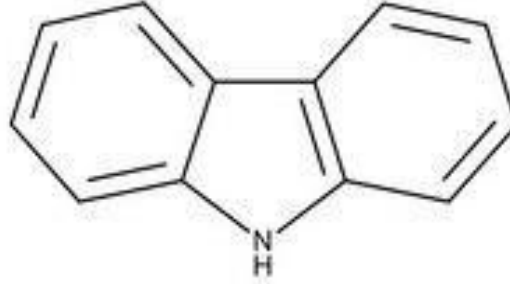
Abstract

In carbazole compounds, changes occur in the photoconductivity behaviour of some charge-transfer complexes depending on the structure of the carbazole class. Because of these changes, it is important to conduct research on the complexation of carbazole compounds. For this purpose, products containing carbazole were synthesized and the properties of the charge-transfer complexes formed by them were examined. In this study, 3,6-di(carbazol-9-yl)-9-ethylcarbazole and 3,6-di(carbazol-9-yl)-9-hexylcarbazole and 1,n-di[3,6-di(carbazole-9-yl)carbazole-9-yl]alkanes with tetracyanoethylene and tetranitromethane were examined. It has been observed that donor and acceptor complexes create a mixture of blue and purple colours.

Keywords: Keyword, Keyword, Keyword, Keyword, Keyword, Keyword

GİRİŞ

Karbazoller, merkezi bir pirol halkasının her iki tarafında kaynaşmış iki benzen halkasından oluşan düzlemsel bir trisiklik iskelete sahip, azot içeren heterosikliklerin önemli bir sınıfıdır (Aragoni, 2015) (Şekil 1).



Şekil 1: Karbazolün kimyasal yapısı.

Karbazol yapısal motifi, bitki veya bakteri kökenli doğal olarak oluşan çok sayıda alkaloidde yaygındır, ancak bunlarla sınırlı değildir. Bu alkaloidlerin birçoğu tıbbi açıdan faydalı olduğundan ve oldukça etkileyici biyolojik aktiviteler (antikanser, anti-HIV, antibakteriyel, anti-Alzheimer, antikoagülan, analjezik, antiepileptik, antidiyabetik, antioksidan, vb) sergilediğinden (Benesi, 1949), kimyasal sentezlerine sürekli ilgi duyulmuştur. Bu bileşiklerden bazıları, özellikle karbazol alışılmadık süstitüsyon modelleri sergiliyorsa veya ek halka sistemlerine kaynaşmışsa, sentetik kimyagerler için zorlu bir zorluk teşkil eder ve bu da ona erişmek için yeni sentetik metodolojinin geliştirilmesine ihtiyaç yaratabilir (Baskar, 2017). Tıbbi kimya da karbazol motifini hipertazis, kalp hastalığı ve hepatit C virüsü replikasyonuna karşı sentetik ilaçlarda kullanmıştır (Anderson, 1973). Karbazol biyolojik aktiviteleri ve tıbbi uygulamaları alanındaki gelişmeler yakın zamanda gözden geçirilmiştir (Campbell, 2017).

İlaç keşfi ve optoelektronik gibi endüstrilerdeki sayısız kullanımları nedeniyle, karbazol türevleri organik sentezde çok dikkat çekmiştir. Bir benzen halkası ile kaynaşmış beş üyeli bir pirol halkası, karbazoller olarak bilinen kimyasal bileşikler sınıfının trisiklik aromatik yapısını oluşturur. Çeşitli kimyasal ve biyolojik özellikler göstermelerinden dolayı onları organik kimya alanındaki araştırmalar için çok önemli bir konu haline getirmiştir.

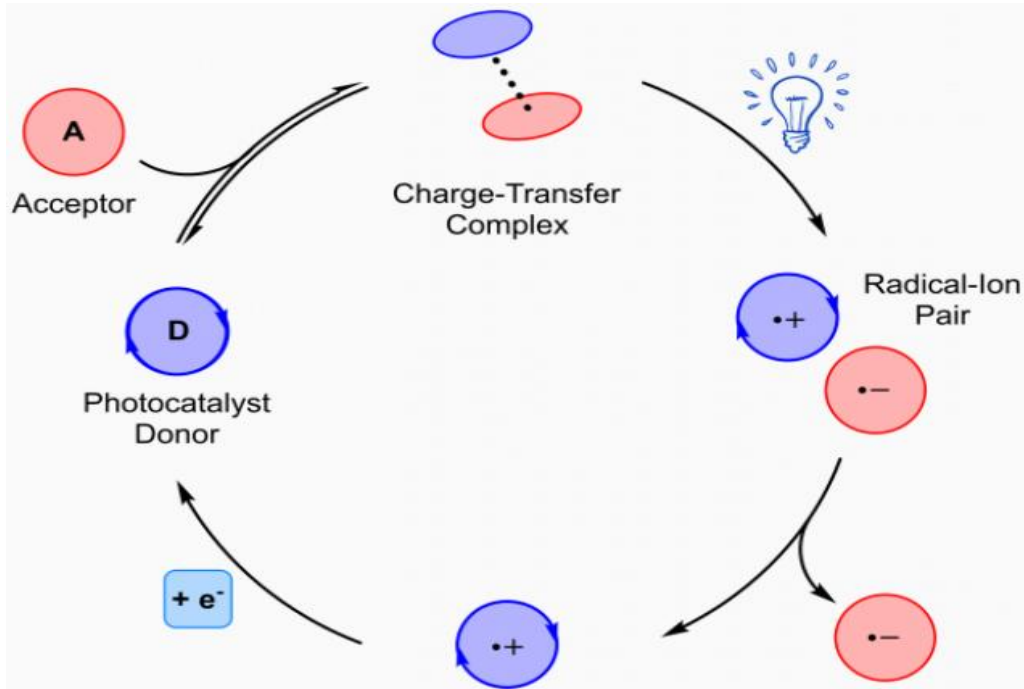
Karbazoller sentetik kimya alanında yararlı yapı taşlarıdır. Kendine özgü yapısal özellikleri ve reaktiviteleri nedeniyle karmaşık organik bileşiklerin sentezlenmesi için değerli ara ürünlerdir. Çeşitli özelliklere sahip yeni bileşiklerin sentezi, karbazollerin devam edebileceği fonksiyonel grup dönüşümleri ile mümkün olmaktadır (Foster, 1980). Karbazoller elektron taşıma ve ışık yayma konusunda mükemmeldir, bu da onları optoelektronik malzemeler için iyi bir seçim haline getirir. Organik yarı iletkenler, fotovoltaiik hücreler ve organik ışık yayan diyotların tümü karbazol bazlı kimyasallar kullanılarak geliştirilmiştir (Rather, 2019).

YÖNTEM

Yapılan deneysel çalışmada 3,6-di(karbazol-9-il)-9-etilkarbazol (1a) ve 3,6-di(karbazol-9-il)-9-heksilkarbazol ile 1,n-di[3,6-di(karbazol-9-il)karbazol-9-il] alkanların tetrasiyanoetilen ve tetranitrometan ile kompleksleşme çalışmaları yapılmıştır. Karbazol ve 9-etil-karbazol satıcı firmadan tedarik edildiği şekli ile % 95-98 saflığa sahipti. Aşağıda anlatıldığı üzere uygun çözücülerden tekrar kristallendirme yoluyla saflaştırılmıştır. 1-bromoheksan, dibromometan, 1,3-dibromopropan, 1,4-dibromobütan ve 1,5-dibromopentan saf maddeleri terikçi firma olan Fluka'dan ve etilen glikol bis-p-toluensülfonat diğer tedarikçi firma olan Aldrich'ten satın alınmıştır. Spektroskopik deneylerde kullanılan karbazol kolon kromatografisi ile tetrasiyanoetilen % 98 saflığa sahip olup deney öncesi süblimleştirme yoluyla saflaştırılmıştır. Tetranitrometan laboratuvarında sentezlenmiş ve deney öncesi dondurma-eritme tekniğiyle saflaştırılmıştır (Zhang, 2018). Spektroskopik deneylerde kullanılan diklorometan analitik saflığa sahip olduğundan olduğu şekilde kullanılmıştır. Oda sıcaklığında manyetik karıştırıcı ile 100 ml EtOH içinde 12-etil-12H-karbazol-6-karbaldehid (2.224 g, 10 mmol) ve anilinden (0.90 g, 9.3 mmol) meydana getirilen bir çözelti vardı. 3 saat karıştırıldıktan sonra çözelti, gece süresince kristalleşmeye işlemine tabi tutuldu ve oluşan kristaller, süzgeç yardımıyla uzaklaştırıldı. Hafif sarı, şeffaf prizmalar elde edilmiştir.

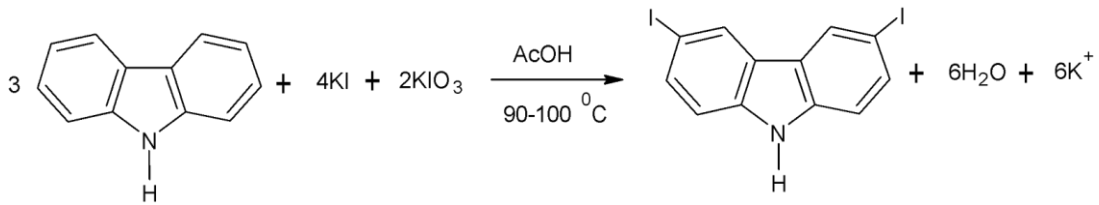
BULGULAR

Şekil 2'de görüldüğü gibi bir yük transfer kompleksi veya elektron-donör-alıcı kompleksi, iki veya daha fazla molekülün bir araya gelmesidir. Ortaya çıkan elektrostatik çekim, moleküler kompleksler için dengeleyici bir kuvvet sağlar. Bu tür komplekslerin çoğu, uyarılmış bir elektronik duruma elektronik geçiş yapabilir. Elektron verici-alıcı kompleksleri olarak da bilinen yük-transfer kompleksleri, elektron zengini bir substrat (verici) ile elektron fakiri bir substratın (alıcı) temel durumda birleşmesini içerir. Tek tek substratlar görünür bölgede absorbe olmayabilirken, yük transfer kompleksi genellikle absorbe olur ve görünür ışık ışınlamasıyla redoks reaksiyonlarını başlatmak için yeni bir alternatif oluşturur.



Şekil 2: Bir yük transfer kompleksi.

Şekil 3’de 3,6-diiyodokarbazolun sentezi görülmektedir.

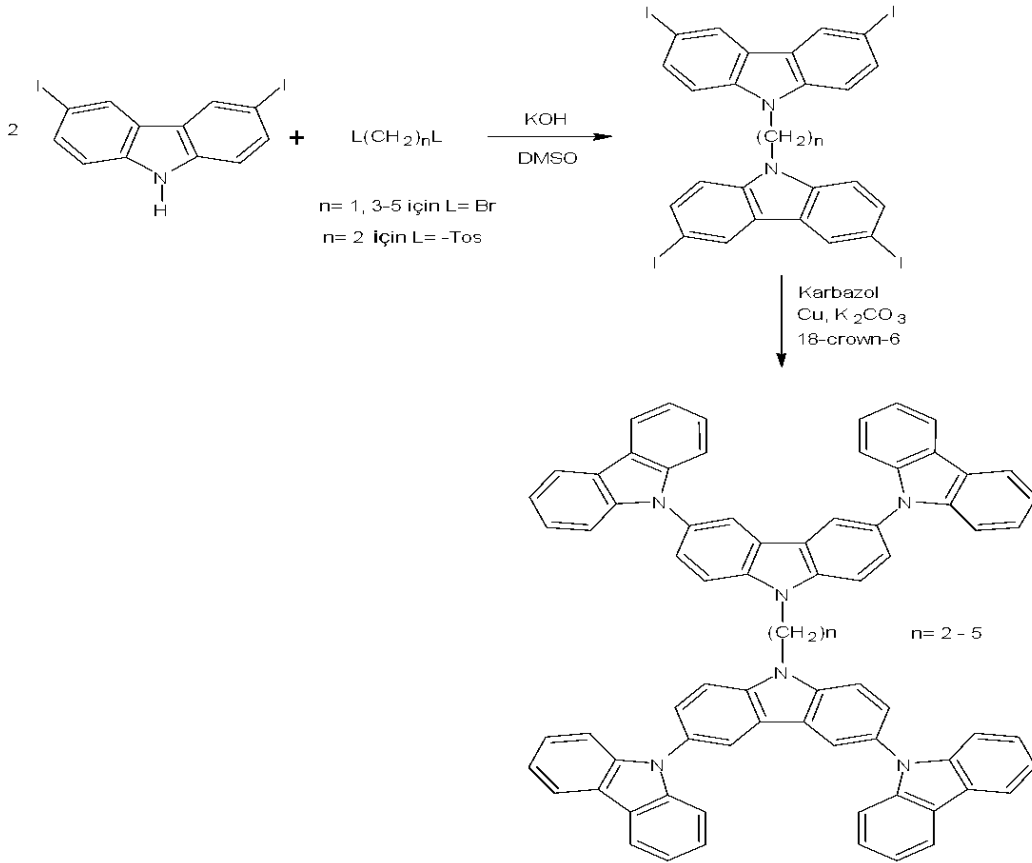


Şekil 3: 3,6-diiyodokarbazolun sentezi.

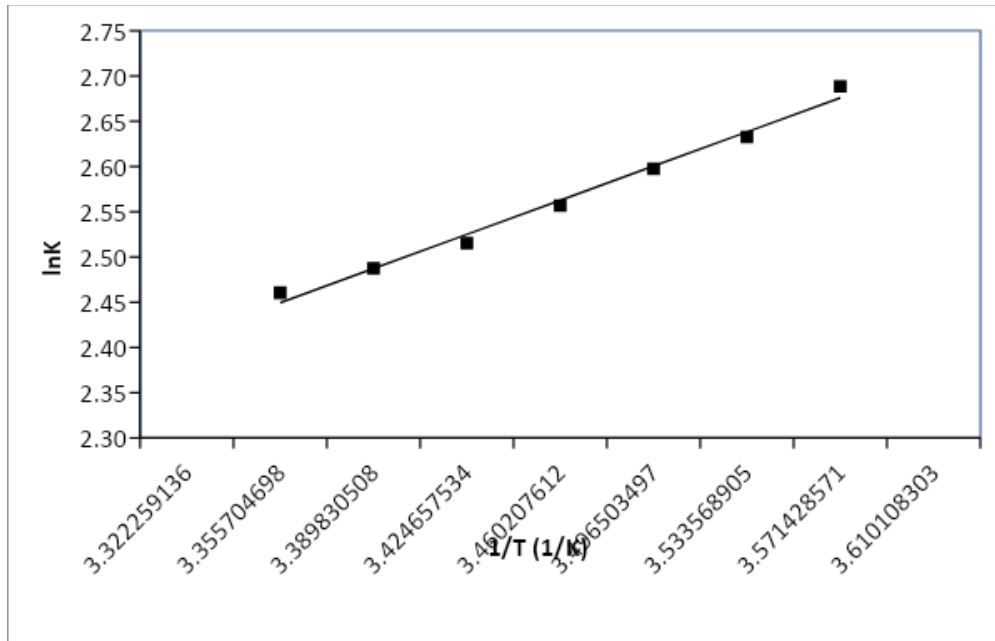
Denklem (1)’ de verilen van’ t Hoff denkleminde ΔH ve ΔS değerleri hesaplandı (Sato, 2017):

$$-\Delta H/R + \Delta S = \ln AD_0 - AA_0 - A \quad (1)$$

Denklem (1)’ de ΔH (kcal/mol) kompleksleşmenin entalpi değişimini, ΔS kompleksleşme entropi değişimini, R ideal gaz sabit değerini (1.986 cal/K mol), T (K) ise kompleksin denge sıcaklığını, $[D]_0$ donörün başlangıç molar derişimini, $[A]_0$ tetranitromethane başlangıç molar derişimini göstermektedir. Şekil 4’de 1,n-di[3,6-di(karbazol-9-il)karbazol-9-il]alkanların sentezidir. Şekil 5’de tetraşıanoetilen kompleksinin van’t Hoff grafiği yer almaktadır.

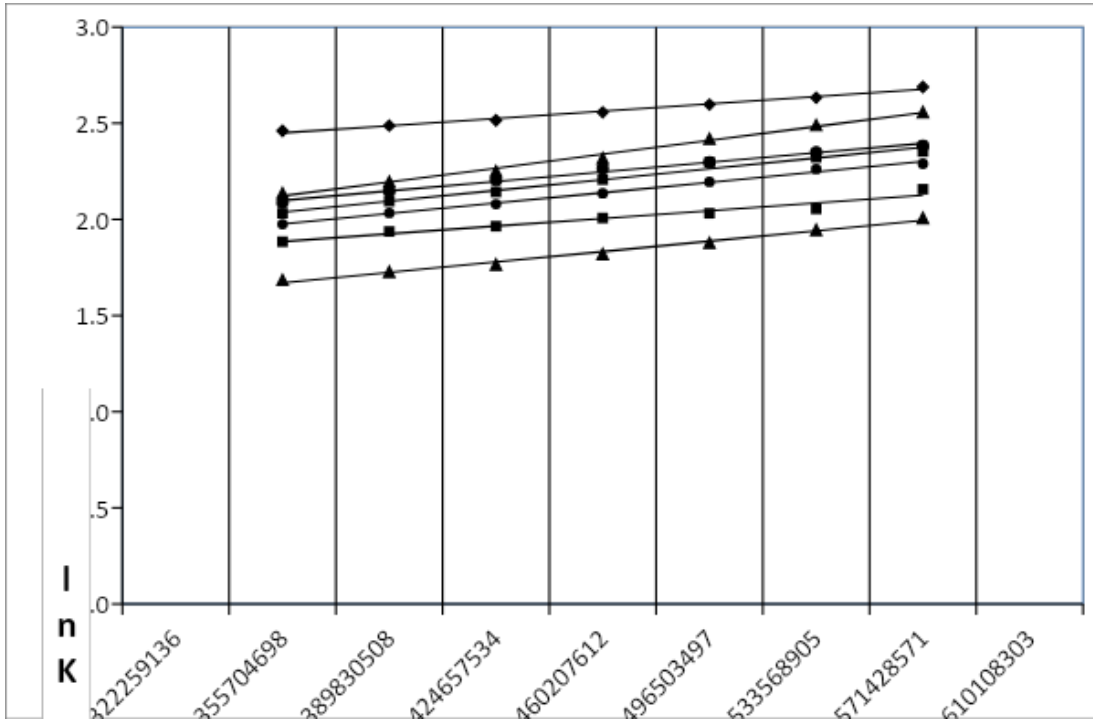


Şekil 4: 1,n-di[3,6-di(karbazol-9-il)karbazol-9-il]alkanların sentezi.



Şekil 5: 3,6-di(karbazol-9-il)-9-etilkarbazol- tetraiyanoetilen kompleksinin van't Hoff grafiği

Şekil 6'daki pozitif eğimden dolayı kompleksleşmenin ekzotermik olduğu sonucuna varılmıştır.



Şekil 6: Karbazol bileşiklerinin tetraşiyanoetilen ile oluşturduğu komplekslerin van' t Hoff grafiği

SONUÇ

Karbazol bileşiklerinde yük-transfer komplekslerin fotoiletkenlik davranışlarında değişiklikler meydana gelir. Bu amaçla içerisinde karbazol taşıyan ürünler sentezlenmiş ve bunların oluşturduğu yük-transfer komplekslerinin özellikleri incelenmiştir. Bu çalışmada 3,6-di(karbazol-9-il)-9-etilkarbazol ve 3,6-di(karbazol-9-il)-9-heksilkarbazol ile 1,n-di[3,6-di(karbazol-9-il)karbazol-9-il]alkanların tetraşiyanoetilen ve tetranitrometan ile kompleksleşme özellikleri incelenmiştir. Donör ve akseptör komplekslerinin mavi ve mor karışımı renk oluşturdukları gözlemlenmiştir. Yük-transfer komplekslerinde temel etkileşim anlık dipol-dipol yönelimleri, London ve van der Waals etkileşmelerinden dolayıdır. Yük transferinde boyut ve temel bileşenler arasındaki bağ kuvveti, donörün iyonlaşma potansiyeli I_D ve akseptörün elektron ilgisi E_A ile beraber değerlendirilir. Kompleksin uyarılmış halinde ise elektronların D'den A'ya tam aktarımını içeren durumdur. Yük-transfer komplekslerinin bileşenlerini elektron donör ve akseptör oluşturduğu için yük-transfer kompleksin denge sabiti akseptör komplekslerine de bağlıdır (Goetz, 2014).



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1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

ISPARTA MİLLİ PARK VE TABİAT PARKLARINDAKİ GÜNÜBİRLİK KULLANIM ALANLARININ ORTOPEDİK ENGELLİ KULLANIMI AÇISINDAN İNCELENMESİ

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Özet

Bu çalışmada, Isparta ili milli park ve tabiat parklarındaki günübirlük kullanım alanlarında ortopedik engelli ziyaretçilere yönelik çalışmaların incelenmesi ve eksikliklerin değerlendirilmesi amaçlanmıştır. Bu amaçla, Koca Gölü Milli Parkı, Kızıldağ Milli Parkı, Isparta Gölcük Tabiat Parkı, Yazılı Kanyon Tabiat Parkı ile Başpınar Tabiat Parkı günübirlük kullanım alanlarında yer alan alt yapı ve donatıların özellikle ortopedik engellilere yönelik oluşturulmuş standartlara uygun olup olmadığının tespiti için gözlem ve tespit yöntemi kullanılmıştır. Çalışma alanlarında bulunan yaya-yürüyüş yolları, rampalar, merdivenler, otoparklar, bazı donatı elemanları (piknik üniteleri, oturma bankları, çöp kutuları, aydınlatma elemanları, çeşmeler, pergola-çardak, köprü, çocuk oyun alanları) ve tesis girişlerinin genel olarak engellilere yönelik standartlar kapsamında yeterli düzeyde olmadığı ortaya çıkmıştır. Sonuç olarak, Isparta ili Milli Park ve Tabiat Parklarında bulunan günübirlük kullanım alanlarının yeni tasarım ve uygulamalar ile her ziyaretçi için erişilebilir kılınması gerekmektedir. Türkiye’de yerleşim yerlerinde, dış mekanlarda ve özellikle insanların rekreasyon ihtiyaçlarını giderdiği açık-yeşil alanlarda toplumun her bireyi için erişilebilir tasarım ve uygulamalara yer verilmesinin önemi gün geçtikçe artmaktadır. Korunan alanlar bünyesinde rekreasyon amaçlı ziyaretçi kullanımına izin verilen günübirlük kullanım alanlarında, engelli ziyaretçilerin kullanımına uygun alt yapı çalışmalarına, tasarım ve uygulamalara yer verilerek her birey için erişilebilirlik ve fırsat eşitliği sağlanmalıdır.

Anahtar Kelimeler: Isparta, Milli park, Tabiat parkı, Günübirlük kullanım alanı, Ortopedik engelli birey



INVESTIGATION OF DAY USE AREAS IN NATIONAL PARKS AND NATURE PARKS IN ISPARTA IN TERMS OF USE OF ORTHOPEDIC DISABLED PEOPLE

Abstract

In this study, it was aimed to examine the works for orthopedically disabled visitors in the day use areas in the national parks and nature parks in Isparta and to evaluate the deficiencies. For this purpose, observation and detection methods were used to determine whether the infrastructure and equipment in the day use areas of Kovada Lake National Park, Kızıldağ National Park, Isparta Gölcük Nature Park, Yazılı Canyon Nature Park and Başpınar Nature Park comply with the standards established especially for orthopedically disabled people. It was revealed that pedestrian-walking paths, ramps, stairs, parking lots, some equipment elements (picnic units, seating benches, garbage bins, lighting elements, fountains, pergola-pergola, bridge, children's playgrounds) and facility entrances in the study areas were generally not at a sufficient level within the scope of standards for disabled people. As a result, day use areas in the National Parks and Nature Parks in Isparta need to be made accessible to every visitor with new designs and applications. In Turkey, the importance of including accessible designs and applications for every individual of the society in residential areas, outdoor spaces and especially in open-green areas where people meet their recreational needs is increasing day by day. Accessibility and equality of opportunity should be ensured for every individual by including infrastructure works, designs and applications suitable for the use of disabled visitors in day use areas where visitors are allowed to use for recreational purposes within protected areas.

Keywords: Isparta, National park, Nature park, Day-use area, Orthopedic disabled individual

GİRİŞ

Engelli, vücudunda eksik veya kusuru bulunanlar olarak tanımlanmaktadır (TDK, 2023). 5378 Sayılı Engelliler Kanununa göre engelli; doğuştan veya sonradan bedensel, zihinsel, duyuşal ve sosyal yeteneklerini çeşitli derecelerde yitirmesi sebebiyle toplumsal yaşama uyum sağlama ve günlük gereksinimlerini karşılama güçlükleri olan olarak tanımlanmaktadır. Birleşmiş Milletler Engelli Kişilerin Haklarına Dair Uluslararası Sözleşmesi ile engelli bireylere eşitlik, haysiyet, özerklik ve topluma tam katılım tanınmıştır (Azarkan ve Benzer 2018). Türkiye'nin 2009 yılında onayladığı Birleşmiş Milletler sözleşmesi erişilebilirlik, yaşama hakkı, adalete erişim, bağımsız yaşam ve topluma dahil olma, düşünce ve ifade özgürlüğü, bilgiye erişim, eğitim, sağlık, rehabilitasyon, istihdam, siyasal ve kamusal yaşama katılım gibi tüm hakların engelliler açısından hayata geçirilmesi ve gereken tedbirlerin alınması için devletleri yükümlü kılmaktadır (Anonim, 2023a).

Erişilebilirlik, engelli bireyler için sahip olduğu haklardan yararlanması (Menteş vd., 2015), haklarını kullanabilme, bağımsız yaşam ve toplumsal yaşamın her alanına katılabilme koşuludur (Çağlar, 2012). Engellilerin günlük yaşamlarını başka bireylere bağı kalmadan, kentlerde yaşayan diğer insanlarla eşit ve birlikte yürütebilmelerinin temel koşulu, fiziksel çevrenin erişim sorunlarının ortadan kaldırılmasından geçmektedir (Yücesoy vd., 2007). Fiziksel engeller hareket özgürlüğünü kısıtlamak dışında, iş, eğitim, sağlık, spor, rekreasyonel aktivite gibi pek çok ekonomik ve sosyal aktivitenin erişimine de engel olmaktadır (Menteş vd., 2015). Engellilerin bağımsızca ve insan onuruna uygun yaşam sürebilmeleri için toplumun diğer bireyleriyle eşit şekilde fiziksel çevreye, ulaşım, bilgiye, teknoloji ve iletişime, halka açık tesis ve hizmetlere erişim olanakları sağlanmalıdır (Çağlar, 2012).

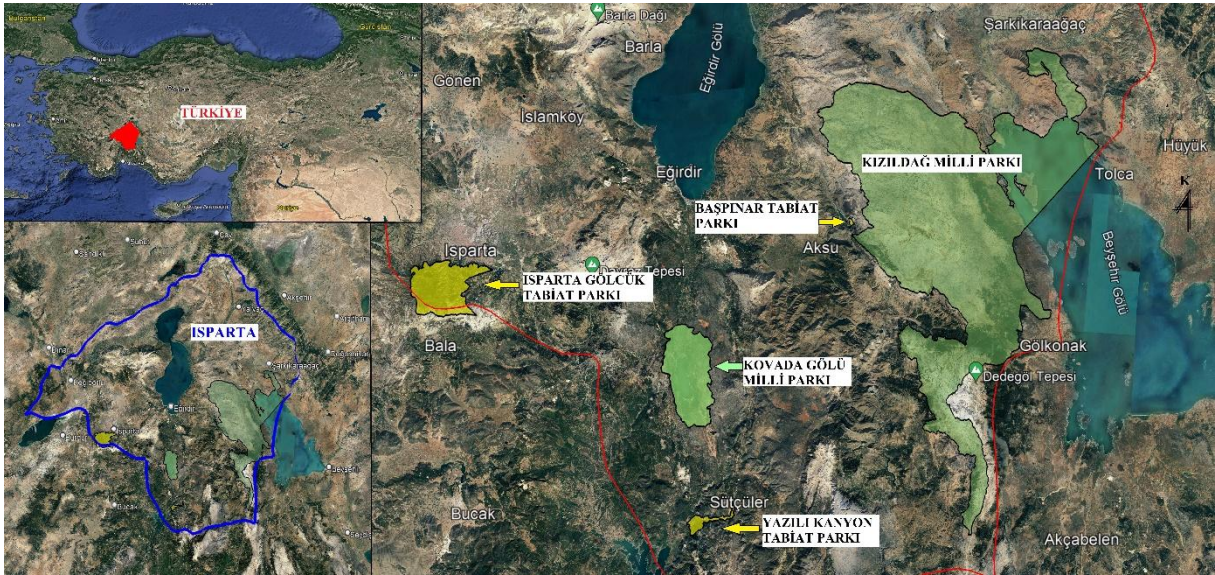
Bireyin sosyal hayata katılımında mekânların ulaşılabilir ve erişilebilir olması büyük önem taşıdığından, engelli bireylerin diğer bireyler gibi engelsiz bir yaşam sürdürebilmeleri için bütün mekânların engelli bireyler için de ulaşılabilir biçimde tasarlanması gerekmektedir (Olgun ve Yılmaz, 2014). Ancak doğal korunan alanların yönetimi toplumdaki her birey için eşit erişim sağlamamaktadır (Aguilar-Carrasco vd., 2022). Doğal alanlara engellilerin erişimini sağlamak insani bir zorunluluktur. Biyolojik çeşitlilik, doğal ve kültürel değerleriyle korunan alanları koruma, tanıma ve değerlerinin önemsenmesi toplumdaki her birey ve grubun temel hakkı ve ihtiyacıdır. Türkiye' de engellilerin korunan alanlara erişim konusu oldukça yeni olmakla birlikte, engelli erişimi konusunda korunan alan yönetimi ve diğer ilgili tarafların bilgi ve farkındalığı düşüktür (Yenilmez-Arpa vd., 2015).

Türkiye'de yürütölen çalışmalarda engellilerin kentsel açık yeşil alan ve diğer kamusal alanlarda ulaşılabilirliği ve erişilebilirliği ile mekânların engelliler açısından standartlara uygun olup olmadığı incelenmiştir. Yenilmez Arpa (2017) engelli ziyaretçilerin korunan alanlara erişiminin desteklenmesi; Küre

Dağları Milli Parkı Örneği çalışmasında hayata geçirilen “Engelli Dostu Milli Park; Küre Dağları Projesi”nde engelli erişimini destekleyen iki önemli park yapısının (ziyaretçi merkezi ve parkur) milli parkta hayata geçirilmesine ilişkin etüt, envanter, tasarım ve uygulama süreçleri incelemiştir. Ancak, Türkiye'nin diğer korunan alanlarında günübirlik faaliyetlerin gerçekleştiği Milli park ve Tabiat parklarında engellilere yönelik çalışmaların incelenmesi konusunda çalışmalar bulunmamaktadır. Bu çalışmada, Isparta ilinde bulunan Milli Park ve Tabiat Parklarında rekreasyon faaliyetlerinin gerçekleştirildiği günübirlik kullanım alanlarında engellilerin alan içerisinde korunan alanın kaynak değerlerine ve rekreasyonel faaliyetler için fiziksel alt yapı ve çevre düzenlemelerine ulaşılabilirliğinin incelenmesi, eksikliklerinin değerlendirilmesi ve çalışma sonucundan günübirlik kullanım alanlarında yapılacak peyzaj tasarım ve uygulamalarına katkı sunması amaçlanmaktadır.

MATERYAL VE YÖNTEM

Çalışma alanı olarak Isparta ilinde bulunan Kızıldağ Milli Parkı, Kovada Gölü Milli Parkı, Isparta Gölcük Tabiat Parkı, Yazılı Kanyon Tabiat Parkı ve Başpınar Tabiat Parkı'nda bulunan günübirlik kullanım alanları seçilmiştir.



Şekil 1. Çalışma alanlarının konumu

Kızıldağ Milli Parkı, barındırdığı biyolojik, jeomorfolojik, jeolojik, kültürel, peyzaj ve rekreasyonel kaynak değerleri ile korunması ve gelecek kuşaklara aktarılması amacıyla 09.05.1969 tarihinde 2316 hektar, 1993 yılında 59400 hektar ve 2018 yılında ise 80200,42 hektar olarak ilan edilerek alanı artırılmıştır. Milli Park Şarkikaraağaç, Yenişarbademli, Aksu, Eğirdir, Sütçüler ilçeleri sınırlarında kalmakta ve 37° 28' 30'' - 38° 31' 21'' kuzey enlemleri ile 31° 31' 37'' - 31° 30' 12'' doğu boylamları arasında yer almaktadır (Şekil 1). Kuzeyinde Şarkikaraağaç İlçe merkezi, Beyköy, Şarkikaraağaç-Beyşehir asphaltı, doğusunda Kıyakede, Köyü,

Fele Köyü Beyşehir Gölü, güneydoğusunda Gölyaka köyü ve Yenişarbademli ilçesi, güneyinde Sütçüler İlçesi sınırlarında yer alan Aşağıkartoz, Aşağıyaylabel ve Yukarıyaylabel köyleri, güneybatısında Eldere Köyü, Aksu Yaka Kanyonu, batısında Aksu ilçesi, Sarıidris Bağacık Köyleri ve Anamas Yaylası bulunmaktadır (Anonim, 2023b).

Kovada Gölü Milli Parkı, Kovada Gölü ve çevresi 03.11.1970 yılında 790 hektarlık kısmı göl yüzeyi olmak üzere 6.534 hektar alan ile Milli Park ilan edilmiştir. Kovada Gölü'nün meydana geliş şekli ile Batı Toroslar'da görülen karstik göllere benzemektedir. Tektonik bir polye olan göl, havzaya düşen yağmur sularının fiziksel ve kimyasal aşınmasına eklenen tektonik yer hareketleriyle şekillenmiştir. Eğirdir Gölü'nün güneye doğru uzantısı olan Kovada Gölü, aradaki dar vadinin zamanla alüvyonlarla dolması sonucunda bugünkü şeklini almıştır. Deniz seviyesinden 908 metre yükseklikte, kıyı uzunluğu 18.800 metre ve 6 metre derinliğe sahiptir. Kovada Gölü Milli Parkı jeomorfolojik yapısı ve barındırdığı doğal kaynaklarıyla bölgesel ve ülkesel ölçekte önemli bir konumdadır. Milli Park Eğirdir ve Sütçüler ilçeleri sınırları içerisinde $37^{\circ} 34' 47''$ - $37^{\circ} 42' 24''$ kuzey enlemleri ile $30^{\circ} 50' 45''$ - $30^{\circ} 55' 53''$ doğu boylamları arasında yer almaktadır (Şekil 1). Milli Park sınırı, güneyde Kınalı Tepe ile Torlu Tepe arasındaki vadiden Abkel Tepe'ye, doğuda Türkmen Dağı eteklerinden Mihliardıç mevkiinde bulunan Aluç Tepe'ye, kuzeyde Aşağıkızılkuyu mevkiinde bulunan Armutlusori Tepe'den Sortusivri Tepe'ye ve batıda Gazelli sırtlarına ulaşmaktadır (Anonim, 2008a).

Isparta Gölcük Tabiat Parkı, 1991 yılında Gölcük Gölü ve çevresi ile Tabiat Parkı olarak ilan edilmiştir. 28.04.2000 tarihinde sınırları revize edilerek 5.925 hektar alan Tabiat Parkı ilan edilmiştir (Anonim, 2008b). Son olarak 24.11.2023 tarih ve 7886 sayılı Cumhurbaşkanın Kararı ile sınırları tekrar revize edilmiş ve alanı 4983,34 hektar olarak değiştirilmiştir (Resmi Gazete, 2023). Tabiat Parkı bitki örtüsü, yaban hayatı, jeolojik ve jeomorfolojik yapısı ve peyzaj zenginliği kaynak değerlerini oluşturmaktadır. Isparta Merkez ilçe sınırları içerisinde $37^{\circ} 41' 04''$ - $37^{\circ} 45' 03''$ kuzey enlemleri ile $30^{\circ} 27' 40''$ - $30^{\circ} 35' 33''$ doğu boylamları arasında yer almaktadır (Şekil 1). Kuzey batısında Gelincik ve Yakaören Köyleri, güney doğusunda Darıdere Köyü, güneyinde ve güneybatısında Burdur İli sınırları bulunmaktadır. Krater gölü olan Gölcük Gölü deniz yüzeyinden 1378 metre yükseklikte, yüzölçümü 76 hektar, kıyı uzunluğu 3.647 metre, gölün çapı 1500 metre, derinliği ise yer yer 32 metredir. Göl çevresi Ulukız Tepe, Kirazlı Tepe ve Pilav Tepenin yer aldığı yaklaşık 1100 hektarlık kapalı bir havzadır (Anonim, 2008b).

Yazılı Kanyon Tabiat Parkı, 05.09.1989 tarihinde 600 hektar büyüklüğü ile Tabiat Parkı olarak ilan edilmiştir. Jeomorfolojik yapısı, bitki örtüsü, yaban hayatı ve içinde barındırdığı arkeolojik değerleriyle birlikte önem kazanmaktadır. Alanda Yazılı Kaya Hitabesi ve Tapınak, Psidia (Adada) harabelerinden Aspendos'a giden taş döşeme kral yolu, tarihi mağara bulunmaktadır. Tabiat Parkı, Isparta İlinin güneybatısında bulunan

Sütçüler İlçesinin güneybatısında 37° 27' 22" - 37° 29' 37" kuzey enlemleri ve 30° 54' 16" - 30° 58' 26" doğu boylamları arasında yer almaktadır (Şekil 1). Sınırı, güneyde Asarboynu Tepe'den Sazaklık Tepe sırtlarına, doğuda Yeşildere Mahallesi'nin batısından kuzey uç noktada Mahmulunduğu mevkiine, kuzey girintide Kuzusivri Tepe sırtlarında, batıda Kayadibi Pınarı'ndan Dedeli Tepe sırtlarına kadar ulaşmaktadır (Anonim, 2008c).

Başpınar Tabiat Parkı ise, 11.04.2006 tarihinde "Başpınar Mesire Yeri" (A Tipi) 11.07.2011 tarihinde ise Tabiat Parkı olarak ilan edilmiştir. 39.50 hektar alan büyüklüğüne sahip Tabiat Parkı Aksu ilçesi sınırlarında yer almaktadır (Şekil 1). Aksu Çayı'nın ana kaynağı, dere/akarsu ve orman ekosistemi ile çevresinin ekolojik, biyolojik (flora-fauna) ve peyzaj değerlerine sahip bir alandır. Sınırı, kuzeyde Sorgun Barajı'na giden köprüden Kurupınar Çeşme'ye, Kavacık Alanı, kurudereden takiple sırta kadar, doğusu batıya bakan sırtı takiple Kanlışme Tepe, Katran Tepe, Büyük Ermili Tepe eteklerinden 1952 Rakımlı Tepe, Arılıkboğazı Dere Mevkiisi, güneyi Arılıkboğazı Dere Mevkii'nden Karagöz Pınarı'ndan sırta, batısı Boyalı Tepe, Leylek Tepe, Çark Tepe, orman sınırından Sorgun Yaylası'na çıkan köprüye kadar olan alanla sınırlıdır (Anonim, 2019).

Çalışma alanları sınırları içerisinde ziyaretçiler tarafından rekreasyonel amaçlı kullanılan gününbirlik kullanım alanlarında bulunan yaya-yürüyüş yolları, rampalar, merdivenler, otoparklar, alanlardaki bazı donatı elemanları (piknik üniteleri, oturma bankları, çöp kutuları, aydınlatma elemanları, çeşmeler), pergola-çardak, köprü, çocuk oyun alanları ve tesis girişlerinin engelli ziyaretçiler tarafından erişilebilirliği ve engellilere yönelik oluşturulmuş standartlara (TS 12576, 1999; BM, 2004; ÖZİDA, 2008) uygun çalışmaların yapıp yapılmadığı, yapılmış ise yapılan çalışmaların uygunluğunun tespitinde gözlem ve tespit yöntemi kullanılmış ve elde edilen veriler alandan alınan fotoğraflarla desteklenmiştir.

BULGULAR VE TARTIŞMA

Yaya-Yürüyüş Yolları

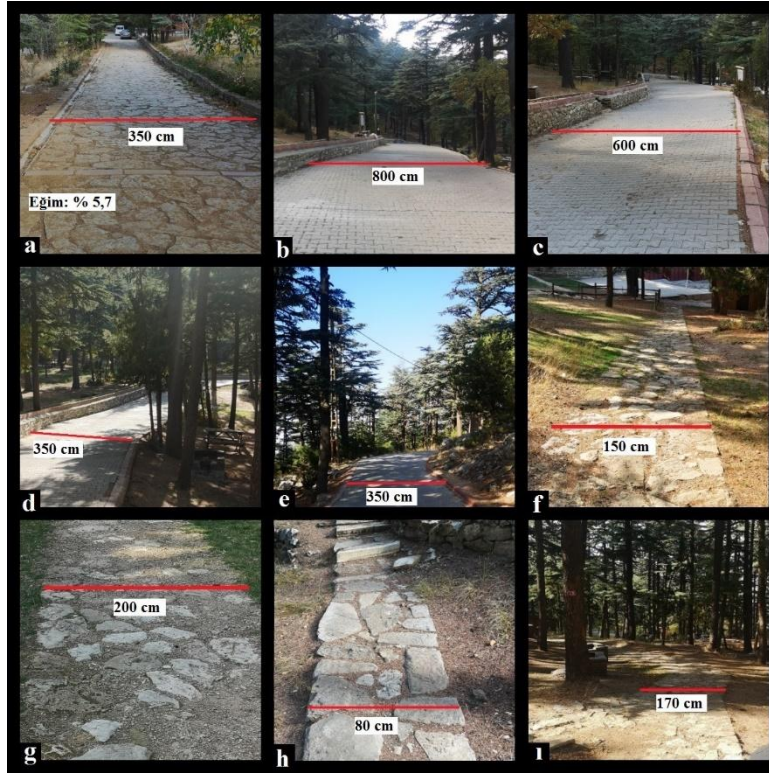
Çalışmaya konu Milli Park ve Tabiat Parkları Gününbirlik Kullanım Alanlarında (GKA)'da bulunan bazı yollar genişliklerine bağlı olarak araç, yaya ve yürüyüş yolları olarak kullanılmaktadır. Araç yolları da araç haricinde yine ziyaretçiler tarafından yaya-yürüyüş yolu olarak kullanılmaktadır.

Çalışma alanlarında yaya-yürüyüş yollarına ait tespitler ve engellilere yönelik standartlar Çizelge 1'de ve GKA'larından elde edilen fotoğraflara Şekil 2-5'te yer verilmiştir. Kızıldağ Milli Parkı GKA'nda bulunan araç yolu ve yaya-yürüyüş yolları genişlikleri (ortalama 150 cm) değişkenlik göstermekte ve yaya yolu standartlarına (150-200 cm) hem uygun (Şekil 2a-1) hem de uygun olmayan (Şekil 2h) yollar bulunmaktadır. Parke taşı ile döşenen yollar engelli ziyaretçilerin kullanımına uygundur. Ancak kayrak taşı ile döşenmiş

yolarda kayrak taşlarının arasındaki boşluklar, taş seviyelerinin farklı olması ve yol döşemelerinde bulunan yer yer bozulmalardan dolayı bebek arabaları, görme engelliler ve tekerlekli sandalye kullanan engelli ziyaretçiler açısından engel oluşturmaktadır.

Çizelge 1. Çalışma alanlarında yaya-yürüyüş yolu bulguları ve engellilere yönelik standartların karşılaştırılması

	Yaya-Yürüyüş Yolları		
	Genişlik	Eğim	Yüzey Kaplama
Standartlar	En az 150 cm, en ideal 200 cm (ÖZİDA, 2008)	%2 (TS 12576, 1999)	Kaygan olmayan, kolay dolaşılacak, seviye değişiklikleri oluşturmayacak, aynı seviyede zemin olmalıdır (TS 12576, 1999)
Kızıldağ MP GKA	Değişken - Ortalama -150 cm (Araç yolu olarak ta kullanılan yollar hariç)	%5,7	Parke taşı, Kayrak taşı
Kovada Gölü MP GKA	Değişken – Ortama 115 cm	-	Ahşap, Kayrak taşı, Doğal zemin (Patika), Mıcır
Isparta Gölcük TP GKA	Değişken- Ortama 170 cm	-	Parke taşı, Kayrak taşı, Stabilize toprak
Yazılı Kanyon TP GKA	Değişken – Ortama 300 cm	%7	Toprak
Başpınar TP GKA	Araç yolu – 550 cm	-	Sıkıştırılmış toprak – mıcır



Şekil 2. Kızıldağ Milli Parkı GKA'nda bulunan bazı araç, yaya- yürüyüş yolları

Kovada Gölü Milli Parkı GKA'nda yaya-yürüyüş yolları genişlikleri (ortalama 115 cm) değişkenlik göstermekte ve yaya yolu standartlarına (150-200 c), sadece Şekil 3a'da yer verilen yol uygun genişliğe sahiptir. Kayrak taşı zemine sahip yaya-yürüyüş yolunda (Şekil 3a) taşlar arasındaki boşluklar ve ani seviye değişiklikleri bulunmaktadır ve eğim açısından (%5,7) standartlara (%2) uymamaktadır. Mıdır malzeme kullanılan yaya-yürüyüş yolu (Şekil 3b) stabil zemine sahip değildir. Alanda bulunan seyir kulesine giden yaya-yürüyüş yolları, doğal zemini düzelterek oluşturulan patika yollarında (Şekil 3c-d) ani seviye değişiklikleri taş- kaya çıkıntıları bulunmaktadır. Ahşap yürüyüş yaya-yürüyüş yolu (Şekil 3e-f) zemini engel bulundurmamaktadır. Şekil 3e-f'de gösterilen yaya-yürüyüş yolu haricinde GKA'nda bulunan diğer yaya-yürüyüş yolları bebek arabaları ve tekerlekli sandalye kullanan engelli ziyaretçiler tarafından kullanımı uygun değildir.



Şekil 3. Kovada Gölü Milli Parkı GBK'nda bulunan bazı yaya- yürüyüş yolları

Isparta Gölcük Tabiat Parkı GBK'nda yaya-yürüyüş yolları genişliklerinde (ortalama 170 cm) yaya yolu standartları (150 -200 cm) açısından farklılıklar bulunmaktadır. Kayrak taşı döşenmiş yaya-yürüyüş yollarının genişliği (120, 100 cm) genişlik standartlarının (150 -200 cm) altında kalmakta ve zemin kaplamalarında deformeler olması tüm ziyaretçilerin kullanımı için tehlike arz etmektedir (Şekil 4a-b). Çimento derz kullanılarak oluşturulmuş kayrak taşı döşeme yaya-yürüyüş yolu (Şekil 4c) ve park taşları ile döşenmiş yaya-yürüyüş yolu (Şekil 4d) en ideal yaya yolu standartlarında (200 cm), tüm ziyaretçilerin için engel bulundurmayacak şekilde inşa edilmiştir. Gölcük gölü etrafında bant şeklinde oluşturulmuş yaklaşık 4500 m uzunluğa sahip stabilize toprak yaya-yürüyüş yolu 200-250 cm arasında genişliğe sahiptir (Şekil 4e-f). Stabilize kabiliyetini kaybetmiş kısımları haricinde engelli ziyaretçiler açısından kullanılabilir düzeydedir.



Şekil 4. Isparta Gölcük Tabiat Parkı GBK'nda bulunan bazı yaya- yürüyüş yolları

Yazılı Kanyon Tabiat Parkı GKA'nından kanyon oluşumu içinde bulunan derenin kenarında oluşturulmuş güzergahı üzerinde kaya yazıtı olan yaya-yürüyüş yolu (Şekil 5a-b) yaya yolu standartları (150-200 cm) üzerinde farklı genişliklere (250-350 cm) sahip yer yer eğimli (%7) olmasından dolayı yaya yolu eğim standardına (%2) uymayan stabilize toprak yoldur. Dere kenarı boyunca belli bir kısmına kadar gidilebilmektedir. Kaya yazıtı kısmından çelik köprü vasıtasıyla ile derenin diğer tarafına geçilerek tekrar GKA'na ulaşılmaktadır. Ancak derenin diğer kısmında kalan yürüyüş yolu, dar patika yol olması ve doğal zeminde engelli olmasından kaynaklı engelli ziyaretçilerin kullanımı için uygun değildir (Şekil 5c). Başpınar Tabiat Parkı GKA'nda ise mevcut yaya-yürüyüş yolu bulunmamaktadır. Alan içerisinde yer alan mıcır malzeme serilmiş stabilize orman yolu (550 cm) ziyaretçileri tarafından yaya-yürüyüş yolu olarak ta kullanılmaktadır. Mıcır yapısından dolayı tekerlekli sandalye kullanan ziyaretçiler açısından uygun bir yapıda değildir (Şekil 5d).



Şekil 5. Yazılı Kanyon (a,b,c) ve Başpınar (d) Tabiat Parkkları GBK'nda bulunan bazı yaya- yürüyüş yolları

Rampalar

Çalışma alanlarında rampalara ait tespitler ve engellilere yönelik standartlar Çizelge 2'de ve GKA'larından elde edilen fotoğraflara Şekil 6 ve 7'de yer verilmiştir. Kızıldağ Milli Parkı GKA'nda bulunan ve eğimli bir alana sahip çadırli kamp alanı ana yoldan 50-100 cm'lik yükseklikte inşa edilmiş istinat duvarı ile ayrılmıştır. Çadırli kamp alanına ana yoldan rampa-merdiven yardımıyla ulaşılmaktadır. Şekil 6a'da yer verilen çadırli kamp alanında bulunan rampanın genişliği (80 cm) standarda (tek yönlerde en az 90 cm) ve uygun genişliğe sahip değildir. Eğimi (%50) standardın (En çok %8) çok üzerinde yer almaktadır. Eğim açısından tüm ziyaretçiler açısından kullanıma uygun olmamakla birlikte ön kısmında basamak şeklinde 30 cm'lik yükseklik bulunması nedeniyle kullanıcılar açısından tehlike oluşturmaktadır. Yüzeyi sert, stabil ve az pürüzlü betonarme dokudan oluşmaktadır. Kovada Gölü Milli Parkı GKA'da İdare ve Ziyaretçi Tanıtım Merkezi binası giriş terasına merdiven haricinde oluşturulan ahşap rampa (Şekil 6b, 6c) ile İdare ve Ziyaretçi Tanıtım Merkezi binası giriş terasına ve teras kısmından Kovada Gölü kenarında oluşturulmuş ahşap iskele giden yaya-yürüyüş yoluna bağlanmaktadır. Ahşap rampa genişliği (120 cm) engellilere yönelik rampa standardına (tek yönlerde en az 90 cm) uygun tasarlanmıştır. Rampa eğimi (%15) standardı (%8) karşılamamaktadır. Rampa sahanlığı (200*200 cm) boyutları standartların (En az 150*150 cm) üzerinde olmasından dolayı uygundur. Ancak sahanlık zemini yarı ahşap ve deforme olmuş karo seramik döşeme (Şekil 6b) olması nedeniyle seviye değişikliği bulunduğundan engelli ziyaretçi kullanımına uygun değildir.

Isparta Gölcük tabiat Parkı GKA’nda betonarme yüzeye sahip (Şekil 6e) rampa toprak zeminden asfalt ulaşım yoluna çıkmaktadır. Rampa eğimi (%9) rampa standardına (%8) göre yüksek değerdedir. Rampa genişliği (300 cm) standartlara (çift yönlerde en az 180 cm) uygundur ancak küpeşte ve tırabzana yer verilmediğinden engelli ziyaretçilerin destek almadan kullanabileceği standartta değildir. Kuter ve Çakmak (2017) 20 cm’den yüksek kot farkı olan rampanın bir ya da iki tarafına küpeşte konulması gerektiğini belirtmiştir. Alanda engelli tuvaletlerin girişlerinde yer verilen rampaların tırabzan yükseklikleri (90 cm) standartlara (80-90 cm) uygun yerleştirilmiş ve yüzeyleri çimento ile yerleştirilen kayrak taşı döşeme yapılmıştır (Şekil 6e-f). Rampa genişlikleri (6f: 120 cm, 6e: 100 cm) standartlara (tek yönlerde en az 90 cm) uygun genişliklere sahiptir. Şekil 6e’de bulunan rampa eğimi (%8) standartlara (en çok %8) uygun ve tekerlekli sandalye kullanan engelli ziyaretçilerin destek almadan kullanımına elverişliyken Şekil 6f’te yer verilen rampa eğimi (%20) uygun olmadığından destek almasını gerektirmektedir. GKA’da bulunan kır gazinosu girişinde bulunan rampa (Şekil 6h) uygun yüzeye sahip olmasına rağmen küpeşte ve tırabzan montajı yapılmamış ve sahip olduğu eğim (%9) standardının (en çok %8) üstündedir. Engelli ziyaretçilerce destek alınmadan kullanmakta zorlanacağı rampa genişliği (120 cm) standartlara (tek yönlerde en az 90 cm) uygun genişliği bulunmaktadır. Yazılı Kanyon ve Başpınar Tabiat Parkı GKA’larında rampa kullanımlarına yer verilmemiştir.

Çizelge 2. Çalışma alanlarında rampa bulguları ve engellilere yönelik standartların karşılaştırılması

	Rampalar					
	Genişlik	Eğim	Sahanlık	Küpeşte	Tırabzan Yüksekliği	Yüzey Kaplama
Standartlar	Tek yönlerde en az 90 cm, Çift yönlerde en az 180 cm (TS 12576,1999)	En çok %8 (TS 12576, 1999)	En az 150*150 cm (TS 12576,1999)	En az 5 cm (TS 12576,1999)	80-90 cm (ÖZİ, 2011)	Sert, stabil, kaymaz ve çok az pürüzlü malzeme ile kaplanmalıdır. Pürüzlük seviyelerinde 2 cm’den büyük farklılık olmamalıdır (TS 12576,1999)
Kızıldağ MP GKA	Tek Yön -80 cm	%50	-	-	-	Betonarme, Kayrak Taşı
Kovada Gölü MP GKA	Tek Yön- 120	%15 %33	200*200 cm	10 cm	100 cm	Ahşap
Isparta Gölcük TP GKA	Değişken – Ortama 152 cm	%9, %20, %8	-	5 cm	90 cm	Betonarme, Kayrak Taşı, Karo Seramik
Yazılı Kanyon TP GKA	-	-	-	-	-	-
Başpınar TP GKA	-	-	-	-	-	-



Şekil 6. Kızıldağ (a), Kovada Gölü (b, c, d) Milli Parkları ve Isparta Gölcük Tabiat Parkı (e, f, g, h) GKA'nda yer alan rampalar

Merdivenler

Çalışma alanlarında merdivenlere ait tespitler ve engellilere yönelik standartlar Çizelge 3'te ve GKA'larından elde edilen fotoğraflara Şekil 7 ve 8'de yer verilmiştir. Kızıldağ Milli Parkı GKA eğimli bir topografyaya sahip olduğundan alanın birçok yerinde yaya-yürüyüş yolları ve sınırlandırılmış alan geçişlerde merdiven kullanılmıştır. Merdiven genişlikleri değişiklik göstermekte olup genişlik ortalamaları (134 cm) ve standartların (en az 180 cm) altında bir ölçüye sahiptir. Alanda bulunan merdivenlerden Şekil 7'de yer verilen merdiven örnekleri ele alınmıştır. Yüzey kaplamalarında kayrak taşı kullanılmıştır. Rıht yükseklikleri ortalaması (20 cm) standartların (maksimum 15 cm) üstündedir ve sadece Şekil 7c'de yer verilen rıht yüksekliği standartlara uyum sağlamaktadır. Ayrıca basamak genişliği farklılıklar gösterse de (100 cm, 120 cm) standart basamak genişliği (en az 30 cm) altında bir değerde değildir. Tırabzan ve küpeşte yer almamaktadır. Şekil 7a-f'de gösterilen merdivenlerde kendi içlerinde rıht yükseklikleri ve merdiven genişlikleri uyumsuz değerler sahip olması, yüzeylerindeki döşeme bozuklukları ile Şekil 7e-f'de yer verilen tırabzanların yüksekliklerinde farklılıklar ve küpeşte olarak kullanılan işlem görmemiş doğal ağaç gövdesi olması tüm ziyaretçilerin kullanımını zorlaştırmakta ve tehlike oluşturmaktadır. TS 12576 (1999)'a göre, merdiven tasarımlarında, rıht

yüksekliğinin maksimum 15 cm olması ve $2 * \text{rıht yüksekliği} + 1 * \text{Basamak genişliği} = 63 \text{ cm}$ formülünün kullanılması gerektiği vurgulanmıştır.

Çizelge 3. Çalışma alanlarında merdiven bulguları ve engellilere yönelik standartların karşılaştırılması

	Merdivenler						
	Genişlik	Sahanlık	Rıht Yüksekliği	Basamak Genişliği	Küpeşte	Tırabzan Yüksekliği	Yüzey Kaplama
Standartlar	En az 180 cm (TS 12576,1999)	180*180 cm (TS 12576,1999)	Maksimum 15 cm (TS 12576,1999)	En az 30 cm (TS 12576,1999)	En az 5 cm (TS 12576,1999)	80-90 cm (ÖZİ, 2011)	Pürüzlü, kaymayı önleyen kaplama kullanılmalıdır (TS 12576,1999)
Kızıldağ MP GKA	Değişken-Ortalama 134 cm	-	Ortalama 20 cm	Ortalama 40 cm	-	95 cm	Kayrak taşı
Kovada Gölü MP GKA	-	-	-	-	-	-	-
Isparta Gölcük TP GKA	-	-	-	-	-	-	-
Yazılı Kanyon TP GKA	Değişken Ortalama 113	120*120 cm	18 cm	Ortalama 60 cm	10 cm	Ortalama 90 cm	Kayrak taşı
Başpınar TP GKA	120 cm	-	20 cm	35 cm	-	-	Beton



Şekil 7. Kızıldağ Milli Parkı GKA'nda yer alan merdivenler

Yazılı Kanyon Tabiat Parkı GKA'nda bulunan merdivenler doğal taşlardan pürüzlü ve kaymayı önleyecek malzemeden inşa edilmiştir. Merdiven genişlikleri farklılık göstermekte olup (ortalama 113 cm) standart ölçüyü (en az 180 cm) sağlamamaktadır. Şekil 8a'da yer verilen merdivende standart (en çok 15 cm) rıht yüksekliğine uymamaktadır. Merdiven bütününde farklı ölçülerde (15-20-30 cm) rıht yükseklikleri mevcuttur. Basamak genişlikleri standartlara (en az 30 cm) uygunluk gösterse de 30-50 cm arasında değişen ölçülerde tasarlanmıştır. Ahşap tırabzan yüksekliği (110 cm) standart ölçülere (80-90 cm) uygun değildir. Aynı alana ait Şekil 8b, 8c'de yer verilen merdivenler yine rıht yükseklikleri, basamak genişlikleri, küpeşte ve tırabzan ölçüleri farklılıklar barındırmakta ve standartları sağlamamaktadır. Merdivenlerdeki ölçü farklılıkları tüm ziyaretçilerin kullanımını zorlaştırmaktadır. Başpınar Tabiat Parkı GKA'nda ana giriş kapısı haricinde güneybatısında bulunan asfalt yoldan betonarme merdiven ile başka giriş verilmiştir. Merdiven rıht yükseklikleri (20 cm) standartlara (en çok 15 cm) uygun değildir. Basamak genişlikleri (35 cm) standart ölçülere (en az 30 cm) uygundur. Merdiven yüzeyi de standartlara (pürüzlü) uygun olsa da merdivende korkuluğa yer verilmemiştir. Ayrıca merdiven başlangıç ve bitiş kısmı arasından kot farkı fazla olmasına rağmen merdivende sahanlık kısmına da yer verilmemiştir. Bu haliyle tüm ziyaretçilerin kullanımını açısından tehlike arz etmektedir. Merdiven tasarımlarında en fazla 12 basamakta bir sahanlık yapılması gerekmektedir (Anonim 2021). Isparta Gölcük Tabiat Parkı GKA'da bina girişleri haricinde merdiven kullanımına yer verilmemiştir.



Şekil 8. Yazılı Kanyon (a, b, c) ve Başpınar (d) Tabiat Parklarında yer alan merdivenler

Otoparklar

Çalışma alanlarında otoparklara ait tespitler ve engellilere yönelik standartlar Çizelge 4'te ve GKA'larından elde edilen fotoğraflara Şekil 9'da yer verilmiştir. Çalışma alanlarında Isparta Gölcük Tabiat Parkı GKA haricinden otopark düzenlemesine yer verilmemiştir. Alanın bazı kısımlarında parke taşı ile düzenlenen otopark alanları bulunmaktadır. Bu alanlarda araç sınırlaması kırmızı renkli parke taşı ile sağlanmıştır. Otopark genişlikleri (250 cm) standarda (en az 360 cm) uygun değildir Ayrıca engelli taşıtları için özel bir alan, işaret ve levha bulunmamaktadır. Çalışma alanlarından Kızıldağ Milli Parkı GKA'nda Ertaş ve Yücedağ (2023) tarafından yapılan bir çalışmada; Kızıldağ Milli Parkı güneybirlik kullanım alanında ziyaretçiler için mevcut otopark alanının bulunmadığı ve araçların yol kenarlarına düzensiz bir şekilde park edilerek alan kullanımını kısıtladığı belirtilmiştir. Diğer çalışma alanlarında da araçlar yol kenarlarına ya da alanda uygun boş alanlara park edilmekte ve bu durum tüm ziyaretçilerin güneybirlik faaliyetlerinde mekânsal kısıtlama oluşturmaktadır. Anonim (2021) otoparkların engelliler, yaşlılar ve yardımcı araç-gereç kullanan kişilerin kullanımına uygun özelliklere sahip olması gerektiği vurgulanmıştır.

Çizelge 4. Çalışma alanlarında otopark bulguları ve engellilere yönelik standartların karşılaştırılması

	Genişlik
Standartlar	En az 360 cm (BM, 2004)
Kızıldağ MP GKA	-
Kovada Gölü MP GKA	-
Isparta Gölcük TP GKA	250 cm
Yazılı Kanyon TP GKA	-
Başpınar TP GKA	-



Şekil 9. Kızıldağ (a) ve Kovada Gölü (b) Milli Parkları, Isparta Gölcük (c, d) Yazılı Kanyon (e) ve Başpınar (f) Tabiat Parkları GKA'nda yer alan otopark ve otopark olarak kullanılan alanlar

Diğer Donatı Elemanları

Çalışma alanlarında bulunan diğer donatı elemanlarına ait tespitler ve engellilere yönelik standartlar Çizelge 5'te ve GKA'larından elde edilen fotoğraflara Şekil 10-14'te yer verilmiştir. Kızıldağ Milli Parkı GKA'nda bulunan piknik ünitelerinin masa yükseklikleri (90 cm) standartlara (75-90 cm) uygun ölçülerdedir. Tekerlekli sandalye kullanan ziyaretçilerin yaklaşabilmesi için masanın altındaki derinlik standardı minimum 60 cm olarak belirlenmiştir. Ancak alanda bulunan piknik üniteleri tasarımlarında tekerlekli sandalyenin yaklaşabileceği derinlik ve yaklaşma alanına yer verilmemiştir (Şekil 10a-b). Alandaki aydınlatma elemanları saha içerisinde homojen olarak dağıtılmadığından, alanda karanlık alanlar oluşabilmektedir. Alanda kullanılmış

en kısa yüksekliğe sahip aydınlatma elemanı (Şekil 10c) yüksekliği (250 cm) standartlara (en az 220 cm) uymakta olup diğer aydınlatma öğelerinin (Şekil 10d) yükseklikleri daha fazladır. Alanda içerisinde yol kenarlarında kapaklı metal çöp konteynerleri bulunmaktadır. Yükseklik (115 cm) açısından standartlara (90 - 120 cm) uygun olsa da konumlandırıldıkları yerler ve kapaklı tasarımından dolayı kullanımı kısıtlamaktadır (Şekil 10e). GKA'nda bulunan çeşmeler 75 cm (Şekil 10f), 50 cm (Şekil 10g), 80 cm (Şekil 10h) olmak üzere farklı yüksekliğe sahip ve standart (85 cm) olarak belirlenmiş yüksekliklere sahip değildir.

Çizelge 5. Çalışma alanlarında diğer donatı elemanları bulguları ve engellilere yönelik standartların karşılaştırılması

Diğer Donatı Elemanları					
	Piknik Ünitesi	Oturma Bankları	Aydınlatma Elemanı	Çöp Kutusu	Çeşme
Standartlar	Masaların yüksekliği 75-90 cm arasında olmalıdır. Tekerlekli sandalyenin yaklaşabilmesi için masanın altındaki derinlik minimum 60 cm olmalıdır (ÖZİDA, 2010)	Zeminden yüksekliği 45 cm, sırt yaslama yerinin yüksekliği 70 cm (BM, 2004)	En az 220 cm'den yüksekte yapılmalıdır(TS 12576,1999)	Kaldırım Bordür taşına en az 40 cm uzaklığında ve en az 90 cm, en çok 120 cm yüksekliğe monte edilmelidir (TS 12576,1999)	Uygun yükseklik 85 cm (BM, 2004)
Kızıldağ MP GKA	90 cm	-	250, 500 cm	115 cm	50, 75, 80 cm
Kovada Gölü MP GKA	90 cm	45- 95 cm	-	115 cm	83 cm
Isparta Gölcük TP GKA	90 cm, 100 cm	40 cm	800 cm	115 cm	80 cm
Yazılı Kanyon TP GKA	90 cm	-	800 cm	115 cm	95 cm
Başpınar TP GKA	90 cm	-	750 cm	115 cm	75 cm



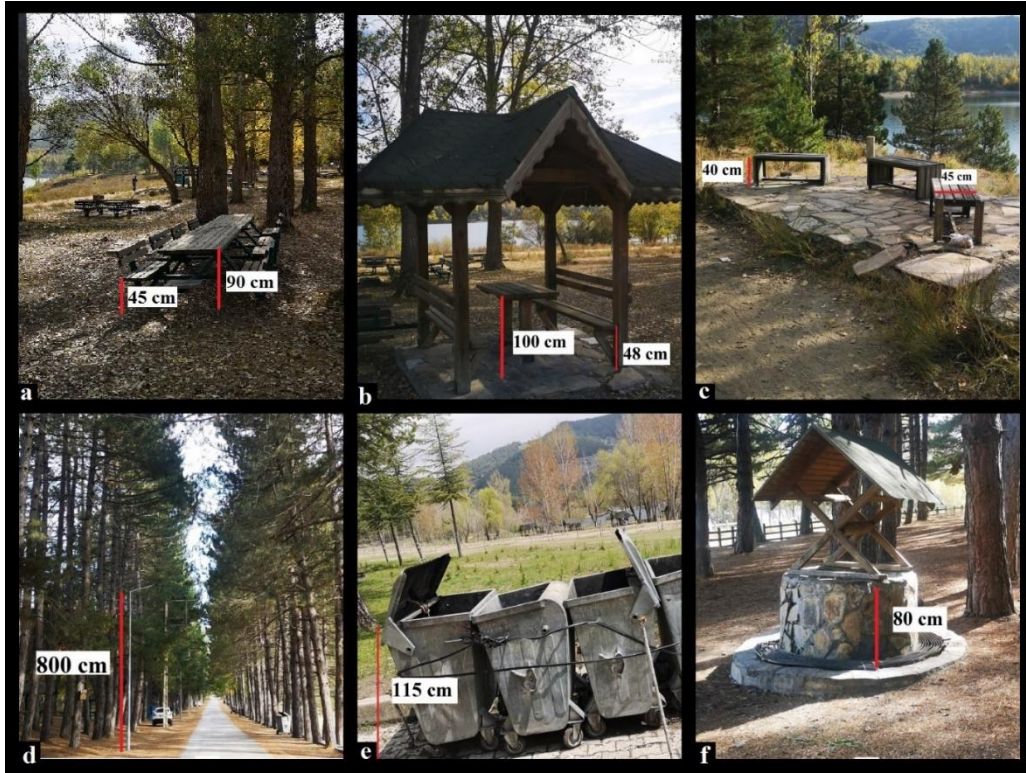
Şekil 10. Kızıldağ Milli Parkı GKA'nda bulunan diğer donatı elemanları

Kovada Gölü Milli Parkı GKA'nda bulunan piknik ünitelerinin masa yükseklikleri (90 cm) standartlara (75-90 cm) uygun sahip, ancak alanda bulunan piknik üniteleri tasarımlarında tekerlekli sandalyenin yaklaşabileceği derinlik (minimum 60 cm) ve yaklaşma alanına yer verilmemiştir (Şekil 11a-b). Alan aydınlatma elemanları bulunmamaktadır. Ahşap yaya-yürüyüş yolu göl kenarında konumlandırılmış yaklaşık 80 m² alana sahip ahşap iskeleye bağlanmaktadır. İskele üzerinde tasarlanmış oturma banklarına yer verilmiştir. Oturma bankları eminden yüksekliği (45 cm) standartlara (45 cm) uygun olup, sırt yaslama yerinin yüksekliği (90 cm) standartlara (70 cm) uymamaktadır (Şekil 11c). Alanda içerisinde yerleştirilen kapaklı konteyner çöp kutu yükseklikleri (115 cm) standartlara (90 - 120 cm) uygundur. Ancak kapaklı tasarımından dolayı kullanımı kısıtlamaktadır (Şekil 11d). Ören (2015) kapaklı çöp kutularının tek elle açılıp kapatılabilmesi gerektiğini vurgulanmıştır. Ancak çöp kutuları metal malzemedenden yapıldığından kapak ağırlıklarının tek elle açılabilmesi kişiden kişiye değişiklik gösterebilmektedir. GKA'nda bulunan çeşme yüksekliği (83 cm) uygun standart yüksekliğine (85 cm) yakın ölçülerdedir. Ön kısmında oluşturulmuş su gideri ve yer döşemesi engelli kullanıcılar açısından kullanımı zorlaştırmaktadır (Şekil 11e).



Şekil 11. Kovada Gölü Milli Parkı GKA’nda bulunan diğer donatı elemanları

Isparta Gölcük Tabiat Parkı GKA’nda bulunan Şekil 12a’da yer verilen piknik ünitesi masa yüksekliği (90 cm) standartlara (75-90 cm) uygun ölçülere sahip ancak, Şekil 12b’de sunulan piknik ünitesi yüksekliği (110 cm) standartlara (75-90 cm) uygun değildir. Piknik üniteleri tekerlekli sandalyenin yaklaşabileceği derinlik (60 cm) ve yaklaşma alanına yer verilmemiştir (Şekil 12a-b). Gölcük gölü etrafında oluşturulmuş olan yaklaşık 4500 metrelik uzunluğa sahip stabilize toprak yolda, yaklaşık 500 metre aralıklara yol kenarında basamak aracılığıyla kayrak taşı döşenerek oluşturulmuş dinlenme platformlarına yerleştirilmiş sırtlıksız bankların yüksekliği (40 cm) standartlara (45 cm) uymamaktadır (Şekil 12c). Platform yüksekliği de engelli ziyaretçilerin kullanımını zorlaştırmaktadır. Alandaki aydınlatma elemanları saha içerisinde yoğunluk oluşan alanlarda ve yol kenarlarında yer verilmiştir. Yükseklikleri (800 cm) standartlara (en az 220 cm) uymaktadır (Şekil 12d). Alanda bulunan metal çöp konteynerleri yükseklik (115 cm) açısından standartlara (90 - 120 cm) uygun (Şekil 12e) olsa da, konumlandırıldıkları yerler ve kapaklı tasarımından dolayı kullanımı kısıtlamaktadır. GKA’nda bulunan çeşme yükseklikleri (80 cm) standart (85 cm) olarak belirlenmiş yüksekliklere erişmemektedir (Şekil 12f). Ayrıca etrafında bağlantı yolu olmadığından özellikle tekerlekli sandalye kullanan ziyaretçilerin faydalanmasını zorlaştırmaktadır.



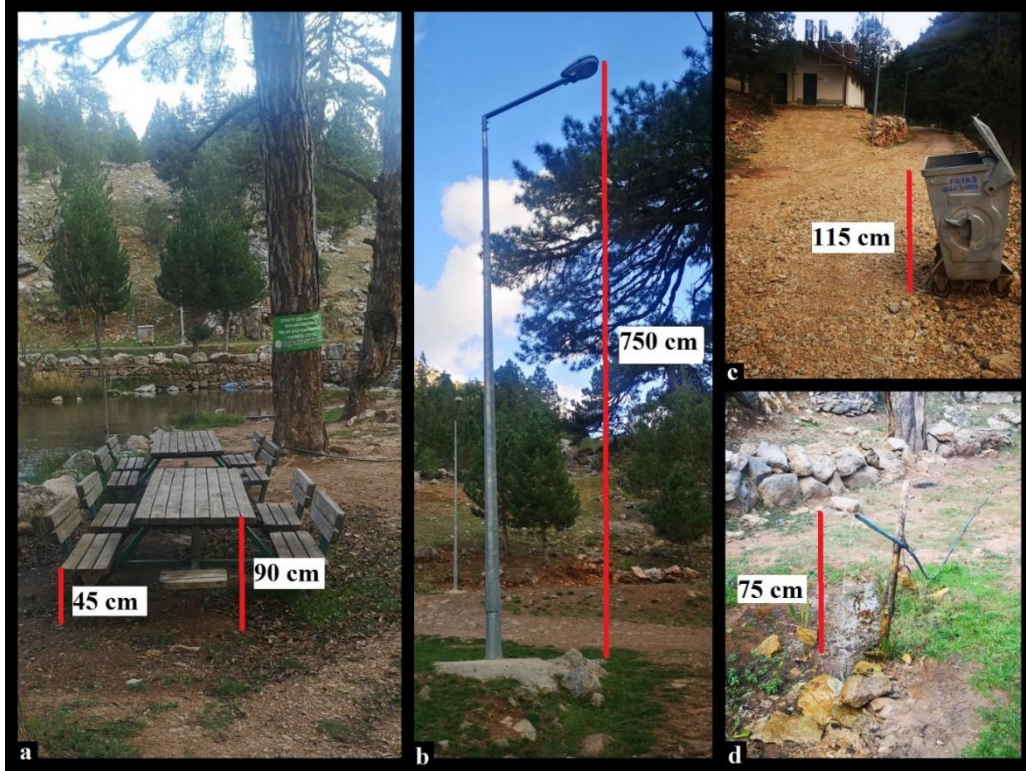
Şekil 12. Isparta Gölcük Tabiat Parkı GKA'nda bulunan diğer donatı elemanları

Yazılı Kanyon Tabiat Parkı GKA'nda bulunan piknik ünitelerinin masa yükseklikleri (90 cm) standartlara (75-90 cm) uygun ölçülerde olup tekerlekli sandalye kullanan ziyaretçilerin yaklaşabilmesi için masanın altındaki derinlik standardı (minimum 60 cm) bulunmamaktadır (Şekil 13a-b). Aydınlatma elemanları yüksekliği (800 cm) standartlara (en az 220) uygun olup saha içerisinde fazla yer verilmemiştir (Şekil 13c). GKA'nda bulunan çeşme yüksekliği (95 cm) standartlara (85 cm) uygun olmamakla birlikte ön kısmında basamaklara da yer verilmesi kullanımı kısıtlanmıştır (Şekil 13d). Belirli yerlere yerleştirilmiş konteyner ve plastik çöp kutuları yükseklik (115 cm) açısından standartlara (90 - 120 cm) uygun olsa da kapaklı olmasından dolayı kullanımı engelli ziyaretçilerin kullanımını zorlaştırmaktadır (Şekil 13e).



Şekil 13. Yazılı Kanyon Tabiat Parkı GKA'nda bulunan diğer donatı elemanları

Başpınar Tabiat Parkı GKA'nda bulunan masa yükseklikleri (90 cm) standartlara (75-90 cm) uygun ölçülerde olup tekerlekli sandalye kullanan ziyaretçilerin yaklaşabilmesi için masanın altındaki derinlik standardına (minimum 60 cm) sahip değildir. (Şekil 14a). Aydınlatma elemanları yüksekliği (750 cm) standartlara (en az 220) uygun olup sahada homojen dağılıma sahiptir (Şekil 14b). Sahada yol kenarlarına yerleştirilmiş konteyner çöp kutuları yükseklik (115 cm) açısından standartlara (90 - 120 cm) uygundur. Ancak olsa da kapaklı olmaları dolayı kullanıma kısıtlama getirmektedir (Şekil 14c). Sahada çeşme yapıları bulunmamaktadır. Şekil 14d'de yer verilen şekilde çeşme oluşturulmuş olup engelli ziyaretçi kullanımına uygun değildir



Şekil 14. Başpınar Tabiat Parkı GKA'nda bulunan diğer donatı elemanları

Gölgeleme Elemanları (Çardak – Pergola)

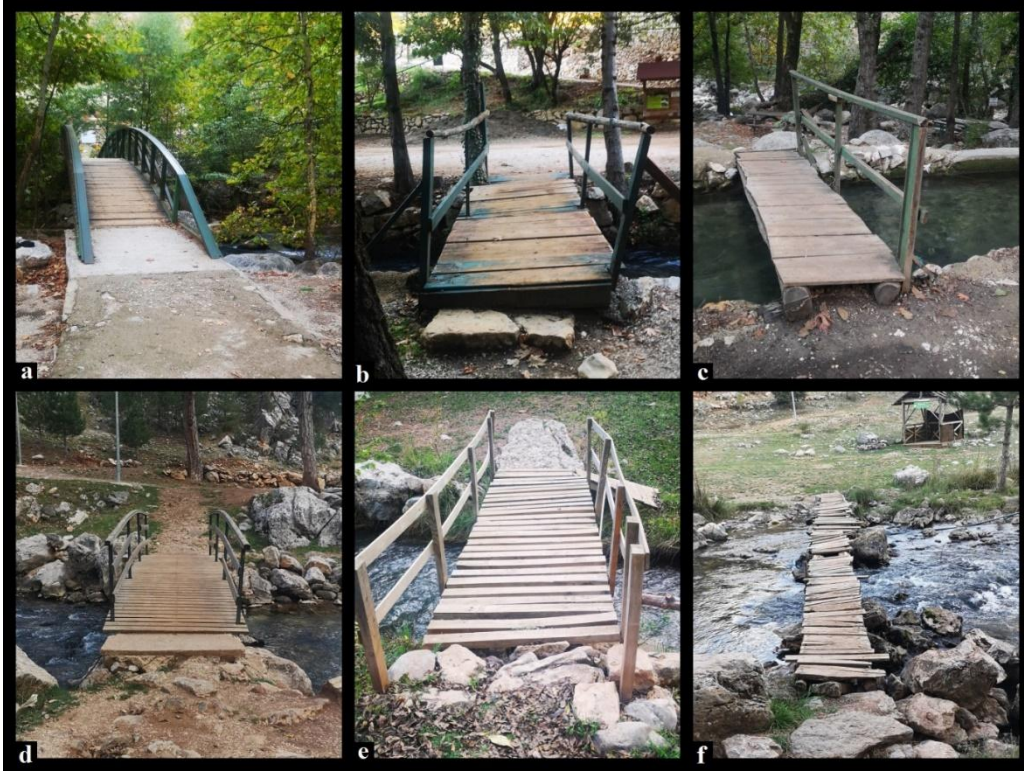
Çalışma alanlarında bulunan gölgeleme elemanları (çardak-pergola) giriş kısımlarında yer alan basamak ve yükseltmeler ile içerisinde bulunan oturma birimleri tekerlekli sandalye kullanan ziyaretçilerin kullanımına uygun platform ve tasarımlara sahip değildir (Şekil 15).



Şekil 15. Kızıldağ (a) Kovada Gölü (b, c, d) Milli Parkı, Isparta Gölcük (e) Yazılı Kanyon (f, g) ve Başpınar (h, i) Tabiat Parkı GKA'nda bulunan gölgeleme elemanları

Köprüler

Çalışma alanlarında Yazılı Kanyon Tabiat Parkı GKA'nda dere ve suni olarak oluşturulmuş su kanalı bulunmaktadır. Dere ve kanal üzerinde köprülere yer verilmiştir (Şekil 16a-c). Başpınar Tabiat Parkı GKA'nda da dere üzerinde yerleştirilmiş ahşap köprüler bulunmaktadır (Şekil 16d-f). İki alandan da bulunan köprülerin eğim, yapı malzemeleri, yapılarda bulunan bozulmalar nedeniyle engelli ziyaretçiler açısından kullanımları uygun değildir.



Şekil 16. Yazılı Kanyon (a, b, c) ve Başpınar (d, e, f) Tabiat Parkı GKA'nda bulunan köprüler

Çocuk Oyun Alanları

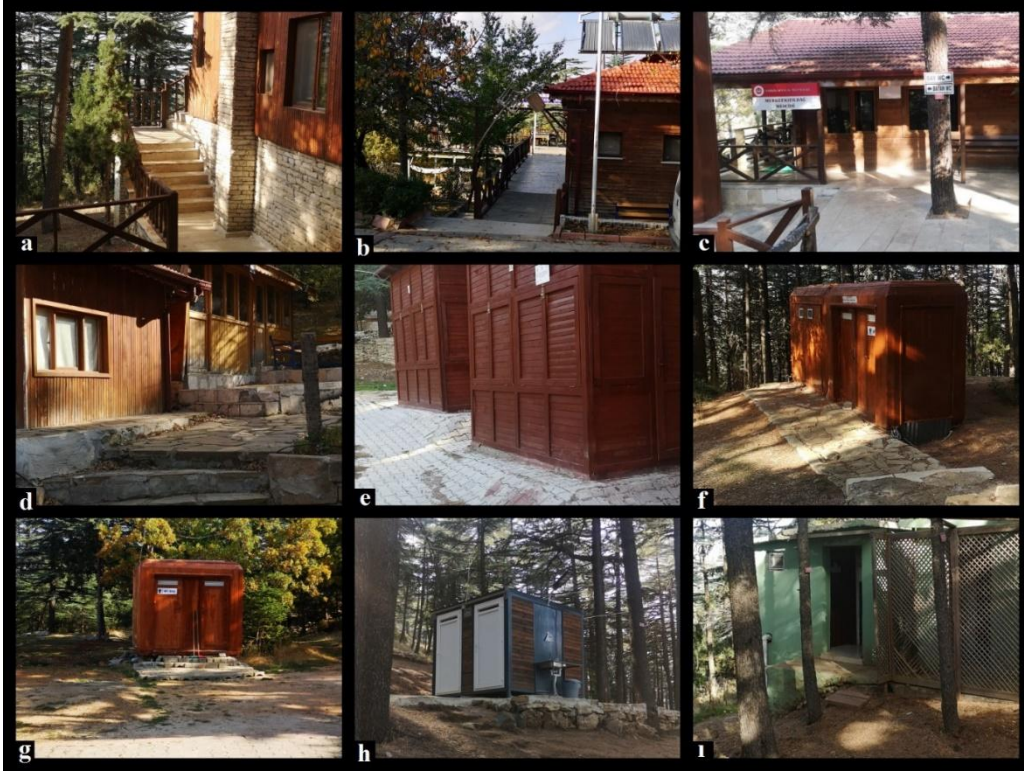
Kızıldağ Milli Parkı GKA'nda 2 adet (Şekil 17a), Kovada Gölü Milli Parkı GKA'nda 1 adet (Şekil 17b) ve Isparta Gölcük Tabiat Parkı (Şekil 17c) GKA'nda 3 adet çocuk oyun alanına yer verilmiştir. Yazılı Kanyon ve Başpınar Tabiat Parkı GKA'nda çocuk oyun alanları bulunmamaktadır. Çocuk oyun alanı çalışma alanlarında oyun grupları içerisinde engelli çocuk oyun grupları bulunmamaktadır. Uslu (2008) çocuk oyun alanının tasarımı, büyüklüğü, iklim koşullarına ve tasarımcıya bağlı olarak sonsuz sayıda değişkenlik gösterileceği, ancak değişmeyen koşulun, çocuk oyun alanlarında engelli çocuklara dost, engeli olmayan çocuklar ile eşit şartlarda ve beraber oyun oynayabileceği güvenli, yaratıcı, eğlenceli ve doğal elemanları bulunduran çocuk oyun alanı tasarımı olması gerektiğini belirtmiştir.



Şekil 17. Kızıldağ (a) Kovada Gölü (b) Milli Parkı ve Isparta Gölcük (c) Tabiat Parkı GKA'nda yer alan çocuk oyun alanları

Tesis Girişleri

Kızıldağ Milli Parkı GKA'nda bulunan bazı tesislere ait fotoğraflara Şekil 18'de yer verilmiştir. GKA'nda 5 adet kır evi (bungalov) bulunmaktadır. Bütün kır evlerinin girişlerinde merdiven bulunmaktadır (Şekil 18a). Kır evlerinin giriş kısımlarında rampalara yer verilmediğinden tekerlekli sandalye kullanan engelli ziyaretçilerin kullanımına uygun değildir. Alanda bulunan ahşap kaplama betonarme kır lokantasına teras kısmından girilmektedir. Teras girişi ahşap ve karo-seramik kaplama bulunduğundan giriş kısmında engel bulunmamaktadır (Şekil 18b). Alanda kadın-erkek mescidi olarak inşa edilmiş yapı ayrı girişleri ve arka kısmında ayrı tuvalet-abdest alma bölümleri bulunmaktadır. Binanı dış alanı (terası) karo-seramik kaplama döşendiğinden engelli kullanıcıların kullanımına uygundur (Şekil 18c). Alandaki ahşap büfenin ön kısmı, merdiven sahanlığından 40 cm yükseklikte teras formu verilerek oluşturulduğundan engelli ziyaretçiler açısından erişimi kısıtlıdır (Şekil 18d). Alandaki ahşap 4 adet demonte satış üniteler parke taşı döşenmiş bir alanda yer almaktadır. Engelli ziyaretçilerin kullanımına uygundur (Şekil 18e). Tuvalet ve duş alma yapılarında ise giriş kısımlarında bulunan yükseltmeler engelli ziyaretçilerin kullanımı için kısıtlama oluşturmaktadır (Şekil 18f-1). Ayrıca alanda engellilere özel tuvalet-duş kısmı bulunmamaktadır.



Şekil 18. Kızıldağ Milli Parkı GKA’nda yer alan bazı tesisler

Kovada Gölü Milli Parkı GKA’nda bulunan İdari ve Ziyaretçi Tanıtım Merkezi binasının girişinde bulunan teras kısmına rampa haricinde merdivenlere yer verilmiştir (Şekil 19a). Burada yer verilen rampanın engelli ziyaretçiler açısından uygun olmadığı rampalar kısmında belirtilmiştir. Alanda bulunan tuvaletlerin girişlerinde sadece merdiven kullanılmıştır (Şekil 19b). İdari ve Ziyaretçi Tanıtım Merkezi binasında bulunan engelli tuvaleti haricinde alandaki tuvalet binasında yer verilmemiştir. Isparta Gölcük Tabiat Parkı GKA’nda bulunan kır gazinosu (restoran) girişinde rampa haricinde merdivenlere yer verilmiştir (Şekil 19c). Kır Gazinosunda bulunan rampanın engelli ziyaretçiler açısından uygun olmadığı rampalar kısmında belirtilmiştir. Alandaki mescit binasının giriş kısmında basamağa yer verilmiş (Şekil 19d) ve sahada bulunan tuvaletlerde engelli tuvaletlerinin girişlerinde rampalar bulunmakta, diğer tuvalet girişlerinde ise merdiven kullanılmıştır (Şekil 19e). Yazılı Kanyon Tabiat Parkı GKA’nda yer alan restoran (Şekil 19f), mescit (Şekil 19g), büfe (Şekil 19h), kır evleri (Şekil 19i) yapımları devam etmektedir. Alandaki tuvalet (Şekil 19i) ise yangın hasarı nedeniyle bakım onarım çalışması devam etmektedir. Tuvalet binasında engelli tuvaleti de bulunmaktadır. Başpınar Tabiat Parkı GKA’nda bulunan kır evlerinin (Şekil j) bulunduğu alanın peyzaj çalışmaları henüz yapılmamıştır. Tuvalet binasında (Şekil k) engelli tuvaleti bulunmaktadır. Ancak tuvalet eğimli bir alanda olduğunda bina ulaşım kısmında düzenleme bulunmamaktadır.



Şekil 19. Kovada Gölü Milli Parkı (a, b), Isparta Gölcük Tabiat Parkı (e, d, e),Yazılı Kanyon Tabiat Parkı (f, g, h, l, i) ve Başpınar Tabiat Parkı (j, k) GKA'nda yer alan bazı tesisler

SONUÇ VE ÖNERİLER

Milli Park ve Tabiat Parklarından bulunan GKA'nda yapılan bu çalışma sonucunda;

- Alanlarda yer verilen bazı yaya-yürüyüş yollarının standartlara uygun genişlik, engelli gruplarının erişimini sağlayabilecek eğim ve uygun doğal malzeme seçimi ile engel oluşturmayacak yüzey kaplama yapılmalıdır. Başpınar Tabiat Parkında yaya-yürüyüş yolları düzenlemesi bulandığından standartla uygun yaya-yürüyüş yolları oluşturulmalıdır.
- Alanların topoğrafik yapısından dolayı eğimli arazi formları yer almaktadır. Yaya- yürüyüş yollarında merdiven ve rampa kullanımlarına yer verilmiştir. GKA'larında bütün ziyaretçiler için tehlike ihtiva eden ve bakım onarım yapılması gereken merdivenler bulunmaktadır. Merdivenlerin riht yükseklikleri ve basamak genişlikleri standartlara uygun ve eşit ölçülerde çözümler getirilmeli ve uygulanmalıdır. Gerekli yerlerde korkuluklara yer verilmeli ve sahanlık oluşturulmalıdır.
- Standart ölçülere uygun olan ancak yüzey kaplamaları uygun olmayan rampaların bakım-onarımının yapılarak uygun standartlara eriştirilmesi, eğimleri uygun olmayan rampaların eğimlerini düşürecek inşaa faaliyetlerinin yapılması ve korkuluk bulunmayan rampalara korkuluk yerleştirilmesi gerekmektedir.

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- Alanlarda yeterli ve uygun otopark alanları bulunmaması sebebiyle araçlar görüntü kirliliği ve düzensizliğe yol açmaktadır. GKA'larında ziyaretçi kapasitelerine göre otopark düzenlemeleri yapılmalı ve engelli ziyaretçi araçları için yeterli miktarda otopark alanı, işaretleme ve levhalara yer verilmelidir.
- Bütün çocuklar aynı ihtiyaçlara gereksinim duyması sebebiyle, GKA'larında yer alan çocuk oyun alanlarının bakım onarım çalışmaları yapılıp, engelli çocuklar için tasarlanan oyun grupları eklenmeli ya da engelli çocuklar için özel çocuk oyun alanı oluşturulmalıdır.
- GKA'larındaki piknik üniteleri benzer tasarım ve ergonomik ölçülere sahip olup masa altında tekerlekli sandalye kullanan ziyaretçilerin yaşayabileceği standart derinliğe yer verilmemiştir. Alanlara engelli standartlarına uygun derinlikte tasarlanan piknik üniteleri getirilmeli ve uygun zemin oluşturularak yerleştirilmelidir.
- GKA'larında genellikle tek tip ve alan genelinde homojen dağılımları olmayan çöp üniteleri bulunmaktadır. Standartlara uygun yükseklikte olmalarına rağmen kapaklı olmaları kullanımı kısıtlamaktadır. Saha içerisinde bütün ziyaretçilerin kolaylıkla kullanabileceği ölçülerde bir model kullanılarak herkesin erişebileceği konumlara yerleştirilmelidir.
- GKA'larında kullanılan aydınlatma elemanları standartlara uygun yüksekliklere sahip ancak alanlarda dağılım miktarları yetersizdir. Sahaların içerisinde karanlık alan bırakılmayacak şekilde aydınlatma elemanlarına yer verilmedi.
- GKA'larında standartlara uygun olmayan çeşmelerin bakım onarım yapılarak standartlara uygun kullanışlı hale getirilmeli ve alanlarda bulunan donatı elemanlarından olan gölgeleme elemanlarının yerleştirildiği platformlara engelli ziyaretçiler için içine girebileceği rampa girişi oluşturulmalıdır.
- Yazılı Kanyon ve Başpınar Tabiat Parklarında bulunan derelerin üzerine yerleştirilen bazı ahşap köprüler bütün ziyaretçiler için tehlike oluşturduğundan kaldırılmalı ve korkuluklu köprüler kullanılmalıdır. Ayrıca dere kıyılarında tehlike arz eden kısımlarda çit kullanılarak sınırlandırılmalıdır.
- GKA'larında bulunan tesis ve bina girişlerinde engelli ziyaretçilerin kullanımını kısıtlayan ve uygun olmayan girişlere çözümler getirilmeli ve yapı tesis inşa faaliyetleri devam eden (Yazılı Kanyon TP) ve tamamlanan (Başpınar TP) çevre düzenlemesi yapılmalı, yapılacak düzenlemelerde engelli ziyaretçiler için standartlara uygun alt yapı ve donatıya yer verilmelidir.
- Milli Park ve Tabiat Parklarının arazi şartlarından ve koruma statülerinden dolayı kaynak değerlerinin tamamı yerinde görülemeyeceğinden ve bütün ziyaretçilerin alan hakkında bilgi sahibi olabileceği, doğa eğitimlerinin verilebileceği ziyaretçi tanıtım merkezleri ve tanıtım birimleri olmayan alanlarda da oluşturulmalıdır.



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Sonuç olarak; Isparta ilinde bulunan Milli Park ve Tabiat Parkları GKA'larının engelli ziyaretçilerin kullanımına uygun olmadığı, engelliler için belirlenmiş standartların alanlarda alt yapı çalışmalarında kısmen uygulandığı tespit edilmiştir. Ülkemizde yerleşim yerlerinde, dış mekanlarda ve özellikle insanların rekreasyon ihtiyaçlarını giderdiği açık-yeşil alanlarda toplumun her bireyi için erişilebilir tasarım ve uygulamalara yer verilme önemi gün geçtikçe artmaktadır. Korunan alanlar bünyesinde, rekreasyon amaçlı ziyaretçi kullanımına izin verilen GKA'larında, engelli ziyaretçilerin kullanımına uygun alt yapı çalışmalarına, tasarım ve uygulamalara yer verilerek her birey için erişilebilirlik ve fırsat eşitliği sağlanmalıdır.

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DİYARBAKIR DİCLEKENT BULVARI'NIN ODUNSU BİTKİ ENVANTERİNİN ÇIKARILMASI VE DEĞERLENDİRİLMESİ

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Özet

Dünyadaki hızlı nüfus artışı ile birlikte kentleşmenin artması önemli bir sorun haline gelmiştir. Kentleşme olgusu, tüm dünyada olduğu gibi Türkiye’de de çevreyi ve kentlerimizi değiştirerek farklılaşmaya neden olmaktadır. Bu anlamda yollar arası bağlantıları kuran kent içi yol ağaçları, yer aldığı mekânda bütünlük sağlayarak ve kentin yeşil alan miktarını artırmada büyük bir rol oynamaktadır. Bu çalışmada, öncelikle Diyarbakır kenti Diclekent bulvarındaki mevcut odunsu bitki varlığının envanteri çıkarılmış ve daha sonra bu bitkiler hem bitkisel tasarım hem de kurakçıl peyzaj açısından değerlendirilmiştir. Bitki taksasının çoğunu geniş yapraklı (25) ağaçlar oluşturmuştur. Diclekent bulvarında *Platanus orientalis* en çok tercih edilen geniş yapraklı ağaç türü olmuştur. Diclekent Bulvarı ağaçlandırmasında tesis edilen bitki taksasının genellikle sabit bir dikim aralığında dikilmedikleri belirlenmiştir. Bitki taksasının çoğunun (%46) su tüketim düzeyinin orta derecede olduğu bulunmuştur. Bu nedenle, bulvarda daha çok su tüketimi düşük düzeyde olan, bölgede doğal yayılış gösteren ve kent aşırı ekolojik koşullarına toleranslı bitki taksasının tercih edilmesi hem peyzaj uygulamalarının başarısını artıracak hem de sürdürülebilir yeşil alanlar oluşturulmasında önemli rol oynayacaktır.

Anahtar Kelimeler: Diyarbakır, yol ağaçlandırması, bitki envanteri, kurakçıl peyzaj



INVENTORY AND EVALUATION OF THE WOODY PLANTS IN DİCLEKENT BULVARI- DİYARBAKIR, TÜRKİYE

Abstract

With the rapid population growth in the world, increasing urbanization has become an important problem. The phenomenon of urbanization causes differentiation by changing the environment and our cities in Turkey, as it does all over the world. In this sense, urban road trees, which establish connections between roads, play a major role in providing integrity in the place where they are located and increasing the amount of green areas in the city. In this study, firstly, the inventory of existing plant existence on the Diclekent boulevards in Diyarbakır city was examined and then the detected plants were evaluated in terms of both plant design and xeric landscape. Among the plant taxa, most broad-leaved trees (25) were preferred. *Platanus orientalis* is the most preferred broad-leaved tree species on Diclekent boulevards. It has been revealed that the plant species used in afforestation on Diclekent Boulevard are mostly not established in a certain planting range. It has been found that the majority of plant taxa (46%) have a moderate level of water consumption. Therefore, choosing plant species with low water consumption, natural distribution in the region, and tolerance to extreme ecological conditions in the city will both increase the success of landscape applications and play an important role in creating sustainable green areas.

Keywords: Diyarbakır, road afforestation, plant inventory, xeric landscaping

GİRİŞ

Dünyadaki hızlı nüfus artışı ile birlikte kentleşmenin artması önemli bir sorun haline gelmiştir. Kentleşme olgusu, tüm dünyada olduğu gibi Türkiye’de de çevreyi ve kentlerimizi değiştirerek farklılaşmaya neden olmaktadır (Bilgili ve ark., 2012). 2022 yılı itibariyle Türkiye’de kentlerde yaşayan nüfus %93,4 oranında artmıştır (TÜİK, 2023). Bu sebeplerden dolayı kent insanının, doğadan kopuk, hızlı bir yaşam tarzına alışmış olduğu görülmektedir. Bu koşullar altında sosyal yapının ve doğal dengenin korunması için sürdürülebilirlik açısından kentsel yeşil alan sayısı artırılıp (Çöp, 2020; Sarı ve Karaşah, 2018), ekolojik, estetik ve psikolojik yönlerden değer kazandırılarak, kentsel yeşil alanlar iyileştirilmeli ve geliştirilmelidir (Bilgili ve ark., 2012). Bu bağlamda kentlere ve çevreye sağlıklı bir yaşam sunmak için kent yeşil alanları önemli bir rol oynamaktadır (Gültürk Doğruyol ve Şişman, 2021).

Kentin aktif olarak kullanılan alanlarından biri olan bulvar, cadde, kaldırım, refüjler kent insanının araç ve yaya güzergahı olarak tercih ettiği en yoğun alanlar olarak bilinmektedir (Eğe Gürel, 2016). Bu alanlar kitlesel yeşil alanları birbirine bağlama işlevini görürken, refüj ve bitkilendirilmiş şeritlerde bulunan ağaçlandırmalar, kentlerde yeşil koridorlar oluşturarak yollar arası bağlantıyı kurmakta yardımcı olurlar (Çelem

ve Uslu, 2006; Başbayraktar ve Yücedağ, 2023). Yollar arası bağlantıları kuran kent içi yol ağaçları, yer aldığı mekânda bütünlük sağlayarak ve kentin yeşil alan miktarını artırarak katkı sağlamaktadır (Gedikli 2022).

Kent içi yol ağaçlandırmaları, yollar ve çevre arasındaki uyumu sağlamanın yanı sıra, görsel güzellik oluşturma, kent iklimini iyileştirme, hava kirliliği (günümüz kentlerinde önemli bir çevre sorunu) ile mücadele için temiz hava sağlama, rüzgâr ve gürültü bariyerleri oluşturmak, kent iklimini iyileştirmede büyük rol oynar. İnsanları ortak hedeflere ulaşmak için bir araya getiren yeşil alanların ve kamusal kentsel alanların hızla azaldığı bir dünyada, kentlerin ve kentsel mekanların ihtiyaçlarını pek çok açıdan karşılayan kent içi yol ağaçlandırmaları kentsel peyzajın ayrılmaz bir unsurudur (Yıldız Karaca ve Öztürk Kurtaslan, 2017). Yol boyunca bir dizi alan yaratarak, yapıları ve mekanları birbirine bağlayarak/ayırarak birçok işleve hizmet eder, binalar ve diğer yapıların görünümelerini güzelleştirmekte, kesişme noktaları ve trafik kontrol önlemleri gibi işlevleri tanımlamak için kullanılmaktadır (Torun, 2014). Yollarda yer alan bitki tasarımları kent peyzajını zenginleştirerek yolu kullanan sürücü ve yayaların daha konforlu bir mekânda hareket etmesini sağlar (Ertin, 2011; Sakıcı ve ark., 2014; Söğüt ve ark., 2018).

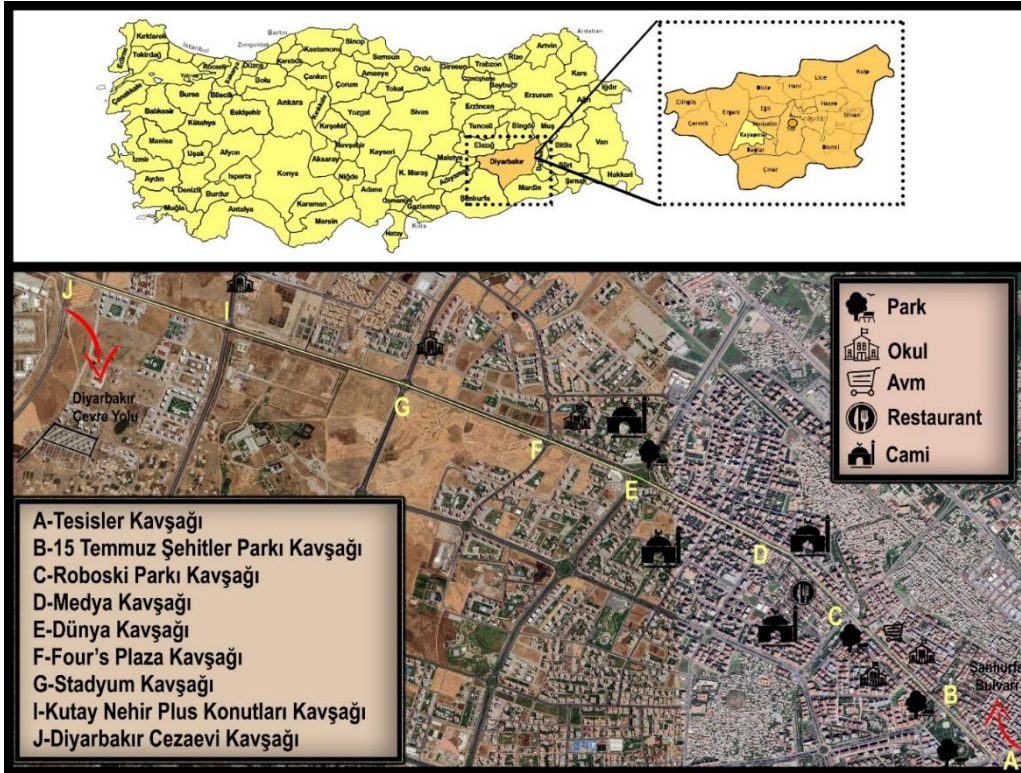
Yolları çevreleyen tasarım ve unsurlar değişkenlik gösterdiği için bunun beraberinde peyzaj tasarımları da değişmektedir. Bu nedenden dolayı kentsel yeşil alanlar ve yol ağaçlarının envanterinin çıkarılması, planlama ve tasarım projelerinin çizilmesi, bilgi sistemlerine işlenmesi ve takip amacıyla düzenli olarak güncellenmesi gerekmektedir (Başbayraktar ve Yücedağ, 2023). Kent içi ulaşım ağının fonksiyonel planlamasında bitkilerin rolü, tesis aşamasında tür seçimi, bitkilerin mimari özellikleri, yetiştirme ortamına uygun dikim yeri, dikim tekniği, koruma, bakım çalışmaları rutin ağaçlandırma tekniklerinin yapılması önemli farklılıklar gösterir ve bu çalışmalarda su kaynaklarını verimli kullanımı alanların yönetimini büyük ölçüde kolaylaştırır (Turna ve Güney 2021). Çevre koşullarının onarılması ve suyun akılcı kullanımı ile iklim değişikliğine bağlı endişeleri yok etmek, çevre-ortam kalitesi iyileştirmek ve kurağa dayanıklı bitkisel uygulamaları öne çıkarmak kentiçi planlamalarının amaçları arasında yer almaktadır (Karaca ve Kuşvuran, 2012; Torun, 2014). Bu amaçla, peyzaj mimarları da son yıllarda kuraklık sorunu yaşayan veya kuraklık tehlikesi sorunu ile mevcut su kaynaklarının etkin ve geri dönüştürülebilir kullanımını benimseyen su-etkin peyzaj yaklaşımı olan kurakçıl peyzaj (xeriscape) çalışmalarına ağırlık vermeye başlamışlardır (Çetin ve Mansuroğlu, 2018). Kurakçıl peyzaj kavramında planlama ve projelendirme, toprak hazırlığı, uygun bitki seçimi, çim alanların oluşturulması, etkili sulama, malç kullanımı ve uygun bakım olmak üzere yedi ilke benimsenmiştir (Selim ve ark., 2021; Çorbacı ve Ekren, 2021). Su tasarrufu için, etkin peyzaj tasarımlarının kullanılması ve doğal bitki türlerinin tercih edilmesi gibi uygulamalar oldukça dikkat çekmektedir (Çöp ve Akat, 2021).

Bugüne kadar yapılan çalışmalarda; Çankırı ili kent merkezinde yer alan parklar, yol orta kaldırımları ile kamu kurumlarının bahçeleri (Karaca ve Kuşvuran, 2012), Isparta kenti mevcut yeşil alanları (Yazıcı ve ark., 2014), Kuşadası kentiçi yolları (Söğüt ve ark., 2018), Kahramanmaraş Aliya İzzetbegoviç Parkı (Abacıoğlu Gitmiş, 2020), Kilis kent parkları (Maaşoğlu, 2020), Ankara Etimesgut Yıldırım Beyazıt Parkı (Metin ve Koçan, 2020), Ankara Altınpark (Çorbacı ve Ekren, 2021), Antalya Serdengeçti Parkı (Selim ve ark., 2021), Muğla-Sarıgerme Halk Plajı (Çöp ve Akat, 2021), Çankırı kent merkezinde yer alan Recep Tayyip Erdoğan, Muhsin Yazıcıoğlu ve Necmettin Erbakan Parkları (Kamer Aksoy ve ark., 2022), Tekirdağ ili Süleymanpaşa ilçesindeki Hasan Ali Yücel Meydanı ve Ali Rıza Efendi Parkı (Kavuran ve Yılmaz, 2022), Adıyaman kent içi yolları (Meşe, 2023) kurakçıl peyzaj yönünden değerlendirilmiş ve bitki türleri tespit edilmiştir. Ancak, Diyarbakır kenti yol ağaçlandırmaları üzerine bir araştırma mevcut değildir. Bu çalışmada, öncelikle Diyarbakır kenti Diclekent bulvarlarındaki mevcut bitki varlığının envanteri yapılmış ve daha sonra tespit edilen bitkiler kurakçıl peyzaj açısından değerlendirilmiştir.

MATERYAL VE YÖNTEM

Araştırmada Diyarbakır ili Kayapınar ilçesi Diclekent Bulvarı çalışılmıştır (Şekil 1). Diyarbakır Güneydoğu Anadolu'nun orta kısmında ve Mezopotamya'nın kuzeyinde yer almaktadır. Yüzölçümü 1516200 km² olan il, 37° 55' kuzey enlemleri ve 40° 12' doğu boylamları arasında kalmaktadır (KTB, 2023). Diyarbakır ilinde sert bir kara iklimi egemendir. Denizden 650 m, Dicle Nehrinden 100 m yükseklikte bulunmaktadır (Diyarbakır Valiliği, 2023). 29 yıllık veriye göre, Diyarbakır ilinin ortalama yüksek sıcaklık 15,9 °C ve yıllık ortalama yağış 493.3 mm ve karla örtülü ortalama gün sayısı 13'tür (MGM, 2023). Diyarbakır ili topraklarının %47,77' si kireçsiz, %6,91'i az kireçli, %7,40'ı orta kireçli, %19,44'ü kireçli, %17,59'u çok kireçli ve %2,77'si marn-kireç toprağı sınıfına girmektedir (Tarım ve Orman, 2023).

Diclekent Bulvarı, 7695 m uzunluğunda olup, Şanlıurfa Bulvarı ile Diyarbakır Çevre Yolu arasında konumlanmaktadır. Bulvar güzergahında, 6 adet park, 6 adet okul, 1 adet AVM, 1 adet cami, 1 adet belediye otobüs garajı ve 1 adet cezaevi kampüsü yer almaktadır.



Şekil 1. Çalışma alanı lokasyonu

Yöntem

Bu çalışmada yerinde gözlem ve tespit yöntemi kullanılmıştır. Çalışmada orta refüj, kavşak ve yol kenarlarındaki bitki türleri farklı kaynaklardan (Zencirkıran 2013 ve Ata 2022) yararlanılarak teşhis edilmiş ve alandan fotoğraflar alınmıştır. Su tüketimleri ve ekolojik tolerans düzeyleri (dona, ısıya, kuraklığa, tuzluluğa, kirliliğe ve rüzgâra dayanıklılık) Zencirkıran ve Akdeniz (2017), Güzel ve Ulus (2021) ve Zencirkıran ve Sönmez (2023)' in çalışmalarından yararlanılarak belirlenmiştir. Ekolojik tolerans düzeyleri "1 = düşük toleranslı", "2 = orta toleranslı" ve "3 = yüksek toleranslı" olmak üzere üç sınıfa ayrılmıştır. Ayrıca bitki taksası; su tüketimleri bakımından "düşük", "düşük/orta", "orta", "orta/yüksek" ve "yüksek" olmak üzere beş kategoride toplanmıştır (Zencirkıran ve Akdeniz, 2017). Bunun yanı sıra, bitki envanteri çıkarılmış, bitki taksasının dikim aralığı, bakım durumları, kullanım sıklıkları, güzergah uzunluğu, yol, kaldırım ve orta refüj genişlikleri belirlenmiş ve kurakçıl peyzaj açısından değerlendirilmiştir.

BULGULAR VE TARTIŞMA

Çalışma alanında yer alan yaya yolları 2.5-6 m genişliğinde olup, orta refüj 2.5-7 m, kavşağa yakın yerler ise 15 m'dir. Bulvar içerisinde bulunan 9 kavşak çapları 17 m ve 101 m arasında değişmektedir (Tablo 1 ve 2).

Tablo 1. Diclekent Bulvarında yaya yolları, orta refüj ve kavşak genişlikleri

Güzergâh	Kavşak Çapı (m)	Yaya Yolları (m)	Orta Refüj (m)
Tesisler - 15 Temmuz Şehitler Parkı Kavşağı	29*	2,5-3	4
15 Temmuz Şehitler Parkı - Roboski Parkı Kavşağı	19	2,5-3	2,5-4
Rojava Parkı - Medya Kavşağı	28	2,5-3	3,5-4
Medya - Dünya Kavşağı	17	5,5-6	3,5-4
Dünya - Four's Plaza Kavşağı	101	6	4,5-7
Four's Plaza - Stadyum Kavşağı	50	5-6	3-4
Stadyum - Kutay Nehir Plus Konutları Kavşağı	57	5-6	3-4
Kutay Nehir Plus Konutları - Diyarbakır Cezaevi Kavşağı	50	5-6	3-4
Diyarbakır Cezaevi Kavşağı	23	-	-

*İlk kavşağın bilgisidir



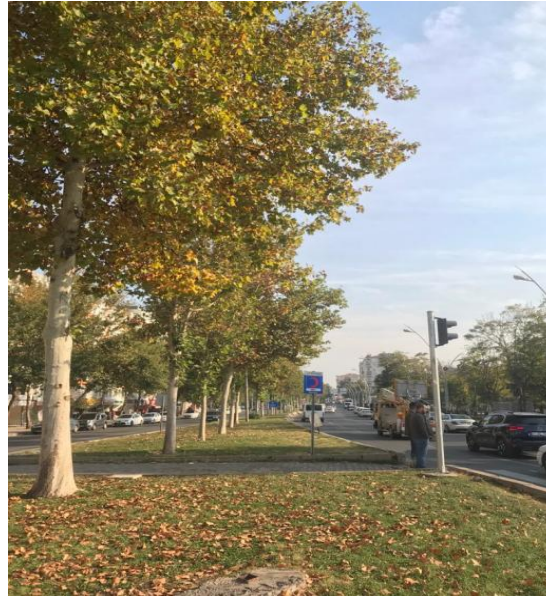


Şekil 2. Kızıldağ Milli Parkı GKA’nda bulunan bazı araç, yaya- yürüyüş yolları

Diclekent Bulvarı yol ağaçlandırmasında toplam 35 bitki taksası kullanılmıştır. Dikim aralığı 1 ile 15 m arasında değişmektedir.

Tesisler - 15 Temmuz Şehitler Parkı Kavşakları Arası

Tesisler ve 15 Temmuz Şehitler Parkı kavşakları arası güzergahın yol ağaçlandırmasında 7 bitki taksası kullanılmıştır. *Platanus orientalis* türü genellikle Diclekent Bulvarı’ndaki yaya yollarında kullanılmıştır, ancak Tesisler ve 15 Temmuz Şehitler Parkı kavşakları arasındaki güzergâh da orta refüjde kullanıldığı tespit edilmiştir (Şekil 2). *Acer negundo* 3-15 m ve *Pinus pinea* 12 m dikim aralıklarıyla tesis edilmiş ve Küçük ve Gül (2005) tarafından önerilen büyük tepe çapına sahip ağaçlar için değerlerin (8-10 m) üzerinde olduğu görülmüştür. Ancak *Morus alba* (3-5 m) ve *Platanus orientalis* (3-6 m) türleri için belirtilen dikim aralıklarının uyumlu olmadığı bulunmuştur. Güzergahtaki bitki taksasının bakım durumları iyi olarak belirlenmiştir (Tablo 3).



Şekil 2. Tesisler ve 15 Temmuz Şehitler Parkı kavşakları arası güzergahın orta refüjünde *Platanus orientalis*

Tablo 3. Tesisler ve 15 Temmuz Şehitler Parkı kavşakları arası bitki envanteri

Bitki taksası adları	Sayısı	Dikim Aralığı (m)	Bakım Durumu
<i>Acer negundo</i> L.	30	3-15	+
<i>Agave sisalana</i> Perrine	10	Sık dikim	+
<i>Cupressus arizonica</i> L.	1	-	+
<i>Morus alba</i> L.	2	3-5	+
<i>Pinus pinea</i> L.	2	12	+
<i>Platanus orientalis</i> L.	129	3-6	+
<i>Rosa sp.</i>	5	Dağınık	+

15 Temmuz Şehitler Parkı - Roboski Parkı Kavşakları Arası

15 Temmuz Şehitler Parkı ve Roboski Parkı kavşakları arası güzergahın yol ağaçlandırmasında 17 bitki taksası kullanılmıştır. Yol ağaçlandırması açısından, *Platanus orientalis* türü için 3-7 m, *Catalpa bignonioides* 3-5 m, *Acer negundo* 2-5 m, *Pinus pinea* 2-6 m, *Prunus cerasifera* 2-4 m ve *Robinia pseudoacacia* 3-5 m bitki taksalarının dikim aralıkları Küçük ve Gül (2005) tarafından önerilen 8-10 m aralığının altında kalmıştır. Ayrıca, *Platanus orientalis* türünden 5 ağaç gövdeden aşınmış ve bu durum estetik görünüşlerine zarar vermiştir. *Catalpa bignonioides* türünün bakımı kötü durumdadır. Orta refüjde kullanılan *Pinus pinea* türü ağaçların elektrik ve aydınlatma direğine temas ettiği gözlenmiştir. Bu nedenle elektrik hatlarının bulunduğu

yerlerde özellikle küçük taçlı ve fazla boylanmayan ağaçların dikilmesi uygundur. Ayrıca, türlere göre değişmekle birlikte yol ağaçları sokak aydınlatmalarından en az 7,5 metre uzaklıkta dikilmesi gerekmektedir (Başbayraktar ve Yücedağ, 2023). *Platanus orientalis* ve *Catalpa bignonioides* türleri dışındaki bitki taksasının bakımları iyi durumdadır (Şekil 3; Tablo 4).



Şekil 3. 15 Temmuz Şehitler Parkı ve Roboski Parkı kavşakları arası güzergahında kötü durumda olan *Catalpa bignonioides* (solda), direğe temas eden *Pinus pinea* (ortada) ve gövdesi zarar görmüş *Platanus orientalis* (sağda)

Tablo 4. 15 Temmuz Şehitler Parkı ve Roboski Parkı kavşakları arası bitki envanteri

Bitki taksası adları	Sayısı	Dikim Aralığı (m)	Bakım Durumu
<i>Acer negundo</i> L.	44	2-5	+
<i>Catalpa bignonioides</i> Walt.	9	3-5	-
<i>Cupressus arizonica</i> L.	47	2,5-10	+
<i>Euonymus japonicus</i> L.	34	3-4	+
<i>Gleditsia triacanthos</i> L.	15	3-8	+
<i>Ilex aquifolium</i>	4	7-10	+
<i>Juniperus chinensis</i> L.	9	4	+
<i>Ligustrum japonicum</i> W.T. Aiton	6	2	+
<i>Morus alba</i> L.	3	5	+
<i>Nerium oleander</i> L.	4	5	+
<i>Pinus pinea</i> L.	58	2-6	+
<i>Platanus orientalis</i> L.	38	3-7	5 adet kurumuş
<i>Prunus cerasifera</i> L.	4	2-4	+

<i>Robinia pseudoacacia</i> L.	7	3-5	+
<i>Syringa vulgaris</i> L.	1	-	+
<i>Thuja orientalis</i> L.	3	3	+
<i>Thuja orientalis</i> L. 'Aurea Nana'	1	-	+

Roboski Parkı - Medya Kavşakları Arası

Roboski Parkı ve Medya kavşakları arası güzergahın yol ağaçlandırmasında 9 bitki taksası kullanılmıştır. Dikim aralığı *Thuja orientalis* için 2 m ve *Cupressus sempervirens* için 10 m iken, diğer bitki taksasında 3-10 m arasındadır (Tablo 5). Bu değerler Küçük ve Gül (2005) tarafından önerilen ölçütlerle (küçük (3-6 m) ve büyük (8-10 m) tepe çapına sahip ağaçlar için) uyum göstermektedir. *Cupressus arizonica* türü direğe temas etmektedir (Şekil 4). Kent içi yol ağaçlandırmalarında, etraftaki yapılar, ön bahçeler, aydınlatma, alt yapı donatımları gibi çeşitli tesisler ve bunların ilerideki gelişme hedefleri ve çevre ile ilişkileri dikkate alınarak, estetik ve peyzaj esasına göre planlanmalı ve düzenlenmelidir (İBB, 2011). Türlerin tümünün bakımı iyi durumdadır.

Tablo 5. Roboski Parkı ve Medya kavşakları arası bitki envanteri

Bitki taksası adları	Sayısı	Dikim Aralığı (m)	Bakım Durumu
<i>Buxus sempervirens</i> L.	33	Sık dikim	+
<i>Cupressus arizonica</i> L.	19	4-10	+
<i>Cupressus sempervirens</i> L.	6	10	+
<i>Morus alba</i> L.	3	3-8	+
<i>Platanus orientalis</i> L.	109	3-10	+
<i>Pinus pinea</i> L.	45	3-10	+
<i>Prunus cerasifera</i> L.	1	-	+
<i>Robinia pseudoacacia</i> L.	19	3-10	+
<i>Thuja orientalis</i> L.	2	2	+



Şekil 4. Diclekent Bulvarı Roboski Parkı ve Medya kavşakları arası güzergahın genel görünümü (solda) ve direğe temas eden *Cupressus arizonica* (sağda)

Medya - Dünya Kavşakları Arası

Medya ve Dünya kavşakları arası güzergahın yol ağaçlandırmasında 12 bitki taksası kullanılmıştır. *Ailanthus altissima* (3-6 m) ve *Cupressus sempervirens* (3 m) için bulunan dikim aralıkları Küçük ve Gül (2005) tarafından 8-10 m tepe çapına sahip ağaçlar için önerilen dikim aralıklarıyla uyum göstermemektedir (Tablo 6). *Acer negundo* türünden 2 adet bitkinin bakım durumu kötü olduğu için gelişim sağlayamamıştır. Orta refüjlerde kullanılan *Cupressus arizonica* ve *Robinia pseudoacacia* bitki türlerinin elektrik ve aydınlatma direğine temas ettikleri gözlenmiştir (Şekil 5). Orta refüjde yer alan *Cupressus arizonica*, *Cupressus sempervirens*, *Morus alba*, *Pinus pinea* ve *Robinia pseudoacacia* bitki taksası büyük tepe çaplarına sahip türlerdir. Yaya ve taşıt trafiğinin engellenmemesi için ağaç taçlarının altında ortalama 3-5 m taç altı yüksekliği olmalıdır (Aklıbaşında ve Erdoğan 2016). Refüjlerde ağaçlandırma yapılırken, bitki türlerinin gelecekte alacakları en son tepe tacı genişlikleri ve refüjlerin genişlikleri düşünülmelidir (Karaşah 2021). Ayrıca *Morus alba* gibi dal/kabuk döken ve özellikle kayganlık yapan ezici meyveleri olan ağaçlar yol ağaçlandırmalarında hiç tavsiye edilmemektedir. Üstelik çiçek ve meyveli ağaçlar, insanların keyfi davranışlarının sonucunda zarar görmelerine neden olabilir (Atay, 1958).

Tablo 6. Medya ve Dünya kavşakları arası bitki envanteri

Bitki taksası adları	Sayısı	Dikim Aralığı (m)	Bakım Durumu
<i>Acer negundo</i> L.	9	4-10	2 adet/bakım durumu kötü
<i>Ailanthus altissima</i> Mill.	5	3-6	+
<i>Buxus sempervirens</i> L.	71	Sık dikim	+
<i>Cupressus arizonica</i> L.	16	4-15	+
<i>Cupressus sempervirens</i> L.	3	3	+
<i>Euonymus japonicus</i> L.	23	1-2	+
<i>Morus alba</i> L.	2	10	+
<i>Nandina domestica</i> Thunb.	11	1	+
<i>Pinus pinea</i> L.	46	3-10	+
<i>Platanus orientalis</i> L.	100	4-15	+
<i>Robinia pseudoacacia</i> L.	55	2,5-10	+
<i>Rosa</i> sp.	30	Sık dikim	+



Şekil 5. Diclekent Bulvarı Medya ve Dünya kavşakları arası güzergahında bakım durumu kötü olan *Acer negundo* (solda), yanlış budama yapılmış *Cupressus arizonica* (ortada), direğe temas eden *Robinia pseudoacacia* (sağda)

Dünya - Four's Plaza Kavşakları Arası

Dünya ve Four's Plaza kavşakları arası güzergahın yol ağaçlandırmasında 17 bitki taksası kullanılmıştır. Bitki taksasından *Platanus orientalis* yaya yollarında kullanılırken ve *Pinus pumila* ise orta refüjde kullanılmıştır. Dikim aralıkları *Morus nigra* için 6-10 m, *Magnolia grandiflora* için 6-9 m, *Platanus orientalis*

için 7-10 m ve *Trachycarpus fortunei* için 11 m olan bitki taksası hariç Küçük ve Gül (2005) tarafından büyük tepe çapına sahip ağaçlar için önerilen 8-10 m değerinin çok altındadır (Tablo 7). *Trachycarpus fortunei* türü kötü bakım durumundan dolayı kurumaya başlamıştır. *Pinus pumila* türü ise direğe temas ederek tehlike arz etmektedir (Şekil 6). Diğer bitki taksasının bakım durumu iyidir.

Tablo 7. Dünya ve Four's Plaza kavşakları arası bitki envanteri

Bitki taksası adları	Sayısı	Dikim Aralığı (m)	Bakım Durumu
<i>Acer palmatum</i> L.	2	5	+
<i>Acer saccharinum</i> L.	24	4,5-6	+
<i>Cupressus arizonica</i> L. 'Glauca Three Balls'	21	2,5-6	+
<i>x Cupressocyparis leylandii</i> L.	31	2,5-3	+
<i>Lagerstroemia indica</i> L.	6	4-6	+
<i>Magnolia grandiflora</i> L.	18	6-9	+
<i>Morus nigra</i> L. 'Pendula'	3	6-10	+
<i>Photinia x fraseri</i> Dress. 'Red Robin'	12	2-15	+
<i>Pinus pumila</i> L.	105	3,5-10	+
<i>Platanus orientalis</i> L.	73	7-10	+
<i>Prunus cerasifera</i> L.	9	1	+
<i>Pyracantha coccinea</i> M. Roem.	200	-	+
<i>Pyrus calleryana</i> 'Chanticleer'	18	5	+
<i>Rosa sp.</i>	225	Sık dikim	+
<i>Thuja orientalis</i> L.	52	2,5-4	+
<i>Thuja orientalis</i> L. 'Aurea Nana'	56	3-5	+
<i>Trachycarpus fortunei</i> (Hook.) H. Wendl.	10	11	-



Şekil 6. Diclekent Bulvarı Dünya ve Four's Plaza kavşakları arası güzergahın direğe temas eden *Pinus pumila* (solda) ve bakımsız *Trachycarpus fortunei* (sağda)

Four's Plaza - Stadyum Kavşakları Arası

Four's Plaza ve Stadyum kavşakları arası güzergahın yol ağaçlandırmasında 4 bitki taksası kullanılmıştır. Yolun sağ ve sol tarafında dikilmiş olan *Platanus orientalis* türü yaya yollarında, *Pinus pumila* türü orta refüjde, *Morus nigra* 'Pendula' ve *Photinia x fraseri*. 'Red Robin' türleri ise Four's Plaza kavşağında tercih edilmiştir. Bu taksa için belirlenen dikim aralıkları büyük tepe çapına sahip ağaçlar için önerilen değerle (8-10 m; Küçük ve Gül, 2005) uyumludur. Ancak *Pinus pumila*'nın dikim aralığıyla (3-4 m) uyum göstermemektedir (Tablo 8). *Platanus orientalis* yaya yollarında durak, *Pinus pumila* ise orta refüjde tabelalara temas ederek görüş alanını kapatmaktadır (Şekil 7). Bu durumda planlamada uygun ölçüde serbest görüş sahalarına ve optik bakımdan emniyetli bir trafik şevkine sahip olmak için ağaç ve çalılarının seçilmesinde taç şekilleri ile dikim şekillerini birlikte dikkate almak gerekmektedir (Seçkin, 1986). Güzergâh da yer alan bitki taksasının bakımı iyi durumdadır.

Tablo 8. Four's Plaza ve Stadyum kavşakları arası bitki envanteri

Bitki taksası adları	Sayısı	Dikim Aralığı (m)	Bakım Durumu
<i>Morus nigra</i> L. 'Pendula'	12	1-3	+
<i>Photinia x fraseri</i> Dress. 'Red Robin'	12	1,5-2	+
<i>Pinus pumila</i> L.	120	3-4	+
<i>Platanus orientalis</i> L.	158	8-11	+



Şekil 7. Diclekent Bulvarı Four's Plaza ve Stadyum kavşakları arası güzergahın görüş alanını kapatan *Platanus orientalis* (solda) ve *Pinus pumila* (sağda)

Stadyum - Kutay Nehir Plus Konutları Kavşakları Arası

Stadyum ve Kutay Nehir Plus Konutları kavşakları arası güzergahın yol ağaçlandırmasında 3 bitki taksası kullanılmıştır (Tablo 9). *Cupressus arizonica* türü 5-6 m dikim aralığı ile orta refüjde ve *Platanus orientalis* türü ise 9-10 m dikim aralığıyla yaya yollarında yer almaktadır. Bu dikim aralıkları Küçük ve Gül (2005) tarafından küçük tepe çapı (3-6 m) ve büyük tepe çapına sahip ağaçlar için önerilen 8-10 m değerlerine uyum sağlamaktadır. Güzergâhda yer alan bitki taksasının bakımı ise iyi durumdadır (Şekil 8).

Tablo 9. Stadyum ve Kutay Nehir Plus Konutları kavşakları arası bitki envanteri

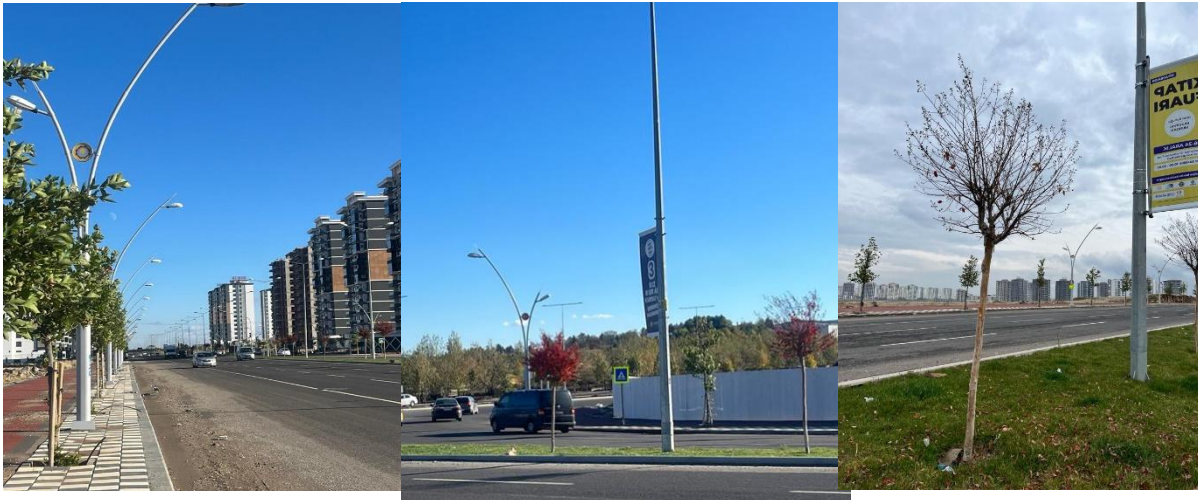
Bitki taksası adları	Sayısı	Dikim Aralığı (m)	Bakım Durumu
<i>Cupressus arizonica</i> L.	173	5-6	+
<i>Lagerstroemia indica</i> L.	25	5	+
<i>Platanus orientalis</i> L.	195	9-10	+



Şekil 8. Diclekent Bulvarı Stadyum ve Kutay Nehir Plus Konutları kavşakları arası güzergahın orta refüjde *Cupressus arizonica* (solda) ve yaya yollarında *Platanus orientalis* (sağda)

Kutay Nehir Plus Konutları - Diyarbakır Cezaevi Kavşakları Arası

Kutay Nehir Plus Konutları ve Diyarbakır Cezaevi kavşakları arası güzergahın yol ağaçlandırmasında 3 bitki taksası kullanılmıştır. *Lagerstroemia indica* türü 3-4 m dikim aralığı ile orta refüjde ve *Platanus orientalis* türü ise 9-10 m dikim aralığıyla yaya yollarında yer almaktadır. Bu değer Küçük ve Gül (2005) tarafından küçük tepe çapı (3-6 m) ve büyük tepe çapına sahip ağaçlar için önerilen 8-10 m dikim aralığına uymaktadır. *Lagerstroemia indica* dışında diğer bitki taksasının bakım durumu iyidir (Şekil 9; Tablo 10).



Şekil 9. Diclekent Bulvarı Kutay Nehir Plus Konutları ve Diyarbakır Cezaevi kavşakları arası güzergahın yaya yollarında *Platanus orientalis* (solda) ve orta refüjde *Lagerstroemia indica* (ortada ve sağda)

Tablo 10. Kutay Nehir Plus Konutları ve Diyarbakır Cezaevi kavşakları arası bitki envanteri

Bitki taksası adları	Sayısı	Dikim Aralığı (m)	Bakım Durumu
<i>Cupressus arizonica</i> L.	5	5-6	+
<i>Lagerstroemia indica</i> L.	107	3-4	-
<i>Platanus orientalis</i> L.	195	9-10	+

Diyarbakır Cezaevi Kavşağı

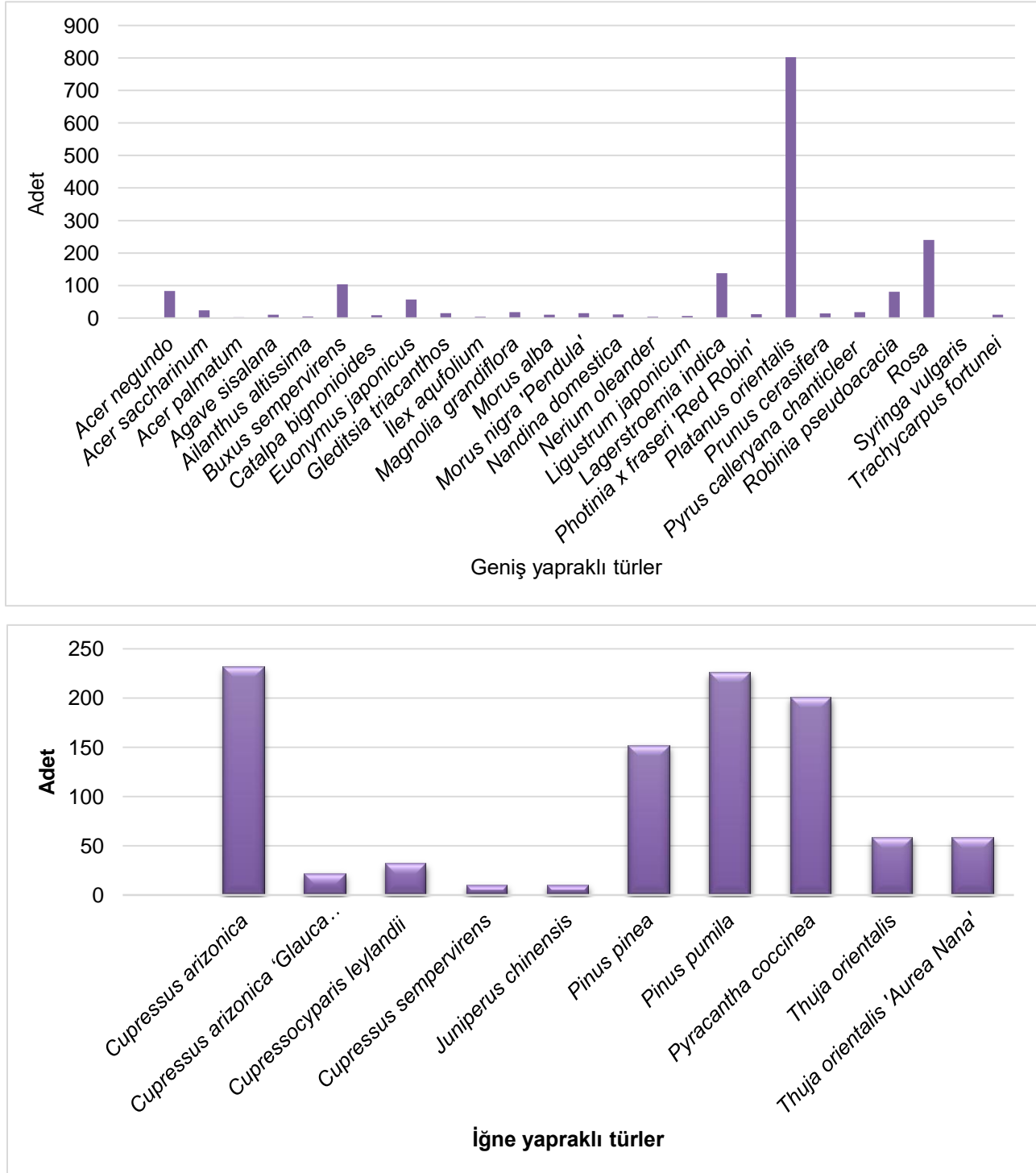
Diclekent Bulvarı Diyarbakır Cezaevi kavşağından sonra son bulmaktadır. Ancak bu güzergâhda bir bitkilendirme ya da yaya yolu çalışması bulunmamaktadır (Şekil 10).



Şekil 10. Diclekent Bulvarı Diyarbakır Cezaevi kavşağından sonrası genel görünüm

Diclekent bulvarlarında toplam 25 geniş yapraklı ve 10 iğne yapraklı tür olmak üzere toplam 35 bitki türü tespit edilmiştir. Diclekent bulvarlarında en çok tercih edilen geniş yapraklı ağaç türü *Platanus orientalis* olmuştur. Yaz aylarında, geniş yapraklı türler geniş ve yuvarlak yapraklarıyla yaya yollarını gölgelendirir. Böylece, geniş yapraklı ağaçların yeşil bir gölgelik gibi doğrusal olarak kullanılması, yalnızca mekanın görünümünü canlandırmakla kalmaz, aynı zamanda sürdürülebilir tasarım sürecine de yardımcı olur (Tafahomi 2022). *Cupressus arizonica* ve *Pinus pumila* en çok tercih edilen iğne yapraklı türlerdir. Bitki taksalarından *Cupressus arizonica*, *Pinus pumila* ve *Platanus orientalis* türlerinin 3'ü de doğal türlerdir. Benzer şekilde, Tarakçı Eren ark. (2020) yol peyzajı çalışmalarında ilgili bölgenin yerli türlerinin kullanımının önemli olduğunu vurgulamaktadırlar. Ayrıca, mevsimsel geçişleri izleme potansiyeline sahip türler olarak *Platanus orientalis* ve *Robinia pseudoacacia* belirlenmiştir. Bu türlerin mevsimsel estetiği ibreli bitkilere kıyasla daha fazladır. Mekân duygusu oluşturma özelliğine sahip olan türler olarak *Robinia pseudoacacia*, *Platanus orientalis*, *Prunus*

cerasifera belirlenmiştir. Görsel kalite açısından bütün türlerin etkin olduğu söylenebilir. Buna karşılık, *Acer palmatum*, *Ailanthus altissima*, *Syringa vulgaris*, *Nerium oleander* ve *Ilex aquifolium* en az tercih edilen geniş yapraklı türler ve *Cupressus sempervirens* ve *Juniperus chinensis* en az tercih edilen iğne yapraklı türler olmuştur (Şekil 11).



Şekil 11. Çalışma alanında kullanılan geniş ve iğne yapraklı türler

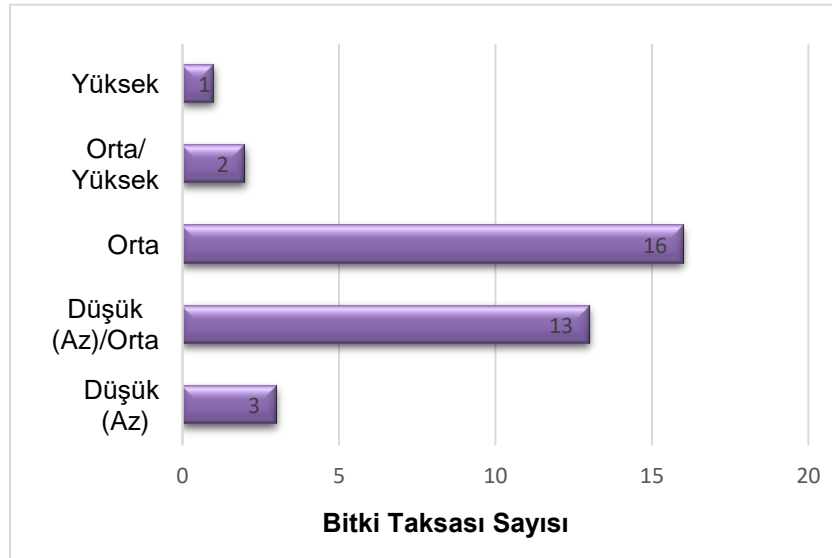
Ekolojik (Don, ısı, kuraklık, tuz, kirlilik ve rüzgâr) tolerans bakımından yapılan değerlendirmeler sonucunda, Diclekent Bulvarı’nda tespit edilen bitkilerin %98’si kirliliğe karşı toleranslı iken, bitki taksasının %66’sının ısıya karşı toleranslı olduğu tespit edilmiştir. Bitkilerin %74’ünün dona, %68’inin rüzgâra, %50’sinin tuza ve %49’ünün ise kuraklığa karşı tam tolerans gösterdikleri bulunmuştur (Tablo 11).

Tablo 11. Bitki taksasına göre ekolojik tolerans düzeyi

Bitki Taksası	Ekolojik Tolerans Düzeyi																	
	Don			Isı			Kuraklık			Tuzluluk			Kirlilik			Rüzgâr		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
<i>Acer negundo</i> L.			x	x					x		x				x	x		
<i>Acer saccharinum</i> L.	x					x			x		x				x	x		
<i>Acer palmatum</i> L.			x	x			x				x			x				x
<i>Agave sisalana</i> Perrine		x				x			x		x			x				x
<i>Ailanthus altissima</i> Mill.			x			x			x		x				x			x
<i>Buxus sempervirens</i> L.			x			x		x			x				x			x
<i>Catalpa bignonioides</i> Walt.			x	x			x			x					x			x
<i>Cupressus arizonica</i> L.			x	x					x		x				x			x
<i>Cupressus arizonica</i> L. 'Glauca Three Balls'			x	x					x		x				x			x
<i>x Cupressocyparis leylandii</i> L.			x	x				x		x					x			x
<i>Cupressus sempervirens</i> L.			x			x			x		x				x			x
<i>Euonymus japonicus</i> L.			x			x			x		x				x			x
<i>Gleditsia triacanthos</i> L.			x			x			x				x		x	x		
<i>Ilex aquifolium</i>			x			x	x						x		x			x
<i>Juniperus chinensis</i> L.			x			x			x				x		x			x
<i>Lagerstroemia indica</i> L.			x	x					x		x				x			x
<i>Ligustrum japonicum</i> W.T. Aiton	x					x			x				x		x			x
<i>Magnolia grandiflora</i> L.		x				x	x				x				x			x
<i>Morus alba</i> L.			x			x			x		x				x	x		
<i>Morus nigra</i> L. 'Pendula'			x			x			x		x				x	x		
<i>Nandina domestica</i> Thunb.			x	x			x		x						x			x
<i>Nerium oleander</i> L.			x			x			x		x				x			x

<i>Photinia x fraseri</i> Dress. 'Red Robin'	x		x	x	x		x	x
<i>Pinus pinea</i> L.	x		x		x	x	x	x
<i>Pinus pumila</i> L.	x		x		x	x	x	x
<i>Platanus orientalis</i> L.	x		x		x	x	x	x
<i>Prunus cerasifera</i> L.	x	x		x		x	x	x
<i>Pyracantha coccinea</i> M. Roem.	x		x	x		x	x	x
<i>Pyrus calleryana</i> 'Chanticleer'	x		x	x	x		x	x
<i>Robinia pseudoacacia</i> L.	x	x			x	x	x	x
<i>Rosa sp.</i>	x		x	x		x	x	x
<i>Syringa vulgaris</i> L.	x	x		x		x	x	x
<i>Thuja orientalis</i> L.	x	x			x	x	x	x
<i>Thuja orientalis</i> L. 'Aurea Nana'	x	x			x	x	x	x
<i>Trachycarpus fortunei</i> (Hook.) H. Wendl.	x		x		x	x	x	x

Çalışma alanında sürdürülebilirliği sağlamak için en ihtiyaç duyulan unsurlardan biri olan su tüketimi bakımından, su tüketim düzeyi orta derecede olan bitki taksası en yüksek oranda (%46) bulunmaktadır. Bunu sırasıyla, az/orta (%37), düşük (%8), orta/yüksek (%6) ve yüksek (%3) bitki taksası takip etmiştir (Şekil 12; Tablo 12).



Şekil 12. Su tüketim durumuna göre bitki taksası

Tablo 12. Bitki taksasına göre su tüketim durumu

Bitki Taksası	Su Tüketim Durumu				
	Düşük (Az)	Düşük (Az)/ Orta	Orta	Orta/ Yüksek	Yüksek
<i>Acer negundo</i> L.			x		
<i>Acer saccharinum</i> L.			x		
<i>Acer palmatum</i> L.			x		
<i>Agave sisalana</i> Perrine				x	
<i>Ailanthus altissima</i> Mill.	x				
<i>Buxus sempervirens</i> L.			x		
<i>Catalpa bignonioides</i> Walt.			x		
<i>Cupressus arizonica</i> L.	x				
<i>Cupressus arizonica</i> L. 'Glauca Three Balls'	x				
<i>x Cupressocyparis leylandii</i> L.			x		
<i>Cupressus sempervirens</i> L.		x			
<i>Euonymus japonicus</i> L.		x			
<i>Gleditsia triacanthos</i> L.		x			
<i>Ilex aquifolium</i>		x			
<i>Juniperus chinensis</i> L.		x			
<i>Lagerstroemia indica</i> L.		x			
<i>Ligustrum japonicum</i> W.T. Aiton		x			
<i>Magnolia grandiflora</i> L.				x	
<i>Morus alba</i> L.			x		
<i>Morus nigra</i> L. 'Pendula'			x		
<i>Nandina domestica</i> Thunb.			x		
<i>Nerium oleander</i> L.		x			
<i>Photinia x fraseri</i> Dress. 'Red Robin'		x			
<i>Pinus pinea</i> L.			x		
<i>Pinus pumila</i> L.			x		
<i>Platanus orientalis</i> L.			x		
<i>Prunus cerasifera</i> L.			x		
<i>Pyracantha coccinea</i> M. Roem.		x			
<i>Pyrus calleryana</i> 'Chanticleer'		x			
<i>Robinia pseudoacacia</i> L.			x		
<i>Rosa sp.</i>					x
<i>Syringa vulgaris</i> L.		x			

<i>Thuja orientalis</i> L.	X
<i>Thuja orientalis</i> L. 'Aurea Nana'	X
<i>Trachycarpus fortunei</i> (Hook.) H. Wendl.	X

SONUÇ VE ÖNERİLER

Kuraklık, şehirleşme, iklim değişiklikleri, orman tahribatları ve çölleşme toplumlari, çevreyi ve ülkeleri tehdit etmektedir. Kuraklık, meteorolojik özelliklere sahip doğal afetler arasında insanlar için en tehlikeli olanıdır. Dünya'nın birçok yerinde olduğu gibi Türkiye'de de olan kuraklığı en aza indirmek için yapılan yeşil alanların büyüklüğü ve sayısı kadar, bu alanlar için tercih edilen bitki taksası da göz ardı edilmemelidir.

Bu çalışmayla, Diyarbakır Diclekent Bulvarı'nda kullanılan bitki taksasının envanteri çıkarılmış, bitki taksasının su tüketim ve ekolojik tolerans düzeyleri ortaya konmuştur. Bitki taksasının çoğu geniş yapraklı (25) ağaçlardan oluşmuştur. Diclekent bulvarında *Platanus orientalis* en çok tercih edilen geniş yapraklı ağaç türüdür. Diclekent Bulvarı ağaçlandırmasında kullanılan bitki taksasının çoğunlukla belirli bir dikim aralığında tesis edilmediği ortaya çıkmıştır. Bu nedenle, bitki taksasının özelliklerine göre belirlenecek dikim mesafesinin tercih edilmesi için gerekli özenin gösterilmesi gerekmektedir. Bu nedenle, bitkilerin gölgeleme gibi estetik gibi işlevsel faydalarından daha fazla yararlanılacaktır. Bitki taksasının çoğunun (%46) su tüketim düzeyinin orta derecede olduğu bulunmuştur. Bu nedenle, bulvarda daha az su tüketen, bölgede doğal olarak büyüyen ve kentteki zorlu ekolojik koşullara dayanıklı bitki türlerinin tercih edilmesi, peyzaj uygulamalarının başarısını artıracak ve sürdürülebilir yeşil alanlar oluşturma sürecinde önemli bir rol oynayacaktır.

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BUĞDAY SAPLARINDAN ÜRETİLEN KAĞIT HAMURLARININ FLUTİNG KAĞIT ÜRETİMİNDE DEĞERLENDİRİLMESİ

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Özet

Bu çalışmada buğday sapından kimyasal yöntemlerle pişirme yapılarak kağıt hamuru elde edilmiştir. Buğday sapından elde edilen birincil lif kağıt hamuru, ikincil lif olan eski oluklu mukavva kağıt hamurları (EOM) ile belirli oranlarda (%0, %5, %10, %15, %20, %25 ve %30) harmanlanarak 90 ± 4 gramajında fluting kağıtları üretilmiş ve üretilen test kağıtlarının fiziksel ve optik özellikleri tespit edilmiştir. EOM kağıt hamuruna ilave edilen buğday sapı kağıt hamurunun katılım oranının artmasına paralel olarak fluting kağıtların mekanik özelliklerinin olumlu yönde arttığı gözlemlenmiştir. EOM kağıt hamurlarına %30 buğday sapı hamuru ilave edildiğinde fluting kağıtların kopma uzunluğu 3.44 km'den 4.34 km'ye yükselerek yaklaşık %26.2 oranında bir artış meydana gelmiştir. Fluting kağıtların optik özelliklerinde buğday sapı kağıt hamurunun kayda değer bir etkisi olmamıştır. Sonuç olarak, ambalaj kağıdı üretiminde kullanılan fluting kağıtların mekanik özelliklerinin buğday sapı kağıt hamurları ilave edilerek iyileştirilmesi ile hem üretim sırasında meydana gelen kağıt kopma sorunlarının önüne geçilebilir hem de ambalajın fiziksel ve mekaniksel etkilere karşı direnci artırılabilir.

Anahtar Kelimeler: Buğday sapı, fluting kağıt, eski oluklu mukavva, mekanik, optik



Abstract

In this study, pulps were obtained by chemically cooking wheat straw. Fluting papers with a basis weight of 90 ± 4 gsm were produced by blending primary wheat straw pulp with secondary fiber pulp from old corrugated containers (OCC) in various proportions (%0, %5, %10, %15, %20, %25, and %30), and the physical and optical properties of the produced test papers were determined. It was observed that the mechanical properties of fluting papers improved positively as the proportion of wheat straw pulp added to OCC pulp increased. When 30% wheat straw pulp was added to OCC pulp, the breaking length of fluting papers increased from 3.44 km to 4.34 km, indicating an approximately 26.2% increase. The optical properties of fluting papers were not significantly affected by the addition of wheat straw pulp. In conclusion, enhancing the mechanical properties of fluting papers used in packaging paper production by incorporating wheat straw pulp can prevent paper tearing issues during production and enhance the resistance of the packaging to physical and mechanical impacts.

Keywords: Wheat stalk, fluting paper, old corrugated cardboard, mechanics, optics



INTRODUCTION

Fluting papers are typically produced from recyclable corrugated cardboard and packaging paper waste with an efficiency of approximately 85%, undergoing various cleaning and screening stages. Due to their ability to retain shape with heat and moisture, they are utilized as corrugated medium in corrugated cardboard production (Biermann, 1993). In our country, waste papers are commonly used as the raw material source for the production of corrugated cardboard papers. However, the quality and characteristics of waste papers allow them to be recycled only 4-6 times, and during recycling, a phenomenon known as hornification occurs, leading to a decrease in fiber bonding ability and surface area (McKee, 1971; Biermann, 1993; Şahin, 2014). Consequently, the strength properties of the produced papers decrease, making it challenging to achieve desired properties as the number of recycling cycles increases. Therefore, strength-enhancing chemicals are used in the production of corrugated cardboard papers, creating both economic and environmental issues (Clark, 1978; Biermann, 1993; Üner and Şahin, 2004).

Papers obtained from primary quality pulp exhibit higher physical property values compared to papers produced from secondary quality pulp. Primary quality fibers can be obtained from annual plants in agricultural areas or our forest resources. In Turkey, the annual wheat production is approximately 21 million tons, ranking 11th in the world (FAO, 2020). According to studies and agricultural experts, approximately 2 kg of wheat straw is obtained from the production location of 1 kg of wheat (Akgül, 1997; Çiçekler, 2012; Tutus and Çiçekler, 2016). Consequently, around 42 million tons of wheat straw are produced annually in our country. However, considering the 15% losses during baling and transportation and 17% losses due to stubbles on the soil, there is approximately a 32% overall loss. In summary, about 68% of the 42 million tons of wheat straw, i.e., 28.6 million tons, can be utilized.

According to the data from the General Directorate of Forestry, there is a total forest area of 22,933,000 hectares in Turkey in 2020 (Anonymous, 2021). Oak, a deciduous tree species, ranks first with 5.8 million hectares, followed by red pine, a coniferous tree species, with 5.6 million hectares. Worldwide, forest areas have decreased from 32.5% to 30.8% between 1990 and 2020, equivalent to an area of 178 million hectares (approximately the size of Libya). Despite these reductions, with the implementation of strategic plans in some countries and the establishment of new forests, forest losses have decreased from 7.84 million hectares per year to 4.74 million hectares. The main cause of forest loss is attributed to the expansion of agricultural lands to meet the increasing food demands of the growing population (FAO, 2020).

In this study, unbleached pulps obtained from wheat straws were blended with old corrugated cardboard in certain ratios to produce fluting papers. The effects of adding wheat straw pulps to old corrugated cardboard pulps in

specific proportions on the physical properties of fluting papers were investigated.

MATERIAL AND METHODS

In this study, wheat straws and old corrugated cardboard, which are widely spread across agricultural areas in our country, were utilized as lignocellulosic raw materials. During the wheat straw selection process for the experiment, samples were collected to represent the entire agricultural area. The cooking conditions applied to wheat straws are provided in Table 1 below.

Table 1. Soda-Air-KBH₄ Cooking Conditions Applied to Wheat Straws

NaOH charge(%)	14
Air pressure (bar)	9
Potassium borohydride (KBH ₄) charge (%)	0,7
Temperature (°C)	140
Time to maximum temperature (min)	40
Time at maximum temperature (min)	50
Liquor to raw material ratio (L/kg)	5/1

Following the cooking process, wheat straw pulps were subjected to washing with abundant water on a 200-mesh sieve to remove cooking chemicals (black liquor). The washed pulps were then opened in a laboratory-type disintegrator for 10 minutes and screened through a shaker sieve with a 0.15 mm aperture to separate the uncooked portions. The old corrugated cardboard (OCC) papers were obtained from Göçdiz Corrugated Cardboard Factory located in the Pazarcık district of Kahramanmaraş in 2014. The corrugated cardboard papers, divided into small pieces, were individually disintegrated into fibers in a laboratory-type Hollander device, adjusted to a consistency of 20-25%, and stored in polyethylene bags at +4 °C.

Table 2. Ratios of Pulps Used in Fluting Paper Production

No	Wheat straw pulp	OCC pulp
Ratios (%)		
1	-	100
2	5	95
3	10	90
4	15	85
5	20	80

6	15	75
7	30	70
8	100	-

Before paper production, wheat straw pulp and OCC paper pulps were beaten in the Hollander beater machine to a freeness degree of 35 ± 3 SR°. Subsequently, they were blended in the ratios specified in Table 2 and used to produce fluting paper. Fluting papers with a basis weight of 90 ± 4 gsm were manufactured using the Rapid Kothen paper machine according to ISO 5269-2 standard. Ten test papers were produced for each experiment mentioned in Table 2. The physical and optical properties of the obtained fluting papers from the experiments were determined using the relevant standards, as listed in Table 3 below.

Table 3. Standards Used for Physical and Optical Tests Applied to Fluting Papers

Physical and Optical Tests	Standards
Grammage (gr/m^2)	TAPPI T 410 om-88
Thickness (μ)	TAPPI T 411 om-89
Bulkiness (cm^3/gr) and Density (gr/cm^3)	TAPPI T 411 om-89
Breaking length (m)	TAPPI T 494 om-01
Burst index ($\text{kPa m}^2/\text{gr}$)	TAPPI T 403 om-91
CCT (Corrugated Crush Test) (kN.m^{-1})	TAPPI T 824
CMT (Concora Medium Test) (N)	TAPPI T 809
SCT (Short Span Compression) (kN.m^{-1})	TAPPI T 826
Brightness (%ISO)	ISO/DIS 2470
Whiteness (%ISO)	ISO 11475
Opacity (%ISO)	ISO/DIS 2471

The tests mentioned above were repeated five times for each experiment, and a variance analysis and Duncan test were additionally applied to demonstrate the impact of the mixture ratios on the physical and optical properties of the papers.

RESULTS AND DISCUSSION

Some physical properties of fluting papers produced with mixtures of old corrugated cardboard (OCC) and wheat straw pulps at a basis weight of 90 ± 4 gsm are provided in Table 4. It is observed that the addition of wheat straw pulps in certain ratios improves the physical properties compared to OCC pulps. According to the variance analysis results, it has been determined that the addition of wheat straw pulps to OCC pulps in specific ratios has a significant effect on the tensile strength, burst and tear indices, CMT, CCT, and SCT values of the produced fluting papers.

Table 4. Some Physical Properties of Fluting Papers

Grup No	OCC pulp (%)	Wheat Straw pulp (%)	Breaking length (km)	Tear index (mN.m ² .g)	Burst index (kPa.m ² .g ⁻¹)	CMT (N)	CCT (kN.m ⁻¹)	SCT (kN.m ⁻¹)	Bulkiness (cm ³ .gr ⁻¹)	Density (gr.cm ⁻³)
1	100	-	3.44e	8.30a	2.17d	141a	1.09c	1.91c	1.78	0.56
2	95	5	3.76ed	8.56a	2.54dc	139a	1.11c	1.88c	1.68	0.59
3	90	10	3.90dc	8.17a	2.71cb	153a	1.25cb	2.01cb	1.68	0.60
4	85	15	4.16cb	8.72a	2.80cba	152a	1.27cb	2.27a	1.65	0.61
5	80	20	4.06dcb	8.22a	2.89cba	162a	1.44b	2.20ba	1.66	0.60
6	75	25	4.77a	8.30a	3.22a	163a	1.49ba	2.19ba	1.59	0.63
7	70	30	4.34b	8.38a	3.03ba	182a	1.69a	2.36a	1.61	0.62
8	-	100	7.86	5.20	4.45	268	2.80	3.58	1.31	0.76

** The mean values indicated with the same letters do not show statistically significant differences according to the Duncan test.

The effects of the participation ratios of wheat straw pulp to OCC pulp on some physical properties of fluting papers are illustrated in Fig. 1.

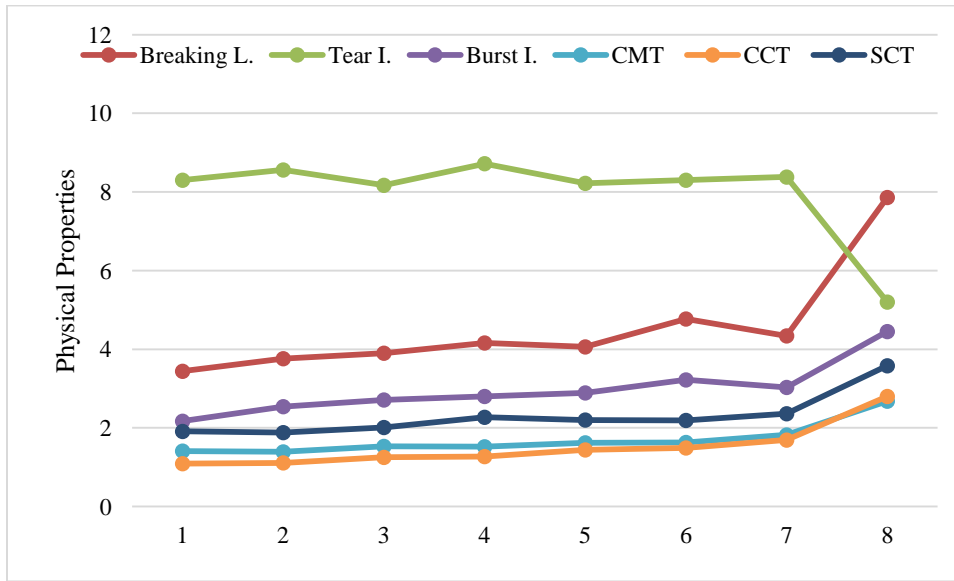


Figure 1. Effects of Wheat Straw Pulp addition Ratio on the Physical Properties of Fluting Papers

The breaking length of papers produced with the addition of wheat straw pulps to OCC pulps is directly proportional to the increase in the wheat straw addition amount. Compared to the control samples, increases of 9.3%, 13.37%, 20.93%, 18.02%, 38.66%, 26.16%, and 128.48% for breaking length, -3.13%, -1.57%, 5.06%, -0.96%, 0%, 0.96%, and -37.35% for the tear index, 17.05%, 24.88%, 29.03%, 33.18%, 48.39%, 39.63%, and 105.07% for the burst index, respectively.

Some optical properties of fluting papers produced from mixtures of OCC and wheat straw pulps are provided in Table.

Table 5. Optical Properties of Fluting Papers

No	OCC pulp (%)	Wheat straw pulp (%)	Whiteness (%ISO)	Brightness (%ISO)	Yellowness (E313)
1	100	0	36.40c	27.83a	35.46a
2	95	5	36.28c	27.54a	36.08b
3	90	10	36.53cb	27.59a	36.49cb
4	85	15	36.72cb	27.60a	36.88c
5	80	20	36.58cb	27.27a	37.61d
6	75	25	37.54a	27.97a	37.6d9
7	70	30	37.24ba	27.52a	38.44e
8	-	100	40.05	26.88	47.25

** The mean values indicated with the same letters do not show statistically significant differences according to the Duncan test.

When examining the optical properties of papers produced with mixtures of OCC and wheat straw pulps, it is observed that as the proportion of wheat straw pulps in the mixture increases, the yellowness values are

adversely affected, while the brightness values show an increase of up to 0.33%, 0.36%, 0.88%, 0.49%, 3.13%, 2.31%, and 10.03%. There is no significant effect of wheat straw pulps on brightness values. In Figure 2, the effects of the participation ratios of wheat straw pulp to OCC pulp on some optical properties of fluting papers are illustrated.

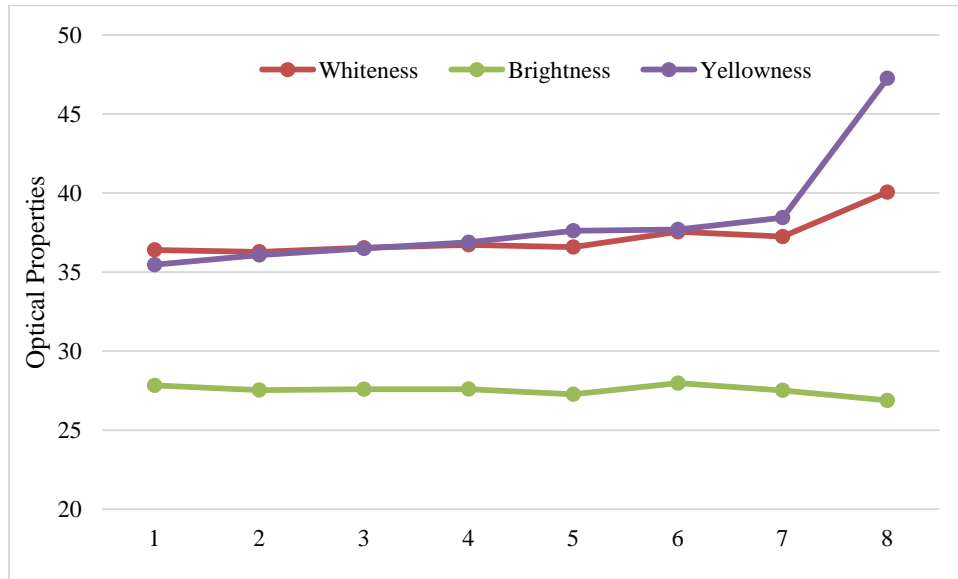


Figure 2. Effects of Wheat Straw Pulp Addition Ratio on the Optical Properties of Fluting Papers

CONCLUSION

In this study, the strength properties of fluting papers produced from recycled old corrugated cardboards are found to be lower than those obtained from wheat straw pulps. Additionally, they exhibit physical properties below the minimum values specified in the TS 12728:2001 standard. Therefore, the market supply and acceptance of fluting papers produced solely from recycled old corrugated cardboards are quite challenging. In this research, unbleached paper pulps obtained from wheat straw were blended with recycled old corrugated cardboards at certain ratios to produce fluting papers. When examining the properties of the produced papers, it was observed that a significant portion of them exceeded the values specified in the relevant standards.

The demand for recycling papers has rapidly increased both in our country and worldwide. However, the paper industry faces a raw material shortage as first-quality paper can only be recycled about 6-7 times with various chemicals, and it cannot provide a sufficient number of products with the desired quality. The conversion of agricultural waste such as wheat straw into paper pulp with eco-friendly chemicals not only supports the paper industry's raw material search but also contributes to the production of paper with the desired properties. Moreover, it reduces the demand for imported paper pulp in our country, thereby contributing to the national economy.



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MELAMİN EMDİRİLMİŞ ATIK KAĞITLARIN KUŞELEME İŞLEMLERİNDE DEĞERLENDİRİLMESİ

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Özet

Bu çalışmada kuşe kağıt üretimi için uzun ve kısa lifli kağıt hamuru harmanları kullanılarak 80 ± 5 gramajlarında kağıtlar üretilmiştir. Kuşe pigmenti olarak öğütülmüş kalsiyum karbonat (GCC) ve öğütülmüş melaminli kağıtlar, bağlayıcı olarak nişasta ve viskozite ayarlayıcı olarak karboksimetil selüloz kullanılarak kuşe harçları hazırlanmıştır. Kuşe harcı size-preste üretilen kağıtlara 3,2 bar atm basıncı altında 3 m/sn hızla her iki yüzey uygulanmıştır. GCC ve öğütülmüş melaminli kağıtlar ile kuşelenen kağıtlar fiziksel, optik özellik ve yüzey düzgünlüğü testlerine tabi tutulmuştur. Elde edilen deney sonuçlarına göre, kuşe kağıt üretiminde kuşe pigmenti olarak kalsiyum karbonat içerikli dolgu minerallerine ek bir malzeme olarak atık melamin emdirilmiş kağıtların öğütülerek kuşe harcı içinde kullanılabilirliği tespit edilmiştir. Atık melamin emdirilmiş kağıtların kullanım yerinden dolayı kuşelenen kağıtların suya ve neme karşı olan direncini de olumlu yönde etkilemiştir. Yüzey düzgünlüğü, fiziksel ve optik özellik değerleri de diğer kuşe pigmentleri gibi olumlu yönde kağıt yüzeyine katkı sağlayarak kuşe harcında kullanılabilirliğini göstermiştir. Ancak GCC ile kuşelenen kağıtların fiziksel ve optik özellik değerlerini olumlu yönde etkilerken suya ve neme karşı olan direncin atık melaminli kağıtlardan elde edilen kuşe pigmenti kadar etkili olmadığı sonucuna varılmıştır.

Anahtar Kelimeler: Atık melaminli kağıt, öğütülmüş kalsiyum karbonat, kağıt, kuşeleme



Abstract

In this study, papers with a basis weight of 80 ± 5 gsm were produced for coated paper production using blends of long and short fiber paper pulps. Coating colors were prepared using ground calcium carbonate (GCC) and ground waste melamine-impregnated papers (MEK) as coating pigments, starch as a binder, and carboxymethyl cellulose as a viscosity modifier. The coating color was applied to both surfaces of the size-pressed papers at a speed of 3 m/s under a pressure of 3.2 bar. Papers coated with GCC and MEK were subjected to physical, optical, and surface roughness tests. According to the experimental results obtained, the feasibility of using waste melamine-impregnated papers as an additional material to calcium carbonate-based filler minerals in coating colors for coated paper production was determined. The use of waste melamine-impregnated papers positively affected the resistance of coated papers to water and moisture due to their origin of use. Surface roughness, physical, and optical values demonstrated the applicability of waste melamine-impregnated papers in coating colors, contributing positively to the paper surface, similar to other coating pigments. However, it was concluded that while papers coated with GCC positively influenced physical and optical properties, their resistance to water and moisture was not as effective as the coated papers obtained from waste melamine-impregnated papers.

Keywords: Waste melamine-impregnated papers, ground calcium carbonate, paper, coating



INTRODUCTION

Writing-printing papers are papers characterized by high optical properties, making them suitable for both writing and printing. These papers are manufactured from either chemical cellulose or a combination of chemical cellulose and mechanical wood pulp with a specific composition structure. Depending on their intended use, these papers undergo a coating process (Çiçekler, 2019).

To enhance the printing characteristics of paper and cardboard, two common methods are widely employed. The first involves passing the paper through a super calender after adding a filler material to the fiber suspension during the papermaking stage, typically in the range of 18-25% (Tutuş ve ark., 2018). This process helps regulate the surface of the paper by organizing small-sized filler particles, thus improving its printing properties. The second method aims to provide a regular and homogeneous surface to the paper after its production. This process, similar to what plasterers do to walls, involves smoothing out surface irregularities through an application of a coating consisting of mineral substances and adhesives. This process is known as paper coating or art paper production. Ground calcium carbonate (GCC), precipitated calcium carbonate (PCC), kaolin, and calcite, which are pigments containing high-purity calcium carbonate, commonly find application in the paper industry due to their high optical properties. These pigments are incorporated into coating solutions, forming a high-quality type of paper with improved writing and printing capabilities (Sönmez, 2008). Coated papers, with their high whiteness and brightness, enhance print quality and product appeal. Calcium carbonate pigments, naturally high in purity, are preferred in the paper industry as fillers and constituents of coating solutions (Eroğlu and Usta, 2004).

In response to the increasing demand for natural and economical products globally and in Turkey, the production of melamine-coated panels is rising proportionally with the resin-impregnated paper production. This increase in production also leads to a rise in the quantity of waste melamine-impregnated papers. The recycling of waste papers generated in the paper impregnation and surface coating sector is crucial within the scope of zero waste. Therefore, waste melamine-impregnated papers are collected and evaluated in various studies (Öz, 2019). The aim of this study is to determine the effects of both ground calcium carbonate (GCC), commonly used as both a filler pigment and a coating material in coated paper production, and ground and sieved waste melamine-impregnated papers (MEK), added as an additional component, on the optical and physical properties of coated papers obtained through the coating process. The study focuses on evaluating how GCC and MEK impact the characteristics of coated papers produced through the coating process.

MATERIALS AND METHODS

In this study, coating color was prepared following the existing coating recipes in the market, utilizing waste melamine-impregnated papers (MEK), ground calcium carbonate (GCC), carboxymethyl cellulose (CMC), and starch. The paper production involved the use of pre-bleached short and long fibers obtained from the market. Waste melamine-impregnated papers were sourced from manufacturing companies, fragmented to micron-sized particles using a stone mill, and sieved through a shaker screen to obtain sub-200 mesh powder samples. The GCC, CMC, and starch used in the study were commercially purchased. This project was conducted at Kahramanmaraş Sütçü İmam University, Faculty of Forestry, and the paper and cardboard production laboratory.

Paper Production and Coating Process

Blends of bleached short fibers (70%) and long fibers (30%), commonly used in the paper industry, were gradually beaten in a laboratory-scale Hollander beater up to 35 ± 5 °SR. Paper production was then carried out on a semi-automatic Rapid Kothen RK-21 paper machine using the beaten pulps with a grammage of 80 ± 5 gsm. For the coating color, suspensions of 50% concentration of waste melamine-impregnated papers (MEK) and ground calcium carbonate (GCC), and 15% concentration of starch were separately prepared. The prepared mixtures were stirred until homogenized in a beaker based on the proportions given in Table 1. Two different coating experiments were conducted using 100% MEK and 100% GCC in the coating color.

Table 1. Coating Color Preparation Recipe

No	MEK (%)	GCC (%)	Starch (%)	CMC (%)
1	0	0	0	0
2	100	100	15	0.3
3	0	100	15	0.3

The prepared coating color was poured between two cylinders in the size-press apparatus, applying it to both surfaces of the paper at a speed of 3 m/s under a pressure of 3.2 bars. The resulting coated papers were conditioned in a chamber with a temperature of 23 ± 1 °C and relative humidity of $65 \pm 1\%$ for 24 hours before undergoing optical and physical property tests.

Determination of Physical and Optical Properties

The coated papers, conditioned in the chamber for 24 hours, were subjected to physical and optical tests in accordance with the standards provided in Table 2 below.

Table 2. Physical and Optical Tests Applied to Coated Papers and Their Standards

Physical and Optical Tests	Standards
Grammage (gr/m^2)	TAPPI T 410 om-88
Thickness (μ)	TAPPI T 411 om-89
Bulkiness (cm^3/gr) and Density (gr/cm^3)	TAPPI T 411 om-89
Breaking length (m)	TAPPI T 494 om-01
Burst index ($\text{kPa m}^2/\text{gr}$)	TAPPI T 403 om-91
Tear index ($\text{mN.m}^2.\text{gr}$)	TAPPI T 414 om-88
COBB (gr/m^2)	ISO 535
Brightness (%ISO)	ISO/DIS 2470
Whiteness (%ISO)	ISO 11475
Opacity (%ISO)	ISO/DIS 2471
Yellowness (E313)	ASTM E313
Surface Roughness	ISO 4287

For the determination of physical and optical properties, 3 repetitions were performed for each experiment, and the averages were calculated.

RESULTS AND DISCUSSION

Physical Properties of Coated Papers

Table 3 provides findings regarding some physical properties of papers coated with GCC and MEK. The coating process has led to significant changes in the tensile strength, burst indices, and tear indices of the papers.

Table 3. Findings on Some Physical Properties of Papers Coated with GCC and MEK.

	Breaking length (m)	Burst index (kPam ² /gr)	Tear index (mN.m ² /gr)	Density (gr/cm ³)	Bulkiness (cm ³ /gr)	COBB (gr/cm ²)
Control (uncoated)	3378	1.42	7.86	0.62	1.61	175
Coated with GCC	3117	1.68	6.26	0.73	1.38	155
Coated with MEK	4791	2.53	6.64	0.61	1.66	134

Compared to the control sample, papers coated with GCC and MEK show a respective decrease of -7.72% and an increase of 41.83% in tensile strength values. The burst indices exhibit an increase of 18.31% and 78.17%, while tear indices decrease by 20.36% and 15.52%. Although no significant differences are observed in bulkiness and density values, notable improvements are identified in COBB values. The surface roughness values indicating the surface properties of coated papers are provided in Table 4 below.

Table 4. Findings on The Surface Roughness Properties of Papers Coated with GCC and MEK

	Ra (µm)	Rq (µm)	Rz (µm)
Control (uncoated)	3.623	4.516	21.779
Coated with GCC	2.202	2.755	13.732
Coated with MEK	3.081	3.839	18.805

The Ra values of uncoated sample and coated papers (GCC, MEK) were determined to be 3.623, 2.202, and 3.081, respectively. The Rq values were 4.516, 2.755, and 3.839, while the Rz values were 21.779, 13.732, and 18.805. It was observed that the coated papers with GCC showed the best result in terms of surface roughness values, but the papers coated with MEK exhibited an improvement in surface roughness compared to the control sample.

Tutuş et al. (2013) conducted a study where they recycled papers, classified into categories such as newspaper, packaging, and writing-printing papers. They added 20-25-30% of precipitated calcium carbonate (PCC) and ground calcium carbonate (GCC) as fillers to the papers they produced, examining the optical and physical

properties of the resulting papers. As a result of their study, it was observed that the controlled production of PCC, with a more regular particle size, shape, and size distribution compared to GCC, improved adhesion to the papers and significantly reduced their physical properties. In another study, the addition of PCC and GCC in specific proportions as fillers to the paper was investigated, and it was found that the use of PCC and GCC resulted in decreases in the physical properties of the papers (Tutuş et al., 2012).

Optical Properties of Coated Papers

Below, Table 5 presents some optical properties of papers coated with PCC and GCC.

Table 5. Findings on Some Optical Properties of Papers Coated with GCC and MEK.

	Whiteness	Brightness	Yellowness	Opacity
Control (uncoated)	79.72	77.02	4.59	96.22
Coated with GCC	83.80	82.31	3.08	98.20
Coated with MEK	81.17	78.12	4.34	96.77

The coating process has led to a significant increase in the brightness and gloss values of the papers. Additionally, positive reductions in yellowness values have been observed. The reason for these increases is that the coating process with GCC and MEK improves the print quality of the paper surface. Compared to the control sample, whiteness values increased by 5.12% and 1.82%, while brightness values increased by 6.87% and 1.43% with GCC and MEK, respectively. Due to their inherent structures, GCC and MEK have contributed to the enhancements in optical property values. However, MEK, with its fibrous structure, and GCC, being 98% pure calcium carbonate, did not endow coated papers with the same level of optical property values.

In a study conducted by Tutuş et al. (2012), examining the physical and optical properties of paper with different proportions of PCC and GCC as fillers, brightness values were determined to be 80.08, 80.57, 80.52, 80.94, 83.06, and 81.15, while burst values were found to be 84.26, 84.37, 85.12, 85.31, 85.96, and 86.06. As a result of their studies, they noted that, due to its structure, PCC is whiter and brighter compared to kaolin, GCC, and other fillers, making it more suitable for achieving optimal brightness and gloss values in paper. Müdüroğlu and Arsoy (2013) aimed to achieve the best printing properties on a base cardboard by using different coating colors consisting of certain proportions of PCC and GCC. As a result of their study, they

observed that the cardboard surface had a homogeneous structure, the quality of the coating color improved, and there was an increase in the optical values of the paper.

Conclusion

As a result of this study, it has been determined that the addition of GCC results in a more homogeneous structure of the paper surface, leading to improvements in optical properties such as whiteness, brightness, yellowness, and opacity. Whiteness value is a crucial parameter influencing print quality, and the use of GCC and MEK as pigments in the coating process significantly increases this value. While the whiteness value of GCC used in coating color for art paper has increased more than MEK, papers coated with GCC negatively affect physical properties, whereas papers coated with MEK show an increase in physical property values. The observed increase in physical properties of papers coated with MEK is attributed to the fibrous structure and melamine adhesive present in MEK. However, it is observed that experimental papers coated with GCC provide the best optical properties, attributed to the high optical characteristics of the GCC pigment and its 98% purity in calcium carbonate. Consequently, this study concludes that, although MEK does not match GCC in the coating process, it enhances the optical properties of experimental papers and contributes higher physical property values compared to GCC coating. MEK is identified as usable in the coating process depending on the intended application of the paper, given its ability to impart high physical property values.



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GIDALARDA AKILLI AMBALAJLAMA UYGULAMALARI VE GIDA GÜVENLİĞİ

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Özet

Ambalaj, bir ürünü içeren fiziksel malzeme olarak kabul edilirken, ambalajlama süreci, müşterilerin satın aldıkları gıdaların üretildiği ve işlendiği andan nihai tüketiciye ulaştığı ana kadar koruma sağlayan bir süreçtir. Ambalaj malzemeleri, plastik, cam, metal ve karton gibi farklı tiplerde olabilir. Ambalaj materyalleri, gıdaların korunması, dış etkenlerden korunması, güvenilirliğinin sağlanması, iletişimi ve izlenmesi gibi önemli görevleri yerine getirir. Bu bağlamda, gıda güvenliği perspektifinden, ambalaj malzemelerinin migrasyon potansiyeli kritik bir öneme sahiptir. Yüksek kaliteli gıdaların piyasaya sunulmasında, raf ömrü gereksinimlerini karşılayan ve tedarik zinciri boyunca depolama, iletişim ve kullanım kolaylığı gibi faktörleri sağlayan ambalajlar kullanmak önemlidir. Gıda ürünlerinin raf ömrünü korumak veya uzatmak için kullanılan çeşitli ambalajlama teknikleri arasında modifiye atmosfer ambalajlama (MAP), vakum ambalajlama, emicilerin kullanımı ve uygun bariyerlere sahip ambalaj malzemelerinin seçimi bulunmaktadır. Bu teknikler, gıdanın kalitesini ve tazelik durumunu korur. Ambalaj indikatörleri, tüketicilere görsel efektlerle bilgi sunarak bir malzemenin varlığını veya yokluğunu, reaksiyon şiddetini veya belirli bir madde konsantrasyonunu aktarır. Bu indikatörler, fiziksel veya kimyasal özelliklerin ölçümü sonucunda ortaya çıkan sinyaller aracılığıyla gıda ambalajının performansını artırır ve tüketicilere güvenilir bilgiler sunar. Bu sayede, ambalaj, gıda güvenliği ve kalitesini sağlama sürecinde önemli bir rol oynar.

Anahtar Kelimeler: Gıda Güvenliği, Gıda Kalitesi, Gıda Ambalajlama, Akıllı Ambalaj



SMART PACKAGING APPLICATIONS IN FOODS AND FOOD SAFETY

Abstract

While packaging is considered as the physical material containing a product, the packaging process is a process that provides protection from the moment the food purchased by customers is produced and processed until it reaches the final consumer. Packaging materials fulfil important tasks such as food protection, protection from external factors, ensuring safety, communication and monitoring. In this context, from a food safety perspective, the migration potential of packaging materials is of critical importance. In bringing high quality foods to the market, it is important to use packaging that meets shelf life requirements and provides factors such as storage, communication and ease of use throughout the supply chain. Packaging materials can be of different types such as plastic, glass, metal and cardboard. Various packaging techniques used to preserve or extend the shelf life of food products include modified atmosphere packaging (MAP), vacuum packaging, the use of absorbents and the selection of packaging materials with appropriate barriers. These techniques maintain the quality and freshness of the food. Packaging indicators convey the presence or absence of an ingredient, the intensity of a reaction or the concentration of a particular substance by providing information to consumers through visual effects. These indicators enhance the performance of food packaging and provide consumers with reliable information through signals generated by the measurement of physical or chemical properties. In this way, packaging plays an important role in the process of ensuring food safety and quality.

Keywords: Food Safety, Food Quality, Food Packaging, Intelligent Packaging

GİRİŞ

Ambalajlama, üreticiden tüketiciye gelene kadar gıdaları fiziksel, kimyasal ve mikrobiyolojik kontaminasyondan koruma konusunda temel bir rol oynar, bu da kalite ve güvenlik açısından önemlidir. Ambalajlanmış gıdanın raf ömrü, gıdanın özelliklerine (pH, su aktivitesi ve solunum hızı) ve dış etkenlere (depolama sıcaklığı, bağıl nem) bağlı olarak değişebilir (Prasad ve Kochhar, 2014; Ghoshal, 2018).

Günümüzde, ambalajın klasik işlevleri olan ürün muhafazası ve çevresel etkenlerden koruma yanında iletişim fonksiyonu da büyük önem kazanmıştır (Bhargava vd., 2020).

Ambalajlı gıdaların çevresel şartları takip edilerek, müşterilerin ürün kalitesini ve raf ömrünü gözlemlene imkanı ortaya çıkmıştır. Daha net bir ifadeyle, akıllı ambalajlama, paketlenmiş gıda ürünlerinin iç ve dış koşullarındaki değişiklikleri izleyen iletişim sistemlerini kullanan bir bilim ve teknoloji olarak tanımlanmaktadır. Bu yaklaşım, ürünün mevcut durumu ve kalitesi hakkında bilgi sağlamaktadır (YÜCEER ve CANER, 2023).

Gıda güvenliğini sağlamak amacıyla kullanılan akıllı ambalajlama sistemleri, kalite göstergelerini aktif ve pasif indikatörler olmak üzere iki ana kategoriye ayırmaktadır (Bhargava vd., 2020).

Akıllı ambalaj, fiziksel gerçeklik ile sanal dünya arasında bir köprü kurarak üreticiler, perakendeciler ve tüketiciler arasında bir köprü işlevi sağlamaktadır. Ürünün durumunu takip etmek için sensörler kullanılarak depolama koşulları (örneğin sıcaklık) ve tazeliği izlemek mümkündür. Bunun yanı sıra, göstergeler veya sensörler, ambalajın dışına veya içine yerleştirilerek ambalaja entegre edilebilir. Avrupa Gıda Güvenliği Kurumu (EFSA), akıllı ambalaj malzemelerini "ambalajlanmış gıdanın veya gıdanın çevresinin durumunu izleyen malzemeler ve sistemler" olarak tanımlamaktadır (Drago vd., 2020).

Gıda üretilme sürecinden başlayarak son tüketimine kadar kalitenin muhafaza edilmesi, ambalajın iç ve dış şartlara maruz kalmasına bağlıdır. Bu şartlar arasında ambalaj içindeki gaz kompozisyonu, bağıl nem, basınç, ışık ve sıcaklık gibi faktörler bulunmaktadır. Ambalajın bulunduğu dış koşullardaki değişiklikler, ambalajın içinde de değişikliklere neden olabilir. Gıda ambalajındaki hava boşlukları, zaman içinde gıda bileşenlerinde değişikliklere yol açabilir. Ambalaj içindeki atmosferdeki değişiklikler, transfer ve depolama sırasındaki sıcaklıkları yansıtarak gıdaların mikrobiyolojik kalitesini belirleyen, ölçen ve/veya raporlayan cihazlar, nihai tüketiciler, üreticiler ve/veya pazarlamacılar için kullanılan koruma stratejilerinin etkinliği hakkında önemli bilgiler sunmaktadır (Janjarasskul ve Suppakul, 2018).

Buna ek olarak, akıllı ambalajlama örneğin barkodlar, hoparlörler, radyo çipleri veya ekranlar aracılığıyla bilgilendirme veya koruma işlevlerini yerine getirebilmektedir. Gıdanın güvenliğini sağlamak

amacıyla geliştirilen bu uygulama, algılama, kayıt, izleme ve bilgileri tüketicilere aktarabilen bir ambalajlama sistemidir. Bu sistem, ambalajlı ürünün son durumu hakkında tüketicilere bilgi sunarak, gıda ürünlerinin izlenebilirliği ve güvenilirliği konusunda etkili bir rol oynamaktadır (YÜCEER ve CANER, 2023).

AMBALAJ VE AMBALAJLAMA KAVRAMI

Ambalaj, bir ürünü içeren fiziksel malzeme olarak kabul edilirken, ambalajlama süreci, müşterilerin satın aldıkları gıdaların üretildiği ve işlendiği andan nihai tüketiciye ulaştığı ana kadar koruma sağlayan bir süreçtir. Ambalaj materyalleri, muhafaza, dış etkenlerden koruma, güvenilirliği temin etme, iletişim ve izleme görevlerini de yerine getirmektedir (Robertson, 2016).

Bunun yanı sıra, ambalajlar kullanım kolaylığı sunacak şekilde dizayn edilmelidir. Örneğin, bir ürünü ilk kez açtıktan sonra tamamen tüketilmeyen bir ürün, tekrar kapatılabilir olmalı ve ürün tükenene kadar kalitesini muhafaza etmelidir. Ek olarak, ambalajlar, tüketimi uygun porsiyon boyutunu belirtmek üzere tasarlanmalıdır. Son olarak, ambalajlar üzerinde, tüketicilere iletilmesi gereken gerekli bilgiler bulunmalıdır (Robertson, 2016).

Fiziksel olarak, ambalajlama sürecinde farklı "katmanlar" kullanılabilir. Birincisi, doğrudan gıda ürünü ile temas eden ana ambalajdır ve genellikle tüketicinin perakende satın alma aşamasında karşılaştığı tek ambalajdır. Bu materyal, ürünlerin temel koruyucu bariyerini sağlar. İkincil ambalajlar, kutu, kasa veya diğer kaplar gibi, bir dizi birincil ambalaj içerir. Bu ikincil ambalajlar, genellikle perakendede birincil ambalajın gösterimi için kullanılan taşıyıcı malzemelerdir ve fiziksel dağıtım sürecinde kullanılırlar. Üçüncü ve dördüncü katmanlar, taşıma ve dağıtım süreçleri için özel olarak tasarlanan ambalajları içerir (Robertson, 2016).

Akıllı ambalajlama sistemleri genellikle iki ana kategoride sınıflandırılır: akıllı etiketler ve ambalaj indikatörleri. Akıllı etiketler, genellikle barkodları ve radyo frekanslı tanımlama etiketlerini içerir. Ambalaj indikatörleri ise çeşitli özellikleri izleyerek ürünlerin durumunu belirler. Bu özellikler arasında sıcaklık-süre indikatörleri, sızıntı tespiti için (O₂ ve CO₂ indikatörleri), tazelik seviyelerini gösteren indikatörler ve biyosensörler bulunmaktadır (Taoukis ve Tsironi, 2016).

Akıllı ambalajlama sistemleri, içerdikleri etiketler ve göstergeler aracılığıyla ürünle ilgili bilgileri işleyerek, ambalajın akıllı özellik kazanmasını sağlar. Bu sayede tüketicilere, ürünün kalitesi, tazeliği, raf ömrü ve kullanım koşulları hakkında detaylı bilgiler sunar. Akıllı ambalajlama sistemlerinin işleyiş prensipleri; sıcaklık-süre ölçümü ile birlikte, kimyasal veya mikrobiyolojik kalite değişimlerinin ölçümüne dayanmaktadır (Yam vd., 2005).

AMBALAJ MALZEMESİ TÜRLERİ

Ürün geliştirme sürecinde ambalaj malzemesi seçerken çeşitli faktörleri dikkate almak önemlidir. Ambalaj malzemesinin önemli bir özelliği, genellikle çok katmanlı bir yapı içinde kullanılmasıdır, bu da çeşitli malzemelerin kombinasyonunu içerir (örneğin, polimerler). Bu çok katmanlı yapı, genellikle oksijen, karbon dioksit veya nem gibi unsurların giriş/çıkışlarını kontrol etmek ve ürünü ışıktan, tat, aroma, besin ögesi veya yağ kaybindan korumak amacıyla bariyer katmanları veya kaplamalar içerir (Morris, 2017).

Gıda güvenliği perspektifinden, ambalaj malzemelerinin migrasyon potansiyeli önem taşımaktadır. Migrasyon; bir ambalaj malzemesinden gıda ürününe birtakım maddelerin geçişini ifade eder ve bu süreçte malzemenin yanı sıra depolama sıcaklığı ve zaman gibi faktörler de önemli bir rol oynamaktadır (Singh vd., 2017).

Ambalaj malzemeleri, plastik, cam, metal ve karton gibi farklı tiplerde olabilir. Plastikler arasında yaygın olarak kullanılanlar, su buharına karşı iyi bir bariyer sağlayan ancak gazlara karşı zayıf olan LDPE, esnek ve hafif yarı saydam bir malzemedir. Genellikle torba, sıvı kapakları veya şişelerde kullanılır. LLDPE, LDPE'ye göre daha dayanıklıdır ve gelişmiş kimyasallara karşı direnç gösterir, -30 °C ila +100 °C sıcaklık aralığında kullanılabilir. Streç filmler ise genellikle LLDPE tabanlıdır (Singh vd., 2017; Robertson, 2017).

FARKLI GIDA ÜRÜNLERİ İÇİN MALZEME ÖNERİLERİ

Farklı gıda ürünlerinin kalite ve güvenlik açısından çeşitli ambalaj malzemelerine ihtiyaçları vardır. Yüksek kaliteli gıdaların piyasaya sunulmasının bir yolu, raf ömrü gereksinimlerini karşılayan ve tedarik zinciri boyunca depolama, iletişim ve kullanım kolaylığı gibi faktörleri sağlayan ambalajların kullanılmasıdır. Genellikle tahıllar, plastik veya kağıt/karton torbalar veya kutular içinde ambalajlanır. Örneğin, kahvaltılık gevrekler gibi tahıl ürünleri nem artışına karşı hassasiyet gösterir ve bu nedenle ürünün lezzetini ve tazeliğini korumak için etkili bir nem bariyerine ihtiyaç duyar. Bu amaçla genellikle HDPE polimerleri tercih edilir. Ayrıca, ambalaj malzemesinin aroma veya tat bariyeri sağlaması gerektiğinde, genellikle PA veya EVOH polimerleri kullanılır (Morris, 2017).

Atıştırmalık gıdalar genellikle yüksek yağ içeriğine sahip olduklarından, bu ürünler için oksijen bariyeri sağlayan bir ambalaj kullanılması gerekmektedir. Ayrıca, nem kazanımını engellemek ve ışık geçirgenliğini azaltmak için nem ve ışık bariyerlerine de ihtiyaç duyarlar. Ambalajın yağ ile temasını önlemek içinse yağ direnci gösteren malzemeler kullanılmalıdır (Morris, 2017).

Unlu mamullerin korunması için ise nem engeli önemli bir özelliktir. Bu bağlamda, polietilen türleri arasında LDPE, LLDPE, HDPE veya PP gibi polimerler tercih edilebilir. Ambalajların ağız genellikle nem

kaybını en aza indirmek amacıyla yapışkan bir bant şeridi veya plastik bir klips ile kapatılır. Sızdırmazlık ve optik özelliklerin sağlanması için ise genellikle EVA kullanılır. Aroma ve tat bariyerlerine ihtiyaç duyulan özel uygulamalar, örneğin kek karışımları gibi, PA tabakalı filmlerle ambalajlanır. Ekmek poşetleri için LLDPE ve LDPE'nin kombinasyonu tercih edilebilir; burada LDPE, paketin daha ince olmasını sağlarken (küçültme), LDPE ise yüksek düzeyde optik özellik ve basılabilirlik sunar (Cauvain ve Young, 2010; Morris, 2017).

Kırmızı et, beyaz et ve balığın ambalajlanmasında kullanılan malzemeler arasında EVA, PVDC ve PA gibi ısıyla büzülebilen bariyer torbalar bulunmaktadır. Bu torbalar, 90°C'deki suya yerleştirilerek ısıyla büzülme ve eti sıkı bir vakumlu paket haline getirmektedir. Ayrıca, kapalı bir hazneye konan ve havası boşaltılan termoform plastik torbalar da kullanılmaktadır. Bu torbalar genellikle dış katman olarak PET, orta katman olarak PA ve iç katmanlarda LDPE veya EVA gibi malzemeleri içermektedir. Termoform yöntemi aynı zamanda derin tepsilerin ısıyla şekillendirilmesi, etin tepsiye yerleştirilmesi ve plastiklerin vakum altında ısıyla mühürlenmesiyle gerçekleştirilmektedir. Isıl şekillendirme için kullanılan malzemeler arasında PA, PET veya PVC levhalar bulunurken, bu katmanları birbirine yapıştırmak için ise LDPE veya EVA kopolimerleri kullanılmaktadır (Morris, 2017; Robertson, 2013).

Peynirler, tekstürlerine göre sert, yarı sert, yarı yumuşak ve yumuşak olmak üzere sınıflandırılır. Sert peynirler genellikle bakteriler tarafından olgunlaştırılır ve <math>< 51\%</math> nem içeriğine sahiptir, örneğin Parmesan, Romano ve Mozzarella. Yarı sert peynirler ise %54 - %63 nem içeriğine sahiptir ve örneğin Cheddar, Edam, Gouda, Emmental, Gruyere gibi peynirleri içerir. Peynirlerin depolanması sırasında olgunlaşma süreçlerini yönetmek için uygun ambalaj malzemeleri kullanılır. Bu malzemeler genellikle PET, LDPE ve PA kombinasyonlarını içerir. Ayrıca, küf oluşumunu önlemek için oksijen bariyeri gerektiğinde EVOH veya PVDC gibi malzemeler tercih edilir (Robertson, 2013; Morris, 2017).

Süt ve süt ürünleri için farklı ambalaj malzemeleri kullanılmaktadır. Geleneksel olarak, süt tozları teneke kutularda ambalajlanır ve yüksek oksijen, nem ve ışık bariyerleri sağlar. Ancak, son yıllarda alüminyum folyo-plastik plakalar, özellikle daha kısa raf ömrüne sahip tozlar için tercih edilen bir ambalaj alternatifi haline gelmiştir. Bu ambalajın yapısı genellikle içte LDPE, dışta PP veya PET, ortada ise alüminyum folyo içerir. Sıvı süt ise geleneksel olarak cam şişelerde ambalajlanmaktaydı, ancak günümüzde tek kullanımlık karton kutular ve plastik kaplar da yaygın olarak kullanılmaktadır. Plastik ambalaj malzemeleri arasında HDPE, PET, LDPE veya LDPE/LLDPE tercih edilmektedir (Robertson, 2013)

Meyve, sebze, patates kızartması, kırmızı et, beyaz et ve balık gibi dondurulmuş gıdalar, çeşitli ambalaj malzemeleri kullanılarak paketlenir. Bu malzemeler, ürünü nem kaybından, ışıktan ve oksijenden korumak amacıyla kullanılır. Geleneksel olarak, dondurulmuş gıdalar genellikle neme dayanıklı bir tabakaya sahip

munlu karton kutularla ambalajlanırdı; ancak bu kutuların yerini günümüzde PVDC kaplamalı katlanabilir karton kutular almıştır. Şu anda dondurulmuş gıdaların çoğu, ana bileşeni LLDPE olan poliolefin karışımı bazlı polimerik filmlerle paketlenir. Ayrıca, üründe ışığa karşı koruma sağlamak için film yapısına beyaz bir pigment eklenmesi yaygındır (Robertson, 2013).

AMBALAJLAMA ORTAMLARI

Gıda ürünlerinin raf ömrünü korumanın veya uzatmanın bir yolu, ambalajlama tekniklerinin kullanılmasıdır. Bu teknikler arasında modifiye atmosfer ambalajlama (MAP), vakum ambalajlama, emicilerin kullanımı ve uygun bariyerlere sahip doğru ambalaj malzemelerinin seçimi bulunmaktadır (Robertson, 2013).

Vakum Ambalajlama

Gıda ürünlerinin raf ömrünü artırmak amacıyla, ortamdaki oksijenin neden olduğu bozulmayı engellemek için vakumlu ambalaj uygulanmaktadır. Bu işlem, ambalaj malzemesini ürünle sıkı temas haline getirerek oksijeni uzaklaştırmayı hedeflemektedir (Embleni, 2013). Vakum paketleme sürecinde, ambalajlanan ürünün yapısına bağlı olarak ambalaj içinde bulunan oksijen miktarı %1'in altındadır. Bu tür oksijen seviyelerini ambalajda korumak için, hermetik sızdırmazlık uygulaması gerçekleştirmek önemlidir (Değirmencioğlu vd, 2011).

Vakum ambalaj, özellikle dondurulmuş yağlı balıkların, beyaz et ve somon gibi, ambalajlanmasında don yanığını azaltmak amacıyla sıkça kullanılmaktadır. Vakumlu ürün örnekleri arasında, küçük kahve ve maya paketleri, peynir, kabuklu yemişler, otlar, baharatlar ve et gibi ürünler bulunmaktadır (Embleni, 2013).

Modifiye Atmosfer

Modifiye atmosfer paketleme (MAP), gıda ürünlerini saran gaz karışımını değiştiren bir ambalajlama yöntemidir. (Embleni, 2013). Bu metot, belirli ürünlerin raf ömrünü depolama sürecindeki kimyasal, mikrobiyolojik ve biyokimyasal süreçleri etkileyerek korumak veya uzatmak amacıyla kullanılmaktadır. Ambalajın atmosferini modifiye ederken, çeşitli gaz karışımları tercih edilmektedir. Örneğin, azot, ambalajdaki diğer gazların miktarını azaltmak için dolgu gazı olarak kullanılır. Oksijenin değiştirilmesi gerektiğinde, azot (N₂), gıdalardaki oksidatif reaksiyonları azaltan inert bir gaz olarak görev yapar. Ek olarak, karbondioksit (CO₂), mikrobiyolojik bozulmayı önlemek için sıklıkla tercih edilen bir diğer ambalaj gazıdır. Yüksek çözünürlüğü nedeniyle, gıdalardaki yağ ve su ile reaksiyona girerek karbonik asit oluşturabilir, bu da antimikrobiyal özelliklere sahip bir gaz olarak işlev görür (Lucas, 2003; Fik vd., 2012; Fernandez vd., 2006).

Oksijen genellikle düşük seviyelerde bulunur, bu nedenle kimyasal ve mikrobiyolojik bozulma sorunlarına yol açmaz. Ancak, solunum yapan ürünleri (örneğin, meyve ve sebze gibi) paketlerken oksijenin

kullanılması önemlidir. Bu durumda, oksijenin varlığı, oksijensizlik durumuna kıyasla daha uygun olduğu için fermantasyona ve kötü kokuların ve tatların gelişmesine neden olabilir. Oksijen kullanımının bir başka avantajlı yolu, et ve et ürünleri için uygulanan MAP'ta, ürünün kırmızı rengini koruma özelliğinden kaynaklanır (Embleni, 2013).

YENİ AMBALAJLAMA TEKNOLOJİLERİ

Doğru ambalaj, gıda ürünlerinin depolanması sırasında güvenli ve yüksek kalitede kalmasını sağlayan temel unsurlardan biridir. Gıda ambalajları, ürünü koruma, muhafaza etme, tüketime uygun hale getirme ve tüketicilerle etkili iletişim kurma amacıyla büyük öneme sahiptir. Geleneksel ambalaj süreci, uygun malzemelerin seçimi ve ortam koşullarının belirlenmesi aşamalarını içerir. Ambalaj malzemeleri, gıdanın özelliklerine uygun olarak ürünü kimyasal veya mikrobiyal bulaşmalardan, kirden, böceklerden ve tozdan korurken aynı zamanda fiziksel zararlardan da korumalıdır. Ambalaj ortamları, gıdalar için uygun bir çevre oluşturarak ürün özelliklerini depolama sürecinde sabit tutar. Geleneksel ambalaj ihtiyaçlarına ek olarak, yeni teknolojilerin entegrasyonu gıda ürünlerinin raf ömrü artırılır, güvenilirlik, güvenlik, koruma ve bilgi iletimi daha da iyileştirilir. Bu teknolojiler arasında aktif ve akıllı ambalajlama da bulunmaktadır (Lee ve Rahman, 2014; Han, 2014).

Aktif Paketleme

Aktif paketleme, paketlenmiş gıdanın kalitesini muhafaza ederken raf ömrünü uzatmayı, güvenliği veya duyuşal özelliklerini artırma amacı güden paketleme işlemi olarak da tanımlanmaktadır (Vinay Pramod Kumar vd., 2018; Ahvenainen, 2003). Ambalajın işlevselliğini artırmak için, içine küçük tabletler veya kesecikler eklemek veya çeşitli aktif bileşenleri ambalaj malzemesinin ara katmanı olarak entegre etmek gibi yöntemlerle ambalaja ek fonksiyonlar kazandırılmaktadır (Conte vd., 2013; Topuz ve Uyar, 2020; Lee, 2016).

Depolama sürecinde, tutucular, ambalaj malzemesi içinde nem, oksijen, etilen ve karbondioksit seviyelerini azaltma amaçlı kullanılmaktadır. Öte yandan, yayıcılar ise antimikrobiyal bileşik, karbondioksit, antioksidan, aroma, etilen veya etanol içeriğini artırmak için pakete bileşikler ekleyerek görev yapmaktadır (Yıldırım vd, 2017; Lee vd., 2015).

Akıllı Paketleme

Akıllı paketleme, aktif ambalaj sürecinin bir bileşeni olabileceği gibi, ambalajlı gıdanın ve ambalajın içindeki ortamın durumunu izleme ve bu bilgiyi kullanıcılara sağlama özelliği ile ayrı bir sistem olarak da kullanılabilir (Han, 2014).

Bu sebeple, akıllı paketlenme teknolojisi, ürün kalitesini izlemek, kritik noktaları takip etmek ve tedarik zinciri boyunca daha detaylı bilgi sağlamak için geliştirilmiş olanaklar sunar. Bu gelişmiş teknoloji, gıda ambalaj malzemelerine entegre edilen veya üzerlerine basılan etiketler veya diğer sistemler şeklinde uygulanmaktadır. Yeni nesil bu paketlenme çözümleri, ürünlerin güvenliği ve izlenebilirliği konularında daha etkili bir performans sağlar (Han vd., 2005).

Gıda ambalajlarında kullanılan akıllı paketlenme sistemleri arasında göstergeler, barkodlar, radyo frekansı tanımlama etiketleri ve sensörler gibi örnekler bulunmaktadır (Lee ve Rahman, 2014).

Göstergeler, ürünün ve çevresinin durumuyla ilgili zaman, sıcaklık, gaz ve tazelik (mikrobiyal bozulma) gibi bilgiler sağlar; bu bilgileri doğrudan görsel değişiklikler aracılığıyla ileterek bilinci artırır. Örneğin, soğutulmuş ürünlerin tarih ve sıcaklık geçmişi izlemek için zaman-sıcaklık göstergeleri kullanılabilir. Sıcaklık, özellikle soğutulmuş veya dondurulmuş ürünler gibi belirli gıdalarda kalite ve güvenliği etkileyen kritik faktörlerden biridir. Bu nedenle, depolama ve tedarik zinciri süreçlerinde bu ürünlerin kararlılığını gözlemlemek önemlidir. Zaman-sıcaklık göstergeleri, mekanik, kimyasal, elektrokimyasal, enzimatik veya mikrobiyolojik reaksiyonlara dayanan sistemdeki değişiklikleri kolayca görselleştiren basit cihazlar olmalıdır. Bu, etiket üzerinde gözle görülür bir renk değişimi gerçekleştirir (Lee ve Rahman, 2014).

Ürün tazelik ve bozulma göstergeleri; organik asitlerden glikoz, asetik veya laktik asitlere, etanol, uçucu nitrojen bileşiklerine, karbon dioksit ve sülfürik bileşikler gibi metabolitlerin üretimine odaklanarak, ambalaj içindeki mikrobiyal büyümenin etkisi hakkında bilgi sağlar. Bu maddelerin izlenmesi, ürün kalitesini düşüren mikrobiyal bozulma veya olgunlaşma süreçlerinin değerlendirilmesine yardımcı olur. Örneğin, meyvelerin olgunluğunu belirlemek amacıyla doğal aroma bileşiklerini tespit etmek için kolorimetrik etiketler kullanılabilir. Bu, meyvelerin mikrobiyal bozulma veya olgunlaşma süreçlerinin derecesini değerlendirme konusunda bilgi sağlayarak ürünün kalitesini artırmaya yönelik önemli bir araçtır (Lee ve Rahman, 2014).

Barkodlar, paket üzerindeki optik tarayıcılar tarafından okunabilir verileri depolamak amacıyla kullanılır. Örneğin, bu uygulama, ürünün tedarik zinciri içindeki konumunu izlemede yardımcı olabilir. 12 basamaktan oluşan ve altında farklı sayılar barındıran farklı boyutlardaki barkodlar, genellikle kullanılan tipler arasındadır. Ancak, bu uygulamanın yaygın kullanımına rağmen, sınırlı bilgi sağlama gibi bazı dezavantajları bulunmaktadır (Lee ve Rahman, 2014).

Alternatif Yeni Ambalajlama Malzemeleri

Alternatif ambalajlama yöntemleri arasında biyoplastikler, biyobozunur malzemeler ve yenilebilir filmler/kaplamalar bulunmaktadır. Bu yöntemler genellikle geleneksel paketlenme sistemlerinden farklıdır ve bu

nedenle gıda ambalajlamada yenilikçi uygulamalar olarak değerlendirilmektedir. Gıda ürünleri genellikle çeşitli plastik malzemelerle paketlenir, ancak geri dönüştürülebilir, tekrar kullanılabilir veya yenilenebilir uygulamalar, çevreye daha az zarar verdiği için tüketiciler tarafından tercih edilmektedir.

Akıllı Etiketler, ürün bilgilerini tanımlamak için kullanılan barkodlara akıllı özellikler ekleyerek, gıdadaki bozulmalarla uyumlu değişikliklere imkan tanır. Termokromik pigment içeren mürekkeplerle oluşturulan bu özel barkodlar, belirli sıcaklıklarda renk değişimine uğrayarak gıdalardaki sıcaklık değişikliklerini izleyebilme yeteneğine sahiptir. Özellikle soğuk koşullarda muhafaza edilen gıda ürünleri için üretilen bu akıllı barkodlar, sıcaklık değişimleriyle birlikte pembe renge dönüşerek barkod okutulduğunda veri aktarımını engeller. Bu sayede potansiyel riskli gıdalarda bozulma durumunda, ürünün barkodu okunamaz hale gelir, satışı gerçekleşmez (Lee ve Rahman, 2014).



Ürün tazeliğini gösteren şeffaf, okunabilir barkod



Tüketime uygun olmayan ürünü gösteren mat, okunamayan barkod

Tazelik indikatörü olan barkodlar (Kokangül ve Fenercioğlu, 2012)

Radyo frekanslı tanıma sistemi (RFID), etiket okuma işlemini radyo dalgalarını kullanarak gerçekleştiren bir teknolojidir. Bu sistem, mikroçiplerin ürüne entegre edilmesi prensibine dayanır, böylece fiziksel etkileşim yerine ürünlerin kimlikleri radyo dalgaları aracılığıyla okunabilir hale gelir (Lee ve Rahman, 2014).

RFID etiketleri, ürünlerin ve ürün geçmişinin ayrıntılarını taşıyarak gıda ile etkileşime geçer. Bu etiketler, gıdanın sıcaklık, nem seviyesi ve tüketim yönergeleri gibi bilgilerini içermekle kalmaz, aynı zamanda radyo dalgaları aracılığıyla ürünün uzaktan izlenmesine olanak tanır (Karagöz ve Demirdöven, 2017).

AMBALAJ İNDİKATÖRLERİ

Ambalaj indikatörleri, bir malzemenin varlığına veya yokluğuna, iki veya daha fazla madde arasındaki reaksiyonun şiddetine veya belirli bir madde veya madde sınıfının konsantrasyonuna bağlı olarak renk yoğunlukları veya boyanın difüzyonu gibi görsel efektlerle tüketiciye bilgi sunar. Bu bilgilerle birlikte, gıdanın kalitesi, tazeliği veya olası mikrobiyal bozulmaların varlığı hakkında fikir elde edilir (Ghaani vd., 2016).

Gıdaların bozulmasında temel bir etken sıcaklıktır. Gıdaların taşınması ve depolanması sırasındaki sıcaklık kontrolü, mikroorganizmaların çoğalması, metabolik aktiviteler ve diğer kimyasal, duyuşal ve besinsel reaksiyonlar üzerindeki etkisi nedeniyle büyük önem taşır (Karel ve Lund, 2003). Zaman-sıcaklık göstergeleri, gıdanın sıcaklık geçmişini kimyasal, elektrokimyasal ve enzimatik reaksiyonlar sonucunda geri dönüşümsüz olarak raporlayan araçlardır (Shimoni vd., 2001).

Başlıca dondurulmuş gıdalarda, et ve et ürünlerinde, dondurulmuş meyve ve sebze, süt ve süt ürünlerinde meydana gelen mikrobiyal kontaminasyon veya uygun olmayan depolama koşulları sonucunda enzimatik ve biyokimyasal bozulmalar, sıcaklık artışının etkisiyle ortaya çıkar ve bu ürünler, sıcaklık deęişimlerine son derece duyarlıdır. Soęuk zincir ürünlerinin etkili bir şekilde denetlenmesi, zamanla deęişen sıcaklık göstergeleri sayesinde mümkün hale gelmektedir (Taoukis ve Tsironi, 2016; Kerry, 2014).

SENSÖRLER

Bir madde varlığının belirlenmesi amacıyla, fiziksel veya kimyasal bir özelliğın tespiti veya ölçümü sonucunda ortaya çıkan bir sinyal kullanılmaktadır ve bunlara sensör denmektedir (Ghaani vd., 2016).

Sensörler, zaman ve maliyet açısından avantajlı analizlere alternatif sunsa da, ticari kullanımlarında karşılaşılan bazı engellerin üstesinden gelinmesi gerekmektedir. Bu zorluklar arasında; akıllı gıda ambalajlama sistemlerinin boyutlarının küçültülmesi, esnekliğın artırılması, maliyetinin düşürülmesi, sağlamlığın güçlendirilmesi, mevzuata uygun olma ve gıda güvenliğini sağlama gibi faktörler yer almaktadır (Vanderroost vd., 2014).

Gıda bozulması veya paket sızıntılarına yönelik olarak geliştirilen küçük ve esnek sensörler, özellikle akıllı ambalaj teknolojilerinde dikkat çekici bir ilgi görmektedir. Bu sensörler, uçucu organik bileşikler ve gaz moleküllerini (H₂, CO₂, O₂, H₂S, NH₃, vb.) izleyebilme özelliğine sahiptir (Tang vd., 2010). Akıllı ambalaj uygulamalarında kullanılan çeşitli sensör tipleri arasında kimyasal sensörler, biyosensörler ve gaz sensörleri bulunmaktadır. Gıda kalitesinin ve ambalaj bütünlüğünün izlenmesinde, kimyasal sensörlerin özellikle yaygın olarak kullanıldığı gözlemlenmektedir. Bu sensörler, sıvı veya gaz fazındaki ortamın kimyasal bileşimi hakkında bilgi sağlama kapasitesine sahiptir. Gaz sensörleri ise, gıda ürünlerinde bakteri üremesinin bir göstergesi olarak, gaz formundaki bakteri metabolitlerinin konsantrasyonlarında meydana gelen deęişiklikleri tespit edebilmektedir (Dalmoro vd., 2017).

Özellikle et ürünlerinde mikrobiyal büyümeyle ilişkilendirilen kimyasal deęişiklikleri tespit etmek amacıyla aminlerin belirlenmesi için amperometrik biyosensörler, platin elektrotları kullanılarak hidrojen

peroksit tespiti ve enzimlere dayalı sistemler gibi çeşitli enstrümantal tekniklerle sensör geliştirmeye yönelik çabalar artmıştır (Huang vd., 2011).

SONUÇ

Gıda ambalajlama, depolama, nakliye ve tüketime kadar gıdaların kalitesini korumak amaçlı uygulanan temel işlerden biridir. Gıdalar için koruma, muhafaza, kullanım kolaylığı ve tüketici iletişimi sağlanmalıdır. Bu gerekçeler doğrultusunda farklı yöntemler kullanılabilir.

Gelişen akıllı ambalajlama teknolojisi, artan gıda tedarik zinciri taleplerini karşılamak amacıyla tasarlanmış olup, gıda ambalajı alanındaki yenilikçi teknolojiler arasında yer alarak daha üst düzeyde kalite güvencesi sunmayı hedeflemektedir. Bu teknoloji, gıda ürünlerinin raf ömrünü en üst düzeye çıkararak sağladığı avantajlarla dikkat çekmektedir. Hızla evrilen bu sistem, gıda ürünlerinin güvenliği ve kalitesinin izlenebilirliğini artırmak adına büyük potansiyele sahiptir. Akıllı ambalaj sistemleri, gıda ürünlerinde potansiyel sorunları tespit ederek önleyici bir rol üstlenmektedir.

Gıda endüstrisinin akıllı ambalajlama teknolojisine yönelik benimsemesi, tüketicilere bir dizi avantaj sunacak ve şüphesiz gıda güvenliğinde gelişmeye katkı sağlayacaktır. Özellikle hızla bozulabilen gıdalar, akıllı ambalajlama için öncelikli bir hedef konumundadır. Depolama sürecinde meydana gelen asitler, aminler, karbondioksit ve aldehitlerin etkisiyle değişen pH seviyelerinin izlenmesi, gıda ambalajında önemli bir araç olarak kullanılmaktadır. Bu izleme işlemi, gıda ürünlerinin raf ömrünü belirlemede etkili bir faktördür.

Geliştirilen akıllı ambalaj malzemelerinin, özellikle paket içerisine entegre edilenler için, gıdaların içeriği ve duyuşal özellikleri üzerindeki etkisi, insan sağlığına potansiyel etkileri ve ayrıca yasal düzenlemelerdeki konumu gibi faktörler kesinlikle göz önünde bulundurulmalıdır. Genel olarak yapılan araştırmalarda, akıllı ambalajlarda kullanılan ambalaj indikatör etiketlerinin ürünleri şeffaf ve izlenebilir hale getirdiği gözlemlenmektedir. Ancak, bu sistemlerin geri dönüşüm süreçleri, geleneksel ambalajlara kıyasla daha karmaşık bir süreci içermektedir.

Ayrıca, sistemlerde olası arızaların ürün üzerindeki olumsuz etkileri hakkındaki araştırmalar yetersizdir.

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Özet

Beslenme, insan yaşamının merkezinde olup sürdürülebilirliğin önemli bir unsuru olarak kabul edilmektedir. Sağlıklı beslenme aşırı tüketimin azaltıldığı ve çevresel etkilerin en aza indirildiği bir beslenme tarzına geçişi ifade eder. Benzer şekilde, gıda sistemlerindeki kayıpların ve atıkların azaltılmasını da içermektedir. "Sürdürülebilir beslenme" terimi, besinlerin yaşam döngüsü boyunca oluşturduğu çevresel etkileri göz önüne alarak ortaya çıkmıştır. Sağlıklı ve sürdürülebilir bir beslenmeye geçmenin hedefi, bireylerin ve ekosistemin sağlığını desteklemektir. Gıda kaybı, gıda tedarik zincirindeki çeşitli aşamalarda meydana gelen miktar veya kalite kayıplarını ifade eder. Bu kayıplar genellikle hasat, hasat sonrası/depolama, işleme ve dağıtım süreçlerinde ortaya çıkar. Gıda atığı ise tüketiciler tarafından kullanılmayan ve tüketilemeyen bir ürünün atılması sonucu ortaya çıkar. Tarladan sofraya kadar olan süreçlerde oluşan üretim, depolama, paketlenme ve taşıma aşamalarında oluşan atık ve kayıplar, sürdürülebilir beslenmenin çevresel etkileri açısından kritik bir konudur. Üretilen gıdanın yaklaşık üçte biri, ya kaybolmakta ya da israf edilmektedir. Bu kayıplar, tedarik zincirinin her aşamasında çeşitli nedenlere dayanmaktadır. Bu aynı zamanda küresel çapta çevresel, sosyal ve ekonomik sürdürülebilirliği tehdit eden önemli bir sorundur. Sorunun çözümü için benimsenecek stratejilerin etkili, düşük maliyetli ve hızlı bir şekilde uygulanabilir olması kritiktir. Hem çevresel hem de ekonomik açıdan bu kayıpların azaltılması, sürdürülebilir beslenmeye geçişin bir parçası olarak önemli bir hedefi temsil etmektedir.

Anahtar Kelimeler: Sürdürülebilirlik, Sürdürülebilir Beslenme, Gıda Kaybı, Gıda Atıkları, Çevresel Etki



FOOD WASTE AND LOSSES IN SUSTAINABLE NUTRITION

Abstract

Nutrition is at the centre of human life and is recognised as an important element of sustainability. Healthy eating refers to a transition to a diet that reduces overconsumption and minimises environmental impacts. Similarly, it includes the reduction of losses and waste in food systems. The term "sustainable nutrition" has emerged in recognition of the environmental impacts of food throughout its life cycle. The goal of transitioning to a healthy and sustainable diet is to support the health of individuals and the ecosystem. Food loss refers to losses in quantity or quality that occur at various stages in the food supply chain. These losses usually occur during harvest, post-harvest/storage, processing and distribution. Food waste is the result of the disposal of a product that cannot be used and consumed by consumers. Wastes and losses in the production, storage, packaging and transport stages from farm to fork are a critical issue in terms of the environmental impacts of sustainable nutrition. Approximately one third of the food produced is either lost or wasted. These losses are attributable to a variety of causes at each stage of the supply chain. This is also an important problem that threatens environmental, social and economic sustainability on a global scale. It is critical that the strategies to be adopted to solve the problem are effective, cost-efficient and can be implemented quickly. Reducing these losses, both environmentally and economically, represents an important goal as part of the transition to sustainable diets.

Keywords: Sustainability, Sustainable Nutrition, Food Loss, Food Waste, Environmental Impact

GİRİŞ

Küresel nüfus, devamlı bir artış eğilimi göstermektedir. 2019 yılında dünya genelinde 7.7 milyar olan dünya nüfusu, güncel tahminlere göre 2030 yılında yaklaşık olarak 8.5 milyara ve 2050 yılında ise 9.7 milyara ulaşabilir. Bu durum, sürdürülebilir gıda temininin giderek daha zor hale geldiği anlamına gelmektedir (World Population Prospects, 2019). Dünya genelinde toplam nüfus, belirli bölgelerde insanların güvenli gıda ve temiz suya erişim konusundaki zorlukları nedeniyle açlık ve yetersiz beslenme sorunlarıyla karşı karşıya kalmaktadır (Coff vd., 2008). Ancak, diğer bölgelerdeki bazı bireyler aşırı kilolu veya obez olma eğilimindedir ve beslenmelerinde hayvansal protein, trans yağlara ve şekere yönelik bir değişim gözlemlenmektedir. Şüphesiz ki, sürdürülebilir beslenme günümüzde önemli bir konu haline gelmiştir ve gıda tüketiminde sürdürülebilirliği sağlamak için az veya fazla tüketilen bölgelerde gıda güvenliği ve güvenilirliği konularının bir arada ele alınması gerekmektedir (Reisch vd., 2013). Çoğunlukla açlık ve beslenmenin yetersizliği ile ilişkilendirilen bir durum olan gıda güvensizliği, sağlıklı bir yaşam için gerekli gıdalara ulaşmada kısıtlılığın yaşandığı durumu ifade eder (Sotiraki vd., 2022).

Sürdürülebilirlik, insan gelişimi için temel bir prensip ve rehber olmuştur. Sürdürülebilirlik konularındaki tartışmalarda, tarım ve gıda sistemleri ön plandadır (Allen ve Prospero, 2016). Sürdürülebilir bir gıda sistemi, gelecek nesillerin ihtiyaçlarına zarar vermeden toplumun gereksinimlerini karşılayabilen bir sistem olarak tanımlanır. Sağlıklı, güvenilir ve besleyici gıdaların sürdürülebilir ve adil bir biçimde sunulmasını temin etmek amacıyla bu sistem geliştirilmelidir. Ancak bugün, dünya genelinde beslenme yetersizliği, obezite ve iklim değişikliği arasında birbiriyle bağlantılı bir durumun varlığı, gıda sisteminin sağlıklı gıda temininde eksiklik yaşandığını göstermektedir. Bu durum, özellikle aşırı işlenmiş gıdaların bu süreçte etkili bir rol oynadığını ortaya koymaktadır. Bu tip gıdalar genellikle yüksek enerji içeriğine sahip, besin öğeleri bakımından eksik ve yüksek şeker içeren ürünlerdir. Ayrıca, gıda işleme sırasında ortaya çıkan zararlı bileşiklerin de sağlığı tehdit ettiği bilinmektedir (Fanzo vd., 2021). Gıda tüketiminde sürdürülebilirliği sağlamak için, oluşan gıda israfını azaltma, sağlıklı ve yeterli beslenmeyi destekleme, toplumun gıda tüketimi konusunda bilinçlendirilmesi ve düzenleyici otoriteler tarafından gıda tüketimine yönelik politikalar geliştirilmesi gibi bir hedefe ulaşmak için çabaların artırılması gerekmektedir. Gıda tüketimi, hanelerin genel çevresel etkisinin yaklaşık üçte birini oluşturarak büyük bir etkiye sahiptir; bu sebeple, önemli bir konudur. İklim değişikliği, toprak bozulması, su kirliliği, su kıtlığı, habitat kaybı ve biyolojik çeşitlilik gibi çevresel etkiler arasında yer almaktadır. Ayrıca, gıda atıkları, su, gübreler, ekili arazi ve fosil yakıtlar gibi gereksiz kullanılan kaynakları tüketmek, aynı zamanda sera gazı emisyonlarını da arttırmaktadır (Tekinbaş vd., 2021). Daha çevreci beslenme alışkanlıklarının oluşturulmasını destekleyen sürdürülebilirlik kavramı, besinlere kolay ulaşım ve beslenme

alanında bir dizi süreci içermektedir. Bu süreçler arasında besin üretimi, ambalajlama-paketleme, işleme, satış, depolama, ulaşım-taşıma ve tüketim bulunmaktadır. Sürdürülebilir beslenme, besin seçimlerinin çevresel etkisini minimuma indirerek, gıda atığı ve kayıplarını önleyerek, yerel ve mevsimsel gıda tüketimine teşvik etme, ayrıca hayvansal besinler yerine bitkisel kaynaklı besinlere yönelme amacı güder (Akay, 2020).

1) SÜRDÜRÜLEBİLİRLİK KAVRAMI

Sürdürülebilirlik kavramı, oldukça eski bir terimdir. Sürdürülebilirlik veya sürdürülebilir kalkınma terimleri, günümüzde hala yaygın olarak kullanılmaktadır (Alsaffar, 2016). Sürdürülebilirlik" terimi, 1980'li yıllarda popülerlik kazanmaya başlamış olup 1983'te, Birleşmiş Milletler tarafından uzun vadeli stratejiler belirlemek amacıyla gelişmiş ve gelişmekte olan ülkelerden oluşan bir 22 kişilik bir grup tarafından ele alınmıştır. WCED olarak da bilinen Brundtland Komisyonu, 1987'de "Brundtland Raporu"nu sunarak sürdürülebilir kalkınma terimini "gelecekteki nesillerin ihtiyaçlarını riske atmadan karşılanan kalkınma" olarak tanımlamıştır. Raporda, artan ekolojik sorunlara çözüm bulmanın, ekonomik gelişmelerle bağlantılı bir çerçeve içinde bulunmasının ve çerçevenin 'sürdürülebilir' olmasının, artan ekolojik sorunlara etkili bir yanıt olduğu vurgulanmaktadır (Atar, 2021). Sürdürülebilirlik genellikle bir sistemin, mevcut ihtiyaçları karşılayabilme yeteneğini sürdürebilmesi ve gelecek nesillerin ihtiyaçlarını karşılamada tehlikeye düşmeden uzun vadede varlığını sürdürebilme yeteneği olarak tanımlanır (Tagtow vd., 2014). Bu bağlamda özellikle dikkate alınması gereken temel prensip, kaynakları kullanırken kendi gereksinimlerimizi karşılamakla birlikte gelecek kuşakların gereksinimlerini düşünerek ve kaynaklarını aşırı tüketmemeye özen göstermek önemlidir (Kirschenmann, 2008).

2) SÜRDÜRÜLEBİLİR BESLENME

Sürdürülebilir beslenme, sürdürülebilir tarımdan türetilen bir kavramdır. Doğal kaynak israfını en aza indiren faaliyetleri teşvik ederken, aynı zamanda yerel ve mevsimsel tüketimi hedefleyen gıda üretimini de ele almaktadır. Gıdanın küreselleşme süreci ve tarımsal sistemlerin üretimdeki artış, ekosistemlerin sürdürülebilirliğine yeterince önem verilmemesi sonucunda, sürdürülebilir beslenme anlayışı uzun bir süre boyunca ihmal edilmişti. Ancak son dönemde uluslararası bilimsel çevreler ve çeşitli Avrupa hükümet kurumları, sürdürülebilir beslenmeye artan ilgi göstererek, bu kavramı tekrar gündeme getirmiştir (Burlingame ve Dernini, 2011).

Sürdürülebilir beslenme, hem biyolojik çeşitliliğe hem de ekosistemlere saygılı, kültürel olarak uygun, erişilebilir, ekonomik açıdan adil ve uygun maliyetli bir şekilde beslenmeyi içerir. Aynı zamanda dengeli, güvenilir ve sağlıklı beslenmeyi hedefler, doğal ve insan kaynaklarını en iyi şekilde kullanmayı amaçlar. Bu tanım, insan sağlığı ile ekosistemlerin birbirine bağlı olduğunu kabul eden çok boyutlu bir çerçeveyi kapsar

(Miller ve Auestad, 2013). Hem sağlık hem de çevresel sürdürülebilirlik açısından bir değerlendirme yapılarak orta ve yüksek gelir düzeyine sahip ülkelerde, aynı zamanda ekonomik geçiş döneminde bulunan ülkelerde yaygın olan beslenme modellerine odaklanılmaktadır. Bu beslenme modelleri genellikle fazla enerji alımı, yetersiz beslenme çeşitliliği ve aşırı bitkisel yağ, şeker ile hayvansal kaynaklı gıdaların aşırı tüketimini içermektedir. Batı diyetlerinde sıkça rastlanan sığır eti üretimi gibi hayvansal kaynaklı gıdaların üretiminin, çevresel etkileri olumsuz yönde etkilediği belirtilmektedir. Ayrıca, bu tip beslenme modellerinin kardiyovasküler hastalıklar, diyabet ve felç gibi sağlık sorunlarına olumsuz etkileri olduğu vurgulanmaktadır. (Fanzo, 2019). Sürdürülebilir beslenmenin genel özellikleri incelendiğinde meyve ve sebzelerden daha fazla tercih edildiği, et ve et ürünlerinin ise daha sınırlı bir şekilde tüketildiği gözlemlenmiştir (Vaz-Velho vd., 2016). Yapılan araştırmalara göre, bitki bazlı beslenmenin çevresel sürdürülebilirlik yönünden et bazlı beslenmeden daha sürdürülebilir olduğu hipotezini desteklemektedir (Baroni vd., 2007).

Kültürel olarak kabul edilebilir gıda üretimi ve tüketiminin sağlıklı veya sürdürülebilir olmadığına dair bir tartışma ortaya konulmaktadır. Özellikle, belirli bölgelerdeki kültürel normların, örneğin Güney Amerika'da sığır eti veya diğer etleri günlük olarak tüketmenin kabul edilebilir olduğunu gösterdiği ancak bu tür bir beslenmenin her zaman sağlıklı veya çevresel açıdan sürdürülebilir olmadığı vurgulanıyor. Bu durum, kültürel olarak kabul edilebilir diyetlerin bazen sağlıksız ve sürdürülemez olabileceği gerçeğini öne çıkarıyor. Bu nedenle, sürdürülebilirlik anlayışına kültürel boyutun dahil edilmesinin tartışmayı karmaşıklaştırdığı belirtiliyor (Béné vd., 2019). Bu aşamada, toplumların hem sağlık hem de sürdürülebilirlik konularında uzlaştığı ve uygun görülen özel önerilerin oluşturulması gereklidir. Türkiye'de gerçekleştirilen bir araştırmada, kadınların %30,6'sı ve erkeklerin %14,6'sı sürdürülebilir beslenme kavramıyla daha önce karşılaştıklarını ifade etmiştir. Ayrıca, kadınların %37,6'sı ve erkeklerin %22,4'ü sürdürülebilir beslenme konusunda yeterli bilgiye sahip olduklarını ortaya koymuştur (Gülsöz, 2017). Araştırma sonuçlarına göre, toplumun sürdürülebilir beslenme ile ilgili farkındalık düzeyi ve bilgi seviyesinin yetersiz olduğundan, bu alanda eğitimlerin artırılması gerektiği belirlenmiştir. Tüketicilerin gıda seçimleriyle ilgili davranışlarının analiz edilmesi ve anlaşılması, bireylerin ve nüfusun sürdürülebilir diyet geçişine yönelik eğitici ve davranışsal müdahalelerin belirlenmesinde kritik bir rol oynayacaktır.

Sürdürülebilir beslenme, aşırı tüketimin minimuma indirilmesi ve çevreye daha az zarar veren sağlıklı bir beslenme tarzına yönelik geçiş ile birlikte, besin sistemlerindeki kayıpların ve atıkların azaltılmasını da içerir. Sürdürülebilir ve sağlıklı beslenmeye geçmenin hedefi, bireylerin ve ekosistemin sağlığını desteklemektir. Bu gerekli değişiklikleri uygulamak, besin sistemlerinde önemli değişiklikleri gerektirebilir (Food and Agriculture Organization of The United Nations [FAO], 2013). Gıdaların nicel kayıplarının yanı sıra,

besin maddelerinin depolanması, işlenmesi ve dağıtımı sırasında bozulması nedeniyle nitel kayıplar da ortaya çıkmaktadır. Besin kayıpları, çiftlikte depolama, muhafaza etme ve hazırlama aşamalarında, aynı zamanda sonraki depolama, işleme ve çiftlikten satış noktalarına taşıma süreçlerinde meydana gelir. Kemirgenler, böcekler ve mikrobiyal bozulma, kayıpların başlıca nedenleridir ve temel nedenler, hasat, işleme, muhafaza ve depolama tekniklerindeki paketleme ve taşıma yöntemleri; depolama ve soğutma tesisleri gibi alt yapılar içinde yer alır. Daha fazla üretim için aynı sayıda insanı beslemek gerektiğinden, gıda atığı, gıda sistemlerinin sürdürülebilirliğini azaltır; bu da tohumların, gübrenin, sulama suyunun, emeğin, fosil yakıtların ve diğer tarımsal girdilerin israfına neden olur (Floros vd., 2010). Gelişmekte olan ülkelerde kayıpların çoğu, tüketiciye varmadan önce çiftlik seviyesinde ve tedarik zinciri boyunca meydana gelmektedir (Gustavsson vd., 2011).

3) GIDA KAYIPLARI ve ATIKLARI

Dünya nüfusunu çevresel açıdan sürdürülebilir bir biçimde beslemek, önümüzdeki on yıllarda giderek daha büyük bir zorluk haline gelecektir. 2012 ile 2050 yılları arasında, nüfus ve gelir artışının etkisiyle küresel tarımsal ürün talebinin yüzde 35 ila 50 oranında artması öngörülmektedir. Bu talebin karşılanması, dünya doğal kaynaklarını daha fazla zorlamakla kalmayacak, aynı zamanda iklim değişikliği, arazi bozulması, su kıtlığı, su kirliliği ve biyolojik çeşitliliğin azalması gibi ciddi çevresel sorunlara da yol açabilir. Bu bağlamda, atık azaltımının daha fazla vurgulanması, küresel dünyanın çevresel sürdürülebilirliğini artırmak için bir strateji olarak düşünülmektedir (FAO, 2018). Besinlerin tarladan sofraya ulaşma sürecinde meydana gelen hatalı işlemler, yanlış soğutma ve depolama yöntemleri, aynı zamanda taşıma sırasında oluşan zorluklar, gıda kayıplarına ve bunun sonucunda gıda atıklarına sebep olmaktadır (Slorach vd., 2019). FAO'nun 2016 raporuna göre, her yıl tüketicilere sunulan gıdaların yaklaşık olarak üçte biri kullanım süresi içinde kaybolmakta veya israf edilmektedir. FAO, bu durumu "her yıl kaybedilen besin miktarının yaklaşık 1,3 milyar ton olduğu" şeklinde ifade etmektedir (FAO, 2016). Besin israfını değerlendirirken, gıda atıkları ile gıda kayıpları arasında ayırım yapmak önemlidir (FAO, 2015). Gıda atıkları ve kayıpları birbirinden ayrı iki unsur olup, sürdürülebilir beslenmenin çevresel etkilerini düşünen bir perspektif için oldukça önemli bir meseledir. Gıda atıkları, tüketiciler tarafından kullanılmayan ve tüketilemeyen bir ürünün çöpe atılması sonucu ortaya çıkar. Diğer yandan gıda kayıpları, besinin üretim aşamasından dağıtım sürecine kadar olan tüm yaşam döngüsünde meydana gelebilecek azalma ve kayıplar olarak tanımlanmaktadır (Parfitt, vd., 2010).

Besinlerin depolanması, işlenmesi ve dağıtım süreçlerinde besin kayıpları yaşanabilir. Bu kayıplar genellikle çiftliklerde, depolama, hazırlık, koruma ve çiftlikten tüketiciye satış aşamalarında ortaya çıkmaktadır. Besin kayıplarının temel sebeplerinden biri, bozulmalara neden olan böcekler ve mikroplardır. Artan besin üretimi ihtiyacı, besin atıklarının artmasına yol açmakta ve bu da besin sistemlerinin sürdürülebilirliğini

azaltılmaktadır. Gelişmekte olan ülkelerde, çoğu kayıp genellikle çiftliklerde ve tedarik zincirlerinde tüketiciye ulaşmadan önce ortaya çıkmaktadır. Bir araştırmaya göre, besin kayıpları gelişmekte olan ülkelerde yalnızca %5 ila %15'i tüketici seviyesindedir, gelişmiş ülkelerde bu oran %30 ila %40 arasındadır. Örneğin, New York eyaletinde bir grup içinde, tüketiciler tarafından satın alındıktan sonra gerçekleşen besin atıkları, herkesin 1,5 ay boyunca beslenebileceği kadar besin israfına sebep olmaktadır. Bu durumda, yapılan israfın %60'ı tüketiciler tarafından gerçekleştirilmektedir (UN Food and Agriculture Organization. 2014). Geliri düşük ülkelerde gıda kaybının temel nedenleri, ürün kayıpları ile taşıma ve depolama sorunlarına dayanmaktadır. Diğer yandan, geliri yüksek ülkelerde gıda kaybının önemli sebebi ise tüketicilerin gıdaları israf etmeleridir (Lettenmeier vd., 2012).

FAO'nun 2019 raporu, dünya genelindeki yetersiz beslenme oranının 2015'ten bu yana sürekli bir artış gösterdiğine ve 820 milyondan fazla insanın açlıkla mücadele ettiğine işaret ediyor. Ayrıca raporda, FAO tarafından ifade edildiği üzere, dünya nüfusunun yaklaşık her dokuz kişisinden birinin açlık çektiği vurgulanmaktadır (World Health Organization, 2019). Gıda kayıpları ve israfı, özellikle gelişmekte olan bölgelerde yaşayan yoksulların gıdaya erişimini sınırlamakta, önemli ölçüde toprak, su ve fosil yakıt kaynaklarını tüketmekte ve gıda üretimine bağlı sera gazı emisyonlarını artırmaktadır. Hasat sonrası işleme, depolama, işleme ve paketleme, dağıtım ve tüketim aşamalarında gıda kayıplarını ve israfını %50'ye kadar azaltma hedeflenmiştir. Elde edilen bulgular, gelişmiş bölgelerdeki gıda kayıplarındaki azalmanın, gelişmekte olan bölgelerdeki yetersiz beslenen insan sayısını 63 milyona kadar düşürdüğünü, bu durumun da hasat edilen alanda, su kullanımında ve gıda üretimiyle ilişkili sera gazı emisyonlarında önemli bir azalmaya neden olduğunu niceliksel olarak göstermektedir (Munesue vd., 2015).

Sürdürülebilirlik kapsamında diğer önemli bir alan olan, atık yönetimidir ve 'sürdürülebilir atık yönetimi' terimleri literatürde sıkça karşılaşılan kavramlardandır. Atıkların çevre dostu ve ekonomik bir biçimde bertaraf edilmesi gerekliliği sürdürülebilir atık yönetimi anlayışının oluşumuna öncülük etmiştir (Legrand vd., 2010; Jang vd., 2011). Gıda üretimi ve tüketimi, çevresel etkilerin temel kaynaklarıdır ve sağlığın iyileştirilmesi ve sürdürülmesi açısından kritik öneme sahip unsurları oluşturur (Hallström, 2015). Gıda atığı, çiftliklerdeki üretim aşamasından başlayarak işleme, dağıtım ve tüketime kadar gıda tedarik zincirinin farklı aşamalarında meydana gelmektedir. Bu, sosyal, çevresel, etik ve ekonomik maliyetleri olan önemli bir küresel sorundur. Her gün tonlarca gıda atılmakta ve israf edilmektedir, bu nedenle sürdürülebilir bir gıda sistemine ulaşmak için gıda israfının önemli ölçüde azaltılması gerekmektedir. Gıda israfı hakkındaki bilgi, fazla gıda ve artıklara yönelik tutum ve davranışları değiştirmek için kritiktir. Eğitim kampanyaları, personeli gıda israfının etkisi ve azaltma

yöntemleri konusunda bilinçlendirmek için teşvik edilmelidir; bunlar arasında uygun depolama, porsiyon kontrolü ve yemek planlaması hakkında bilgiler bulunmaktadır (Gonçalves vd., 2023).

Tarımsal üretim alanlarının daralmasının yanı sıra, tedarik zincirindeki kayıp ve israfın artışı, sürdürülebilir gıda ve çevre güvenliği açısından bir tehdit oluşturuyor. Gıda ve Tarım Örgütü (FAO) raporunun sonuçlarına göre, gıda kayıplarının yaklaşık %54'ü üretim, hasat sonrası taşıma ve depolama aşamalarında oluşmakta, %46'sı ise dağıtım, işleme ve tüketim süreçlerinde meydana geldiği belirtilmektedir. Bu gıda kaybı ve israf sadece küresel gıda güvencesini artırmak için kaçırılan bir fırsat olmanın ötesinde, aynı zamanda çevresel kaynakların gereksiz yere tüketilmesiyle ilgili bir sorunu temsil etmektedir (Dhami, 2020).

Küresel çapta her yıl israf edilmekte olan gıda miktarının büyüklüğü ve buna bağlı sosyo-ekonomik ile çevresel etkiler sebebiyle, tüm ülkeler gıda israfını azaltma konusunda çabalar sarf etmektedir (Abdulla vd., 2013). Bu çalışma Türkiye'de uygulanan ve Tarım ve Orman Bakanlığı ile Gıda ve Tarım Örgütü (FAO) iş birliğiyle hayata geçirilen "Gıdanı Korum" projesini kapsamaktadır. Türkiye'de gıda kayıplarını önleme, azaltma ve yönetme strateji ve eylem planını içermektedir (ADAY ve Serpil, 2021; TOB, 2020).

Besin atıkları, doğal kaynakların etkili bir şekilde kullanılmasıyla birlikte, önemli bir sürdürülebilirlik sorununu beraberinde getirir. Besin üretim sürecinde harcanan büyük miktarlardaki su, enerji, arazi alanları ve gübre gibi doğal kaynaklar, besin atıklarıyla birlikte israf edilmektedir. Artan besin ihtiyacı ve azalan kaynaklar göz önüne alındığında, besin atıklarının azaltılması ve üretilen besinlerin tüketiminin artırılması, zorunlu bir gereklilik olarak değerlendiriliyor (FAO, 2018).

Atık yönetimi ile ilgili yapılan araştırmada, Shanklin ve Pettay'ın ABD'nin askeri yemek tesislerinde, atıkların çoğunun hazırlık ve servis aşamalarında ortaya çıktığını vurgulamışlardır. Gıda hizmetlerinde meydana gelen atıkların %64,0'ının önlenemez, %18,0'inin önlenemez olmadığı, %18,0'inin ise kaçınılmaz olduğu ifade edilmiştir (Shanklin vd., 1991). Çin'de gerçekleştirilen bir çalışmada, diyetisyenler ve beslenme öğretmenleri tabak israfının nedeninin okullarda dengesiz beslenme ve yemeklerin beğenilmemesi olduğunu ifade etmişlerdir (Liu vd., 2016). Yapılan bir incelemede, katılımcı işletmelerin %62,0'sinin atıklarını çöpe attığını, %21,0'inin geri dönüşüme gönderdiğini, %17,0'sinin ise farklı bir yöntem olarak sokak hayvanlarını beslediğini ifade etmiştir (Morillo vd., 2015). Besin atıklarının geri dönüşümü, sürdürülebilirliğin bir parçası olarak değerlendirilmektedir ve oldukça önemlidir (Ukita vd., 2004).

Gıda sisteminin çevresel etkilerinin, iklim değişikliği, arazi kullanımındaki değişiklikler, tatlı su kaynaklarının tükenmesi ve su ve kara ekosistemlerinin kirlenmesi gibi faktörlerden kaynaklandığı vurgulanmaktadır. Springmann ve ark.2010 ile 2050 yılları arasında beklenen nüfus artışı ve gelir seviyelerindeki değişikliklerin, gıda sisteminden kaynaklanan çevresel etkileri %50-90 oranında artırabileceğini

belirtmektedir. Ayrıca, gezegen için güvenli sınırların aşılabileceği uyarısında bulunmaktadır. Daha sağlıklı ve bitki bazlı beslenme alışkanlıklarına geçiş, teknolojik gelişmeler, gıda kaybı ile israfının azaltılması gibi çeşitli stratejilerin, gıda sisteminin çevresel etkilerini azaltmak için potansiyel çözümler olduğunu öne sürmektedir (Springmann vd., 2018). Gruber ve arkadaşlarının çalışması, çevresel etkilerin önemli ölçüde azaltılabileceğini, özellikle gıda kayıplarının azaltılması yoluyla gösterdi. Temel gıda kayıpları genellikle tüketici aşamasında meydana gelmektedir. Üç farklı tüketici davranışı modeli ele alınmıştır: temel, çevreye duyarlı ve dikkatsiz. Bu, toplam yaşam döngüsü etkilerinde önemli farklılıklara yol açmıştır; bu durum, çevreye duyarlı bir tüketici tarafından gıda tüketiminin çevresel etkisinin nasıl azaltılabileceğini göstermektedir (Gruber vd., 2016).

4) GIDA KAYIPLARININ OLUŞTUĞU GIDA KATEGORİLERİ

Richter ve Bokelmann'un (2016) araştırmasına göre, meyve ve sebze endüstrisindeki gıda kayıplarının temel nedenleri perakende ve ticaret standartlarına yönelik gerekliliklere dayanmaktadır. Öte yandan, diğer sektörlerde faaliyet gösteren şirketlerin en fazla gıda kayıpları genellikle balık ve et endüstrisinde görülen ürün kusurları, teknik hatalar ve son kullanma tarihinin geçmiş olması gibi faktörlere bağlı olarak ortaya çıkmaktadır (Richter ve Bokelmann, 2016).

Gıda atıklarının miktarının belirlenmesi amacıyla, 2015 yılında İtalya'da yapılan bir çalışmada, miktar bakımından en büyük kayıpların sebze ve meyvelerde gerçekleştiği, bu ürün kategorisini sırasıyla unlu mamuller ve süt ürünleri takip etmiştir. Sebze ve meyve bölümüne dair bulgular, önemli ölçüde israfın olduğunu gösterdi. Bu ürünlerin atılmasının temel nedeni çürümeleri nedeniyle artık tüketiciler tarafından kabul edilemez hale gelmeleri idi, unlu mamullerde oluşan kayıplar ise tüketicilerin bu tür ürünleri daima taze bulma isteğinden kaynaklanmaktadır. Ayrıca, unlu mamullerin düşük fiyat seviyesinin de kayıpları artırdığı tespit edilmiştir (Cicatiello vd., 2017).

Priefer, Jörissen ve Bräutigam (2016, s. 156) tarafından yapılan bir araştırma da, evlerde gıda atığı oluşumunda en belirgin gıda gruplarının meyve ve sebzelerle birlikte tahıllar olduğu, bunları takiben süt ürünlerinin geldiği, ancak et ve balığın toplam gıda atığı içindeki payının nispeten küçük olduğu gözlemlenmektedir (Priefer vd., 2016).

Dinis ve arkadaşları, balık menülerindeki tabak artıklarının et menülerine kıyasla daha yüksek olduğunu tespit etmişlerdir. Tüm balık menülerinde tabak artıkları %50,0'den fazla olduğu için her iki cinsiyette de düşük balık tüketimi gözlemlenmiştir. Erkeklerde en fazla tabak artığı karnabaharda (%83,3), kızlarda ise rendelenmiş havuçta (%82,5) gözlemlenmiştir. Her iki cinsiyet için de yüksek kalıntı değerine sahip olan meyveler ananas (%47,1) ve kividir (%53,3) (Dinis vd., 2013).

Farklı gıda türlerinde bozulmayı hızlandıran faktörlerin genel anlamda bilinmemesi durumunda, kayıpları önlemek olası değildir. Bu bağlamda, süt ve süt ürünlerinde doğru depolama sıcaklığının seçilmemesi, çevredeki oksijen seviyeleri ve mikroorganizmalar, ürünlerin raf ömrünü kısaltabilir (Lu ve Wang, 2017).

Mikrobiyal büyüme, oksidasyon ve enzimatik otoliz reaksiyonları, et ve et ürünlerinde meydana gelen bozulmanın temel mekanizmalarını oluşturur. Bununla birlikte, hayvanın kesim anındaki yaşı, kesim koşulları, işleme süreci, dağıtım yöntemleri, muhafaza koşulları ve ambalaj türü gibi diğer faktörler de bozulma reaksiyonlarına etki eder (Dave ve Ghaly, 2011).

Meyve ve sebzelerde, raf ömrünü sınırlayan temel faktörler arasında nem kaybı, hasar, mikrobiyal büyüme ve enzimatik yumuşama yer almaktadır. Bunun yanı sıra, ışık, ortam sıcaklığı, oksijen, nem ve taşıma koşulları da bu reaksiyonların hızını artırabilir veya azaltabilir. Tahıllarda ise nişasta retrogradasyonu, nem absorpsiyonu ve oksidasyon, bozulmayı tetikleyebilir; bu bozulma reaksiyonları ise çevresel nem, sıcaklık, oksijen ve taşıma yöntemine bağlı olarak etkilenebilir (Singh ve Anderson, 2004).

Konaklama sektöründeki gıda kayıplarının nedenleri arasında, tabakların boyutu, müşterileri gerektiğinden fazla almaya teşvik eden sabit fiyatlı açık büfe seçenekleri, müşteri ihtiyaçlarına uymayan porsiyon sunumları, talep değerlendirmesindeki zorluklar (müşteri sayısı) ve çeşitli hijyen kuralları yer almaktadır (Priefer vd., 2016).

5) BESİNLERİN ÜRETİM VE TÜKETİM AŞAMALARINDA OLUŞAN GIDA KAYIPLARININ ÇEVRESEL ETKİLERİ

Küreselleşmenin artması ve dünya nüfusundaki artış, özellikle gıda endüstrisinde tedarik zincirlerinin sürdürülebilirliği üzerinde önemli bir etkiye sahiptir. Gıdanın üretiminden tüketimine kadar olan süreçlerin sürdürülebilirliği, tedarik zincirinin genel sürdürülebilirliği üzerinde belirleyici bir faktördür (Govindan, 2018).

5.1) Ambalajlama ve Paketleme

Ambalajın gıda zincirinde oynadığı önemli roller vardır; gıdayı korur ve böylece güvenli ve sağlıklı kalmasını sağlayarak sürdürülebilirliği destekleyen önemli faktörlerdir. Plastik ve kâğıt gibi malzemelerin aşırı kullanımı, besinlerin paketlenmesi için çevresel olarak olumsuz etkilere yol açabilir. Fakat paketleme, gıda israfını azaltma ve raf ömrünü uzatma avantajlarına sahiptir. Ambalaj üretiminin çevreye olan etkileriyle besinlerin raf ömrünün artırılması arasında bir zorluk bulunsa da, paketleme sürecinin sürdürülebilir üretime katkı sağlamak için denge oluşturulabilir (Sonesson vd., 2010; Licciardello ve Piergiorganni, 2020).

Her sene büyük miktarlarda plastik atığın okyanusa girdiği ve burada yavaşça parçalandığı, biriktiği ifade edilmektedir. Plastiklerin okyanusta kimyasalların ve türlerin taşınmasındaki rolü hala tam olarak

anlaşılammış olsa da, bu durum ekosistemlere ve insan sağlığına potansiyel bir tehdit oluşturabilir. Okyanusa plastik ve diğer çöplerin girmesini engellemenin temel noktası, atık yönetimini geliştirmektir (Kershaw vd., 2011). Ambalajın ebatları da paketleme sürecinin çevresel etkisini değiştirebilmektedir. Boyut olarak farklı paketlenmiş ürünlerin karşılaştırılması göstermiştir ki daha büyük boyutlarda paketlenen ürünler, daha az çevresel etkiye sahiptir (De Monte vd., 2005).

5.2) Taşıma

Besinlerin dünya genelinde farklı bölgelere taşınması, yüksek çevresel etkilere sahip olan karışık bir sistemdir. Bir ürünün üretim kaynağı ile tüketiciye ulaştığı nokta arasındaki uzaklık, genellikle 'gıda mili' olarak adlandırılır. Bu uzaklık, sürdürülebilir üretim ve tüketimin bir göstergesi olarak algılanmakta ve gün geçtikçe artmaktadır (Govindan, 2018). Besinlerin taşınabildiği mesafenin kısaltılması, yerel ve bölgesel ürünlerin daha fazla tercih edilmesiyle besin üretim sistemlerini daha sürdürülebilir hale getirebilir (Van vd., 2007). Birçok tüketici, satın aldıkları ve tükettikleri gıdanın kökeni hakkında duyarlıdır. Tercih genellikle yerel, bölgesel veya yerli üretimden yana olmaktadır. Kültürel öneme sahip olan ve gıda güvenliği, bölgesel özellikler ile bölgesel ve yerel ekonomilere destek gibi konuların yanı sıra çevresel faktörler de büyük bir etken haline gelmiştir. Yerel üretimin kısa taşıma mesafelerine ihtiyaç duyduğu ve bu nedenle tercih edilebilir olduğu savunulmuştur; bu bağlamda, birkaç yıl önce ortaya atılan "gıda kilometresi" kavramı çevresel tercih edilebilirliğin bir göstergesi olarak kabul edilmişti. Ancak, giderek artan sayıda yapılan LCA (Yaşam Döngüsü Değerlendirmesi) çalışması, çevresel açıdan yerel veya yerli üretimin her zaman ithalattan daha avantajlı olmadığını, taşıma modunun ise taşıma mesafesinden daha önemli olduğunu göstermiştir. Havayolu taşımacılığının çevresel etki bakımından en yüksek olduğu, devamında ise sırasıyla karayolu, demiryolu ve deniz taşımacılığı takip etmektedir (Nemecek vd., 2016). Deniz ve demiryolu kullanımının gıda taşımacılığının çevresel etkilerini azaltabileceği belirtilmiştir; fakat ithal edilen ürünler dışındaki yerel ve ithal gıdaların çevresel etkilerini belirlemede, üretim yöntemlerinin daha kritik olduğu vurgulanmaktadır (Xu vs., 2015).

5.3) Tüketim

Beslenme alışkanlıkları, küresel ölçekte biyolojik çeşitliliği etkileyen bir faktördür. Et ve süt tüketimi, bu etkilerin temel unsurlarıdır ve dengeli ve sağlıklı bir beslenmenin, çevresel ve sosyal faydalar sağlayabileceği düşünülmektedir. Beslenme alışkanlıkları; satın alma süreci, eve getirilen besinlerin kullanılması, ev içi tüketim ve evsel atık oluşumlarından oluşmaktadır (Crenna vd., 2019). Tüketicilerin tercih ettiği satın alma seçenekleri kadar, besinleri pişirme ve hazırlama süreçlerinde kullanılan araç-gereçler ve yöntemler de çevresel etkiler üzerinde değişiklik göstermektedir (Xu vs., 2015). Besinleri hazırlarken kullanılan ön pişirme ve ıslatma gibi işlemlerle birlikte düdüklü tencere gibi basınç aracılığıyla hızlı pişirme araçlarının

kullanımının, besin hazırlama ve tüketme süreçlerinde önemli ölçüde enerji tasarrufu sağladığı ifade edilmektedir (Garnett, 2008). Hazırlık ve tüketim sonrasında oluşan evsel atıklar, geri dönüştürme veya kompostlama yöntemleri kullanılarak azaltılabilir (Bernstad ve Cour Jansen, 2012).

5.4) Diğer İşlemler

Besinleri dondurma veya kurutma gibi bu teknikler, enerji harcamasını arttırmaktadır. Gıda kalitesinin korunması, değer kaybının sınırlanması ve enerjinin uygun şekilde kullanılması besin değeri için oldukça önemlidir. Üreticiden perakendeciye kadar olan zincirde sıcaklık seviyesinin optimal bir şekilde yönetilmesi, enerji talebini ve maliyetleri belirlerken ürün kalitesi, süreç verimliliği ve zincirin sürdürülebilirliği üzerinde etkili olabilir. Dondurulmuş gıdaların dağıtımını ve depolanması, ürünlerin kalitesini korumak için düşük sıcaklıkta tutulan "soğuk zincir" kategorisine dahil edilir. Gıda ürünlerinin zaman içinde bozulmasını önlemek, değer kaybını engellemek ve kalitenin güvence altına alınması için "soğuk zincirlerde" enerji uygun bir şekilde kullanılmalıdır. Soğuk zincir uygulamasında, sıcaklık seviyesi düştükçe enerji tüketimi artış gösterir. Dondurulmuş ve soğuk zincirle taşınan gıdaların çevresel etkileri, taze gıdalara kıyasla çevresel etkilerinin daha fazla olduğu gözlemlenmektedir (Zanoni ve Zavanella, 2012).

Kurutma işlemi, bir üründeki su aktivitesini azaltarak nemin uzaklaştırılması anlamına gelir. Bu, bozulma hızını yavaşlatarak ve kaliteyi koruyarak gerçekleşir. Güneşte kurutma, özellikle gelişmekte olan ülkelerde yaygın olarak kullanılan geleneksel bir yöntemdir. Ancak, bu yöntemin kontrolsüz uzun süreli kuruma süreleri, kontaminasyon ve düşük kalitede ürünlerle sonuçlanabileceği ifade edilmektedir. Modern kurutma sistemleri, daha yüksek kaliteli ürünler sunabilen kontrol altındaki koşullar altında gerçekleştirilebilir; ancak genellikle maliyetli ve enerji yoğun olarak nitelendirilmektedir. Ayrıca, küresel gıda talebinin artmasıyla birlikte, gıda zincirinin fosil yakıtların kullanımını artırdığına dikkat çekilmektedir (Lamidi vd., 2019). Kurutma işlemi ; raf ömrünü uzatmaya, nakliye ağırlığını azaltmaya ve nakliye maliyetini düşürmeye yardımcı olabilir. Kurutma sürecinin optimize edilmiş olması, sadece besin maddelerini konsantre etmekle kalmaz, aynı zamanda enerji tüketimini minimize etmeye yönelik bir çaba içerir (Babu vd., 2018).

SONUÇ

Gelecek kuşakların sağlıklı ve güvenilir gıdalara erişebilmesi, mevcut neslin gıda tercihleri doğrultusunda mümkündür. Sürdürülebilir beslenme, besinlerin yaşam döngüsü değerlendirilerek ve çevresel etkilerini inceleyerek en uygun beslenmeyi desteklemektedir. Bugünlerde artan dünya nüfusunun sağlıklı ve dengeli beslenme ihtiyacını, mevcut kaynakları sürdürülebilir bir şekilde kullanarak çevreye zarar vermeden karşılamak giderek güçleşmektedir. Kaynakların geri kazanılması ve etkin bir şekilde kullanılması giderek daha önemli hale gelmiştir. Dünya nüfusundaki artış, gıda atıkları ve kayıplarına karşı önlemler alınmasını



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gerektirmiştir. Nüfus artışıyla birlikte, tarımda verimin çevreye zarar vermeden artırılması, gıda atıklarının ve besin kayıplarının azaltılması, gıda ihtiyacının karşılanabilmesi için oldukça önemlidir. Bu bağlamda, sürdürülebilir çevre ve sürdürülebilir gıda için besin atık ve kayıplarını en aza indirmek ya da değerlendirmek büyük önem taşımaktadır.

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1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY, 2024

ISIRGAN OTU (*URTICA DIOICA* L.), ACI KAVUN (*ECBALLIUM ELATERIUM* L.) VE DAĞ KEKİĞİ (*THYMUS SERPYLLUM* L.) BİTKİ EKSTRELERİNİN DLD-1 KOLOREKTAL KANSER HÜCRELERİNDE SİTOTOKSİK AKTİVİTELERİNİN ARAŞTIRILMASI

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Özet

Yüzyıllardır modern ve alternatif tıpta tedavi amaçlı olarak pekçok bitki kullanılmıştır. Aynı zamanda günümüzde bitkilerin yaprak, meyve, kök veya sap kısımlarından elde edilen özütler, bileşenler, uçucu yağlar vb. eczacılık ve farmakoloji alanlarında ilaçların ham maddelerini oluşturmada etkin rolde dirler. Bu bağlamda çalışmamızda tıbbi öneme sahip amino asitler, mineraller, klorofil, steroller, karotenoidler, vitaminler, fenoller, flavonoidler ve taninlerce zengin olan ve ayrıca antiseptik, antioksidan, antimikrobiyal gibi özellikleriyle bilinen ısırgan otu (*Urtica dioica* L.), acı kavun (*Ecballium elaterium* L.) ve dağ kekiği (*Thymus serpyllum* L.) bitki ekstreleri kullanıldı. MTT (3-(4,5-dimetiltiyazolil)-2,5-difenil tetrazolyum bromid) testi hücre çoğalmasında renk değişimini ölçen standart kolorimetrik bir yöntemdir. Bu çalışmada sitotoksiteyi belirlemek amacıyla MTT yöntemi ile kolorektal kanser hücrelerinde (DLD-1 CCL-221TM) *U. dioica* L., *E. elaterium* L. ve *T. serpyllum* L. bitki ekstreleri 24 saat süreyle 25, 100, 400, 800 ve 1600 µM dozlarında muamele edildi ve hücresel canlılık oranları yüzde olarak belirlendi. Elde ettiğimiz veriler, *U. dioica* L. bitki ekstresi ile 24 saat muamele edilen grupta kontrol ve çözücü grupları ile karşılaştırıldığında hücrelerin canlılık yüzdelerinin doza bağlı olarak anlamlı ($p < 0.05$) derecede azaldığı belirlendi. *E. elaterium* L. ve *T. serpyllum* L. bitki ekstrelerinde ise doza bağımlı bir şekilde hücre canlılık yüzdelerinin azaldığı fakat gruplar arasında istatistiksel olarak bir anlamlılık olmadığı kaydedildi.

Anahtar Kelimeler: Sitotoksite, *U. dioica* L., *E. elaterium* L. ve *T. serpyllum* L.



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Özet

Sağlıklı beslenme; yaşamın sürdürülmesi, büyüme ve gelişme, üretkenlik, sağlık ve iyilik hali için anne karnından başlayarak yaşamın sonuna kadar önemlidir(Baysal, 1996, Baysal, 2011). İlerleyen yıllarda yaklaşık 9 milyar olması beklenen dünya nüfusuna en az düzeyde çevresel etkiye sahip daha sağlıklı bir beslenme sağlamak, küresel besin üretim sistemlerinin karşı karşıya olduğu büyük bir zorluktur. Bu zorlukla, verim açığını kapatacak ve sürdürülebilir beslenmeye yoğunlaşacak, beslenme davranışlarını değiştirecek ve besin israfını azaltacak bir yöntem kombinasyonu yoluyla mücadele edilebileceği öngörülmektedir (Kemaloğlu,2021,ss.4-5).Gıda ve Tarım Örgütü (FAO) “Sürdürülebilir beslenme; insan ve doğal kaynakları optimize etme yanında, biyoçeşitliliğe ve ekosisteme saygılı ve koruyucu, kültürel olarak kabul gören, ulaşılabilir, ekonomik olarak uygun ve karşılanabilir, beslenme açısından yeterli, güvenilir ve sağlıklıdır.” demektedir (FAO,2019,Pekcan,A.G., 2019) . Sürdürülebilir sağlıklı diyetler ise bireyin sağlığını ve iyilik halini tüm yönleri ile geliştiren, düşük çevresel baskısı ve etkisi olan, erişilebilir, maliyeti karşılanabilir, güvenilir, eşitlikçi ve kültürel olarak kabul edilebilir beslenme örüntüleridir. Hedefi tüm bireylerin optimal büyüme ve gelişmesini sağlamak, günümüz ve gelecek nesillerin tüm yaşam sürecinde fiziksel, mental ve sosyal yönden iyilik halini ve işlevselliğini geliştirmek, malnütrisyonun her türünün (yetersiz beslenme, mikrobeyin öğeleri eksikliği, fazla kilo, şişmanlık) önlenmesine katkı sağlamak, beslenmeye bağlı bulaşıcı olmayan hastalıkların (BOH) riskini azaltmak, biyoçeşitliliğin ve gezegenin korumasını desteklemektir(Olgun vd.,2022,ss.261-271). Su ayak izi kullandığımız su miktarının ölçülmesidir(İlhan vd.,2023,s.9768). Su ayak izi genellikle mavi, yeşil ve gri su ayak izi olmak üzere üç bileşene ayrılmaktadır(Kemaloğlu,2021,ss.4-5). Kişilerin beslenmeden dolayı oluşan su ayak izini, et ve et ürünlerini öncelik alan bir diyetten bitkisel ürünleri öncelik alan vejetaryen diyetle geçirerek azaltılabilir(Mekonnen, M.M., & Gerbens-Leenes,W.,2020, s.2696).

Anahtar Kelimeler: sürdürülebilirlik, sürdürülebilir beslenme , su ayak izi, gıda üretimi

Abstract



1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY,2024

Healthy nutrition is important for sustaining life, growth and development, productivity, health and well-being from the womb to the end of life (Baysal, 1996, Baysal, 2011). Providing a healthier diet with minimal environmental impact to a world population expected to be around 9 billion in the coming years is a major challenge facing global food production systems. It is predicted that this challenge can be tackled through a combination of methods that will close the yield gap and focus on sustainable nutrition, change dietary behaviour and reduce food waste (Kemaloğlu,2021,ss.4-5). The Food and Agriculture Organization (FAO) states that "Sustainable diets are culturally acceptable, accessible, economically feasible and affordable, nutritionally adequate, safe and healthy, respectful and protective of biodiversity and ecosystems, and respectful of biodiversity and ecosystems, as well as optimising human and natural resources" (FAO,2019,Pekcan,A.G., 2019). Sustainable healthy diets are nutrition patterns that improve the health and well-being of the individual in all aspects, have low environmental pressure and impact, are accessible, affordable, reliable, equitable and culturally acceptable. Its goal is to ensure optimal growth and development of all individuals, to improve the physical, mental and social well-being and functionality of current and future generations throughout their lives, to contribute to the prevention of all forms of malnutrition (malnutrition, micronutrient deficiency, overweight, obesity), to reduce the risk of nutrition-related non-communicable diseases (NCDs), and to support the protection of biodiversity and the planet (Olgun vd.,2022,ss.261-271). Water footprint is the measurement of the amount of water we use (İlhan vd.,2023,s.9768). Water footprint is generally divided into three components: blue, green and grey water footprint (Kemaloğlu,2021,ss.4-5). People can reduce their dietary water footprint by switching from a diet that prioritises meat and meat products to a vegetarian diet that prioritises plant products (Mekonnen, M.M., & Gerbens-Leenes, W., 2020, s.2696).

Keywords: sustainability, sustainable nutrition, food production, water footprint

GİRİŞ

1.Sürdürülebilirlik Ve Sürdürülebilir Beslenme

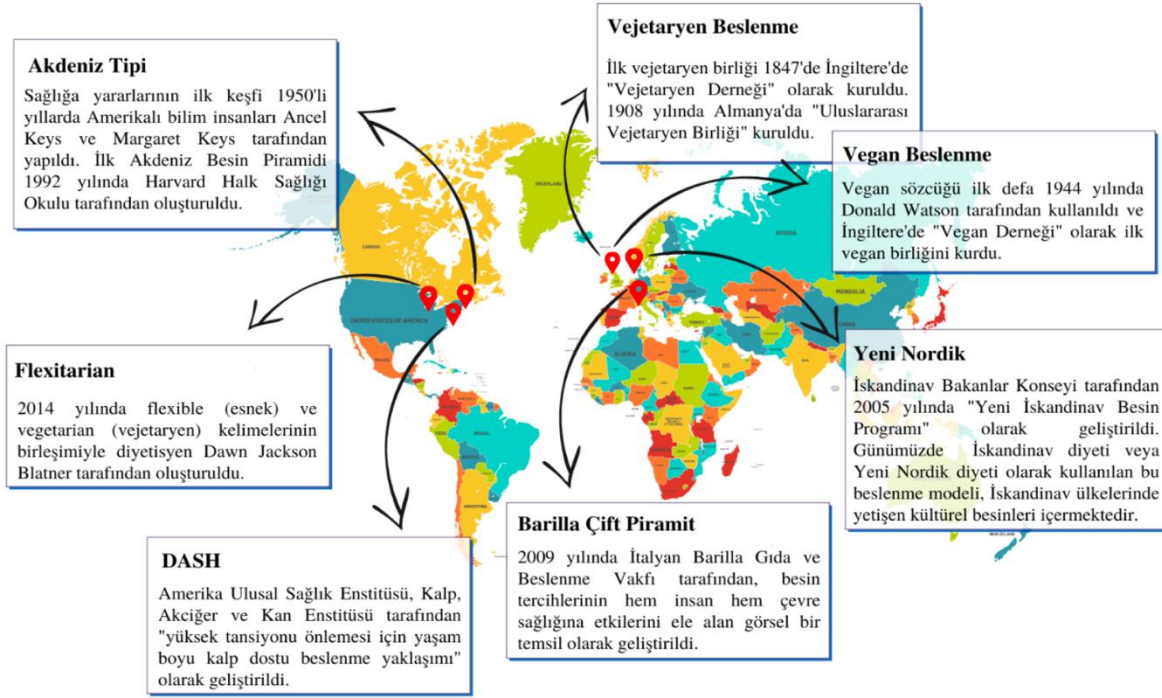
Toplumun sağlıklı olması ve gelişiminin devam etmesi için onu oluşturan insanların sağlıklı olması gerekir. Sağlıklı olmanın temelini oluşturan yeterli ve dengeli beslenme halidir. Sağlıklı beslenme; yaşamın sürdürülmesi, büyüme ve gelişme, üretkenlik, sağlık ve iyilik hali için anne karnından başlayarak yaşamın sonuna kadar önemlidir(Baysal, 1996, Baysal, 2011). Besin sistemleri; besinin üretim, depolama, nakliye, ticaret ve tedarik süreçlerini içeren kapsamlı bir terimdir. Besin sistemleri; besin güvencesini, beslenme kalitesini ve satın alınabilirliğini yönetmektedir(Haddad L,2016,s.133). Sağlıklı beslenme için besin çeşitliliğine dayalı olarak besinlerin tüketilmesi ve halkın bu konuda doğru bilgilendirilmesi gerekmektedir(Pekcan,A.G.,2017,ss.95-98). Beslenmede temel tartışma konularından biri olan besin güvencesi kavramı; tüm insanların sağlıklarını devam ettirebilmeleri için ihtiyaç duydukları yeterli, güvenli ve besleyici gıdaya; her an fiziksel ve ekonomik olarak erişebilmeleri olarak tanımlanmaktadır (FAO,1996). Besin güvencesinin sağlanamadığı durumlarda, hem birey bazında hem de toplum bazında; yetersiz beslenme, obezite ve kronik hastalık gibi sonuçlar ortaya çıkabilmektedir (RA,L.,2012,s.63). Malnutrisyonla benzer şekilde obezite de halk sağlığını ve sağlık giderlerini olumsuz etkilemektedir (Erdoğan,2018,s.3).

Dünya Sağlık Örgütü (DSÖ), yetersiz ve dengesiz beslenmenin dünya çapında tüm yaş gruplarında her üç kişiden birini etkilediğini ve gelişmekte olan dünyada yıllık 10,4 milyon çocuk ölümünün yarısında önemli bir rol oynadığını ayrıca hayatta kalan çocuklarda da hastalık ve sakatlığın bir nedeni ve sonucu olmaya devam ettiğini bildirmiştir (WHO, 2000). İlerleyen yıllarda yaklaşık 9 milyar olması beklenen dünya nüfusuna en az düzeyde çevresel etkiye sahip daha sağlıklı bir beslenme sağlamak, küresel besin üretim sistemlerinin karşı karşıya olduğu büyük bir zorluktur. Bu zorlukla, verim açığını kapatacak ve sürdürülebilir beslenmeye yoğunlaşacak, beslenme davranışlarını değiştirecek ve besin israfını azaltacak bir yöntem kombinasyonu yoluyla mücadele edilebileceği öngörülmektedir (Kemaloğlu,2021,ss.4-5). Dünya üzerinde yaşayan yedi milyar insanın besin ihtiyacını eşzamanlı olarak karşılamak, gezegenimizin sınırlı kapasitesini ve kaynaklarını zorlaması bakımından küresel düzeyde çevresel sürdürülebilirlik konusunda en önemli tehdit unsuru olarak görülmektedir (Erdoğan,2018). Küresel besin sistemimiz ve sürdürülebilirliği konusunda literatürde birçok çalışma bulunmaktadır. Bu çalışmaların verdiği ortak mesaj, mevcut besin sistemimizin gelecekte toplumsal iyiliğe katkılarını sağlamada beklenen veya ihtiyaç duyulan şeyler konusunda başarısız olacaktır (Haddad L,2016,s.133).

Sürdürülebilir beslenmenin tarihçesinde ise; kelime kökeni Latince “sustinēri” den gelen kavramsal temelleri 1970’lerin başında atılan “sürdürülebilirlik” veya “sürdürülebilir kalkınma” terimini J. Coomer (1979) “sürdürülebilir bir toplumun kendi kendini devam ettirebilen, büyümenin sınırlarını bilen ve büyümek için başka seçenekler arayan bir toplum” olarak tanımlamıştır. Bir diğer tanım ise Robert Allen (1980) tarafından “insan ihtiyaçlarının kalıcı tatmini ve yaşam kalitesinin iyileştirilmesini sağlayan gelişmeler” olarak belirtilmiştir(Olgun vd.,2022,ss.261-271). “Sürdürülebilirlik” kavramı 1980’li yıllarda popülerleşmeye başlamış 1983 yılında ise Birleşmiş Milletler tarafından sürdürülebilirlik için uzun süreli stratejileri belirlemek adına gelişmiş ve gelişmekte olan ülkelere 22 kişilik bir grup görevlendirilmiştir. Bir diğer adı Brundtland Komisyonu olan WCED 1987 yılında “Brundtland Raporu(ortak geleceğimiz raporu)”nu öne sürmüştür. Sürdürülebilir Kalkınma terimi 1987’de WCED tarafından yayınlanan Brundtland Raporunda(ortak geleceğimiz) “İnsanlık, bugünün ihtiyaçlarını sağlarken gelecekteki kuşakların gereksinimlerini riske atmadan karşılayan kalkınmayı sürdürülebilir kılma yeteneğine sahiptir.” olarak tanımlanmıştır (Atar, 2021). WCED ve birçok kişi tarafından yapılan bu tanımlar, sürdürülebilir kalkınma kavramının çok yönlü bir konu olduğunu göstermektedir (Olgun vd.,2022,ss.261-271, İlhan vd.,2023,s.9768, Pekcan,A.G.,2019,ss. 1-10). Gıda ve Tarım Örgütü (FAO) “Sürdürülebilir beslenme; insan ve doğal kaynakları optimize etme yanında, biyoçeşitliliğe ve ekosisteme saygılı ve koruyucu, kültürel olarak kabul gören, ulaşılabilir, ekonomik olarak uygun ve karşılanabilir, beslenme açısından yeterli, güvenilir ve sağlıklıdır.” demektedir (FAO,2019,Pekcan,A.G., 2019). Sürdürülebilir tüketim modelleri, dünyanın taşıma kapasitesinden ödün vermeden insanlara temel ihtiyaçlarını karşılama konusunda potansiyellerini geliştirme özgürlüğü sunan tüketim modelleri olarak tanımlanabilir. Sürdürülebilir tüketim politikası tüketicilerin davranışlarını etkileyerek çevre üzerindeki olumsuz etkilerini azaltmaya yönelik önlemlerden oluşmaktadır (Erdoğan,2018).

Garnett(2013) ise besin sürdürülebilirliğine ulaşmada üç önemli faktörü belirlemiştir; verimlilik odaklı, talep azaltıcı ve besin sistemi dönüşümü. Verimlilik odaklı bakış açısı, gıda üretiminde sürdürülebilirliğin sağlanmasında kilit rol olarak teknolojik yenilikler ve yönetimsel değişiklikleri öngörmektedir. Öte yandan talep kısıtlaması bakış açısında problemin altında yatan nedenin tüketicilerin sürdürülemez tüketim davranışları olduğu ve çevreye yüksek olumsuz etkisi olan gıdaların tüketiminin azaltılması gerektiği vurgulanmaktadır. Üçüncü bakış açısı besin sistemi dönüşümünde ise sosyal adalet ve çevresel sürdürülebilirliği sağlamak için sosyo-ekonomik olarak değişime ihtiyaç olduğunu ortaya koymaktadır. Garnett her bir bakış açısının güçlü ve zayıf yönleri bulunduğunu nihai hedefe ulaşmak için üçünün birden ele alınması gerektiğini vurgulamaktadır (Erdoğan,2018).

Günümüzde sürdürülebilirlik, gıda güvenesi ve beslenme, sürdürülebilir diyetler toplum sağlığında beslenme alanında ve sürdürülebilir besin sistemlerinde uluslararası tartışmaların temel alanlarını oluşturmaktadır. Sürdürülebilirlik konularının beslenme rehberlerine yansıtılması tüketicinin sağlıklı beslenmesinin yanısıra sağlıklı çevrenin sürdürülebilmesi için de dikkate alınmaktadır (Pekcan, 2017). Gıda Tarım Örgütü'ne (FAO) göre, "Sürdürülebilir diyetler düşük çevresel etkileri ile, günümüzün ve geleceğin nesilleri için besin, beslenme güvenesi ve sağlıklı yaşama katkı sağlayan diyetlerdir. Sürdürülebilir diyetler biyoçeşitliliğe ve ekosistemlere duyarlı, kültürel olarak kabul gören, erişilebilen, ekonomik olarak uygun ve karşılanabilen, beslenme yönünden yeterli, güvenilir ve sağlıklı, doğal ve insan kaynaklarını optimize edicidir". Bu doğrultuda Akdeniz diyeti sürdürülebilir diyet modeli olarak kabul edilmektedir (Pekcan, 2017, Pekcan, 2019).



ŞEKİL 1: Sürdürülebilir beslenme modelleri (Olgun vd., 2022, ss. 261-271).

Sürdürülebilir sağlıklı diyetler bireyin sağlığını ve iyilik halini tüm yönleri ile geliştiren, düşük çevresel baskısı ve etkisi olan, erişilebilir, maliyeti karşılanabilir, güvenilir, eşitlikçi ve kültürel olarak kabul edilebilir beslenme örüntüleridir. Hedefi tüm bireylerin optimal büyüme ve gelişmesini sağlamak, günümüz ve gelecek nesillerin tüm yaşam sürecinde fiziksel, mental ve sosyal yönden iyilik halini ve işlevselliğini geliştirmek, malnütrisyonun her türünün (yetersiz beslenme, mikrobeyin öğeleri eksikliği, fazla kilo, şişmanlık) önlenmesine katkı sağlamak, beslenmeye bağlı bulaşıcı olmayan hastalıkların (BOH) riskini azaltmak, biyoçeşitliliğin ve gezegenin

korumasını desteklemektir (Olgun vd.,2022,ss.261-271). Avrupa Besin ve Beslenme Eylem Planı 2015-2020 ile Avrupa Bölgesi'nde beslenmeye bağlı önlenebilir BOH'un ve sık görülen her türlü malnütrisyonun azaltılmasını tüm hükümetler kapsamında, tüm politikalarda sağlık yaklaşımı doğrultusunda hedeflemektedir. Besin sistemlerinin yönetiminin, toplumun diyetinin ve beslenme durumunun iyileştirilmesine katkı sağlayacak bir dizi öncelikli eylemler sunmuştur. Çalışmaların sonucunda Akdeniz Diyeti (AD) ve Nordik Diyeti (ND) (İskandinav ülkeleri: Danimarka, Finlandiya, İzlanda, Norveç, İsveç) olarak iki Avrupa diyetinin sağlığı geliştirici olduğu rapor edilmiştir (Renzella J vd., 2018, Pekcan,2019).

1.1.Beslenmenin Sürdürülebilirliğe Etkisi

- **Karbon Ayak İzi**, CO2 eşdeğeri olarak ölçülen ve incelenen sistemin her aşamasında iklim değişikliğinden, insan etkilerinden kaynaklanan sera gazlarının atmosfere yayılmasıyla oluşan ve beraberinde atmosferdeki dengenin bozulmasıyla sera gazı emisyonlarının çevreye verdiği zararın ölçüsünü ifade eder.(Boer, Witt ve Aiking, 2016, Olgun vd.,2022,ss.261-271, Kadıoğlu,S., & KAYA, P.S., 2022). Bir ürünün ya da faaliyetin üretiminden başlayarak taşıma, kullanım ve yok edilmesi de dâhil yaşam döngüsünün tüm aşamalarında ortaya çıkan ve biriken CO2 emisyonunun ölçümüne karbon ayak izi adı verilmektedir(Kemaloğlu,2021,ss.4-5).
- **Su Ayak İzi** veya sanal su içeriği, üretimden tüketime kadar tüm zincir tarafından hacim cinsinden harcanan ve / veya kirletilen su kaynaklarının kullanımını ifade etmektedir. Su Ayak İzi; yeşil, mavi ve gri su olmak üzere üç bileşenden oluşmaktadır (Olgun vd.,2022,ss.261-271).
- **Ekolojik Ayak izi**, tüketilen kaynakları sürdürülebilir bir şekilde sağlamak ve üretilen tüm emisyonları absorbe etmek için gerekli olan; biyolojik olarak verimli toprak ve su miktarını temsil etmektedir (Kadıoğlu,S., & KAYA, P.S., 2022).
- **Besin Atıkları Ve Kayıplar**: Besin atıkları, tüketiciler tarafından kullanılabilir ve yenilebilir bir ürünün atılmasıyla ortaya çıkarken besin kayıpları, besinin kütlelerinde üretimden dağıtıma kadar olan tüm yaşam döngüsünde ortaya çıkabilecek azalma ve kayıplar olarak tanımlanabilir (Olgun vd.,2022,ss.261-271).Besinlerin tarladan sofraya geldiği süreç boyunca işleme sırasında yapılan hatalar, yanlış depolama ve soğutma işlemleri, taşıma esnasında karşılaşılan sorunlar besin kayıplarına ve dolaylı olarak besin atıklarına neden olmaktadır (Slorach vd., 2019, ss. 798-814).
- **Diyetisyenler Ve Sürdürülebilir Beslenme**: Diyetisyenler besin bilimi, toplum gereksinimleri, davranış değiştirme ve insan sağlığını geliştirme alanlarında aldıkları eğitim ve uzmanlıkları nedeniyle toplumların sürdürülebilir beslenme örüntülerini yönlendirmede tek ve önemli meslek mensubudur.

Herkes için yeterli, güvenilir, sağlıklı ve sürdürülebilir diyetleri yaşam döngüsü boyunca sağlamalı ve desteklemelidir(Pekcan,2019).

1.1.1.SU AYAK İZİ

Tatlı su ; yaşamı, gelişimi ve çevreyi sürdürmek için gerekli olan sınırlı bir kaynaktır. Bununla birlikte çoğu kişi tarafından kabul edilen önemine karşın insanlığın değerli tatlı su kaynaklarını yönetme şekli suyla ilgili bir dizi ciddi çevresel sorunlara yol açmıştır (Hogeboom, 2020). Özellikle son yıllarda giderek artan talep nedeniyle tatlı su kıtlığının insan popülasyonunun sürdürülebilir kalkınması için açık bir tehdit haline geldiği ortaya çıkmıştır (Kemaloğlu,2021,ss.4-5). Tatlı su kaynaklarının kirlenmesi sadece ekolojik sürdürülebilirlik ve halk sağlığına yönelik bir tehlike oluşturmakla kalmamakla birlikte buna ek olarak tatlı suya olan rekabeti de arttırmaktadır (Kemaloğlu,2021,ss.4-5). Ayrıca su kirliliğinin var olan diğer faktörlerle birlikte dünya genelinde su güvenliği ve nehir biyoçeşitliliği üzerinde ciddi bir tehlike oluşturduğu ileri sürülmektedir (Vörösmarty ve ark., 2010). Dünyadaki tatlı su kaynakları büyük oranda besin üretimi için kullanılmaktadır (Suweis ve ark., 2013). Dünya çapında kişisel su ayak izlerinin yaklaşık %90'ı tarımsal ve hayvansal üretim şeklinde besin üretimine ayrılmıştır. Buna karşılık evsel ve endüstriyel su tüketimi nispeten çok daha azdır (Erdoğan,2018, Kemaloğlu,2021,ss.4-5). Bir ürünün su kullanımını sanal olarak değerlendirmek kolay değildir ve ürünün üretim sürecinde kullanılan su miktarını etkileyen birçok faktör vardır. Örneğin; üretim yeri ve zamanı (hangi yıl, hangi sezon), kullanılacak ölçüm teknikleri, üretim yöntemi ve su kullanımının verimliliği bunlardan bazılarıdır (Erdoğan,2018). Su kaynaklarının sürdürülebilirliğini sağlamak için her damla suyun kullanımına dikkat edilmelidir(İlhan vd.,2023,s.9768).

Su Ayak İzi Değerlendirmesi, Su Ayak İzi Ağı (WFN) tarafından geliştirilen su kullanım miktarının ölçüm yöntemlerinden biridir . Su ayakizi kullandığımız su miktarının ölçülmesidir. Su ayakizi tek bir besinin üretilmesi (Örnek: Buğdayın, kırmızı etin üretimi) ya da besin dışı bir ürün için (Örnek: Araçta kullanılan benzin, giyilen bir giysi, bir şirket için) hesaplanabilmektedir (İlhan vd.,2023,s.9768). ‘Su Ayak İzi’ terimi, ilk defa 2002 yılında Hoekstra ve Hung tarafından UNESCO-IHE’de ortaya çıkarılmıştır (Hoekstra, 20). Daha sonra Hoekstra ve Chapagain tarafından geliştirilen su ayak izi terimi, genel olarak bir birim ürün (m³/ton) üretimindeki tüm aşamalarda kullanılan su miktarı veya belirlenmiş bir alanın (örneğin; ülke, il, bölge), bireyin veya topluluğun yıllık su hacmi (m³/yıl) olarak ifade edilmektedir (Erdoğan,2018, Kemaloğlu,2021,ss.4-5).

Bir besinin su ayak izi genellikle, bu ürünün üretiminde kullanılan su miktarı (buharlaştırma ve terleme yoluyla) olarak tanımlanabilir (Hoekstra,A.Y.,2011). Artan nüfus ve yaşam standartlarına ek olarak değişen diyet tercihleriyle birlikte, önümüzdeki yıllarda su kullanımının artmaya devam etmesi beklenmektedir (Erdoğan,2018, Kemaloğlu,2021,ss.4-5).

1. BİLSEL INTERNATIONAL KORYKOS SCIENTIFIC RESEARCHES AND INNOVATION CONGRESS, 27-28 JANUARY,2024

Bu bileşenler birlikte suyun kullanımını, suyun kaynağını (yağmur suyu, yüzey su, yeraltı suyu) ve kirleticilerin ortadan kaldırılması için gerekli temiz su hacmini gösterir (Pekcan,2019).

Su ayak izi genellikle mavi, yeşil ve gri su ayak izi olmak üzere üç bileşene ayrılmaktadır.

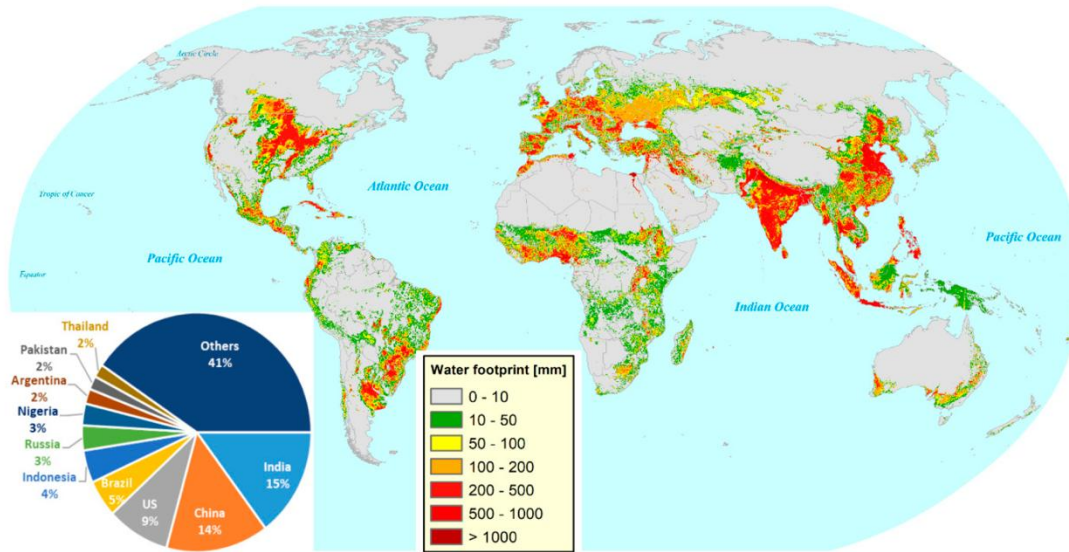
- Mavi su ayak izi, bir ürünün üretimi için küresel mavi su kaynaklarından (yüzey ve yer altı suyu) buharlaşarak veya doğrudan kullanılabilen tatlı su miktarını ifade etmektedir(Pekcan,2019, Erdoğan,2018, Kemaloğlu,2021,ss.4-5).
- Yeşil su ayak izi, bir ürün üretmek için topraktan buharlaşan, köklerden emilen ve ürün tarafından kullanılan yağmur suyu miktarını ifade etmektedir(Hoekstra , A.Y.,2011). Tarımsal üretim aşamalarında yaygın olarak kullanılan suyun büyük bir bölümünü temsil etmektedir.
- Gri su ayak izi ise, yerel su kalitesi standartlarını sağlamak için belirli bir faaliyetle ilişkili kirleticilerin azaltılması veya bertaraf edilmesinde kullanılan tatlı su miktarını ifade etmektedir. Gri su ayak izinin dâhil edilmesi, su ayak izi tespit çalışmalarında görece daha yenidir fakat su kıtlığının bir faktörü olarak kirliliğin önemi düşünüldüğünde oldukça önemli görülmektedir(Erdoğan,2018, Kemaloğlu,2021,ss.4-5).

ŞEKİL 2: Su ayak izi bileşenlerinin tanımı (FAO ve Bioversity International, 2012, Kadioğlu, S., & KAYA, P.S., 2022).

Kavram	Açıklaması
Yeşil Su (Green water)	Yerden ve ekili bitki örtüsünden gelen yağmur suyu buharlaşma hacmi göstergesidir.
Mavi Su (Blue water)	Tüm sistem boyunca yüzey veya yeraltı suyu kaynaklarından kullanılan, havzaya veya kaynağa yeniden doldurulmayan tatlı su hacmi göstergesidir. Bu ayak izi hem sulama hem de üretim sürecindeki su tüketimini içermektedir.
Gri Su (Grey water)	Ürünlerin veya hizmetlerin üretimi ile ilişkili kirli su hacmi göstergesidir. Kirleticileri, suyun kalitesini sağlayacak bir dereceye kadar seyreltmek için gereken su miktarı (teorik olarak) olarak ölçülmektedir.

Ayrıca su ayak izi bize herhangi bir ülkede kullanılan su miktarını da göstermektedir (Pekcan, 2019).

ŞEKİL 3: Pasta grafik, toplam küresel su ayak izinde büyük paya sahip başlıca ülkeleri göstermektedir (Mekonnen, M.M., & Gerbens-Leenes, W., 2020, s.2696).



Hindistan, Çin ve ABD toplam küresel yeşil, mavi ve gri su ayak izinin %38'ini oluşturmaktadır (Mekonnen, M.M., & Gerbens-Leenes, W., 2020, s.2696).

1.1.1.1. Gıda Üretimi İçin Gereken Su Miktarı

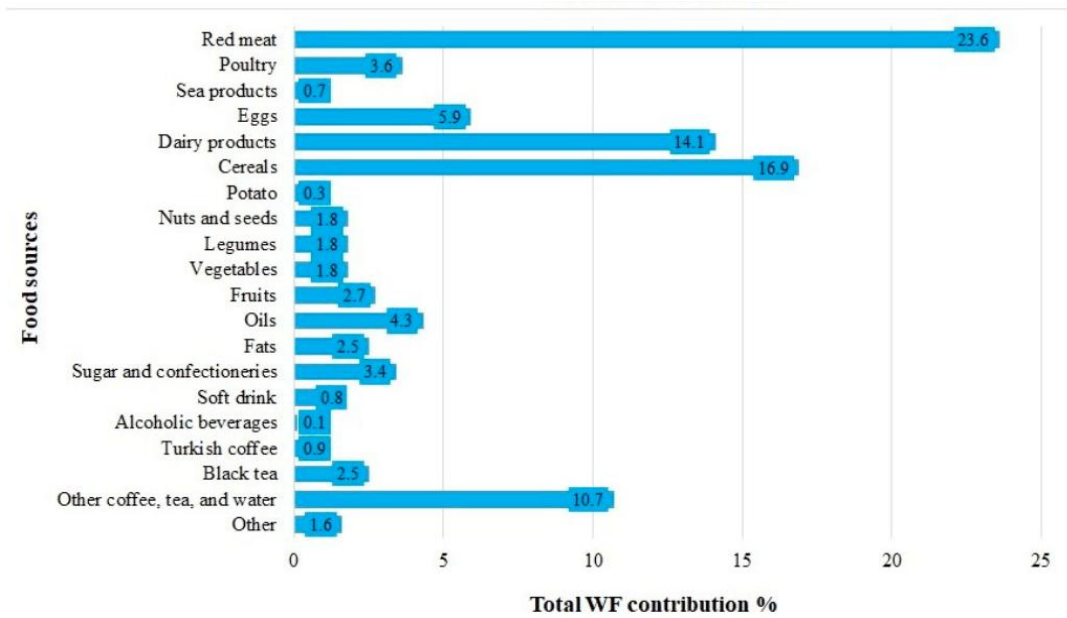
Besin üretimi doğal kaynakların, örnek olarak suyun kullanılmasında önemli paya sahiptir. Dünya çapında kişisel su ayak izlerinin yaklaşık %90'ı tarımsal ve hayvansal üretim şeklinde besin üretiminden olmaktadır. Hayvansal üretimden dolayı oluşan su ayak izinin büyük kısmı, toplam su ayak izinin %98'ini kapsayan hayvancılıkta kullanılan yemlerden oluşmaktadır. Tarımsal üretim ise dünyadaki toplam su ayak izinin %92'sini oluşturmaktadır. Bununla birlikte tarımsal alanda kullanılan suyun %29'u doğrudan ya da dolaylı olarak hayvansal üretim için harcanmaktadır (Hoekstra ve Mekonnen, 2012, Kemaloğlu, 2021, ss.4-5).

Hoekstra (2010) çalışmasında ileri sanayi bir ülkede yaşayan kişinin beslenmeden dolayı oluşan su ayak izini, et ve et ürünlerini öncelik alan bir diyetten bitkisel ürünleri öncelik alan vejetaryen diyetle değiştirilerek %36 oranından azaltılabileceği bulunmuştur. Diyetin su ayak izi beslenme alışkanlıklarında yapılacak değişiklikler ile önemli oranda azaltılıp değiştirilebilir. Ayrıca su ayak izinde azalma, beslenme düzeninde yapılacak değişiklikler ve ayrıca Batı ülkelerinde besinlerin israf edilmemesiyle gerçekleştirilebilir (Kemaloğlu, 2021, ss.4-5). FAO'nun Gıda ve Tarımın Durumu hakkındaki 2019 raporunun tamamen gıda kaybı ve israfı konusuna ayrılmış olması, konunun ele alınmasının önemini daha da vurgulamaktadır. İnsan tüketimi için küresel olarak üretilen gıdanın ağırlık olarak yaklaşık üçte biri ve kalori olarak dörtte biri 2009 yılında kaybolmuş veya israf edilmiştir. Gıda kayıp ve atıklarının yaklaşık dörtte üçü tahıllar ile meyve ve sebzelerle ilgilidir. Mekonnen ve Fulton (2018), ABD gıda sisteminde gıda kaybını ve israfını azaltmanın, mevcut vegan veya vejetaryen diyetlere geçişten daha etkili olduğunu bulmuştur (Mekonnen, M.M., & Gerbens-Leenes, W., 2020, s.2696).

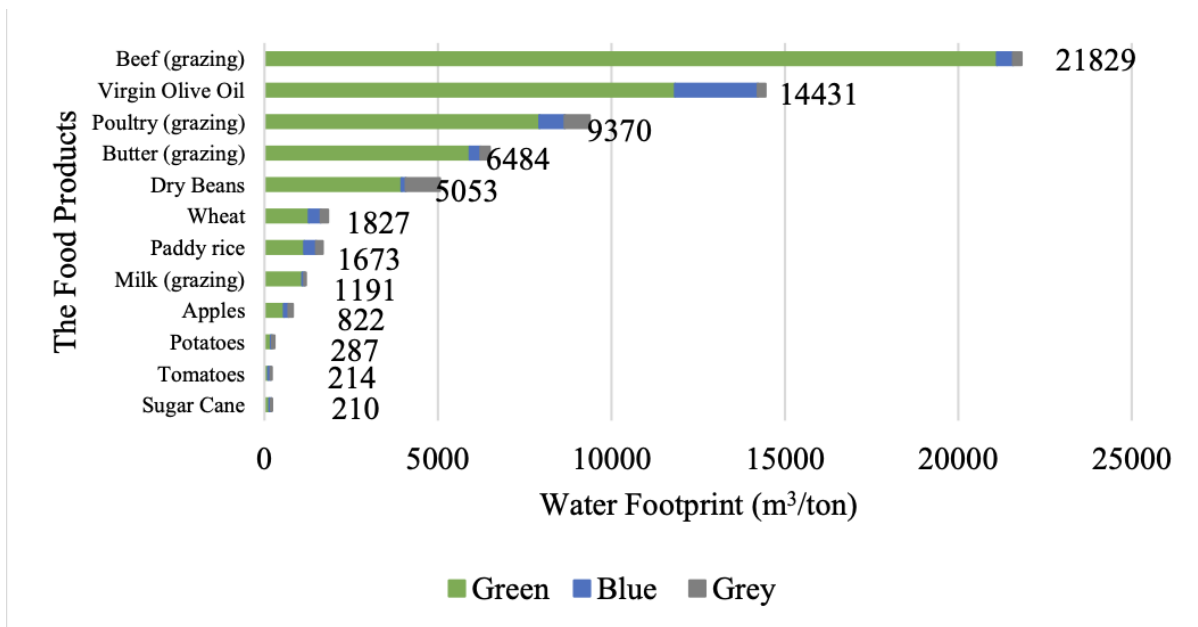
İklim ve arazi kullanım değişikliği altında bitkisel üretimle ilgili gelecekteki tahmini küresel su ayak izi, mevcut dönem için yapılan tahminler aralığında olmasına rağmen, Huang, Hejazi, Tang, Vernon, Liu, Chen ve Calvin (2019), iklim ve arazi kullanım değişikliği altında su ayak izinin %22'ye kadar artacağını öngörmüştür. Küresel sulanan alandaki genişleme nedeniyle 2090 yılına kadar %70 oranında artacak olan mavi su ayak izi için su ayak izi'ndeki artış özellikle büyüktür (Huang vd., 2019, Mekonnen, M.M., & Gerbens-Leenes, W., 2020, s.2696). Bitkisel üretimin tüketim su ayak izinin yaklaşık %86'sı doğrudan insan gıda tüketimi için kullanılabilen ürünlerin üretimiyle ilgilidir. Diğer %14'ü ise yem bitkileri, lif, kauçuk ve tütün içindir. Mısır, kolza tohumu, palmye yağı meyvesi, soya fasulyesi ve ayçiçeği gibi bazı gıda bitkileri aynı zamanda biyoyakıt üretimi için de kullanılmaktadır. Bu da insan gıdası tüketimi için kullanılan toplam su ayak izini azaltacaktır (Mekonnen, M.M., & Gerbens-Leenes, W., 2020, s.2696).

Besinlerin toplam su ayak izi yüzdeleri Şekil 4'te gösterilmiştir. En çok katkıda bulunan iki besin toplam su ayak izi için kırmızı et ve tahıllar (%23,6 ve %16,9) dır (İlhan vd., 2023, s.9768).

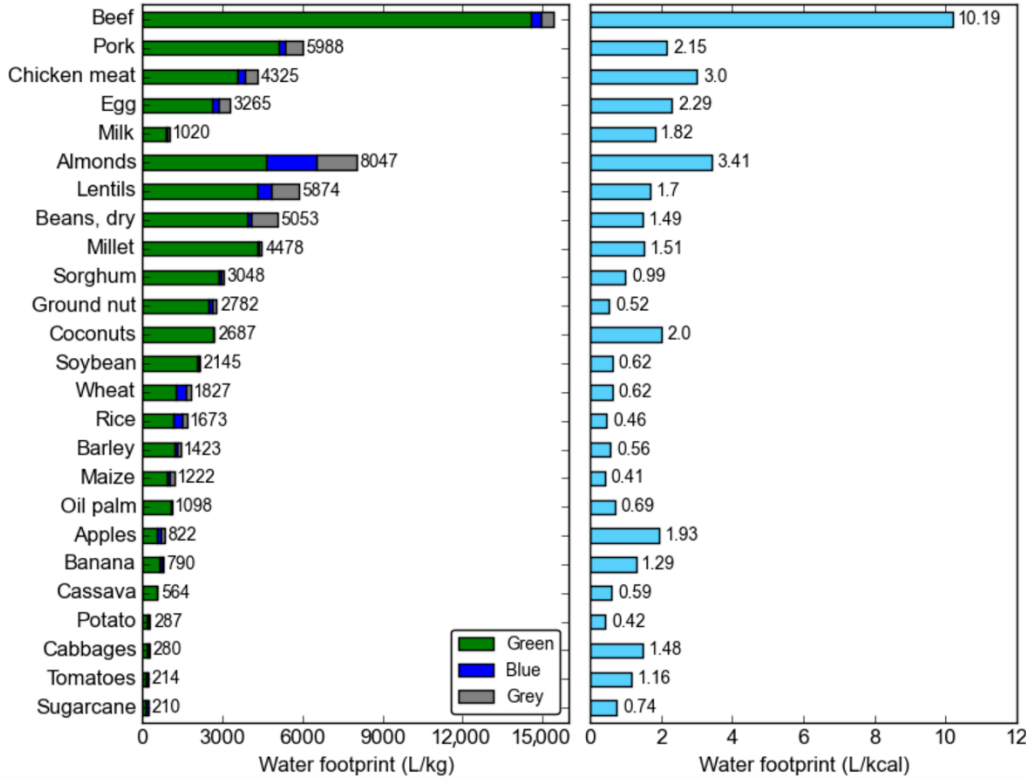
Şekil 4: Besinlerin Su Ayak İzi (İlhan vd.,2023,s.9768).



Şekil 5: Seçilmiş Besinlerin Mavi Yeşil Gri Su Ayak İzleri 10



ŞEKİL 6: Seçilen mahsul ve hayvansal ürünlerin su ayak izi 1)kg ürün başına bir litre su içinde su ayak izi ;2) Üründe bulunan besin enerjisinin kcal başına bir litre su içinde su yaka izi Mekonnen ve Hoekstra (2011) ve Mekonnen ve Hoekstra'dan (2012) veri kaynağı (Mekonnen, M.M., & Gerbens-Leenes,W.,2020, s.2696).



Seçilen bitkisel ve hayvansal ürünlerin su ayak izini, fiziksel ağırlık (L/kg) cinsinden ve besinsel enerji içeriği (L/kcal) üzerinden gösterilmektedir. Hayvansal ürünlerinin su ayak izi ile bitkisel ürünlerin arasında önemli farklılıklar göstermektedir. Ortalama olarak, eşdeğer enerji değerine sahip ürünlerden hayvansal gıda ürünlerinin su ayak izi bitkisel gıda ürünlerinin su ayak izinden daha büyüktür. Küresel su ayakizi değerlerine bakıldığında sırasıyla sebzeler: 322, yumrular: 387, meyveler: 962, tahıllar: 1644, yağlı tohumlar: 2364, kurubaklagiller: 4055, sert kabuklu meyveler için 9063 m³/ton olarak hesaplanmıştır. Hayvansal besinler için su ayakizi ise sırasıyla süt: 1020, yumurta: 3265, tavuk eti: 4325, tereyağ: 5553, peynir: 5060, keçi eti: 5521, koyun eti: 10412 ve dana eti: 15415 m³/ton olarak rapor edilmiştir. Dana etinin su ayakizi kalori başına (10.19 L/ kkal) tahıllardan (0.51 L/kkal) 20 kez daha fazladır. Besinler protein için su ayakizi yönünden değerlendirildiğinde süt, yumurta ve tavuk eti gramı başına su ayakizi kurubaklagillerden 1.5 kez daha fazladır. Dana etinin su ayakizi kurubaklagillere göre 6 kez fazladır (Mekonnen, M.M., & Hoekstra , A.Y.,2011, ss. 401-415). Bir kilogram dana eti için yaklaşık 15.000 litre su (%93 yeşil, %4 mavi ve %3 gri su ayakizi)

gerekmektedir. Bu durum üretim sisteminin türüne, hayvan için kullanılan yem kaynağına ve bileşimine göre değişmektedir .Bir kilogram hayvansal protein üretimi 1 kg tahıl proteinine göre 100 kez daha fazla su gerektirmektedir . Çiftlik balığı ve kabuklu deniz ürünleri için su ayakizi 1974 m³/ton (%83 yeşil, %9 mavi ve %8 gri su) bulunmuştur . Tahıllar kıyaslandığında su ayakizi mısır için en düşük (1222 m³/ton), pirinç için orta (1644 m³/ton) ve buğday için en yüksek (1827 m³/ton) bulunmuştur (Pekcan,A.G,2017).

Yetişkin bir kadının bir günlük beslenmesi için gerekli günlük su miktarı Amerikan Beslenme Rehberi önerilerine göre 4080 L (17.000 kupa, 1 kupa=240 mL), İngiltere için 2280 L (9500 kupa), Çin için 1680 L (7000 kupa) ve Şili için 1500 L (6250 kupa) olarak hesaplanmıştır .Amsterdam ve Rotterdam için su ayakizi kişi başına günde 3245 L bulunmuştur. Hayvansal besin, bitkisel yağ ve şeker tüketiminde azaltma sonucu daha sağlıklı beslenmeye yönelme ile su ayakizinde %29-32 azalmanın olabileceği hesaplanmıştır (Pekcan,A.G.,2017).

Mavi ve gri su ayak izi değerleri yaşlılarda daha düşük bulunmuştur.Eğitim ve finansal durumu yüksek olan bireyler daha yüksek su ayak izi değerlerine sahip olduğu bulunmuştur. Benzer şekilde, daha düşük bel-kalça oranına sahip bireyler daha düşük su ayak izi değerlerine sahiptir. Ayrıca, beslenme çeşitliliği arttıkça çevre sağlığını etkileyen diyetle ilgili çevresel faktörler arttığı bulunmuştur. Toplam su ayak izi , Türkiye genellikle tahıl bazlı diyetle ilgili çevresel faktörler arttığı bulunmuştur. Toplam su ayak izi , Türkiye genellikle tahıl bazlı diyetle göre beslendiği için dünya ortalamasının altında kalmıştır. Ayrıca, toplam su ayak izi ve yeşil su ayak izi erkeklerde daha yüksek bulunmuştur. Bunun sebebi, erkeklerin kadınlardan daha çok ekmek ve diğer tahıl ürünleri tüketimine sahip olması bulunmuştur. Yüksek su ayak izi içeren diyetler bu çalışmada daha fazla kırmızı et ve tahıl içeriyordu (İlhan vd.,2023,s.9768).

Kayatz ve ark.(2019) ,Hindistan'da pirinç ve buğday yerine mısır, darı, sorgum gibi tahılların yetiştirilebileceği gösterilmiştir. Willett ve ark.(2019) , "daha sağlıklı" diyetlerin "mevcut" diyet kalıplarına benzer mavi su ayakizlere sahip olduğunu göstermiştir. Meyveler, yağlar ve kuruyemişler gibi sağlıklı besinlerin önemli bileşenleri olan bitki bazlı gıdalar, diyetteki mavi su ayak izlerine büyük katkıda bulunmuştur. Bu gıdaların üretimi ve sağlıklı diyetler, sulamayı sınırlayabileceği yerlerde azalan yeraltı suyu veya yüzey suyu mevcudiyetine duyarlı olabilir (Harris vd., 2020,ss.375-386).

Vanham ve ark. (2021) ,Mağrip ülkeleri Tunus ve Cezayir için Akdeniz diyeti su ayak izi, mevcut su ayak izine kıyasla biraz daha yüksektir ve gıda ürünü gruplarının oranları farklı bulmuşlardır. Bu tür diyet değişimleri, Akdeniz ülkelerinde su kaynaklarının sürdürülebilir kullanımını elde etmek için çözümün önemli parçaları olacaktır.Eat lancet diyeti: Tam tahılların, meyvelerin, sebzelerin, kuruyemişlerin ve baklagillerin tüketilen gıdaların daha büyük bir bölümünü oluşturduğu bir bitki diyetini vurgulamıştır. Et ve süt ürünleri diyetin önemli

bölümlerini oluşturmuş, ancak tam tahıllar, meyveler, sebzeler, fındık ve baklagillerden önemli ölçüde daha küçük oranlardadır. Gıda ürün grubunda “bitki yağlar ve hayvansal yağlar”, MEDIT için %50 zeytinyağı, diğer %50 kalan yağlar ve hayvansal yağlardır. EAT-LANCET için, mevcut tercihe göre %90 oranında sıvı yağlar ve %10 oranında hayvansal yağlar kullanılmıştır. "Bakliyat, fındık, yağlı bitkiler" ürün grubunda, EAT-LANCET için %25 fındık, %25 yer fıstığı ve %50 diğer ürünler (mevcut tercihe göre oranlar). MEDIT için genel oran kuralı takip edilmiştir. Yeşil artı mavi su ayak izi için olduğu gibi, EAT LANCET diyetinin MEDIT diyetinden daha az mavi su kaynağı gerektirdiği kanıtlanmıştır. MEDIT için en büyük mavi su ayak izi oranları meyve ve mahsul yağlarından oluşmuştur .EAT-LANCET için bunlar meyve, tahıl ve bakliyat, fındık ve yağ mahsulleridir. Bu gözlem, tahılların, meyvelerin, kuruyemişlerin ve yağların diyetlerin mavi su ayak izi'ne önemli katkıda bulunduğunu bulan Harris ve ark.'nın (2019) gözden geçirmesiyle tutarlıdır(Vanham vd.,2021)

2.SONUÇ

Dünya da var olan sorunlardan gıda yetersizliği, fazla tüketimi ve mevsim değişiklikleri beslenmenin sürdürülebilirliğini sağlama da önemli olduğu gösterilmiştir. Artan dünya nüfusunun gereksinimlerini karşılamayı ve gelecek nesillerin gereksinimlerini karşılamak sağlıklı bir yaşam için sistemler kurulmalıdır. Sürdürülebilirliği desteklemek için bitkisel ağırlıklı beslenmek, yerel ve organik gıda tercih etmek önemli ayrıca politikacılarında bu konuda bilgilendirme yapması önemlidir. Ayrıca işlenmiş gıda tüketimini azaltmak, bölgesel ve mevsimsel ürünler satın almak, yemek kültürünü keyifli hale getirmek ve gıda israfını engellemek yine önemli adımlar olacaktır. Diyetisyenler, bu davranış değişikliklerini külyürel kabul edebilirlik ile birleştirip hayata geçirilmesinde son derece önemlidir (Kadioğlu,S., & KAYA, P.S., 2022, İlhan vd.,2023,s.9768).

Besin kayıplarının besinin üretiminden tüketimine kadar olan aşamalarda önlenmesinin ekonomik kaynakların yanısıra su kaybının önlenmesi için de büyük önemi bulunmaktadır.

Akdeniz diyeti, beslenme ve sağlık üzerine olan olumlu etkileri sebebiyle düşük su ayakizi nedeniyle tercih edilmeli ve güçlendirilmelidir. Akdeniz diyeti kültürel bir mirastır ve sürdürülebilir diyet modelidir(Pekcan,A.G.,2017).

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Özet

Bitki bazlı beslenme, hayvansal ürünler açısından zengin beslenmeyle karşılaştırıldığında daha sürdürülebilirdir çünkü daha az doğal kaynak kullanır ve çevreye daha az vergi verir. Küresel nüfus patlaması ve refah artışı göz önüne alındığında, hayvansal kaynaklı gıdalara olan talebin arttığı görülüyor. Çevresel veriler, et ve süt ürünleri açısından yüksek olan dünya çapındaki mevcut gıda tüketim uygulamalarının sürdürülemezliğine ilişkin hızla birikmektedir. Yenilenemeyen doğal kaynaklar azalıyor ve çevresel bozulma hızla artıyor. Gıda tüketimi ve çevresel değişimlere ilişkin mevcut eğilimler göz önüne alındığında, gıda güvenliği ve gıda sürdürülebilirliği çatışma halindedir. Besinlerin yaşam döngüsü boyunca oluşturduğu çevresel etkiler “sürdürülebilir beslenme” kavramının ortaya çıkmasına neden olmuştur. Besinlerin tarladan sofraya gelene kadar geçen tüm süreçlerde atmosfere salınan sera gazı emisyonu, su, arazi ve enerji kullanımı, üretim, depolama, paketlenme, taşıma gibi aşamalarda meydana gelen atık ve kayıplar sürdürülebilirlik için oldukça önem arz etmektedir. Sürdürülebilir beslenme, bitkisel kaynaklı besinleri içeren meyve, sebze, tam tahıllar, baklagiller, yağlı tohumlar ve zeytinyağı tüketimini öneren, hayvansal gıda, doymuş yağ ve şeker alımını kısıtlayan beslenme modellerini kapsamaktadır. Vejeteryan beslenmede bu beslenme şekline örnek verilebilir. Sürdürülebilir beslenme konusunda atılacak her adım, gıda üretiminde harcanan kaynakların en aza indirilmesini, biyoçeşitliliğin korunmasını, sera gazı emisyonlarının önlenmesini, ambalajlı ve yoğun enerji içeren besinlerin tüketiminin azalmasını ve en önemlisi gıda israfının son bulmasını sağlayacaktır. Dünya çapında bitki bazlı beslenmeye "geri dönmek" sürdürülebilir bir gelecek için makul bir alternatif gibi görünüyor. Bitki bazlı beslenmenin küresel olarak benimsenmesini destekleyen politikalar, dünya nüfusu için gıda tedarikini, sağlığı, çevresel ve sosyal adalet sonuçlarını eş zamanlı olarak optimize edecektir. Böyle bir beslenme politikasının uygulanması, insan ırkının ve paylaştığımız biyosferdeki diğer canlıların sürdürülebilir geleceği için belki de en akılcı yollardan biridir.

Anahtar Kelimeler: Sürdürülebilirlik ,beslenme, vejeteryan , bitkisel



THE PLACE OF VEGETARIAN NUTRITION IN SUSTAINABLE NUTRITION

Abstract

A plant-based diet is more sustainable compared to diets rich in animal products because it uses fewer natural resources and is less taxing on the environment. Considering the global population explosion and increasing prosperity, the demand for animal-based foods appears to be increasing. Environmental data is rapidly accumulating on the unsustainability of current food consumption practices around the world, which are high in meat and dairy products. Non-renewable natural resources are decreasing and environmental degradation is increasing rapidly. Given current trends in food consumption and environmental changes, food security and food sustainability are in conflict. The environmental effects of food throughout its life cycle have led to the emergence of the concept of "sustainable nutrition". Greenhouse gas emissions released into the atmosphere in all processes from the food to the table, water, land and energy use, waste and losses occurring in stages such as production, storage, packaging and transportation are very important for sustainability. Sustainable nutrition includes nutritional models that recommend the consumption of plant-derived foods, fruits, vegetables, whole grains, legumes, oilseeds and olive oil, and restrict the intake of animal foods, saturated fat and sugar. Vegetarian nutrition can be given as an example of this type of nutrition. Every step taken towards sustainable nutrition will minimize the resources spent on food production, protect biodiversity, prevent greenhouse gas emissions, reduce the consumption of packaged and energy-dense foods, and most importantly, end food waste. Worldwide, "returning" to plant-based diets seems like a plausible. Implementing such a nutrition policy is perhaps one of the most rational ways for the sustainable future of the human race and other creatures in the biosphere we share. alternative for a sustainable future. Policies that support global adoption of plant-based diets will simultaneously optimize food supply, health, and environmental and social justice outcomes for the world's population.

Keywords: Sustainability, nutrition, vegetarian, herbal

GİRİŞ

Tarihsel süreçte farklı özelliklere sahip toplumların kendi içerisinde oluşturduğu kültürel öğeler beraberinde birbiri ile benzeşmeyen beslenme alışkanlıkları geliştirmiştir. Coğrafya, dini inançlar, örf ve adetler, geçmişten gelen gelenekler, insanın çevresindeki doğayı kavrama becerisi ve bakış açısı farklılıkları gibi etkenler de bu beslenme alışkanlıklarının gelişmesinde etkili olan faktörler arasındadır (Dilek, 2018) Sağlık, etik, dini değerler gibi faktörler, tüketicilerin yaşam tarzını etkilemekte ve tüketim tercihleri üzerinde önemli rol oynamaktadır (North ve ark., 2021). Bireylerin hayvansal içerikli ürünler kullanmak istememesi, hayvanlara ve çevreye yönelik zarar vermeyen ürünleri tercih etmesi ve bitkisel alternatiflere yönelimleri beslenme davranışlarına yansıdığı görülmektedir (Gendel ve ark., 2021). Vejetaryenlik, genellikle hayvansal kaynaklı gıdaların yerine bitkisel kaynaklı besinlerin tüketilmesini içeren bir beslenme şeklidir. Vejetaryen ise; bitkisel besinleri tüketen, hayvansal besinleri (kırmızı et, tavuk, balık, süt ve süttten yapılan ürünler, yumurta gibi) sınırlı miktarda veya hiç tüketmeyen kişiler olarak tanımlanmaktadır (Fraser ve ark., 2009). Vejetaryenlik Tanımı ve Tarihi Vejetaryen kelimesinin kökeninin vejetaryenliğin sebze ağırlıklı bir beslenme türü olması nedeniyle İngilizcede sebze anlamına gelen ‘vegetable’ kelimesinden geldiği düşünülmektedir. Fakat vejetaryen kelimesi sağlıklı, canlı ve yaşam dolu anlamına gelen Latince kökenli bir kelime olan ‘vegetus’ kelimesinden gelmektedir. 1842 yılında vejetaryen beslenme tarzına genel bir tanım getirilmiştir. Bu tanıma göre vejetaryen beslenme tarzı, balık, tavuk ve kırmızı etin tüketilmediği, süt ve süt ürünleri ile yumurtanın ise tercihe bağlı tüketildiği bir beslenme şeklidir (Tunçay Son, 2016). Vejetaryen ifadesi ise hayvansal ürünleri sınırlı veya hiç tüketmeyen bunun yanı sıra ağırlıklı olarak sebze türleriyle beslenen kişilere verilen isimdir (Karabudak, 2012). Vejetaryenler meyve, sebze, bakliyatı tahıl ve tohum gibi bitkisel ürünler ile beslenip et kesinlikle tüketmemektedir. Bu et tüketmeme durumu istisnasız olarak; kırmızı et, tavuk eti, balık, yengeç, karides, ıstakoz gibi deniz mahsullerini içermektedir. Bu tanıma göre vejetaryenlik; hayvansal gıdaların (süt, yumurta, bal vb.) tercihe bağlı olarak tüketilip, tüketilmemesi dışında tamamen bitkisel kaynaklı beslenme şeklidir. Vejetaryenlik Türk Dil Kurumu’nda ise (TDK) ‘etyemez’ şeklinde Fransızca kökenli bir kelime olarak ifade edilmektedir. (Tunçay Son, 2016) yürüttükleri bir çalışmada vejetaryenlik kavramını: et, kümes hayvanları, balık veya kabuklu deniz ürünlerinin tüketilmediği bir beslenme biçimi olarak tanımlamışlardır. Vejetaryenliğin yakın tarihteki sürecine bakıldığında ilk vejetaryen derneğinin 1847 yılında İngiltere’de (Vegetarian Society) kurulduğu, sonrasında ise “Amerikan Vejetaryen Derneği (1860)”, “Alman Vejetaryen Derneği (1867)” isimleri ile farklı ülkelerde de yaygınlaştığı görülmektedir (Tunçay Son, 2016). İlerleyen yıllarda, tüm dünyadaki vejetaryen derneklerin 1908 yılında bir araya gelerek “Uluslararası Vejetaryen Birliği” çatısı altında birleştikleri, Avrupa ülkelerindeki derneklerin ise “Avrupa Vejetaryen Derneği” adında 1988 yılında bir araya

gelerek bir çatı altında birleştiği belirtilmektedir (IVU, 2021). Türkiye’de ise 2012 yılında kurulan “Türkiye Vejetaryen Derneği” söz konusu çatı örgütlenmelerin bir üyesi olarak varlığını sürdürmektedir (TVD, 2021).

Vejeteryan Beslenme Modelleri

Semi-vejetaryenlik (Flexitaryen) vejetaryen ve etçil beslenme arasında bir geçiş özelliğinde olan bir vejetaryen tipidir. Sadece tavuk ve balık olmak üzere haftada belli sayıda olacak şekilde sınırlı miktarda et tüketilmektedir. Bu diyetle yumurta, süt ve süt ürünleri de tüketilmektedir. Vegetarian Society (Ulusal İngiltere Vejetaryen Derneği) tarafından bu grup vejetaryen olarak kabul edilmemektedir. Çünkü onlara göre vejetaryen diyetinde hiçbir şekilde et tüketilmemelidir.

Lacto-ovo vejetaryenlik de hiçbir et (et, tavuk, deniz canlısı, balık) tüketilmemekte ancak hayvanlardan üretilen sekonder ürünler (yumurta, süt, bal gibi) yenilmektedir.

Lacto vejetaryenlik de hiçbir et, bunun yanı sıra yumurta da tüketilmez, bal, süt ve süt ürünleri tüketilir.

Ovo vejetaryenlik; yumurta hariç hiçbir hayvansal ürünün tüketilmediği vejetaryen çeşididir.

Pesco-vejetaryenlik; et ve tavuk yemeyen ancak balık ve diğer deniz canlılarının tüketildiği vejetaryen çeşididir. Bu grup yumurta, süt ve süt ürünlerini de tüketmektedir. Vegetarian Society tarafından bu grubu da yine et tükettiği gerekçesi ile vejetaryen olarak kabul edilmemektedir.

Polo-vejetaryen; bitkisel besinler yanında sadece kümes hayvanlarını tüketenlere verilen addır. Bu grup da aynı şekilde Vegetarian Society tarafından vejetaryen olarak kabul edilmemektedir. Veganlık ise hiçbir şekilde et, hayvanlardan elde edilmiş bal, süt, yumurta, yoğurt, kefir gibi ürünleri tüketmeyen ve bunun yanı sıra yün, ipek, deri gibi hayvansal ürünlerden yapılmış olan kıyafetleri kullanmayan bir vejetaryen tipidir. Diyetleri sebze, meyve, tahıl, yemiş (ceviz, fındık gibi) vb. besinlerden oluşmaktadır. Veganlar, hayvanlar üzerinde test edilmiş ürünlerin (kozmetik ürünler, deterjan, diş macunu vb.) tüketimine de karşıdırlar. Veganlar ayrıca hayvansal yağ içeren sabunları ve süt içeren çikolata, kek, pasta gibi ürünleri de tüketmezler. Hayvanların kullanılması nedeniyle sirlere gitmezler ve canlı hayvanların kullanıldığı filmleri izlemezler. (Tunçay Son, 2016)

Sürdürülebilirlik kavramı

Sürdürülebilirlik terimi ilk olarak 1987 yılında Birleşmiş Milletler Dünya Çevre ve Kalkınma Komisyonu’nun Brundtland Raporunda “sürdürülebilir kalkınma, bugünün gereksinimlerinin gelecek nesillerin gereksinimlerini karşılama yeteneğinden ödün vermeden karşılar” şeklinde tanımlanmıştır (Cassen, 1987) Raporunda “İnsanlık, doğanın gelecek kuşakların gereksinimlerine cevap verme yeteneğini tehlikeye atmadan, günlük

ihtiyaçları sağlayabilme ve kalkınmayı sürdürülebilir kılma yeteneğine sahiptir” denilmektedir Raporda “İnsanlık, doğanın gelecek kuşakların gereksinimlerine cevap verme yeteneğini tehlikeye atmadan, günlük ihtiyaçları sağlayabilme ve kalkınmayı sürdürülebilir kılma yeteneğine sahiptir” denilmektedir (Pekan, 2017) FAO, 2050 yılında artan dünya nüfusunun gereksinmesinin ve artan hayvansal besine talebin karşılanabilmesi için besin üretiminde en az %62 artış sağlanmasının gerekli olduğunu belirtmiştir (Derni ve ark., 2016) Sürdürülebilirlik yaklaşımı insanı değerli kılan, nesiller arası aktarımın doğru bir şekilde gerçekleşmesini hedef edinen, ekolojik ve ekonomik verimliliği destekleyen ve refah seviyesinin artmasını amaçlayan bir yaklaşım olmuştur. Bu yaklaşımın benimsenmesi ile doğa ve kaynaklarının tükenmesi, biyoçeşitlilikte azalma, gıda atık ve israfının artması engellenecek ve gelecek kuşakların ihtiyaçlarını kısıtlamadan, sürekli bir şekilde karşılanması sağlanmış olacaktır (Bilim, 2012). Sağlıksız ve sürdürülebilirliği olmayan besin üretimi insan sağlığı ve dünya için küresel risk oluşturmaktadır. Dünya’da 820 milyondan fazla insanın her gece yatağa aç girdiği (Ahluwalia ve ark., 2012) ve yetersiz beslendiği, 2018 yılında 1.3 milyar kişinin orta düzeyde gıda güvencesizliği yaşadığı; yani düzenli olarak besleyici ve yeterli besine erişemediği (Ahluwalia ve ark., 2012), 151 milyon çocuğun yaşına göre boy uzunluğunun kısa (bodur), 51 milyon çocuğun boy uzunluğuna göre vücut ağırlığının düşük (zayıf) (Mekonnen ve ark.,) 2 milyardan fazla insanın mikrobeyin öğeleri eksikliğinin (Mekonnen ve ark., 2017) olduğu bilinmektedir. Fazla kilo ve şişmanlık ile BOH’lar küresel olarak 4 milyon ölüme neden olmaktadır. Günümüzde yaklaşık 2 milyar yetişkin ve 40 milyondan fazla beş yaş altı çocuk fazla kiloludur. 670 milyondan fazla yetişkin ve 120 milyondan fazla 5-19 yaş grubu çocuk ve genç ise şişmandır (Ahluwalia ve ark., 2012)

Beslenmenin Sürdürülebilirliğe Etkisi

Beslenme ve Su Ayak İzi

Su, dünyada bulunan tüm organizmalar için hayati öneme sahip, biyolojik yaşamı ve faaliyetlerimizin devamını sağlayan en önemli besin ögesidir. Artan dünya nüfusu ve şehirleşmeyle beraber biyolojik çeşitlilik üzerinde oluşan baskılar sonucu su kullanımı giderek artmakta ve bu durum geleceğimiz için büyük bir risk oluşturmaktadır (Belgacem ve ark., 2021). Su kıtlığını çözmeye yönelik çeşitli yaklaşımlardan en önemlisi Sürdürülebilir Kalkınma Hedeflerinin 6.4. maddesinde belirtilmiştir (Ridoutte ve ark., 2019). Bir diğer önemli yaklaşım ise Avrupa Birliği tarafından öne sürülen ve kabul gören “Su Ayak İzi” değerlendirmesidir (Atar, 2021)

Su ayakizi tüketilen, buharlaşan ve kirlenen suyun hacminin ölçülmesidir ve m³/ton ve m³/yıl olarak ifade edilmektedir. Su Ayakizi Erişimi su ayakizini üç grupta incelemektedir (Water Footprint Network).

Bunlar, mavi, yeşil ve gri sudur. Bu bileşenler birlikte suyun kullanımını, suyun kaynağını (yağmur suyu, yüzey su, yeraltı suyu) ve kirleticilerin ortadan kaldırılması için gerekli temiz su hacmini gösterir. Mavi su ayakizi ürün oluşturabilmek için gereken (buharlaşan veya doğrudan kullanılabilen) yüzey veya yeraltı su miktarıdır. Yeşil su ayakizi ürün oluşturabilmek için gereken (buharlaşan veya doğrudan kullanılabilen) yağmur suyu miktarıdır. Gri su ayakizi ürün üretim sonucunda özgün su kalitesi standartlarını karşılayabilmek için kirleticilerin dilüye edilmesi (karıştırılması, ortadan kaldırılması) için gereken taze su miktarıdır (Water Footprint Network). Besin Üretimi İçin Gerekli Su Miktarı Besin üretimi doğal kaynakların, örneğin suyun kullanımında önemli paya sahiptir. Tüm kullanılan suyun %92'si besin üretimi için kullanılmaktadır. Tarımda kullanılan suyun %29'u doğrudan veya dolaylı olarak hayvansal üretim için kullanılmaktadır. Özellikle hayvansal ürünler bitkisel kaynaklı ürünlere kıyasla enerji birimi başına daha fazla suya gereksinim duymaktadır. (Gerbens ark., 2013)

Hindistan'da yapılan bir çalışmada diyetin düzenlenmesi ile mavi su ayakizinin %30 azaltılabileceği bulunmuştur. Böyle bir senaryo ile sağlanan diyetle (diyette kurubaklagillerin artırılması ile) 2050 yılı için toplamda 100.000 ülke nüfusu için 6800 sağlıklı yaşam yılı kazanma ile sonuçlanabileceği öngörülmüştür.(Milner ve ark., 2017)

Besinlerin Sera Gazı Emisyonlarına Etkileri

Yaşadığımız yüzyılın büyük sorunlarından biri olan iklim değişikliği, insan etkilerinden kaynaklanan sera gazlarının atmosfere yayılmasıyla oluşan ve beraberinde atmosferdeki dengenin bozulmasıyla sonuçlanan bir durumdur (Boer, Witt ve ark.,, 2016).

Beslenme sektöründe hayvansal besinlerin üretimi için kullanılan su, arazi ve sera gazı emisyonları bitkisel kaynaklı meyve ve sebze üretimiyle karşılaştırıldığında çevresel etkisinin daha yüksek olduğu. Diğer yandan hayvancılık sektörüne bakıldığında ise geviş getiren hayvanların metan gazı üretmesi sebebiyle daha yüksek sera gazı emisyonlarına sahip olduğu söylenmektedir (Joe Millward ve Garnett, 2010). İngiltere de yapılan bir çalışmada beslenme modelini vejetaryen veya vegan diyet ile değiştirerek sera gazı emisyonundan sırasıyla %22 ve %26'lık tasarruf yapılabileceği hesaplanmıştırPirinç, üretiminde fazla sulama gerektirmesi ve yüksek düzeylerde metan gazı oluşturması sebebiyle sera gazı emisyonlarına etkisi yüksek bir tahıldır. Bunun yanında tahıl grubunda rafine etme süreci, pişirme süresi ve enerji kullanımının azalması sebebiyle tam tahıllar ve rafine tahıllar arasında çevresel etki farklılıkları vardır. Kepekli ekmeğin sera gazı emisyonu beyaz ekmeğe göre daha azdır (Jallinoja ve ark., 2016).

Sürdürülebilir Beslenmede Vejeteryan Beslenme

Bitki bazlı diyetler, ilgili sağlık yararlarının yanı sıra, hayvan bazlı diyetlere göre daha az çevresel etkiye sahip olma eğilimindedir (Nelson ve ark.,2016). Gıda üretimi, dünya genelinde biyolojik çeşitlilik kaybına en büyük katkıyı sağlayan faktördür ve ormansızlaşmanın %80'inden, tatlı su kullanımının %70'inden ve insan kaynaklı sera gazı (GHG) emisyonlarının %30'undan sorumludur . Et, sera gazı emisyonları ve arazi kullanımı üzerinde en büyük etkiye sahip gıda olarak tanımlanıyor.1000 kcal kuzu veya sığır eti üretmek sırasıyla 14 ve 10 kg sera gazı emisyonu üretirken, 1000 kcal mercimek veya tofu için sadece 1 ve 3 kg sera gazı emisyonu ortaya çıkıyor.1 porsiyon sığır eti veya domuz eti üretmek için sırasıyla 1211 ve 469 L su gerekirken, 1 porsiyon kuru fasulye, soya peyniri veya domates üretmek için 220, 57 ve 30 L su gerekir. Çok sayıda çalışma, et tüketiminin azaltılmasının sera gazı emisyonlarının yanı sıra toprak, su ve enerji kullanımını da azaltabileceğini ve aynı zamanda sağlık sonuçlarını iyileştirebileceğini göstermiştir .Ancak sağlıklı ve sürdürülebilir bir beslenme için eti tamamen ortadan kaldırmak gerekli değildir. Nelson ve ark. tarafından sistematik bir inceleme. et veya süt ürünlerini ortadan kaldırmadan ve maliyeti artırmadan beslenme gereksinimlerini karşılayan sürdürülebilir bir diyetle ulaşmanın mümkün olduğunu gösterdi. Hipertansiyonu Durdurmaya Yönelik Diyet Yaklaşımları, Akdeniz, Sağlıklı ABD Tarzı ve Sağlıklı Vejetaryen diyetleri gibi çoklu bitki bazlı diyetlerin obezite, KVKH, T2D ve bazı kanserler gibi kronik hastalık riskini azalttığı gösterilmiştir. Bu beslenme kalıplarının tümü, süt ürünleri gibi hayvansal ürünleri içerebilir ve hatta bazıları makul miktarlarda kırmızı ete izin verir, ancak hepsinin daha sağlıklı olduğu ve ortalama ABD diyetinden daha az çevresel etkiyle ilişkili olduğu gösterilmiştir (Nelson ve ark.,2016).

Vejetaryen beslenme çoğunlukla tahıllar, meyveler, sebzeler, sert kabuklu yemişler gibi bitkisel kaynaklı gıdalardan oluşan, hayvansal gıda tüketimini kısıtlayan bir beslenme modelidir (Tunçay, 2018). Vegan beslenme ise birincil ve ikincil tüm hayvansal kaynaklı ürünlerin diyetten çıkartıldığı, bu ürünlerle yapılmış nesnelere dahi kullanılmadığı (deri, yün, ipek gibi) bir beslenme şekli ve aynı zamanda katı bir yaşam tarzıdır (Vanacore ve ark., 2018). Bu beslenme modelleri lif, antioksidanlar, fitokimyasallar, fitoöstrojenler, omega-3 (n-3) yağ asitleri bakımından zengin, kolesterol, doymuş yağ ve trans yağ içeriği bakımından fakirdir (Crowe, Appleby, Travis ve Key, 2013). Yapılan çalışmalarda vejetaryen ve vegan beslenmenin obezite, Tip 2 diyabet, kalp damar hastalıkları, kanser gibi birçok kronik hastalığın oluşma riskinde azalmalara katkı sağladığı sonucuna varılmıştır.Ayrıca bireylerin vücut ağırlığı, vücut yağ yüzdesi, yağsız kas kütlesi, kemik mineral yoğunluğu ve kan yağlarında olumlu etki göstermektedir (Oussalah, Levy, Berthezène, Alpers ve Guéant, 2020; Bakaloudi ve ark., 2021).

Hayvansal ve bitkisel besinlerin üretim aşamaları kıyaslandığında hayvansal besinlerin daha fazla sera gazı emisyonu, su ayak izi ve arazi kullanımına neden olduğu bilinmektedir (Lynch, Johnston ve Wharton, 2018).

Yapılan bir araştırmada vejetaryen ve vegan beslenme ile batı tarzı diyetler karşılaştırılmış ve batı tarzı diyetin 2,5 kat enerji, 2 kat su, 13 kat gübre, 1,4 kat pestisitinin daha fazla kullanımına neden olduğu sonucuna varılmıştır (Marlow ve ark., 2009). Ülkelere göre farklılık gösteren ulusal diyet modelleri, vejetaryen diyetler ve Akdeniz diyetinin karşılaştırıldığı birçok çalışmada vejetaryen beslenme modellerinin ve Akdeniz diyetinin sera gazı emisyonu ve arazi kullanımının diğer diyetlere göre daha az olduğu tespit edilmiştir (Van Dooren, Marinussen, Blonk, Aiking ve Vellinga, 2014). Aynı şekilde su ayak izi için yapılan başka bir çalışmada sağlıklı beslenme, vejetaryen beslenme ve karma beslenme modelleri ele alınmıştır. Bu üç diyetin günlük olarak su ayak izindeki etkisine bakıldığında; sağlıklı beslenmenin %23, karma beslenmenin %30, vejetaryen beslenmenin ise %38'lik bir azalma sağladığı gözlemlenmiştir (Vanham, Mekonnen ve Hoekstra, 2013).

SONUÇ

Canlıların ortak yaşam alanı olan dünya, nüfus artışıyla beraber iklim değişikliğine, ekolojik dengenin bozulmasına ve küresel tehditlere maruz kalmıştır. Bu sorunlar yeryüzü kaynaklarının veriminin azalmasına ve kıtlık probleminin ortaya çıkmasına neden olmaktadır. Gelecek nesillerin sağlıklı ve güvenli gıdaya ulaşabilmesi yaşayan neslin besin tercihleriyle mümkündür. Sürdürülebilir beslenme, besinlerin yaşam döngüsü değerlendirmesini yaparak çevresel etkilerinin incelenmesiyle optimal beslenmeyi sağlamaktadır. Literatürde bulunan çalışmalar, sürdürülebilir beslenmenin sera gazı emisyonu ve su ayak izi skoru az, enerji ve arazi kullanımı konusunda verimli, besin atık ve kayıplarının olmadığı bir beslenme tarzı olduğunu açıklamaktadır. Bitki bazlı gıdalar, meyve, sebze, tam tahıllar, baklagiller, yağlı tohumlar, balık, kümes hayvanları, zeytin ve zeytinyağı çevresel etkileri düşük, sürdürülebilir beslenmenin temelini oluşturan gıdalardır. Kırmızı et, işlenmiş ürünler, doymuş yağ, hayvansal ürünler ve şekerli yiyecekler ise ekolojik dengeye olumsuz etkilerinden dolayı sınırlandırılmalıdır. Sürdürülebilir beslenme modellerinin uygulanması insan, çevre ve gezegen sağlığı için optimal iyiliği sağlayacaktır. Bireylerin sürdürülebilir beslenmeyi benimsemesi gelecek nesillere sağlıklı bir dünya bırakmak adına son derece önemli ve vazgeçilmezdir



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BEDEN ALGISININ YEME BOZUKLUKLARI ÜZERİNDEKİ ETKİLERİ

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Özet

Beden boyutu, biçimi ve bu özelliklerle ilişkili faktörlerin zihinde oluşturduğu etki olarak tanımlanan beden algısı bireyin yaşamını birçok alanda etkilemektedir. Yaş, cinsiyet, sosyokültürel baskılar, sosyal medya kullanımı, akran zorbalığı gibi faktörler bireylerde beden memnuniyetsizliğinin oluşmasına neden olmaktadır. Bireylerde gelişen beden memnuniyetsizlikleri madde kullanımı, zarar verici davranış eğilimi, sosyal izolasyon ve yeme bozuklukları gibi sorunları beraberinde getirmektedir. Yeme bozuklukları, görülme sıklığı zamanla artan ve patolojik sonuçlara neden olan ciddi bir hastalıktır. Özellikle ergenlik dönemindeki bireylerde ve kadınlarda görülme sıklığının daha yüksek olduğu tahmin edilmektedir. Zihinsel Bozuklukların Tanısal ve İstatistiksel El Kitabında (DSM-5) anoreksiya nervoza ve bulimia nervoza gibi yeme bozukluklarının önemli bir ayırt edici özelliği olarak beden algı bozukluklarına yer verilmektedir. Beden görünümüne karşı memnuniyetsizlik duyan bu bireylerde ciddi diyet kısıtlamaları, düzensiz kilo kontrol davranışları, laksatif etkili ilaç kullanımı ve kusmayı içeren telafi edici uygunsuz davranışlar sıklıkla görülmektedir. Bilişsel davranışçı yaklaşımlar, bireylerin bedenleri hakkında ne düşündükleri ve ne hissettikleri ile bu deneyimlerle nasıl bir ilişki kurdukları arasındaki ayrıma odaklanarak düşünce ve duyguların olumsuz etkilerinin değiştirilebileceğini öne sürmektedir. Bireylerin öz saygılarının artması, vücuduna değer vermesi ve olumlu düşüncelere sahip olması beden takdirini sağlayarak vücut memnuniyetsizliğini azaltmaktadır. Vücut memnuniyeti yüksek olan bireylerde sağlıklı yeme davranışları ve düzenli fiziksel aktivite gibi olumlu yaşam tarzı alışkanlıklarının gelişmesiyle birlikte yeme bozuklukları gibi sorunların önlenebileceği tahmin edilmektedir.

Anahtar Kelimeler: Beden Algısı, Beslenme Bozuklukları, Beslenme Davranışı



EFFECTS OF BODY PERCEPTION ON EATING DISORDERS

Abstract

Body perception, defined as the effect of body size, shape, and factors related to these features on the mind, affects the individual's life in many areas. Factors such as age, gender, socio-cultural pressures, social media use, and peer bullying cause body dissatisfaction in individuals. Body dissatisfaction that develops in individuals also brings with it problems such as drug use, self-harm, social isolation, and eating disorders. Eating disorders are serious diseases that increase in frequency over time and cause pathological consequences. Its incidence is estimated to be higher, especially in adolescents and women. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) includes disturbances of body image as an important hallmark of eating disorders such as anorexia nervosa and bulimia nervosa. In these individuals who are dissatisfied with their body appearance, compensatory inappropriate behaviors such as serious nutritional restrictions, irregular weight control behaviors, laxative drug use, and vomiting are frequently observed. Cognitive-behavioral approaches suggest that the negative effects of thoughts and emotions can be changed by focusing on the distinction between what individuals think and feel about their bodies and how they relate to these experiences. Increasing individuals' self-esteem, valuing their bodies, and having positive thoughts reduce body dissatisfaction by increasing the appreciation of the body. It is estimated that problems such as eating disorders can be prevented by developing positive lifestyle habits such as healthy eating behaviors and regular physical activity in individuals with high body satisfaction.

Keywords: Feeding Behavior, Nutrition Disorders, Size Perception



YETİŞKİN BİREYLERDE GECE YEME SENDROMU, KRONOTİP VE BESLENME ALIŞKANLIKLARININ BELİRLENMESİ

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Özet

Yetişkin bireylerde kronotip ve gece yeme sendromu (GYS) varlığı son zamanlarda popüler olarak araştırılan konular arasındadır. Gece yeme sendromu insomnia, akşam hiperfajisi ve sabah anoreksisi ile karakterize bir klinik rahatsızlıktır. Günlük kalorinin en azından %50'sinin akşam yemeğinden sonra atıştırmalar ile alınması, haftada üç gece en az bir kez uyanma ve sonrasında yüksek kalorili atıştırmaların yapılması ile bu durumun en az üç ay sürmesiyle görülür. Kronotip; sirkadiyen ritim tercihini etkileyen bireysel özellik olarak tanımlanmaktadır. Yapılan araştırmalarda, bireylerin “sabahçıl”, “akşamcıl” ve “ne sabahçıl ne akşamcıl (ara tip)” olmak üzere üç kronotipe ayrıldığı gösterilmiştir. Kronotipin özellikle akşamcıl tipi, diyet alımı ile ilişkilendirilmiştir. Akşamcıl tip kronotipe sahip bireylerde; GYS'nin daha fazla görülme olasılığına sahip olduğu, sağlıklı bir diyet alışkanlığının daha az görüldüğü, öğün zamanlamasında gecikme, daha sık kahvaltı atlama alışkanlığı, daha düşük meyve ve sebze tüketimi ve daha fazla miktarda şekerli yiyecek/içecek ve alkol tüketiminin olduğu gözlenmektedir.

Bu çalışma 20-64 yaş arası 74 (45 kadın, 29 erkek) bireyde yürütülmüştür. Beslenme alışkanlıklarına bakıldığında; bireylerin %54.1'inin 3 ana öğün yaptığı, %43.2'sinin 2 ara öğün alışkanlığına sahip olduğu görülmüştür. Öğün atladığını belirten 47 birey arasında en fazla atlanan öğünün öğle öğünü olduğu (%55.3) gözlemlenmiştir. GYS'nin kadınlarda %8.9; erkeklerde %17.2 oranında olduğu bulunmuştur. Kronotiplerine bakıldığında; %87.8'inin ara tip olduğu onu %8.1 ile akşamcıl tipin takip ettiği görülmüştür. Kronotip sınıflamasına göre GYS gözlenme durumuna bakıldığında; GYS'si olan bireylerden %77.8'inin ara tip olduğu gözlenmiştir. GYS'si olan bireylerin ortalama beden kitle indeksi (BKİ) 22.1 kg/m² iken, olmayanların 27.3 kg/m²'dir. GYS'si olmayan bireylerde enerji, karbonhidrat, protein, yağ ve lif alım miktarları GYS'si olan bireylere göre anlamlı olarak daha yüksek bulunmuştur. GYS'si olan bireylerde D, B₁, B₆, B₁₂, Pantotenik asit vitaminleri ve sodyum, klor, flor ve iyot mineralleri alım miktarları GYS'si olmayan bireylere göre anlamlı düzeyde daha yüksek olduğu bulunmuştur.

Sonuç olarak bireylerin kronotipleri beslenme alışkanlıklarını ve dolayısıyla GYS gelişme durumunu doğrudan etkilemektedir.

Anahtar Kelimeler: Beslenme, Gece yeme sendromu, Kronotip, Mineral, Vitamin



DETERMINATION OF NIGHT EATING SYNDROME, CHRONOTYPE, AND NUTRITIONAL HABITS IN ADULTS

Summary

Chronotype and the occurrence of night eating syndrome (NES) in adults have recently become popular topics for investigation. NES is a clinical disorder characterized by insomnia, evening hyperphagia, and morning anorexia. It is defined by consuming at least 50% of daily calories from snacks after supper, waking up at least once three nights a week, and engaging in high-calorie snacking for at least three months. Chronotype is described as an individual trait that influences circadian rhythm preference. According to studies, individuals are classified into three chronotypes: "morning people," "evening people," and "neither morning people nor evening people (intermediate type)." The evening chronotype, in particular, has been linked to nutritional consumption. Individuals with the evening chronotype have an increased risk of NES, are less likely to have healthy eating habits, have delayed meal timing, skip breakfast more frequently, consume less fruit and vegetables, and intake more sugary foods/drinks and alcohol.

This study included 74 participants (45 girls & 29 men) aged 20 to 64 years. In terms of nutritional habits, 54.1% of individuals ate three main meals and 43.2% had two snacks. Lunch was the most frequently skipped meal among the 47 people who reported missing meals. NES has been determined to be 8.9% in women and 17.2% in men. When chronotypes were examined, it was shown that 87.8% were intermediate type, with evening type accounting for 8.1%. According to the chronotype classification, 77.8% of those with NES were intermediate type. Individuals with NES had a mean body mass index (BMI) of 22.1 kg/m², compared to 27.3 kg/m² for those without the illness. Individuals without NES consumed significantly higher amounts of calories, carbs, protein, fat, and fiber than those with NES. Individuals with NES had significantly higher intakes of vitamins such as D, B₁, B₆, B₁₂, pantothenic acid and minerals such as sodium, chlorine, fluorine, and iodine compared to individuals without NES.

In conclusion, individuals' chronotypes have a direct impact on dietary habits which results in the development of NES.

Keywords: Nutrition, Night eating syndrome, Chronotype, Mineral, Vitamin



SOSYAL JETLAG VE BESLENME

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Özet

'Sosyal jetlag' terimi, biyolojik ve sosyal zaman arasındaki uyumsuzluğu tanımlamak için türetilmiştir. Boş günler ve iş/okul günleri arasındaki uyku/aktivite programları arasındaki tutarsızlıktan kaynaklanan bir tür sirkadiyen uyumsuzluk olarak tanımlanabilmektedir. Mevcut veriler, çalışanların ve öğrencilerin yaklaşık % 50'sinin ≥ 2 saat sosyal jetlag yaşadığını, %70'inin ise en az 1 saat sosyal jetlag yaşadığını göstermektedir. Sosyal jetlag hem çocuklar hem de yetişkinler için ciddi sağlık sonuçları doğurabilir. Artan kalp hastalığı, obezite, diyabet, depresyon ve azalan akademik performans ile ilişkilendirilmiştir.

Sirkadiyen yanlış hizalama, farklı metabolik yollar yoluyla enerji dengesini bozabilir. Örneğin erkeklerde iştah açıcı ve enerji yoğun yiyeceklere duyulan istek, açlık hormonlarında artış, kadınlarda ise tokluk hormonlarında azalma meydana gelir. Ayrıca, sirkadiyen yanlış hizalama yetersiz uykuyla yakından ilişkilidir ve bireylerin yeme alışkanlıkları uyku davranışlarıyla bağlantılı olabilmektedir.

Sirkadiyen yanlış hizalamanın bir örneği olarak vardiyalı çalışmada, gece çalışanlarının daha fazla miktarda kahve (kafein) ve alkolün yanı sıra daha az meyve ve sebze tüketmesiyle beslenme alımındaki değişikliklerle ilişkili olduğu rapor edilmiştir. Ayrıca, uzun süre devam eden kısa uyku süresine maruz kalma, daha yüksek alkol, şeker, karbonhidrat ve toplam enerji alımı, daha düşük meyve ve sebzeler, lif ve protein alımı, sağlıksız beslenme alışkanlıkları ve daha düşük genel diyet kalite puanı ilişkilendirilmiştir. Sosyal jetlag'a sahip bireylerin daha fazla abur cubur ve şekerle tatlandırılmış içecekler ve ayrıca daha az meyve ve sebze tükettikleri rapor edilmiştir.

Sonuç olarak sosyal jetlag diyet kalıplarını ve beslenme davranışını değiştirdiği düşünülmektedir ve Araştırmalar, daha fazla sosyal jetlag yaşayan bireylerin, sağlıklı beslenme düzenine bağlılıklarının azaldığını belirtmektedir. Konunun daha iyi anlaşılabilmesi için daha fazla çalışmaya ihtiyaç vardır.

Anahtar Kelimeler: Beslenme, Sosyal Jetlag, Kronotip



SOCIAL JETLAG and NUTRITION

Summary

The term 'social jetlag' was coined to describe the mismatch between biological and social time. It can be described as a type of circadian mismatch resulting from inconsistency between sleep/activity schedules between days off and work/school days. Available data indicate that approximately 50% of employees and students experience ≥ 2 hours of social jetlag, while 70% experience at least 1 hour of social jetlag. Social jetlag can have serious health consequences for both children and adults. It has been associated with increased risk of heart disease, obesity, diabetes, depression, and decreased academic performance.

Circadian misalignment can disrupt energy balance through different metabolic pathways. For example, in men, there is a desire for appetizing and energy-dense foods, an increase in hunger hormones, and in women, a decrease in satiety hormones. Additionally, circadian misalignment is closely associated with inadequate sleep, and individuals' eating habits may be linked to their sleep behaviors.

As an example of circadian misalignment, shift work has been reported to be associated with changes in nutritional intake, with night workers consuming greater amounts of coffee (caffeine) and alcohol, as well as fewer fruits and vegetables. Additionally, prolonged exposure to short sleep duration is associated with higher intake of alcohol, sugar, carbohydrate, and total energy intake, lower intake of fruits and vegetables, fiber, and protein intake, unhealthy eating habits and lower overall diet quality score have been associated. Individuals with social jetlag have been reported to consume more junk food and sugar-sweetened beverages as well as fewer fruits and vegetables.

As a result, social jetlag is thought to change dietary patterns and nutritional behavior, and research indicates that individuals who experience more social jetlag have reduced adherence to a healthy eating pattern. More studies are needed to better understand the subject.

Keywords: Nutrition, Social Jetlag, Chronotype



ÇEVREYE DUYARLI YEŞİL RESTORAN UYGULAMALARI

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ÖZET

Uzun yıllardan beri doğada, iklimde ve çevrede artan çevresel sorunlar, bilinçsizce tüketim, doyumsuzluk gibi davranışlar nedeniyle, çevre bilinci gelişmiş tüketicileri, çevre dostu hizmetlere yönelmiştir. Son zamanlarda sıkça yaşanan kaynakların bilinçsizce kullanılması nedeniyle “sürdürülebilirlik” ve “yeşil düşünme” kavramları ortaya çıkmıştır. “Yeşil olmak” ve “yeşile gitmek” dünya çapında birçok sektörde yaygın olarak kullanılan sloganlar haline gelmiştir. Çevre dostu, yeşil, organik, yerel olarak üretilen, çevreye duyarlı, sürdürülebilir, biyodinamik ve enerji açısından verimli ürünler ve iş uygulamaları artarak günümüz toplumunda bir trend haline almıştır. Tüketiciler çevre konusunda giderek daha bilinçli hale geldikçe ve yeşil ürün, hizmetlere olan talepleri arttıkça, birçok restoran sektörü, çevre yanlısı uygulamaları hayata geçirmek için çaba harcamaya başlamışlardır. Bu doğrultuda restoran işletmeleri çevre dostu tüketici talepleri doğrultusunda çevreye duyarlı uygulamalara yönelmiştir. Çevreye duyarlı bu yönelim ile çevrenin korunmasına yönelik ‘yeşil’ hareket de gündeme gelmiştir. Çevreye duyarlı uygulamalar; yeşil restoran işletmelerinde verimli kaynak kullanımı, sürdürülebilir gıda, su ve enerji tüketiminde bilinçlilik, atık ve artık uygulaması gibi yeşil davranışlar ile çevrenin korunmasına katkı sağlamaktadır. Çevre sorunlarına ilişkin farkındalığın artmasıyla birlikte, "restoranlar gıdaya erişim yerlerinin yakın olmasının, karbon ayak izlerini azaltmanın ve gezegeni kurtarmanın yollarını ararken, çevre sorunlarını izlenmesi gereken adımların en üstüne yerleştirerek 'yeşil' uygulamaları tanıtmaya başlamışlardır. Bu amaç ile yeşil nesil restoranlar, çevre bilincini oluşturmak ve işletmelerin sürdürülebilir hale gelmesini sağlama yöntemini seçmişlerdir. Yeşil restoran endüstrisi ve sürdürülebilirliği hakkında daha fazla çalışmaya ihtiyaç duyulmaktadır.

ANAHTAR KELİMELER: çevre dostu, sürdürülebilir, yeşil hareket, yeşil restoran



ABSTRACT

For many years, environmentally conscious consumers have turned to environmentally friendly services due to increasing environmental problems in nature, climate and the environment, and behaviors such as unconscious consumption and insatiability. The concept of sustainability and green thinking have emerged due to the unconscious use of resources, which has been occurring frequently recently. "Being green" and "going green" have become widely used slogans in various sectors around the world. Eco-friendly, green, organic, locally produced, environmentally friendly, sustainable, biodynamic and energy efficient products and business practices have increasingly become a tendency in today's society. As consumers become increasingly environmentally conscious and their demand for green products and services increases, many restaurant industries are striving to implement pro-environmental practices. In this context, restaurant businesses are turning to environmentally friendly practices in line with social responsibility and environmentally friendly consumer requests. This environmentally sensitive motion has brought about the notion of environmentally sensitive "green" movement aimed at protecting the environment. Environmentally friendly practices; In green restaurant businesses, it positively affects the protection of the environment through green applications such as fruitfulls use of resources, sustainable food, conscious water and energy consumption, turning to renewable resources, and waste and residue management. With enhancement awareness of environmental matters, "restaurants have begun to promote 'green' practices by placing environmental issues at the top of the menu as they look for ways to decrease meal miles, reduce their carbon footprint, and save the globe." For this purpose, green generation restaurants create environmental cognizance and ensure that businesses become sustainable. More studies are needed on the green restaurant industry and its sustainability.

KEYWORDS: environmentally friendly, sustainable, green movement, green restaurant

GİRİŞ

Çağımızda, sera etkisi, hava, su ve toprak kirliliği ile birlikte türlerin yok olması/kaybolması ve doğal kaynakların tükenmesi gibi çevresel sorunlar, sürdürülebilirlik açısından önemli bir tehdit oluşturmaktadır. Bu sorunlar insanların çevreye karşı duyarsız davranışlarıyla yakından ilişkilidir. Araştırmacılar, bu nedenle çevresel açıdan sürdürülebilir bir şekilde insan davranışlarının düzeltilmesiyle bu sorunların çözülebileceği konusunda hem fikirdir. Özellikle bireylerin tüketim davranışlarının değişmesi çevresel sürdürülebilirlik için önemli bir gereklilik olarak değerlendirilmektedir. (1) Restoran endüstrisi bilindiği gibi israfa neden olmakta ve çevresel olarak sürdürülemez uygulamalara bağlı olarak çevreye ciddi zarar vermektedir. Örneğin, yalnızca 2018 yılında Amerika Birleşik Devletleri'nde 643 milyon öğün değerinde yiyeceğin çöpe atıldığı tahmin edilmektedir. Organik gıda atıklarının yanı sıra, her yıl yaklaşık 40 milyar birim plastik yemek takımları çöplüklere ve okyanuslara atılmaktadır. Aynı zamanda tüketicilerin; son zamanlarda gözlemlenen yeşil tüketicilik eğilimiyle birlikte bunların çevre üzerindeki etkileri ve bu etkileri azaltma konusundaki sorumlulukları konusunda daha bilinçli hale geldiği görülmektedir. (2) Son yıllarda teknoloji geliştikçe ve insanlar çevre sorunları konusunda giderek daha bilinçli hale geldikçe “yeşil” hareket hızla büyümüştür. Tüketiciler, çevresel endişeleri nedeniyle geri dönüşüm, su ve enerji tasarrufu ile "yeşil" satın alma gibi çevre dostu davranışlara yönelmişlerdir. Tüketicilerin bu yönelimleri ve çevre sorunlarına olan farkındalığın artmasıyla birlikte, restoranlar gıda atıklarını, karbon ayak izlerini azaltmanın ve gezegeni kurtarmanın yollarını ararken çevre sorunlarını menülerinin ön planına çıkararak 'yeşil' pazarlamayı tanıtmaya başlamışlardır. (3) Yeşil olmak ve yeşile gitmek dünya çapında birçok sektörde yaygın olarak kullanılan sloganlar haline gelmiştir. Bu doğrultuda çevre dostu, yeşil, organik, yerel olarak üretilen, çevreye duyarlı, sürdürülebilir, biyodinamik ve enerji açısından verimli ürünler ve iş uygulamaları gündemdedir. Restoran endüstrisi de, çevreye faydalı olan ve karbon ayak izini azaltan uygulamaları benimseme yolunda adımlar atmaktadır. (4)

YEŞİL RESTORAN TANIMI

Yeşil restoranlar, menülerinde organik olan, yerel işlemlerle üretilmiş ürünlerden yiyecekler hazırlayan; atıkların azaltılması ve geri dönüşümü programı, kaynakların verimli kullanılması gibi uygulamaları ön plana alan işletmelerdir. (5) Faaliyetlerinde çevre yanlısı uygulamalara önem verdiği görülen yeşil restoranlar, ekolojik restoran adıyla da bilinmektedir. (6) Yeşil restoran akımında, yiyecek hazırlama sürecinde gereksinim duyulan ürünlerin elde edilmesi, gıdanın ve ortamın hijyeni için su harcaması, restoranda kullanılan enerjinin tüketimi, kimyasalların azaltılması, yemek hazırlığı sırasında ve daha sonrasında ortaya çıkan atıklar ve buna benzer çoğu etken incelenmektedir. Restoranlarda enerji tasarrufu sağlanması, işletme maliyetlerinde düşüş, kamuoyunda bilinirlik ve itibar artışı ile işe bağlılığın artması gibi söz konusu faktörlere önem verilmesi, çeşitli

olumlu sonuçları beraberinde getirmektedir. Bu amaçla, restoranların sürdürülebilir bir hizmete erişmesi sağlanmaktadır. (7)

YEŞİL RESTORAN TARİHÇESİ

Yeşil restoranın tanımı, Lorenzini eşliğinde 1994 yılında çevreye duyarlı olmasına dikkat edilerek düşünülmüş ve bu ilkeye göre tekrardan inşa edilen yapılar olarak belirtilmiştir. Yeşil Restoranlar Birliği (The Green Restaurant Association) Amerika’da kurulan uluslararası düzeyde ticari amacı olmayan, şeffaf bir şekilde bilimsel sertifikasyon standartları kullanarak yeşil restoran işletmelerini teşvik eden bir kurumdur. Yeşil Restoranlar Birliği, yiyecek içecek işletmelerinin gerekli standartları kullanılması koşuluyla yeşil restoran davranışına önderlik ederek sürdürülebilir bir yaklaşıma yönlendirmiştir. (8) Bu kuruluşa göre restoranlar atığın geri dönüşümü, yiyecek üretiminde su ve enerji kaynaklarını azaltma, kullanılan her araç gerecin geri dönüştürülebilir şekilde kullanılmaları gibi ana ölçütleri karşılamalıdır. (9) Yeşil Mutfak yeni bir eğilim olarak gün geçtikçe gelişmesini sürdürmektedir. Bazı kurumlar yeşil davranışlarını çevreci ve yeşil politikalar ile destekleyerek ilerlemektedirler. Bu yeşil politikaları barındıran sertifika programlarının bazıları;

- Yeşil Restoran Sertifikasyonu 4 Standartları

-ISO 14000 Çevre Yönetim Sistemi

-ISO 50001 Enerji Yönetimi Sistemi

- ‘‘Yeşil Nesil Restoran’’ sertifikası

-Yeşil Yıldız sertifikasyonu olarak sayılmaktadır. (10)

DÜNYADA VE TÜRKİYE’DE OLAN YEŞİL RESTORAN KURULUŞLARI

Dünya’da ki çevreci yeşil restoran kurumlarından birkaçı Sürdürülebilir Restoranlar Birliği (Sustainable Restaurant Association(SRA), Yeşil Restoranlar Birliği (Green Restaurant Association(GRA), Avustralya Yeşil Masa (Green Table Australia (GTA) ve Yeşil Masa Ağı (Green Table Network (GTN) olarak sayılmaktadır. Yeşil Restoranlar Birliği, Türkiye’de Boğaziçi Üniversitesi ve Dünya Doğayı Koruma Vakfı (WWF) - Türkiye iş birliği önderliğinde çevreye duyarlı yeşil restoran hareketi meydana gelmiştir. İstanbul’da öncü olarak seçilen restoranlarda uygulanmaya konulan bu hareket; yiyecek içecek işletmelerinde duyarlı tüketim farkındalığı, su kullanımını azaltma ve enerji verimliliği, kirlilik ve atık azaltma, sürdürülebilir gıda, sürdürülebilir yapı dizaynı sağlamayı amaçlamaktadır. (11) Boğaziçi Üniversitesi ve Doğal Hayatı Koruma Vakfı, bazı turizm restoran yatırımcıları ve gastronomi işletmeleri ortaklığı ile kurulan yeşil restoran uygulamaları işletmelere su ve enerji kaynakları önde olmak üzere diğer tüm çevresel değerlerin korunarak üretim süreçlerinin ilerlemesini

desteklemiştir. Dünya’da yeşil restoran uygulamalarına katılan ve sertifika alan yiyecek içecek işletmesi bulunmaktadır. Bu işletmeler; Tom’s Kitchen, Frankie, Fenix, Sunset Grill&Bar, La Mancha ve Tadında Anadolu olarak sayılmaktadır. (6)

YEŞİL RESTORAN KRİTERLERİ

Çevreye duyarlı yeşil restoran uygulamalarını yerine getirmek isteyen işletmelerin toplam 95 kriteri yerine getirmesi beklenmektedir. Toplamda yedi ana başlıktan oluşan bu kriterler;

- Verimli enerji kullanımı
- Su tüketimi
- Sürdürülebilir gıda kullanımı
- Atık yönetimi ve geri dönüşüm
- Tek kullanımlık malzemeler
- Kimyasal ve kirlilik azaltmak
- Sürdürülebilir yapı ve mobilya kullanımı olarak sıralanmaktadır. (10)

RESTORANLARIN YEŞİL ÖZELLİKLERİ

“ *Yeşil olmak* ” çevreye karşı duyarlı olmak ve çevreye verilen zararı en aza indiren uygulamaları kullanmak anlamına gelmektedir. Yeşil uygulamalar, kaynakların aşırı kullanımı ve geri dönüştürülemeyen ürünlerin her türlü kullanımı da dahil olmak üzere kuruluşların karbon ayak izlerini en aza indirmek ve çevreye verilen zararı azaltmak amacıyla gerçekleştirebilecekleri uygulamalardır. Yeşil restoranlar için yeşil yiyecekler ve çeşitli yeşil uygulamalar, müşteri kararlarını etkileyen önemli faktörlerdir. Genel olarak restoran işletmelerinde yaygın olarak gözlemlenebilen yeşil uygulamalar arasında enerji ve su verimliliği sağlayan ekipmanların kullanılması, yerel olarak yetiştirilen ve organik yiyeceklerin kullanılması, sağlıklı menüler sunulması, tek kullanımlık bardakların ve paketli kapların yasaklanması, çalışanların yeşil uygulamaları benimsemesi, kızartma yağlarının geri dönüştürülmesi ve imha edilmesi, enerji tasarrufu sağlanması ve kirliliğin azaltılması gibi eğitimler yer almaktadır. (12) Restoranların uyguladığı yeşil faaliyetler, doğrudan veya dolaylı olarak yaptığı işletme uygulamalarından meydana gelen çevresel sorunları önemli ölçüde azaltmayı hedeflemektedir. Örnek olarak, çevreye duyarlı bir yaklaşım biçiminin sergilenmesi, atıkların geri dönüştürülmesi, su tasarrufunun sağlanması, enerji harcamasında verimlilik ve havanın kirletilmesinden uzak durulması vb. davranışlarla olmalıdır. Sürdürülebilir gıda kullanımı, sağlığa zarar vermeyen temizlik ürünleri ve biyo-tarımsal atık ürünleri gibi çevre yanlısı ürünlerin satın alınması, restoranın sadece iyi bir kurumsal imaj

oluşturmasına destek olmakla kalmayıp aynı zamanda yeşil uygulamaların tedarik zincirinde dikey olarak büyümesine olanak sağlamaktadır. Örneğin, yeşil restoranlar; çiftçileri veya yerel üreticileri, bu restoranlarda kullanılacak yeşil ürünleri tedarik etmek için bu yeşil uygulamaları benimsemeye yönlendirmektedirler. Bu sayede ekonomik büyümeye katkıda bulunmuş olmaktadır. Sonuçta yeşil restoranlar üreticilere iş olanakları sağlamakta hem de tüm taraflar için avantajlı olarak hizmet sunmaktadır. (13)

Atık yönetiminde standart reçete uygulamaları, atılan sebze kabuklarından dömi glas sos yapımı, meyvelerden zest çıkarmak, ekmekten galeta unu yapılması gibi gıda ürünlerinin geri dönüştürülmesi yapılan çalışmalar arasında görülmektedir. Ayrıca gıda atıklarının geri dönüşümünün sağlanmasında hayvan barınakları ilk sırada gelmektedir. Geri dönüşümü yapılan gıda ürünleri arasında ekmek, sebze ve meyve kabukları ön plana çıkmaktadır. Belediyeler tarafından toplanan atık yağlar, ekonomiye kazandırılan diğer ürünler arasında ön sıralarda yer almaktadır. Karton, cam, plastik vb. atıklar da işletmelerce ayrıştırılıp belli dönemlerde toplanmaktadır. Mutfak personellerinin daha az gıda artığı oluşması için standart reçeteler kullanılması gerekmektedir. Mutfak yöneticileri için bir diğer önemli husus da personelin eğitimi ile bilinçlendirmenin atık yönetimine olumlu etkiler göstereceğidir. Bir diğer önemli unsur ise müşterilerin tabak artıklarının görsel olarak analiz edilmesidir. İşletmeler gıda tedariklerinden ürünlerin son kullanım tarihlerine, devamlı aynı kalitede alıma, mevsiminde ürünlere ve kurumsal tedarikçilerle çalışmaya özen göstermektedir. Çevreye duyarlı restoranların mutfak faaliyetlerinde su kullanımı değerlendirildiğinde, işletmelerde en fazla su tüketimi mutfakta yemek hazırlama esnasında ve genel temizlikte olduğu görülmektedir. Su harcanmasını en aza indirmek için dikkatli kullanım, makinelerle yapılan temizlik, su arıtma sistemlerinin kullanımına özen gösterilmesi gerektiği belirtilmektedir. (11)

YEŞİL RESTORANLAR VE SÜRDÜRÜLEBİLİRLİK

Üretme, tüketme ve hazırlama aşamalarında çevresel zararlı etkilere hassas işletmeler, verimli enerji kullanımı ve enerji tasarrufu sağlama, atıkların çevreye zararlarını en aza düşürmeye, su ve hava kirliliğini önleme, gıda güvenliğini sağlama vb. konularda yararlı yaklaşımlar sergilemektedir. Restoranların çevreye duyarlı birçok sürdürülebilir faaliyetlere eğiliminde olmalarının nedenlerinden biri, rekabet üstünlüğü elde etmesiyle markasını güçlendirme arzusunda bulunduğu algılanmaktadır. Sürdürülebilirlik yöntemleri kullanarak tercih edilebilir hale gelmek isteyen restoranlar, organik gıda kullanımını arttırmanın yanında, yerel çiftçileri desteklemek, çevresel ayarlamaları sürdürülebilir duruma getirmek şeklinde stratejiler benimsemektedir. Restoranlarda kullanılacak olan gıdaların miktarı ve tedariki, üretim koşulları ve servis sırasındaki uygulamaları sürdürülebilirlik bakımından kritik bir öneme sahiptir. Restoranların çevresel etkisi incelendiğinde sürdürülebilirlik faaliyetlerinin önemli noktası olan karbon ayak izi olduğu görülmektedir. Restoran

işletmelerinden kaynaklı sera gazı emisyonu oranı oldukça ciddi miktardadır. Bu durumda, işletmelerin olumsuz çevresel etkilerinin önde gelen faktörünün karbon ayak izi miktarındaki artış oluğu görülmektedir. Bunun yanı sıra gıda hazırlığı esnasında ve servis sonrası oluşan atıklar, üretim bandının devam etmesi için harcanan elektrik, ısı vb. kaynakları, temizlikte kullanılan ürünlerden kaynaklı kimyasallar, uzak yerlerden yapılan tedarik sürecinde oluşan kayıplar yiyecek içecek sektöründe var olan işletmelerin sürdürülebilirlik eğilimine zararlı etkileri arasında belirtilmektedir. Bununla birlikte, toplumda meydana gelen çevre duyarlılığı sayesinde şekil alan iktisadi seçimleri, işletmeler üzerine fayda sağlaması da önemli bir faktördür. Sonuç olarak çevreye duyarlı yeşil restoran görüntüsü elde eden işletmeler çevreye duyarlı tüketiciler tarafından tercih edilebilir hale gelmektedir. (6)

YEŞİL RESTORAN MENÜ UYGULAMALARI

Ekolojik olarak sürdürülebilir uygulamaların bir parçası olarak restoranlar, menüleri aracılığıyla tüketicilerin karbon ayak izlerini azaltmalarına yardımcı olmaktadır. Bu amaçla menü tasarımının değiştirilmesi önemli katkılar sağlamaktadır. Yeşil restoranlar çevresel amaçları doğrultusunda, yemeklere ekolojik etkileri hakkında bilgi eklemek, sera gazı emisyonları hakkında bilgi sağlayan karbon etiketleri sunarak, tüketici tercihlerinin karbon ayak izini azaltma potansiyeline sahip haline gelmektedir. Restoranlarda iklim dostu yemek seçimlerinin, her yemeğe karbon etiketi koyarak ve değişken bileşenlere sahip modüler yemeklerde varsayılan seçenek olarak iklim dostu bileşeni kullanarak teşvik edilmelidir. Alternatif olarak, varsayılanlar diğer seçeneklere göre daha dikkat çekici olabilir. Öne çıkan yemek seçeneği olan menülerde (örneğin, en üstte yer alan, daha büyük yazı tipiyle yazılan veya yemeğin resmi bulunan menü), müşterinin dikkati diğerlerinden daha çok bu seçeneğe yönlendirilirse yemek daha iyi algılanır. Örneğin vejetaryen yemekler menüsünün en üstüne yerleştirildiğinde, satılan vejetaryen yemeklerin payı arttığı görülmektedir. (14) Menülerde kullanılan bitki bazlı gıdalar, hayvansal kaynaklı protein ürünlerine göre önemli ölçüde daha az enerji, su ve toprak gerektirir, bu da sera gazı emisyonlarının azalmasına katkı sağlar. Ancak bitki bazlı gıdalarla ilgili diğer çevresel kaygıları da gözden kaçırmamak önemlidir. Örneğin soya, hindistancevizi, badem, yulaf veya pirinçten elde edilen bitki bazlı süt, genellikle hayvansal süttten daha düşük sera gazı emisyonuna sahiptir, ancak bazı bileşenler ek çevresel kaygılara neden olabilmektedir. Suyun kıt olduğu bölgelerde fındık, özellikle de badem yetiştirmek, su kaynaklarını daha da tüketebilir. Benzer şekilde, monokültür hindistancevizinin yaygın şekilde yetiştirilmesi, arazi kullanımının artmasına, biyolojik çeşitlilik kaybına ve aşırı gübre kullanımına neden olabilir. Pirinç üretimi aynı zamanda güçlü sera etkilerine sahip olan çok fazla miktarda metan açığa çıkarır. Bu nedenle bitki bazlı gıdalar genellikle hayvan bazlı gıdalara göre daha düşük karbon emisyonuna sahip olsa da diğer çevresel etkileri de dikkate almak gerekmektedir. (15) Kısaca yeşil restoranlar; sağlıklı ve taze menü seçenekleri, yerel

olarak yetiştirilen, organik ve sürdürülebilir şekilde üretilmiş gıdalar, besleyici ve sağlıklı menü seçeneklerini tercih etmelidirler. Sürdürülebilirlik girişimlerini desteklemek amacıyla her menü unsurunda beslenme bilgilerini, pişirme işlemlerini, tuzun ve yağın az kullanıldığı, az kalorili ve düşük karbonlu etiket bilgileri eklenmelidir. Bu noktalara vurgu yapılması, etkili pazarlama araçlarının hazırlanmasına ve müşterilerin sağlıklı ve sürdürülebilir yemek seçimleri yapma konusunda eğitime ve etkileme konusunda da önemli bir rol oynayacağı öngörülmektedir. (16)

SONUÇ

Sonuç olarak dünya çapında sürdürülebilirliğe dair endişeler hızla ilerlerken birçok sektör faaliyetlerinde çeşitli uygulamalara yönelmektedir. Hizmet sektöründe faaliyet gösteren restoranlar ise çevreye duyarlı uygulamaları benimseme yaklaşımına gitmektedir. Bu doğrultuda yiyecek içecek işletmelerinde tüketicilerin damak lezzetlerine uygun sağlıklı besinler sunularak çevreye duyarlı ve sürdürülebilir uygulama anlayışını gitgide arttırmaktadır. Restoranlar, tüketicilerin yalnızca fiziksel ihtiyaçları sonucunda tüketimin meydana geldiği bir yer olmayıp beraberinde toplumun hem sosyal hem kültürel değerlerinin de ifade edildiği alanlardır. Bu nedenler göz önüne alındığında, restoranların gıda israfını engelleme, atıksal miktarı düşürme ve enerji tasarrufunu sağlama gibi çevreye ait uygulayacağı adımların toplumda daha önemli olacağı açıktır. Sözü edilen bu çevresel adımlar ele alındığında, çevreye duyarlı yeşil nesil restoran eğilimiyle karşılaşmaktadır. Çevreye duyarlı yeşil restoran uygulamaları, ticari bir endişeyle değil çevreye duyarlı bireyler tarafından atık miktarının ve karbon ayak izinin azaltılması hedefi ile oluşan bir uygulamadır. Çevreye duyarlı yeşil restoran uygulamalarını yaygın hale getiren en önemli etken restoran işletmeleri içinde sürdürülebilir genel kurallara ait artan farkındalık olarak yorumlanmaktadır. Bunun sonucunda yeşil nesil restoran biçiminde çevreye duyarlı uygulamalar katlanarak artmaktadır.

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FARKLI BESİN VE DİYETLERİN KARBON AYAK İZİ ÜZERİNE ETKİLERİ

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ÖZET

İklim değişikliğiyle mücadele, insanlık için en acil sorunlardan biridir. Gıda sisteminin tek başına küresel sera gazı (GHG) emisyonlarının %26 ila %34'ünden sorumlu olduğu tahmin edilmektedir. Sebeplerin iyice anlaşılması ve bu olayın mümkün olduğunca azaltılmasına yönelik eylemler gerçekleştirilmesi amacıyla, çevresel göstergelerin (ayak izleri) değerlendirilmesinde ürün ve hizmetlerin yaşam döngüsü değerlendirmesi gibi araçlar kullanılmaktadır. En yaygın kullanılanlar, sera gazı emisyonlarını ve bir ürün üretmek için gerekli girdileri belirleyen karbon ayak izini içerir. Gıda maddeleri hesaplanırken bitki veya hayvanların yetiştirilmesinden başlayarak hasat, işleme, dağıtım ve atık arıtımına kadar tüm üretim aşamaları dikkate alınır. Bu göstergelerin değeri, üretim sürecinin özelliği, konum, çevre koşulları ve diğer ilgili birçok faktörden etkilenir; bu nedenle aynı ürünlerin göstergeleri arasında çok büyük farklılıklar olabilir. Şu ana kadar yapılan araştırmaların sonuçları, bitki yetiştirilmesinin, et ve diğer hayvansal ürünlerin üretimine kıyasla çevreye çok daha az zararlı olduğunu açıkça göstermektedir. Gıda sisteminde karbon ayak izinin belirlenmesinde insanların diyet tercihleri arz talep konusunda üretimi etkilediği için büyük önem taşımaktadır. Gıda sektörünün ve insanların tercih ettiği diyetlerin çevresel ayak izleri, özellikle de karbon ayak izi üzerindeki etkisinin araştırılması giderek yaygınlaşmaktadır. Bu nedenle bu alandaki araştırmalara devam edilmesi ve mümkün olan en fazla sayıda ürüne genişletilmesi gerekmektedir.

Anahtar Kelimeler: Sera gazı emisyonu, Karbon ayak izi , Diyet, Besin



ABSTRACT

Fighting climate change is one of the most urgent problems for humanity. It is estimated that the food system alone is responsible for 26% to 34% of global greenhouse gas (GHG) emissions. In order to better understand the causes and take actions to reduce this phenomenon as much as possible, it is necessary to evaluate environmental indicators (footprints), such as life cycle assessment of products and services. Tools are used. The most commonly used ones include greenhouse gas emissions and carbon footprint, which determines the inputs required to produce a product. When calculating foodstuffs, all production stages, starting from growing plants or animals to harvesting, processing, distribution and waste treatment, are taken into account. The value of these indicators is affected by the nature of the production process, location, environmental conditions and many other relevant factors; Therefore, there can be very large differences between the indicators of the same products. The results of the research carried out so far clearly show that growing plants is much less harmful to the environment than the production of meat and other animal products. In determining the carbon footprint in the food system, people's diets are of great importance as they affect production in terms of supply and demand. It is becoming increasingly common to investigate the impact of the food industry on its environmental footprint, especially its carbon footprint. Therefore, research in this area needs to be continued and expanded to the largest number of products possible.

Key words: Greenhouse gas emission, Carbon footprint, Diet, Food,

GİRİŞ

Karbon ayak izi, iklim değişikliğinin etkilerini ortadan kaldırmayı amaçlayan sera gazı emisyonlarının azaltılmasına ilişkin geniş bilimsel ve sosyal farkındalığı yansıtan çevresel etkinin bir göstergesi olarak değerlendirilmektedir. (González-García & ark., 2018). Gıda sistemi, esas olarak Sera Gazı (GHG) emisyonu, su gereksinimleri ve arazi kullanımıyla ilişkili olumsuz çevresel etkiler açısından en önemli sektörlerden biri olarak kabul edilmektedir (Gustafson vd., 2016). Gıda üretimi ve tüketimi, tarım ve hayvancılık faaliyetleri, işleme, dağıtım, hazırlama, tüketim ve atık yönetimi gibi çok çeşitli aşamaları içeren karmaşık bir sistemi içermektedir(Friel vd., 2009). Gıda sisteminden kaynaklanan tüm sera gazı emisyonlarının yaklaşık %50'si, esas olarak nitroz oksit (yem bitkileri üretimi), metan (enterik fermantasyon) ve karbondioksit emisyonlarına atfedilen tarım faaliyetleriyle ilgilidir. (Friel vd., 2009). Sağlıklı bir bakış açısıyla gıda alımı, hayvansal kaynaklı gıdaların (özellikle sığır eti) tüketimini azaltmalı ve bitkisel kökenli gıdaları arttırmalıdır(Thaler vd., 2015). Bu nedenle, gelecekteki sürdürülebilir gıda modelinin tanımı, et bazlı beslenmeden bitki bazlı beslenmeye geçişle ilişkilendirilebilmektedir. Giderek önem kazanan bir diğer konu ise beslenme kalıpları, kaynak tüketimi ve çevresel etkiler arasındaki ilişkidir. (Tilman ve Clark,2014) Bu anlamda, çevresel açıdan daha sürdürülebilir gıda üretim zincirlerinin tasarımına odaklanan araştırma çalışmaları, daha sürdürülebilir yeme kalıplarını teşvik etme ihtiyacının altını çizmektedir.(Perignon vd., 2017)

İklim Değişikliği ve Gıda sistemi

İklim değişikliğiyle mücadele, insanlık için en acil sorunlardan biridir. Sera gazı emisyonları (GHG) özellikle enerji ve taşımacılık sektörlerinde fosil yakıtların yanmasıyla ortaya çıkmaktadır. Bununla birlikte, gıda sektörü antropojenik iklim değişikliğine önemli bir katkıda bulunan bir diğer ana kaynak olarak belirlenmiştir.Gıda üretimi ile doğrudan ilişkilendirilen ve GHG emisyonlarına katkıda bulunan başlıca süreçler şunlardır:

Çiftlik öncesi süreçler: Çiftliğe girdi üretimi ve taşımacılığı; en önemlisi yem ve gübreler olmak üzere, yakıtlar, pestisitler, büyüme ortamları, ilaçlar, makine ekipmanı, binalar, diğer sermaye malları vb.

Çiftlik içi süreçler: Toprak emisyonları, hayvanlarda enterik fermantasyondan kaynaklanan emisyonlar, gübre yönetiminden kaynaklanan emisyonlar, tarlalarda, seralarda, hayvan evlerinde vb. enerji kullanımından kaynaklanan emisyonlar

Çiftlik sonrası süreçler: Kesimhane işlemleri, işleme ve paketleme, depolama ve soğutma, taşıma ve dağıtım, perakende ve toptan satış, hazırlık, sindirim ve atık

2050 yılında küresel nüfusun yaklaşık olarak 9 milyara ulaşması ve artan gelir seviyeleri nedeniyle, FAO gıda üretiminde %70'lik bir artışın gerekeceğini önermektedir (FAO, 2009). Bu, iklim değişikliği, biyoçeşitlilik kaybı, arazi, su ve enerji kıtlığı, toprak erozyonu ve kimyasal kirlilik gibi faktörlerin küresel gıda üretim sistemleri üzerinde ciddi bir stres oluşturduğu bir dönemde açıkça büyük bir zorluktur. Üretilen ürün başına çevresel yükü azaltmanın yanı sıra, gıda kayıplarını azaltma ve diyetleri değiştirme gibi diğer önlemlere de bakmanın büyük bir ihtiyaç olduğu açıktır.(Röös, 2013)

Karbon Ayak İzi

Karbon ayak izi kavramı sera gazı emisyonlarının ölçümünü kolaylaştırmak için kullanılmaktadır. “Karbon ayak izi” terimi, Wackernagel tarafından 1996 yılında önerilen ekolojik ayak izinden türetilmiştir ve giderek bu terim hızla dünya çapında siyaset, iş dünyası ve medya arenasına yayılmış ve daha fazla dikkat çekmeye başlamıştır Çünkü direkt çevre kaygısıyla ilişkilendirilmiş bir kavramdır (Wiedmann ve Minx, 2008).

Karbon ayak izi yıllardır yaygın olarak kullanılan bir kavram olmasına karşın hala kesin tanımı konusunda tartışmalar süre gelmektedir. Kyoto protokolüne göre karbon ayak izi depolama, kullanım ve yıkım dahil olmak üzere ürünün yaşam döngüsünden kaynaklanan CO₂ eşdeğeri ve diğer sera gazlarının toplam miktarı olarak kabul edilir (Kijewska ve Bluszcz, 2016)Avrupa Parlamentosu Yönetmeliği'ne göre bir ton CO₂ eşdeğeri, sera gazı kütesinin ton cinsinden ve bunların küresel ısınma katsayısının çarpımı olarak ifade edilen sera gazı miktarıdır. Bu, karbon ayak izi ölçü biriminin karbondioksit, nitroz oksit ve metanın yanı sıra hidroflorokarbonlar, perflorokarbonlar, sülfür heksaflorür ve diğer sera gazlarının emisyonunu belirlediği anlamına gelir(Danish, ve Wang, 2019 ; Konieczny vd., 2013)

Sera gazlarının hepsi iklim değişikliğini aynı şekilde etkilemez, bu nedenle çeşitli ürünlerin karbon ayak izlerini kolayca karşılaştırabilmek için uygun faktörler kullanılarak karbondioksit miktarına dönüştürülerek hesaplanır. (Karczmarczyk, 2014)

Gıda Sistemi ve Karbon Ayak İzi

Gıda tedarik zinciri yılda 13,7 milyar metrik ton karbondioksit eşdeğeri (CO) ürettiği ve gıda sisteminin tek başına küresel sera gazı (GHG) emisyonlarının %26 ila %34'ünden sorumlu olduğu tahmin edilmektedir. (Crippa vd., 2021) Ayrıca nüfus artışı ve gelir düzeyindeki artışla birlikte gıda zinciri kaynaklı emisyonlarda da önemli artışlar bekleniyor Bu nedenle, IPCC(Hükümetlerarası İklim Değişikliği Paneli) yönergeleri doğrultusunda, gıda tedarik zincirinin emisyonlarının azaltılması kritik öneme sahiptir(Springmann vd.,2018)

Farklı gıda ürünlerinin karbon ayak izi değerleri, aynı gıda ürünü için bile, üretim sistemi ve karbon ayak izi değerlendirmesindeki metodolojik seçimlere bağlı olarak oldukça değişkenlik gösterir. Ancak, ortaya

çıkan bir desen, genel olarak hayvansal ürünlerin bitkisel gıdalardan önemli ölçüde daha yüksek bir karbon ayak izine sahip olduğudur (Tukker vd., 2006). Ancak bazı ısıtılmalı seralarda üretilen, hava yoluyla taşınan veya düşük verimli sistemlerde üretilen bazı bitkisel gıdalar için yüksek karbon ayak izi değerleri belirlenmiştir (Stoessel vd., 2012). Özellikle sığır eti ve kuzu eti, rumenli hayvanlardaki enterik fermantasyondan kaynaklanan CH₄ katkısı nedeniyle olağanüstü yüksek değerlerine sahiptir. Domuz ve kümes hayvanları gibi monogastrik hayvanlardan elde edilen et ürünleri, rumenli hayvanlardan elde edilen ürünlere göre daha düşük karbon ayak izi değerlerine sahip olsa da, yem üretiminde gereken büyük miktardaki yem ve gübre işleme emisyonları nedeniyle çoğu bitkisel gıdadan daha yüksek değerlere sahiptir. (Röös, 2013)

Gıdanın karbon ayak izini incelemekten elde edilen başka önemli bir perspektif, hayvancılık üretiminden doğrudan salınan emisyonların, genellikle öncesi ve çiftlik içi emisyonlar tarafından domine edildiğidir, bu sırada sonrası çiftlik dışı emisyonlar genellikle önemli ölçüde daha küçüktür (Cederberg vd., 2009a; Peters vd., 2010). Bitkisel bazlı gıdalarda, sonrası çiftlik aşamaları toplam karbon ayak izine önemli bir katkıda bulunabilir; örneğin, taşımadan kaynaklanan emisyonlar meyve ve sebzeler için toplam karbon ayak izinin önemli bir bileşenini oluşturabilir (Sim vd., 2007; Weber ve Matthews, 2008).

Süt ve Süt Ürünlerinin Karbon Ayak İzi Üzerine Etkileri

Süt ürünleri iyi bir protein, yağ ve önemli mineral kaynaklarıdır (Duan ve., 2018) ve dünyanın her yerinde süt, peynir, krema, yoğurt vb. farklı formlarda tüketilmektedir. 2015 yılında toplam süt üretimi 800 milyon tonu aşmış ve kişi başına küresel süt tüketiminin 111,3 kg olduğu tahmin edilmiş ve bu rakam, önceki 10 yılda kişi başına tüketimde %10'luk bir artışa karşılık gelmektedir. 2025 yılına kadar %12,5'lik bir artışın daha olması öngörülmektedir. (Uluslararası Süt Ürünleri Federasyonu, 2016)

Süt önemli bir beslenme kaynağıdır ve talepteki artış (2005'ten 2015'e süt üretimindeki %30 artış), süt sektöründen kaynaklanan sera gazı emisyonlarında %18'lik bir artışa neden olmuştur. (GDP, 2018)

Yeni Zelandalı bilim adamları, 2010-2018'de orta ölçekli çiftliklerden gelen inek sütünün karbon ayak izi oluşumunu inceledi. Yayılan sera gazının %70'inden fazlası, ineklerin sindirim süreçlerinin bir ürünü olan metandı. (Ledgard vd., 2020) Hammaddede özelliklerinin ürünün karbon ayak izi üzerindeki etkisini incelemek amacıyla geleneksel bir İspanyol fabrikasında üretilen inek peynirinin göstergeleri karşılaştırıldı. Peynir, mera bazlı ve yarı kapalı sistemlerden elde edilen ineklerin sütünden yapıldı. Her iki durumda da en büyük miktarda sera gazı inekler tarafından üretildi. Mera çiftçiliğinden elde edilen sütün karbon ayak izi (0,99 kg CO₂ ·kg süt⁻¹), ikinci tür çiftçilikten elde edilen süte (1,22 kg CO₂ ·(kg süt⁻¹) göre) %18 daha düşüktü. mera sütünden elde edilen peynirin ayak izi 15 kg CO₂ ·(kg⁻¹) ve diğer peynirlerin ayak izi 16,9 kg CO₂ ·(kg⁻¹) olup, bu

veriler ve peynirin sütün türü ne olursa olsun aynı şekilde üretilmişse, bitmiş ürünün çevresel indeksini önemli ölçüde etkilediği bulunmuştur.(Laca vd., 2020)

21 Avrupa ve Kuzey Amerika ülkesindeki pazarlarda mevcut olan 212 bitki bazlı ve 40 süt ürününü içeren spreadleri karşılaştırdı. Bitkisel ürünlerin ortalama karbon ayak izi çok daha düşüktü ve ürünün kg'ı başına 3,3 kg CO₂ tutarındaydı; tereyağ için ise bu gösterge 12,1 kg CO₂·(kg⁻¹) civarında dalgalanıyordu, ancak boyutları üretildiği ülkeye bağlı olarak farklı olduğu belirtilmiştir.(Liao & ark., 2020) Süt işleminin önemli bir kolu da çocuklar ve bebekler için süt ürünleri üretimidir. 1 kg değiştirilmiş süt üretmenin karbon ayak izi yaklaşık 4 kg CO₂ olarak tahmin edilmiştir. 2012 yılında bu ürünlerin altı ülkede (Avustralya, Çin, Filipinler, Hindistan, Güney Kore ve Malezya) toplam satışı 720.450 ton olarak gerçekleşmiştir. (Smith,2019). Süt ürünlerine ilişkin karbon ayak izi tahminlerinin çoğu, 1 ila 3 kg CO₂e /kg ürün arasında değişmektedir. Ancak üç ürün önemli ölçüde daha yüksek bulunmuştur. Bu ürünler: peynir (5,3 kg CO₂e /kg), tereyağı (7,3 kg CO₂e /kg) ve süt tozu (10,1 kg CO₂e / kg). yoğurdun (1,5'e karşılık 1,0 kg CO₂e /kg) olduğunda belirtilmiştir. (Üçtuğ vd., 2019)

Süt sektörü , özellikle çiftçilik faaliyetlerinden kaynaklanan büyük miktarlarda metan emisyonları ve pastörizasyon, buharlaştırma veya fermantasyon gibi süt işleme faaliyetlerinin yüksek enerji yoğunluğu nedeniyle de küresel sera gazı emisyonlarına önemli bir katkıda bulunmaktadır. (Üçtuğ vd., 2019)

Etlerin Karbon Ayak İzi Üzerine Etkileri

Et, çevresel etkisi en fazla olan gıda ürünüdür (Steinfeld,2006), Bunun nedeni, tüketilen enerjinin %75-90'ının vücut bakımı için gerekli olması veya gübre ile deri ve kemik gibi yan ürünlerde kaybolması nedeniyle hayvanların yemi ete dönüştürmedeki verimsizliğidir. Ayrıca etin karbon ayak izi çoğu durumda arazi kullanımı, asitlenme ve ötrofikasyon potansiyelide etler arasındaki karbon izi farklılıklarının nedenlerinden biridir.(Röös, 2013)

Sığır eti ve kuzu eti, özellikle enterik fermantasyondan kaynaklanan CH₄ katkısı nedeniyle olağanüstü yüksek karbon ayak izi değerine sahiptir. Avusturya' da yapılan bir çalışmada sığır eti üretiminden kaynaklanan sera gazı emisyonları 23,4 ila 27,2 kg CO₂ eşdeğeri/kg arasında değiştiği kuzu eti üretimindeki emisyonlar 6,1 kg CO₂ eşdeğeri /kg olduğu hesaplanmıştır (Six vd.,2017)

Domuz ve kümes hayvanları gibi monogastrik hayvanların eti, diğer ürünlere göre daha düşük karbon ayak izi değerleri gösterir. Kümes hayvanlarının karbon ayak izine yönelik bir çalışmada kümes hayvanlarının üretiminin karbon ayak izinin 5,52 kg CO₂ eşdeğeri/ kg olduğu bulunmuş, (Cesari vd.,2017) domuz etinin üretimi karbon ayak izinin ise 4,6 kg CO₂ eşd/kg olduğu belirtilmiştir.(Wiedemann vd.,2015). Ancak yine de

yem üretiminde gereken büyük miktarlar, yem ve gübre işleme emisyonları nedeniyle çoğu bitkisel kaynaklı gıdalardan daha yüksek karbon ayak izi değerlerine sahiptir (Röös, 2013).

Sebze ve Meyvelerin Karbon Ayak İzi Üzerine Etkileri

Meyve ve sebze incelenen her çevresel göstere için düşük ortalama çevresel etkilere sahiptir, ancak su kıtlığı olan bölgelerde ağırlıklı su kullanımında büyük varyasyon bulunmaktadır. Ayrıca, meyve ve sebze üretim yöntemi de çevresel etkisini belirleyen bir faktördür. Örneğin, meyve sebze üretimi genellikle açık tarlalarda gerçekleşse de, ısıtmalı seralarda da gerçekleştirilebilir. Bir porsiyon meyve ve sebze ısıtmalı seralarda üretildiğinde, açık tarlada üretilmesine göre %200 daha fazla sera gazı emisyonu yayarken, %25 oranında daha az arazi kullanmaktadır. Ancak, seralarda üretilen meyve ve sebzelerin sera gazı emisyonları, enerji yenilenebilir enerji kaynaklarından sağlandığında azaltılabilir. Ayrıca üretilen sebze ve meyvelerin farklılıkları, gübre uygulamaları açısından değerlendirildiğinde farklılıklar gözlemlenebilmektedir (Clark ve Tilman, 2017).

Tahılların Karbon Ayak İzi Üzerine Etkileri

Üretilen porsiyon başına, tam tahıl tahıllarının genellikle düşük ortalama çevresel etkilere sahip olduğu gözlemlenmektedir, ancak tam tahıl tahıllarının üretildiği porsiyon başına sera gazı emisyonları ve su kullanımında büyük bir varyasyon bulunmaktadır. Tam tahıl tahıllarının sera gazı emisyonlarındaki varyasyonu, özellikle tahıllar arasındaki farklardan kaynaklanmaktadır. Danimarka’ da farklı diyetlerin karbon ayak izi üzerine yapılan çalışmada gıdaların karbon ayak izi de incelenmiş ve kilo başına karbon ayak izleri (kg CO_2 eşdeğer kg^{-1}) buğdayın 0,82 $\text{kg CO}_{2\text{eq}}$ çavdarın 0,77 $\text{kg CO}_{2\text{eq}}$ yulafın 0,75 $\text{kg CO}_{2\text{eq}}$ pirincin ise 1,66 $\text{kg CO}_{2\text{eq}}$ olduğunu bulmuşlardır (Bruno vd., 2019). Pirinç üretimi, pirinç tarlaları sular altında kaldığında anaerobik bozunma yoluyla salınan metan nedeniyle diğer tahıllara göre porsiyon başına %100-200 daha yüksek sera gazı emisyonuna sahiptir. Metan, karbondioksitten daha yüksek radyatif zorlama ve dolayısıyla ısınma potansiyeline sahip bir sera gazıdır (Poore ve Nemecek 2018). Ayrıca, üretilen tahılların porsiyon başına sera gazı emisyonunda bölgesel bir varyasyon bulunmaktadır; bu, besinleri (gübre türü) daha az verimli kullanan veya büyük karbon depolama alanlarına (örn. torf alanları) sahip bölgelerdeki üretim sistemlerinden kaynaklanan daha yüksek sera gazı emisyonlarıyla sonuçlanmaktadır (Carlson vd., 2017).

Baklagillerin Karbon Ayak İzi Üzerine Etkileri

Baklagiller özellikle düşük ortalama sera gazı (GHG) emisyonlarına neden olmaktadır. Baklagil üretiminin GHG, etkisi düşüktür çünkü baklagillerin azotu bağlama yeteneği vardır (atmosferik azotu bitki tarafından kullanılabilir nitrojene dönüştürme), bu da gübre girdisi gereksinimlerini azaltır ve sonuç olarak

baklagil üretiminin GHG emisyonlarının etkilerini azaltır çünkü bu etkiler genellikle gübre uygulaması ve sızıntılarından kaynaklanmaktadır.

Akdeniz Diyetinin Karbon Ayak İzi Üzerine Etkileri

Akdeniz diyeti ilk kez 1980'lerde tıp camiasının Girit ve Güney İtalya gibi Akdeniz Havzası bölgelerinde yaşayan insanlarda uzun yaşam beklentilerini ve düşük kardiyovasküler hastalık risklerini fark etmeye başlamasıyla uluslararası popülerlik kazanmıştır.(Davis vd., 2015)Akdeniz diyeti ağırlıklı olarak meyve, sebze ve sert kabuklu yemişler açısından zengin, yağ kaynağı olarak zeytinyağının orta derecede tüketildiği, et, ilave şeker, doymuş yağ asitleri ve tuzlu atıştırmalıkların düşük olduğu bitki bazlı bir diyettir.(Rosi vd., 2017)

Karbon ayak izine etkisi incelendiğinde Akdeniz diyetinde işlenmiş gıdaların düşük tüketimi aynı zamanda plastik tüketimini ve bu ürünlerin işlenmesi, paketlenmesi ve taşınmasıyla ilişkili emisyonları da azaltır.(Dernini vd., 2017)Akdeniz ve Atlantik diyetleri olarak adlandırılan diyetlerin yüksek beslenme puanları ve düşük karbon ayak izi sunduğunu tespit edilmiştir.(González-García vd., 2018)Akdeniz diyetinin kuralları, sürdürülebilirlik göz önünde bulundurularak ayarlanmasına izin verir Akdeniz diyetini takip ederek ve emisyonları daha da azaltmak için mevsimsel, yerel kaynaklı ve sürdürülebilir şekilde hasat edilmiş ve işlenmiş malzemeleri tüketmeye odaklanarak daha iklimsel bir yaklaşımı kolaylıkla benimseyebilirsiniz. (Dixon vd., 2023)

Vegan Diyetin Karbon Ayak İzi Üzerine Etkileri

"Veganizm" terimi ilk kez 1944 yılında Donald Watson ve Dorothy Morgan tarafından kullanılmıştır. Veganizm, Jain ilkesi olan ahimsa veya şiddetsizlikle bağlantılı olarak antik Hindistan'da gözlemlenen katı bir vejetaryenlik biçiminden evrim geçirmiştir (GFİ,2021)Türkiye'de yürütülen bir pazar araştırmasında vegan ve vejetaryen bireylerin toplam oranının %5'in altında olduğu bildirilmiştir . Vegan ve vejetaryenlerin genel popülasyona oranı düşük olarak görülmekle birlikte artış oranları yüksek seyretmektedir. (Güler ve Çağlayan 2021)

Veganizm, 2010'lardan bu yana büyük bir popülerlik kazanmış ve hızla büyümüştür. Bu, restoranlarda ve market zincirlerinde seçilebilecek bitki bazlı gıda seçeneklerindeki artışta ve günlük tüketicilere özel olarak "vegan" olarak pazarlanan ürün markalarındaki artışta gözlemlenebilir. Bu ilerleme, Good Food Institute'ye göre "perakende pazarı için bitki bazlı gıdaların değerinin 2020'deki 6,9 milyar dolardan 7,4 milyar dolara yükseldiği" hızlı bir pazar genişlemesiyle duyurulmuştur(Appleby ve Key,2019).

Veganlık gibi katı bitki bazlı diyetler genellikle hangi yiyecek kategorilerinin dahil edilmek yerine hariç tutulduğuna göre tanımlanır. Gerçek bir vegan, diyetinde et, süt ürünleri, yumurta ve hayvansal kaynaklı materyaller veya bileşenler (örn. bal, peynir mayası ve jelatin) dahil olmak üzere herhangi bir hayvansal ürünün kullanılmasından kaçınır. Ana gıda kategorilerindeki geniş kısıtlamalar nedeniyle meyve, sebze, tahıl, baklagiller, sert kabuklu yemişler ve tohumların tüketimine ağırlık verilir. Bu nedenle veganlık tipik olarak yağ ve protein açısından düşük, ancak karbonhidrat bakımından yüksektir.

Vegan beslenme ve yaşam tarzını sürdürmenin çevresel etkilerine gelince; taze meyve ve sebze tüketiminin artması, diğer pek çok beslenme uygulamasıyla karşılaştırıldığında önemli ölçüde daha düşük karbon ayak izi oluşmasına olanak tanıyor. Standart Amerikan diyetinin tipik özelliği olan ve keto ve paleo gibi yiyeceklerle desteklenen, yüksek düzeyde üretilmiş ve işlenmiş gıdaların düşük miktarlarda kullanıldığı bir vegan diyeti, daha düşük çevresel etkiye sahip olacaktır. Benzer şekilde, 140 farklı ülke için yakın zamanda yürütülen bir modelleme çalışması, vegan beslenmenin mevcut beslenmeyle karşılaştırıldığında kişi başına düşen sera gazı ayak izinde %70 azalma gösterdiğinin altını çizmiştir (Kim vd., 2020)

Bununla birlikte, son yıllarda veganlığın popülaritesi arttıkça, veganlığın çevresel ve sürdürülebilirlik faydalarından dikkati dağıtabilecek vegan veya bitki bazlı et alternatiflerinin sayısında gözlemlenebilir bir artış olmuştur (Mann, 2014). Alternatif et endüstrisi, artan talebin bir sonucu olarak hızla genişlemeye devam ettiğinden, vegan diyetinin karbon ayak izi, daha fazla veganın daha yüksek miktarlarda işlenmiş bitki bazlı et ikame ürünleri tüketmesi nedeniyle Standart Amerikan diyetinin karbon ayak izine doğru yönelmeye başlayabilir.

Ketojenik Diyetin Karbon Ayak İzi Üzerine Etkileri

Keto olarak da bilinen ketojenik diyet, ilk olarak 20. yüzyılın başlarında epilepsi hastalarında nöbetleri önlemenin bir yolu olarak ortaya atılmıştır. (Włodarek, 2019) Keto, yağ ve protein bakımından zengin gıdaların tüketiminin yanı sıra şeker ve tahıl gibi karbonhidratların önemli ölçüde sınırlandırılmasıyla karakterize edilir. Amaç, vücudun yakıt olarak karbonhidratlar yerine yağ depolarını kullandığı bir ketoz durumuna ulaşmasıdır (Tinguely vd., 2021).

Yüksek yağlı hayvansal ürünler ve kırmızı ete yönelik kısıtlamaların olmayışı, keto diyetinin çevresel etkisinin yüksek olduğunu göstermektedir. Beyaz ete ve yağ oranı yüksek bitki bazlı gıdalara daha fazla odaklanarak diyeti daha iklim dostu olacak şekilde değiştirmek mümkün olsa da, keto kaçınılmaz olarak zaten kısıtlayıcı olan iklim dostu bir diyetin sürdürülmesini daha zor hale getireceği düşünülmektedir (Dixon vd 2023).

Vejetaryen Beslenmenin Karbon Ayak İzi Üzerine Etkileri

Vejetaryenliğin kökenleri, eski Mısır uygarlıklarının, et tüketiminden kaçınmanın reenkarnasyonu kolaylaştıracağı inancına dayalı olarak vejetaryen diyetleri benimsemeye başladığı M.Ö. 3200 yılına dayanmaktadır.(Beig, 2008).Tarih boyunca vejetaryenliğin yayılması, şiddet içermeyen ilkeleri benimseyen dinlerle ilişkilendirilmiştir. Buna ek olarak, 20. ve 21. yüzyıllarda bilim, et tüketiminin azaltılmasıyla ilişkili sağlık açısından birçok faydanın olduğunu gözlemledi. Bu tür faydalar dünya çapında vejetaryenlik uygulamasını güçlendirmiştir. (De Souza vd ., 2017).

Şu anda vejetaryenliğin dünya çapındaki yaygınlığı aynı değildir. Asya, nüfusun yüzde 19'unun bu uygulamayı benimsediği en yüksek yaygınlığa sahip kıtadır. Dünyada en yüksek prevalansa sahip tek ülke olan Hindistan (nüfusun neredeyse yüzde 40'ı), Asya kıtasındaki sonuçlara katkıda bulunmaktadır (Ruby,2012). Afrika ve Orta Doğu'da yaygınlık yüzde 16 civarında; Orta ve Güney Amerika'da ise yüzde 8.Vejetaryenliğin en düşük yaygınlığı Kuzey Amerika'da (nüfusun yaklaşık yüzde 6'sı vejetaryendir) ve vejetaryenliğin nüfusun yalnızca yüzde 5'i tarafından benimsendiği Avrupa'da görülmektedir.

Literatürde yaygın olarak açıklanan çeşitli vejetaryen diyet türleri vardır. En çok fikir birliğine varılan sınıflandırma dört farklı türden oluşur: insanların ara sıra et tükettiği (haftada bire kadar) veya kırmızı eti hariç tutarak beyaz et tükettiği esnek veya yarı vejetaryen diyet; balık ve deniz ürünleri hariç tüm etlerin hariç tutulduğu pesko-vejetaryen veya peskataryen diyet; her türlü etin hariç tutulduğu ancak süt ürünleri ve yumurta gibi hayvansal kökenli ürünlere izin veren ovolaktovejetaryen diyet ve hayvansal kökenli tüm ürünleri hariç tutan katı vejetaryenlik (Clarys vd., 2014 ; McEvoy ve Woodside, 2015).

Genel olarak bitki bazlı diyetler, gıda üretimi için daha az doğal kaynak gerektirdiğinden ve çevre üzerinde daha az etkiye sahip olduğundan hayvansal gıdalara dayalı olanlardan daha sürdürülebilirdir. Her şeyi yiyen bir diyetin, vejetaryen bir diyete göre 2,9 kat daha fazla su, 2,5 kat daha fazla enerji, 13 kat daha fazla gübre ve 1,4 kat daha fazla pestisit gerektirdiği tahmin edilmektedir (Marlow vd.,2009). Ayrıca et ve süt ürünleri üretimi, gıda üretiminden kaynaklanan tüm gaz emisyonlarının yüzde 80'ine, gıdadan kaynaklanan toplam sera gazlarının ise yüzde 24'üne katkıda bulunuyor. Hayvancılık üretimi, küresel olarak tüm tarım arazilerinin yaklaşık yüzde 70'ini kullanıyor ve tarıma harcanan suyun yüzde 29'unu tüketiyor (Chai vd., 2019).

Farklı diyet türlerinin analiziyle ilgili olarak, sistematik bir incelemede toplanan 34 makaleden elde edilen veriler, bir diyetin içeriği ne kadar bitki bazlı olursa o kadar sürdürülebilir olduğunu göstermiştir. Vegan beslenme, en düşük sera gazı emisyonu ve en az çevresel etkiyle, özellikle de yerel olarak üretilen gıdalara dayalı olduğunda ve ultra işlenmiş et ikamelerinin daha az tüketilmesiyle, en sürdürülebilir diyet olarak kabul edilmiştir. Aynı çalışmada ovolaktovejetaryen diyetler vegan diyetlerden daha büyük bir çevresel etkiye sahip

olduğunu belirtmişler ve ovolaktovejetaryen diyetlerden kaynaklanan sera gazlarının yüzde 40'ının süt ürünleri tüketiminden kaynaklandığını belirtmişlerdir.(Chai vd., 2019).

Aleksandrowicz ve arkadaşlarına göre, tipik bir Batı diyetinden daha sürdürülebilir gıda modellerine geçişi yani geniş getiren hayvanların tüketiminin tek mideli hayvanlarla değiştirilmesine ek olarak, hayvansal gıdaların azaltılmasını veya bitkisel kökenli diğer yiyeceklerle değiştirilmesini (örneğin, vejetaryen, vegan, Akdeniz ve pesketaryen diyetleri gibi) içeriyordu. Su kullanımında yüzde 50'lik bir azalmaya ek olarak, sera gazı emisyonlarını ve gıda üretimiyle ilgili arazi kullanımını yüzde 80'e kadar azaltabileceğini belirtmişlerdir (Aleksandrowicz vd.,2016) Rosi ve ark. tarafından yapılan bir çalışmada da benzer sonuçlar gözlemlendi (Rosi vd., 2017). İtalya'da vejetaryen diyetlerin (ovolaktovejetaryen ve vegan) değerlendirilen üç açıdan daha düşük bir ekolojik ayak izine sahip olduğunu gösterdi: CO2 üretimi su tüketimi ve arazi kullanımı. Bu verileri doğrulayan, çevresel etkiyi azaltmak ve sağlığı iyileştirmek için farklı beslenme stratejilerinin küresel bir analizi, gelişmiş ülkelerde hayvansal gıdaların bitkisel kökenli gıdalarla değiştirilmesinin erken ölümlerin sayısını yüzde 12'ye kadar azaltabileceğini tahmin ediyor. sera gazı emisyonlarını yüzde 84'e kadar azaltmıştır (Springmann vd.,2018).

Sonuç ve Öneriler

Bu inceleme temel olarak belirli diyetlerin ve besinlerin karbon ayak izi üzerindeki etkilerini araştırmıştır. Ancak gerçekten sürdürülebilir bir gıda sistemine ulaşmak için sorunun birçok boyutta ele alınması gerekmektedir. Sağlıklı ve sürdürülebilir beslenme yoluyla iklim değişikliğinin azaltılmasına yönelik çalışmalarda bireysel tüketicinin rolünün yanı sıra çiftçilere, şirketlere ve politika yapıcılara da önemli görevler düşüyor. Hem insanlara hem de çevreye fayda sağlayan gıda tüketiminin geleceği esnek olmalı ve et ve işlenmiş gıda tüketiminin azaltılmasıyla birlikte bütün, bitki bazlı gıdalara vurgu yapılmasını içermelidir. Bu davranış değişiklikleri, ayrıntılı gıda yaşam döngüsü değerlendirmelerinin bulunabilirliği ve erişilebilirliği artırılarak desteklenmelidir.

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AN ASSESSMENT OF PROBLEMS ENCOUNTERED BY PRE-SERVICE TEACHERS DURING TEACHING PRACTICES EXERCISE IN TARABA STATE, NIGERIA

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ABSTRACT

This study assesses the problems most student teachers encountered during teaching practice exercises at Taraba State, Nigeria. A descriptive survey design was adopted; six research objectives and research questions were formulated for the study. The population comprises of 1558 Pre-service Teacher drawn from the Taraba State. A simple random sample was used to select 150 Pre-Service teachers using random stratified sampling techniques. The instrument used for data collection was a questionnaire on 'An assessment of the problems encountered by Pre-service teachers during teaching practice exercises' (QAPETP). This relates to problems such as evaluation problems, personal problems, emotional problems, instructional problems, classroom management, and teacher preparation problems, which were validated by experts, and a reliability coefficient of 0.87 was obtained using the Spearman-Brown correlation formula. The Data was analyzed and interpreted using Frequency, Mean, and Percentage. The findings revealed that the Pre-Service teachers faced accommodation Problem, particularly when posted outside of the host communities. Based on the findings, it was recommended that there should be proper orientation for the Pre-Service teachers before going on a teaching practice exercise. It was again recommended that the schools authorities should give the Pre-Service teachers financial support for their upkeep during the process of teaching practice exercise.

Keywords: Assessment, Teaching Practices, Pre-service Teachers and Evaluation