MeetCon

MEETCON-EUROPE

INTERNATIONAL CONGRESS OF INNOVATIVE STUDIES

13-17 OCTOBER 2025 / MUNICH – GERMANY



EDITORS

Assoc. Prof. Dr. Hasan ÇİFTÇİ

Dr. Sultan GÖKTAŞ

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CONGRESS ID

CONGRESS TITLE

MEETCON - EUROPE
INTERNATIONAL CONGRESS ON SCIENTIFIC RESEARCH

DATE AND PLACE

October 13-17, 2025
Munich, Germany

ORGANIZATION

MEETCON CONFERENCE

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October 13-17, 2025

Munich, Germany

CONGRESS PROGRAM

Meeting ID: 838 7883 7347
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14.10.2025 / ONLINE / SESSION-1 / HALL-1

Munich Local Time: 12:30-14:00 Ankara Local Time:13:30-15:00

Zoom Meeting ID: *838 7883 7347* / Zoom Passcode: meetcon

HEAD OF SESSION: Prof. Dr. Arif MAMMADZADE/ Elnur ALIZADE

Authors	Affiliation	Presentation Title
Emre ORUÇ Assoc. Prof. Dr. Onur YEMENİCİ	Bursa Uludağ University Bursa Uludağ University	**Effect Of Chord Length On Aerodynamıc Performance Of A Model Wıth Naca 0015 Aırfoıl**
Lect. Muhammed Şerif YOLUK Muhammed Veysel MÜJDECİ	Harran University Harran University	**Investıgatıon Of The Changes In Compressıve Strength And Flexural Strength Of Mortars Produced Wıth Different Ratıos Of Date Seed Powder**
Prof. Dr. Ersin GÜNGÖR Res. Assist. Dr. Yağmur YEŞİLBAŞ	Bartın University Bartın University	**The Intersection Of Green Certification And Forestry: A Quantitative Study On The Yes-Tr System İn Turkey**
Res. Assist. Dr. Yağmur YEŞİLBAŞ Prof. Dr. Ersin GÜNGÖR	Bartın University Bartın University	**The Effects Of Storm Damage İn The Shadow Of Climate Change: Analysis By The Zonguldak Forest Regional Directorate**
Prof. Dr. Arif MAMMADZADE Elnur ALIZADE	Scientific Research Institute Azerbaijan State Oil and Industry University	**Impact Of Geomagnetıc Actıvıty On Magnetıc Fıeld Measurements And Implıcatıons For The Petroleum Industry**
Muhammed Kerim ARLI Emre GÖĞÜŞ Mehmet ASIROGLU Res. Assist. Oğuz Emre UZMAN Assoc. Prof. Dr. Atınç YILMAZ	Kabataş Erkek Lisesi Koç School Üsküdar American Academy İstanbul Beykent University İstanbul Beykent University	**Comparatıve Deep Learnıng Approaches For Sıgn Language Recognıtıon: Temporal Convolutıon And Transformer Models On The Wlasl Dataset**

(All speakers required to be connected to the session 10 min before the session starts)
Moderator is responsible for ensuring the smooth running of the presentation, managing the group discussion and dynamics.

14.10.2025 / ONLINE / SESSION-1/ HALL-2

Munich Local Time: 13:00-14:30 Ankara Local Time: 14:00-15:30

Zoom Meeting ID: *838 7883 7347* / Zoom Passcode: meetcon

HEAD OF SESSION: Assoc. Prof. Dr. Tuba SEVIMOGLU

Authors	Affiliation	Presentation Title
Res. Assist. Gülnaz ERDİ Assoc. Prof. Dr. Aysel BÜLEZ	Kahramanmaraş Sütçü İmam University Kahramanmaraş Sütçü İmam University	**Innovatıve Approaches In Mıdwıfery Educatıon**
Asst. Prof. Dr. Bişar AMAÇ Asst. Prof. Dr. Ömer GÖÇ	Harran University Harran University	**Effects Of Cardıopulmonary Bypass On Lıpıd Metabolısm In Patıents Wıth Coronary Artery Dısease**
Assoc. Prof. Dr. Tuba SEVIMOGLU	Hamidiye Institute of Health Sciences,	**Drug Reposıtıonıng For Breast Cancer Vıa Transcrıptome Profılıng And Vırtual Screenıng Identifies Skı-I As A Dual Inhıbıtor**
Ravana Guliyeva Tahir Salahov Basti Qurbanli Elnara Valiyeva Farida Khalafova Aynur Sadiqova	Baku State University Baku State University Baku State University Baku State University Baku State University	**The Environmental Impact of Petroleum-Based Polymers and the Theoretical Evaluation of Inorganic Catalysts**
Ravana Guliyeva Sabina Allahyarova Farida Rzayeva Ziba Hajiyeva Laman Quluyeva	Baku State University Baku State University Baku State University Baku State University Baku State University	**The Role of the Microbiome in Human Health and Ecological Balance: A Genetic and Biochemical Approach**
Dr. Azize Bingöl Diedhiou	Şırnak University	**The Importance Of Physıcal Actıvıty After Barıatrıc Surgery**

(All speakers required to be connected to the session 10 min before the session starts)
Moderator is responsible for ensuring the smooth running of the presentation, managing the group discussion and dynamics.

14.10.2025 / ONLINE / SESSION-1 / HALL-3

Munich Local Time: 13:00-14:30 Ankara Local Time: 14:00-15:30

Zoom Meeting ID: *838 7883 7347* / Zoom Passcode: meetcon

HEAD OF SESSION: Dr. Kenan ÇELİK

Authors	Affiliation	Presentation Title
Dr. Kenan ÇELİK	GAP Uluslararası Tarımsal Araştırma ve Eğitim Merkezi	**Enhancing Stress Tolerance İn Fruit Trees Using Biostimulants**
Dr. Kenan ÇELİK	GAP Uluslararası Tarımsal Araştırma ve Eğitim Merkezi	**The Role Of Preharvest Spermidine Applications İn Postharvest Physiology Of Stone Fruits**
Assoc. Prof. Dr. Aslıhan ZINDEREN Res. Assist.Yağmur ÇOLAK	Atatürk University Atatürk University	**Medıa Presentatıon Of Artıfıcıal Intellıgence: Framıng Dynamıcs In Sözcü And Hürriyet News**
Assoc. Prof. Dr. Bahar URHAN	Akdeniz University	**Hıgher Educatıon And Soft Skılls: A Bıblıographıc Analysıs Of Prominent Themes**
Asst. Prof. Dr. Rahim KIZGUT	Giresun University	**The Use Of Anımal Products In AncıentGreek Cousıne**
Assoc. Prof. Fikret ALIZADE	Azerbaijan, Baku State University	**The Real And Lınguıstıc Interpretatıon Of Phraseologısms In The Azerbaıjan Language**
Dr. Burak TOMAK	Marmara University	**The Perspectives Of Turkish Efl Students On The Integration Of "Chatgpt" With Their Language Learning Process: An Action Research**
Namazov Ilqar Assoc. Prof. Dr. Namazova KAMALA Gulnar İBRAHIMOVA Ahmadova ULVIYYA Elçin NAMAZOV	Department of Vascular Surgery Department of Anesthesiology Department of Vascular Surgery Department of Vascular Surgery Vascular Surgery Department of Cardiovascular Surgery	**Applıcatıon Of Ozone Autohemotherapy And Lumbar Sympathectomy In Buerger's Dısease (clinical case)**

(All speakers required to be connected to the session 10 min before the session starts)
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14.10.2025 / ONLINE / SESSION-1 / HALL-4

Munich Local Time: 13:30-15:00 Ankara Local Time: 14:30-16:00

Zoom Meeting ID: *838 7883 7347* / Zoom Passcode: meetcon

HEAD OF SESSION: Prof. Dr. Tariyel Talibov

Authors	Affiliation	Presentation Title
Abdul-Rahman Balogun Muhammed-Shittu	British School in Baku	**Experience of Metacognition, Integrity, and Self-Efficacy Learning among Vocational Post-Secondary Students.**
Rahil Jafarov Maharram Zarharova Ellada Kheyrullah	Sumqayıt Devlet Universitesi Sumqayıt Devlet Universitesi	**Master of Word and Politics: A Journey into the Legacy of Shah Ismail Khatai**
Esmira Rahimova Zakir	Educational Center and Kinder Garden	**Azerbaijan: a hero of the First Karabakh War Rahimov Zakir**
Vugar Vali Asmatov	Baku State University,	**Substantive-Legal And Procedural-Legal Study Of The Separation Of A Share From Common Shared Property**
Karimova Sevinj Amiraslanova Shafa Bayramova Elnara Hasanova Nurlana Musayeva Lala	Azerbaijan Medical University Azerbaijan Medical University Azerbaijan Medical University Azerbaijan Medical University Azerbaijan Medical University	**Bacterıal Vagınosıs**
Vagif Giblaliyev Yusifzade Elchin	Azerbaijan British College Azerbaijan University	**Development And Prospects Of Engıneerıng Servıces In Azerbaıjan**
Sura Rahimova Prof. Dr. Tariyel Talibov Dr Solmaz Asgerova Fatimeyi Zehra Hidayetzade	Nakhchivan State University Nakhchivan State University Nakhchivan State University	**Study Of The Phytochemıcal Composıtıon Of Artemısıa Lercheana Specıes**
Sura Rahimova Prof. Dr. Tariyel Talibov Assoc. Prof. Dr. Anvar İbrahimov	Department of Pharmacy and Biochemistry Department of Pharmacy and Biochemistry, Department of Pharmacy and Biochemistry,	**On The Avaılabılıty Of Tussılago Farfara L. In The Nakhchıvan Autonomous Republıc**

(All speakers required to be connected to the session 10 min before the session starts)
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14.10.2025 / ONLINE / SESSION-1 / HALL-5

Munich Local Time: 13:30-15:00 Ankara Local Time: 14:30-16:00

Zoom Meeting ID: *838 7883 7347* / Zoom Passcode: meetcon

HEAD OF SESSION: Naseem Akhter

Authors	Affiliation	Presentation Title
Dr Muhammad Masroor Hussain Dr Sana Qammar, Hai-Jie Hu Fu-Yu Li	Sichuan University Sheikh Zayed Medical College/Hospital	**Next-Generation Therapeutic Breakthroughs in Biliary Tract Cancer: A New Era of Systemic Treatment**
Prof. Assoc. Dr. Nevila Koçollari Asunta TOROMËNI	University of Tirana, Albania	**Vısual Methods And Mobılıty Studıes**
Prof. Assoc. Dr. Nevila Koçollari Asunta TOROMËNI	University of Tirana, Albania	**Gendered Dımensıons Of Youth Academıc Mobılıtıes**
Amal Bassam Rajaa Bassam Younes Rachdi Marouane El Alouani Mohammed Hafid Hamid Saufi Said Belaaouad	Hassan II University of Casablanca Hassan II University of Casablanca, Hassan II University of Casablanca Mohammed V University of Rabat Mohammed V University of Rabat Hassan II University of Casablanca	**Preparation Of Solid Alkali Activator For Geopolymer Synthesis Using – Red Clay Waste, Water Glass**
Assoc. Prof. Dr. Ilda KASHAMI Assoc. Prof. Dr. Arjan ÇURI	Mediterranean University of Albania Mediterranean University of Albania	**Sustainability Social Dynamics and the Transformation of Health and Welfare Services**
Assoc. Prof. Dr. Arjan ÇURI Assoc. Prof. Dr. Ilda KASHAMI	Mediterranean University of Albania Mediterranean University of Albania	**Cultivating Care: A Virtue Ethics Approach to Sustainability in Health and Welfare**
Elza Bitsadze	Akaki Tsereteli State University	**Integrating Diverse Database Models: Relational, NoSQL, Object- Oriented, and Cloud-Based Approaches**

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14.10.2025	HALL-1 / SESSION-1
GERMAN LOCAL TIME: 08:30-10:30	11:00-13:30

HEAD OF SESSION: Prof. Dr. Yusuf SERT

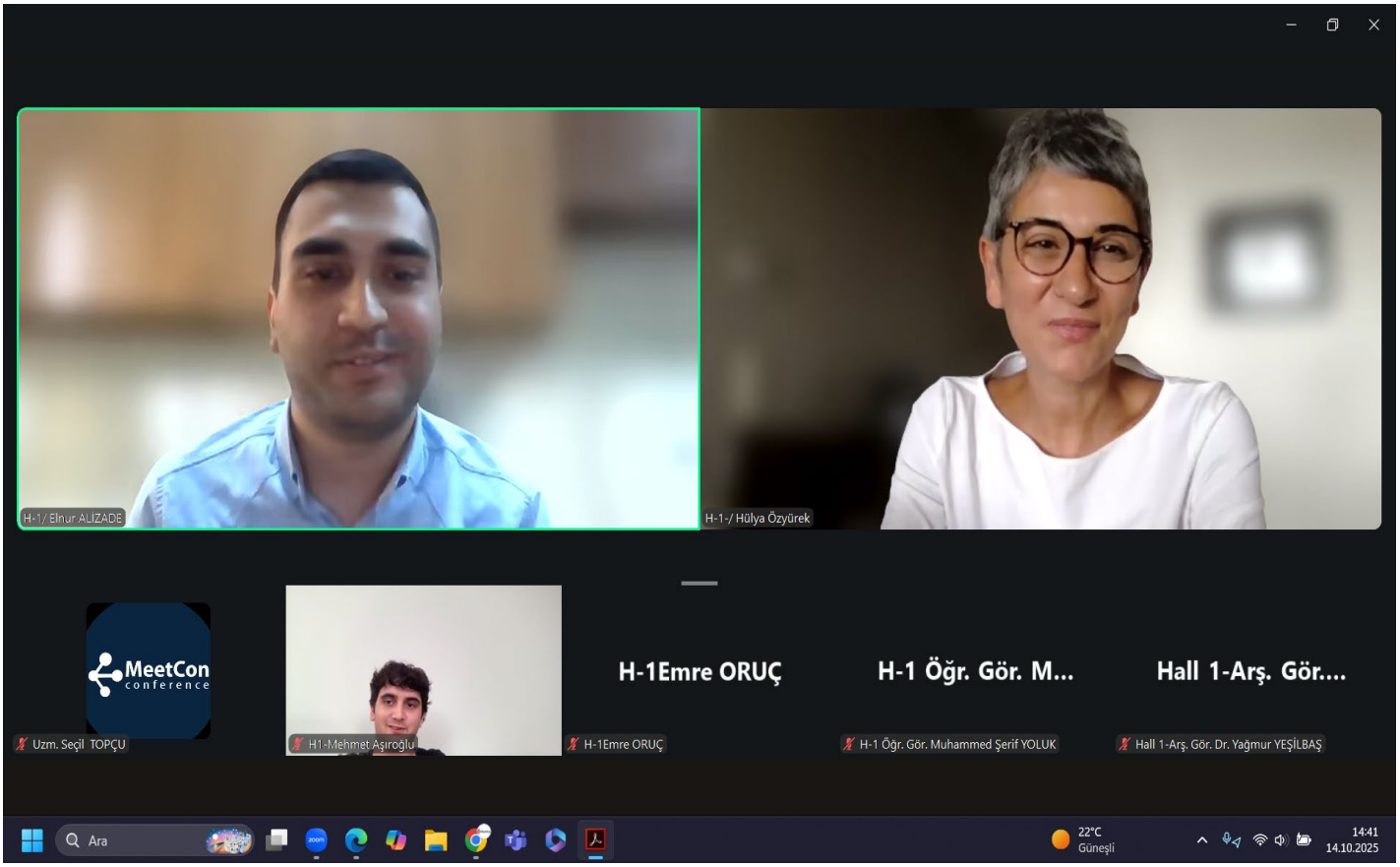
Authors	Affiliation	Presentation Title
Dr. Ali Topcuk	Justus Liebig Sekundarschule	**Evaluatıon Of Islamıc Relıgıous Courses In The Federal Republıc Of Germany And Specıfically In The State Of North Rhıne - Westphalıa**
Vusala Ismayilova	Azerbaijan University	**Developıng Analytıcal Thınkıng In Students Durıng The Teachıng Of Cytology And Hıstology**
Assoc. Prof. Dr. Marian AMBROZY	Institute of Technology and Economics, Slovakia	**Dıalectıcal Phenomena In Mathematıcs**
Prof. Dr. Elena Varga	University of Vienna	Living Together in Transition Cities
Dr. Luca Moretti	Humboldt University of Berlin	Digital Europe 2040
Prof. Dr. Anneliese Richter	Sapienza University of Rome	Artificial Intelligence as a Cognitive Partner: Redefining Learning Processes in Digital Education
Assoc. Prof. Dr. Tomasz Nowak	Jagiellonian University	Reframing Cultural Value: The Economic Impact of Creative Industries on Post-Transition European Cities
Dr. Sophie Dubois	Paris Sciences et Lettres	Narratives of Power in Global Media

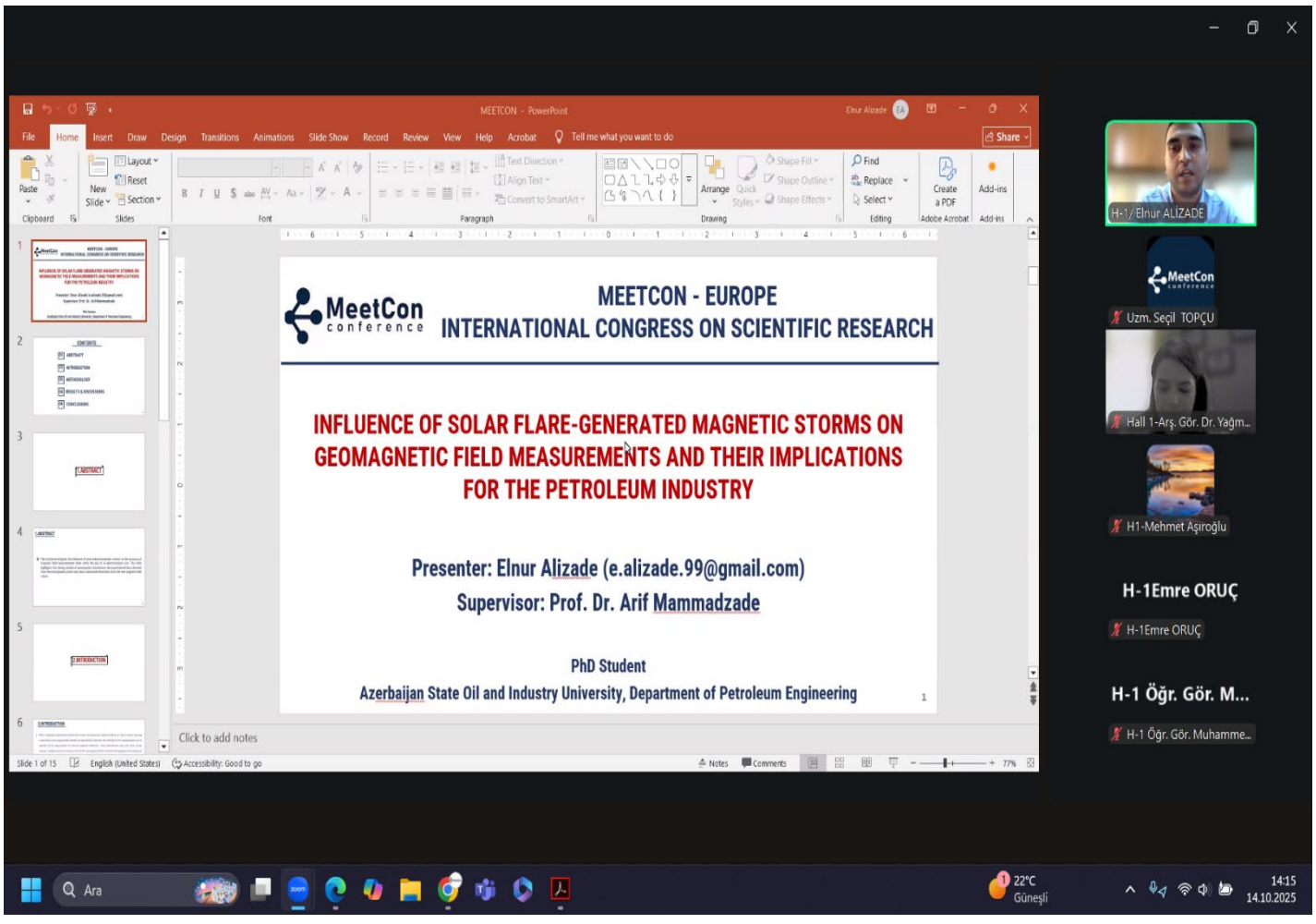
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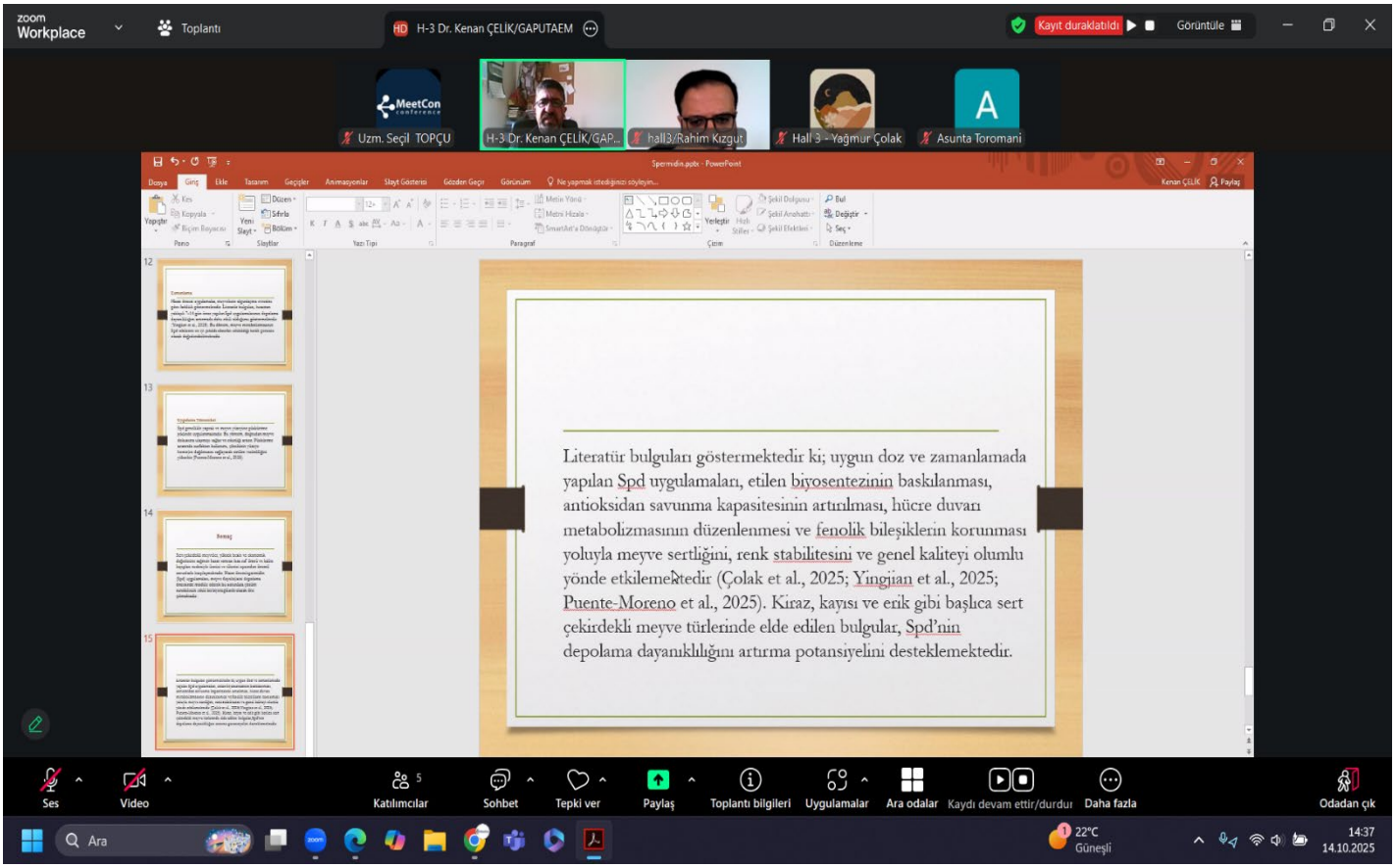
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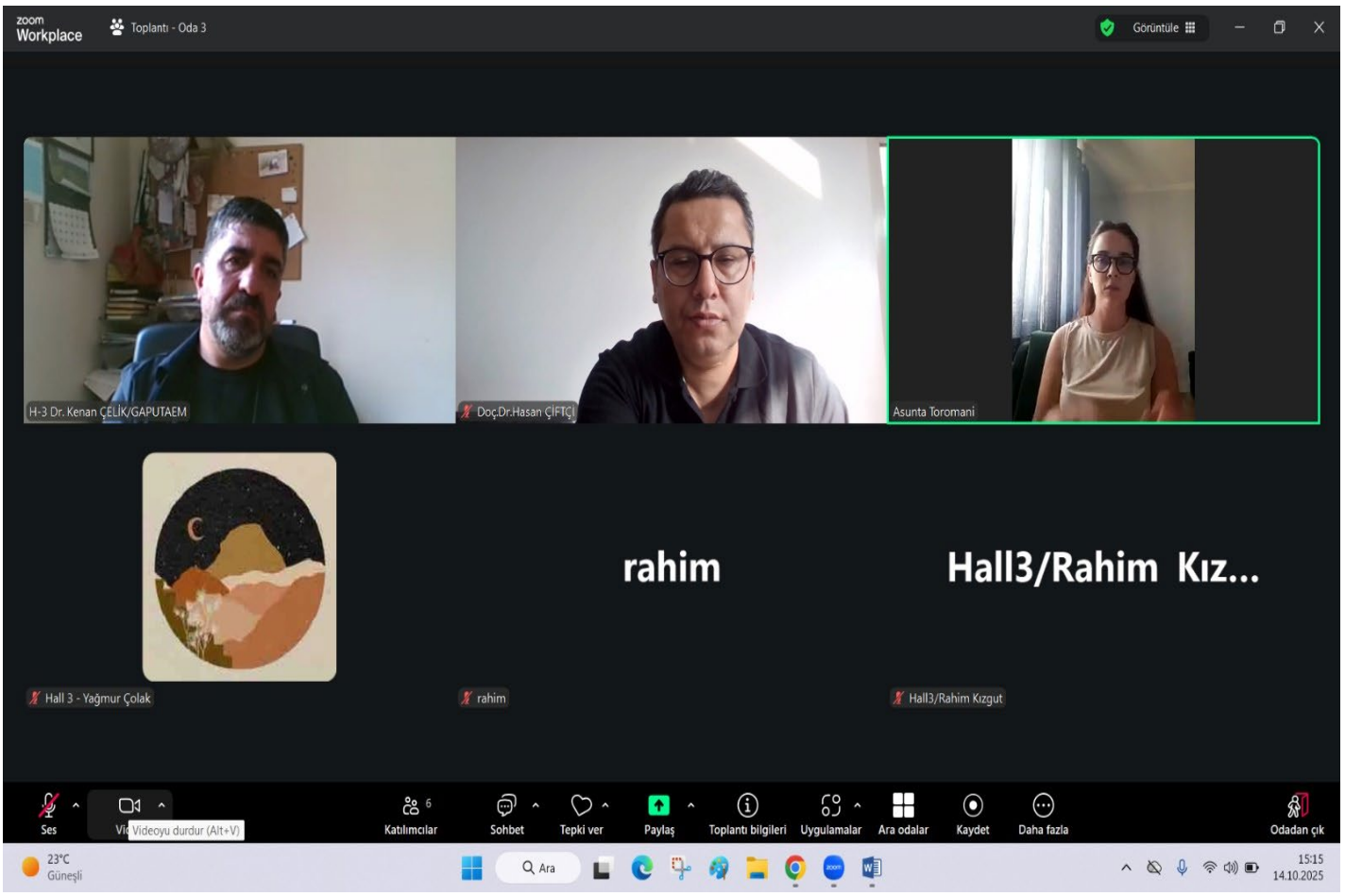


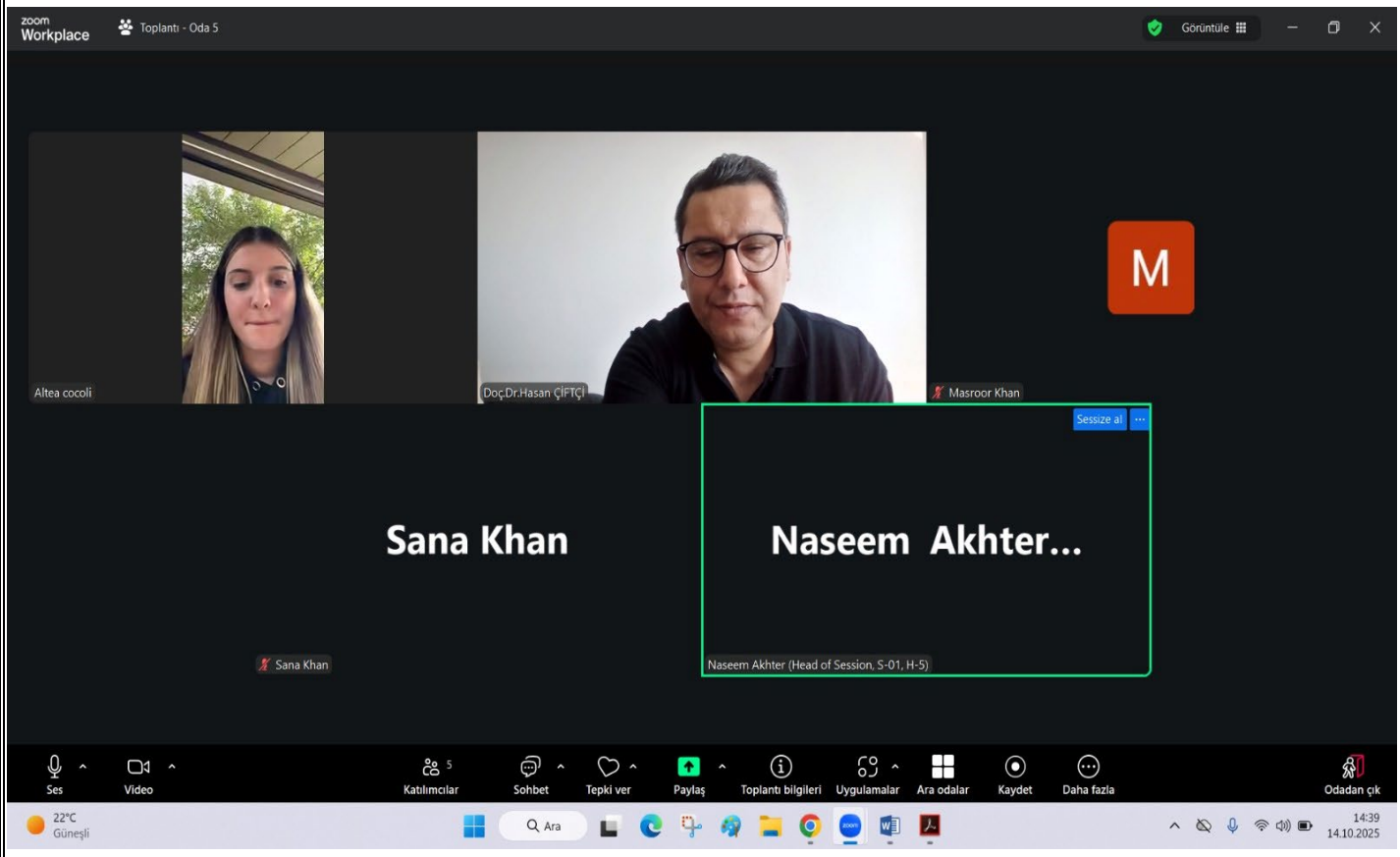


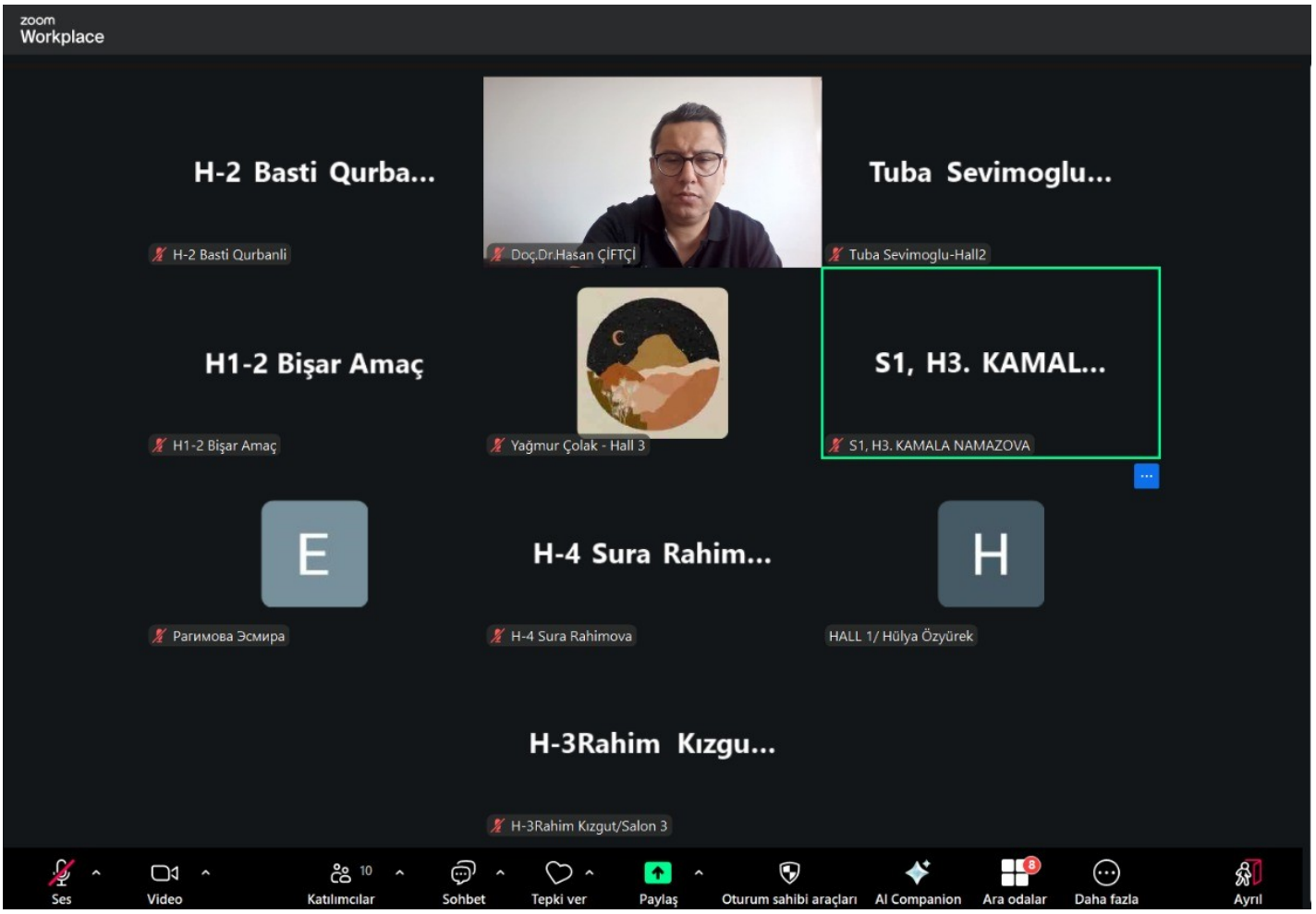

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H-1/ Hülya Özyürek
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H1-Mehmet Aşıroğlu
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Hall 1-Arş. Gör. Dr. Yağmur YEŞİLBAŞ
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INTERNATIONAL CONGRESS ON SCIENTIFIC RESEARCH
INFLUENCE OF SOLAR FLARE-GENERATED MAGNETIC STORMS ON GEOMAGNETIC FIELD MEASUREMENTS AND THEIR IMPLICATIONS FOR THE PETROLEUM INDUSTRY
Presenter: Elnur Alizade (e.alizade.99@gmail.com)
Supervisor: Prof. Dr. Arif Mammadzade
PhD Student
Azerbaijan State Oil and Industry University, Department of Petroleum Engineering
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Toplantı
H-3 Dr. Kenan ÇELİK/GAPUTAEM
Kayıt duraklatıldı
Görüntüle
Uzm. Seçil TOPÇU
H-3 Dr. Kenan ÇELİK/GAP...
hall3/Rahim Kızgut
Hall 3 - Yağmur Çolak
Asunta Toromani
Literatür bulguları göstermektedir ki; uygun doz ve zamanlamada yapılan Spd uygulamaları, etilen biyosentezinin baskılanması, antioksidan savunma kapasitesinin artırılması, hücre duvarı metabolizmasının düzenlenmesi ve fenolik bileşiklerin korunması yoluyla meyve sertliğini, renk stabilitesini ve genel kaliteyi olumlu yönde etkilemektedir (Çolak et al., 2025; Yingjian et al., 2025; Puente-Moreno et al., 2025). Kiraz, kayısı ve erik gibi başlıca sert çekirdekli meyve türlerinde elde edilen bulgular, Spd'nin depolama dayanıklılığını artırma potansiyelini desteklemektedir.
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Toplantı - Oda 3
Görüntüle
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Sana Khan
Naseem Akhter (Head of Session, S-01, H-5)
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14.10.2025


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H-2 Basti Qurbanli
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S1, H3. KAMALA NAMAZOVA
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İLGİLİ MAKAMA

MEETCON – EUROPE ULUSLARARASI YENİLİKÇİ ÇALIŞMALAR KONGRESİ 13-17 Ekim 2025 tarihleri arasında **Münih, ALMANYA'**da yüzyüze ve online olarak 11 farklı ülkeden (**Türkiye:**16 ve diğer **Ülkeler:** 26; **Toplam:**42 akademisyen/araştırmacıların katılımı ile gerçekleşmiştir. Kongre, 16 Ocak 2020 Akademik Teşvik Ödeneği Yönetmeliğine getirilen '' Tebliğlerin sunulduğu yurt içinde veya yurtdışındaki etkinliğin uluslararası olarak nitelendirilebilmesi için Türkiye dışından en az 5 ülkeden farklı tebliğ sunan konuşmacının katılım sağlaması ve tebliğlerin yarıdan fazlasının Türkiye dışından katılımcılar tarafından sunulması esastır. '' değişikliğine uygun düzenlenmiştir.

Bilgilerinize arz edilir. Saygılarımla.



Assoc. Prof. Dr. Hasan ÇİFTÇİ
Head Of MeetCon Conference

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INTERNATIONAL CONFERENCE NETWORK

EFFECT OF CHORD LENGTH ON AERODYNAMIC PERFORMANCE OF A MODEL WITH NACA 0015 AIRFOIL

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ABSTRACT

Introduction and Purpose: Morphing wing technologies allow the wing's shape to dynamically assume the appropriate position, significantly improving performance parameters such as lift, drag, and stall resistance. The morphing process typically involves a structured series of steps: first, the aerodynamic mission is determined and relationships between lift and drag are established. An aerodynamic performance target is defined by increasing or decreasing these forces. The controller system then generates actuation signals for the optimal position and transmits them to the shape-shifting actuators. These actuators deform the airfoil's internal structure, flexible surface, or mechanical chain according to its own characteristics, enabling changes in camber, chord, thickness, or angle of attack. The wing then transitions to a new aerodynamic shape based on appropriate operating conditions, while embedded sensors monitor flow parameters to provide real-time feedback. When the desired aerodynamic configuration is achieved, the system can either return the airfoil to its original geometry or adapt to a new configuration, achieving optimal performance in various flight regimes. In this study the effect of increased chord length on airfoil geometry was determined.

Materials and Methods: In this study, models with the initial NACA0015 airfoil profile capable of deformation were examined. Positions for each millimeter increase in chord length were simulated using CATIA CAD, and individual aerodynamic performances were analyzed using Fluent, based on CFD. The k-ω SST turbulence model was used in the analyses.The turbulence intensity in the test area was set to 10% by default. The flow velocity was defined as 10 m/s for each model, and the average Reynolds number was calculated as Re = 100,000.

Results: The results indicated that increasing chord length improved wing aerodynamic performance for specific conditions.

Discussion and Conclusion: The lift and drag coefficients obtained has demonstrated that increasing the chord length increased lift force and decreased drag force at the same angles of attack. In conclusion, the increase in chord length led to improvements in wing aerodynamic performance.

Key Words: NACA0015; Morphing wing; Computational Fluid Dynamics; Aerodynamics

INVESTIGATION OF THE CHANGES IN COMPRESSIVE STRENGTH AND FLEXURAL STRENGTH OF MORTARS PRODUCED WITH DIFFERENT RATIOS OF DATE SEED POWDER

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ABSTRACT

Introduction and Purpose: The date palm, a globally significant plant, is particularly notable for its seeds. Although rich in fibre, date seeds are mostly treated as waste. Recently, sustainable approaches in construction have encouraged the use of such by-products in mortar production. This study investigates the substitution of date seed powder in mortar at ratios of 0%, 5%, 10%, 15%, and 20%, and examines changes in compressive and flexural strengths.

Materials and Methods: Mortar samples were produced using Portland cement CEM I 42.5 R as binder and 0–4 mm river sand as fine aggregate. The water/cement ratio was fixed at 0.5. Five mixtures were prepared by replacing cement with date seed powder at the above ratios. Cube specimens (50×50×50 mm) were tested for compressive strength, while beam specimens (40×40×160 mm) were tested for flexural strength. All specimens were water-cured for 28 days and tested under standard laboratory conditions.

Results: Strength values varied depending on the substitution ratio. As the date seed powder content increased, compressive and flexural strengths decreased across all mixtures. The highest strengths occurred in the 0% mixture, while the lowest were recorded with 20% substitution.

Discussion and Conclusion: The results indicate that using date seed powder as a cement substitute negatively affects mortar strength. The decrease is likely due to insufficient bonding between seed powder and the cement matrix. Microstructural analysis showed higher void ratios in mixtures with seed powder, caused by reduced cemet content. At higher substitution levels, incompatibilities within the internal structure further reduced strength. Thus, date seed powder is not suitable as a binder replacement in mortar.

Key Words: Date Seed Powder, Mortar, Compressive Strength, Flexural Strength

THE INTERSECTION OF GREEN CERTIFICAION AND FORESTRY: A QUANTITATIVE STUDY ON THE YeS-TR SYSTEM IN TURKEY

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ABSTRACT

Introduction and Purpose: Sustainability is now viewed not only as an environmental necessity but also as a comprehensive approach encompassing economic efficiency, effective resource management, and long-term policy strategies. In this context, Turkey's green building certification system, YeS-TR, aims to improve the environmental performance of buildings while also promoting the use of building materials sourced from sustainable forest resources, the reduction of carbon emissions, and the protection of ecosystem services. While the YeS-TR certification system is not directly linked to forestry, it is closely related to the forest products market and sustainable forestry policies. This study used the Conjoint Analysis (CJA) method to reveal the economic and political impacts of YeS-TR on the forestry sector.

Materials and Methods: The CJA method used in the study enabled the quantitative measurement of industry participants' preferences and the determination of the relative importance levels of four key factors. The findings revealed that the use of sustainable forest products is the most critical factor, accounting for 35% of the weight. This was followed by contribution to carbon management (25%), market value and economic benefit (22%), and implementation and prevalence (18%). The results show that the primary concern of industry participants is the sustainable management of resources; however, economic factors also play a decisive role in decision-making processes.

Results: The data indicates that YeS-TR could serve as a strategic tool both in increasing the economic value of forest resources and in integrating them into carbon markets. Integrating the economic value of carbon sequestration capacity into the system could offer new revenue opportunities for the forestry sector. In addition, the increase in the market value of certified forest products creates an important incentive mechanism for forest management. However, realizing this potential depends on strengthening the implementation infrastructure and activating control mechanisms.

Discussion and Conclusion: As a result, the success of YeS-TR is directly related to the transformation capacity of the forest products market, the optimization of resource management, and the economic implementability of sustainable forestry practices. The effective implementation of this system can make a significant contribution to the Turkish forestry sector achieving its sustainable development goals.

Key Words: Ecosystem Services, Carbon Management, Optimization and Decision Making, Green Certification, Conjoint Analysis (CJA), Climate Change

THE EFFECTS OF STORM DAMAGE IN THE SHADOW OF CLIMATE CHANGE: ANALYSIS BY THE ZONGULDAK FOREST REGIONAL DIRECTORATE

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ABSTRACT

Introduction and Purpose: Forest ecosystems are not merely wood production areas; they serve multiple functions such as water retention, soil conservation, carbon storage, providing habitats for biological diversity, and offering economic and cultural contributions to rural communities. However, biotic and abiotic factors increasingly threaten these services. According to assessments conducted at the European level, the total forest area affected by biotic and abiotic factors is approximately 7.3 million hectares, with storm damage accounting for 51% of the losses. The annual wood loss caused by this situation is approximately 38 million m^3, which corresponds to approximately 1.3 times Turkey's total wood production volume for 2024. Since approximately 57% of storm damage, which also causes major destruction in Turkey, occurred in the Zonguldak Forest Regional Directorate (ZOBM) in 2024, this study aims to quantitatively assess the economic and ecological effects of storm damage that occurred within the ZOBM boundaries in 2024.

Materials and Methods: The study examined extraordinary revenue inventory data for 2024 and identified a total of 593,262 m^3 of storm damage in ZOBM. Economic analyses were conducted based on data from 28 auction sales held during the year, and the average unit sales price was calculated as \$85.34/m^3 for coniferous and deciduous species and different product types.

Results: Accordingly, the total market value of storm damage was determined to be approximately \$50.6 million. In addition, carbon stock losses were assessed using IPCC National Greenhouse Gas Inventory calculation methods, and it was determined that the damage corresponded to approximately 534 thousand tons of CO_2 equivalent potential emissions. Accordingly, approximately 26.7 million trees would need to grow for one year to compensate for the carbon loss caused by the storm damage. The findings indicate that ZOBM has a risk profile above the Turkey average in terms of storm damage.

Discussion and Conclusion: The results indicate that urgent measures are needed to reduce economic losses in the region, protect carbon stocks, and ensure the sustainability of ecosystem services. To this end, it is recommended that strategies for reducing disaster risk based on ecosystems be developed, and that financial mechanisms for protecting carbon stocks be established. This study reveals the multidimensional effects of extreme weather events associated with climate change on forest ecosystem services, providing scientific recommendations for managing these effects.

Key Words: Storm Damage, Climate Change, Carbon Management, Sustainable Forestry

INFLUENCE OF SOLAR FLARE-GENERATED MAGNETIC STORMS ON GEOMAGNETIC FIELD MEASUREMENTS AND THEIR IMPLICATIONS FOR THE PETROLEUM INDUSTRY

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ABSTRACT
This article investigates the influence of solar-induced magnetic storms on the accuracy of magnetic field measurements taken within the gap of an electromagnet core. The study highlights that during periods of geomagnetic disturbance, the experimental data obtained from the investigated system may show substantial deviations from the true magnetic field values. These discrepancies are attributed to the perturbations in the Earth's magnetic environment caused by solar flare activity, which interfere with the stability and reliability of measurement processes. Beyond their technical significance, such variations can also have broader implications: changes in the geomagnetic field are known to affect ecological systems, influencing the growth and behaviour of flora and fauna, while also exerting measurable effects on human health and overall well-being. Accurate geomagnetic measurements are critical for reservoir characterization, well placement and monitoring during field development and EOR operations. Geomagnetic disturbances caused by solar activity can introduce deviations in magnetic data, potentially affecting decisions on injection strategies, well trajectories and production optimization. Understanding these influences is essential for maintaining operational efficiency, minimizing risks and improving recovery performance in hydrocarbon fields. The study emphasizes the need to account for space-weather effects in the planning and execution of field development and EOR projects, highlighting strategies to ensure measurement reliability under geomagnetic fluctuations. By linking solar-induced magnetic variability to practical challenges in EOR and field development, the research provides insights for enhancing production efficiency and optimizing reservoir management.
Keywords: Solar Flare, Magnetic Storm, Petroleum Industry, Magnetic Field Measurement, Ecology.

INTRODUCTION
When conducting experimental studies that involve measuring the magnetic field of an "open" system, meaning a setup that is not magnetically shielded by impermeable materials, the reliability of the measurements can be affected by the superposition of external magnetic influences. These disturbances may arise from various sources, including natural variations in the Earth's geomagnetic field, localized anthropogenic electromagnetic fields, and large-scale solar-induced magnetic storms. Such external contributions can lead to deviations between the measured and the actual values of the investigated magnetic field, complicating both the

interpretation of results and the reproducibility of experiments (Yang, Zhou & Blunt, 2021; Alvarado & Manrique, 2010).

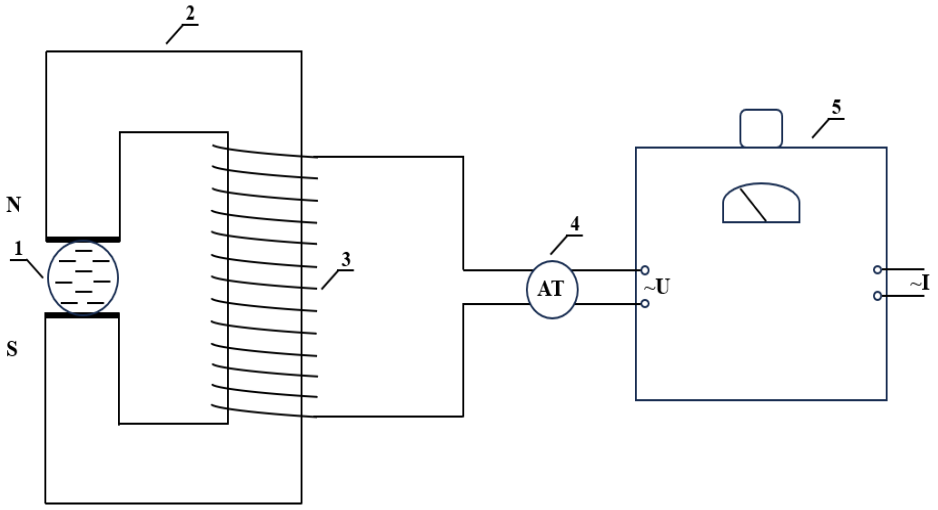
In this context, the present article focuses on the effect of a solar-generated magnetic storm on magnetic field measurements performed within the gap of an electromagnet core. The chosen object of study is particularly relevant because an electromagnet with an open measurement gap is sensitive to fluctuations in the surrounding magnetic environment. During geomagnetic disturbances, the intensity and orientation of the Earth's magnetic field undergo rapid changes, which in turn can distort the electromagnetic conditions inside the measurement zone. These distortions may manifest as shifts in field strength, fluctuations in stability, or increased noise in the recorded data (Mirzajanzade, Iskandarov, Abdullayev, Agayev, Aliyev, Amirov & Gasimov, 1960).

METHODOLOGY

To illustrate the experimental configuration, the schematic diagram of the electromagnet core with its measurement gap is presented in Figure 1. This setup enables a detailed examination of how external solar-induced perturbations interact with the controlled magnetic field of the system. By analyzing the deviations observed during periods of magnetic storm activity, the study aims to quantify the degree of influence such cosmic phenomena exert on laboratory-scale measurements. The findings are significant not only for improving the accuracy of magnetic field investigations in unshielded environments but also for developing strategies to mitigate the impact of space weather on sensitive experimental systems (Mammadzade, 2021; Safarov, Vezhnin & Vulfovich, 2020).

1 – object under study, 2 – electromagnetic coil core, 3 – ammeter, 4 – alternating current to direct current converter.

Figure 1.



Schematic diagram of the experimental setup.

Measurements on the setup for treating the studied object (1) with a magnetic field are carried out as follows. A direct electric field voltage U is set at the output of the AC-to-DC converter (4). Using a magnetometer, the magnetic field strength H, located in the middle of the electromagnetic coil core (2) is determined. The obtained values are recorded in a table, based on which the dependence of H on U is plotted, see Figure 2.

The date of the experiment was determined from Table 1, which indicates the days of geomagnetic disturbances in November 2024 in the city of Baku, published on the internet.

In addition, it should be noted that magnetic storms are natural phenomena arising from disturbances in the Earth's geomagnetic field and occur quite frequently. These disturbances can have a serious impact on electromagnets, other systems operating on the basis of electromagnetic fields, and sensitive experimental devices. Variations in the geomagnetic field lead to local instabilities in the electromagnetic field, which in turn may cause measurement errors or operational inconsistencies in electromagnetic-based equipment, especially in instruments requiring high precision. Such effects may reduce the accuracy of experimental results and lead to data distortion.

For the month of November, Table 1, which reflects the intensity of magnetic storms in Baku, provides essential information for assessing their potential impact on laboratory experiments. The intensity levels presented in the table quantitatively evaluate the strength of disturbances in the planet's magnetic field and allow researchers to identify the most suitable days for conducting laboratory experiments. The intensity levels of magnetic storms (expressed on a scale from 1 to 8, as shown at the bottom of the table) indicate different degrees of geomagnetic activity. Experiments were conducted on days when the scale indicated "minor disturbances," ensuring stability and correctness of the results. These conditions minimized the influence of geomagnetic activity and created favorable conditions for obtaining more accurate and reliable experimental analyses (Mammadzade & Alizade, 2025; Alizade, 2025).

Moreover, the careful scheduling of experiments based on geomagnetic indices is consistent with international scientific practice, where space-weather data are often incorporated into experimental design to ensure reproducibility. In particular, avoiding periods of highgeomagnetic activity not only improves the quality of measurements but also contributes to reducing uncertainty in the interpretation of observed physical phenomena. By integrating geomagnetic monitoring into the planning stage, researchers strengthen the credibility of their results and ensure that any observed effects can be attributed to controlled experimental variables rather than external natural disturbances.

Furthermore, it is worth mentioning that for each day of laboratory experiments involving the use of magnets, real-time geomagnetic activity indicators were monitored, and any sudden changes were recorded and considered during the interpretation of results. In practice, this meant continuous observation of geomagnetic indices from specialized monitoring centers, with data cross-checked against independent international observatories. This additional verification step reduced the possibility of overlooking short-lived geomagnetic fluctuations that could affect sensitive instruments.This approach made it possible not only to account for the general level of magnetic storms but also to minimize the effects of local and short-term geomagnetic deviations. As a result, external geomagnetic influences on experimental outcomes were reduced to a minimum, ensuring high accuracy and reliability of the measurements, while at the same time confirming that careful selection of experimental periods and continuous monitoring of geomagnetic conditions are essential prerequisites for obtaining reproducible and scientifically valid results.

Table 1. Indicators of magnetic storm activity levels observed in Baku during the month of November (Internet material)

Dates	Time Frames							
	00:00	03:00	06:00	09:00	12:00	15:00	18:00	21:00
01.10.2024	1	1	1	1	1	1	1	1
02.10.2024	1	1	1	1	1	1	1	1
03.10.2024	1	1	1	1	4	5	3	3
04.10.2024	4	4	6	6	6	4	5	5
05.10.2024	3	4	4	6	6	7	7	6
06.10.2024	5	5	4	4	4	5	5	4
07.10.2024	4	4	3	3	3	3	4	5
08.10.2024	5	3	3	3	3	3	3	3
09.10.2024	2	2	1	1	1	1	1	2
10.10.2024	5	7	7	8	8	7	7	8
11.10.2024	7	6	6	6	6	5	4	5
12.10.2024	4	4	3	3	3	4	3	2
13.10.2024	2	2	1	2	2	3	3	3
14.10.2024	2	2	1	1	2	2	2	2
15.10.2024	2	1	1	2	3	4	4	3
16.10.2024	3	3	3	4	4	3	2	2
17.10.2024	2	1	2	2	2	3	2	3
18.10.2024	2	2	3	3	3	4	4	3
19.10.2024	3	2	2	2	2	3	3	3
20.10.2024	3	3	2	2	1	1	1	1
21.10.2024	1	1	1	1	1	1	4	2
22.10.2024	2	2	2	2	2	2	2	2
23.10.2024	2	2	2	2	2	2	2	2
24.10.2024	2	2	2	2	2	3	3	4
25.10.2024	3	2	2	2	2	2	4	4
26.10.2024	3	3	3	2	2	2	3	3
27.10.2024	3	3	2	2	1	2	3	5
28.10.2024	5	5	5	4	4	4	4	3
29.10.2024	3	3	3	2	2	2	3	2
30.10.2024	2	2	2	2	2	2	1	1
31.10.2024	1	1	1	1	1	1	2	2

The numbers indicated in the table's scale correspond to the following conditions:
1 - No significant disturbances, 2 - Minor disturbances, 3 - Weak geomagnetic storm, 4 - Minor geomagnetic storm, 5 - Moderate geomagnetic storm, 6 - Strong geomagnetic storm, 7 - Severe geomagnetic storm, 8 - Extreme geomagnetic storm.

CONCLUSION AND DISCUSSION

The experiments were carried out in accordance with the established methodology under both high and low geomagnetic activity conditions. During the tests, the oil volume, water volume, electrical resistance, and potential difference were measured and the corresponding results were incorporated into Table 2. As can be seen from the data, when the experiments coincided with periods of high geomagnetic activity, the obtained values of the investigated parameters, as well as their overall efficiency, were noticeably lower. In contrast, under conditions of low geomagnetic activity, the measured oil and water volumes, together with the resistance and potential difference, showed a significant increase, reflecting an improvement in efficiency.

This comparison clearly demonstrates that geomagnetic activity exerts a considerable influence on the system, where reduced activity creates more favorable conditions for fluid displacement and electrokinetic behavior in the porous medium.

Table 2. The results of experiments conducted at low (1st) and high (2nd) geomagnetic actiivty conditons.

t, min	P, atm	V_{oil}, mL		η_{oil}, %		V_{wat}, mL		η_{wat}, %		R, kOm		U, mV	
		1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
5	1.6	0	0.0	0.00	0.00	0	0	0.00	0.00	140	140	57.8	58.1
10	3.2	1	0.5	0.29	0.21	0	0	0.00	0.00	130	140	52.2	52.8
15	4.8	2	1.0	0.59	0.42	0	0	0.00	0.00	130	150	48.7	49.8
20	6.4	3	2.0	0.88	0.64	0	0	0.00	0.00	135	140	51.4	51.8
25	8.0	4	3.0	1.18	0.97	0	0	0.00	0.00	135	140	53.1	53.7
30	9.6	5	4.0	1.47	1.22	0	1	0.00	0.12	135	130	54.6	54.1
35	11.2	8	6.0	2.35	1.98	3	3	0.38	0.38	130	140	50.3	51.2
40	12.8	12	10.0	3.53	3.15	5	5	0.63	0.63	130	150	53.8	55.4
45	14.4	15	12.0	4.41	4.05	8	7	1.00	0.98	130	140	52.1	53.4
50	16.0	25	20.0	7.35	5.81	13	14	1.63	1.65	130	140	54.1	55.1
55	17.6	40	34.0	11.76	6.93	18	17	2.25	2.21	120	150	48.1	50.1
60	19.2	60	53.0	17.65	15.67	25	26	3.13	3.16	130	140	50.6	51.3
65	20.8	85	77.0	25.00	20.05	40	43	5.00	5.21	120	130	46.8	47.7
70	22.4	100	92.0	29.41	25.15	65	67	8.13	8.20	120	140	44.2	45.9
75	24.0	120	109.0	35.29	31.23	100	107	12.50	13.42	120	140	47.5	48.6
80	25.6	135	124.0	39.70	36.61	140	145	17.50	19.41	120	140	50.2	51.2
85	27.2	150	141.0	44.12	38.83	180	190	22.50	23.39	120	130	49.6	50.4
90	28.8	165	154.0	48.53	42.25	225	235	28.13	30.04	110	130	53.5	55.2
95	30.4	180	170.0	52.94	46.78	260	270	32.50	33.27	110	120	49.3	50.5
100	32.0	185	176.0	54.41	50.05	300	310	37.50	38.32	100	120	45.9	46.1
105	33.6	190	181.0	55.88	51.12	350	365	43.75	44.65	100	130	43.6	45.3
110	35.2	199	185.0	58.53	53.28	408	420	51.00	54.11	100	120	45.4	46.3

According to research findings the following results are concluded:

1. Geomagnetic activity has a measurable impact on experimental outcomes. The comparison of results under high and low geomagnetic activity demonstrates that magnetic storms reduce the efficiency of oil and water displacement, as well as lower the values of resistance and potential difference. This confirms that external geomagnetic disturbances directly interfere with the accuracy and stability of magnetic field–dependent measurements.
2. Low geomagnetic activity provides more favorable conditions for EOR-related processes. Experiments carried out during low geomagnetic activity exhibited higher oil and water recovery volumes, along with improved resistance and potential difference values. These results indicate that reduced geomagnetic disturbance enhances electrokinetic effects in porous media, leading to more efficient displacement behavior.
3. Accounting for space-weather effects is critical for petroleum operations. The findings emphasize that solar-induced geomagnetic disturbances can influence both laboratory experiments and field-scale applications, including reservoir monitoring, well placement, and EOR optimization. Careful timing of experiments and continuous monitoring of geomagnetic conditions are therefore necessary to ensure reliable measurements, minimize operational risks, and improve overall recovery efficiency.

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COMPARATIVE DEEP LEARNING APPROACHES FOR SIGN LANGUAGE RECOGNITION: TEMPORAL CONVOLUTION AND TRANSFORMER MODELS ON THE WLASL DATASET

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ABSTRACT

Introduction and Purpose: Sign language recognition is an essential research field in computer engineering, as it enables the development of inclusive communication technologies for individuals with hearing impairments. This study aims to comparatively evaluate two alternative deep learning architectures beyond ResNet-based baselines: a temporal convolutional network (TCN) designed to capture short- and mid-range gesture dynamics, and a transformer-based encoder capable of modeling long-term dependencies.

Materials and Methods: Experiments were conducted on the Word-Level American Sign Language (WLASL) dataset, which was obtained from Kaggle, using signer-independent partitions and five-fold cross-validation. Multiple random seeds were applied to ensure reproducibility and statistical reliability. Performance evaluation included accuracy, macro F1, calibration metrics, and robustness tests under varying illumination, occlusion, and temporal jitter conditions.

Results: The TCN model achieved an average accuracy of 92.4% and a macro F1 of 91.7%, while reducing parameter complexity by approximately 40% compared to ResNet50. The transformer model reached 94.1% accuracy and 93.5% macro F1, providing superior differentiation of visually similar gestures, though with a 1.8× increase in training time and higher inference latency.

Discussion and Conclusion: The findings highlight the trade-offs between efficiency and performance across different architectures. While TCN provides a lightweight yet robust solution, the transformer model demonstrates stronger recognition capability for complex gesture patterns. Ablation analyses and Grad-CAM visualizations further illustrate the interpretability and limitations of each architecture. These results emphasize practical pathways for applying sign language recognition in educational and healthcare domains, where reliable and accessible gesture interpretation systems are increasingly needed.

Key Words: Sign Language Recognition; Temporal Convolutional Networks (TCN); Transformer Models; Accessible Artificial Intelligence; Human-Computer Interaction

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EBELİK EĞİTİMİNDE YENİLİKÇİ YAKLAŞIMLAR

INNOVATIVE APPROACHES IN MIDWIFERY EDUCATION

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ÖZET

Sağlık sisteminin hızla değişen gereksinimleri, ebelik eğitiminin öğrenci merkezli, etkileşimli ve teknoloji destekli yöntemlerle yeniden yapılandırılmasını zorunlu kılmaktadır. Anne ve bebeğine doğrudan temas eden ebelik mesleğinde, eğitim kalitesini artıracak yenilikçi yaklaşımların belirlenmesi önemlidir. Bu derlemede sağlıklı iki canlı ile temas halinde olan ebelik mesleğinde eğitimin kalitesinin arttırılmasında yol gösterici olacak eğitim yaklaşımlarının ele alınması amaçlanmıştır.

Ebelik eğitiminde kullanılan güncel yöntemleri incelemek üzere planlanan çalışmada PubMed, Scopus, Web of Science, Google Scholar, Cochrane Library, YÖK Ulusal Tez Merkezi ve TR Dizin veri tabanları taranmıştır. "midwifery education", "innovative approaches", "simulation", "digital learning", "team-based learning", "interprofessional education" ve Türkçe karşılıkları kullanılarak güncel literatürde tarama yapılmıştır.

Literatürde en sık vurgulanan yöntemler; simülasyon temelli eğitim, ters-yüz öğrenme, ekip tabanlı öğrenme, teknoloji destekli öğrenme, interprofesyonel eğitim, yansıtıcı uygulamalar ve yapay zekâ destekli öğrenmelerdir. Simülasyon, klinik becerilerin güvenli geliştirilmesinde en etkili yöntem olarak öne çıkmaktadır. Ters-yüz öğrenme, klasik derslere göre öğrenciyi aktif kılarak kalıcılığı artırmaktadır. Ekip tabanlı öğrenme, iletişim ve işbirliği becerilerini güçlendirmektedir. İnterprofesyonel eğitim, disiplinler arası koordinasyonu geliştirmektedir. Yapay zekâ kişiselleştirilmiş geri bildirim sunarak gelecekte daha önemli bir potansiyel taşımaktadır. Dijital öğrenme ise öğrenciye esneklik sağlarken, yüz yüze eğitim yöntemi öğrenciler arası etkileşimde daha avantajlıdır. Genel değerlendirmede, öncelikli olarak simülasyon temelli eğitim öne çıkmakta; ters-yüz, ekip tabanlı ve interprofesyonel yaklaşımlar onu takip etmektedir.

Ebelik eğitiminin çağın gereklerine uyum sağlayabilmesi, öğrenci merkezli ve teknoloji destekli yöntemlerin entegrasyonu ile mümkündür. Teori ve pratiği bütünleştiren bu yöntemler, öğrenme motivasyonunu artırarak hem akademik hem klinik becerilerin gelişimine katkı sağlamaktadır. Müfredatların bu yönde güncellenmesi ve eğitimcilerin kendini bu öğrenme metotlarına adapte etmesi eğitimin kalitesini arttıracaktır.

Anahtar Kelimeler: Ebelik, ebelik eğitimi, yenilikçi yaklaşımlar, öğrenme metotları

ABSTRACT

The rapidly changing needs of the healthcare system necessitate the restructuring of midwifery education with student-centered, interactive, and technology-supported methods. It is crucial to identify innovative approaches that will improve the quality of education in midwifery, a profession that directly interacts with mothers and their babies. This review aims to explore educational approaches that will guide the improvement of the quality of education in midwifery, a profession that interacts with two healthy living beings.

To review the literature evaluating current methods used in midwifery education, the PubMed, Scopus, Web of Science, Google Scholar, Cochrane Library, YÖK National Thesis Centre, and TR Index databases were searched. The search was conducted using the terms 'midwifery education', 'innovative approaches', "simulation", 'digital learning', 'team-based learning', 'interprofessional education' and their Turkish equivalents.

The methods most frequently emphasized in the literature are simulation-based education, flipped learning, team-based learning, technology-enhanced learning, interprofessional education, reflective practices, and artificial intelligence-supported learning. Simulation stands out as the most effective method for safely developing clinical skills. Flipped learning increases retention by keeping students active compared to traditional courses. Team-based learning strengthens communication and collaboration skills. Interprofessional education improves interdisciplinary coordination. Artificial intelligence holds even greater potential in the future by providing personalized feedback. Digital learning, on the other hand, provides flexibility for students, while face-to-face education offers advantages in student interaction. In the overall evaluation, simulation-based education stands out as the primary choice, followed by flipped, team-based, and interprofessional approaches.

Adapting midwifery education to modern needs is possible through the integration of student-centered and technology-supported methods. These methods, which integrate theory and practice, increase motivation to learn and contribute to the development of both academic and clinical skills. Updating curricula accordingly and adapting educators to these learning methods will enhance the quality of education.

Keywords: Midwifery, midwifery education, innovative approaches, learning methods

GİRİŞ

21. yüzyılda teknolojinin gelişimi, sağlık hizmetlerindeki hızlı değişimler ve toplumun artan ihtiyaçları gebelik, doğum, doğum sonrası dönem ve yenidoğan bakımını desteklemede köklü bir role sahip olan ebelerin eğitiminde sürekli yenilenmeyi zorunlu kılmaktadır (Yılmaz & Karanisoğlu, 2016). Geleneksel eğitim yöntemleri, öğrencilerin eleştirel düşünme, karar verme ve klinik beceri geliştirme süreçlerinde tek başına yeterli bulunmamaktadır (Ameh & Van den Broek, 2015). Bu nedenle son yıllarda, yenilikçi ve öğrenci merkezli yaklaşımlar ebelik eğitim programlarında giderek daha fazla yer almaktadır.

Simülasyon temelli eğitim, öğrencilerin güvenli bir ortamda klinik uygulamaları deneyimlemelerine olanak tanıyarak öz yeterliliklerini artırarak hata riskini azaltırken, probleme dayalı öğrenme ve ters yüz öğrenme gibi yaklaşımlar öğrencilerin öğrenme sürecine aktif katılımını teşvik ederek kalıcı öğrenmeyi desteklemektedir (Hayden, 2010; Nelissen et al., 2017, Fritz et al., 2017). Bir başka eğitim yaklaşımı olan ekip tabanlı öğrenme ise öğrencilerin iletişim ve işbirliği becerilerini güçlendirmektedir (Pires et al., 2025). Teknoloji destekli uygulamalar ve interdisipliner eğitim modelleri ise öğrencilerin mesleki bilgi ve becerilerini güncel sağlık sisteminin gereksinimlerine uyarlamalarına yardımcı olmaktadır (Nghitanwa, Endjala, & Hatupopi, 2019).

Dolayısıyla, ebelik eğitiminde yenilikçi yaklaşımların incelenmesi, hem öğrenci başarısı hem de sağlık hizmeti kalitesinin artırılması açısından kritik bir öneme sahiptir. Bu makalede, ebelik eğitiminde kullanılan yenilikçi yöntemler literatür ışığında ele alınacak ve eğitimdeki katkıları tartışılacaktır.

SİMÜLASYON TEMELLİ EĞİTİM

Simülasyon temelli eğitim; gerçek dünyanın ögelerini taklit ederek teori ve pratik arasındaki boşluğu kapatan belirli öğrenme hedeflerine ulaşmayı amaçlayan bir eğitim yöntemidir (Williams et al., 2018; Beşevli & Hüseyinoğlu, 2024). Bu yöntem, eğitimdeki yeni yaklaşımlar ve deneyimsel öğrenme teorileriyle uyumlu olup sağlık profesyonellerinin eğitiminde güçlü ve kanıta dayalı bir öğretim ve öğrenme yöntemi olarak kullanılmaktadır (Vermeulen et al., 2021; Beşevli & Hüseyinoğlu, 2024).

Sağlık hizmeti sunucularının özellikle ebelik öğrencilerinin becerilerinin geliştirilmesinde simülasyon teknikleri 2000'li yılların başlarından bu yana önemli bir eğitim stratejisi olarak benimsenmiştir. Simülasyon teknikleri, öğrencilerin teknik becerilerini geliştirmenin yanı sıra öğrencilerin karar verme ve algılama yeteneklerini de geliştirmeye yardımcı olmaktadır (Williams et al., 2018). Ebelik eğitiminde kullanılan simülasyonların hasta güvenliği ve acil durum müdahaleleri ile ilgili olumlu sonuçlar ortaya koyduğu bu nedenle simülasyonun ebelik eğitiminde kritik bir rol oynadığı belirtilmektedir (Reyhan vd., 2018). Simülasyonun ebelik eğitimi için kullanım tarihine baktığımızda ise tıpta ilk kez simülasyon 16. yüzyılda "phantom" denilen plastik modellerle gerçekleştirilmiş olup obstetrik yeteneklerin geliştirilmesi ve bu sayede anne- bebek ölümlerini azaltılması amaçlanmıştır (Edeer & Sarıkaya, 2015). 19. yüzyılda ise; ilk kez doğum sürecinde balmumu ve ahşap figürlerle anlatma yöntemi uygulanmıştır (Göktolga & Demir, 2010).

Dünya Sağlık Örgütü (DSÖ)'nün 2018 yılında yayımladığı "Hemşirelik ve Ebelik Eğitiminde Simülasyon" adlı kılavuz, uluslararası standartlarda eğitim ve öğretimin sağlanabilmesi için simülasyon temelli eğitimi önermekte; bu yöntemin avantajlarına ayrıntılı biçimde yer vermektedir (WHO, 2018; Beşevli & Hüseyinoğlu, 2024). Simülasyon temelli eğitimin başlıca avantajları arasında öğrencilerin bilişsel ve psikomotor becerilerinde gelişim sağlaması, teori ile uygulama arasındaki bağlantıyı güçlendirmesi ve girişimsel prosedürlerin simülatörler aracılığıyla önceden uygulanabilmesi sayesinde güvenli bir klinik ortam oluşturulması yer almaktadır (WHO, 2018).

Simülasyon Çeşitleri

Hayden (2010) simülasyon uygulamalarını gerçeklik düzeyine göre düşük, orta ve yüksek gerçeklikli olmak üzere üç gruba ayırmıştır. Bu simülasyon türleri, eğitim programlarında verimliliği ve etkililiği artırma fırsatı sunmaktadır (WHO, 2018; Beşevli & Hüseyinoğlu, 2024).

Düşük Gerçeklikli Simülatörler: İntramüsküler uygulama teknikleri için kullanılan bacak veya kalça gibi temel anatomik modellerden ve bilgisayarsız mankenlerden oluşmaktadır (Karaduman & Başak, 2022; Maskálová et al., 2018). Öğrencilere geri dönüş sunamama, etkileşimli iletişim ve karar mekanizmalarını geliştirmede etkisiz kalma gibi dezavantajları bulunmasına rağmen düşük gerçeklikli simülatörler öğrenme sürecini olumlu yönde etkilemektedir (Sezer & Elçin, 2017; Hazar & Gültekin, 2019).

Orta Gerçeklikli Simülatörler: Öğrencilere uygulama sırasında elektronik cihazlar (bilgisayar gibi) aracılığıyla geri bildirim sağlayan düşük maliyetlerle elde edilebilen cihazlardır (Sezer &Elçin, 2017). Bu simatörler içerisinde en yaygın olanları ekran tabanlı, mekanik işlev öğretici mankenler ve sanal gerçeklik özellikli haptik simülatörlerdir (Sezer & Elçin, 2017; Hazar & Gültekin, 2019).

Yüksek Gerçeklikli Simülatörler: Teorik bilgiyi klinik uygulamalarla birleştirerek, yüksek riskli müdahalelerde hastaya zarar vermeden, gerçeğe en yakın ekipmanlarla deneyim

kazanmayı sağlayan, yüksek teknoloji içeren görsel ve ileri düzey girişimsel cihazların kullanıldığı simülasyon yöntemidir (Hayden, 2010).

Simülasyonun Ebelik Eğitiminde Kullanım Alanları

Doğum ve Doğum Eylemi Yönetimi: Ebelik eğitiminde doğumun fizyolojik mekanizmalarının ve yönetiminin öğrenilmesi süreci kaçınılmaz unsurlardan olup ebenin bu süreci güvenli bir şekilde yönetmesi gerekmektedir (İldan Çalım vd., 2020). Bu nedenle ebelik eğitim programları, klinik becerileri geliştirmek için simülasyon tabanlı eğitimi kullanmaktadır. Bu eğitimler klinik becerileri geliştirmekle kalmayıp aynı zamanda öğrencilerin bilgisini geliştirme, hasta güvenliğini arttırma ve öğrencilere klinik ortamda nadiren görülen vakalarda pratik yapma olanakları sağlamaktadırlar (Lendahls & Oscarsson, 2017). Mannella et al, (2018) yüksek gerçeklikli doğum simülatörünün öğrencilerinin klinik yönetim kapasitesini ve öz güvenini artırdığını belirlemişlerdir. Ayrıca simülasyon tabanlı eğitimler iletişim, problem çözme, eleştirel düşünme ve ekip çalışması gibi klinik odaklı faaliyetlerin geliştirilmesinde faydalı olmaktadır (İldan Çalım vd.,2020).

Acil Obstetri:

Son yirmi yıldır dünya genelindeki en önemli hedeflerden biri anne ve yenidoğan morbidite ve mortalitesini azaltmaktır. Sağlık hizmetinde oluşabilecek herhangi bir gecikme veya aksaklık bu hedefe ulaşmada başarısızlığa neden olabilmektedir (Ameh & Van Den Broek, 2015). Bu başarısızlığı önleyebilmek adına çalışmalar yapılmakta olup altyapının güçlendirilmesi, obstetri alanında çalışan sağlık profesyonellerinin eğitimine önem verilmesi ve kaynakların sınırlı olduğu bölgelerde acil obstetrik bakımın iyileştirilmesi üzerine girişimlerde bulunulmaktadır (Fritz et al., 2017). Bu bağlamda çeşitli simülasyon eğitimleriyle omuz distosisi, postpartum kanama, acil sezeryan, umblikal kord prolapsusu gibi acil obstetrik komplikasyonlarda obstetrik bakım becerileri kazandırılmaktadır (Beşevli & Hüseyinoğlu,2024). Bu simülatörler sadece öğrenci eğitiminde değil klinikte çalışan sağlık profesyonellerininde bilgi güncellemelerinde kullanılmaktadır. Huang vd.. (2018) umblikal kord vakalarında ilk yardım simülasyonu eğitimi çalışmasında simülasyon eğitimi sonrası sağlık profesyonellerinin tanılamayı daha erken yapabildiği ve yenidoğan apgar skorlarının 1, 5 ve 10. dakikalarda daha yüksek olduğu aynı zamanda yenidoğan yoğun bakım ünitesine yatış oranlarının daha düşük olduğu belirlenmiştir. Bir başka acil obsterik komplikasyon olan postpartum kanama yönetiminde literatürde yer alan çalışmalar obstetrik simülasyon tabanlı eğitimin kanama yönetiminde klinik performansı iyileştirdiğini, postpartum kanama insidansının %2,1'den %1,3'e düştüğü belirtmiştir (Nelissen et al., 2017; Nghitanwa, Endjala & Hatupopi, 2019).

Sonuç olarak simülasyonlar teorik bilgi ile uygulamalı pratiği birleştirerek klinisyenler ve ebelik öğrencilerinin vakalara müdahalesinde kritik öneme sahiptir.

Ters-Yüz Öğrenme (Flipped Learning)

Ters yüz öğrenme (TYÖ), ders öncesi ve ders içi etkinlikler ile desteklenen, bilgi iletişim teknolojileri ile zenginleştirilmiş yenilikçi bir öğrenme yaklaşımıdır (Hew & Lo 2018). Bu yaklaşımda eğitmen tarafından öğrencinin gereksinimleri doğrultusunda hazırlanmış video, podcast, eğitsel oyunlar vb. eğitim materyallerini öğrenci ders öncesi çalışarak derse gelmekte ve ders içinde grup tartışmaları, olgu sunumları, beyin fırtınası vb. etkinlikler ile üst düzey beceriler geliştirmektedir (Erden,2022). Çevirimiçi platformların kullanımıyla desteklendiği için dönüştürülmüş sınıf olarak da adlandırılan TYÖ bireysel ya da rekabetçi öğrenme ortamının aksine işbirliğine dayalı öğrenme ortamı sunmaktadır (Kaban, 2022).

Ders öncesi ve ders sonrası uygulamalar ile öğrenme sürecini destekleyen TYÖ' de öğrencilerin başarı skorlarının arttığı, eleştirel düşünme, öz düzenlemeli öğrenme, problem çözme becerilerinde olumlu etki yarattığı, uygulama becerilerinin arttığı ve kendi kendine liderlik

becerilerinin geliştiği görülmektedir (Lee & Park 2018; Li & ark. 2020; Park & Suh, 2021). Golaki et al., (2022) TYÖ yaklaşımının, geleneksel yaklaşıma kıyasla hasta güvenliği bilgisinin kalıcılığında olumlu etkiler gösterdiğini belirtmiştir. Oktorina et al., (2023) modifiye edilmiş ters yüz sınıf yaklaşımının ebelik öğrencilerinin derse hazırlık, aktif katılım ve anlayışlarında belirgin iyileşmeler olduğu görülmüştür. Literatürde yer alan bir başka çalışmada ise Koronavirüs hastalığı 2019 (COVID-19) pandemisi sırasında uygulanan TYÖ yaklaşımının çevrimiçi ön hazırlık ve etkileşimli sınıf içi bölümün öğrenmede fayda sağladığı belirtilmiştir (Astuti et al., 2024).

Ters yüz öğrenme yaklaşımının ebelik eğitiminde kullanımı ile ilgili çalışmalar sınırlı olup konu ile ilgili daha çok çalışmaya ihtiyaç duyulmaktadır.

Ekip Tabanlı Öğrenme (ETÖ)

Ekip Tabanlı Öğrenme (ETÖ), tek bir eğitmenin bulunduğu büyük ya da küçük (>100 öğrenciye ya da <25 kişilik) sınıflara uygulanabilen, küçük gruplar aracılığıyla yürütülen bir öğretim stratejisidir. Öğrenci merkezli yapısı ve birçok mesleki yeterliliği destekleme potansiyeli ile dikkat çeken ETÖ, öğrencilere hem bilgi edinme hem de edindikleri bilgileri uygulama fırsatı sunar. Bu yöntemin temel bileşenleri; stratejik ekip oluşturma, ders dışı hazırlık (ön ödev), hazırlık için yeterli süre verilmesi ve takım temelli uygulamalardır (Parmelee & Hudes, 2012). ETÖ'nün temel amacı, öğrencilerin bilgi düzeylerini artırmanın yanı sıra eleştirel düşünme ve problem çözme becerilerini geliştirmektir (Ulfa et al., 2021).

Esasen tıp eğitiminin her kademesinde kullanılabilen ve öğrenme sürecini güçlendiren özenle oluşturulmuş bir adım dizisini izleyen aktif bir öğrenme öğretim stratejisi olan ETÖ son zamanlarda ebelik eğitiminde de uygulanmaya başlamıştır (Parmelee & Hudes, 2012; Ulfa et al., 2021). Ulfa et al., (2024)' nin öğretim üyeleri ve öğrencilerin katılım gösterdiği araştırma ekip tabanlı öğrenmenin öğrenci bilgisinin ve öğrencilerin derse aktif katılımını arttırdığını kanıtlanmıştır. Her iki okulda da ETÖ 'nün benimsendiği, öğretim üyeleri ve öğrencilerin ilgi ve aktif katılım gösterdiği gözlemlenmiştir. Konu ile ilgili yapılan sistematik derlemede ise ETÖ'nün öğrenci katılımı, öğrenci memnuniyeti, başarı, uygulama geliştirme ve dönüştürücü öğretim ve öğrenme üzerinde etkili olabilecek bir strateji olduğu belirlenmiştir (Dearnley vd, 2018). Ekip tabanlı eğitim ayrıca anne ve yenidoğan sağlığının iyileştirilmesinin önünde engel teşkil eden düşük seviyeli bakımın kalitesini arttırmak için kullanılabilmektedir. Ulfa et al., (2021)' nin Endonezya'daki ebelik öğrencilerinin doğum sonrası kanama konusundaki bilgilerini ve öğrenme memnuniyetlerini artırmak için kullandıkları ekip tabanlı öğrenme stratejisinin, öğrencilerin bilgisini geliştirmek için etkili bir aktif öğrenme stratejisi olduğu belirlenmiştir.

Toplumda en iyi sağlık hizmetini sunabilmeleri için ebelerin üstün liderlik, etkili iletişim ve ekip çalışması gibi becerilere sahip olmaları gerekmektedir. Bu sebeple, ebelik öğrencilerinin eğitim ve mesleki becerilerini geliştirmek için ekip tabanlı öğrenme yaklaşımı önerilmekte ve konu ile ilgili literatüre katkı sağlayacak çalışmalar yapılması önerilmektedir.

Dijital Öğrenme

Dijital öğrenme yaklaşımı gelişmekte olan ülkelerdeki üniversiteler ve öğretim kurumları için bilgi sağlamada temel dayanak haline gelmiştir (Zhang et al., 2020). Bilgi teknolojisi aracılığıyla öğrencilere sağlanan eğitimin kalitesini artırmak için kullanılan dijital öğrenme aynı zamanda öğrenciler ve eğitimciler için birlikte öğrenme ve etkileşim kurma konusunda yeni yollar açmaktadır (Bao, 2020; Gegenfurtner et al., 2021).

Dijital öğrenme (e-öğrenme) müdahaleleri ebelik eğitiminde yirmi yıldan uzun süredir kullanılmaktadır (Button et al., 2014). COVID-19 pandemisi sırasında, eğitim kurumlarını tamamen kapanma olasılığına karşı kesintisiz öğretim ve öğrenme gerekliliği nedeniyle dijital öğrenme kullanımı hızlanmıştır (Bao, 2020). Dijital öğrenme sosyal medya platformları, öğrenci öğrenmesine yardımcı olabilecek içerik paylaşımı ve başkalarıyla bağlantı

kurma konusunda dijital bir kültüre sahip açık çevrimiçi alanlara sahip farklı yöntemleri içinde barındırmaktadır (Price et al., 2018 ; O'Connor et al., 2018). Bu yöntemler arasında simülasyonlar, oyunlaştırma, harmanlanmış öğrenme şeklinde yöntemler yer almaktadır (Şahin & Samur, 2017; Tonbuloğlu & Tonbuloğlu 2021; Bulut & Gölbaşı, 2023).

Dijital öğrenme, öğrencilerin öğrenme hızlarını düzenlemelerine ve nasıl öğrendiklerini izlemelerine yardımcı olmakla beraber (Gegenfurtner et al., 2021) öğrencilere yer ve zaman esnekliği ve çalışma materyallerine erişim kolaylığı sağlamaktadır (Siddiqui et al., 2024). Bu avantajlarının yanı sıra dijital öğrenmenin bilgisayar sunucularının çok fazla kullanıcıyı barındıramama, çevrimiçi eğitim platformunun aşırı yüklenmesi nedeniyle sık sık kapanabilme ve öğrencilerin odaklarını çok çabuk kaybedebilme gibi dezavantajları bulunmaktadır (Bao, 2020). Siddiqui et al., (2024) dijital öğrenmeye nazaran yüz yüze öğrenmenin bilgi, klinik beceriler ve sosyal yeterliliklerde bir artışa yol açtığını belirlemişlerdir.

Öğretim elemanları, dijital öğrenme ve yüz yüze öğretim ve öğrenmede hayati paydaşlardır (Bali &Lui, 2018) ve dijital öğrenme yöntemlerinin ebelik programlarına dâhil edilmesi, müfredatın güncellenmesini ve gerekli altyapının geliştirilmesi için eğitmen ve öğrencilerden destek alınmasını gerektirmektedir.

İnterprofesyonel Eğitim (İPE)

İnterprofesyonel eğitim bir diğer adıyla meslekler arası eğitim iki ya da daha fazla meslekten profesyonelin, etkili işbirliği yapmayı öğrenmeleri ve sağlık hizmetlerinde daha iyi sonuçlar elde edebilmeleri için birlikte öğrenmeleri durumudur (WHO, 2010; van Diggele et al., 2020). Hasta bakımına tek bir disiplin yaklaşımını maliyetli, güvensiz ve etkisiz olduğu sağlık hizmetinde meslekler arası ekiplerin oluşturulması elzemdir (Spaılding et al., 2021). Ekip çalışması ve iş birliğinin önemli yetkinlikler olduğu sağlık işgücüne öğrencileri hazırlamak için kritik bir yaklaşım olan İPE uluslararası sağlık kuruluşu tarafından desteklenmektedir. Meslekler arası ekip çalışmasını teşvik etmek, hasta bakımının kalitesini artırmak ve sağlık sonuçlarını iyileştirmek gibi amaçları bulunan İPE' nin uygulanmasının zorlu olduğu kabul edilmektedir (van Diggele et al.,2020; Bogossian et al., 2023). Her ne kadar uygulamada zorluklar olsa da iyi tasarlanmış İPE programları uygulama kalitesine bağlı olarak farklı oranlarda başarı gösterebilmektedir (Bogossian et al., 2023). Edwards et al., (2015)' nin tıp ve ebelik öğrencilerine yönelik sepsis, annede kollaps, doğum sonrası kanama ve omuz distosisi olmak üzere tasarladıkları eğitim müdahalesinin öğrencilerin bilgi puanlarını arttırdığı belirlenmiştir. Ayrıca meslekler arası tutum, etkileşim, ekip çalışması ve ilişkilerin olumlu yanıtlar verdiği görülmüştür. Ebelik, sosyal hizmet, psikoloji ve tıp öğrencilerinin perinatal dönemde psikososyal sorunları olan kadınlara destek olabilmeleri için meslekler arası iletişim becerilerini geliştirmeyi hedefleyen bir başka araştırmada katılımcıların kadınları desteklemek için çok disiplinli bir ekipte çalışırken kendi rollerini ve birbirlerinin rollerini daha iyi anladıkları görülmüştür (Keedle et al.,2023).

İnterprofesyonel eğitim sürdürülebilir bir yaklaşım olarak görülmeli ve pratik görevler ve ekip çalışması gibi müdahaleler eğitime entegre edilmelidir. Üniversite ortamında lisans eğitimi sırasında İPE'ye başlanarak ebelik kariyeri boyunca devam etmelidir.

Yapay Zekâ Destekli Öğrenme

Yapay zekâ (YZ), insan zekâsı gerektiren görevleri bilgisayar sistemlerinin yerine getirme kapasitesi olarak tanımlanmaktadır (OED, 2023). Bu kavram ilk kez 1956 yılında John McCarthy tarafından tanımlanmış olup, McCarthy'ye göre yapay zekâ, insan gibi düşünebilen, karar alabilen, insanların odaklandığı görevleri yerine getirebilen ve problem çözebilen makineleri ifade etmektedir (Akbulut, 2013).

Günümüzde yapay zekâ; iş gücü piyasası, eğitim, sağlık ve ulusal güvenlik dâhil olmak üzere birçok sektörde hızla yaygınlaşmakta ve temel teknoloji olarak çeşitli uygulamalarda kullanılmaktadır (Saint Laurent, 2018; Zhang & Dafoe, 2019). Özellikle sağlık alanında dijital

tıbbın dönüşümünde merkezi bir rol oynayan yapay zekâ, hastalıkların erken tanı, tedavi, takip ve bakım süreçlerinin yanı sıra; ana-çocuk sağlığı, obstetrik bakım ve sağlık profesyonellerinin eğitimi gibi alanlarda önemli ilerlemelere olanak tanımaktadır (Clipper et al., 2018; Cirban Ekrem & Daşıkan, 2021).

Bununla birlikte, yapay zekânın sağlık ve eğitim alanlarında kullanımı bazı kritik etik ve teknik sorunları da beraberinde getirmektedir. Veri güvenliği, algoritmik önyargılar, bireysel mahremiyetin ihlali ve insan etkileşiminin azalması gibi sorunlar, yapay zekâ teknolojilerinin kullanımı sürecinde dikkatle ele alınması gereken konular arasında yer almaktadır (O'Connor, 2022; Bulut & Hüseyinoğlu, 2024).

Özellikle ebelik eğitimi bağlamında değerlendirildiğinde, mevcut geleneksel öğrenme yöntemleri; sınırlı kaynaklar, klinik uygulama olanaklarının yetersizliği ve öğrenci merkezli yaklaşımların eksikliği gibi çeşitli engellerle karşı karşıyadır. Bu durum, öğrencilerin teorik bilgilerini uygulamaya aktarmakta zorlanmalarına ve mesleki yeterliliklerinin gelişiminde gecikmelere yol açabilmektedir. Diğer yandan teknolojik gelişmelerin hızla ilerlemesi ve anne-yenidoğan sağlığı hizmetlerinin dinamik yapısı, ebelik eğitiminin yetkinlik temelli bir müfredata ve sonuç odaklı bir değerlendirme anlayışına yönelmesini zorunlu kılmaktadır (Herbawani, Susanti & Adnani, 2025).

Bu bağlamda, yapay zekânın ebelik eğitimine ve hizmetlerine entegrasyonu, hem öğrenci başarısının artırılmasında hem de hasta bakım kalitesinin iyileştirilmesinde önemli bir potansiyele sahiptir (Bulut & Hüseyinoğlu, 2024). Yapay zekâ destekli uygulamalar, öğrenme sürecini kişiselleştirme, anında geri bildirim sağlama, klinik karar verme becerilerini geliştirme ve karmaşık senaryolarla baş etme konusunda öğrencilere rehberlik etmektedir. Ayrıca yapay zekâ, simülasyon destekli öğrenme ile birleştirildiğinde, öğrencilerin hem bilişsel hem de psikomotor becerilerinin gelişimine katkı sunmaktadır.

Araştırmalar, ebelik eğitiminde yapay zekânın; teorik bilgilerin pekiştirilmesi, acil durumların yönetimi, yüksek riskli gebeliklerin değerlendirilmesi, doğum süreci yönetimi, jinekolojik değerlendirmeler ve fetal izlem gibi çok çeşitli alanlarda etkili biçimde kullanılabileceğini göstermektedir (Aktaş Reyhan & Dağlı, 2023; Irwin, Jones, & Fealy, 2023; Lee et al., 2023; Kranz & Abele, 2024). Bu uygulamaların, öğrencilerin pratik becerilerini geliştirmelerine yardımcı olduğu gibi, hasta güvenliğini önceleyen, kanıta dayalı uygulamaları da desteklediği belirtilmektedir.

Özellikle son dönemde yapılan literatür çalışmaları, ebelerin yapay zekâ temelli girişimlere ve bilimsel araştırmalara aktif olarak katılım gösterebilmeleri için, bu teknolojilerin ebelik eğitimine acil olarak entegre edilmesi gerektiğini vurgulamaktadır (Kranz & Abele, 2024). Bununla birlikte, eğitim kurumlarının bu dönüşüme uygun altyapıyı oluşturması, öğretim elemanlarının dijital yeterliliklerinin artırılması ve etik-sorumlu kullanım ilkelerinin göz önünde bulundurulması büyük önem taşımaktadır.

Sonuç olarak, yapay zekâ, ebelik eğitiminde sadece bir destekleyici araç değil; aynı zamanda mesleğin geleceğini şekillendirecek stratejik bir unsur olarak görülmelidir. Etkili ve etik bir şekilde entegre edilen yapay zekâ uygulamaları, hem öğrenci öğrenmesini derinleştirecek hem de sağlık hizmetlerinde kaliteyi artıracaktır.

SONUÇ

Yirmi birinci (21.) yüzyıl sağlık hizmetlerinin hızla değişen yapısı, ebelik eğitiminin klasik yöntemlerle sürdürülemeyeceğini açıkça ortaya koymaktadır. Ebelerin hem annelerin hem de yenidoğanların yaşamına doğrudan etki eden kritik bir rol üstlenmeleri, eğitimlerinin yüksek kalite ve güncel yaklaşımlar çerçevesinde yürütülmesini zorunlu kılmaktadır. Bu bağlamda, öğrenci merkezli, etkileşimli, teknoloji ve deneyim temelli eğitim yöntemlerinin entegrasyonu, ebelik eğitiminin temel taşlarından biri haline gelmiştir.

Bu derlemede ele alınan simülasyon temelli eğitim, ters-yüz öğrenme, ekip tabanlı öğrenme, dijital öğrenme, interprofesyonel eğitim ve yapay zekâ destekli öğrenme gibi yaklaşımlar, ebelik eğitiminde teori ile pratiğin etkin şekilde bütünleştirilmesini sağlamaktadır.

Tüm bu yöntemler, yalnızca bilgi aktarımı sağlamanın ötesine geçerek; öğrencilerin klinik karar verme, eleştirel düşünme, problem çözme ve etik değerlendirme gibi profesyonel yetkinliklerini geliştirmeye yöneliktir. Bu noktada, ebelik eğitiminin müfredat düzeyinde güncellenmesi, eğitimcilerin yeni öğrenme modellerine uyum sağlaması ve teknolojik altyapının desteklenmesi kritik önem taşımaktadır.

Sonuç olarak, yenilikçi ve bütüncül eğitim yaklaşımlarıyla donatılmış bir ebelik eğitimi; hem öğrencilerin akademik ve mesleki gelişimlerini artıracak hem de toplumun sağlık düzeyini yükseltecek nitelikli ebelerin yetişmesine katkı sağlayacaktır. Bu doğrultuda, hem uygulayıcılar hem politika yapıcılar hem de akademisyenler tarafından bu dönüşümün desteklenmesi gereklidir.

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INTERNATIONAL CONFERENCE NETWORK

EFFECTS OF CARDIOPULMONARY BYPASS ON LIPID METABOLISM IN PATIENTS WITH CORONARY ARTERY DISEASE

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ABSTRACT

Introduction and Purpose: Cardiopulmonary bypass (CPB) is a widely used technique in coronary artery bypass grafting (CABG) surgery, temporarily suspending cardiac and pulmonary function. This procedure can induce short-term changes in lipid metabolism in addition to triggering inflammatory responses. Levels of total cholesterol, LDL-C, HDL-C, VLDL-C, and triglycerides serve as molecular markers of the plasma lipid profile, reflecting the metabolic status of the cardiovascular system and postoperative homeostasis. Investigating the effects of CPB on lipid metabolism can contribute to a molecular-level understanding of biochemical alterations following surgery. This study aimed to evaluate the impact of CABG surgery under CPB on lipid metabolism.

Materials and Methods: Forty patients with coronary artery disease undergoing open-heart surgery under cardiopulmonary bypass (CPB) were included in the study. Serum samples collected before and after CPB were analyzed for total cholesterol, triglycerides, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and very-low-density lipoprotein cholesterol (VLDL-C) levels using an enzymatic colorimetric method on an automated biochemical analyzer. LDL-C and VLDL-C levels were calculated using the Friedewald formula when appropriate. All analyses were performed according to the manufacturer's instructions using commercial kits, and the results were evaluated statistically.

Results: A total of 40 patients with coronary artery disease were included in the study, of whom 22 were male (55%) and 18 were female (45%). The mean age of the patients was 62 ± 8 years, and the mean body mass index (BMI) was 27.4 ± 3.2 kg/m². Postoperative analysis revealed a significant decrease in total cholesterol levels ($p < 0.05$). Similarly, LDL-C levels showed a marked reduction after surgery ($p < 0.05$). HDL-C levels exhibited a slight increase, but this change was not statistically significant ($p > 0.05$). Although triglyceride levels tended to increase, the difference was not statistically significant ($p > 0.05$). VLDL-C levels also showed no significant change between preoperative and postoperative measurements ($p > 0.05$).

Discussion and Conclusion: Postoperative analysis revealed a significant decrease in total cholesterol and LDL-C levels, while HDL-C levels showed a slight, non-significant increase. Changes in triglyceride and VLDL-C levels were not statistically significant. These findings suggest that cardiopulmonary bypass (CPB) may exert a short-term modulatory effect on lipid metabolism.

Key Words: Lipid Profile; Cholesterol; Coronary Artery Disease; Cardiopulmonary Bypass

DRUG REPOSITIONING FOR BREAST CANCER VIA TRANSCRIPTOME PROFILING AND VIRTUAL SCREENING IDENTIFIES SKI-I AS A DUAL INHIBITOR

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Abstract

Introduction and Purpose: Breast cancer, which is the most prevalent cancer in women, is defined as a malignant development of breast tissue. Hormone therapy, radiation, chemotherapy, surgery, and immunological or targeted therapies are some possible aspects of management. Even though there is no cure, early discovery frequently results in good survival rates and long-term remission, particularly when it is localized. This study aimed to identify potential therapeutic agents through a transcriptomic analysis and drug repurposing study.

Material and Methods: The breast cancer dataset GSE33487 was analyzed, and differentially expressed genes were identified. A protein interaction network was constructed, and hub proteins were identified. Compounds with potential therapeutic relevance for the upregulated hub DEGs were pointed out. Virtual screening was performed to select the highest-scoring candidate small molecules.

Results: Fifteen hubs were identified, with two of them being downregulated (EGFR and CDK1). Docking-based virtual screening was performed using thirteen upregulated hubs (FN1, PTPRC, MMP9, CCNA2, ITGAM, TOP2A, BIRC5, BUB1, CDC45, CCL2, KIF20A, EXO1, and PLK1) against ten predicted small-molecule candidates with potential therapeutic relevance (masitinib, methotrexate, pyrimethamine, Tripolin b, palbociclib, fludarabine, antimycin-a, SKI-I, cerivastatin, and papaverine). SKI-I bound all proteins with affinities of −7.6 kcal/mol or better, with the highest affinity to MMP9 (-12.3 kcal/mol).

Discussion and Conclusion: SKI-I may function as a dual inhibitor of MMP9 and SPHK1. If proven effective, it may be used to combat breast cancer metastases as well as tumor-promoting inflammation.

Keywords: Breast cancer, gene expression, virtual screening, SKI-I

Introduction

Breast cancer, a malignant disease, occurs when aberrant cells in the breast, usually those lining the milk ducts or lobules, proliferate and divide uncontrollably (Obeagu & Obeagu, 2024). Globally, it remains the most frequently diagnosed cancer in women and a leading cause of cancer-related mortality (Sun et al., 2023). Surgery, radiation therapy, systemic chemotherapy, hormone therapy for hormone-receptor-positive cancer, and targeted or immune-based treatments for particular molecular subtypes are some possible treatment options, depending on the tumor biology and stage at diagnosis (Wang & Wu, 2023). While a universal cure has not been achieved, early detection through screening programs and the development of multimodal therapies have markedly improved outcomes. Many patients, particularly those diagnosed at an early, localized stage, can achieve long-term remission and excellent survival rates (Tauber et al., 2025).

The process by which a gene's information is employed to produce a measurable characteristic, usually by regulating the synthesis of proteins, is known as gene expression. In order to compare normal and unhealthy conditions, modern high-throughput techniques frequently use messenger RNA (mRNA) quantification to measure expression (Alberts et al., 2017). Drug

development has traditionally relied heavily on computational methods, which enable scientists to rapidly identify compounds that are strong, specific, and drug-like, interacting with particular protein targets. These methods can reduce development costs and aid in the logical design of safer and more efficient small-molecule medications by accelerating the first stages of research (Leelananda & Lindert, 2016).

This *in silico* study aimed to identify breast cancer-associated biomarkers and propose potential therapeutic candidates. Differentially expressed genes (DEGs) were determined through statistical analysis of the high-throughput gene expression dataset GSE33487. A protein interaction network was constructed, and hub proteins associated with up- and downregulated DEGs were identified. Virtual screening was performed to select the highest-scoring candidate small molecules. Overall, the work highlights the therapeutic potential of SKI-I and the importance of systems-level research for drug repurposing in breast cancer, underscoring the need for further clinical and experimental studies.

Materials and Methods

Data Acquisition and Analysis

Breast cancer dataset GSE33487 was selected from Gene Expression Omnibus for analysis (Barrett et al., 2013). This is an expression profiling microarray experiment conducted using the Agilent-026652 Whole Human Genome Microarray 4x44K v2 platform. Uniform, laser-capture microdissected breast cancer specimens were used to assess chemokine expression profiles using a cDNA microarray. Data from two normal mammary acini and 4 malignant samples were selected. Differentially expressed genes (DEGs) were identified using the interactive analysis tools GEO2R and LIMMA (Linear models for Microarray Data) (Ritchie et al., 2015). Additionally, to control the rate of false discoveries, the Benjamini-Hochberg technique was selected for the investigation (Benjamini & Hochberg, 1995). Two cutoff points were established: p-value < 0.05 and fold change (FC). Downregulated differential expression is indicated by FC <2, and upregulated differential expression is indicated by FC > 2.

Protein Interaction Networks and Hubs Associated with the Data

Using the STRING database, a network of protein interactions connected to the DEGs was created (Szklarczyk et al., 2023). Local characteristics were computed with Cytoscape's CytoHubba plug-in (Chin et al., 2014; Shannon et al., 2003). The degree metric was used to determine the hubs of the network.

Identification of Potential Therapeutics

The CLUE platform (https://clue.io/about) was used to predict small-molecule candidates with potential therapeutic relevance for the upregulated hub DEGs identified in this study. CLUE is a cloud-based resource for the analysis of perturbational datasets derived from gene expression (L1000) and proteomic (P100, GCP) assays. It integrates reference gene expression profiles for thousands of small molecules with computational tools for connectivity analysis, primarily based on Gene Set Enrichment Analysis (GSEA). The list of upregulated hub DEGs was queried against the CLUE database, and the top ten small molecules, ranked by connectivity score, were selected for subsequent analysis.

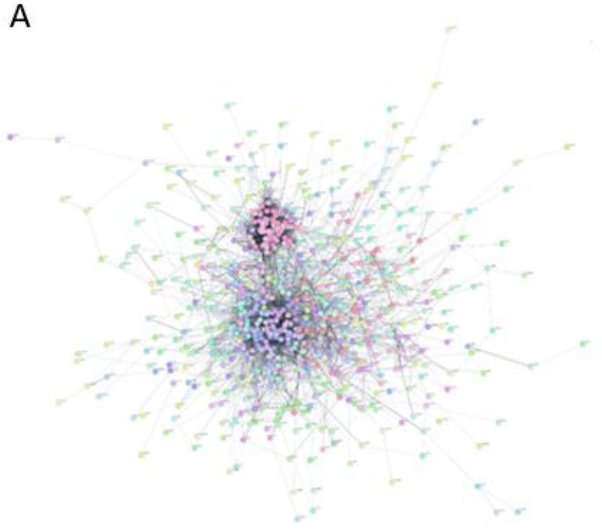
Virtual Screening of the Compounds

The potential binding ability of the compounds to the thirteen upregulated hubs was investigated using Autodock Vina v1.2.0 (Eberhardt et al., 2021). The Protein Data Bank (www.rscb.org) provided the proteins in .pdb format for download. To extract ligands, water molecules, or other adducts from the proteins, Biovia Discovery Studio Visualizer 2024 was utilized (BIOVIA 2017). All of the phytochemicals' 3D structures were downloaded in .sdf format from the PubChem database (www.pubchem.com). OpenBabel was used to minimize the energy of these phytochemicals using the steepest descent optimization algorithm using MMFF94 force fields (O'Boyle et al., 2011).

Results and Discussion

This study analyzed the breast cancer dataset GSE33487 and identified a total of 980 differentially expressed genes, of which 624 are upregulated. The protein interaction network for all the DEGs was also constructed (Figure 1). There were 733 nodes and 5541 edges in the network. The top 15 hubs of the network were also identified. Only EGFR and CDK1 are downregulated. The rest of the hubs are upregulated.

A



B

Rank	Gene Name	Score
1	EGFR	106
2	FN1	104
3	PTPRC	100
4	MMP9	92
5	CDK1	91
6	CCNA2	83
7	ITGAM	82
8	TOP2A	81
9	BIRC5	80
9	BUB1	80
11	CDC45L	79
12	CCL2	78
13	KIF20A	76
14	EXO1	75
15	PLK1	74

Figure 1. a) Breast Cancer PPI network b) Top 15 hubs of the network according to degree metric

Here, EGFR, FN1, PTPRC, ITGAM, and CCL2 are signaling - immune related, CDK1, CCNA2, PLK1, KIF20A, BUB1, and CDC45L are associated with Cell-cycle and Proliferation, and TOP2A, EXO1, BIRC5, and MMP9 are related to DNA repair and apoptosis.

Identification of Small Molecules

Docking-based virtual screening was performed using the thirteen upregulated hubs (FN1, PTPRC, MMP9, CCNA2, ITGAM, TOP2A, BIRC5, BUB1, CDC45, CCL2, KIF20A, EXO1, and PLK1) and the top ten predicted small-molecule candidates with potential therapeutic relevance to these hubs were identified (Table 1).

Table 1. Top 10 Potential Drugs for the Upregulated Hubs

Score	Name	Description	Target	MOA
-99.93	masitinib	KIT inhibitor	KIT, FGFR3, LYN, PDGFRA, PDGFRB	KIT inhibitor, PDGFR receptor inhibitor, SRC inhibitor
-99.93	methotrexate	Dihydrofolate reductase inhibitor	DHFR, AOX1, FOLR1, TYMS	Dihydrofolate reductase inhibitor
-99.93	pyrimethamine	Dihydrofolate reductase inhibitor	DHFR, DHFRP1, HEXA, SLC47A1, STAT3	Dihydrofolate reductase inhibitor
-99.93	Tripolin b	Angiogenesis inhibitor	EGFR	Angiogenesis inhibitor
-99.93	palbociclib	CDK inhibitor	CDK4, CDK6, CCND3	CDK inhibitor
-99.93	fludarabine	DNA synthesis inhibitor	ADA, DCK, POLA1, RRM1, RRM2	DNA synthesis inhibitor, DNA repair enzyme inhibitor, Purine antagonist
-99.93	antimycin-a	ATP synthase inhibitor	CYCS	ATP synthase inhibitor
-99.93	SKI-I	Sphingosine kinase inhibitor	SPHK1, VCP	Sphingosine kinase inhibitor
-99.89	cerivastatin	HMGCR inhibitor	HMGCR, CYP2C8, CYP3A5	HMGCR inhibitor
-99.89	papaverine	Phosphodiesterase inhibitor	PDE10A, PDE4B, PDE5A	Phosphodiesterase inhibitor

Here, the candidate drugs can be categorized into five groups: a) Kinase inhibitors: Masitinib, Palbociclib, SKI-I, b) Antimetabolites: Methotrexate, Pyrimethamine, Fludarabine, c) Angiogenesis inhibitors: Tripolin b, d) Mitochondrial/metabolic: Antimycin-A, Cerivastatin, e) Plant alkaloid (natural): Papaverine.

A Protein-Drug interaction network was also constructed by surveying the literature (Figure 2). Central hubs PLK1, CCNA2, and TOP2A appear as major nodes connected to multiple drugs (e.g., palbociclib, masitinib, methotrexate, fludarabine), highlighting their role as core regulators of cell-cycle progression and DNA replication. Microenvironment/invasion nodes MMP9 and CCL2 are linked to angiogenesis inhibitors, papaverine, cerivastatin, and, indirectly, to SKI-I through SPHK1, reflecting pathways that control extracellular matrix remodeling and pro-inflammatory signaling. Inclusion of SKI-I introduces the sphingosine-1-phosphate (S1P) signaling axis. SPHK1 generates S1P, which activates downstream effectors promoting chemokine production (e.g., CCL2) and matrix metalloproteinase activity (e.g., MMP9). This network suggests that SKI-I, by inhibiting SPHK1, may attenuate S1P-mediated signaling, thereby down-regulating CCL2-driven monocyte recruitment and MMP9-dependent extracellular matrix degradation. Such dual suppression could limit angiogenesis and metastatic dissemination in breast cancer. The diagram thus integrates cell-cycle control, inflammatory chemokine signaling, and matrix remodeling into a single systems-level view, illustrating how combined targeting of SPHK1 (via SKI-I) and other nodes could modulate the tumor microenvironment as well as tumor cell proliferation. Table 3 also shows the functional grouping of the hub proteins and the drugs.

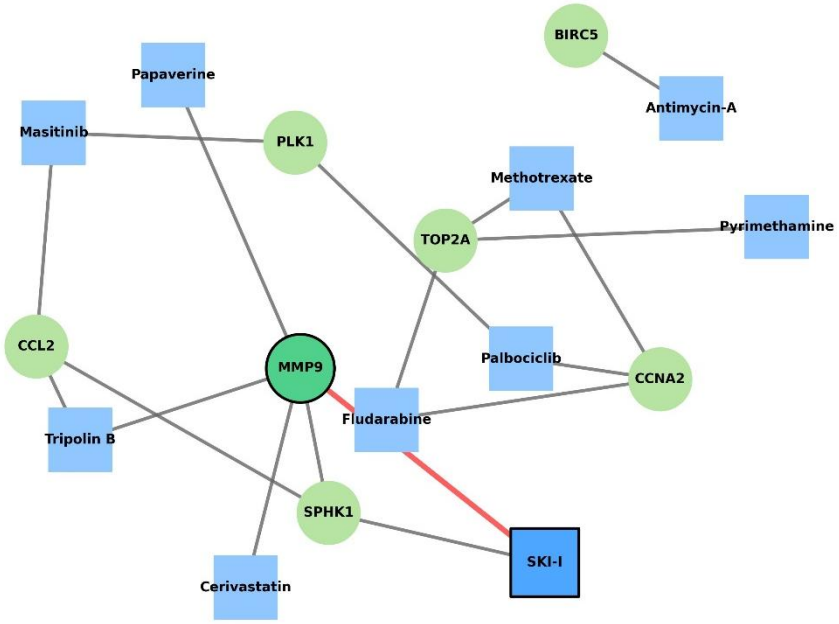


Figure 2. Drug–protein interaction network of candidate breast cancer therapeutics. Blue squares denote small-molecule drugs and green circles denote breast cancer-associated protein targets. Edges represent literature-supported or predicted functional interactions. The sphingosine-kinase inhibitor SKI-I and the matrix metalloproteinase MMP9 are highlighted in bold outlines, and their direct connection is emphasized with a red edge to indicate potential off-target binding observed in our docking analysis.

Table 3. Functional grouping of the hub proteins and the drugs that target them

Mechanistic Hub	Hub Proteins	Drugs	Rationale
Cell-cycle / Mitosis	PLK1, CCNA2, BUB1, CDC45, KIF20A, EXO1	**Palbociclib**, **Tripolin B**	Control of G1/S and mitotic checkpoints
DNA replication / Repair	TOP2A, EXO1	**Methotrexate**, **Pyrimethamine**, **Fludarabine**	Nucleotide metabolism and topoisomerase inhibition
Apoptosis / Survival	BIRC5	**Antimycin-A**	Mitochondrial apoptosis regulation
Inflammation / Immune Microenvironment	CCL2, ITGAM, PTPRC	-	Cytokine signaling and immune-cell recruitment
ECM Remodeling / Metastasis	MMP9, FN1	**Cerivastatin**, **Papaverine**, **SKI-I**	Extracellular matrix degradation and invasion

Virtual Screening of the Potential Therapeutic Compounds

Ten compounds were positioned as ligands against the 13 upregulated hub proteins. According to the virtual screening results, SKI-I had the highest binding affinity to MMP9 with -12.3 kcal/mol (Figure 3). Masitinib had the second-highest affinity to MMP9 (-11.5 kcal/mol). BUB1-SKI-I complex had the third highest affinity (-11.2 kcal/mol).

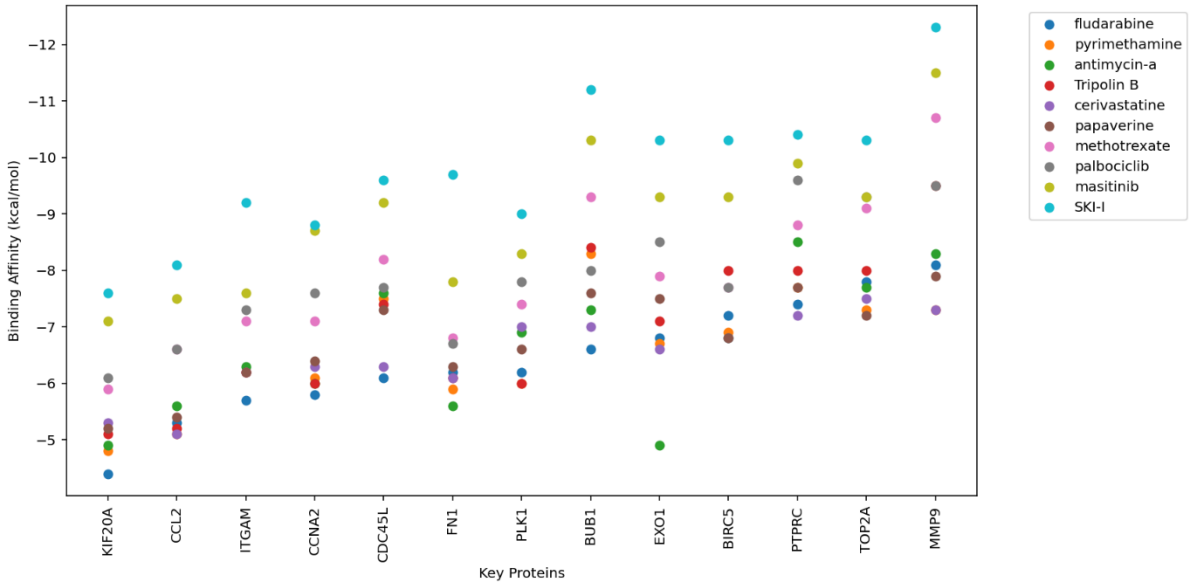


Figure 3. Binding affinities of the small molecules to the hub proteins calculated through the docking-based virtual screening

The relationship between the upregulated proteins, drugs, and the binding affinities was also visualized as a network (Figure 4). If validated, these findings could have important implications. SKI-I's dual inhibition of SPHK1 and MMP9 may simultaneously impair tumor cell survival and proliferation through SPHK1/S1P signaling while limiting invasion and extracellular matrix remodeling via MMP9, supporting its potential as an anti-metastatic therapy in breast cancer. Notably, MMP9 also shows strong binding to masitinib, and BUB1 is a target of SKI-I, suggesting that these compounds may exert multi-target effects across complementary pathways. This highlights opportunities for repurposing existing inhibitors as dual- or multi-action agents, or using them as scaffolds to design novel bivalent or multi-targeted therapeutics.

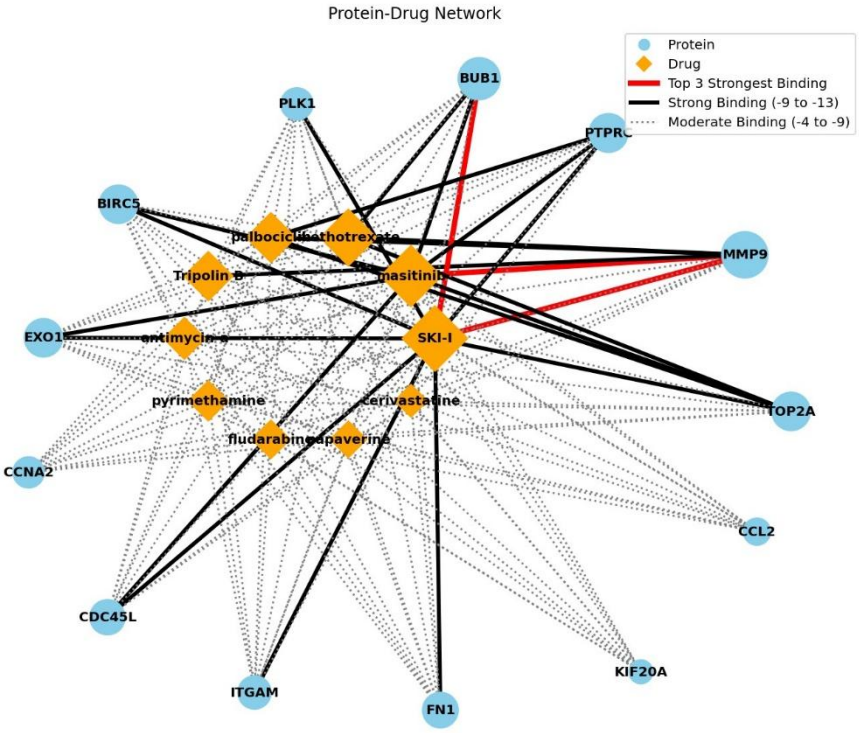


Figure 4. Protein – Drug Network with Binding Affinities

Conclusion

Through an integrated bioinformatics and virtual screening approach, a direct interaction between SKI-I and MMP9 was identified. We observed a high predicted binding affinity of SKI-I to MMP9 (docking score = -12.3 kcal/mol). To our knowledge, direct SKI-I–MMP9 interactions have not been previously reported. SKI-I might act as a dual SPHK1/MMP9 inhibitor. If validated, it could be leveraged to target both tumor-promoting inflammation (via SPHK1–S1P–CCL2) and metastasis (via MMP9) in breast cancer. Absence of SPHK1 in GSE33487 does not mean it is irrelevant or not expressed in breast cancer. It likely reflects platform limitations or the specific samples. In addition to highlighting SKI-I's therapeutic potential, our findings highlight the importance of systems-level study for drug repurposing in breast cancer. Although these results are promising, thorough experimental verification is necessary to establish its potential as a future part of breast cancer therapy regimens. This includes in vitro functional assays as well as in vivo efficacy and safety studies.

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THE ENVIRONMENTAL IMPACT OF PETROLEUM-BASED POLYMERS AND THE THEORETICAL EVALUATION OF INORGANIC CATALYSTS

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Abstract

Petroleum-derived polymers such as polyethylene (PE), polypropylene (PP), and polyvinyl chloride (PVC) are indispensable materials in modern society due to their strength, versatility, and low cost. However, their persistence in the environment generates complex ecological challenges. These polymers fragment physically in aquatic systems but remain chemically stable for decades, disrupting food chains as microplastics are ingested by plankton, fish, and higher organisms. Additives including phthalates, dyes, and stabilizers leach into water, causing carcinogenic, endocrine-disrupting, and toxicological effects. Moreover, plastic residues alter soil fertility, reduce light penetration in aquatic habitats, and contribute to oxygen depletion, thereby accelerating ecological imbalance.

Microplastics (<5 mm), originating from textiles, cosmetics, and the degradation of plastics, are particularly concerning due to their ubiquity and persistence. Their entry into soils, rivers, and oceans through wastewater systems demonstrates the limitations of current waste management. Human exposure via food and water further raises public health concerns, linking microplastic pollution with immune, endocrine, and metabolic risks.

To mitigate these challenges, green chemistry approaches emphasize the development of biodegradable polymers, improved recycling technologies, and sustainable production pathways. In this context, inorganic catalysts offer significant ecological and economic advantages over petroleum-based systems. Materials such as metal oxides, zeolites, and hybrid porous coordination polymers exhibit stability, reusability, and reduced toxicity, making them promising candidates for processes such as biodiesel synthesis and polymerization. Theoretical modeling of these catalysts provides insights into reaction mechanisms, efficiency, and scalability.

In conclusion, petroleum-based polymers remain a critical environmental concern, but their impacts can be alleviated through integrated strategies combining sustainable polymer design, advanced waste treatment, and the replacement of conventional petroleum-derived catalysts with inorganic alternatives.

Keywords: Petroleum-based polymers, Microplastics, Inorganic catalysts, Green chemistry, Environmental impact, Sustainable alternatives

THE ROLE OF THE MICROBIOME IN HUMAN HEALTH AND ECOLOGICAL BALANCE: A GENETIC AND BIOCHEMICAL APPROACH

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Abstract
The human microbiome, comprising bacteria, viruses, fungi, and archaea, has emerged as a central determinant of both human health and ecological balance. Host genetics profoundly influence microbial diversity and function, shaping immune responses, metabolism, and susceptibility to chronic diseases. Genetic variants in autophagy-related pathways, such as *ATG16L1* and *IRGM*, alter microbial composition and contribute to inflammatory bowel disease, demonstrating how host–microbe interactions drive pathogenesis. Horizontal gene transfer (HGT) further accelerates microbial adaptation, resistance, and virulence, with maternal transmission underscoring its evolutionary significance. At the biochemical level, microbial metabolites, particularly short-chain fatty acids, regulate host epigenetic states, influencing gene expression without altering DNA sequence. Advanced sequencing technologies, including long-read platforms (PacBio, Oxford Nanopore), have enhanced strain-level resolution, structural variant detection, and epigenetic profiling, offering critical insights into microbiome dynamics and One Health challenges. Beyond human health, ecological balance is supported through microbial and plant-mediated processes such as phytoremediation, where symbiotic plant–microbe interactions detoxify soil and water contaminants. Together, these perspectives highlight the microbiome as both a regulator of host physiology and a contributor to environmental sustainability. Integrating genetics, biochemistry, and synthetic biology offers novel therapeutic opportunities, including engineered probiotics, precision microbiota modulation, and environmentally informed interventions. Such multidisciplinary approaches will be pivotal for advancing personalized medicine, ecological resilience, and global health.
Keywords: Microbiome, Host genetics, Biochemistry, Inflammatory bowel disease, Horizontal gene transfer, Phytoremediation

THE IMPORTANCE OF PHYSICAL ACTIVITY AFTER BARIATRIC SURGERY

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The World Health Organization (WHO) defines obesity as "the accumulation of excess fat in the body that impairs health." [1]. It is reported that the prevalence of obesity, defined numerically as a body mass index (BMI) greater than 30 kg/m^2, has reached epidemic proportions in developed countries [2]. Obesity is projected to overtake smoking as the leading cause of death in the United States [3]. Obesity, a major factor in the development of a wide range of diseases including diabetes, hypertension, dyslipidemia and obstructive sleep apnea syndrome, is becoming an increasingly important global health problem, [4, 5], not only in healthcare but also in the economy [6]. Therefore, it is critical to consider the most effective intervention strategies to reduce the health risk and economic costs associated with obesity.

Thanks to its restrictive and malabsorptive nature, as well as its effects on satiety and hunger mechanisms, bariatric surgery (BS) has emerged as a vital intervention in the treatment of individuals struggling with severe obesity, promoting large and sustained weight losses and significantly reducing food intake [7]. It is known that bariatric surgery plays an important role in losing an average of 25-29% of pre-operative body weight within the first year [8, 9]. Many studies report that weight gain begins approximately 12-24 months after bariatric surgery. [10]. It is stated that up to 20% of patients begin to gain weight 6 months after surgery, and that lack of physical activity may be an important factor in this process [8]. Many studies indicate that physical activity plays an important role in weight loss and maintenance after bariatric surgery [11, 12].

The importance of exercise in the post-bariatric surgery period isn't limited to weight loss; its additional benefits on metabolic health are also noteworthy. Exercise improves glycemic control by increasing peripheral tissue insulin sensitivity, adding to the metabolic gains achieved with surgery. [13, 14]. In a randomized controlled trial conducted by Coen et al. (2015), it was shown that a 6-month moderate aerobic exercise program after RYGB significantly increased insulin sensitivity and cardiorespiratory capacity. [13]. Similarly, Shah et al. (2011) reported that a high-volume exercise program improved glucose tolerance [14]. Exercise also increases metabolic flexibility by improving mitochondrial function, fat oxidation, and intramuscular lipid metabolism. [15, 16]. All these data indicate that regular physical activity is an indispensable component not only for weight management but also for maintaining metabolic health in the post-bariatric surgery period.

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INTERNATIONAL CONFERENCE NETWORK

ENHANCING STRESS TOLERANCE IN FRUIT TREES THROUGH THE USE OF BIOSTIMULANTS

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Abstract
Fruit trees exhibit high sensitivity to abiotic stress conditions such as drought, salinity, and high temperature. These stresses restrict photosynthetic capacity, water and nutrient uptake, and cause cellular oxidative damage, ultimately leading to yield and quality losses. Biostimulants have gained importance as natural or synthetic compounds that enhance plant stress tolerance. In particular, seaweed extracts (Ascophyllum nodosum and Ecklonia maxima), amino acids, polyamines, and protein hydrolysates strengthen the resistance of fruit trees to abiotic stresses by activating antioxidant systems, increasing osmolyte accumulation, regulating hormonal balance, and modulating the expression of stress-responsive genes. The effects of different types and application methods of biostimulants on the stress responses of fruit trees are supported by an increasing number of findings in the literature.
Keywords: Biostimulant, fruit trees, drought stress, salinity, polyamines, seaweed extracts, amino acids

Introduction
Global climate change has increased the frequency and severity of abiotic stresses in fruit production systems. Stresses such as drought, salinity, and high temperature negatively affect photosynthesis, stomatal behavior, and water and mineral uptake, leading to significant yield and fruit quality losses, especially in *Prunus*, *Citrus*, *Malus*, and *Vitis* species (Afonso et al., 2022; Kumar et al., 2024). These stresses limit the uptake of water and nutrients, disrupt cellular metabolism, and cause oxidative damage (ElSayed et al., 2022).
Traditional stress management strategies are often limited to irrigation and fertilization practices, which may be inadequate for sustainable production. Biostimulants, on the other hand, offer an eco-friendly and sustainable approach by enhancing plant stress tolerance (Ma et al., 2022). They improve stress responses and enhance yield and quality by stimulating the plant's natural defense mechanisms (Kumar et al., 2024).

Mechanisms of Action of Biostimulants
Biostimulants enhance stress tolerance in fruit trees by modulating stress responses at the molecular, biochemical, and physiological levels. Four main mechanisms and relevant literature evidence are presented below:

2.1 Activation of the Antioxidant Defense System
Abiotic stresses such as drought, salinity, and high temperature lead to the accumulation of reactive oxygen species (ROS), resulting in lipid peroxidation, protein denaturation, and loss of membrane integrity. Biostimulants such as seaweed extracts enhance the activities of antioxidant enzymes including superoxide dismutase (SOD), catalase (CAT), and peroxidase (POD), thereby reducing ROS levels. For instance, in *Vitis vinifera* cv. 'Touriga Franca', the

application of *Ascophyllum nodosum* extract and glycine betaine increased phenolic content, antioxidant capacity, and the activities of SOD and CAT enzymes (Monteiro et al., 2024).

2.2 Enhancement of Osmolyte Accumulation

Under stress conditions, intracellular osmolytes (e.g., proline, glycine betaine) play a crucial role in maintaining cell turgor, preserving enzyme function, and stabilizing ionic balance. In *Malus domestica*, the application of seaweed extract under salinity stress increased both phenolic content and proline accumulation, which enhanced the plant's physiological tolerance to salinity stress (Koulympoudi et al., 2023).

2.3 Modulation of Hormonal Balance

Hormones play a critical role in regulating plant stress responses. Various studies have shown that biostimulants improve stress tolerance by regulating hormone levels. For example, seaweed extract applications suppress ethylene signaling under stress conditions while modulating abscisic acid (ABA) and cytokinin levels to support stomatal closure and water conservation mechanisms (Raja & Vidya, 2023).

2.4 Regulation of Gene Expression and Metabolic Pathways

Biostimulant application enhances the activity of genes associated with antioxidant defense and phenolic metabolism pathways. For instance, in *Vitis vinifera* cv. 'Touriga Franca', treatments with seaweed extract and glycine betaine significantly increased the expression of genes involved in phenolic biosynthesis, such as *PAL*, *CHS*, and other flavonoid biosynthetic genes (Monteiro et al., 2024).

3. Biostimulant Applications in Fruit Species

3.1 Citrus (Citrus spp.)

Field applications of seaweed-derived biostimulants such as alginate oligosaccharides (AOS) in citrus species have led to significant increases in photosynthetic rate, leaf antioxidant enzyme activities, and fruit sugar content. For example, Li et al. (2023) reported that in citrus trees treated with AOS, the net photosynthetic rate in leaves significantly increased after the third spraying cycle. Furthermore, the expression levels of genes related to fruit sugar metabolism (*CitSPS1*, *CitSPS2*, *SUS*) were upregulated, and the accumulation of glucose, fructose, and sucrose in fruits was markedly higher compared to the control group. The same study demonstrated a positive correlation between leaf antioxidant enzyme activities (SOD, CAT, POD) and sugar accumulation in both leaves and fruits (Li et al., 2023).

3.2 Apple (Malus domestica)

Protein hydrolysates and amino acid–based biostimulants enhance stress resistance in apple trees when applied through root drenching or foliar spraying. In several field and greenhouse experiments, applications of protein hydrolysates led to increased proline accumulation, contributing to reduced water loss and improved membrane stability under stress conditions (Sun et al., 2024). In addition, seaweed-based biostimulant fertilizers have been reported to improve photosynthetic efficiency, fruit size, and sensory quality in apples, while positively affecting mineral composition and antioxidant capacity (Yang et al., 2023).

3.3 Grapevine (Vitis vinifera)

Applications of seaweed extracts and amino acid combinations in vineyards have shown positive effects such as maintaining photosynthetic performance, improving stomatal conductance, and enhancing berry size and firmness. For instance, various seaweed extract treatments in 'AL' grape cultivars resulted in significant improvements in fruit weight, hue,

chroma, and antioxidant content compared to the control group. These findings indicate that biostimulants can serve as an effective tool to improve grape quality (Kumar et al., 2023).

4. Application Protocols and Recommendations

4.1 Dosage and Timing

The efficacy of biostimulants largely depends on their dosage and timing of application. Foliar spraying and root drenching are the most commonly used methods. Applications performed before stress onset or during fruit development stages have been found to yield better results in enhancing physiological resilience. For instance, seaweed extract applications to apple trees during the post-bloom period significantly improved photosynthetic performance and fruit quality (Yang et al., 2023).

4.2 Combined Applications

Combining different biostimulants can produce synergistic effects, leading to stronger stress tolerance than single treatments. For example, seaweed extract plus amino acid applications have been shown to maintain fruit quality under drought conditions by supporting both photosynthesis and osmoregulation mechanisms). Similarly, combinations of polyamines and seaweed extracts in vineyards were reported to enhance antioxidant enzyme activity and improve berry firmness (Bulgari, Franzoni, & Ferrante, 2019).

4.3 Molecular Analysis

To better understand the mechanisms of action of biostimulants, post-treatment evaluations of gene expression, protein profiles, and metabolic pathways are essential. For instance, in citrus, alginate oligosaccharide applications upregulated genes associated with sugar metabolism and antioxidant defense (*CitSPS*, *SUS*, *SOD*, *CAT*), directly contributing to fruit quality improvement (Li et al., 2023). Therefore, molecular-level monitoring is a critical step to validate physiological outcomes observed under field conditions.

5. Future Research Directions

- ✓ **Inter-Species Response Variability:** Systematic comparison of stress tolerance and physiological responses to biostimulants among different fruit species will facilitate the development of species-specific application protocols.
- ✓ **Investigation of Molecular Mechanisms:** Detailed analysis of gene expression and metabolic pathways related to antioxidant defense, osmolyte accumulation, and hormonal modulation will deepen the understanding of stress response mechanisms.
- ✓ **Commercial-Scale Applications:** Findings from laboratory and small-scale field trials should be validated under commercial production conditions. Determining optimal doses, timing, and application methods should be supported by cost-benefit and safety analyses.
- ✓ **Combined Biostimulant Strategies:** Exploring synergistic effects of combinations such as seaweed extracts, amino acids, and polyamines will enable the development of integrated strategies to enhance stress tolerance and fruit quality.

6. Conclusion

Biostimulants emerge as effective tools for enhancing resistance mechanisms in fruit trees against abiotic stresses, thereby preserving yield, quality, and fruit health. Seaweed extracts, amino acids, and polyamines enhance stress tolerance by activating antioxidant defense systems, increasing osmolyte accumulation, modulating hormonal balance, and regulating the

expression of stress-related genes. Optimizing applications across fruit species, refining dosage and timing protocols, and developing combination strategies will further improve biostimulant efficiency. Future research focusing on molecular and metabolic mechanisms, as well as supporting commercial-scale implementation, will play a crucial role in promoting sustainable and environmentally friendly fruit production systems.

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INTERNATIONAL CONFERENCE NETWORK

ROLE OF PREHARVEST SPERMIDINE APPLICATIONS IN THE POSTHARVESTPHYSIOLOGY OF STONE FRUITS

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Abstract
Stone fruits (such as cherry, apricot, plum, and peach) represent an important fruit group due to their high economic and nutritional value; however, they are characterized by short shelf life as a result of their high respiration rates and ethylene sensitivity. Consequently, postharvest quality losses, chilling injury, and poor storage performance often occur. Among plant growth regulators, spermidine (Spd), a polyamine compound, has emerged as a key bioregulator that modulates cellular metabolism during ripeninga nd senescence.
Recent studies have demonstrated that, in addition to postharvest treatments, preharvest Spd applications can enhance the physiological status of fruit tissues before storage. Literature findings indicate that appropriately timed and dosed Spd applications significantly reduce storage-related quality losses by suppressing ethylene biosynthesis, strengthening antioxidant defense systems, regulating the activity of cell wall–modifying enzymes, and preserving phenolic compounds. Positive effects on firmness retention, color stability, phenolic content, and antioxidant capacity have been widely reported. Nevertheless, further studies are needed to optimize application dose, timing, method, and to clarify species-specific responses.
Current knowledge on preharvest spermidine applications in stone fruits contributes to a better understanding of the underlying physiological mechanisms and highlights research gaps relevant to commercial practice. Overall, the findings suggest that Spd represents a promising strategy to improve postharvest quality maintenance and storage performance in stone fruits.
Keywords: Spermidine, polyamine, stone fruits, preharvest application, storage, quality

1. Introduction
Stone fruits (*Prunus* spp.) constitute a major fruit group cultivated worldwide due to their high nutritional value, sensory qualities, and economic importance. However, these fruits exhibit short shelf life because of their high respiration rates, ethylene sensitivity, and fragile tissue structure. Such characteristics lead to quality deterioration, chilling injury, and a decline in commercial value, particularly during long-term storage and marketing processes (Das et al., 2011; Saba et al., 2012). Reducing postharvest losses and extending storage life are therefore of great importance for both producers and consumers.
Polyamines (putrescine, spermidine, and spermine) are low molecular weight biogenic amines that play crucial roles in regulating growth, development, and stress responses in plants. Among them, spermidine (Spd) stands out as an important bioregulator in fruit ripening and senescence processes (Khan et al., 2007). The physiological effects of Spd are mediated through multiple mechanisms, including the suppression of ethylene biosynthesis, activation of antioxidant defense systems, maintenance of membrane integrity, and regulation of cell wall metabolism (Puente-Moreno et al., 2025).
While postharvest polyamine treatments have long been investigated for their effects on fruit physiology, recent studies have focused on preharvest Spd applications, which have shown potential to improve the physiological condition of fruits prior to storage (Çolak et al., 2025;

Yingjian et al., 2025). Findings indicate that properly timed and dosed preharvest Spd treatments can reduce firmness loss, maintain antioxidant capacity, stabilize phenolic compounds, and delay color degradation.

In this context, understanding the role of preharvest spermidine applications in the postharvest physiology of stone fruits is essential for both scientific research and commercial practice. Elucidating the mechanisms of Spd action and assessing interspecific variations will contribute to the development of advanced storage and quality management strategies for stone fruits.

2. Mechanisms of Spermidine Action

Spermidine (Spd) is a multifunctional polyamine that exerts diverse physiological effects on the postharvest biology of stone fruits. Preharvest applications modulate the metabolic status of fruit tissues, enhancing storage tolerance and reducing quality losses. These effects can be explained through four primary mechanisms:

2.1. Regulation of Ethylene Biosynthesis

Ethylene plays a central role in fruit ripening and senescence. Spd can inhibit ethylene production by suppressing the activities of 1-aminocyclopropane-1-carboxylic acid (ACC) synthase and ACC oxidase—two key enzymes in ethylene biosynthesis (Yingjian et al., 2025). This regulation delays ripening and extends fruit shelf life. Particularly in ethylene-sensitive species such as cherry and plum, preharvest Spd applications have been shown to slow down ripening and minimize storage-related quality losses (Çolak et al., 2025).

2.2. Enhancement of Antioxidant Defense Systems

During storage, the accumulation of reactive oxygen species (ROS) can cause lipid peroxidation and cellular membrane damage. Spd treatments enhance the activities of antioxidant enzymes such as superoxide dismutase (SOD), catalase (CAT), and peroxidase (POD), thereby reducing ROS accumulation and maintaining cellular integrity (Çolak et al., 2025). This mechanism is particularly critical for improving fruit resilience under prolonged cold storage conditions.

2.3. Regulation of Cell Wall Metabolism

Fruit softening is accelerated by the activation of cell wall–degrading enzymes such as polygalacturonase (PG), pectin methylesterase (PME), and β-galactosidase. Spd applications suppress the activities of these enzymes, stabilize the cell wall structure, and maintain fruit firmness for a longer period (Puente-Moreno et al., 2025). This effect is especially significant for soft-textured fruits such as apricot and plum, contributing to improved postharvest storage tolerance.

2.4. Phenolic Content and Color Stability

Phenolic compounds are essential for maintaining antioxidant capacity and color stability in fruits. Preharvest Spd applications promote the preservation of phenolic compounds, delaying pigment degradation and color changes (Çolak et al., 2025). This effect is particularly evident in anthocyanin-rich fruits like cherry and plum and directly enhances consumer-perceived visual quality.

2.5. Combined and Synergistic Effects

The effects of Spd are not limited to individual treatments but can also occur synergistically when combined with other bioregulators such as $CaCl_2$ or salicylic acid. Such combinations

enhance resistance to storage stress, improving both physical durability and metabolic stability (Puente-Moreno et al., 2025).

In summary, preharvest spermidine applications in stone fruits:

- ✓ Suppress ethylene production,
- ✓ Enhance antioxidant defense capacity,
- ✓ Stabilize cell wall structure,
- ✓ Preserve phenolic content and color, and
- ✓ Exhibit synergistic effects when combined with other bioregulators.

These multifaceted mechanisms collectively explain why preharvest Spd applications are effective in improving storage life and maintaining fruit quality in stone fruits.

3. Application Experiences in Stone Fruits

In recent years, an increasing number of studies have investigated the effects of preharvest spermidine treatments on stone fruits. This section summarizes the most prominent findings in major species such as cherry, apricot, and plum.

3.1. Cherry (*Prunus avium* L.)

Cherries are highly perishable due to their sensitivity to ethylene and short shelf life. Çolak et al. (2025) reported that preharvest Spd applications at concentrations of 0.5–1.5 mM:

- Maintained fruit firmness during storage,
- Reduced phenolic compound losses, and
- Lowered decay and fungal infection rates.

Moreover, these treatments significantly enhanced color stability and antioxidant capacity, thereby delaying postharvest quality deterioration under extended storage conditions.

3.2. Apricot (*Prunus armeniaca* L.)

In apricot, preharvest applications of Spd at concentrations between 0.1 and 0.5 mM have been shown to preserve fruit firmness and aroma profile during storage (Saba et al., 2012). Spd also reduces chilling injury and modulates the ripening rate. These findings indicate that preharvest Spd treatments offer distinct advantages in maintaining postharvest quality and extending storage life, especially in soft-textured fruits like apricot.

3.3. Plum (*Prunus domestica* L.)

Experiments on plums have demonstrated that combined applications of Spd and putrescine:

- Reduce chilling injury,
- Maintain fruit firmness, and
- Extend shelf life (Khan et al., 2007).

Such combined treatments exhibited stronger protective effects compared to single applications, helping to preserve cellular integrity during storage.

3.4. Other Species and General Findings

In other stone fruit species such as peach and nectarine, preharvest Spd applications at 0.5–1.0 mM concentrations have been reported to:

- Delay firmness loss,
- Enhance antioxidant defense, and
- Preserve phenolic content and color stability (Puente-Moreno et al., 2025).

Overall, literature data reveal that, although species-specific variations exist, Spd treatments generally provide substantial benefits for postharvest quality maintenance and storage performance in all stone fruits.

4. Application Protocols and Practical Recommendations

The effectiveness of preharvest spermidine (Spd) treatments in stone fruits is directly dependent on the proper selection of dosage, timing, and application method. Studies conducted under various species and environmental conditions have revealed that optimization of application protocols is essential for maximizing efficacy.

4.1. Dosage and Concentration

In most studies, Spd concentrations range between 0.1 and 1.5 mM. Optimum effects in species such as cherry and plum have generally been observed at 0.5–1.0 mM (Çolak et al., 2025; Puente-Moreno et al., 2025). Lower concentrations tend to reduce chilling injury, especially in soft-textured fruits, whereas excessively high concentrations may pose a risk of phytotoxicity. Therefore, dosage optimization for each species is of critical importance.

4.2. Timing

The timing of preharvest applications varies depending on the fruit developmental stage. Literature findings indicate that Spd treatments applied approximately 7–14 days before harvest are most effective in enhancing storage tolerance (Yingjian et al., 2025). This period is considered a critical physiological window in which the fruit metabolism can most efficiently absorb the regulatory effects of Spd.

4.3. Application Methods

Spd is generally applied by foliar spraying on leaves and fruit surfaces. This method ensures direct contact with fruit tissues and enhances efficacy. The inclusion of a surfactant during spraying promotes uniform solution coverage, improving absorption efficiency (Puente-Moreno et al., 2025).

4.4. Combined Treatments

The combination of Spd with other bioregulators, such as $CaCl_2$ or salicylic acid, may provide synergistic protection against storage-related stresses. For example, Spd + $CaCl_2$ combinations strengthen cell wall stability, contributing to the maintenance of fruit firmness, while Spd + salicylic acid applications enhance antioxidant capacity, reducing oxidative stress (Puente-Moreno et al., 2025).

4.5. Practical Recommendations

- ✓ Dosage and timing should be optimized for each fruit species.
- ✓ Applications 7–14 days before harvest yield the most beneficial metabolic responses.
- ✓ Spraying should be the preferred method, with surfactants added to reduce surface tension and improve coverage.
- ✓ Combined bioregulator treatments can be considered to reinforce the effects of Spd.
- ✓ Cost-benefit analysis and residue safety assessments should be conducted before large-scale commercial adoption.

5. Research Gaps and Future Perspectives

Preharvest spermidine (Spd) treatments have emerged as a promising bioregulator for improving storage tolerance and maintaining postharvest quality in stone fruits. However, a

review of the current literature reveals several critical knowledge gaps that need to be addressed to fully understand the mechanisms and optimize application strategies.

5.1. Species-Specific Responses

Responses to Spd vary among different stone fruit species. While clear benefits have been reported in cherries and plums, optimal dosage and timing for some apricot and peach cultivars remain uncertain and require systematic investigation (Saba et al., 2012). Future studies should focus on interspecific and inter-cultivar comparisons to develop species-specific application protocols.

5.2. Standardization of Application Protocols

Current studies vary considerably in dosage, timing, frequency, and method of application. This heterogeneity limits the comparability of results and their transferability to commercial practice. Establishing standardized protocols would enhance the reliability and reproducibility of Spd's effects (Çolak et al., 2025).

5.3. Elucidation of Molecular and Metabolic Mechanisms

Although the influence of Spd on ethylene biosynthesis, antioxidant systems, and cell wall metabolism has been partially described, further investigation is required at the genetic and molecular levels. The effects of Spd on gene expression, protein activity, and signal transduction pathways should be explored in detail (Puente-Moreno et al., 2025).

5.4. Commercial Scale and Application Safety

While laboratory and small-scale field experiments have yielded encouraging results, large-scale commercial applications remain limited. Additional research is needed on cost-effectiveness, residue safety, and consumer acceptance. Furthermore, protocols should comply with food safety standards and agricultural regulations to ensure commercial viability.

5.5. Future Perspectives

- ✓ Increasing interspecific and long-term comparative studies will clarify the general applicability of Spd treatments.
- ✓ The use of molecular biology and metabolomics techniques will help elucidate detailed mechanisms and optimize application strategies.
- ✓ Integrated approaches combining multiple bioregulators could provide more effective outcomes in commercial fruit production systems.

6. Conclusion

Despite their high nutritional and economic value, stone fruits are highly perishable due to their short shelf life and susceptibility to postharvest quality deterioration. Preharvest spermidine (Spd) applications have emerged as an effective bioregulator strategy capable of modulating fruit physiology prior to storage and mitigating postharvest losses.

Literature evidence demonstrates that properly timed and dosed Spd applications positively influence fruit firmness, color stability, and overall quality by suppressing ethylene biosynthesis, enhancing antioxidant defense capacity, regulating cell wall metabolism, and preserving phenolic compounds (Çolak et al., 2025; Yingjian et al., 2025; Puente-Moreno et al., 2025). Findings from key species such as cherry, apricot, and plum further support the potential of Spd to improve storage performance.

However, interspecific variability, lack of standardized application protocols, and limited understanding of molecular mechanisms remain significant constraints for large-scale implementation. Therefore, future research should prioritize comparative studies among species, molecular and metabolomic analyses, large-scale field validations, and food safety assessments.

In conclusion, preharvest spermidine applications represent a promising strategy for enhancing postharvest quality preservation and storage tolerance in stone fruits. When optimized and scientifically validated, this approach can offer sustainable benefits to both producers and consumers.

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INTERNATIONAL CONFERENCE NETWORK

MEDIA PRESENTATION OF ARTIFICIAL INTELLIGENCE: FRAMING DYNAMICS IN SÖZCÜ AND HÜRRİYET NEWS

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ABSTRACT
This study investigates how artificial intelligence (AI) is framed in news coverage published in Sözcü and Hürriyet, two of Turkey's most visited online news platforms. While AI is frequently addressed in terms of technological progress, its representations in the media also contribute to shaping collective perceptions and ideological orientations. The aim of this research is to reveal the framing dynamics in AI-related news and to examine how meaning is constructed through media discourse. According to SimilarWeb data from September 2025, Sözcü and Hürriyet were selected for analysis. Using the keyword "artificial intelligence," purposive sampling was applied to identify news articles directly focusing on AI. Entman's framing approach provided the theoretical framework. The collected news texts were subjected to descriptive analysis within four categories: problem definition, causal interpretation, moral evaluation, and suggested remedies. The findings demonstrate that AI-related news not only reports technological developments but also produces ideological frames that influence how society interprets artificial intelligence. These frames show that the media functions both as an informant and as an actor shaping public opinion. The study reveals that news coverage of AI in media goes beyond transmitting information about technological innovations. It highlights discursive patterns that present AI not only as a technological issue but also as part of broader social contexts. Consequently, the analysis provides insights into how meanings related to artificial intelligence are produced through news framing.
Keywords: Artificial Intelligence; Media; Framing; News

GİRİŞ
Cambridge Sözlüğü (2025), yapay zekâyı "dili insani bir şekilde yorumlama ve üretme, görüntüleri tanıma ya da oluşturma, problemlere çözüm getirme ve sunulan verilerden öğrenme yeteneği gibi insan beyninin sahip olduğu niteliklerden bazılarını taşıyan bilgisayar sistemleri veya makinelerin kullanımı ya da incelenmesi" olarak tanımlamaktadır. Ayrıca yapay zekâ, makinelerin insanlara özgü çeşitli karmaşık bilişsel ve davranışsal becerileri taklit etmesini mümkün kılan bir teknolojidir (Sheikh, Prins ve Schrijvers, 2023). Bu teknoloji, yalnızca teknik bir yenilik olmanın ötesinde üretim, iletişim ve karar alma süreçlerini köklü biçimde dönüştürerek birçok sektörde yapısal değişimlere yol açmıştır. Gansser ve Reich'e (2021) göre yapay zekâ (YZ), insanların yaşamlarını basitleştirmeyi ve çeşitli durumlarda onlara destek olmayı amaçlamaktadır. Yapay zekâ teknolojileri, navigasyon sistemleri, sohbet robotları ile müzik ve film öneri sistemleri gibi uygulamalar aracılığıyla günlük yaşamda giderek daha fazla yer almakta ve önemli değişimlere neden olmaktadır. Ancak, bu teknolojilerin günlük yaşamdaki artan varlıklarına rağmen, sıradan bireylerin bu sistemlerin nasıl işlediğini ve ortaya

çıkardıkları sonuçları kavraması oldukça zordur (Sartori ve Bocca, 2023). Yapay zekâya yönelik toplumsal algı, çoğunlukla bu teknolojinin sunduğu fayda ve olanaklara duyulan hayranlık ile onun belirsiz ve gizemli doğasından kaynaklanan endişe, tehdit ve korkular arasında şekillenmektedir (Brauner, Hick, Philipsen ve Ziefle, 2023). Johnson ve Verdicchio'ya (2017) göre, kontrol edilemeyen yapay zekâ olgusu kamuoyunda belirgin bir korku ve endişe yaratmaktadır. Yapay zekâya ilişkin kamuoyu algısı, zamanla bu alandaki araştırmaları sınırlayabilecek biçimde şekillenmektedir. Bu durum hem kamuoyu söyleminde hem de yapay zekâ araştırmacıları arasındaki tartışmalarda, insanların makinelere insan özerkliğine benzer nitelikler atfetmesine neden olan "özerklik" kavramına ilişkin belirsizlik ve yapay zekâ sistemlerinin tasarım ile dağıtım süreçlerinde insanların oynadığı merkezi rolü göz ardı eden "sosyoteknik körlük" olmak üzere iki temel sorunu ortaya çıkarmaktadır. Yigitcanlar, Degirmenci ve Inkinen'in (2024) *"Drivers behind the public perception of artificial intelligence: Insights from major Australian cities"* başlıklı çalışmasında, yapay zekâya ilişkin kamuoyu algısının hem olumlu hem de olumsuz boyutlar taşıdığı ortaya konulmuştur. Olumlu algılar, yapay zekânın günlük yaşamı kolaylaştırması, verimliliği artırması ve özellikle kentsel hizmetler ile afet yönetimi gibi kamu yararına alanlarda önemli katkılar sunabileceğine dair inançla şekillenmektedir. Buna karşılık olumsuz algılar, gizlilik ve mahremiyet endişeleri, yapay zekâ şirketleri ile devlet kurumlarına duyulan güvensizlik ve etik sorunlara ilişkin kaygılar etrafında yoğunlaşmaktadır.

Medya ve haber içerikleri, yalnızca bilgi aktarmakla kalmayıp, bu bilgileri sunma biçimleri aracılığıyla da belirli çerçeveler üzerinden toplumsal algıyı şekillendirmektedir. Haber içerikleri, kamuoyunun belirli olaylar hakkında ne düşüneceğini değil ne hakkında düşüneceğini belirleyen bir filtre işlevi görürken (McCombs ve Shaw, 1972), aynı zamanda olayların nasıl anlaşılması gerektiğine dair bilişsel ve duygusal yönlendirmelerde de bulunmaktadır (Entman, 1993). Goffman'a göre (1986. s.10), sosyal gerçeklik bu çerçeveler aracılığıyla yapılandırılmakta ve yorumlanmaktadır. Dolayısıyla çerçeveleme, bireylerin sosyal gerçekliği anlamlandırma süreçlerini yönlendiren önemli bir iletişim stratejisi olarak işlev görmektedir. Bu süreç, yalnızca bireylerin olayları nasıl algıladıklarını değil; aynı zamanda bu algıların duygu, düşünce ve davranışlarına nasıl yansıdığını da şekillendirme potansiyeline sahiptir. Çerçeveleme, ilk olarak, nedensel bir etkenin ne yaptığının ve bunun genellikle değerler temelinde ölçülen maliyet ve faydalarıyla belirlenmesini içeren sorun tanımını; ikinci olarak, problemi yaratan güçlerin belirlenmesini içeren nedenlerin tespit edilmesini; üçüncü olarak, nedensel etkenlerin ve bunların etkilerinin değerlendirilmesini içeren ahlaki yargıları; son olarak ise, sorunlara yönelik çözümlerin sunulması, bu çözümlerin gerekçelendirilmesi ve muhtemel sonuçlarının öngörülmesini içeren çözüm önerilerini kapsamaktadır (Entman, 2009, s. 6). Medya bilgileri, insanların yeniliklere ve ortaya çıkan teknolojilere nasıl tepki verdiklerini karmaşıklaştırabilmektedir. Medyada bu tür bilgilere maruz kalan bireyler, yeni teknolojiler hakkında farklı hisler, duygular ve algılar geliştirebilmektedir (Cui ve Wu, 2019). Medyanın yapay zekânın hem olumlu hem de olumsuz toplumsal etkilerini dikkate alması, bu teknolojinin dengeli bir biçimde çerçevelenmesi ve temsil edilmesi açısından büyük önem taşımaktadır (Sartori ve Bocca, 2023). Yapay zekâya ilişkin haberlerin hangi çerçeveler aracılığıyla sunulduğunun incelenmesi, medyanın teknolojik gelişmeleri nasıl anlamlandırdığını ve toplumsal algının oluşumuna nasıl katkıda bulunduğunu ortaya koymak açısından önemlidir. Bu çalışma, Türkiye'nin en çok ziyaret edilen çevrimiçi haber platformlarından Sözcü ve Hürriyet'te yayımlanan yapay zekâ konulu haberlerde kullanılan çerçeveleri belirleyerek, yapay zekânın medya söylemi içinde nasıl temsil edildiğini ve anlamın nasıl inşa edildiğini ortaya koymayı amaçlamaktadır.

YÖNTEM

Erving Goffman (1986, s. 10), çerçeve kavramını, bireylerin toplumsal olayları ve durumları anlamlandırırken kullandıkları zihinsel yapılar ve örgütlenme ilkeleri olarak tanımlamaktadır. Bu çerçeveler, bireyin deneyimlediği olaylara anlam kazandırmasını sağlamakta ve bu olaylara nasıl katıldığını belirlemektedir. Çerçeveleme, algılanan gerçekliğin bazı yönlerinin seçilmesi ve bunların iletişim metni içinde daha belirgin hale getirilmesi yoluyla, tanımlanan olguya ilişkin bir sorun tanımı, nedensel yorum, ahlaki değerlendirme ve/veya çözüm önerisi oluşturma sürecidir (Entman, 1993, s. 52).

Bu çalışma, SimilarWeb Eylül ayı verilerine göre Türkiye'nin en çok ziyaret edilen çevrimiçi haber platformlarından ikisi olan Sözcü ve Hürriyet'te yayımlanan haberlerde yapay zekânın nasıl çerçevelendiğini incelemektedir. Bu kapsamda 10 Ekim 2025 tarihinde Hürriyet ve Sözcü haber sitelerinin arama bölümlerine "yapay zekâ" anahtar kelimesi yazılarak tarama gerçekleştirilmiştir. Elde edilen sonuçlar arasından, belirlenen dahil etme ve hariç tutma ölçütleri doğrultusunda değerlendirme yapılmıştır. Buna göre, doğrudan yapay zekâ konusunu ele alan ve haber sitelerinin kendi arama motorlarında ilk sıralarda görünür olan haberler amaçlı örnekleme yöntemi ile seçilmiştir. Her iki haber sitesinden üçer haber olmak üzere toplam altı haber örnekleme dâhil edilmiştir. Reklam, tanıtım veya duyuru niteliği taşıyan içerikler, yapay zekâ ile ilişkili olmayan haberler, köşe yazıları ve çerçeveleme kuramı kapsamında analiz yapılmasına elverişli düzeyde metin yoğunluğu bulunmayan kısa haberler örneklem dışı bırakılmıştır.

BULGULAR

Çalışmanın amacı doğrultusunda, haberler çerçeveleme yaklaşımı temelinde analiz edilmiş olup, analize ilişkin ayrıntılar Tablo 1.1'de sunulmuştur.

Tablo 1.1. Analize Dâhil Edilen Haberler

Gazete	Haberin Başlığı	Problem Tanımı	Nedensel Yorum	Ahlaki Değerlendirme	Önerilen Çözüm/Söylem
Hürriyet	**Ekibin Junior'ı Artık Yapay Zekâ (Hürriyet, 2025)**	Yapay zekânın istihdam kaybına neden olacağı ve işsizlik tehdidi ile karşı karşıya kalınacağı vurgusu yapılmaktadır.	Teknolojik ilerleme, küresel rekabet ve verimlilik arayışı ekseninde bir çerçeveleme yapılmıştır.	Uyarıcı ve temkinli bir yaklaşım içermekte, kadın ve yeni mezun istihdamı açısından ortaya çıkabilecek bir eşitsizlik durumu vurgulanmaktadır.	İnsan makine iş birliği ve yeni beceri kazandırma vurgusu yapılmakta ve politik reformlara gereksinim olduğu ifade edilmektedir.
Hürriyet	**Yapay zekâda deneme dönemi bitti (Hürriyet, 2025)**	Haberde, şirketlerin yapay zekâyı deneysel bir araç olmaktan çıkarıp operasyonel sürece yerleştirdiği vurgusu vardır.	Haberde nedensellik, küresel ekonomik rekabet ve dijital dönüşüm bağlamında çerçevelenmiştir.	Teknolojiye gelişme odaklı olumlu bir yaklaşım bulunmakta, riskler ikinci planda tutulmaktadır.	Yatırım, inovasyon ve veri kalitesi ile veri güvenliğinin sağlanması için altyapının güçlendirilmesi önerilmektedir.
Hürriyet	**Yapay zekâ, insanlardan daha ikna edici**	Yapay zekânın insan iletişimini etkileyerek manipülasyon yaratma riski	Nedensel çerçeveleme geniş veri erişimi, kişisel bilgi kullanımı ve algoritmik öğrenme	Teknolojik ilerleme ve mahremiyet ikilemi arasındaki	Kişisel verilerin korunması için, şeffaflık ve etik açıdan düzenlemelere

	(Hürriyet, 2025)	vurgulanmaktadır.	bağlamında yapılmıştır.	gerilim vurgulanmaktadır.	olan ihtiyaç ifade edilmektedir.
Sözcü	**Tatil planlarını da artık yapay zeka yapıyor (Sözcü, 2025)**	Tatil planları gibi gündelik kararlarda yapay zekânın insan tercihlerinin yerini almaya başladığından söz edilmektedir.	Teknoloji kolaylık sağladığı için tüketici alışkanlıklarında yaşanan dönüşüm vurgusu yapılmıştır.	Haberde dengeli ve nötr bir sunum yapılmıştır. Teknoloji yaşamı kolaylaştıran bir araç olarak sunulmuştur.	Teknolojinin dengeli bir şekilde kullanılması gerektiğinin altı çizilmiştir.
Sözcü	**Uzmanı: 2030'da yalnızca 5 meslek kalacak – %99 işsizlik tehlikesi (Sözcü, 2025)**	Yapay zekâ ve otomasyon nedeniyle iş gücü piyasasının çökme riskinden bahsedilmektedir.	Genel yapay zekânın (AGI) gelişimi ve şirketlerin maliyet optimizasyonu vurgusu vardır.	Haberde karamsar ve uyarıcı bir çerçeveleme yapılmıştır. İnsan emeğinin değersizleşmesi ve etik problemler vurgulanmaktadır.	Teknolojiye hazırlık, etik açıdan denetimin gerekliliği ve insan emeğinin korunması çağrısı yapılmaktadır.
Sözcü	**Amerikalı bilim insanları korkutan bir keşif yaptı: Beynimiz yumuşama başlıyor! (Sözcü, 2025)**	Yapay zekâ sistemlerinin kullanımının insanın zihinsel kapasitesini etkilemesi ve öğrenme becerilerini zayıflatmasından söz edilmektedir.	Nedensel çerçeveleme aşırı kullanım, bilişsel tembellik, algoritmik bağımlılık üzerinden kurulmaktadır.	Duygusal ve uyarıcı bir çerçeveleme bulunmakta ve insanın düşünme yetisini yitirme korkusu vurgulanmaktadır.	Yapay zekânın bir asistan olarak farkındalıklı kullanımı önerilmektedir.

Analiz edilen altı haberin çerçeveleme analizi, önde gelen iki dijital haber platformu Sözcü ve Hürriyet'in yapay zekâyı farklı çerçevelerle sunduğunu göstermektedir. Her iki gazete de yapay zekâyı yalnızca teknolojik bir gelişme olarak ele almamakta; bu teknolojiyi toplumsal, ekonomik ve etik boyutları olan çok yönlü bir dönüşüm aracı olarak sunmaktadır. Bununla birlikte her iki haber platformunun yapay zekâya ilişkin kullandığı çerçeveler belirgin bir şekilde farklılaşmaktadır.

Analiz edilen haberlerde Hürriyet, yapay zekâyı ekonomik ilerleme, verimlilik ve dönüşüm çerçeveleri içinde sunmaktadır. Bu bağlamda Hürriyet'in haberlerinde çerçeveleme, teknolojik iyimserlik ve uyum temaları etrafında şekillenmekte ve yapay zekâ kaçınılmaz bir ilerleme süreci olarak okunmaktadır.

Sözcü'nün haberlerinde ise yapay zekâ çerçevesi toplumsal risk, insan emeğinin değersizleşmesi ve bilişsel gerileme temaları etrafında kurulmaktadır. Dolayısıyla yapay zekânın yol açabileceği sorunlara ve bunların sonuçlarına odaklanılmaktadır. Bununla birlikte Sözcü'nün "Tatil planlarını da artık yapay zeka yapıyor" haberinde daha ılımlı bir çerçeve benimsenmiş ve yapay zekâ, gündelik yaşamı kolaylaştıran bir araç olarak tanımlanmış, ancak insan dokunuşunun korunması gerektiği vurgulanmıştır. Bu anlamda gazete, insan merkezli denge arayışını önceleyen bir çerçeve çizmiştir.

SONUÇ

Çalışma, Türkiye'de çevrimiçi ana akım medyada yapay zekâya ilişkin haberlerin nasıl çerçevelendiğini incelemiş ve yapay zekânın medya çerçeveleri aracılığıyla nasıl

anlamlandırıldığını ortaya koymuştur. Hürriyet ve Sözcü haber sitelerinden alınan altı haberin analizine dayalı olarak gerçekleştirilen çalışma, yapay zekâya ilişkin haberlerin yalnızca bilgi aktarmakla kalmadığını aynı zamanda yapay zekâya ilişkin anlamları da inşa ettiğini ortaya koymaktadır. Haberlerin analizi, yapay zekânın; ideolojik, kültürel ve toplumsal anlam üretim süreçlerinin bir parçası olarak çerçevelendiğini göstermektedir.

Çalışmanın bulguları, her iki gazetenin yapay zekâya ilişkin çerçeveleme dinamiklerinin farklı olduğunu göstermiştir. Hürriyet'in haberlerinde, yapay zekâ genel olarak modernleşme, verimlilik ve ekonomik rekabet çerçevesinde konumlandırılmıştır. Bu durum yapay zekânın teknolojik ilerlemenin kaçınılmaz bir aracı olarak sunulduğuna işaret etmektedir. Dolayısıyla Hürriyet'in haberlerinde genel olarak teknolojiye iyimser bakan bir yaklaşım olduğu söylenebilir. Sözcü ise, haberlerinde daha eleştirel bir çerçeve benimsemiştir. Yapay zekâyı toplumsal eşitsizlikleri derinleştiren, insan emeğini ve insanın zihinsel kapasitesini tehdit eden bir unsur olarak resmetmiştir. Dolayısıyla haberlerde yapay zekâya dair kaygılar dikkat çekmektedir. Bu anlamda Sözcü'nün haberleri, teknolojik dönüşüme dair toplumsal endişelerin güncel bir izdüşümü olarak okunabilir.

Gazetelerin haber çerçeveleri karşılaştırıldığında, yapay zekâya ilişkin haberlerin teknoloji ve insan ikiliği etrafında şekillendiği görülmektedir. Bu durum, teknolojiyi ekonomik rasyonaliteyle bütünleştiren uyum çerçevesini ve insanın bilişsel ve etik özerkliğini korumaya çalışan direniş çerçevesini üretmektedir. Bu anlamda medya hem teknolojik ilerlemenin meşrulaştırıcısı hem de onun toplumsal sonuçlarını görünür kılan bir tartışma sahası olarak işlev görmektedir. Çerçeveler, medyanın yapay zekâya ilişkin algının şekillenmesinde rol oynayabileceğini göstermekte ve medyanın yapay zekâya ilişkin yaklaşımını görünür kılmaktadır.

Gelecekte yapılacak araştırmalarda, bağımsız dijital platformlar, reklamlar, televizyon gibi farklı medya ortamlarında yapay zekânın nasıl çerçevelendiğine dair benzer bir çerçeveleme analizi gerçekleştirilebilir. Bu gibi çalışmalar medya ortamında, yapay zekâya ilişkin söylemin nasıl çeşitlendiğini göstermek açısından önemli olacaktır.

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HIGHER EDUCATION AND SOFT SKILLS: A BIBLIOGRAPHIC ANALYSIS OF PROMINENT THEMES

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ABSTRACT
Updating education and curricula at higher education institutions that train the workforce of the future is of vital importance. It is clear that education based on outdated theoretical knowledge will create a significant gap in university education. Training young adults preparing to enter the workforce in employability skills as part of their education during their most productive learning years greatly benefits both their entry into the workforce and their retention in jobs. Based on the gap in literature, this study highlights the importance of soft skills and higher education concepts, whose importance continues to grow in the 21st century, and attempts to reveal the relationship between these two concepts. A bibliometric approach based on the literature is presented between the concepts of "soft skills" and "higher education" by conducting a keyword search in the WoS database. According to the prominent findings, the top three most productive countries are Spain, Portugal, and the United States, and the most productive institutions are Tecnológico de Monterrey, Universitat Politècnica de València, and Universiti Teknologi MARA. The top three keywords of the authors were higher education, soft skills, and employability. Through the bibliometric analysis conducted, the dimensions of the research conducted on these two key concepts and new research opportunities are presented in detail.
Keywords: Soft skills, higher education, employability, education, skills.

Introduction
The issue of employment and job security has become a concept accompanied by anxiety in light of new technological developments, while advances in artificial intelligence have begun to make not only job security but even getting a job quite difficult. Although this may seem like a problem for job seekers, a work ethic that eliminates the human factor will also threaten businesses in the future. Research in the field of soft skills invites the scientific world, which has focused on the rapidly accelerating role of technology in working life, to face the reality that human skills are being neglected.
The quality of education provided at higher education institutions can be determined based on the employment rates and success of graduates. Therefore, educational institutions that equip their students with more job-related skills and competencies are becoming more successful (Marinas et al., 2021). For example, in a study examining university-level competencies, personality skills, communication skills, complex thinking, information research, creativity, information use, global skills, and leadership emerged as the eight main competency areas that form the basis of the competency measurement tool developed in collaboration with all stakeholders. The results of this study, which provides an efficient understanding for curriculum development and addressing deficiencies, are noteworthy (Hwang and Kwon, 2019).
The importance of these skills, which young people pursuing higher education will use throughout their studies, not just for their future careers, became clearer during the COVID-19 pandemic. During this unexpected crisis, soft skills became an urgent need in higher education.

This is because students needed to manage their emotions and improve their social adaptation, as well as cope with the academic and personal challenges arising from radical and sudden changes in teaching methods. This was only possible by strengthening their emotional intelligence (López & Lozano, 2021). In today's higher education system, while students are taught theoretical knowledge, the practical application of this knowledge is neglected. As a result, when students enter the workforce, they are unable to effectively apply the knowledge they have learned about their field of work. The education system should not only transfer knowledge but also teach the practical application of this knowledge (Mohammed & Ozdamli, 2024).

It is a well-known fact that the business world is highly competitive. Many jobs require not only hard skills, but also the ability to interact effectively and efficiently with other people (McGovan, Lopez-Serrano, & Burgos, 2023). Competence in these roles is achieved by teaching soft skills to future employees at higher education institutions and ensuring that these skills are used effectively in the workplace.

Materials and Methods

This section of the study presents the purpose of the research, the analyses conducted, and the findings. Answers to the research questions will be sought based on the data obtained.

RQ1. What is the trend in the development of academic studies on the concept of “soft skills” in higher education over the years?

RQ2. Which countries, institutions, and authors are the most productive in the areas of “soft skills” and “higher education”?

RQ3. What structural characteristics do the most cited authors, sources, and collaboration networks in this field exhibit?

RQ4. What is the thematic distribution of studies on “soft skills” and “higher education,” and what are the most frequently used keywords?

RQ5. What new trends and gaps do bibliometric indicators in literature reveal for future research?

The Purpose of Research

Based on quantitative data and numerical measurement indicators, bibliometric analyses conducted on the concepts of “soft skills” and “higher education” aim to present studies on these two concepts to researchers from a holistic perspective.

Data and Analysis

Various bibliometric analysis tools are used in the field. In this study, the VOSviewer 1.6.20 program was preferred due to its strong functionalities. It is considered an important program that offers researchers convenience in discovering developments, relationships, and new concepts in literature.

Furthermore, it enables in-depth analysis of data sets due to its visualization, mapping, and multidimensional analysis capabilities. The Web of Science Core Collection database was used in the current study. The selection of the Web of Science database for various analyses, including bibliometric analyses, is an important factor in terms of the reliability of the research. The Web of Science database has advanced search indicators for advanced data analysis and uses various control mechanisms. It covers high-quality and reliable studies in terms of publication ethics. It also provides access to extensive data collection from different disciplines.

Subsection Publications by Year

On March 23, 2025, a search was conducted using the keywords “soft skills” and “higher education” with “all fields” selected, yielding 952 results, including 903 documents and 49 recommended documents. Analyses were performed on 903 documents. By year, 588 articles, 279 conference papers, 34 review articles, 24 book chapters, 21 early view studies, and 6 editorials were found from 97 different disciplines/fields, ranging from the oldest in 2003 to the

newest in 2025. In terms of disciplines, the vast majority of the studies belong to the fields of Education Educational Research (490), Education Scientific Disciplines (125), Management (56), Engineering Multidisciplinary (47), Computer Science Interdisciplinary Applications (45), and Social Sciences Interdisciplinary (40). The data obtained was analyzed based on author-citation-journal-country-institution and keyword analyses. Content indexed in Web of Science was used as the database.

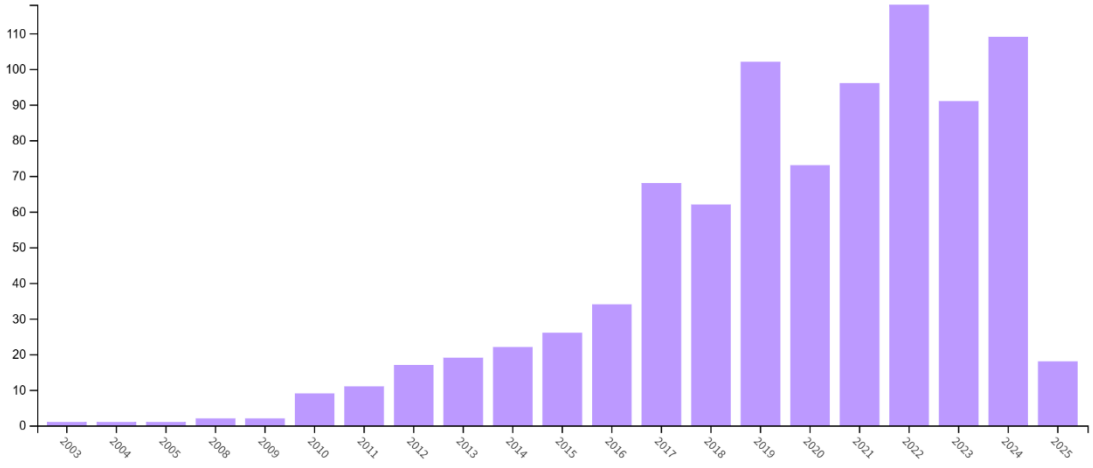


Figure 1. Publications by Year (2003-2025)

Web of Science Categories	Record Count	% of 903
Education Educational Research	490	54.264
Education Scientific Disciplines	125	13.843
Management	56	6.202
Engineering Multidisciplinary	47	5.205
Computer Science Interdisciplinary Applications	45	4.983
Social Sciences Interdisciplinary	40	4.430
Business	38	4.208
Green Sustainable Science Technology	31	3.433
Environmental Sciences	29	3.212
Engineering Electrical Electronic	27	2.990

Table 1. Number of publications by category (2003-2025)

Publication Titles	Record Count	% of 903
Inted Proceedings	36	3.987
Education Sciences	28	3.101
Edulearn Proceedings	28	3.101
Iceri Proceedings	26	2.879
Sustainability	23	2.547
Education and Training	18	1.993
Higher Education Skills and Work Based Learning	18	1.993
Ieee Global Engineering Education Conference	15	1.661
Edulearn19 11th International Conference on Education and New Learning Technologies	11	1.218
Procedia Social and Behavioral Sciences	11	1.218
Frontiers in Education	10	1.107

Frontiers in Education Conference	10	1.107

Table 2. Publications by Journal (min. ten record)

Co-authorship of authors

According to the authors' co-authorship analysis, a network map was created by setting criteria of at least 1 publication and at least 1 citation to identify the most connected and collaborative authors. Analysis of the names with the highest connections among them reveals 20 names grouped into a single cluster with a total of 190 connections. Each of the most connected authors in the cluster has a total of 19 connections. It is also noted that the most cited authors (Succi 346, Canovi 316, Clarke 252, Crossman 252) are not the most connected authors. The most prolific authors are also not among the most connected authors (Dias 6, Mareque 4, Caggiano 4, Lara-Prieto 4, Membrillo-Hernandez 4, Abbas 4, Soares 4, Caratozzolo 4, Marin-Garcia 4, respectively).

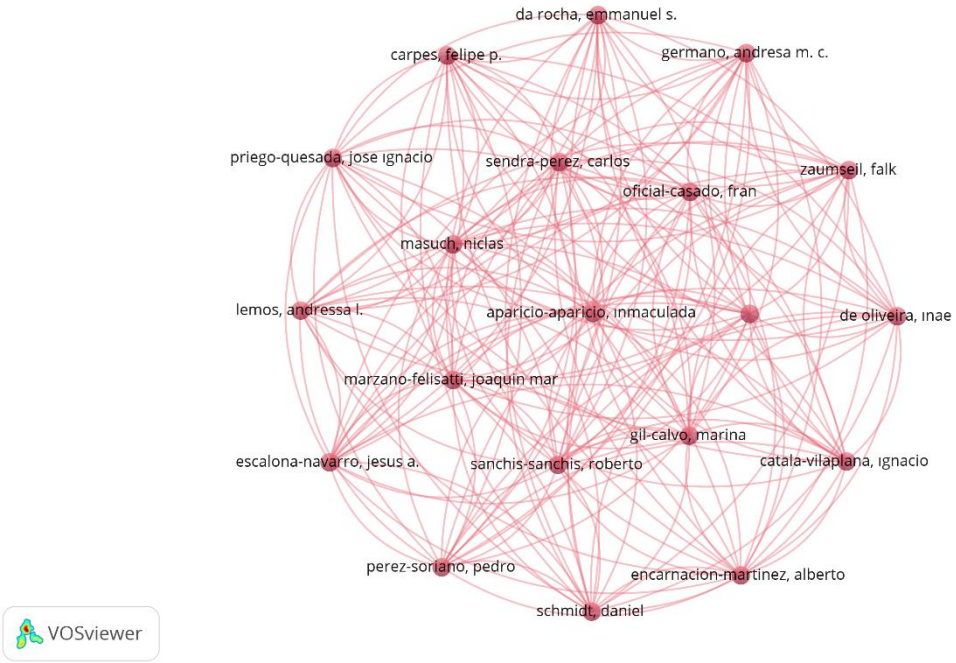


Figure 2. Co-authorship of authors

Author Attribution Analysis

A network map of author citation analysis was generated using at least 1 publication and at least 1 citation criterion to identify citation networks. Analysis of the 570 interconnected units revealed a total of 25 clusters, 2,550 connections, and a total connection strength of 2,595. Succi with 346 citations, Canovi with 316 citations, Clarke with 252 citations, and Crossman with 252 citations were the most cited authors. The top two most cited authors among these four also ranked first and second in terms of total connection strength.

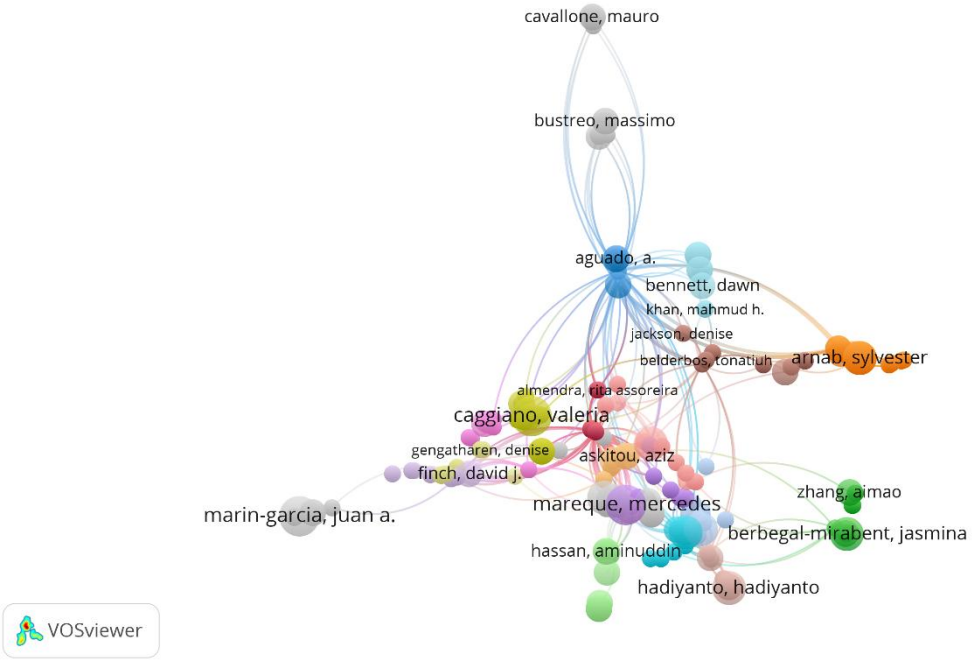


Figure 3. Authors' citation networks

Country Citation Analysis

An analysis was conducted on 65 observation units with interrelated connections, based on the criterion that at least one work must be published by a country and receive one citation in order to create a network map of citations received by publications according to their countries of origin. Fourteen clusters, 278 connections, and a total connection strength of 489 were identified. The countries receiving the most citations were the United States (764 citations), Australia (753 citations), and Italy (740 citations). These countries ranked in the top three in terms of total connection strength. In terms of the number of publications, the ranking was Spain (118 publications), Portugal (76 publications), and the United States (64 publications).

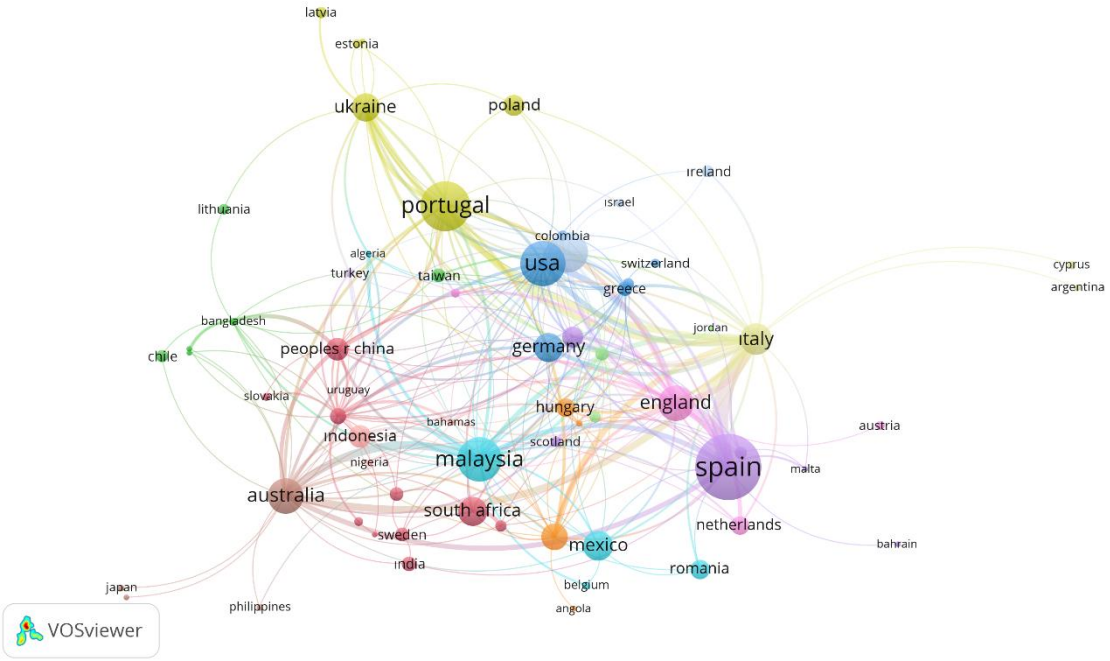


Figure 4. Countries' Citation Links

Institutional Citation Analysis

An analysis was conducted on 531 observation units with inter-institutional relationships, based on the criterion that at least one work must be published and one citation received by an institution in order to create a network map of inter-institutional citations. Tecnol Monterrey (21 works), Univ Politecn Valencia (16 works), and Univ Tecnol Mara (10 works) were represented, while the institutions with the most citations were ESCP Europe Business School (316 citations), University of Adelaide (252 citations), and University of Australia (252 citations). A total of 26 clusters, 1,045 connections, and a total connection strengt of 1,087 were identified.

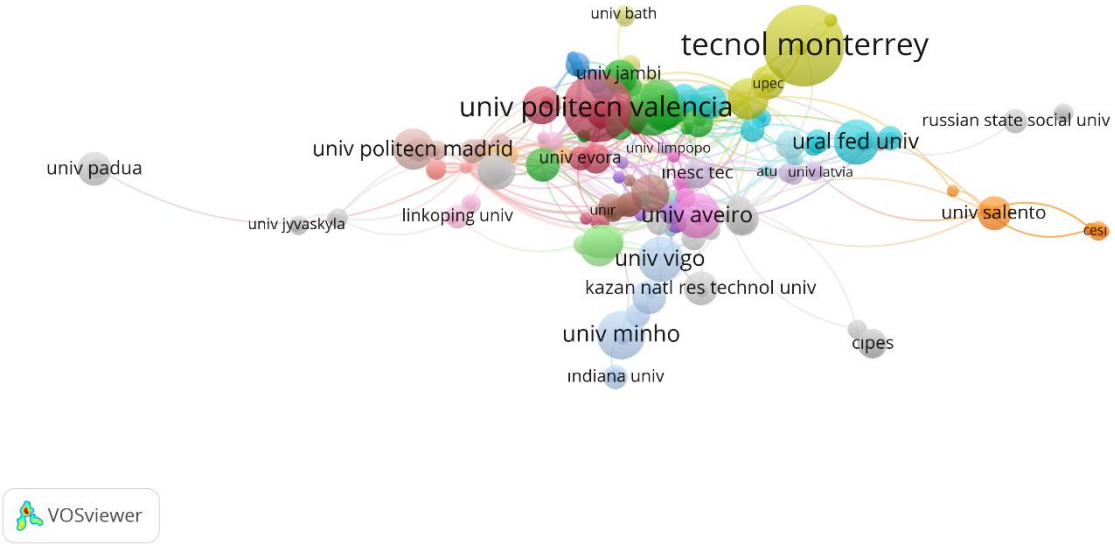


Figure 5. Institutional citation analysis

Keyword Analysis

The most frequently used 2261 keywords in publications related to soft skills and higher education were analyzed. When considering the minimum occurrence of a keyword as 1, the terms higher education (310 occurrences), soft skills (286 occurrences), employability (66 occurrences), engineering education (28 occurrences), and skills (23 occurrences) were the most prominent. In terms of total connection strength, the strongest expressions were post-truth, fake news, and social media. Analysis of 210 observation units, each appearing at least three times and showing interrelationships, identified a total of 16 clusters, 1,282 connections, and 2,215 total connection strength.

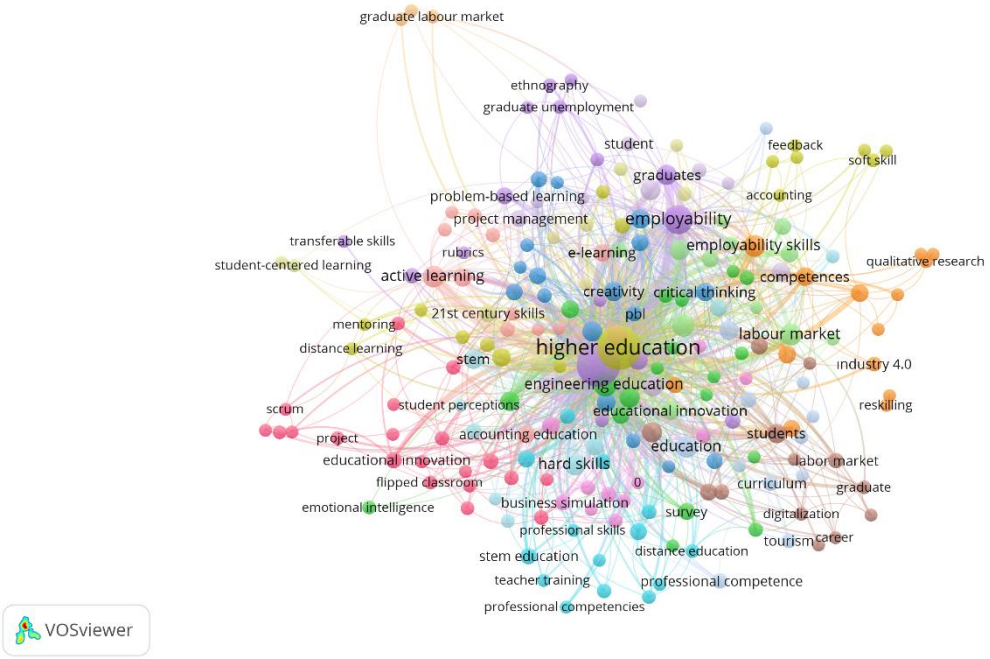


Figure 6. Keyword analysis

Bibliometric Coupling of Documents

Bibliographic matching refers to the situation where two independent sources cite common work. According to the analysis conducted on 490 works selected based on the criterion of having received at least 1 citation and having connections between them, 16 clusters, 8,404 connections, and 11,826 total connection strength were obtained. The publications with the most bibliographic matching were Succi (2020) with 316 citations, Crossman (2010) with 252 citations, and Finch (2013) with 191 citations. The works with the highest total connection power were Mainga (2022), Garcia-Alvarez (2022), and Dolce (2020).

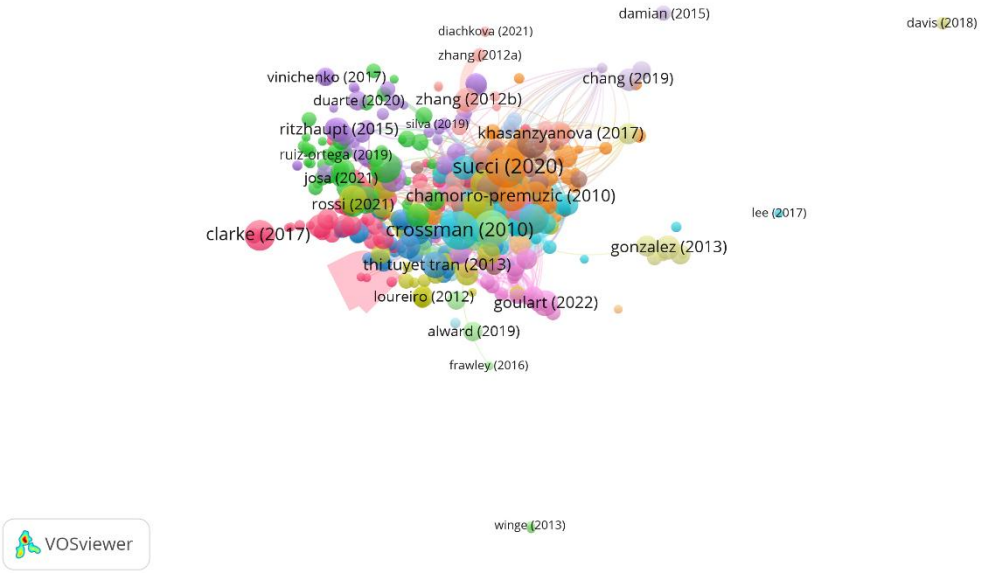


Figure 7. Bibliometric Coupling Analysis of Texts

Bibliographic Coupling of Authors

According to the analysis conducted with 1,535 units selected based on the criterion of having published at least one work and received at least one citation, and which are interconnected, 51 clusters, 86,974 connections, and a total connection strength of 260,601 were obtained. The authors with the most bibliographic matches were Succi (1,430 connection strength) with 346 citations, Canovi (863 connection strength) with 316 citations, and Clark (339 connection strength) with 252 citations.

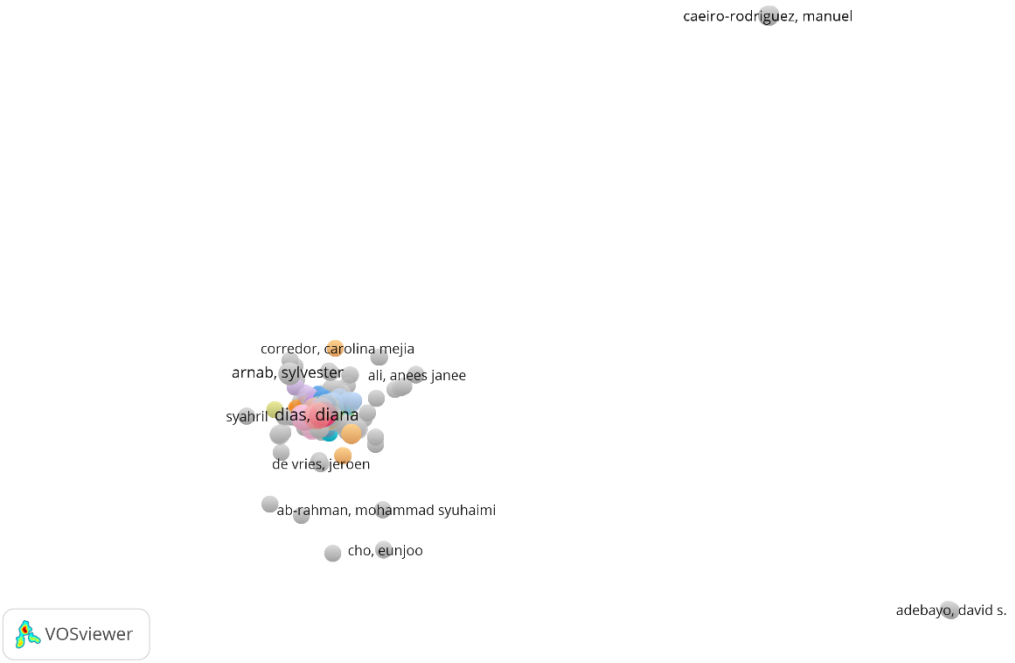


Figure 8. Authors' Bibliometric Coupling Analysis

Co-citation of co-authors

Different sources cited in a publication are referred to as co-citations. Based on an analysis of 160 units, with a minimum citation count of 10, a total of 6 clusters, 4,519 links, and 12,509 total link strength were identified. The authors with the most co-citations were identified as Jackson d. (107), Robles, mm (69), and Andrews, j (62).

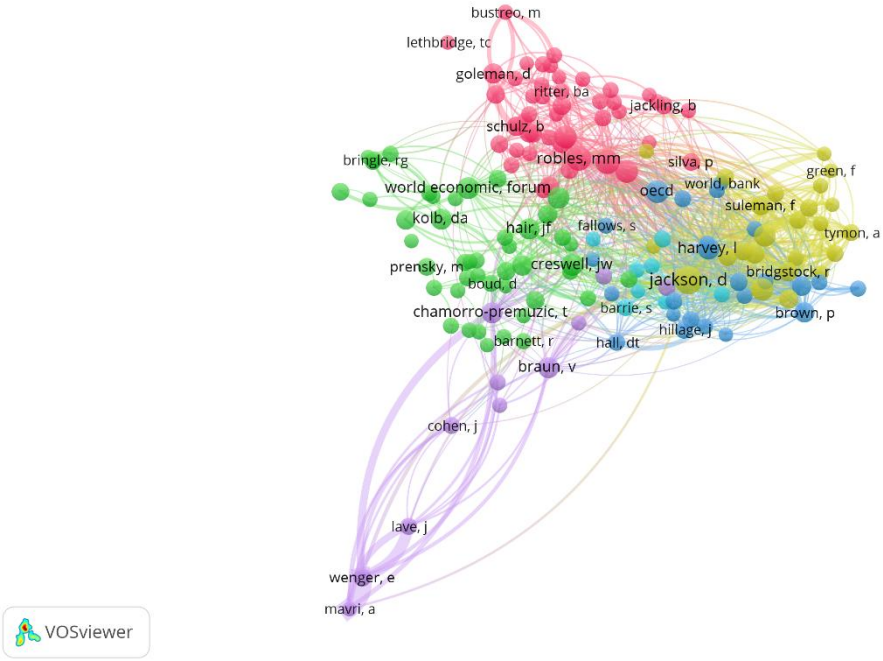


Figure 9. Co-citation of co-authors Analysis

Reference Citation Analysis

According to the analysis conducted with 142 units selected based on the criterion of having published at least 1 work and received 1 citation, and which are interconnected, 26 clusters, 261 connections, and 294 total connection strength were obtained. The highest number of citations (427 citations, 17 works) was found in sources on education and training, followed by studies in higher education (379 citations, 6 works) and higher education (344 citations, 5 works).

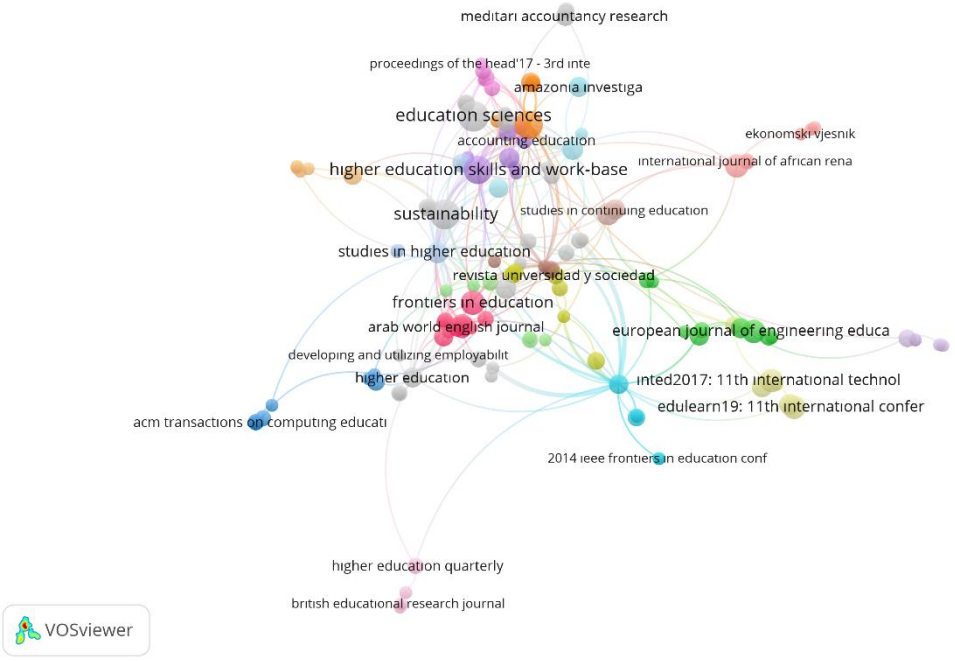


Figure 10. Reference Citation Analysis

Conclusion

This study examines the relationship between the concepts of "soft skills" and "higher education" using a bibliometric approach, revealing the trends, productive actors, and thematic tendencies of research conducted in this field over the past twenty years. Analyses conducted using the Web of Science Core Collection database reveal that these topics are increasingly the subject of research interest and show a marked upward trend, particularly since 2020.

According to the findings, Spain, Portugal, and the United States are the countries with the highest number of publications, while Tecnológico de Monterrey, Universitat Politècnica de València, and Universiti Teknologi MARA are among the most productive institutions. Succi, Canovi, and Clarke stand out as the most cited authors. These results show that the concept of soft skills is intensively addressed in European and Latin American-based universities and that the topic is of interdisciplinary interest on a global scale.

According to keyword analysis, the terms "higher education," "soft skills," and "employability" constitute the strongest thematic axes in the field. In parallel, the increasing visibility of concepts such as "engineering education," "skills development," and "post-truth" indicates that in the future, soft skills will gain greater importance not only in the social sciences but also in engineering and technology-based fields.

Research findings emphasize that higher education should focus not only on the transfer of academic knowledge but also on developing students' skills in emotional intelligence, communication, problem solving, teamwork, and creativity. It shows that it is critically important for universities to give more space to soft skills education in their curriculum design in terms of employability and professional sustainability.

In conclusion, this bibliometric analysis contributes to the existing body of knowledge in the field by systematically revealing the emerging trends in soft skills research in higher education. Future studies are recommended to be conducted on a broader sample by including different databases (e.g., Scopus, ERIC, or PubMed) and to examine regional differences and application examples comparatively. Thus, the integration of soft skills into education policies can be evaluated more comprehensively in line with the changing labor force dynamics of the 21st century.

Limitations

The study has certain limitations. The inclusion of studies listed in the WOS Core Collection in the analysis and the exclusion of databases such as Scopus and PubMed, as well as other sources not available online, are the most critical limitations of the study.

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INTERNATIONAL CONFERENCE NETWORK

THE USE OF ANIMAL PRODUCTS IN ANCIENT GREEK COUSINE

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ABSTRACT

The ancient Greeks prepared lavish banquet tables and meals for their social life and celebrations. Ancient Greek cuisine had a structure that offered considerable variety in terms of the ingredients used. Although this cuisine had the typical characteristics of a Mediterranean cuisine, with a focus on grains, legumes, and fruits due to its geographical location, it also included animal products. When it comes to these products, goats, sheep, and pigs first come to mind. Goats, which the ancient Greeks used extensively, especially in cheese production, were considered one of the most important animals economically, and their meat was consumed in abundance. However, their meat was only tasty at certain ages and at certain times of the year. At other times, it had a bad taste and smell. Nevertheless, it was very nutritious. Lamb was more productive than goat. It featured heavily on the menus of evening meals attended by city dwellers, especially in Athens and Sparta. Pork was also widely consumed, especially in the Classical Age, like goat and sheep. It was the most common type of meat on menus, especially in Athens. As with other domestic animals, a series of technical terms were used to describe pigs of specific ages and sexes, and these were transferred into culinary terminology. Large livestock also featured in the Ancient Greek cuisine. The sacrifice of an ox forms the central theme of the third book of Homer's Odyssey. Beef and veal are rare in Athens and most cities in Central and Southern Greece. Written sources from the 4th century BC contain no significant data on the consumption of large animal meat. Domestic donkey meat was consumed, albeit rarely, in the Ancient Greek cuisine. However, it was not considered as tasty as wild donkey meat. The taste of wild donkey meat is similar to rabbit meat. Some families brought the meat of old domestic donkeys to their tables. However, this meat, like horse and camel meat, has a very unpleasant smell and is difficult to digest. Animal offal was also preferred in Ancient Greek food culture. Heart, liver, kidney, and tongue were among the most commonly consumed offal. Rabbits were frequently hunted by hunters near Athens and found their way onto tables. Similarly, various bird species were also hunted and graced dining tables. Chicken meat is one of the most consumed proteins in the white meat group. It is known that honey, eggs, milk, and dairy products were widely consumed among animal products. Undoubtedly, seafood constituted another important part of Ancient Greek food culture. Numerous species of fish were widely fished in waters under Greek control. Many authors, including Aristophanes, Homer, Aristotle, Galen, and Xenophon, provided comprehensive information about the Ancient Greek cuisine. The main objective of this study is to evaluate the variety of animal products in the Ancient Greek cuisine, which is quite rich in terms of both vegan and animal product usage, and how they were presented, based on examples we have identified in ancient sources.

Key Words: Ancient Greek, Animal Products, Couisine, Ancient Sources.

INTERNATIONAL CONFERENCE NETWORK

THE REAL AND LINGUISTIC INTERPRETATION OF PHRASEOLOGISMS IN THE AZERBAIJAN LANGUAGE

AZERBAYCAN DİLİNDEKİ DEYİMLERIN GERÇEK-DİLBİLİMSEL YORUMU

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ABSRACT
Human beings express what they see, hear, and feel primarily on two levels. That is, they can convey a specific situation, event, person, object, or trend either in a literal or abstract way. Naturally, during communication, a person's mental and emotional state plays a key role in how something is expressed.
In such cases, the same phenomenon can be communicated in three different ways: neutral (ordinary), polite (euphemistic), or offensive (dysphemistic). For example, consider the concept of death. It can be described as "died" (neutral), "passed away" (euphemism), or "croaked" (dysphemism).
The soul of a people, the richness of their language, and their deep spirituality are often reflected in idiomatic expressions. Idioms typically originate from the lower strata of society rather than the upper. As a result, a member of the upper class might not say “My head is killing me” in front of subordinates; instead, they might say “I have a headache,” with little emotion. This shows that abstract, indirect ways of thinking—opposite to literal and direct expression—are often created by ordinary people.
Viewed from different angles, language reveals interesting insights depending on individual perspectives and interpretations. Observations show that idioms generally stem from two sources: literal (real) and figurative (indirect).
The first source is based on real-life associations. For example, Rovshan’s grandfather Ali once said, “I’ll put out the man’s eye,” and a mother might say to her child, “If you do this again, I’ll put out your eye.” The idiomatic meaning in this context is “I will punish you.” However, such direct equivalents are not always available.
The second source is figurative and metaphorical. These idioms are much harder to interpret literally, as they often reflect emotional and cognitive responses that cannot be captured in a single word. In this metaphorical layer, a variety of expressions reflect people’s intelligence and emotions in different areas of life. For example: “My stomach ruptured” – (heart attack), “My stomach burst” – (severe heart attack), “My ear rang” – (someone was talking about me), “My heart sank” – (fear or disappointment), “My spleen whined” – (hearing bad news), etc.
Sometimes idioms carry more than one meaning. For instance, the phrase **“the patient came to himself”** can mean: he was tired, he lost weight, or his condition improved—depending on the context.
As these examples show, idioms clearly demonstrate the depth, richness, and flexibility of popular thought.
Keywords: idioms, literal meaning, metaphorical meaning, euphemism and interpretation of dysphemis

Özet
İnsan, gördüklerini, duyduklarını ve hissettiklerini esas olarak iki düzlemde sunar. Yani belirli bir durumu, olayı, kişiyi, nesneyi ve gidişatı gerçek veya soyut bir şekilde ifade edebilir. Elbette, bir konuşma sırasında kişinin zihinsel ve duygusal yönü bir şeye ilişkin olarak ortak bir rol oynar. Böyle bir durumda, aynı olguyu üç şekilde aktaramaz: sıradan (basit), etik (euphemistik) ve kaba (disphemous). Örnek olarak, birinin ölümünün "öldü" (sıradan), "vefat etti" (euphemism), "sefil oldu" (disphemy) olarak söylenebileceğini belirtmek gerekir.
İnsanların ruhu, dillerinin zenginliği ve derin maneviyatı ise deyimsel ifadelerde bulunabilir. Deyimler, toplumun üst tabakalarının değil, alt tabakalarının ürünüdür. Dolayısıyla, üst sınıfın bir temsilcisi, astlarının önünde asla "Başım ağrıdan çatlıyor" demez, çok az duyguyla "Başım çok ağrıyor" der. Dolayısıyla, gerçek ve doğrudan anlamın zıttı olan soyut-dolaylı düşüncenin yaratıcısı, sıradan insanlardır. Bu bağlamda, herhangi bir açıdan aydınlatılan gerçekler, kendi bakış açılarına ve yorumlarına göre ilginç gerçekleri ortaya çıkarır.
Gözlemler, deyimlerin iki kaynağa dayandığını kanıtlıyor: gerçek ve dolaylı.
İlk kaynak, hayattan alınan karelerle ilişkilendirilerek oluşturulur (Rovşa'nın babası Ali, adamın gözünü çıkardı; annesi çocuğuna: "Bunu bir daha yaparsan gözünü çıkarırım"). İkinci cümlede verilen deyimsel ifadenin sözcüksel karşılığı "Cezalandıracağım"dır. Ancak böyle bir fırsat her zaman mevcut değildir.
İkincisi - mecazi, dolaylı yol - çok farklıdır. Buradaki fikri tek kelimeyle ifade etmek imkansızdır. Tamamen mecazi olan bu katmanda, bir dizi kavram her alandaki insanların zekâsını ve duygularını yansıtır. Örneğin:
Midem yırtıldı (kalp krizi); Midem çatladı (şiddetli kalp krizi); Kulağım çınladı (duyan kişinin onun hakkında konuşması); Kalbim çöktü (korku); Dalağım sızladı (kötü haber duymak); vb.
Bazen deyimler birden fazla anlamın taşıyıcısı haline gelir:
"Hasta kendine geldi" cümlesinin üç farklı anlamı vardır: yorgundu, kilo almıştı, durumu iyileşmişti.
Olgulardan da anlaşılacağı gibi, deyimler popüler düşüncenin geniş olanaklarını açıkça ortaya koyabilmektedir.
Anahtar kelimeler: deyim, gerçek anlam, mecaz anlam, örtmece ve disfemizm yorumu,

INTERNATIONAL CONFERENCE NETWORK

AZƏRBAYCAN DİLİNDƏ FRAZEOLOGİZMLƏRİN GERÇƏK-LİNQVİSTİK YOZUMU

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Giriş

İnsan görüb,eşidib,duyduğunu əsasən iki planda təqdim edir. Yəni o, müəyyən bir şərait, hadisə, şəxs, əşya və işlərin gedişatını gerçək və ya mücərrəd ifadə edə bilər. Sözsüz ki, danışıq əsnasında nəyəsə münasibətdə insanın əqli və hissi (emotiv) tərəfi müştərək rol oynayır. Bu cür halda o, eyni faktı adi (sadə), etik (evfemistik) və qaba (disfemistik) olaraq üç yolla çatdırma bilər. Örnək kimi göstərmək lazımdır ki, bir kəsin ölümünü "öldü" (adi), "rəhmətə getdi"(evfemizm),"gorbagor oldu" (disfemizm) şəklində demək mümkündür.

Xalqın ruhuna, dilinin zənginliyinə və dərin mənəviyyatına gəldikdə isə, onu frazeoloji ifadələrdə tapmaq mümkündür.Frazeologizmlər cəmiyyətin yuxarı deyil, aşağı təbəqəsinin yaradıcılığıdır. Belə ki heç vaxt yuxarı zümrənin nümayəndəsi ona tabe insanların qarşısında "Başım ağrıdan çatlayır" deyil, az emosiya ilə "Başım bərk ağrıyır" deyər. Deməli həqiqi, müstəqim mənanın qarşıllığı olan mücərrəd-dolayı düşüncənin müəllifi sadə xalqdır. Elə bu baxımdan hər hansı tərəfdən işıqlandırılan həqiqətlər öz fikir açımına, yozumuna görə maraqlı faktlar üzə çıxarır.

Müşahidələr onu sübut edir ki,frazeologizmlər iki – həqiqi və dolayı mənbəyə əsaslanır.

Birincisi həyatdan götürülmüş çerçəkliklərlə səsləşmə (Rövşənin atası Alı kişinin gözünü çıxardılar; Ana uşağına:"Bunu bir də etsən,gözünü çıxararam") yolu ilə əmələ gəlir.İkinci cümlədə verilən frazeoloji ifadəyə leksik qarşılıq kimi "cəzalandıraram" uyğun gəlir. Lakin hər dəfə belə imkan əldə olunmur.

İkinci – məcazi, dolayı yol isə çox fərqlidir.Burada fikri bir sözlə ifadə etmək
imkan daxilindən xaricdir. Tam məcazi olan bu qatda bir sıra anlayışlar xalqın hər bir sferada zəka və duyumlarını əks etdirir.Örnək:

Bağrı yarıldı (infarkt); Bağrı çatladı (geniş infarkt); Qulağım çaldı (duyan şəxsin kiminsə onun haqqında danışması); Ödüm ağzıma gəldi (qorxu), Dalağım sancdı (pis xəbəri duyma) və s.

Bəzən frazeologim bir neçə məna daşıyıcısına çevrilir:

"Xəstə cana gəlmişdi" cümləsi üç fərqli məna daşıyır: bezmişdi, kökəlmişdi,yaxşıılaşmışdı.

Faktlardan göründüyü kimi, frazeologizmlər xalq düşüncəsinin geniş imkanlarını bariz şəkildə göstərmək qüdrətindədir.

Tapıntılar və yenilik

Frazeologizmlər dilin emosional, estetik və ünsiyyət funksiyalarını gücləndirən sabit söz birləşmələridir. Onlar xalqın düşüncə tərzini, dünyagörüşünü, mədəniyyətini və tarixini əks etdirir.

Frazeologiyada müəyyən motiv olmalıdır ki,bu da frazeoloji birləşmənin məzmununu formalaşdıran əsas semantik dayaq, yəni onun obrazlı mənasının yaranmasına səbəb fikir və ya təsəvvür anlatsın.

Ümumiyyətlə,frazeologizm hansısa mədəni, tarixi, məişət və ya təbiət hadisələrindən bir motiv kimi bəhrələnir. Bunun müqabilində Azərbaycan dilindəki frazeologizmlər motivlərinə görə bir sıra aşağıdakı sahələri əhatə edir.(Hər bölgüdə qısaca örnəklər göstərilir):

1. *Məişət və gündəlik həyat motivi*

Bu sahədə olan frazeologizmlər insanların gündəlik təcrübələrindən yaranır:

Gözün üstə qaşın var deməmək – heç bir irad bildirməmək

Əli yanına düşmək – çarəsiz qalmaq
2. *Əxlaq və davranış motivi*
Bunlar insanların davranışlarına, əxlaqi dəyərlərə aid olan frazeologizmlərdir:
Üzü qara olmaq – biabır olmaq
Əli təmiz olmaq – vicdanlı, dürüst olmaq
3. *Əmək,iş fəaliyyəti motivi*
Əmək, zəhmət, iş fəaliyyəti ilə bağlı ifadələr işlənir:
Alnının təri ilə qazanmaq – halal zəhmətlə pul qazanmaq
Əlini daşın altına qoymaq – məsuliyyət daşımaq
4. *Əkinçilik və maldarlıqla bağlı dolayı motivlər*
Ənənəvi kənd təsərrüfatı sahələrinin insan həyatındakı yerini əks etdirən ifadələr.
Dən düşmək – pay almaq
Saman altından su yeritmək – gizlicə pis niyyət güdmək
Yüyəni əldən vermək – nəzarəti itirmək
5.*Bədən üzvləri motivi*
Bədən hissələrinin adları ilə yaranan ifadələr çox yayılmış və məhsuldar motivdir.
Başını itirmək – çaşqın olmaq
Əli cibində gəzmək – laqeyd olmaq
Göz görə-görə – hər kəsin gözü qarşısında
6. *Duyğular və psixoloji hallar motivi*
İnsanların daxili aləmi və hisslərini ifadə edən frazeologizmlər işlənir:
Başı göyə çatmaq – çox sevinmək
Dili-ağzı bağlanmaq – qorxudan danışa bilməmək
7. *Təbiət və heyvanlar aləmi*
Bəzən təbiət hadisələri və heyvanlarla bağlı frazeologizmlər obrazlı mənalarda istifadə olunur:
Qurd ürəyi yemək – çox cəsarətli olmaq
Suyu bulandırmaq – vəziyyəti qarışdırmaq
Daş kimi bərk – çox möhkəm
8. *Zoomorfik motivlər (heyvanlarla bağlı)*
Heyvan adları və onların davranışı əsasında formalaşan ifadələr:
Tülkü kimi hiyləgər
Əqrəb kimi sancmaq
İt kimi peşman olmaq
9. *İqtisadiyyat və ticarət motivi*
Bu sahədə insanlar arasında münasibətləri və iqtisadi fəaliyyətləri ifadə edən frazeologizmlər mövcuddur.
Pul əl yandırır – çoxlu pul xərcləmək
Borcla nəfəs almaq – daim borc içində olmaq
Ürəyi bir döyünmək – eyni hissləri keçirmək
Can deyib-can eşitmək – bir-birinə çox bağlı olmaq
10. Siyasət və idarəetmə motivi
Burada daha çox metaforik ifadələrə rast gəlinir:
Sükanı əlinə almaq – rəhbərlik etmək
İpin ucunu buraxmaq – nəzarəti itirmək
8. *Sosial münasibət və insan xarakterli motivlər*
İnsanlararası münasibətlər və xarakterlərlə bağlı düşüncələrdən doğan ifadələr:
İkiüzlü olmaq – riyakarlıq etmək
Dilini dişləmək – susmaq, sözünü saxlamaq
Üzü qara olmaq – biabır olmaq

11. *Savaş və qəhrəmanlıq motivləri*
Tarixi döyüşlər, qəhrəmanlıq və igidliklə bağlı obrazlardan yaranır.
Qılıncını qınından çıxarmaq – mübarizəyə başlamaq
Canını sipər etmək – fədakarlıq göstərmək
Bayrağı ucaltmaq – qalib gəlmək, şöhrət qazanmaq
12. *Kosmik və səmavi motivlər*
Ulduzlar, ay, göy, günəş kimi göy cisimlərinə əsaslanan ifadələr.
Ulduzu barmaqla göstərmək – çox məşhur olmaq
Göylə yer arasında qalmaq – qərarsızlıq yaşamaq
Ay kimi parıldamaq – çox gözəl olmaq
13. *Dini və mifoloji motivlər*
İslama, türklərə məxsus mifoloji dünyagörüş və dini anlayışlardan qaynaqlanan ifadələr.
Qiyamət qoparmaq – böyük hay-küy salmaq
Əzrayıl kimi dayanmaq – qorxunc görünmək
Cəhənnəmə vasil olmaq – ölmək (məcazi və ya istehza ilə)
Örnəklər göstərir ki, motiv frazeologizmin obrazlılıq səviyyəsini yüksəldir, mədəni kodunu göstərir,tarixi və mədəni dəyərlərlə əlaqəsini nümayiş etdirir, əsas fikri,mənanı daha dolğun çatdırmağa xidmət edir.
Frazeologizmlərdə ifadənin əsas mənasını daşıyan hissə onun nüvəsidir. Bu, frazeologizmin məna baxımından öz qoruyub-saxlaya biləcək ana hissəsidir. Adətən nüvə leksik-semantik cəhətdən əsas yükü daşıyan komponentdir. Məsələn:
1.“Ağzı bağlı adam” frazeologizminin mənası sirr saxlayan, danışmayandırsa, nüvəsi *ağızdır.*Çünki “ağız” burada “danışmaq”la bağlı əsas sözdür, ifadədən çıxarılsa, məna itər.
2. “Əlini daşın altına qoymaq”da məsuliyyəti öz üzərinə götürmək, risk etməyə işarə edilıir.Nüvə hissə “*əlini qoymaq”*birbaşa hərəkətin daşıyıcısıdır.Burada əsas fikir hərəkət etmək və təşəbbüs göstərməkdir.
3. “Qanı qaralmaq” – kədərlənmək, əhval-ruhiyyəsi pozulmaqdır.Nüvəni “*qan” təşkil edir.* Belə ki bu söz emosional vəziyyətlə bağlı metaforik daşıyıcıdır (Qədim türk və İslam mədəniyyətində "qan" həyat və duyğu ilə əlaqələndirilir)
Frazeologizmlərdə nüvənin əhəmiyyətinə gəldikdə, onun özəllikləri aşağıda göstərilənləri əks etdirir:
1.Nüvə frazeologizmin əsas semantik yükünü daşıyır.
2.Bədii təsvir və obraz bu söz ətrafında formalaşır.
3.Frazeologizmdə dəyişməyən və dəyişməsi mənanı pozan hissədir.
Xalqın fəlsəfi dünyagörüşü, düşüncə tərzi, həyat və insan anlayışına yanaşması, varlıq və zamanla bağlı baxışları da frazeoloji ifadələr vasitəsilə məcazi və obrazlı şəkildə əks oluna bilir.
Başqa sözlə, frazeologizmlər xalq fəlsəfəsinin daşıyıcılarıdır. Onlar gündəlik həyatda işlənməsinə baxmayaraq, dərin mənəvi və fəlsəfi məzmun daşıyırlar.
Frazeologiyada fəlsəfi anlamın əsas istiqamətləri əsasən bunlardır.
1. *Həyat və ölüm fəlsəfəsi*
Bu qrup frazeologizmlər insan həyatının faniliyi, ömür, tale və ölüm haqda xalq düşüncəsini əks etdirir:
Ömürdən gün əksilmək – yaşlanmaq
Can vermək – ölmək
Qismətində varsa... – taleyə inanmaq

Dünya beş günlükdür – həyatın keçiciliyi haqqında düşüncə
Bu tip ifadələrdə fatalizm, yəni taleyin dəyişməzliyinə inam özünü göstərir.Bu isə folklor fəlsəfəsinin əsas xüsusiyyətlərindəndir.

2. *Tale və alın yazısı*
Azərbaycan xalqının *təqdirdən qaçmaq olmaz* ideyasını əks etdirən ifadələrdir:
Alnında nə yazılıbsa, o da olacaq
Yazı-qismət belə imiş – hər iki ifadədə olacağa çarənin olmaması fikri
Taleyin qara yazısı – ağır həyat yaşamaq
Başa gələn çəkilər – baş verənlərlə barışma fəlsəfəsi
Bu frazeologizmlər varlıq və zərurət, azadlıq və məcburiyyət kimi fəlsəfi kateqoriyaların dildə təzahürüdür.
3. *Zaman və keçicilik anlayışı*
Zamanın ötüb-keçməsi, heç bir şeyin əbədi olmaması ilə bağlı frazeoloji fikirlər:
Dünya fani
Zaman hər dərdin dərmanıdır
Su axar, daş qalar – zaman dəyişsə də, bəziləri sabit qalır.
Hər şeyin vaxtı var–həmin mənada
Burada *zaman fəlsəfəsi* (temporallıq) və *dəyişkənlik* ideyası əsasdır.
4. *İnsan və cəmiyyət*
İnsanın özü və ətraf mühiti ilə münasibətləri haqqında fəlsəfi düşüncələr:
İnsan gərək özü-özünə güzgü ola – özünü tənqid edə bilmək
Nə əkərsən, onu biçərsən – səbəb-nəticə qanunu
Dost dar gündə tanınar – sosial sınaq vasitəsilə insanın qiymətini bilmək
El bir olsa, dağ oynadar – birlik və həmrəylik fəlsəfəsi
Bu ifadələrdə etik-fəlsəfi, sosial-fəlsəfi düşüncə sistemləri yer alır.
5. *Bilgi və müdriklik*
Xalq müdrikliyi, təcrübəyə əsaslanan fəlsəfi düşüncə və dərin müşahidə qabiliyyəti:
Min eşitməkdənsə, bir görmək yaxşıdır
Sükut da bir cavabdır
Ağıl yaşda deyil, başdadır
Söz gümüşdürsə, sükut qızıldır
Bu ifadələr epistemologiya (bilgi fəlsəfəsi), müdriklik, düşüncə və məntiq kateqoriyalarına daxildir.
6. *Daxili aləm və mənəvi ahəngdaqlıq*
İnsanın özü ilə barışıqda olub-olmaması, daxili narahatlıq və mənəvi tarazlıq məsələləri:
Ürəyinə dammaq – altıncı hiss, intuisiya
Dili ilə qəlbi bir olmaq – səmimiyyət
Gözə görünməyən yük daşımaq – mənəvi yük
İçində fırtına qopmaq – daxili ziddiyyətlər yaşamaq
Bu ifadələr insanın subyektiv varlığı və psixoloji fəlsəfəsi ilə bağlıdır.
Ümumilikdə frazeologizmlər xalq fəlsəfəsinin canlı daşıyıcıları olaraq,sadə görünən ifadələrin arxasında dərin varlıq, zaman, əxlaq və insan anlayışları dayanır ki, bu da danışıq dili vasitəsilə fəlsəfi ideyaların xalq şüurunda bərqərar olduğunu sübut edir.
Azərbaycan frazeologiyasında insanın *daxili aləmini, psixoloji vəziyyətini, emosional hallarını, xarakter xüsusiyyətlərini, hiss və duyğularını* ifadə edən psixologizmlərə də rast gəlinir.Bu sabit söz birləşmələri insan təfəkküründün, duyğularının və psixoloji vəziyyətinin dildə məcazi, obrazlı, lakin çox təsirli formada əksidir.
Frazeologizmlərdə psixologizmin əsas sahələri aşağıdakılardır:

1. *Daxili emosional hallar*
İnsanın sevinci, kədəri, qorxusu, təşvişi və ya ümidsizliyi ilə bağlı ifadələr:
Başı göyə dəyər – çox sevinmək
İçi qan ağlamaq – dərindən kədərlənmək
İçi getmək – çox arzulamaq, içindən gəlmək
Dili-ağzı bağlanmaq – qorxudan, şokdan danışa bilməmək
Bu ifadələr insanın emosional rahatlanma və ya yüklənmə hallarını göstərir.
2. *Stress, gərginlik və panika*
Daxili narahatlıq, psixoloji gərginlik, qərarsızlıq və ya təşviş halları:
İçi titrəmək – qorxu və ya həyəcan keçirmək
Əli-ayağı çaşmaq – təşvişə düşmək
Səbr kasası daşmaq – psixoloji dözümlülüyün tükənməsi
Yeri göy görməmək – heç nə hiss etməmək, qapanmaq
Bu ifadələr çox vaxt psixoloji yüklənmənin zirvə həddini göstərir.
3. *Xarakter və temperament*
İnsanın xasiyyəti, davranış tərzi və daxili psixoloji meylləri:
Yel kimi insan – yerində durmayan, hərəkətli
İçində qurd oynamaq – narahat, dinclik tapmayan
Sərt təbiətli olmaq – kobud, soyuq
Odlu-alovlu danışmaq – emosional, coşqulu danışmaq
Burada insanın daxili psixoloji quruluşu obrazlı şəkildə ifadə olunur.
4. *Şüuraltı qavram (intuisiya)*
Qeyri-şüuri düşüncə, hiss etmə, "altıncı hiss" tipli psixoloji halları əks etdirir:
Ürəyinə dammaq – qabaqcadan hiss etmək
İçindən bir səs demək – intuisiya ilə qərar vermək
Qəlbinə yol tapmaq – başqasının psixoloji bağını qazanmaq
Bu ifadələr şüuraltı psixoloji mexanizmləri çox gözəl əks etdirir.
5. *Psixoloji ziddiyyət və daxili mübarizə*
İnsanın daxilindəki mübarizə, tərəddüd və özünüidarə ilə bağlı ifadələr:
İki od arasında qalmaq – daxili qərarsızlıq
Özünü didib-parçalamaq – peşmanlıq, vicdan əzabı
Gözünün içinə baxmaq – daxili niyyətləri oxumağa çalışmaq
Daxilində tufan qopmaq – emosional partlayış yaşamaq
Bu, psixoloji dualizm, yəni insanın öz daxilində apardığı mübarizəni göstərir.
6. *Mənəvi-psixoloji təsəlli və güclənmə*
Ümid, özünü toparlama və psixoloji motivasiya ilə bağlı ifadələr:
Ümid yeri olmaq – psixoloji dayaq
Dözüm daşı olmaq – güclü iradəyə sahib olmaq
Səsini içinə salmaq – sakit qalmaq, susmaq
Özünü ələ almaq – psixoloji nəzarəti bərpa etmək
Bu ifadələr psixoloji davamlılıq və müqavimət gücünü göstərir.
Frazeologiyada psixologizmlərin əhəmiyyətini göstərərkən onun müxtəlif sahələrdə roluna diqqət yetirilsa, belə bir mənzərə ortaya çıxır:
Dildə duyğuları konkret sözlərlə deyil, obrazlı şəkildə çatdırır, ədəbiyyatda xarakterlərin daxili aləminin açılmasında əhəmiyyətli rol oynayır, psixologiyada xalq ruhunu və psixi vəziyyətlərin milli düşüncədə təzahürünü göstərir,pedaqogikada şagirdlərin emosional inkişafının izlənməsi üçün nümunəvi vasitə olur.
Göründüyü kimi, frazeologizmlərdə psixologizmlər insanın daxili dünyasını,emosional vəziyyətini,psixoloji halını çox dərin və incə formada, obrazlı şəkildə çatdırır.Onlar həm

də xalq psixologiyasının kodlaşdırılmış formasıdır,yəni milli mədəniyyətin emosional və psixoloji yaddaşıdır.

Sonuc

Frazeoloji faktlar xalq düşüncəsinin nə dərəcədə zəngin olduğunu göstərir. O,bütün həyati və ya qeyri-həyati mühitlərə şamil edilə bilir, özündə ilk-öncə linqvistik, daha sonra fəlsəfi, psixoloji, pedaqoji sahələri ehtiva edir.

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THE PERSPECTIVES OF TURKISH EFL STUDENTS ON THE INTEGRATION OF "CHATGPT" WITH THEIR LANGUAGE LEARNING PROCESS: AN ACTION RESEARCH

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ABSTRACT

Introduction and Purpose: With the release of AI technology, everyone has started to widely use it in any field even in their daily lives. The most commonly used one is "chatgpt", which is both well-known and user-friendly for everyone. Thus, it is evident that educators must accept this fact and plan to use it efficiently. At this point, the researcher aimed at finding out whether the students in his classes use "chatgpt" and how they use it especially in terms of language learning. Hence, the purpose of this study is to determine how Turkish learners of English enrolled in a preparatory program of a state university use "chatgpt" in their language learning process, whether they benefit from it and which skills they resort to it.

Materials and Methods: This study has been conducted as action research as the researcher is actively in the process of gathering data, which were collected from the context where he has been working for a long time. This is significant in that the researcher is quite familiar with the context of the data and he collected it from two different B1 level classes in which 10 students from each class joined in the study, which means that there were 20 participants in total. The consents of the students were taken to join in the study and the researcher had on-site interviews with the students as long as the observations he made when they were taking his classes. These students knew that they would take English-medium-instruction when they passed the proficiency test of the school; therefore, they were highly aware of the significance of learning English in this program.

Results: The results showed that students highly used "chatgpt" in their language learning process. They used it especially to improve their writing skills as they accepted the fact that they found it hard to write an academic essay so they made "chatgpt" write it, instead. They also told that they did not use it to improve their grammar and they rarely benefited from it to develop their "vocabulary" skills. However, nobody mentioned the use of "chatgpt" for the development of either "listening" or "speaking" skills.

Discussion and Conclusion: The current study has demonstrated that Chatgpt is frequently used for writing. However, students need "guidance" and "instruction" for this because they do not use it wisely. Thus, teachers have a great responsibility for this because they need to instruct them on how to use it effectively not only for "writing" but also for other skills development. Moreover, teachers should also raise the awareness of the learners for the ethical issues caused by their unconscious use of "chatgpt".

Key Words: English as a Foreign Language; Chatgpt; English language learning; Turkish learners of English; Action research

APPLICATION OF OZONE AUTOHEMOTHERAPY AND LUMBAR SYMPATHECTOMY IN BUERGER'S DISEASE (clinical case)

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ABSTRACT

Thromboangiitis obliterans (Buerger's disease) is a serious vascular pathology characterized by inflammatory and thrombotic damage to the distal arteries in young smokers. In advanced stages, the disease leads to chronic ischemia and an increased risk of amputation.

A 37-year-old man (X/T №1777) presented with pain, bruising, darkening of the fingers, and wounds on the right lower limb. Doppler examination revealed complete occlusion of the right popliteal and calf arteries and 16–18% stenosis of the left calf artery. A diagnosis of grade IV chronic ischemia of the right lower limb was established. Before the operation, the patient received a lidocaine infusion at the LII-LIII level via an epidural catheter. Subsequently, a right-sided lumbar sympathectomy was performed under intubation anesthesia. In the postoperative period, the patient underwent six sessions of ozone autohemotherapy (10–20 mg ozone + 250 ml venous blood), epidural analgesia (lidocaine), Diprospan, TrombASS, infusion therapy (glucose + vitamins, Reosorbilact), and antibiotic treatment (ceftriaxone).

The effect of the treatment was evaluated using markers of oxidative stress and the antioxidant system. Malondialdehyde (MDA) level decreased from 6.3 nmol/ml before surgery to a 1.54-fold lower value after surgery, indicating a reduction in oxidative stress in tissues ($p<0.05$). Diene conjugates (DK) decreased from 4.8 D233/ml to 1.37-fold after treatment, reflecting a

reduction in inflammatory processes ($p<0.05$). Catalase concentration increased 1.29-fold ($p<0.01$) from 448 U/g Hb/min before surgery, and superoxide dismutase (SOD) level increased 1.25-fold ($p<0.05$) from 530 U/g Hb/min after postoperative treatment. These findings demonstrate the restoration of the antioxidant system, reduction of free radicals in tissues, and attenuation of inflammation.

In conclusion, lumbar sympathectomy combined with ozone autohemotherapy improves blood flow to tissues, enhances oxygen and nutrient delivery, reduces oxidative stress, and restores the antioxidant system in patients with Buerger's disease. This approach not only improves tissue condition but also helps stabilize the patient’s clinical status and prevents complications associated with chronic ischemia.

Keywords: *thromboangiitis obliterans, catalase, antioxidant markers, ozone therapy, sympathectomy*

INTERNATIONAL CONFERENCE NETWORK

EXPERIENCE OF METACOGNITION, INTEGRITY, AND SELF-EFFICACY LEARNING AMONG VOCATIONAL POST-SECONDARY STUDENTS

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Abstract

This investigational article emphases on the effects of the second language on academic misconduct of the students at higher institutions of learning. In this era, technology has advanced drastically and contributed to the enhancement of how learning takes place. Relevantly, there are lots of free online programs in view of machine translation such as google translator metamorphosing the method of students' engagement with regards to the second language. The notion of machine translation has intrigued the attentions of many learners in higher institutional settings. Interestingly, issues concerning the predominance of online free translation program could have been deemed from the perspectives of numerous critics, as practically unthinkable. Numerous studies have been conducted on academic integrity and academic misconduct such as cheating, plagiarism, fabrication and falsification of data have been dealt with in separation. Given that, the students with the second language ability usually have specific way to cheat and uncommon methods of engaging in academic misconduct. Thus, this study explores the effects of the second language on academic misconduct of the students. The participants were the populace of Khazar university students. A self-developed questionnaire was randomly distributed to 95 students of the control group. This study adds to the literature for the following reasons: 1- the scarcity of the literature in issues pertaining to the second language and academic integrity, and 2- by addressing the second language students from another perspective. The previous studies addressed and limited the second language students to the classroom settings. This study expands the scope through the student's ability so read and understand another language apart from the university language of instruction. By this, the simplicity in choosing the appropriate and accurate analysis methods confirms the limitations of this study on the one hand and opens the door of contributions for the subsequent studies on the other hands.

***Keywords*:** academic integrity; second language; academic misconduct; higher institution students; Khazar university.

SÖZ VƏ SİYASETİN USTADI: ŞAH İSMAYIL XETAİ'İN İRSİNE SAYAHAT

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Özet

Söz ve siyasetin ustadı olarak tanınan Şah İsmail Hatayi, XVI. yüzyılda Azerbaycan tarihinin ve kültürünün gelişiminde belirleyici bir rol oynamış; kurduğu Safevî devleti ile bölgenin siyasi haritasını köklü biçimde değiştirmekle kalmamış, aynı zamanda edebiyat alanında da zengin bir miras bırakmıştır. Onun edebî yaratıcılığı yalnızca estetik-bediî açıdan değil, aynı zamanda ideolojik içeriği bakımından da millî özbilincin güçlenmesine, dinî-siyasî düşüncenin şekillenmesine ve toplumsal-siyasî şuurun yükselmesine hizmet etmiştir. Hatayi'nin poetik mirasında Türkçenin ince ifade imkânlarını ustalıkla kullanması, tasavvuf felsefesini şiir diliyle aktarması, vatan, adalet ve birlik ideallerini edebî söz aracılığıyla somutlaştırması onun edebî faaliyetini devletçilik misyonu ile yakından ilişkilendirmiştir. Tarihî kaynaklar ve dönemin siyasî gerçeklikleri ışığında yapılan analizler, Şah İsmail'in yalnızca askerî-siyasî bir lider değil, aynı zamanda millî-kültürel hafızanın koruyucusu, Türk edebiyatının gelişimine ivme kazandıran büyük bir sanatkâr olduğunu göstermektedir. O, iktidarı döneminde merkezî bir yönetim sistemi kurmakla birlikte, edebî meclisler düzenlemiş, Türkçenin devlet dili statüsünü pekiştirmiş, şiiri hem manevî terbiye hem de siyasî etki aracı hâline getirmiştir. Hatayi'nin mirası, dönemin tarihî-siyasî bağlamında, millî kimlik ile edebiyatın karşılıklı ilişkisini yansıtan canlı bir örnek olarak bugün de bilimsel araştırmalar açısından güncelliğini korumaktadır.

Anahtar Kelimeler: kılıç ve kalem sentezi, sözün serkerdesi, Türkçenin tahtı, şiirde devlet ideolojisi, tasavvuf irfanının edebî dili, birlik ve adalet poetikası, taçtan mısraya uzanan yol

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MASTER OF WORD AND POLITICS: A JOURNEY INTO THE LEGACY OF SHAH ISMAIL KHATAI

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Abstract
Recognized as a master of word and politics, Shah Ismail Khatai played a decisive role in the development of Azerbaijan's history and culture in the 16th century. By founding the Safavid state, he not only radically transformed the political map of the region but also left behind a rich literary heritage. His creative work, significant not only for its artistic and aesthetic value but also for its ideological content, contributed to strengthening national self-awareness, shaping religious-political thought, and elevating socio-political consciousness. In Khatai's poetic legacy, his skillful use of the subtle expressive possibilities of the Turkic language, the presentation of Sufi philosophy through poetic language, and the embodiment of ideas of homeland, justice, and unity through artistic expression closely linked his literary activity with the mission of statehood. Analyses conducted against the background of historical sources and the political realities of his time demonstrate that Shah Ismail emerged not only as a military-political leader but also as a guardian of national and cultural memory, as well as a great artist who stimulated the development of Turkic literature. During his reign, alongside establishing a centralized system of governance, he organized literary gatherings, reinforced the status of the Turkic language as the state language, and transformed poetry into both a means of moral education and an instrument of political influence. In the historical-political context of his era, Khatai's legacy remains today a vivid example of the interrelation between national identity and literature, preserving its relevance from a research perspective.**Keywords:** synthesis of sword and pen, commander of the word, throne of the Turkic language, state ideology in poetry, artistic language of Sufi gnosis, poetics of unity and justice, the path from crown to verse.

Introduction.

In the stormy political landscape of the sixteenth-century East, there emerged a figure who expanded the borders of his state with the sword while awakening the spirit of national identity with the pen – Shah Ismail Khatai. He was not only the founder of an empire but also the architect of the Turkish language's ascension to the throne of political and cultural life. In the most tumultuous moments of history, Khatai's verses resounded in unison with the clang of swords, uniting the people around the ideals of unity, justice, and faith. His name was immortalized in history as a rare ruler-poet, who built a bridge between the battle cries echoing beneath the Safavid red banner and the whispers of Sufi wisdom circulating in court gatherings. Rising to the pinnacle of both power and poetry, Khatai left his mark on the memory of centuries as both a political conqueror and a spiritual guide.

Main Part.

Shah Ismail Khatai was born on June 23, 1487, in the city of Ardabil. During the period of Sheikh Safi al-Din of Ardabil, who was active at the turn of the thirteenth and fourteenth centuries, the Dar al-Irshad was established and soon became one of the most influential centers of scientific and philosophical debate in the Near East. The Safavid order, formed there and

later known as the Qizilbash movement, rapidly spread to many countries of the East. Sufis and disciples gave strong support to Ismail's grandfather Sheikh Junayd and his father Sheikh Haydar, assisting them closely in laying the foundations of a new state. Ismail's early participation in battles and his later establishment of a powerful Azerbaijani state were the natural results of the long-standing struggles of his family and their followers. [7]

After the death of his father, Ismail remained in Lahijan for about six years, and upon reaching maturity, in August 1499, Sheikh Haydar's thirteen-year-old son set out from Lahijan towards Ardabil. [2]

In the spring of 1500, Ismail advanced from Erzincan toward the mountainous regions north of the Aras River, moving to the southern shores of Lake Goycha. According to historical sources, particularly the accounts of Ibrahim Amini, his army included representatives of the Arashlu and Zulqadar tribes. [4] Chronicles report that Ismail received news that the inhabitants of Baku had refused to submit to the Safavid representatives and to pay them "tribute"; upon receiving this information, he dispatched Muhammad Beg Ustajlu and Ilyas Beg Khunuslu to seize the city.

During the Qizilbash campaign against Shirvan in the spring of 1500, the 20,000-strong army of the Shirvanshah Farrukh Yassar was crushed, and Farrukh Yassar himself perished on the battlefield. Shortly thereafter, the fortress of Baku also fell into Qizilbash hands, fundamentally altering the political map of the region. The struggle for power coincided with the division of the Aq Qoyunlu state into two poles: one ruled by Alvand Mirza, who chose Tabriz as his capital, and the other by Sultan Murad, who declared Isfahan his center. Upon learning of the Qizilbash victory, Alvand Mirza sent a powerful army northward against them. In the confrontation that took place in the Sharur plain of Nakhchivan, the Qizilbash defeated his 30,000-strong force, forcing Alvand Mirza to flee to Erzincan. Subsequently, under Ismail's leadership, the Qizilbash entered Tabriz in 1501 without resistance and proclaimed him ruler; thus, a significant and glorious state in the history of the Azerbaijani people – the Safavid Empire – was officially established.

In 1503, Khatai defeated Sultan Murad, thereby subjugating the second wing of the Aq Qoyunlu dynasty, which consequently disappeared from the stage of history; all its territories were incorporated into the Safavid state. Yet Shah Ismail's conquests did not end there; with both his intelligence and military prowess, he launched new campaigns as a powerful conqueror. Between 1503 and 1508, he captured Mazandaran, Iraq-i Ajam (Persian Iraq), Yazd, Farsistan, Kirman, Marash, and Diyarbakir, eventually annexing Baghdad and all of Arab Iraq into the borders of his empire.

In 1510, Khatai won a historic victory over the Uzbek ruler Shaybani Khan, leading to Shaybani's death; as a result, Khorasan, Herat, Balkh, and other strategic cities were incorporated into the Safavid Empire. Thus, despite his young age, Shah Ismail, with his strategic acumen and military skill, achieved brilliant victories and established a vast and powerful empire; its boundaries extended from Derbent in the north to the Persian Gulf in the south, and from Eastern Anatolia in the west to Herat and Balkh in the east.

Following these successes, relations between Khatai and Ottoman Sultan Selim I (1512–1520) grew increasingly strained, and the deepening conflict turned into open war. In August 1514, at the Battle of Chaldiran, Shah Ismail's army was defeated; alongside Sultan Selim's superior forces, the strategic role of artillery played a particularly decisive part in this loss. The tragedy of Chaldiran dealt a devastating blow to the young Safavid ruler, both spiritually and politically. Shah Ismail Khatai died in 1524 at the age of 37. His tomb is located in Ardabil, in the mausoleum of Sheikh Safi, where it has been immortalized in the sacred place where his ancestors were buried. [8]

The richness of the existing sources on Shah Ismail Khatai allows for the wide use of scholarly foundations in the study of both his statecraft and literary legacy. Historical documents, classical works, and modern studies serve to illuminate his political activity, administrative system, and cultural contributions with precision. These sources, encompassing both contemporary eyewitness accounts and modern scholarly evaluations, reinforce the study of Khatai's legacy from a scientific perspective.

Narullah Falsafi, author of a multi-volume work dedicated to Shah Abbas, analyzing Shah Ismail and the political and social structure of the state he created, notes that during the Safavid period, a privileged and powerful class emerged in Iran, which occupied all military and administrative positions and ruled the people with broad authority and grandeur. Therefore, during the Safavid era, despite Shah Ismail being called the Shahanshah of Iran, power was in fact established in the form of a "Qizilbash State" (*Mamlakat-i Qizilbash*). Historical sources indicate that in the Iranian court, the Turkish language functioned both as the official and everyday medium of communication, and Shah Ismail, by composing poetry in Turkish, strongly promoted national identity and cultural heritage. The Qizilbash, regarding themselves as of noble Turkic origin, considered themselves superior to the local Iranian population, whom they disparagingly referred to as "Tat" and "Tajik." This represented not only a socio-hierarchical distinction but also a confirmation of the political and ethnic legitimacy of the new state. [3]

For example, the work of the Indian scholar Ghulam Sarwar, although covering the reign of Shah Ismail, is evaluated more as a compilation of factual material due to the author's lack of generalizations, and thus retains its scholarly significance. Based on such a rich corpus of sources, alongside the Safavid period and Shah Ismail's state-building activity, a number of other historical studies, archival documents, classical and modern research works may also be employed in articles and monographs. [5]

Thus, Shah Ismail's policy demonstrates that he acted not only as a state-builder but also as a guardian of national-cultural identity, synthesizing political authority with ethnic-national superiority.

Shah Ismail Khatai, an eminent statesman who paid special attention to the development of poetry in the mother tongue and who himself created immortal works in this language, is among the rare personalities who rendered exceptional service to the socio-political and cultural advancement of the Azerbaijani people. One of the most important stages in the history of our nation's development is directly connected with his name. As a figure deeply attached to his native soil, Khatai had a particular reverence for the art of the *ozan–ashiq* tradition. Alongside classical poetic forms, he composed works in various types of folk poetry that became widely memorized and recited. Drawing from the rich traditions of both written literature and oral creativity, this warrior-poet always preserved the unity of content and form in his literary activity, employing every form, genre, and meter in a purposeful manner. Simplicity, clarity, sincerity, and a profound bond with life and its demands constitute the characteristic features of Khatai's poetry. [6]

This literary heritage consists of the poet's *Divan* (including poems in syllabic verse), the masnavis *Nasihatname* and *Dehnama*, as well as several poems written in Persian. Interestingly, both the *Divan*, his syllabic verse works, and the two masnavis were all composed in his mother tongue. Sources also indicate the existence of his work *Mənaqib al-asrar wa bühjat al-ahrar*, which, according to Khatai scholar A. Mammadov, is a collection of poems in the syllabic meter, essentially an anthology of various poetic samples. At the same time, sources note that Khatai also composed poems in Arabic. Thus, it is established that the poet wrote in Azerbaijani, Persian, and Arabic. Khatai was active in both lyric and epic genres: he did not limit himself to composing masnavis but also employed a wide range of lyric forms. His lyric

poetry includes ghazals, qasidas, *murabbaʿs*, *tarjiʿbands*, *tuyughs*, rubai, *qitʿas*, and other genres in the *aruz* meter; while in the syllabic meter, one finds *gerayli*, *qoshma*, *varsaghi*, and *bayati*. This accomplished artist was among the first poets to introduce syllabic verse into the divan tradition, thus integrating folk poetic genres into classical court literature. [1]

His poetry is a vivid expression of a pure spiritual world, a lucid ideology, a deep faith in the future, and an uncompromising hatred of all forms of evil. In Khatai's verses, the human being—the lyrical hero—is depicted as a proud and free-spirited figure; his immortality and eternity, his wisdom and the formidable force he displays against his enemies are conveyed in a manner consistent with the conditions of the age. For instance, in the poem with the refrain *"Gəldim imdi"* ("I have now arrived"), the poet employs pantheistic-mystical tones to reflect a powerful hatred in the new human being against the manifold evils of the century.

I am the hand of ecstatic love, I have now arrived,
Forever with God am I, I have now arrived.
Within the world, regard me as the wise,
I am that truth and purity, I have now arrived.
Do not, by any means, mistake me for another,
I am that heart-enchanting one, I have now arrived.
Upon the soul of the hypocrite, with the sword's strike,
Today, I am the trial sent by Truth, I have now arrived.

I am the hand of love's intoxication, I have now arrived,
Forever with God am I, I have now arrived.
Within the world, know me as the wise one,
I am that truth and purity, I have now arrived.
Do not, by any means, mistake me for another,
I am that soul-enchanting beloved, I have now arrived.
Upon the hypocrite's soul with the sword's fierce strike,

Today I am the trial from the Divine, I have now arrived.Let us consider these lines:
"Cahan içində bir aqil məni bil, / Mən ol sidqü səfayəm, gəldim imdi" ("Within the world, regard me as the wise / I am that truth and purity, I have now arrived"). In these verses, the poet emphasizes the figure of a person who supports the truth and walks the righteous path. From these lines, I understand that Khatai highlights not only himself but also the ideals and principles that guide his era. He calls attention to the concept of honesty and righteousness within every individual and confirms it through his own example.

Even this single poem demonstrates that Khatai is not merely a poet but also a philosopher deeply aware of the social and moral issues of his time. For me, his lyrical hero is not merely an idealized figure but a model of integrity, courage, and nobility that every person must discover within themselves. Each line of the poem reminds me of the importance of being an independent thinker, principled, and possessing a rich inner world.

In Khatai's work, pantheistic philosophical thought and mystical overtones should not be seen as limitations or mere religiosity; on the contrary, they should be considered advanced and courageous traits for his era. His lyrical hero harbors profound hatred against all evil, is ready to strike with the sword against enemies, and is depicted as a progressive and heroic figure. As the poet himself states, this hero is a *dilrüba*—a noble being symbolizing purity, trust, and fidelity, never straying from the path of beauty and truth; he is merciless against treachery and corruption.

At the same time, Khatai occasionally expresses his reflections on life and humanity without employing mystical coloring. In such poems, his Sufi-pantheist views are conveyed subtly, almost imperceptibly, demonstrating his philosophical depth in a restrained and refined manner.
They say every newcomer is the world, yet you are the ancient foundation;
You have captured the heart of all, how remarkable that you are a traveler.
To everyone, you granted a hundred years of fulfillment in this world;
He who sought it found life, knowing who you are amid the darkness.
With everyone you played, turning and spinning the wheel;
Do not be deceived by the wealth and possessions of the world.
No wise person perceives your pattern, how astonishing you are.
O Khatai, may you always rejoice in the world's affairs;
Its beginning is adorned with brilliance, its end is grandeur.
For love is with the devoted, and you are a master in love.

Shah Ismail Khatai's poem reflects a profound philosophical perspective on the world and human experience. In the opening lines, the lyrical hero presents himself as both ancient and enduring:
"Hər gələn dünya mənim der, sən qədim bünyadsən" ("They say every newcomer is the world, yet you are the ancient foundation"). Here, the world is depicted as transient, while the human being is portrayed as eternal and noble. The line *"Cümlənin könlün alıbsan, nə əcəb səyyadsən?"* ("You have captured the heart of all, how remarkable that you are a traveler?") illustrates the poet's subtle observation of expectations and desires, as if Khatai invites the reader to carefully examine the complex twists and turns of life. Later, in the lines *"Hər kəsə bir yüz ilə verdin muradın dünyada, / Xızı olan buldu həyatı, bildi kim zülmatsən"* ("To everyone, you granted a hundred years of fulfillment in this world; he who sought it found life, knowing who you are amid the darkness"), themes of life's injustice, the unequal distribution of fate, and recognition of true human ability come to the forefront. From my perspective, Khatai, while acknowledging the brevity and inequity of life, simultaneously values the inner strength and wisdom of the individual. In the concluding lines of the poem: *"Ey Xətai, sən cahanın cövrünə şad ol müdam, / Əvvəli zərqü nişatdır, axiri şəhmatsən. / Çünki sevgin dust iləndür, eşq ilə ustadsən"* ("O Khatai, may you always rejoice in the world's affairs; its beginning is adorned with brilliance, its end is grandeur. For love is with the devoted, and you are a master in love"), the poet emphasizes his philosophy of love and the spiritual value of life. To me, these lines indicate that true human value lies not only in material wealth but in spiritual richness, love, and wisdom. His lyrical hero serves as a model for readers: each person must discover their inner strength and live rightly and sincerely. Khatai conveys that only spiritual richness and nobility render a person truly free and strong, while material wealth and worldly power are secondary. [5]
Khatai's poetry on love generally avoids intense grief or dramatic sentiment; his works do not display deep tragic motifs. In his amorous lyrics, the focus is often on the future, on the triumph of goodness and life's positive aspects. The poet frequently depicts the joy of union (*vusal*), creating an optimistic atmosphere in his poetic world. This optimism cannot be solely explained by personal life experience. As M. Abbasov emphasizes: *"The expression of the joy of union should not be interpreted narrowly within the context of ancient and medieval times. This quality gained broader social significance in Khatai's lyricism, forming as a reaction against renunciation of life, world-weariness, and living solely for the afterlife. Simultaneously, the poet poetically affirms the human right to a happy, joyful, and meaningful life, making a strong love of life one of the central themes of his lyricism."* [1]

So, under which *takhallus* (pen name) did Shah Ismail express his poetic identity in his lyrical and imaginative works? Academic Fuad Qasımzadə, in the preface *"Siyasət, sənət, elm müsəxxiri"* to Axund Haji Kerbalayi Soltan Huseynqulu's work *"Shah Ismail Khatai (Chronological-Historical Data)"*, notes, citing the author, that Shah Ismail had eleven pen names, twenty-nine titles, and epithets. The poet's birth name was Abul-Muzaffar Ismail ibn Heydar al-Safavi, but he most frequently used the pen name *Khatai*. L. Faiqqizi, Doctor of Philosophy in Philology, notes that in recent times, this pen name is more accurately rendered as *Khatai* rather than *Khatai* in transliteration.

Several hypotheses exist regarding Shah Ismail's choice of the pen name *"Khatai."* While the precise reason for adopting this *takhallus* remains uncertain, some scholars argue that its root is not "*xəta*" (error) but "*xətay*." Historically, *Xətay* refers to a Turkish tribe that left its mark in history. According to another account, Shah Ismail reportedly said: *"When I was born, I came not into the world but into the midst of faults. Yet a wise voice has always said that you will surpass all these faults. This word 'fault' does not belong to my fate; it will remain in my future epithet."* However, none of these accounts can be definitively verified, and the true origin of the Shah's pen name remains a mystery.

Among Turkic-speaking peoples, including Azerbaijanis, it was customary to assign the name of a tribe's chief to prominent figures—khagans, commanders, or elders. A striking example of this tradition is Shah Ismail's adoption of the pen name *Khatai*, reflecting both his tribal affiliation and his lineage. The final letter "i" (or "yi") in the pen name further emphasizes this affiliation. [9]

Shah Ismail's choice of *Khatai* is highly meaningful, as it simultaneously expresses his lineage and identity. This *takhallus* reflects the threefold complexity of his persona as poet, ruler, and statesman. I argue that by adopting *Khatai* in his lyrical poetry, Shah Ismail symbolically conveyed not only his poetic identity but also the hidden layers of his inner world, his Sufi influences, and his connection to folk culture. The pen name thus serves as a unique expression of his multifaceted personality—both as a sword-wielding ruler and a pen-wielding poet—inviting readers on an aesthetic and spiritual journey into the world he created. As historians and literary scholars note, Shah Ismail Khatai achieved great victories not only on the battlefield but also in the arena of pen and word. His state-building efforts and poetic legacy complement each other, leaving a rare and invaluable mark on Azerbaijani history and culture. The renowned historian Ismail Habib wrote:
"Khatai is master of both sword and pen; every step he takes is a historic event for both statecraft and poetry." The poetry composed under the pen name *Khatai* reveals a world deeply influenced by Sufism and close to the spirit of the people; it also symbolizes his lineage, inner richness, and poetic grandeur. His wisdom as a ruler, the delicacy and lyricism of his poetry, and his love for life mutually reinforce one another, rendering his persona both multifaceted and captivating.

Conclusion. Thus, Shah Ismail Khatai remains an unforgettable figure in both history and literature. His name endures between the brilliance of the sword and the light of the pen, serving as an enduring example for future generations of the harmonious balance between power and word.

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AZERBAJAN: A HERO OF THE FIRST KARABAKH WAR RAHIMOV ZAKİR

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Abstract
The main purpose of the article is to study the life and activities of Colonel Zakir Rahimov, a hero and participant of the First Karabakh War. While writing the article, newspapers, articles, and books dedicated to him were consulted. The analytical method was applied in the study.
Writing an article abroad about the heroes of the First Karabakh War is highly relevant and important both for the preservation of Azerbaijan's historical memory and for conveying its just voice to the international community.
Conveying the stories of these heroes to the world strengthens Azerbaijan's national identity, presents the political realities of the region in a more objective way, and sets an example of patriotism for future generations (Dawudow, 2022).
Practical significance: The material can be used in history lessons at secondary schools and higher education institutions, and it may also benefit those interested in history. In addition, the article provides useful recommendations.
Key words: Azerbaijan, hero, Karabakh War I, Zahir Rahimov

Азербайджан: Герой Первой Карабахской войны Рагимов Закир

Резюме

Учительница Эсмира Рагимова, Закир гызы
Основатель и руководитель Учебного центра «ЭСМИНУР» и мини садика

Основная цель статьи — изучение жизни и деятельности полковника Закира Рагимова, героя и участника Первой Карабахской войны. При написании статьи были использованы газеты, статьи и книги, посвящённые ему. В исследовании применялся метод анализа.
Написание статьи о героях Первой Карабахской войны за рубежом является весьма актуальным и важным как для сохранения исторической памяти Азербайджана, так и для донесения его справедливого голоса до международного сообщества.
Раскрытие историй этих героев для мировой аудитории укрепляет национальную идентичность Азербайджана, более объективно представляет политические реалии региона и служит примером патриотизма для будущих поколений (Dawudow, 2022).
Практическое значение: материал может быть использован на уроках истории в средних и высших учебных заведениях, а также будет полезен для тех, кто интересуется историей. Кроме того, в статье предложены эффективные рекомендации.
Ключевые слова: Азербайджан, герой, Первая Карабахская война, Рагимов Закир

Введение и актуальность

Первая Карабахская война (1988–1994) стала для азербайджанского народа не только страницей истории, но и поворотным моментом в формировании национальной идентичности. Герои этой войны — простые солдаты, офицеры, местные защитники — своей самопожертвованностью и жизнью во имя территориальной целостности Азербайджана заслуживают признания не только внутри страны, но и за её пределами.

Освещение в зарубежных публикациях историй этих героев, раскрытие их личного и национального значения, подвига, а также представление сути конфликта в юридическом, историческом и правозащитном контексте — важная задача (Crisis Group, 2017). Это имеет значение для гуманитарной справедливости, сохранения исторической памяти и внесения вклада в международный мир.

Написание статей о героях Первой Карабахской войны в зарубежной прессе или международных научных журналах считается важным и актуальным по ряду причин:

1. **Донесение исторической правды до мира**

Зарубежные публикации служат продвижению объективной позиции Азербайджана в вопросе карабахского конфликта.

Жизненный путь, самопожертвование и борьба героев Карабаха представляются мировой общественности как историческое доказательство, противостоящее искажениям, созданным армянской пропагандой.

2. **Сохранение национальной идентичности и памяти**

Жизнь и борьба героев должны быть представлены не только внутренней аудитории, но и на международном уровне, чтобы освободительная борьба азербайджанского народа не была забыта.

Это также помогает будущим поколениям сохранить свою идентичность.

3. **Международное правовое и политическое значение**

Карабахская война — это не только региональная, но и международно-правовая проблема.

Показ подвига героев позволяет донести до зарубежного читателя справедливую борьбу Азербайджана за территориальную целостность.

4. **Популяризация азербайджанской культуры и героических традиций**

Через публикации за рубежом мировому сообществу демонстрируются национально-духовные ценности и традиции героизма Азербайджана.

Это также является важным шагом в формировании международного имиджа страны.

5. **Научная и публицистическая актуальность**

Разработка таких тем в международных научных журналах служит новым источником для историографии.

На академических дискуссиях за рубежом слышен голос Азербайджана, и его авторитет в научном пространстве растёт.

Основная часть

Полковник Закир Рагимов участвовал в боях Первой Карабахской войны в 1990-е годы, служил в национальной армии, посвятив свою молодость Родине. Я думаю, что любовь к Родине дана не каждому. Высшая любовь — это любовь к Родине, к матери, к Богу. Все эти возвышенные чувства были присущи моему отцу.

Закир Рагимов родился в 1950 году в городе Баку, родом из Кюрдаханы. В 1967 году окончил среднюю школу № 31 и поступил в Политехнический институт. В 1972 году закончил институт и в сентябре того же года был призван на военную службу. Службу проходил на Украине. В 1974 году вернулся в Баку в звании лейтенанта и служил в «Сальянских казармах» в звании старшего лейтенанта. Для повышения военной квалификации поступил в Тбилисское артиллерийское училище.

С 1976 года продолжил службу в Группе советских войск в Германии (ГДР), где провёл 5 лет. С 1981 года служил на Дальнем Востоке (Приморский край) в звании капитана. В 1983 году поступил в Ленинградскую военную академию в звании майора. В 1987 году получил звание подполковника. В 1990 году вернулся в Азербайджан.

С 1991 года участвовал в боях добровольческой бригады за свободу страны в районах Лачын, Кельбаджар, Агдам, Физули, Тертер, Агдере. В 1994 году вышел в отставку в звании полковника. Скончался в 2002 году [Муктаров, 2009].
После войны у него возникли проблемы со здоровьем — с сердцем.
Не потому что он мой отец, но все, кто его знал, говорят, что он был мужественным человеком. Он был сильным и умным военным. Иногда мне казалось, что мой отец бессмертен, что он никогда не умрёт. Моя любовь к отцу была настолько велика, что родные и близкие говорили мне: «Не люби его так сильно, жизнь жестока и может отнять его у тебя слишком рано». Словно они знали или чувствовали это.
Он был для меня и отцом, и другом. Я вместе с ним ездила в воинские части, в горячие точки. Сама настаивала, чтобы он брал меня с собой. Он учил меня водить машину и танк, прыгать с парашютом. На фронте он вместе со своими солдатами плечом к плечу сражался против врага.
Его любили и уважали не только я, но и наши родственники. Эту любовь и уважение он заслужил сам. Но настал день, когда нам пришлось с ним расстаться. Я считаю своим долгом хранить память о нём и о таких героях войны, как он.

Предложения и выводы

- Документирование и архивирование героических историй.
- Улучшение представления информации для международных научных журналов и СМИ.
- Использование историй этих героев как средства дипломатии и межкультурного диалога.

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BACTERIAL VAGINOSIS

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Abstract.
Bacterial vaginosis (BV) affects women of reproductive age and can either be symptomatic or asymptomatic. Approximately 50 % of women are symptomatic and experience vaginal malodor, discharge, itching and increased vaginal ph. Bacterial vaginosis can increase the risk of contracting many sexually transmitted infections (STIs) such as human immunodeficiency virus (HIV), Neisseria gonorrhea (NG), Chlamydia trachomatis (CT), Trichomonas vaginalis (TV) and herpes simplex virus-2 (HSV2). Though effective treatment options do exist, metronidazole or clindamycin, these methods have proven not to be effective long term. The purpose of this review is to summarize current literature on the epidemiology of bacterial vaginosis and highlight areas of deficiency in current clinical practice with respect to bacterial vaginosis. BV recurrence rates are high, approximately 80 % three months after effective treatment. Furthermore, in some instances treatment is ineffective and bacterial vaginosis persists. Literature also documents the relationship between bacterial vaginosis and human papillomavirus (HPV). HPV is the most common sexually transmitted infection among young adult women while bacterial vaginosis is the most common cause of vaginal symptoms among women of reproductive age. Bacterial vaginosis is associated with high levels of anaerobic organisms which can damage the vaginal epithelium and increase the risk of HPV infection. Recent research also highlights the role of the vaginal microbiome in bacterial vaginosis.
Results.
The results of this review warrant further exploration into the etiology of bacterial vaginosis as well as exploration of more long-term effective treatment and the investigation of prognostic indicators. Additionally, the need for a standard definition of recurrent and persistent bacterial vaginosis is recognized.

DEVELOPMENT AND PROSPECTS OF ENGINEERING SERVICES IN AZERBAIJAN

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Introduction. Engineering services are one of the main pillars of the economic and technological development of any country. In Azerbaijan, this sector is rapidly developing and expanding, especially in parallel with the development of the oil and gas, construction, energy and transport sectors. Against the backdrop of digitalization and technological innovations, the demand for engineering services is increasing both at the state and private sector levels.Engineering services in Azerbaijan cover various areas and are mainly divided into the following categories. First of all, construction and infrastructure engineering occupies an important place. This area includes the design and construction of highways, bridges, buildings, as well as water and sewage systems. Infrastructure development is a key condition for the country's social and economic progress.
Energy engineering is also an important area and includes services related to the construction of power plants, the application of renewable energy sources, as well as oil and gas infrastructure. This area plays a major role in the efficient use of Azerbaijan's energy resources and sustainable energy supply.Mechanical and automation engineering deals with the design, assembly and construction of equipment for industrial facilities and automation systems. This is an important area for optimizing production processes and increasing productivity.
Information technology and software engineering covers the application of digital technologies such as software, system integration and industry 4.0. This area is of great importance in the development of modern technologies and digital transformation. Finally, environmental engineering covers areas such as environmental monitoring, waste management and water resource protection. These services are important in terms of ensuring sustainable development and ecological balance.
Thus, engineering services in Azerbaijan, covering various fields, make significant contributions to the country's socio-economic development and technological progress.

Material and method. The engineering sector is one of the rapidly developing fields in recent years. Large infrastructure projects implemented in Baku and industrial zones, in particular, create a great demand for engineering services. The need for specialists working in this field is increasing and the role of engineering services in the implementation of various projects is becoming increasingly important.
However, there are also certain problems in the sector. One of the main difficulties is the shortage of personnel. The number of engineers with practical knowledge and experience is still not enough, and this may affect the quality of projects. In addition, although there are some technical universities in the country that provide engineering education, their connection with the industry is weak. This prevents students from gaining real field experience and being prepared in accordance with the needs of the industry.

The role of foreign engineering companies is also important in large and complex projects in Azerbaijan. Thus, foreign engineering firms, which are partners of international and local companies such as BP, SOCAR, participate in various projects and bring experience and innovation to the local sector. In general, for the development of the engineering sector, it is important to train local personnel and strengthen cooperation between industry and educational institutions.

Conclusion. In Azerbaijan, engineering services are not only an important component of economic development, but also one of the main areas that drive technological progress. Strengthening state policy, increasing local human resources potential, and expanding industry-academia cooperation are important for the development of this area in line with global trends.
Key Words: engineering services, cooperation, companies, development, global trend.

STUDY OF THE PHYTOCHEMICAL COMPOSITION OF ARTEMISIA LERCHEANA SPECIES

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ABSTRACT
The article examines the biological characteristics of the Artemisia lercheana species, which belongs to the Artemisia L. genus and is distributed in the Nakhchivan Autonomous Republic, and studies its phytochemical composition and distribution areas. When determining the taxonomic spectrum, the latest nomenclature changes were taken as a basis. Expeditions were organized, the distribution zones of the species were determined and collections were carried out. The main priority in scientific research was given to chromatographic and spectrophotometric methods. The wavelengths of the ethanol extract of the species obtained in a UV spectrophotometer were 664 nm, 432 nm, 435 nm, and 321 nm. The 664 nm wavelength indicates that the ethanol extract contains chlorophyll pigment, the 432 nm and 435 nm wavelengths indicate that the extract contains isorhamnet (3,5,7,31,41), a flavonol compound, and the 321 nm wavelength indicates that the extract contains quercetin (3,5,7,31,41).
Key words: environment, species, phytochemical, lercheana, UV spectr

Introduction and Purpose: Plants are the primary source of carbohydrates, proteins, fats, vitamins, and minerals essential for human nutrition. Many plants are used in traditional and modern medicine. About 25% of pharmaceutical drugs are derived from plant compounds. Medicinal plants are among the oldest sources of health care known to humanity. For thousands of years, people across different civilizations have relied on plants to prevent and treat diseases. Even today, about 80% of the world's population uses herbal medicines for some aspect of primary health care, according to the World Health Organization. Medicinal plants remain a vital part of both traditional healing systems and modern pharmaceutical research [1].

Plants contain many beneficial compounds, one of which is flavonoids. Flavonoids are a large group of naturally occurring polyphenolic compounds widely distributed in plants. They are responsible for the vivid colors of fruits, flowers, and leaves, and play a crucial role in plant defense against pathogens, UV radiation, and oxidative stress. In human nutrition, flavonoids have attracted significant scientific interest due to their diverse biological activities and potential health benefits [5].

The Nakhchivan Autonomous Republic has unique soil and climate conditions, rich flora and vegetation. Ordubad district is an area of the autonomous republic with rich flora biodiversity. Prominent researchers have noted that there are 1,148 plant species in the flora of the autonomous republic. Species belonging to the Asteraceae Dumort family are herbs, shrubs, subshrubs, rarely lianas and trees, depending on their life forms. The flora of the autonomous republic includes 437 species represented by 89 genera [3].

Materials and Methods: The object of the study is the species A. lercheana, belonging to the genus Artemisia L., distributed in the Ordubad region. The main priority in scientific research was given to chromatographic and spectrophotometric methods. Expeditions were organized, the distribution zones of the species were determined and the collection was carried out. When determining the taxonomic spectrum, the latest nomenclature changes were taken as a basis [7; 9].

The organs of the collected plant samples were separately dried, ground, and extracted using polar and non-polar solvents using standard methods. After the solvent was removed, the extracts were subjected to thin layer, paper and column chromatography. After the plant was dried and ground, it was extracted with 80% ethanol for 3 hours and the extract was filtered and the residue was dried. The residue was extracted again with 80% ethanol. The extracts were filtered through Whatman No. 4 paper. The extracts were concentrated in a rotary evaporator. Different solvent systems were used in thin layer chromatography. After thin layer chromatography, the chromatograms were examined under UV short-wavelength 254 nm and long-wavelength 365 nm light in a Model CM 10 A fluorescence analysis cabinet [5;6].**Results:** The ovarian inflammation and necrosis were found to be highest in transplantation group ($p<0.05$). The comparison including all groups revealed that tissue necrosis and inflammation were unfavorably affected in HC-treated group.

Discussion: One of the genera included in the family is Artemisia L. - Wormwood. Approximately 180 species of the genus distributed in the world, 25 are known to be distributed in the Caucasus, 16 in Azerbaijan, and 14 in the flora of Nakhchivan. The flowers of the species included in the genus Artemisia L. are collected in the broom flower group. The back of the seeds is furrowed, rough or smooth. The seeds are about 1 mm long, narrowing towards the base of the egg or ovate-ellipsoid. To determine the species of the genus Wormwood, it is necessary to pay more attention to the seeds. Depending on the species, they have simple and compound leaves. The leaves are pinnate or trifoliate. The shape and color of the serrated leaves are among the main characteristics of the species. Information about the family Asteraceae Dumort. is found in the works of Talıbov T.H., Ibrahimov A.Sh., Mammadov T.S., Alasgarova A.N. and other researchers [1]. One of the important issues is the study of the genus Artemisia L., which belongs to the Asteraceae Dumort. family, distributed in the Ordubad district of the Nakhchivan Autonomous Republic, the determination of its distribution areas, systematic analysis, and investigation of its use prospects. Looking at the history of studying plants in the flora of the Ordubad region, it becomes clear that the genus Artemisia L. has not been studied comprehensively. Therefore, we consider it necessary to provide information about the botanical, bioecological characteristics, distribution, scientific and folk medicine use of the species included in this genus [2; 3].

In recent years, nomenclatural changes and additions to taxa in plant systematics have caused serious misunderstanding. Thus, during the study of some species distributed in the flora of Ordubad region, the latest nomenclatural names were clarified. Although the Catalogue of Life website and other sites that provide descriptions of nomenclature names previously listed Artemisia lercheana Web., A. nachitschevanica Rzazade – Nakhchivan wormwood as synonyms of Seriphidium lercheanum (Weber ex Stechm.) Poljakov, after the latest update, A. nachitschevanica Rzazade was listed as a synonym of A. lercheana Web. – Lerxian wormwood. Also, the species A. lercheana Web. – Lerchean wormwood itself is listed as a synonym of the species A. fragrans Willd. It seems that all three species are combined in the species A. fragrans Willd. [4]. Alasgarova A.N. studied the chemotaxonomy of controversial wormwood species and noted that the A. nachitshevanica species arose as a result of cross-pollination of the A. fragrans and A. szowitziana species. The author described A. nachitshevanica, which is listed as a synonym in the literature, as an independent species, citing the existence of biogenetic relationships between sesquiterpene lactones obtained from A. nachitshevanica and lactones obtained from A. szowitziana, as well as lactones characteristic of A. fragrans. Based on the results of scientific research and literature data, the taxonomic composition of the genus Artemisia L. – Wormwood, distributed in the Ordubad region, taking into account the latest nomenclature changes, is given as follows [2].

Ordo.: Asterales
Fam.: Asteraceae Dumort.
Genus.: Artemisia L.
A. absinthium L.
A. araxina Takth.
A. dracunculus L.
A. fragrans Willd. (A. lercheana Web.)
A. incana (L.) Druce (A. fasciculata Bieb.)
A. nachitshevanica
A. scoparia Waldst. Kit.
A. spicigera C.Koch
A. vulgaris L.

As can be seen from the taxonomic composition, 9 species of the Artemisia L. genus are widespread in the flora of the Ordubad region. A. fragrans Willd. (A. lercheana Web.) is a drought and frost-resistant, undemanding species of this species, which reaches a height of 30-40 cm. Its roots are dense. The rootstock is numerous and hairy. The basket is 2-3 mm long and ovoid. The leaves are flat, serrated on the lower part, 2-4 cm long. The flowers are light reddish in color. It blooms in August, and seeds in November-December. A. fragrans plays a major role in the development of livestock farming by forming an abundance in pastures. A. fragrans xerophytic jungles are found in many parts of the flora of the Nakhchivan Autonomous Republic, as well as in the Arazboyu plain, the villages of Aza, Bist, Bilev, etc. in the Ordubad region [1; 8].

The UV spectrum of the ethanol extract obtained from the stem and leaves of the plant was measured and the obtained spectrum is shown in Figure 1.

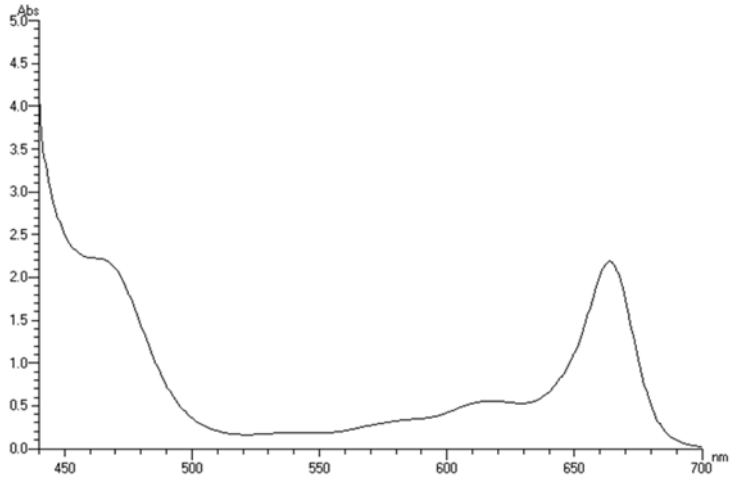


Figure 1. UV spectrum of ethanol extract of A. lercheana Web.

The wavelengths obtained in the UV spectrophotometer of the ethanol extract of the species were 664 nm, 432 nm, 435 nm, 321 nm. The wavelength of 664 nm proves that the ethanol extract contains chlorophyll pigment, the wavelengths of 432 nm and 435 nm prove that the extract contains isorhamnet (3,5,7,31,41), which is a flavonol compound, and the wavelength of 321 nm proves that quercetin (3,5,7,31,41).

Conclusion: Based on scientific research conducted during the study period and literature data, the species composition of the genus Artemisia L. distributed in the flora of the Ordubad region was investigated, and the following species of the genus were found to be distributed in the research area: A. absinthium L., A. arahina Takth., A. dracunculus L., A. fragrans Willd. (A. lercheana Web.), A. incana (L.) Druce (A. fasciculata Bieb.), A. nachitshevanica, A. scoparia Waldst. Kit., A. spicigera C.Koch, A. vulgaris L. The distribution zones of each species were also determined. The phytochemical composition of the species was determined using chromatographic and spectrophotometric research methods. It was determined that, the extract contains isorhamnet (3,5,7,31,41), which is a flavonol compound, and the wavelength of 321 nm proves that quercetin (3,5,7,31,41). During research, it was found that some of these species can be used in the production of medicines, in improving the sanitary and hygienic conditions of the environment, and in other areas.

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ON THE AVAILABILITY OF TUSSILAGO FARFARA L. IN THE NAKHCHIVAN AUTONOMOUS REPUBLIC

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ABSTRACT
Abstract: The article presents the results of research on the possibility of using Tussilago farfara L. plants in the family Asteraceae Bercht. & J. Presl-Asteraceae. Asteraceae is a diverse and polymorphic family and currently there are more than 24,700 species in the world belonging to 1,623 genera, and in Azerbaijan up to 120 genera and 450 species are distributed. After adding new species to the families Asteraceae Bercht. & J. Presl, it was established that 92 genera and 362 species of Asteraceae grow on the territory of the Nakhchivan Autonomous Republic. To study the physical and geographical characteristics of the distribution zones of official medicinal plants in the Nakhchivan Autonomous Republic, territories were selected for the first time and divided into specific zones based on vegetation abundance and distribution patterns. The distribution areas of Tussilago farfara L., their geobotanical characteristics, natural resources, and potential uses were studied across the 10 corresponding zones. It was revealed that the annual volume of Tussilago farfara L. procurement in the Nakhchivan Autonomous Republic is equal to 42.77 tons
Key words: flora, biodiversity, Asteraceae, Tussilago, Azerbaijan

Plant life plays a vital role in the lives of humans and animals. It's impossible to imagine the Earth without vegetation; without plants, our planet would not have evolved to its current state. The healing properties of plants have been known to people since time immemorial; for thousands of years, they have been used as food, for housing, for medicinal purposes, as a means of protection, etc.

Among renewable, inexhaustible natural resources, medicinal plants stand out. The primary consideration here is not the abundance of this valuable natural resource, but how effectively it is used. Therefore, the origin of a given plant, its reserves, and its areas of application must first be determined. Depending on their purpose, plants have historically been divided into the following groups: edible - Plantae alimentaria, forage - Plantae pabularis, ornamental - Plantae ornamentalis, honey plants - Plantae mellifera, medicinal - Plantae medicinalis, poisonous - Plantae toxica, etc. Many plant products are used by humans and animals. Plants consumed

primarily contain beneficial vitamins, sugar, and other bioactive substances. However, some of these plants' byproducts, accumulating in vegetative and reproductive organs, poison humans and animals. This is why they are conventionally divided into poisonous and harmful. In fact, these plant properties did not arise by chance, but rather evolved as a natural defense against adverse environmental conditions or neighboring creatures. Regarding the toxicity of some plants, it's worth noting the words of the famous 15th-century physician Paracelsus (real name Philippus Aureolus Theophrastus Bombastus von Hohenheim), who asserted that "only the dose of a substance determines whether it is poisonous or medicinal." Indeed, many poisonous plants yield valuable medicinal preparations, such as digitalis and lily of the valley, which yield cardiac glycosides, and henbane, which yields atropine.

Asteraceae Bercht. & J. Presl - Asteraceae is a diverse and polymorphic family. Currently, there are more than 24,700 species in the world, belonging to 1,623 genera [11, pp. 201-217]. In Azerbaijan, up to 120 genera and 450 species are widespread. We have compiled a taxonomic spectrum of the flora of the Nakhchivan Autonomous Republic, identifying 92 genera and 362 species of Asteraceae within the territory. This family includes many useful species. Plants belonging to this family are herbs, shrubs, sometimes trees or vines, and sometimes xerophyte succulents with fleshy stems and leaves. The leaves are alternate, opposite, sometimes with very large sheaths, glabrous or more or less pubescent on both sides, some with spines and hooks. Flowers are bisexual or unisexual. Very small flowers are gathered into a group called a head or capitalism. The head is surrounded by one or more rows of free or adjoining bracts, called whorls. The corolla is regular or irregular, with adjoining petals. Regular corollas are bell-shaped or tubular, while irregular ones are ligulae. A tubular corolla has five teeth, indicating that it is formed from five petals fused together. The apex of a ligulae corolla also has five teeth, but appears torn lengthwise on one side, resembling a long, flat tongue. In addition to these two flower forms, the Asteraceae family has two more flower forms. One is a false ligulae flower, and the other is a funnel-shaped flower. Representatives of this family vary greatly in both appearance and structure. However, they are easily distinguished by their characteristic head and flowers. This family contains many useful species.

The rich xerophytic flora of the Nakhchivan Autonomous Republic has historically developed and formed in close genetic relationship with the flora of the Mediterranean, Western Asia, and Iran. More than 1,200 useful plants are widespread on the territory of the Nakhchivan Autonomous Republic, including approximately 750-800 species of medicinal plants, 132 of which have been used in modern medicine for centuries as officinal plants, 44 of which are cultivated plants, and 88 are wild. Having grouped the officinal medicinal plants by life form, 24 species of trees (12 cultivated), 21 species of shrubs (8 cultivated), 62 species of perennial herbs (7 cultivated), 25 species of annual-biennial herbs (17 cultivated) were identified. Thirty of the 88 species of wild official medicinal plants have extensive natural resources, and 11 wild plant species are listed in the Red Book of the Nakhchivan Autonomous Republic as rare plant species (2010). This article presents the distribution zones of the species Tussilago farfara L. (Common coltsfoot), and examines its natural resources, annual harvest volume, and potential applications.

Tussilago L. is a monotypic genus in the family Asteraceae Dumort. - Asteraceae. Common coltsfoot is a perennial herbaceous plant with a creeping, branched, long rhizome and dense roots. The stems are erect, unbranched, 15-20 cm long, with a head, covered with ovate-lanceolate, reddish-brownish scale-like leaves, flower baskets are golden-yellow, 1-2 cm in diameter. After flowering, oblong, rounded-cordate, angular, unequally toothed and leathery basal leaves appear, tomentose below, glabrous above, arranged in one direction. The flower basket at the top of the stem is golden-yellow, the marginal florets are ligulate, the central ones are tubular. The fruits are achenes 3.5-4 mm long, with a tuft of white silky hairs. The flower

heads are 2-2.5 cm long and angular. The leaves are 8-25 cm long, rounded, angular, and serrated, dark green above, almost glabrous, and white-tomentose below. In early spring, the flower buds emerge from the soil first and open, followed by the stem and leaves.

To study the physical and geographical characteristics of the distribution zones of official medicinal plants in the Nakhchivan Autonomous Republic, territories were selected for the first time and divided into specific zones based on vegetation abundance and distribution patterns. The distribution areas of Tussilago farfara L., their geobotanical characteristics, natural resources, and potential uses were studied across the 10 corresponding zones. It was revealed that the annual volume of Tussilago farfara L. procurement in the Nakhchivan Autonomous Republic is equal to 42.77 tons (Table 1; Map 1.).

Table 1

Natural reserve of coltsfoot

Zone	Number of plants per 1 ha (pcs.)	Average weight of 1 plant (Herba), g	Total area ha	Yield, 1 ha/kg	Natural reserve, t		
					Biologist Reserve	Operating Reserve	Annual volume of procure-ment
1	320	135	458	43,20	19,79	7,91	1,98
2	850	130	397	110,50	43,87	17,55	4,39
3	682	186	556	126,85	70,53	28,21	7,05
4	640	184	733	117,76	86,32	34,53	8,63
5	170	135	615	22,95	14,11	5,65	1,41
6	810	192	400	155,52	62,21	24,88	6,22
7	790	190	365	150,10	54,79	21,91	5,48
8	646	192	423	124,03	52,47	20,99	5,25
9	214	145	512	31,03	15,89	6,35	1,59
10	190	120	340	22,80	7,75	3,10	0,78
Total:			4799	904,744	427,72	171,09	42,77

Coltsfoot is common in the Nakhchivan Autonomous Republic, growing in the forests and steppes of Batabat, Garagush, Kükü, Dereboghaz, Unus, Khursa, Keçili, Külüs, Ayıderesi, and Arafsa. It can also be found on cliffs, wastelands, and landfills, near rivers and ponds, on ravine slopes, near railways, and in fields. In folk medicine, the infusion and juice of the leaves and flowers are used, but the roots are most commonly used. The leaves are harvested in June-July, and the flowers in April-May. It is best to collect the leaves by hand in midsummer and dry them by spreading them in a thin layer on paper, either outdoors or in an attic. The dried material is stored and transported in paper bags, plywood boxes, or glass jars. The shelf life of the raw material is three years. Collected flowers can be dried in dryers at 35-400C or in open attics. The flowers have a shelf life of 2 years. Leaves are dried at 50-600C in well-ventilated areas. Store coltsfoot in places protected from moisture. The plant has an extensive natural resource.

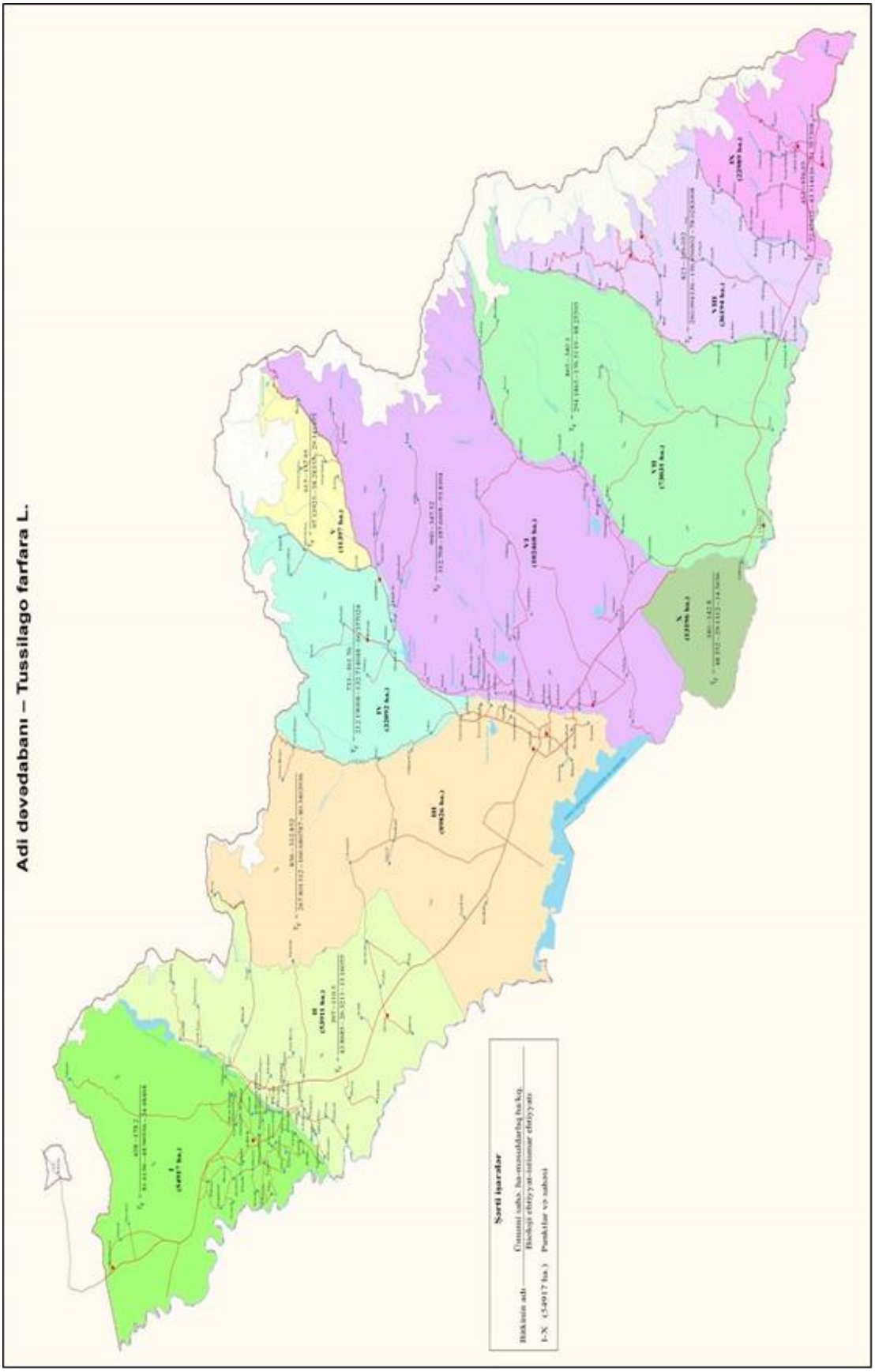
Chemical composition and uses: The leaves and flowers of the plant are the raw materials. Coltsfoot leaves contain bitter glycosides (up to 2.63%), sitosterol, carotenoids, tannins, ascorbic acid (5 mg%), essential oil, mineral salts, inulin, and dextrin. The flowers are mainly found in medicinal infusions. They contain arnidol, sigmasterol, taraxanthin, faradiol, and sitosterol. Essential oil, phenolic compounds, sesquiterpenoids, and triterpenoids are obtained from the aboveground parts of the plant. Hyperoside, rutin, kaempferol, 3-O-β-D-glucopyranoside, quercetin, kaempferol, and kaempferol-3-O-α-L-rhamnopyranosyl-(1□6)-β-D-glucopyranoside have been identified in coltsfoot buds. Of the phenolic and carboxylic acid derivatives in the plant buds, caffeic acid is isolated, and from it, methyl and ethyl esters.

The plant contains anti-inflammatory, antitussive, astringent, diuretic, and diaphoretic substances. It has antisclerotic and antispasmodic properties. Coltsfoot is used for acute and chronic upper respiratory tract diseases, including bronchitis, pleurisy, pneumonia, diphtheria, asthma, bronchiectasis, and influenza. The plant is an effective expectorant and choleretic, helpful for tuberculosis. Its anti-inflammatory properties make it useful in treating gastrointestinal tract, gallbladder, and liver diseases, malaria, eczema, kidney disease, and cystitis. It is applied externally to burns, furunculosis, thrombophlebitis, tonsillitis, and stomatitis. The plant's juice has wound-healing properties. Coltsfoot is exceptionally beneficial for rhinitis and tuberculosis. A decoction is used for freckles, moles, itching, and hair growth. The plant's leaves stimulate appetite and improve digestion. Cigarettes made from coltsfoot leaves help relieve coughs and toothaches. Dioscorides, Pliny, and Galen reported on the plant's healing properties. In some countries (Australia and New Zealand), the plant's use is prohibited due to its alkaloid content, which can have a negative impact on the liver with prolonged use.
In folk medicine, it is used as a burn remedy. An infusion of coltsfoot leaves and flowers is very effective as an expectorant and diaphoretic for colds, as well as for gastritis, kidney disease, cystitis, colitis, and enteritis. A mixture of coltsfoot and black elderberry produces good results. Long-term use of coltsfoot preparations may also have a carcinogenic effect.
Preparation: Infuse 3 tablespoons of flowers or leaves in a thermos with 2 cups of boiling water (daily dose). The infusion is taken orally three times a day, 20-40 minutes before meals. The composition is also useful for external use.
Healing tea: take coltsfoot leaves, plantain, and licorice roots in a 4:3:3 ratio, respectively. Brew 1 tablespoon of the mixture with 2 cups of boiling water, let it steep for 30 minutes, strain, and drink 2 tablespoons every 3 hours. This mixture promotes expectoration.
As a diuretic and diaphoretic, pour one tablespoon of a mixture of coltsfoot leaves, raspberries, and barberry leaves in a 2:2:1 ratio with a glass of boiling water and steep in a thermos. Take it warm in the evenings. A herbal mixture of mint and coltsfoot is used as a wound-healing agent. For furunculosis, half a glass of a decoction of these herbs in the form of a poultice is applied to the affected areas 3 times a day.





Tussilago farfara L.


Adi devədabanı – Tussilago farfara L.
Şərti işarələr

Map 1. Tussilago farfara L. natural resources and potential uses were studied across the 10 corresponding zones

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NEXT-GENERATION THERAPEUTIC BREAKTHROUGHS IN BILIARY TRACT CANCER: A NEW ERA OF SYSTEMIC TREATMENT

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ABSTRACT

Introduction and Purpose:
Biliary tract cancers (BTCs), encompassing gallbladder cancer and cholangiocarcinoma, are rare but aggressive malignancies with poor survival outcomes. Historically, gemcitabine–cisplatin has been the standard systemic therapy, yet its benefits are limited by recurrence, resistance, and molecular heterogeneity. This review aimed to synthesize recent advances in systemic therapy, with emphasis on targeted and immune-based approaches, and to highlight the evolving role of biomarkers in guiding personalized treatment.

Materials and Methods:
A comprehensive literature search was conducted across PubMed, EMBASE, Google Scholar, and the Cochrane Library for studies published from December 2010 to December 2024. Eligible publications included randomized trials, meta-analyses, and high-quality cohort studies assessing chemotherapy, targeted therapies, immunotherapy, or combination regimens in BTC. Data on efficacy, biomarkers, and survival outcomes were extracted and narratively synthesized.

Results:
Advances in molecular profiling have identified actionable alterations, including FGFR2 fusions, IDH1/2 mutations, HER2 amplification, and BRAF V600E mutations. Targeted therapies directed against these drivers have demonstrated encouraging efficacy, reshaping treatment options. Immunotherapy, particularly immune checkpoint inhibitors, has yielded survival gains, most notably in the TOPAZ-1 and KEYNOTE-966 trials where checkpoint inhibitors combined with gemcitabine–cisplatin improved overall survival. Novel regimens, including nanoliposomal irinotecan and dual ICI strategies, provide further promise in the

second-line setting. Integration of biomarkers is enabling precision oncology, allowing treatment to be tailored according to genetic and immune profiles.

Discussion and Conclusion:
Systemic therapy for BTCs is undergoing a paradigm shift, with precision medicine and immunotherapy emerging as cornerstones of modern care. Personalized treatment approaches based on molecular alterations and biomarker-driven strategies are increasingly feasible and clinically relevant. Future research must focus on unraveling resistance mechanisms, validating predictive biomarkers, and optimizing multimodal regimens. Collectively, these advancements offer a pathway toward improved survival and quality of life for patients with BTCs.

Keywords: Biliary tract cancer; Cholangiocarcinoma; Systemic therapy; Targeted therapy; Immunotherapy; Biomarkers; Precision oncology

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VISUAL METHODS AND MOBILITY STUDIES

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Abstract
This review examines the increasing adoption of the visual methodological approaches to the study of youth mobility in the time period of 2015-2025. Visual methods such as Photo Elicitation, Participatory Mapping, and Video Diaries have become key tools used to capture the complex and multi-dimensioned realities of the mobility of the young. The value of the methodologies rests in the production of rich qualitative information often overlooked by mainstream quantitative techniques in conducting research on the movements of the youths (Pink, 2015; Rose & Wilson, 2017). The methods are used in various formats and allow the youths to tell narratives of mobility in participatory manners and mapping the infrastructural systems influencing the pattern of movement (Hickey & Kearns, 2017; Kent & Wyllie, 2019). The impacts are significant and help to enhance the agency among the youth participants in the research process and enrich the knowledge on the culture and the emotional dimensions on mobility (Miller et al., 2020; Cuellar & Jasper, 2021). This analysis identifies the transformative capacity of the methods to unveil the complex experiential dynamics on the mobility among the youths and ultimately support the production of more inclusive and responsive urban environments.
Keywords: visual methods, youth, mobility, review

Introduction
The multidisciplinary field of mobility studies has experienced extraordinary growth over the past two decades, registering an appreciation for the fact that mobility involves something more than the organizational intricacies of the transport system (Urry, 2007). Mobility also involves serious issues with respect to relations of power, belonging, exclusion, and everyday life (Urry, 2007). In the enormous field, youth mobility has proved to be an incredibly prominent focus of analysis since youth experience mobility as both a logistical necessity and an everyday aspect of the content of their identity, independence, and social integration (Rose & Wilson, 2017). In the urban and rural spaces, youth's ability for movement—whether it is going to school, maintaining friendships, entertainment, or employment seeking—both mirrors and perpetuates broader social structures of possibility and constraint (Rose & Wilson, 2017).
Scholars more and more used visual methodologies to engage with these dynamics between 2015 and 2025. This movement occurred simultaneously with a more general "visual turn" among the social sciences, under which images, mapping, and multimodal representation gained increased prominence as modes of knowledge production (Pink, 2015). In contradistinction to more established mobility studies fortified by numerical data like surveys of travel, GPS tracking, and observations of traffic (Kelly & Smith, 2022), visual methodologies attempted to portray the affective, embodied, and socio-cultural aspects of mobility that numerical data could not describe.

This article surveys the burgeoning youth mobility literature that has utilized visual approaches over the past decade. It places these methodological developments within the broader debates

within mobility and youth studies, accounts for their usage within a range of comparative international case studies, and offers an assessment of their insights and limitations. In the process, it signifyies the transformative capacity of visual scholarship for the amplification of youth perspectives, the unearthing of heretofore unobserved facets of movement, and the direction of more inclusivemobility policy formation.

Methodology

This paper is organized as a narrative literature review focusing on visual methodologies in the investigation of youth mobility, spanning the years 2015 to 2025. The selection of this review method is justified by the field's ongoing development and its fragmented nature, which includes contributions from various disciplines such as geography, sociology, education, and urban studies. Undertaking a systematic meta-analysis would have resulted in the omission of significant conceptual and qualitative insights, whereas a narrative review facilitates a thorough critical engagement with both theoretical and empirical literature (Snyder, 2019).

The research questions for this synthesis are as follows: How have visual methods been employed in the study of youth mobility over the period 2015-2025, and what the contributions and limitations of their usage?; What types of visual methods have been most used for studies related to youth mobility?; How have visual methods enabled the development of richer understandings of mobility as social, cultural, and embodied practice?; What the limitations, ethical concerns, or methodological barriers identified through such literature?

The search included literature up to and including June 2025 and covered January 2015 onwards. Systematic searches were carried out through institutional databases like Scopus, Web of Science, JSTOR, and Google Scholar, as well as additional targeted searches within journals related to mobilities, youth studies, geography, and qualitative studies. The search process employed the use of the following keywords like youth mobility, visual methods, photovoice, participatory mapping, video diaries, and visual ethnography. Boolean operators and truncations (e.g., mobilit AND visual) were employed for purposes of capturing an exhaustive list of relevant publications.

The reference lists of key studies were further searched to identify additional work not revealed through the database searches. In the snowballing approach, it ensured the inclusiveness of influential but otherwise less universally indexed contributions. Articles were considered for inclusion if they utilized one or more visual methodologies as a core instrument of research, dealt with mobility within its broader meaning, including daily travel, migration, accessibility of urban infrastructures, or identification via movement, were produced and published between the years 2015 and 2025, and were produced for peer-reviewed journals, edited books, and main reports of research.

Every chosen text underwent a comprehensive review and was summarized with a focus on the specific visual methodology utilized, the geographical context, the youth demographic examined, and the principal findings. Special emphasis was placed on examining how visual methodologies influenced both the research process (e.g., participation of youth, agency, ethical considerations) and the significant knowledge produced regarding mobility (e.g., emotional impact, embodiment, implications for policy).

The synthesis process was defined by the iterative approach. Themes were not predetermined but emerged from the constant reading and mutual analysis of what literature was available. Studies were grouped into three main categories corresponding to the most commonly used visual methodologies: photo elicitation/photovoice, participatory mapping, and video diaries/visual storytelling. In the main categories, more detailed thematic analysis highlighted elements such as agency, embodiment, identity, and impact on policy. Thematic classification

thus determined the layout of the following review framework. As a narrative review, the article does not purport systematically to cover all literature in the field. Foci were the identification of principal trends, methodological breakthroughs, and conceptual insights more than the measuring of the proceedings of individual methods or results. Although all efforts were taken for the inclusion of a variety of geographical locations, the existing literature is richer within single locations—principally North America and Europe—than within others. The imbalance manifests deeper structural inequities within the world of the publication of scholarship more than demonstrating proof of purposeful exclusion.

Defining youth mobility

> *...mobility contributes fundamentally to the processes of youth identity formation… (Zhang and Li, 2020)*

Youth mobility is not just the movement of youth people over different geographical spaces but also the interpretations, actions, and experiences that accompany movement. Therefore, the concept runs the gamut—from ordinary journeys to school or college to global migrations driven by education, employment, or family situations. Hickey and Kearns (2017) argue that mobility within the youth studies paradigm can't simply be measured by the lengths and the times of the moves; rather, it ought to be understood as a social practice through which life chances are created and where identities are produced. In such a manner, the capacity of youth people to move into and through urban spaces often affects their entry into educational facilities, culture, and social life. Likewise, the barriers they confront—whether infrastructural, financial, or social—may deepen exclusion and marginalization.

For youth and emerging adults, mobility through spaces without restriction often signifies autonomy, independence, and involvement within the adult social world. At the same time, restrictions on movement—whether for a lack of vehicle throughout the day, social norms, or government legislation—may undercut agency and enshrine generational divisions. As such, the analysis of youth mobility can and must look beyond movement itself and consider the relationship of spatial practices with broader cultural and political processes.

The role of visual methods

> *Visual research disrupts the dominance of text and numbers by inviting participants to produce their own representations of mobility (Thomas and Van Geusauwe, 2018).*

Visual methodologies provide an especially fertile framework for the analysis of youth mobility. Based on ethnography and participatory methods, visual methods foreground the processes of observation, representation, and co-production of knowledge with participants.

Visual methodologies are particularly appropriate for conducting studies among youth populations because they align with the comfort youth predispose toward visual media, such as photographs and digital storytelling, and, simultaneously, also mitigate hierarchical relations among participants and researchers through the employment of artistic and multimodal modes of communication (Smith & Brown, 2016; Wylie & Cahill, 2021). Through an examination of the affective and embodied dimensions of movement, visual methodologies can disclose aspects of mobility hard to access through the employment of more traditional surveys or interviews. A photograph taken by a youth of a busy bus stop, for instance, can incite feelings

of frustration, helplessness, or belonging more emphatically than a descriptive text could convey.

Visual methods in youth mobility research

Photo elicitation and photovoice

Common among the studies of youth mobility is photo elicitation, whereby photographs serve as stimuli for discussion. A more augmented participatory form, photovoice, takes the methodology one step further by equipping participants with cameras to document their mobility experienes and thereafter reflect collectively on the photographs yielded. Through the approach, the youth can articulate their perspectives both through photographs and oral means, thus positioning them as co-researchers and not just subjects.

Pink (2015) foregrounds the sensory richness enshrined within such techniques, arguing that photographs inclusively register the atmospheres, textures, and affective details of urban movement that relatively few surveys on paper are able to achieve. Cuellar and Jasper (2021) demonstrate the potential within their photovoice study of Latin American youth, whereby photovoice projects allowed youth participants to map hazardous itineraries, point up neglected infrastructural support, and suggest upgrades. This process not only produced insightful empirical evidence but also established avenues for youth advocacy within urban policy arenas.

Participatory mapping

Participatory mapping is an effective tool for visualizing the movement behaviors of adolescents. By collaboratively producing maps of their daily routes, constraints, and salient spaces, youth refine representations that are alternative and nonhierarchical compared with the official cartographies. Hickey and Kearns (2017) describe the process where the mapping exercises reveal the breaks within the city spaces, registering both the material arrangement and the symbolic territories of inclusivity and exclusivity among the forces shaping movement.

Kent and Wyllie (2019) show that participatory mapping often highlights areas considered dangerous or unapproachable, thus revealing infrastructural and social barriers too often ignored by mainstream urban planning strategies. Elwood and Mitchell (2018) argue that the maps are counter-narratives that break prior spatial understanding and validate the assertions of the youth to the city spaces. Involving the youth in the mapping process enables them to depict both restraints and aspirations, producing observations that are relevant for both urban policymakers and planners.

Video diaries and visual narrative

Video diaries are a novel methodology that allow participants to document their experience of movement as it is occurring. Kelly and Smith (2022) outline the way video diaries give narrative-dense accounts of everyday journeys ranging from everyday activities through to episodes of disruption. Their contemporaneity involved with video recordings gives an insight into feelings, movement, and environment that retrospective interviews by more conventional interview method might lose.

Wang and Li (2023) illustrate that visual narrative puts mobility into longer life frames, and for youth, it is related to their hopes, social lives, and identities. In cross-cultural contexts, Wills and De Lannoy (2019) discuss that video initiatives enable the articulation of the issues of mobility within urban spaces like London and Cape Town, thus enabling comparative insights within different world urban spaces.

Transformative dimensions of visual approaches

Visual methodologies is not only about data generation; it is about redefining the essence of research itself.

Augmenting agency and voice

One of the most important achievements of visual research relates to youth agency. Miller, Sadeghi, and Peters (2020) argue that we, the youth, become active knowledge producers when we create our own images and narratives. This shift serves not only to affirm youth voice, but also to stimulate critical reflection. Cuellar and Jasper (2021) stress that visual projects tend to foster what is termed as collective agency, whereby youth participants engage in dialogues about their work and later showcase it to community partners.

Embodiment, affect and emotion

It is argued by Rose and Wilson (2017) that the mobility of the youth cannot be studied in isolation from the affective and embodied feelings that come with movement. Such aspects are where visual methodologies shine. A video recording a bicycle rider commuting to work in a city choked with traffic, for example, captures the embodied feelings of stress and sensory overload that come from city riding. Thomas and Van Geusauwe (2018) illustrate how embodiment is a critical analytic, enabling researchers to trace ways in which mobility not only provides access, but also changes bodily experiences of freedom, risk and vulnerability.

Space, place, and identity

Mobility connects to larger questions about space and identity. Wylie and Cahill (2021) point out that visual projects show urban spaces as lived-in, contested, and emotionally impactful, rather than just neutral settings for movement. Zhang and Li (2020) reveal that mobility plays a key role in shaping youth identity. Young people's visual stories often show movement as a way to achieve independence, belonging, or aspirations. By illustrating these processes, researchers learn about the symbolic importance of mobility in young people's lives.

Applications and case studies

The use of visual methods in youth mobility research has led to a variety of case studies in different global contexts.

The obstacle to active transportation among adolescents in North America and Europe has been recorded by photovoice projects. Such endeavors demonstrate how the undermining of infrastructure has a disproportionately negative impact on under-income young people (Smith and Brown, 2016). Participatory mapping practices in New Zealand have demonstrated how marginalized youth travel in urban environments in ways that are informed by colonial pasts. These projects emphasize the relations between mobility and cultural identity (Hickey and Kearns, 2017).

Elwood and Mitchell (2018) outline the projects of participatory mapping in the U.S. cities. In this case, the young people employed visual instruments to criticize transit inequalities influencing local plans of the area. On the same note, Carter and Dunn (2024) present evidence that visual data youth made had an impact on transport policies. This goes on to show how governance can be formed through visual means.

Wills and De Lannoy (2019) reveal that in the Global South, visual storytelling in South Africa and Brazil emphasized mobility issues surrounding violence, inequality and inadequate infrastructure. Wang and Li (2023) generalize it to the Asian cities, which shows that through visual narratives, it becomes possible to see the interrelationship of cultural values, gender roles, and mobility. These case studies emphasize the possibility of visual approach to accommodate various cultural and political contexts and the means of bridging research with practice.

Critical reflections

Although visual approaches are most promising, they too have some limitations. There is a methodological challenge to analyze visual data. As Kelly and Smith (2022) note, the abundance of visual content can be difficult to arrange and this increases the risk of over-interpreting the message or overemphasizing certain details. Ethical concerns are also of importance. Smith and Brown (2016) note the issues with consent, confidentiality, and rights of the visual materials in particular with the minors. Researchers have to take care of the dangers of abusing participants or distorting them.

There is also the issue of power with regard to participatory projects. As Miller et al. (2020) warn, researchers can be overly influential in interpretation and sharing despite having participatory objectives. The voices of youth must remain at the center and that needs consistent self-reflection and openness.

Lastly, the integration of visual methods with other methods is challenging and opportunities are present. Carter and Dunn (2024) believe that by combining visual techniques with such quantitative data analysis tools as GIS analysis or survey data, it is possible to enhance validity and policy impact. The mixed-methods designs existing in future studies should continue to experiment with the benefits of different approaches.

Conclusion

The ten year period between 2015 and 2025 was the period of consolidation of visual approaches as the key tools used in youth mobility research. Focusing on agency, embodiment and affect as privileges, visual methodologies have added value to the understandings of how the young people experience and negotiate movement across space. They have made young people researchers themselves, they made minority voices heard, and they led to a more inclusive policy in mobility.

Moving into the future, there are a number of avenues that will be worth pursuing. There is a great potential of digital and virtual platforms. The visual research can be expanded to new areas with mobile applications, social media platforms, and virtual reality environments, that can capture mobility in more dynamic ways. There is also a need to do longitudinal visual studies to trace the dynamics of youth mobility practices throughout the lifestages, adolescence to adulthood. Lastly, cross-cultural studies can be enhanced by comparative research to progress the knowledge of how mobility is influenced in various social, cultural and political environments.

Finally, visual methodologies are a way out of the divide between research and practice. They not only produce knowledge, but they are also mobilized, providing avenues to urban futures that are more interactive, open, and responsive to the lived experiences of youth.

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INTERNATIONAL CONFERENCE NETWORK

GENDERED DIMENSIONS OF YOUTH ACADEMIC MOBILITIES

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Abstract

This study examines the gendered inequities noted in academic mobility for youth in the Balkans and draws attention to differential effects of socio-cultural and macro-structural factors on girls' and boys' educational paths. Its theoretical base lies in gendered space theory and social constructionism, both of which examine the ways in which norms of gender help to shape mobility opportunities and experience (Valentine, 2018; Skovgaard & Sobczyk, 2020). Methodologically, it conducts a systematic literature review in conjunction with qualitative synthesis of interview data, policy texts, and educational reports gathered in the past decade in order to identify persistent gender-related inhibitors and facilitators in regional mobility practice. Findings indicate that girls experience higher cultural expectations, safety concerns, and family pressures inhibiting their mobility sets and educational choices. Boys, on the other hand, normally confront fewer restrictions and are incentivized to seek desired mobility ambitions in conformity with societal ideals of masculinity and autonomy (Kozarova & Spasić, 2022; Tasić & Mitrović, 2020). It underscores the importance of discharging gender-aware policies and people-centered interventions crafted for redress of inequity and enforcement of balanced academic mobility channels for both boys and girls in the Balkans. A focus on the points of contact of gender, safety, and social norms informs a deeper understanding of inequity in mobility in post-conflict and transition societies.

Keywords: youth, mobilities, academic, gender

Introduction

Mobility in academic areas – student exchange, international scholarships, study abroad programs, and internal-national movement for academic purposes – has become a leading indicator of educational opportunity and social inclusion in many parts of the globe, including Balkans. Young individuals who are involved in mobility are likely to build academic credentials, as well as expand social, linguistic, and cultural capital that has implications for better labor returns and generalized social networks (European Commission, 2021). Despite that, mobility is unequally distributed between gender divides. In Balkans, where socio-cultural values, patriarchal family obligations, and economic realities are ingrained, gender acts to strongly control who moves, where and on what terms.

The present document for its part offers a comparative, evidence-based history of the influence that gender has on academic mobility in the Western Balkans. It responds to the following core issues: Firstly, what is empirically known regarding gender variations in academic mobility amongst Balkan youth? Secondly, how are (and how are they not) national strategies and policies attentive to gendered obstacles to mobility? Lastly, how are policy changes or interventions promising for facilitating greater equity in accessibility?

In order to ground this analysis on, the paper draws on data from Albania, for which comparatively more data on higher education gender balance, country strategy, and youth programs are available; and on data available in nearby countries. The sources are youth national strategies, higher educational data, gender equality indices, EU and UN agency reports, and peer-reviewed journals.

Conceptual Model

Gendered Space Theory

The theory of gendered space points out that movement across a space is far from neutral. Spaces both material (such as cities, cross-borders, transit)--and institutional (such as universities or foreign scholarship programs)--are built on the basis of gendered notions about who is proper, who is safe, and what the permissible action is (Valentine, 2007; Valentine, 2018). For most Balkan societies, norms about the appropriateness of women, family caretaking, and a sense danger create de facto restrictions on girls' movement, especially if that movement means a journey, a shift in residences, or travel across international borders.

Social Constructionism

Social constructionist accounts point out that gender identities are constructed and reproduced within society by practices, institutions, discourses, and everyday relationships, for instance, the family, community, schooling, mass media, and policy. The question "appropriate ambition" or "acceptable risk" for young women is one that is context-sensitive. In mobility, that is not just about whether girls are able to study abroad, but whether they are promoted, empowered, or considered able.

Intersectional and Structural Aspects within Post-Conflict Transition Situations

The Balkans continue to be influenced by histories of conflict, economic transition, migration, and disparate development. All these characteristics cross with gender in various fashions. Rural-urban divisions, minority group belonging, socio-economic class, and infrastructural access (transport, secure accommodation, economic means) blur with gendered expectations in order to produce multifaceted disadvantages (or, for others, advantages). Policy thus has to be aware simultaneously of gender and its interlocking with geography, class, ethnicity, and history.

Methodology

This study is founded on documents and empirical data between 2021 and 2025, country policy reports—the country's youth and higher education strategies, and those regarding gender equality—were gathered from Ministries of Education, country statistics offices, and international counterparts for Albania, Serbia, North Macedonia, Bosnia & Herzegovina, Montenegro, and Kosovo; country statistics office data and gender equality indices (e.g., EIGE Gender Equality Index) and reports (EU, UN) were mapped. Survey or study data, wherever possible, that comprised gender-disaggregated mobility or a mobility-related measure were integrated.

There are few systematic and comparable data on academic mobility (particularly international mobility) that are distinguished by gender in some Balkan nations. Therefore, some results are from qualitative research, reports, or proxy indicators (such as balance between the genders in higher education,gender participation by scholarship if available).

Empirical Evidence: National and Comparative Data Profiles

Balance between genders in higher education

In Albania, statistics reveal that women are a majority among students and graduates at Bachelor's and Master's degree levels: during the academic year 2022/2023, women accounted for approximately 55.8% of students at Bachelor's level and 66.9% at Master's degree levels; women also accounted for 56.2% PhD students, and 63.9% PhD graduates (Llatfiu & Shuli, 2024). The participation by female scholars drops significantly in the uppermost academic positions: just approximately 18.2% of rectors within Albanian universities are female, and a high level of gender gap within positions for full prof (percentage for women is approximately 32.7%) (Llatfiu & Shuli, 2024).

These statistics would indicate that at least in Albania, women are not less represented than men in participation, yet are less represented than men in leadership and higher echelon roles. The same tracks follow in other Balkans nations, though with fewer publicly available data.

Youth Unemployment, NEETs, and Gender

Mobility opportunities are often facilitated by socio-economic inequities. Young people aged 15-29 years old who are NEETs (Not in Employment, Education or Training) are approximately 25.2% in 2022 in Albania. Among them, unemployment represents approximately 41.8%, and the rest are inactive for reasons other than that, for example, family care or discouragement (UNICEF, 2022). The difference between male and female employment is significant for young people: female youth are less participating in labor than male youth. For example, labor participation for female youth (15-64 years old) in Albania in 2020 was approximately 61.2%, whereas for male youth the same was ~77.1%, creating a gap between genders for approximately 15.9 percentage points (Western Balkans average similar or higher) (Regional Cooperation Council, 2022).

These lacks are important as financial means, independence, and activity frequently determine whether young individuals are able to benefit from mobility (e.g., able to afford living quarters and travel, living costs abroad).

Gender in Mobility Programs: What We Know

Even though systematic and publicly accessible country-and-gender-disaggregated data on participation in Erasmus+ (or other international academic exchange programs) for the entire region of Western Balkans doesn't exist, some data are reported to be included in various reports and studies. For example, "Cost benefit of academic mobility, brain drain and migration: Western Balkans in a crossroad" (Kacani, Trunk, Qorraj, & Shaqiri, 2025) did inquire about international career prospects. There, in the sample, in Albania and Kosovo, women were represented asrespondents for ~74% and ~69%, respectively (i.e., those returning the questionnaire), and in Bosnia & Herzegovina considerably more men responded (~56%). This is, however, indirect evidence for participation in one form of mobility since a composition of a survey response by gender doesn't necessarily imply that those are absorbing one form of mobility.

Another statistics pertaining to the matter at hand: the EIGE Gender Equality Index states that Albania, Montenegro, North Macedonia, and Serbia have all created complete indices, inclusive of education with learning mobility (though subdomains vary). The indices demonstrate that the countries are lower than the EU-27 average, and thus a point for augmenting gender equality exists across a number of fields, for example, mobility or cross-border research cooperation (European Institute for Gender Equality, 2023).

Albania

Albania has a series of national strategies that are pertinent to mobility and gender. The National Youth Strategy 2022–2029 places emphasis on improving opportunities for youth, inclusivity with participation, employability, and integration into European schemes and educational mobility (INSTAT, 2023). This is similar to the National Strategy for Development and European Integration (2022–2030). Inspection of strategy content for identified strategies thus far, however, would find that gender is mentioned often as a wide-ranging principle and somewhat less often as a series of actionized measures or participation goals in mobility.

Another document that comes close to being relevant is the Gender Budgeting: A Contextual Analysis of the Higher-Education Sector in Albania, which includes lengthy data on women's representation in higher education and higher academy (students, academic staff) and mentions the "leaky pipeline" effect, yet doesn't necessarily categorize participation in international mobility schemes such as the Erasmus+ program by gender (Llatfiu & Shuli, 2024).

Other Western Balkans Countries

Comparable strategy reports for Serbia, North Macedonia, Bosnia & Herzegovina, and Kosovo frequently refer to youth, employability, EU integration, and mobility at a generic level in educational strategies or at the national level in youth strategies. Reviews (of policy, international reports, however, betray that gender is nearly never at the spotlight if mobility is at the central stage. The policies refer to equality or inclusion but frequently lack gender-disaggregated targets for mobility or monitoring data. Public reports are scarce in referring to statistics on girls versus boys taking part in international exchange, societal norms influencing uptake, or accommodation or travel support systems constructed with sensitivity to girls' needs.

Comparative Analysis: Trends, Barriers, and National Variations

Patterns Within Nations

From available data, some patterns are evident. Female representation is high in enrolled students at various levels (Bachelor's, Master's, PhD level) in Albania, while they decrease at higher positions. Employment and NEET rates indicate a gap for young women. Gender indices for many Western Balkans nations rank lower than EU means, particularly for areas that include power, power and decision-making, political participation, and freedom of movement.

States that are in a better position to reap from greater oversight for gender equity have comparatively greater female participation within higher scholarly environments. That may not necessarily convert into international travel or study awards parity, particularly if travel equates to financial, security or family barriers.

Major Barriers Examined

From the literature, policy reports, and scarce available empirical research, the key obstacles for girls' educational upward mobility in the Balkans are:

Family and cultural practices: Historical roles for men and women tend to value girls' labor that belongs to the household or the family, or make parents more apprehensive to allow daughters to travel or reside outside the family home.

Judgement on safety and risks: Female students are more concerned with matters that include physical security, harassment, transportation, accommodation at host sites, or cross-gender travel.

Financial limitation: The transportation, living allowance, paperwork or visa, lodging, and associated costs are a burden and, if funds are scarce, boys are commonly favored.

Institutional support gaps: Information, mentorship, or institutional policies missing to enable female participation in mobility (e.g., study awards aimed at/towards girls, assistance for childcare or parental approval, policies for secure accommodation).

Policy invisibility/weakening of monitoring: The strategies aren't often inclusive of gender-disaggregated data for travel, or indicators for checking if girls and boys are accessing the travel programs in a balanced manner.

National Variations in Policy Strategies

Albania excels within Balkans in having relatively rich data on female participation in tertiary study and strong commitments on gender equality within most strategy documents (Youth Strategy, Youth Guarantee / EU4Youth, Global Accelerator Roadmap, etc.) – although mobility-specific targets on gender are still lacking. Albania's EU4Youth initiative, for example, aligns with the National Youth Strategy 2022-2029 and has objectives aiming at improving employability and mobility in its broadest definition. However, its available outcome measures hitherto are more about NEET rates, vocational study and employability within the labor market than cross-border mobility or academic exchange with a focus on relevant targets on gender (UNICEF, 2022).

Other nations:

Serbia, North Macedonia, and others have EU integration and educational development plans which comprise internationalization and mobility, yet scanning them one finds that gender is frequently incorporated as a general principle or within inclusion/equality pieces, without hard, quantitative goals on mobility-by-gender.

Certain EU sub-regional projects or EU candidate country instruments (like EIGE's Gender Equality Index) enable comparative information, yet frequently areas pertaining to mobility are poorly represented or have outdated, gender-disaggregated data available for Balkan nations.

Serbia

Serbia's Youth Strategy 2030 has youth inclusion and mobility as a priority (Government of Serbia, 2023). The Gender Equality Strategy 2021–2030 for Serbia establishes equality as a key development dimension (Government of Serbia, 2021). Gender-disaggregated data on educational mobility are lacking, and the policies on mobility are not translated into Gender-sensitive action.

Northern Macedonia

The Education Sector Analysis 2024 notes that women outnumber men at the tertiary level and are more likely to graduate while at the lower grades within the secondary level enrolment for girls is low (Ministry of Education and Science of North Macedonia, 2024). The National Gender Equality Strategy (2022–2027) refers strongly to equality for all (UNDP, 2022). There are, however, no systematic statistics on female and male participation in international programs for mobility.

Kosovo

There are more robust gender-sensitive interventions from Kosovo. The impact study on the Kosovo Education Strategic Plan (2017–2021) mentions that 52% of the beneficiaries of the scholarships were female, although fewer than men applied (Miftari, 2023). From 2023/2024, the Ministry for Education has distributed 1,882 UN Women-supported STEM young women scholarships, with over 4,600 beneficiaries thus far since its inception (UN Women, 2024). There has been greater participation within Erasmus+, and the data are not provided for a breakdown by gender (European Research Area, 2022).

Discussion

The data and policy research provided reveal that while gaps between men and women in higher educational enrollment are diminishing (even being in favor for women in certain nations), a notable disparity in academic mobility opportunities (particularly those that include travel, study abroad, or living away from home) for Balkanic young women persists.

This gap is due to both structural and cultural barriers. Structural barriers are economic deprivation, unavailable scholarship funding split with gender equity, inadequate institutional support (housing, security), and unavailable information. Cultural barriers are family expectations, gender-role expectations, perception of risk, and at times religious or right-wing moral expectations.

Inasmuch as movement is often a stepping stone to greater employability and social capital, these inequalities have downstream effects beyond schooling: they affect careers, settlement choices, representation in leadership roles, and ultimately, how gender equity plays out in the rest of society.

Albania's comparatively healthy data frame and comparatively greater policy focus on gender equality offers a useful example. There, however, are no mobility-specific indicators available on gender. Other Western Balkans nations trail again.

Comprehension and policy implications:

Produce and make publicly available movement data that are gender disaggregated. Education ministries, NationalHigher Education Offices, and National Statistics Offices in Balkan nations should gather and make available data on how many girls and boys are taking part in exchange programs, international scholarships, study abroad, etc., country of origin, field discipline, rural/urban origin, and qualitative reasons (why they engage or do not engage).

Create mobility programs with gender-specific support. Scholarships or mobility awards may incorporate travel security, accommodation within a secure setting, accommodation for parent consent, mentoring, and pre-deployment preparation that foresees gendered restrictions.

Integration of mobility equity in country strategies with numerical targets. All strategies on youth, educational, or EU integration that involve mobility must balance male and female objectives, timing, and indicators.

Combat socio-cultural norms by raising awareness and through community action interventions. Engage with schools, families, youth associations to change attitudes regarding girls' movement, autonomy, and freedom. Initiatives such as "EU for Gender Equality" in Albania are best practices for direct action against norms (UNFPA, 2023).

Take advantage of European and global standards. The EU accession procedure, the programs of Erasmus+, indices of EIGE, and UN SDGs (particularly SDG 4 – Quality Education; SDG 5 – Gender Equality) present instruments and rewards for the governments of nations to make gendered mobility a priority.

Regional cooperation and information sharing. Balkan countries would be served well by regional information sharing, comparative reviews of mobility programs, and exchange best practices for gender-responsive mobility support.

Conclusion

In the Balkans, girls encounter a series of, intersecting obstacles to educational mobility that arise both structurally (economic, institutional, security) and out of sociocultural norms. The rate of higher educational enrollment has in most instances achieved or exceeded parity at the level, yet that parity somewhat fails to translate into equitable opportunity for mobility. National plans in most instances demonstrate equality, yet frequently inadequately engage with mobility per se, or consist of weak or non-specific instruments for gendered mobility.

To make headway on equity in academic mobility, something beyond aspirational statements is required. Policymakers need to develop data gathering that is measurable at a gender-disaggregated level; craft scholarship and mobility programs with built-in supports for families and communities to shift norms; and get European equality frameworks to align at a national strategy level. Without these steps, academic mobility will continue to be inequally accessed and hold back the Balkans region's full potential for youth, and particularly young women.

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INTERNATIONAL CONFERENCE NETWORK

DEVELOPMENT AND PROSPECTS OF ENGINEERING SERVICES IN AZERBAIJAN

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Introduction.

Engineering services are one of the main pillars of the economic and technological development of any country. In Azerbaijan, this sector is rapidly developing and expanding, especially in parallel with the development of the oil and gas, construction, energy and transport sectors. Against the backdrop of digitalization and technological innovations, the demand for engineering services is increasing both at the state and private sector levels.
Engineering services in Azerbaijan cover various areas and are mainly divided into the following categories. First of all, construction and infrastructure engineering occupies an important place. This area includes the design and construction of highways, bridges, buildings, as well as water and sewage systems. Infrastructure development is a key condition for the country's social and economic progress.
Energy engineering is also an important area and includes services related to the construction of power plants, the application of renewable energy sources, as well as oil and gas infrastructure. This area plays a major role in the efficient use of Azerbaijan's energy resources and sustainable energy supply.
Mechanical and automation engineering deals with the design, assembly and construction of equipment for industrial facilities and automation systems. This is an important area for optimizing production processes and increasing productivity.
Information technology and software engineering covers the application of digital technologies such as software, system integration and industry 4.0. This area is of great importance in the development of modern technologies and digital transformation. Finally, environmental engineering covers areas such as environmental monitoring, waste management and water resource protection. These services are important in terms of ensuring sustainable development and ecological balance.
Thus, engineering services in Azerbaijan, covering various fields, make significant contributions to the country's socio-economic development and technological progress.

Material and method

The engineering sector is one of the rapidly developing fields in recent years. Large infrastructure projects implemented in Baku and industrial zones, in particular, create a great demand for engineering services. The need for specialists working in this field is increasing and the role of engineering services in the implementation of various projects is becoming increasingly important.
However, there are also certain problems in the sector. One of the main difficulties is the shortage of personnel. The number of engineers with practical knowledge and experience is

still not enough, and this may affect the quality of projects. In addition, although there are some technical universities in the country that provide engineering education, their connection with the industry is weak. This prevents students from gaining real field experience and being prepared in accordance with the needs of the industry.

The role of foreign engineering companies is also important in large and complex projects in Azerbaijan. Thus, foreign engineering firms, which are partners of international and local companies such as BP, SOCAR, participate in various projects and bring experience and innovation to the local sector. In general, for the development of the engineering sector, it is important to train local personnel and strengthen cooperation between industry and educational institutions.

Conclusion. In Azerbaijan, engineering services are not only an important component of economic development, but also one of the main areas that drive technological progress. Strengthening state policy, increasing local human resources potential, and expanding industry-academia cooperation are important for the development of this area in line with global trends.

Key Words: engineering services, cooperation, companies, development, global trend.

INTERNATIONAL CONFERENCE NETWORK

PREPARATION OF SOLID ALKALI ACTIVATOR FOR GEOPOLYMER SYNTHESIS USING - RED CLAY WASTE, WATER GLASS

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Abstract :
Discharges of various micropollutants (organic and inorganic) into the environment are on the increase. These pollutants are generally toxic, poorly biodegradable, and cause numerous adverse health effects. In this context, this work focuses on the development of a geopolymer based on red clay waste, with a view to its application as an adsorbent in the treatment of an aqueous medium contaminated by Methyl Orange. The synthesized geopolymer was characterized by various analytical techniques. The raw material and the synthesized geopolymers were characterized by various physico-chemical methods. The results of XRF, XRD, and FTIR confirmed the successful synthesis of geopolymer beads, while the SEM/EDX findings revealed the homogeneous surface of the adsorbents. Adsorption tests were carried out by varying various parameters likely to affect adsorption performance, including adsorbent dose, solution pH, contact time, initial Methyl Orange concentration, and solution temperature.

The kinetic study revealed that the geopolymer eliminates Methyl Orange relatively quickly. The pseudo-second-order model is the most suitable for presenting the adsorption mechanism. The isotherm for Methyl Orange retention on geopolymer is in perfect agreement with the Langmuir model. Evaluation of the thermodynamic quantities showed that the Methyl Orange adsorption process is favorable, spontaneous, and endothermic. The results we have found allow us to predict that the use of these new generations of geopolymers offers great potential for the retention of cationic textile dyes.

Keywords: Adsorption; red clay waste; Geopolymer Beads; Methyl Orange; Characterization.

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INTEGRATING DIVERSE DATABASE MODELS: RELATIONAL, NOSQL, OBJECT-ORIENTED, AND CLOUD-BASED APPROACHES

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Abstract
In the contemporary digital landscape, organizations increasingly rely on data-driven decision-making, necessitating flexible, scalable, and efficient database management systems. Traditional relational databases have long dominated enterprise environments, providing structured storage, transactional reliability, and standardized query capabilities. However, the exponential growth of unstructured and semi-structured data, alongside evolving application requirements, has catalyzed the emergence of alternative database paradigms, including non-relational (NoSQL) databases, object-oriented databases, and cloud-based solutions. Each paradigm addresses specific challenges and offers distinct advantages, enabling organizations to optimize data storage, processing, and retrieval in alignment with operational goals.
Relational databases remain vital for applications demanding strong consistency, ACID-compliant transactions, and complex queries. They excel in environments where structured data and well-defined schemas are prevalent, such as financial systems, enterprise resource planning, and academic information management. Despite their robustness, relational models face scalability limitations and reduced efficiency when handling massive volumes of dynamic or heterogeneous data, which has prompted the exploration of alternative approaches.
NoSQL databases provide flexible schema designs, high scalability, and rapid data access, making them suitable for handling unstructured and semi-structured datasets, such as social media feeds, IoT sensor outputs, and large-scale web applications. By offering document, key-value, columnar, and graph-based storage models, NoSQL systems support distributed architectures, enabling real-time analytics and high-performance operations under heavy workloads.
Object-oriented databases integrate object-oriented programming principles with database management, allowing complex data types, encapsulation, inheritance, and polymorphism to be represented natively. This facilitates the modeling of real-world entities and seamless integration between application logic and persistent storage, reducing development complexity and enhancing maintainability.
Cloud-based databases represent a transformative approach to data management, combining distributed storage, elasticity, and advanced computational capabilities. They provide on-demand scalability, automated resource management, and integration with algorithmic and AI-driven processes, enabling organizations to implement predictive analytics, intelligent query optimization, and high-availability systems without extensive hardware investments. Cloud-native solutions also promote global accessibility, cross-platform integration, and real-time collaboration, aligning with the needs of modern enterprises.
This study examines the comparative strengths, limitations, and application domains of relational, NoSQL, object-oriented, and cloud-based databases. By highlighting practical use cases across industries such as e-commerce, healthcare, finance, and digital content management, the research demonstrates that a hybrid or integrative approach often yields the greatest benefits. Organizations that strategically combine multiple paradigms can optimize performance, ensure data integrity, enhance scalability, and foster innovation, ultimately achieving superior operational efficiency and informed decision-making in complex, data-intensive environments.
Keywords: Relational Databases, NoSQL Databases, Object-Oriented Databases, Cloud Databases, Data Management, Scalability, Big Data, Intelligent Systems

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CULTIVATING CARE: A VIRTUE ETHICS APPROACH TO SUSTAINABILITY IN HEALTH AND WELFARE

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ABSTRACT

This research explores the ethical dimensions of sustainability within welfare management services, reframing sustainability as a profound philosophical imperative that transcends mere resource efficiency. It argues for a paradigm shift from viewing sustainability as a set of operational tactics to understanding it as a fundamental ethical commitment. Employing a virtue ethics lens, the study examines how integrating sustainable practices into health and welfare systems can cultivate moral character within service providers and promote human flourishing for care recipients.

The research critiques traditional utilitarian and deontological approaches to sustainability, asserting that these frameworks often fail to capture the intrinsic values at stake. A virtue-based framework offers a more holistic understanding by recognizing the inherent value of ecological integrity and social equity as virtues to be cultivated. The study uses conceptual analysis, drawing from classical and contemporary virtue ethics literature, alongside illustrative case studies to identify virtues such as compassion, prudence, justice, and temperance as essential for establishing a sustainable ethos in health and welfare settings. Compassion drives a deep concern for the well-being of current and future generations, prudence calls for wise resource management, justice demands equitable access to services, and temperance urges restraint in consumption and waste.

The research also addresses potential challenges to implementing a virtue ethics approach, such as conflicting values and the difficulty of measuring virtuous behavior. It proposes a philosophical model for integrating sustainability into organizational values, professional training, and ethical decision-making processes, aiming to cultivate a culture of care that extends beyond short-term gains and prioritizes the long-term well-being of all stakeholders and future generations. This involves fostering reflective practices, promoting moral dialogue, and developing ethical leadership skills among health and welfare professionals. By placing emphasis on the moral qualities of individuals and communities, this research offers a novel perspective on how to achieve genuine and lasting sustainability in the vital field of health and welfare management.

Keywords: sustainability,virtue ethics,health,welfare,moral philosophy

Introduction

The sustainability crisis facing contemporary healthcare systems demands not merely technical solutions but fundamental ethical reflection on the values, character, and responsibilities that should guide health and welfare services (Jameton & Pierce,2001). While much attention has been devoted to operational strategies for reducing environmental impact and improving resource efficiency, less consideration has been given to the philosophical foundations that should inform sustainable healthcare practice(see Gribble,2017). This paper argues that virtue ethics provides a uniquely valuable framework for understanding and advancing sustainability in health and welfare contexts, offering insights that complement and extend beyond traditional utilitarian and deontological approaches. The imperative for sustainability in healthcare arises from multiple converging challenges. Healthcare systems are significant contributors to environmental degradation, accounting for substantial proportions of national carbon emissions, waste generation, and resource consumption. Simultaneously, health outcomes are increasingly threatened by environmental changes including climate disruption, biodiversity loss, and pollution. These environmental challenges interact with persistent social inequities, as disadvantaged communities bear disproportionate burdens of both environmental harm and inadequate healthcare access. Addressing these interconnected challenges requires not only operational improvements but also fundamental transformation in how wellness professionals and organizations understand their ethical responsibilities. Traditional ethical frameworks have provided important guidance for wellness practice, but they face significant limitations when applied to sustainability challenges. Utilitarian approaches, which evaluate actions based on their consequences for overall welfare, tend to reduce sustainability to cost-benefit calculations that struggle to adequately value ecological integrity or address obligations to future generations(Wesseh,2025). Deontological frameworks, which emphasize duty and universal moral rules, offer important principles such as the Hippocratic injunction to "*do no harm*," but their rigid rule-based structure can lack the contextual sensitivity needed for complex sustainability decisions. Both approaches, moreover, focus primarily on actions and their justification rather than on the character, motivations, and moral development of healthcare professionals and institutions (Wesseh,2025). Virtue ethics offers a complementary perspective that addresses these limitations. Rather than asking primarily "*what should I do*?" virtue ethics begins with the question "*what kind of person should I be*?" and "*what kind of institution should we become*?" This character-centered approach recognizes that sustainable healthcare requires not merely compliance with rules or optimization of outcomes, but cultivation of moral excellences—virtues—that dispose individuals and organizations toward right action. Virtues such as compassion, prudence, justice, and temperance provide both motivation for sustainable practice and practical wisdom for navigating the complex ethical terrain of healthcare sustainability(Verstegen et al.,2024). Recent philosophical work has begun to develop virtue ethics frameworks specifically for environmental and healthcare contexts. Symons (2025) draws upon McPherson's (2021) analysis of the virtues of limits to articulate how virtues such as temperance and humility can guide sustainable healthcare practice. Jordan and Kristjánsson (2016) propose a new virtue of "*harmony with nature*" that recognizes human flourishing as fundamentally dependent on ecological health. These theoretical developments, combined with growing empirical evidence regarding the role of character and values in healthcare practice, suggest that virtue ethics can make important contributions to sustainability transformation. This paper develops a comprehensive virtue ethics framework for sustainability in health and welfare services. It begins by critiquing the limitations of traditional ethical approaches and

articulating the distinctive contributions of virtue ethics. It then identifies and analyzes four core virtues essential for sustainable healthcare: compassion, prudence, justice, and temperance. The paper examines how these virtues can be cultivated through reflective practices, moral dialogue, and ethical leadership, and proposes a philosophical model for integrating virtue-based sustainability into organizational values, professional training, and decision-making processes. Finally, it addresses implementation challenges and offers practical guidance for fostering virtue-based sustainability in healthcare contexts.

2. Critique of Traditional Ethical Approaches to Sustainability

2.1 The Need for Virtue Ethics

The limitations of utilitarian and deontological frameworks point toward the need for a complementary ethical approach that can address sustainability's distinctive challenges. Virtue ethics offers several important advantages (Gribble,2017). *First*, it recognizes the intrinsic value of both human and ecological flourishing, providing a basis for environmental stewardship that does not depend solely on instrumental calculations or anthropocentric principles. *Second*, it emphasizes character development and moral formation, recognizing that sustainable healthcare requires not merely right actions but virtuous agents disposed toward sustainable practice. *Third,* it integrates reason and emotion, acknowledging that sustainability requires not only rational analysis but also appropriate affective responses such as compassion for those affected by environmental harm and reverence for nature. *Fourth*, virtue ethics provides resources for addressing the temporal dimensions of sustainability. Virtues such as prudence involve practical wisdom regarding long-term consequences and the ability to balance present and future considerations. The virtue of justice extends naturally to intergenerational concerns, recognizing obligations to ensure that future generations can flourish. *Fifth*, virtue ethics emphasizes the importance of moral exemplars and communities of practice in ethical development. Sustainable healthcare requires cultivating organizational cultures and professional communities that embody and transmit sustainable virtues. As Gribble (2017) argues in developing an environmental health virtue ethics, while much environmental literature addresses the legal, communal, and institutional changes required for sustainability, virtue discourse is rarely explicitly integrated. This represents a significant gap, as the cultivation of appropriate character traits and dispositions is essential for translating sustainability principles into consistent practice. The virtue ethics framework developed in this paper seeks to address this gap by articulating the specific virtues needed for sustainable healthcare and examining how they can be cultivated.

3. Core Virtues for Sustainable Healthcare

3.1 Compassion: Concern for Current and Future Generations

Compassion, understood as deep concern for the suffering and flourishing of others, stands as a central virtue for sustainable healthcare(Zolnierz et al.,2018). Traditionally, medical compassion has focused on the suffering of individual patients in the present moment. A sustainability-oriented compassion must expand this temporal and relational scope to encompass concern for future generations who will be affected by today's environmental and resource decisions. Aramesh (2017) identifies compassion as a central virtue in medicine, describing it as a merging point of masculine and feminine virtues and a crucial part of professional attitude. This traditional understanding of compassion emphasizes empathetic engagement with patient suffering and commitment to alleviating it. Sustainable wellness requires extending this compassionate concern beyond individual patients to include communities affected by environmental health hazards, future generations who will inherit the environmental consequences of current practices, and even non-human beings whose welfare is intertwined with human health. This expanded compassion involves several components,

including imaginative empathy, recognition of interconnection, what might be called "*ecological sensitivity*", an affective attunement to environmental degradation and its impacts and the courage to act on compassionate concern even when doing so requires challenging established practices or accepting personal costs. The cultivation of compassion through practices such as mindfulness training, narrative medicine, and reflective practice appears to enhance both patient care quality and environmental consciousness (Cariboni et al.,2007).

3.2 Prudence: Wise Resource Management and Practical Wisdom

Prudence, or practical wisdom (*phronesis* in Aristotelian terms), involves the capacity to deliberate well about what is good and advantageous for human flourishing and to act accordingly(Pitman,2012). In care sustainability contexts, prudence manifests as wise resource management, thoughtful consideration of long-term consequences, and skillful navigation of complex ethical terrain. The prudent hcare professional or organization recognizes that resources are finite and must be stewarded carefully to serve both present and future needs. This involves several capacities as the accurate perception of relevant facts and circumstances, sound deliberation about ends and means, the ability to balance multiple considerations in reaching practical judgments about right action and appropriate temporal orientation. Hordern (2020) emphasizes that prudence in healthcare must be integrated with compassion and justice, forming a constellation of virtues that mutually support and constrain each other. Prudence without compassion may become mere calculation, while compassion without prudence may lead to well-intentioned but ultimately harmful actions. The cultivation of prudence requires case-based learning, mentorship from experienced practitioners, and reflective analysis of past decisions and their consequences.

3.3 Justice: Equitable Access and Fair Distribution

Justice, understood as fair distribution of goods and burdens and equitable treatment of persons, is essential for sustainable healthcare (Anderson et al.,2009). Sustainability is inherently a justice issue, as environmental degradation and resource depletion disproportionately affect disadvantaged communities and future generations who have limited voice in current decisions. A virtue ethics approach to justice emphasizes not merely adherence to fair procedures but cultivation of a just character disposed toward equity and fairness. Healthcare justice in a sustainability context involves several dimensions involving intragenerational justice, intergenerational justice, ecological justice and procedural fairness, ensuring that those affected by sustainability decisions, particularly marginalized communities, have meaningful voice in decision-making processes (Anderson et al.,2009). The cultivation of justice as a virtue involves more than learning principles of fair distribution. It requires developing appropriate emotional responses to injustice, including moral outrage at inequity and empathetic concern for those who suffer unjust burdens. It demands courage to challenge unjust practices and institutions, even when doing so involves personal risk. It involves humility to recognize one's own complicity in unjust systems and commitment to ongoing moral growth.

3.4 Temperance: Restraint in Consumption and Environmental Stewardship

Temperance, traditionally understood as moderation and self-restraint, takes on particular importance in sustainability contexts(Worthington et al.,2021). In an era of overconsumption and environmental degradation, temperance involves appropriate restraint in resource use, resistance to excessive consumption, and cultivation of limits in healthcare practice. This virtue directly addresses the environmental impacts of healthcare systems that consume vast quantities of energy, materials, and resources. Temperance in sustainable healthcare manifests in several ways, including the utility of material restraint, technological restraint, epistemic humility and cultivation of alternative sources. The cultivation of temperance requires counter-cultural formation, as it opposes dominant cultural messages promoting unlimited consumption and

technological maximum. Table 1 and Figure 1 represent these core virtues in sustainable healthcare.

Figure 1. The four core virtues for sustainable welfare.

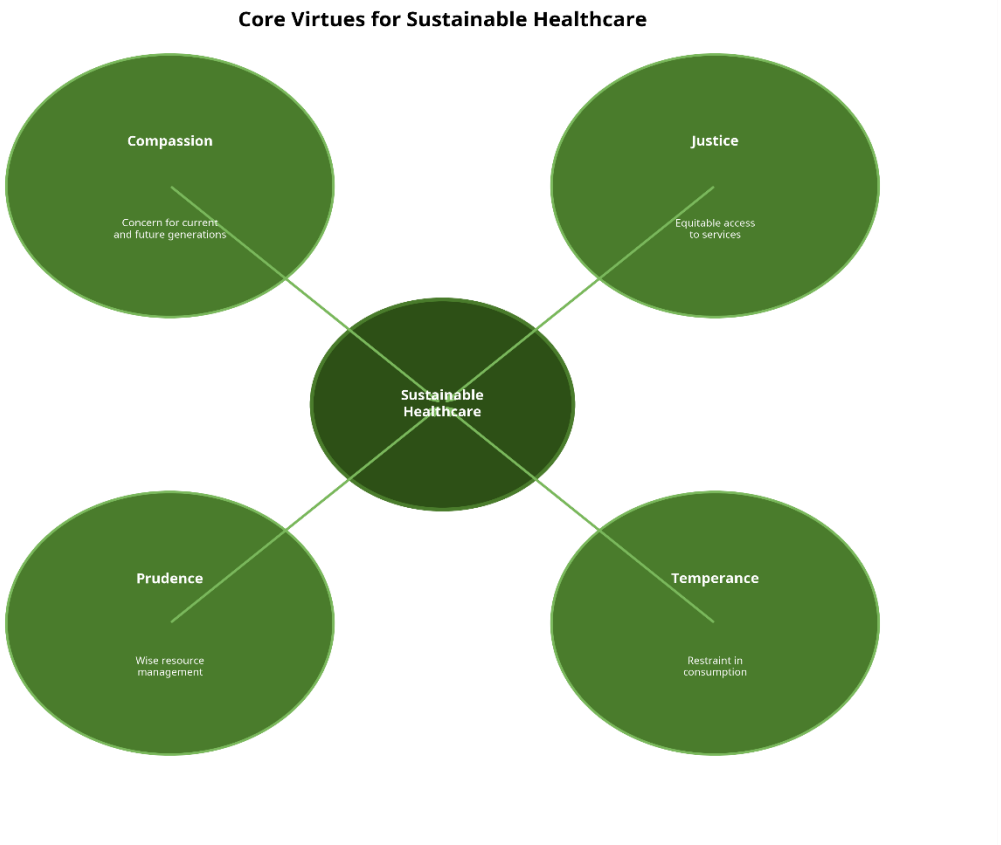


Table 1. Core virtues for sustainable welfare

Virtue	Classical definition	Welfare and healthcare application	Sustainability dimension	Cultivation methods
Compassion	Deep concern for suffering of others	Patient-centered care, Empathetic practice	Concern for current and future generations	Reflective practice, Narrative medicine
Prudence	Practical wisdom in decision-making	Evidence-based practice, Clinical judgment	Wise resource management	Case-based learning, Mentorship
Justice	Fair distribution of goods and burdens	Equitable access to care	Fair resource allocation across time	Ethics education, Policy analysis
Temperance	Moderation and self-restraint	Appropriate use of interventions	Restraint in consumption and waste	Mindfulness training, Environmental audits
Fortitude	Courage in facing difficulties	Advocacy for patients and systems	Standing up for sustainable practices	Leadership development, Moral courage training

4. Philosophical Model for Virtue-Based Sustainability

4.1 Integration into Organizational Values

The cultivation of virtues for sustainable healthcare requires embedding these moral excellences into the fundamental values and identity of healthcare organizations. This integration must occur at multiple levels, mission statements, strategic priorities, performance metrics, and organizational culture. An organization committed to virtue-based sustainability does not merely add sustainability as a programmatic initiative but conceptualizes its core purpose to include environmental stewardship and intergenerational responsibility. This integration begins with explicit articulation of sustainability as a core organizational value grounded in virtues. Mission statements should identify compassion, prudence, justice, and temperance as essential to the organization's identity and purpose. Strategic planning processes should incorporate virtue-based sustainability considerations into goal-setting and resource allocation decisions. Performance metrics should assess not only operational sustainability indicators but also evidence of virtue cultivation among staff and leadership. Organizational culture change requires sustained attention to the symbols, narratives, and practices that shape collective identity. Leaders must model virtuous sustainable behavior, making visible their own commitment to compassion for future generations, prudent resource use, just distribution, and temperate consumption. Organizational stories and celebrations should highlight exemplars of sustainable virtue, creating moral models for others to emulate. Physical spaces and operational systems should be designed to support and reinforce virtuous practice.

4.2 Professional Training and Education

Professional education provides a critical opportunity for virtue cultivation. Medical, nursing, and health administration curricula should integrate virtue ethics frameworks for sustainability, helping students develop both intellectual understanding and practical wisdom regarding sustainable healthcare. This integration should occur across the curriculum rather than being confined to specialized ethics courses. Case-based learning offers particularly valuable opportunities for developing practical wisdom. By analyzing complex cases involving sustainability dilemmas, students can develop the capacity to perceive relevant ethical considerations, deliberate about appropriate responses, and make sound judgments in ambiguous situations. These cases should highlight the role of virtues in guiding sustainable practice and the consequences of vice or moral failure. Reflective practice exercises help students develop self-awareness regarding their own values, motivations, and character. Journaling, group reflection, and guided self-examination can illuminate students' emotional responses to sustainability challenges, their habitual patterns of thought and action, and areas requiring moral growth. Mentorship relationships with faculty and practitioners who embody sustainable virtues provide models for emulation and guidance for character development. Clinical education should provide opportunities for students to practice virtuous sustainable behavior in real healthcare contexts. This includes exposure to sustainable healthcare practices, participation in sustainability initiatives, and reflection on the ethical dimensions of clinical decisions. Preceptors should provide feedback not only on technical competence but also on development of virtues relevant to sustainable practice.

4.3 Ethical Decision-Making Processes

Virtue ethics offers a distinctive approach to ethical decision-making that complements principle-based methods. Rather than asking primarily "*what rules apply*?" or "*what produces the best outcomes*?", virtue-based decision-making asks "*what would the virtuous agent do in this situation*?" and "*what action best expresses and develops virtuous character*?" This approach involves several steps. First, it requires careful perception of the ethically relevant features of the situation, including environmental impacts, effects on future generations, equity

implications, and opportunities for virtue expression. The virtuous agent has cultivated sensitivity to these considerations and notices them readily. Second, it involves deliberation informed by practical wisdom, considering how different responses would express or undermine virtues such as compassion, prudence, justice, and temperance. Third, virtue-based decision-making considers not only the immediate action but also its effects on character development. Actions that may produce good outcomes but involve vice (such as deception or injustice) are problematic because they corrupt character and make future virtuous action more difficult. Conversely, actions that express and strengthen virtue are valuable even when they involve costs or difficulties. Fourth, this approach recognizes the importance of emotional responses in ethical discernment. Appropriate emotions—compassion for those who will suffer from environmental harm, outrage at injustice, reverence for nature—provide important moral guidance. The virtuous agent has cultivated emotional responses that track moral reality and inform practical judgment. Organizational decision-making processes should be structured to support virtue-based deliberation(Lenka et al.,2021). Ethics committees and sustainability task forces should include explicit consideration of how decisions express or undermine organizational virtues. Decision frameworks should prompt consideration of character implications alongside operational and financial factors(Lenka et al.,2021). Regular ethics rounds and moral dialogue sessions should provide opportunities for collective reflection on the virtues needed for sustainable healthcare. Table 2 gives on overview of these dimensions.

Table 2. Virtue development and organizational integration

Integration level	Focus Area	Specific Practices	Virtue Cultivation	Sustainability Outcomes
Indivdiual	Personal character	Reflective practice, Moral exemplars	Compassion, Prudence	Ethical decision-making
Professional	Clinical practice	Ethics rounds, Case discussions	Justice, Temperance	Sustainable care delivery
Organizational	Institutional values	Mission alignment, Culture building	All virtues	Systemic sustainability
Educational	Training programs	Curriculum integration, Role modeling	Progressive development	Future-ready professionals
Policy	Governance structures	Ethical frameworks, Accountability	Institutional virtues	Sustainable health systems

4.4 Reflective Practices and Moral Dialogue

The cultivation of virtues requires ongoing reflective practice and moral dialogue. Virtues are not acquired through a single decision or training program but develop gradually through repeated practice, reflection, and refinement. Healthcare organizations must create structures and cultures that support this ongoing moral development. Reflective practice involves regular examination of one's actions, motivations, and character in light of virtuous ideals(Symons,2025). This can take multiple forms: individual journaling, peer reflection groups, supervision sessions focused on moral development, and organizational retreats dedicated to ethical reflection. The key is creating protected time and safe spaces for honest self-examination and mutual accountability. Moral dialogue among healthcare professionals provides opportunities for collective wisdom-building and mutual moral support. These dialogues should address both specific ethical dilemmas and broader questions about the kind of professionals and organizations we aspire to become. They should welcome diverse

perspectives and create space for disagreement and uncertainty, recognizing that practical wisdom often emerges through dialogue rather than individual reflection alone.

Interdisciplinary dialogue is particularly important, as sustainable healthcare requires integration of clinical, environmental, ethical, and social perspectives. Bringing together physicians, nurses, administrators, environmental specialists, ethicists, and community representatives can generate richer understanding and more comprehensive responses to sustainability challenges.

5. Implementation Challenges and Solutions

5.1 Conflicting Values and Priorities

Healthcare organizations operate within environments characterized by multiple, often conflicting values and priorities. The pursuit of sustainability can conflict with other important values such as patient autonomy, clinical excellence, organizational financial viability, and professional autonomy. These conflicts create significant implementation challenges for virtue-based sustainability. The conflict between patient welfare and environmental sustainability represents a particularly challenging tension. When a resource-intensive intervention offers marginal benefit to a current patient, how should the virtuous practitioner balance compassion for that individual against prudent stewardship of resources and justice toward future generations? Traditional medical ethics, with its strong emphasis on patient-centered care and individual benefit, may seem to prioritize current patient welfare over environmental considerations. Virtue ethics offers resources for navigating these conflicts. First, it recognizes that virtues must be held in balance, with each virtue constraining and informing the others. Compassion for current patients must be tempered by prudence regarding long-term consequences and justice toward future generations. Conversely, environmental stewardship must be informed by compassion and cannot justify abandoning care for present patients. The practically wise agent develops capacity to discern appropriate balance in specific situations.Second, virtue ethics can reframe apparent conflicts by challenging underlying assumptions. The dichotomy between patient welfare and sustainability may be false, as environmental degradation ultimately harms patient welfare and sustainable practices often enhance quality of care. Virtue-based reflection can reveal how seemingly competing values actually support each other when properly understood.Third, structured moral deliberation processes can help organizations navigate value conflicts. Ethics committees and sustainability task forces should explicitly address tensions among values, seeking solutions that honor multiple commitments rather than simply prioritizing one value over others. This deliberative approach recognizes that practical wisdom often emerges through dialogue and collective reflection.

5.2 Economic Pressures and Short-Term Thinking

Healthcare organizations face intense economic pressures that can undermine commitment to sustainability. Resource constraints, competitive markets, and short-term financial accountability create incentives for practices that maximize immediate financial performance even when they compromise long-term sustainability. These economic pressures can seem to conflict with virtues such as temperance and prudence that counsel restraint and long-term thinking. Addressing this challenge requires both individual virtue cultivation and systemic change. At the individual level, healthcare professionals and leaders must develop the virtue of fortitude, moral courage to advocate for sustainable practices even when facing economic pressures. This includes willingness to challenge unsustainable practices, propose alternatives that may involve short-term costs, and resist organizational pressures toward practices that compromise long-term flourishing. At the systemic level, policy reforms are needed to align economic incentives with sustainability values. Value-based reimbursement models that reward

long-term health outcomes and sustainable practices can reduce the conflict between financial viability and environmental stewardship. Accounting frameworks that incorporate environmental and social costs can make visible the true costs of unsustainable practices. Investment in sustainable infrastructure, while requiring upfront costs, can generate long-term financial and environmental benefits. Organizations can also develop business cases for sustainability that demonstrate how virtuous practices support financial performance. Reduced waste, improved efficiency, enhanced reputation, and better staff retention can result from sustainable practices, providing economic justification for virtue-based approaches. However, virtue ethics recognizes that some sustainable practices may be right even when they involve financial costs, and that economic considerations should not be the sole determinant of ethical action.

5.3 Cultural Transformation and Institutional Resistance

Perhaps the most fundamental challenge is the need for cultural transformation in healthcare organizations and professional communities. Virtue-based sustainability requires changes not merely in policies or practices but in the values, assumptions, and identities that constitute organizational culture. Such transformation faces significant resistance from established norms, vested interests, and the inertia of existing systems. Cultural transformation requires sustained, multi-faceted efforts. Leadership commitment is essential, as leaders shape culture through their decisions, behaviors, and the values they reinforce. Leaders must not only articulate commitment to virtue-based sustainability but also model it consistently in their own conduct. They must be willing to challenge established practices, reallocate resources toward sustainability, and hold themselves and others accountable for virtue development. Engaging multiple stakeholders in the transformation process enhances both legitimacy and effectiveness. When healthcare professionals, patients, community members, and other stakeholders participate in envisioning and implementing virtue-based sustainability, they develop ownership and commitment. Participatory processes can also generate more contextually appropriate and comprehensive solutions than top-down mandates. Phased implementation allows organizations to build capacity and demonstrate success incrementally. Beginning with pilot initiatives, celebrating early successes, and learning from challenges can build momentum for broader transformation. This approach recognizes that virtue development is gradual and that organizations need time to develop the practical wisdom required for sustainable practice. Table 3 presents these systemic challenges and their evidence-based impact.

Table 3. Implementation challenges and proposed solutions

Challenge	Nature of challenge	Impact on implementation	Proposed solution	Evidence-based
Conflicting Values	Multiple competing priorities	High - Creates ethical tensions	Structured moral deliberation processes	Moderate (case studies)
Measuring Virtuous Behavior	Qualitative nature of virtues	Very High - Assessment difficulties	Multi-method evaluation frameworks	Limited (theoretical)
Economic Pressures	Short-term financial constraints	High - Undermines long-term focus	Value-based reimbursement models	Emerging (pilot programs)
Cultural Transformation	Institutional resistance to change	Moderate-High - Slow adoption	Phased implementation with samples	Strong (organizational change literature)

6. Paradigm Shift: From Operational Tactics to Ethical Commitment

6.1Integrating Virtue Ethics with Sustainable Development Goals

The virtue ethics framework for healthcare sustainability aligns closely with and can advance the United Nations Sustainable Development Goals (SDGs). Each of the core virtues contributes to specific SDGs while the framework as a whole supports the integrated, holistic approach that the SDGs require (Jameton & Pierce,2001). Compassion, with its concern for the suffering and flourishing of all persons including future generations, directly supports SDG 3 (Good Health and Well-being). By expanding the circle of moral concern beyond immediate patients to include communities affected by environmental health hazards and future generations, compassionate healthcare practice addresses health equity and long-term population health. Compassion also motivates attention to the social determinants of health and the environmental conditions necessary for well-being. Prudence, as wise resource management and practical wisdom, contributes especially to SDG 12 (Responsible Consumption and Production). The prudent healthcare organization carefully stewards resources, avoids waste, and makes thoughtful decisions about technology adoption and resource use. Prudence involves considering the full life-cycle impacts of healthcare products and practices, from raw material extraction through disposal, and making choices that minimize environmental harm while maintaining quality care. Justice, with its emphasis on equitable access and fair distribution, directly advances SDG 10 (Reduced Inequalities). By attending to environmental health disparities, ensuring equitable access to sustainable healthcare services, and recognizing obligations to future generations, just healthcare practice addresses multiple dimensions of inequality. Justice also supports SDG 16 (Peace, Justice and Strong Institutions) by promoting fair governance structures and inclusive decision-making processes. Temperance, as restraint in consumption and environmental stewardship, contributes to SDG 13 (Climate Action) and other environmental goals. By cultivating moderation in resource use, resistance to overconsumption, and respect for ecological limits, temperate healthcare practice reduces environmental impact and supports climate mitigation efforts. Temperance also supports SDG 15 (Life on Land) by fostering respect for ecological systems and biodiversity. The integrated virtue framework supports SDG 17 (Partnerships for the Goals) by fostering the collaborative relationships and shared commitment necessary for achieving sustainability objectives. Virtues such as compassion, justice, and prudence dispose individuals and organizations toward partnership and collective action. The emphasis on moral dialogue and community engagement creates conditions for effective collaboration across sectors and stakeholders. Table 4 reflects these virtues and their primary SDGs connections.

Table 4 . Virtue ethics and Sustainable Development Goals

Virtue	Primary SDGs Connection	Mechanisms of Contribution	Healthcare Examples	Measurable outcomes
Compassion	SDG 3 (Good Health and Well-being)	Empathetic care delivery	Client-centered sustainability initiatives	Quality of care,
Prudence	SDG 12 (Responsible Consumption)	Wise resource stewardship	Evidence-based resource allocation	Resource efficiency, Waste reduction
Justice	SDG 10 (Reduced Inequalities)	Equitable access and distribution	Fair allocation of sustainable resources	Health equity metrics, Access indicators
Temperance	SDG 13 (Climate Action)	Restraint in environmental impact	Low-carbon healthcare practices	Carbon footprint, Environmental impact
All virtues	SDG 17 (Partnerships for Goals)	Collaborative virtue cultivation	Multi-stakeholder sustainability initiatives	Partnership effectiveness, Collective outcomes

6.2 Cultivating a Culture of Care

The ultimate aim of virtue-based sustainability is cultivating a culture of care that extends across time and space to encompass current and future generations, human and non-human nature. This culture of care represents a fundamental transformation in how healthcare organizations understand their mission and responsibilities. Rather than viewing care as limited to individual patient encounters, it recognizes that genuine care requires attending to the broader conditions, environmental, social, economic, that make health and flourishing possible. A culture of care grounded in virtue ethics involves several elements. First, it requires expanding the moral community to include all those affected by healthcare practices, including future generations who cannot speak for themselves and ecological systems that sustain life. This expanded moral vision recognizes that we are embedded in networks of relationships and dependencies that extend far beyond immediate clinical encounters. Second, it involves cultivating appropriate emotional responses to sustainability challenges. A culture of care fosters compassion for those who suffer from environmental health hazards, outrage at injustice and inequity, reverence for nature, and hope for a sustainable future. These emotions are not obstacles to rational decision-making but essential components of moral perception and motivation. Third, it requires developing institutional structures and practices that embody and reinforce virtues. This includes sustainability policies grounded in ethical principles, decision-making processes that incorporate virtue-based deliberation, performance metrics that assess character alongside outcomes, and educational programs that foster moral development. The physical environment, organizational rituals, and every day practices should all support and express commitment to sustainable virtues. Fourth, a culture of care recognizes that sustainability is not achieved through individual heroism but through collective commitment and mutual support. It creates communities of practice where healthcare professionals can support each other in developing virtues, share practical wisdom, and hold each other accountable for sustainable practice. It fosters partnerships with patients, communities, and other stakeholders in shared pursuit of sustainability.

7. Conclusion: Toward Virtuous and Sustainable Healthcare

This paper has developed a comprehensive virtue ethics framework for sustainability in welfare services, arguing that traditional utilitarian and deontological approaches, while valuable, are insufficient for addressing the complex ethical dimensions of healthcare sustainability. By

focusing on character, practical wisdom, and moral development, virtue ethics offers resources for transforming healthcare in ways that honor both human flourishing and ecological integrity. The framework identifies four core virtues: compassion, prudence, justice, and temperance, as essential for sustainable wellness practice. Compassion extends moral concern across time and space to encompass future generations and ecological communities. Prudence provides practical wisdom for navigating complex sustainability challenges and making sound judgments about resource use. Justice ensures equitable distribution of environmental benefits and burdens across current and future populations. Temperance cultivates appropriate restraint and respect for ecological limits. Together, these virtues provide both motivation for sustainable practice and guidance for right action in specific situations. The cultivation of these virtues requires multi-level interventions spanning individual character development, professional education, organizational culture change, and policy reform. At the individual level, reflective practice, moral exemplars, and experiential learning support virtue development. Professional education should integrate virtue ethics throughout curricula, using case-based learning, mentorship, and clinical experiences to develop practical wisdom. Organizations must embed sustainability virtues in their values, structures, and cultures, creating environments that support and reinforce virtuous practice. Policy frameworks should align incentives with sustainability values and support the institutional conditions necessary for virtue cultivation. Implementation challenges including conflicting values, measurement difficulties, economic pressures, and cultural resistance are significant but not insurmountable. Structured moral deliberation can help navigate value conflicts. Multi-method evaluation frameworks can assess virtue development despite measurement challenges. Value-based reimbursement and business cases for sustainability can address economic pressures. Phased implementation with strong leadership and stakeholder engagement can overcome cultural resistance. The virtue ethics approach represents a paradigm shift from viewing sustainability as operational tactics to understanding it as ethical commitment. This reframing elevates sustainability from a specialized function to a core organizational value, recognizes the need for moral formation alongside technical solutions, and acknowledges that sustainable healthcare requires cultivating the character and practical wisdom necessary for long-term flourishing. It offers a transformative vision for healthcare that extends beyond short-term efficiency to cultivate a culture of care for current and future generations. The integration of virtue ethics with the Sustainable Development Goals demonstrates how this philosophical framework can advance concrete sustainability objectives. By fostering compassion, prudence, justice, and temperance, healthcare organizations can contribute to good health and well-being, responsible consumption, reduced inequalities, climate action, and partnerships for the goals. The virtue-based approach provides both ethical grounding and practical guidance for achieving these global objectives. Looking forward, the cultivation of sustainable virtues in healthcare represents both a moral imperative and a practical necessity. As environmental challenges intensify and resource constraints become more pressing, healthcare systems must transform their practices and cultures. This transformation requires not merely technical innovation but moral development—the cultivation of character, practical wisdom, and institutional virtues that dispose individuals and organizations toward sustainable practice. By embracing virtue ethics as a framework for sustainability, healthcare can fulfill its fundamental commitment to promoting human flourishing while honoring its responsibilities to future generations and the broader ecological community. The vision of virtuous and sustainable healthcare is ambitious, but it is also achievable through sustained commitment, strategic investment, and collective action. It requires healthcare professionals, organizations, educators, and policy-makers to embrace their roles as moral agents and institutional change leaders. It demands courage to

challenge unsustainable practices, humility to acknowledge our limitations and interdependencies, and hope that transformation is possible. Most fundamentally, it requires cultivating the virtues, compassion, prudence, justice, and temperance, that enable us to care well for all those whose flourishing depends on the choices we make today.

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INTERNATIONAL CONFERENCE NETWORK

SUSTAINABILITY SOCIAL DYNAMICS AND THE TRANSFORMATION OF HEALTH AND WELFARE SERVICES

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ABSTRACT
This study investigates the complex social dynamics that influence the implementation and long-term effectiveness of sustainability initiatives within health and welfare management services. Moving beyond a purely technical or economic focus, this research utilizes sociological theories of institutionalism and social capital to examine how organizational structures, power relationships, and stakeholder networks shape the adoption, diffusion, and impact of sustainable practices. The research employs a mixed-methods approach, combining quantitative surveys of service providers, managers, and policy-makers with in-depth qualitative interviews of community members, advocacy groups, and sustainability experts. The quantitative component measures attitudes toward sustainability, perceptions of organizational support, and levels of engagement in sustainable practices. The qualitative component explores the lived experiences of stakeholders, uncovering barriers and facilitators to sustainability and identifying key drivers of change. Findings reveal that while regulatory pressures and economic incentives can stimulate initial adoption of sustainable practices, the long-term success hinges on cultivating social capital through strong collaborative partnerships, fostering a shared sense of responsibility, and empowering local communities . The study identifies key barriers to sustainability, including bureaucratic inertia, fragmented governance structures, professional silos, and unequal access to resources and opportunities. It also explores the role of leadership in championing sustainability, the impact of organizational culture on individual behavior, and the importance of incorporating diverse perspectives into decision-making processes. The research concludes by recommending strategies for enhancing social learning, promoting community engagement, building trust among stakeholders, and creating more equitable, resilient, and sustainable health and welfare systems. These strategies include promoting inter-organizational collaboration, investing in education and training programs, developing participatory governance mechanisms, and advocating for policy changes that support sustainable development goals.
Keywords: social capital, health, welfare, organizational change, community engagement

Introduction

The imperative for sustainability in health and welfare services has never been more urgent. As global challenges including climate change, resource depletion, and health inequities intensify, healthcare systems must transform their operational models to ensure long-term viability while maintaining quality care delivery. Sustainability in this context extends beyond environmental considerations to encompass social equity, economic resilience, and institutional adaptability. The transformation toward sustainable health and welfare services represents a fundamental shift in how organizations conceptualize their responsibilities to current and future generations. Understanding the social dynamics that facilitate or impede this transformation is essential for effective policy development and organizational change management. Social dynamics encompass the complex interactions among stakeholders, the institutional structures that shape behavior, and the relational networks that enable collective action. Two theoretical frameworks: sociological institutionalism and social capital theory, offer complementary perspectives for analyzing these dynamics (De Luca et al.,2024). Sociological institutionalism examines how organizational structures, norms, and cultural frameworks shape the adoption of sustainability practices, while social capital theory focuses on how networks, relationships, and trust among stakeholders facilitate collaborative action toward shared goals. Despite growing recognition of sustainability's importance in healthcare, significant gaps remain in understanding how social dynamics influence the transformation process (De Luca et al.,2024;Eriksson,2011). Previous research has largely focused on technical or operational aspects of sustainability, with limited attention to the relational and institutional factors that determine implementation success(Medina et al.,2023; Eriksson,2011;Hofmeyer & Marck,2008). This study addresses this gap by examining the interplay between institutional pressures, social capital, and stakeholder engagement in shaping sustainability outcomes in health and welfare services. The paper is guided by three central questions: *First*, how do institutional structures and norms influence the adoption and implementation of sustainability practices in health and welfare organizations? *Second,* what role does social capital play in facilitating collaborative action toward sustainability goals? *Third,* what barriers impede sustainable transformation, and what strategies can effectively overcome these obstacles? By addressing these questions, this study contributes to both theoretical understanding and practical guidance for sustainability transformation in health and welfare contexts.

2. Theoretical Framework

2.1 Sociological Institutionalism

Sociological institutionalism provides a powerful lens for understanding how organizational structures, cultural norms, and institutional pressures shape the adoption of sustainability practices in health and welfare services (Rothstein &Stolle,2003). This theoretical perspective, rooted in the work of Galleli & Amaral (2025), emphasizes that organizations operate within institutional environments that define appropriate behaviors, legitimate practices, and acceptable outcomes. Healthcare organizations are particularly susceptible to institutional influences due to their complex regulatory environments, professional hierarchies, and public accountability requirements. The institutional perspective highlights three key mechanisms through which sustainability practices diffuse across health organizations. *First*, coercive isomorphism occurs when regulatory bodies, government agencies, or funding organizations mandate specific sustainability requirements. Healthcare organizations adopt these practices to maintain legitimacy and ensure continued access to resources. *Second,* mimetic isomorphism emerges when organizations facing uncertainty model their practices on successful peers, leading to the diffusion of sustainability innovations across institutional fields. *Third*, normative

isomorphism results from professionalization processes, as healthcare professionals internalize sustainability values through education, training, and professional socialization.

Research on institutional change in healthcare demonstrates that successful sustainability transformation requires alignment between formal organizational structures and informal cultural norms (Pop et al.,2018). When sustainability initiatives are imposed through top-down mandates without corresponding changes in organizational culture, implementation often remains superficial or encounters significant resistance. Conversely, when sustainability becomes embedded in professional identities and organizational values, it generates authentic commitment and sustained behavioral change. The institutional perspective also defines the role of institutional entrepreneurs, i.e., individuals or groups who actively work to transform existing institutional arrangements. In healthcare contexts, these change agents may include visionary leaders, sustainability champions, or advocacy coalitions who challenge established practices and promote alternative models (Pop et al.,2018). Their success depends not only on their individual characteristics but also on their ability to mobilize resources, build coalitions, and frame sustainability in ways that resonate with existing institutional logics.

2.2 Social Capital Theory

Social capital theory complements the institutional perspective by focusing on the relational networks and trust-based interactions that enable collective action toward sustainability goals. Social capital, broadly defined, refers to the resources embedded in social relationships that facilitate coordination and cooperation for mutual benefit (Di Nicola,2014). In welfare contexts, social capital manifests through professional networks, inter-organizational partnerships, and community relationships that support collaborative problem-solving and knowledge exchange(Di Nicola,2014).

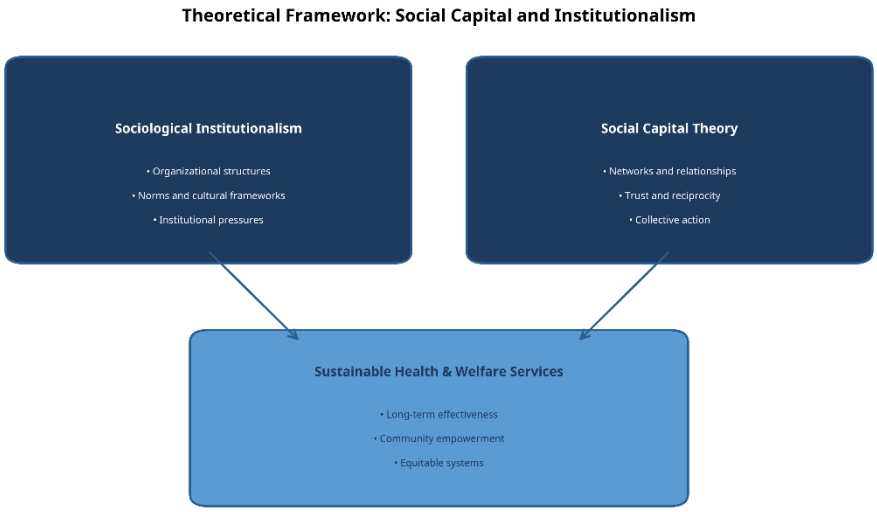
Medina et al. (2023) distinguish among several dimensions of social capital, each playing distinct roles in sustainability transformation. *Structural social capital* includes the network ties and organizational configurations that connect stakeholders, measured through indicators such as network density and centrality. *Relational social* capital refers to the trust, norms of reciprocity, and mutual obligations that characterize relationships among actors. *Cognitive social capital* involves shared understandings, collective visions, and common interpretations that enable coordinated action. Additionally, these authors differentiate between bonding social capital (within-group connections that foster solidarity) and bridging social capital (cross-group linkages that facilitate diverse perspectives and resources). De Luca & Lin (2024) show that social capital contributes to sustainability in multiple ways. *First*, it reduces transaction costs associated with collaboration by establishing trust and reducing the need for formal monitoring mechanisms. *Second,* it facilitates knowledge transfer and social learning, enabling organizations to learn from peers' experiences and adapt successful practices to local contexts. *Third*, it enhances collective problem-solving capacity by bringing together diverse expertise and perspectives. *Fourth*, it strengthens resilience by creating redundant pathways for resource access and information flow.

In healthcare settings, workplace social capital has been identified as particularly important for sustainable development. A comprehensive integrative review by Xu et al. (2024) found that nurses' workplace social capital, characterized by respectful interactions, trust, reciprocity, and shared understanding, is positively associated with multiple Sustainable Development Goals, including good health and well-being (SDG 3), decent work and economic growth (SDG 8), and partnerships for the goals (SDG 17). The study analyzed 29 empirical studies and identified 23 distinct outcomes of workplace social capital, demonstrating its far-reaching implications for healthcare sustainability.

2.3 Integrative Framework

The integration of sociological institutionalism and social capital theory provides a comprehensive framework for understanding sustainability transformation in health and welfare services. Institutional structures create the context within which social capital operates, defining the rules, norms, and expectations that shape relational interactions. Conversely, social capital can influence institutional change by enabling collective action to challenge existing arrangements and promote alternative practices.This integrative framework recognizes that sustainability transformation occurs at multiple levels, individual, organizational, and systemic with social dynamics operating across these levels. At the individual level, professional socialization and peer networks shape sustainability attitudes and behaviors. At the organizational level, institutional pressures and internal social capital influence the adoption and implementation of sustainability practices. At the systemic level, inter-organizational networks and institutional fields determine the diffusion and legitimation of sustainability innovations. Figure 1 represents this visualization.

Figure 1. Integrative theoretical framework



The framework also highlights the temporal dynamics of sustainability transformation. Initial adoption may be driven primarily by external institutional pressures, such as regulatory requirements or economic incentives. However, long-term success depends on the development of internal social capital and the embedding of sustainability values in organizational culture. This suggests that effective sustainability strategies must address both institutional alignment and relational capacity-building.

3. Methodology

3.1 Research Design

This study employed a convergent parallel mixed-methods design to capture both the breadth and depth of social dynamics influencing sustainability in health and welfare services. The mixed-methods approach was selected for its ability to integrate quantitative measurement of relationships among variables with qualitative exploration of stakeholder experiences and contextual factors. This design enables triangulation of findings across data sources, enhancing the validity and comprehensiveness of conclusions. The research was conducted in multiple

health and welfare organizations across diverse geographic and organizational contexts, ensuring variation in institutional environments, organizational characteristics, and sustainability maturity levels. This purposive sampling strategy allowed examination of how contextual factors shape the relationship between social dynamics and sustainability outcomes.

3.2 Quantitative Component

The quantitative component involved a structured survey administered to service providers, managers, and policy-makers across participating organizations. The survey instrument included validated scales measuring key constructs from the theoretical framework:

Institutional Pressures: Adapted from institutional theory research, this scale assessed the extent to which organizations experienced coercive, mimetic, and normative pressures toward sustainability adoption. Items measured regulatory requirements, peer influence, and professional norms related to sustainability.

Social Capital: Drawing from established social capital measurement frameworks, the survey included subscales for structural, relational, and cognitive dimensions. Structural social capital was assessed through network position and collaboration frequency. Relational social capital was measured using trust indices and reciprocity scales. Cognitive social capital was evaluated through items assessing shared vision and collective goals.

Sustainability Engagement: This scale measured the extent of organizational commitment to sustainability across environmental, social, and economic dimensions. Items assessed policy adoption, resource allocation, stakeholder involvement, and performance monitoring related to sustainability.

Organizational Culture: Cultural factors were assessed using scales measuring innovation orientation, learning culture, collaborative climate, ethical leadership, and accountability systems.

The survey was administered electronically, with multiple reminder contacts to maximize response rates. A total of 487 valid responses were obtained, representing a response rate of 64%. Data were analyzed using structural equation modeling (SEM) to examine relationships among theoretical constructs while controlling for organizational characteristics and contextual factors.

3.3 Qualitative Component

The qualitative component consisted of in-depth semi-structured interviews with diverse stakeholders, including community members, advocacy groups, sustainability experts, and organizational leaders. Interview participants were selected through purposive and snowball sampling to ensure representation of multiple perspectives and experiences.

The interview protocol explored several key themes:

- Lived experiences with sustainability initiatives in health and welfare services
- Perceptions of barriers and facilitators to sustainability transformation
- The role of relationships, trust, and collaboration in sustainability efforts
- Institutional factors shaping organizational responses to sustainability challenges
- Strategies for overcoming resistance and building commitment to sustainability

Interviews were conducted until thematic saturation was achieved, resulting in a final sample of 42 participants. All interviews were audio-recorded with participant consent, transcribed verbatim, and analyzed using thematic analysis. The analytical process involved multiple stages: familiarization with data, generation of initial codes, identification of themes, review and refinement of themes, and definition of final themes. Two researchers independently coded a subset of transcripts to establish inter-coder reliability, with disagreements resolved through discussion.

3.4 Data Integration

The integration of quantitative and qualitative data occurred at multiple stages of analysis. *First,* quantitative findings regarding the strength of relationships among variables informed the selection of themes for deeper qualitative exploration. *Second,* qualitative insights regarding contextual factors and mechanisms were used to interpret quantitative patterns. *Third*, joint displays were created to visually represent the convergence and divergence of findings across data sources. This iterative integration process enhanced the depth of understanding regarding how social dynamics shape sustainability transformation.

Table 1. Research methodology overview

Component	Description	Participants	Instruments/Methods
Quantitative Component	Surveys measuring attitudes toward sustainability, perceptions of organizational support, and levels of engagement	Service providers, Managers, Policy-makers	Structured questionnaires, Likert scales, Statistical analysis
Qualitative Component	In-depth interviews exploring lived experiences, barriers, and facilitators	Community members, Advocacy groups, Sustainability experts	Semi-structured interviews, Thematic analysis, Narrative inquiry
Data Integration	Mixed-methods synthesis combining numerical and narrative data	All stakeholder groups	Convergent parallel design, Joint display analysis

4. Findings

4.1 Drivers of Sustainability Adoption

The quantitative analysis revealed distinct patterns in how different factors influence sustainability adoption and long-term success. SEM modeling showed that regulatory pressures and economic incentives exert strong effects on initial adoption ($\beta = 0.68$ and 0.71 respectively, both $p < 0.001$), but their influence on long-term sustainability success is considerably weaker ($\beta = 0.42$ and 0.38 respectively, both $p < 0.05$). This pattern suggests that while external pressures and financial considerations motivate organizations to initiate sustainability efforts, they are insufficient for sustaining commitment over time.

In contrast, social capital and community empowerment show the opposite pattern. Their effects on initial adoption are moderate ($\beta = 0.45$ and 0.28 respectively), but they exert very strong influences on long-term success ($\beta = 0.82$ and 0.79 respectively, both $p < 0.001$). This finding highlights the critical importance of relational factors and stakeholder engagement for embedding sustainability in organizational practices and culture.

Table 2. Key findings on differential effects of drivers

Driver type	Initial Adoption Effect	Long-term Success Effect	Sustainability Mechanism
Regulatory process	High ($\beta = 0.68$, $p < 0.001$)	Moderate ($\beta = 0.42$, $p < 0.05$)	Compliance-driven behavior change
Economic incentives	High ($\beta = 0.71$, $p < 0.001$)	Moderate ($\beta = 0.38$, $p < 0.05$)	Cost-benefit motivated adoption
Social capital	Moderate ($\beta = 0.45$, $p < 0.01$)	Very High ($\beta = 0.82$, $p < 0.001$)	Trust-based collaborative networks

Community Empowerment	Low (β = 0.28, p < 0.05)	Very High (β = 0.79, p < 0.001)	Shared responsibility and ownership

* *β represents standardized regression coefficients from SEM modeling.*

Qualitative interviews provided rich insights into the mechanisms underlying these quantitative patterns. Participants described how regulatory compliance often led to "*checkbox*" approaches to sustainability, where organizations implemented minimal requirements without genuine commitment. As one municipality administrator explained: "*We did what we had to do to meet the regulations, but it didn't really change how we think about our environmental impact or social responsibility*." In contrast, when sustainability emerged from collaborative processes involving diverse stakeholders, it generated authentic ownership and sustained engagement. A community health advocate described this dynamic: "*When we were actually involved in designing the sustainability program, not just consulted but truly partnered, it became our initiative too. We had a stake in making it work*."

4.2 The Role of Social Capital

The analysis of social capital dimensions revealed that different forms of social capital contribute to sustainability through distinct mechanisms. Relational social capital, characterized by trust and reciprocity, showed the strongest association with sustainability outcomes (r = 0.74, $p < 0.001$). Bridging social capital, involving cross-group linkages and diverse networks, also demonstrated strong effects (r = 0.71, $p < 0.001$). Cognitive social capital (r = 0.68, $p < 0.001$), structural social capital (r = 0.62, $p < 0.001$), and bonding social capital (r = 0.58, $p < 0.001$) showed moderate to strong associations.

Table 3. Social capital dimensions and their associations with sustainability outcomes

Social Capital Dimension	Definition	Measurement Indicator	Association with Sustainability (r)
Structural	Network ties and organizational configurations	Network density, Centrality measures	r = 0.62, p < 0.001
Relational	Trust, norms, and reciprocity among actors	Trust indices, Reciprocity scales	r = 0.74, p < 0.001
Cognitive	Shared understanding and collective vision	Vision alignment scores, Shared goals	r = 0.68, p < 0.001
Bonding	Within-group connections and solidarity	In-group cohesion, Team integration	r = 0.58, p < 0.001
Bridging	Cross-group linkages and diverse networks	Inter-group collaboration, Boundary spanning	r = 0.71, p < 0.001

Qualitative data showed how social capital operates in practice. Trust emerged as a foundational element enabling collaborative sustainability efforts. Participants described how pre-existing trust relationships facilitated rapid mobilization around sustainability initiatives, while lack of trust created barriers requiring extensive relationship-building before substantive collaboration could occur. A welfare manager reflected: "*We had worked together on quality improvement for years, so when sustainability became a priority, we already had the trust and communication patterns to move forward quickly*." Bridging social capital proved particularly important for innovation and adaptation. Organizations with strong cross-boundary networks were better able to access diverse knowledge, learn from peers' experiences, and adapt successful practices to local contexts. A sustainability coordinator explained: "*Our connections*

with other hospitals, community organizations, and environmental groups gave us access to ideas and expertise we never would have developed internally."

4.3 Barriers to Sustainability Transformation

The research identified four primary barriers impeding sustainability transformation in health and welfare services, each with distinct characteristics and implications.

Bureaucratic Inertia (Impact Score: 8.5/10, Prevalence: 78%) emerged as the most pervasive barrier. Participants described how established routines, risk-averse cultures, and resistance to change created substantial obstacles to sustainability adoption. Hierarchical decision-making structures slowed response to sustainability challenges, while departmental autonomy impeded coordination across organizational boundaries. As one policy-maker observed: "*The system is designed for stability, not transformation. Every change requires navigating multiple layers of approval, and by the time you get through them, the momentum is lost*."

Fragmented Governance (Impact Score: 8.0/10, Prevalence: 72%) reflected the challenges of coordinating sustainability efforts across multiple jurisdictions, funding streams, and accountability structures. Participants noted that health and welfare services often operate within complex governance arrangements involving national, regional, and local authorities, each with distinct priorities and requirements. This fragmentation creates coordination challenges and can result in contradictory or competing sustainability initiatives.

Professional Silos (Impact Score: 7.5/10, Prevalence: 65%) referred to the tendency of different professional groups to operate independently, limiting cross-functional collaboration essential for holistic sustainability approaches. Medical, nursing, administrative, and support staff often maintain separate professional identities and communication channels, impeding integrated sustainability efforts. A physician leader reflected: "*We talk about patient-centered care and integrat*ed *services, but when it comes to sustainability, everyone retreats to their professional corners*."

Unequal Access to Resources (Impact Score: 9.0/10, Prevalence: 81%) was identified as the most impactful barrier, particularly affecting smaller organizations and those serving disadvantaged communities. Sustainability initiatives often require upfront investments in technology, training, and infrastructure that are beyond the capacity of resource-constrained organizations. This creates a sustainability gap, where well-resourced organizations advance while others fall behind.

Key barriers to sustainability in health and welfare services, showing impact scores based on stakeholder assessments are shown in Table 4.

Table 4. Barriers to sustainability and proposed mitigation strategies

Barrier	Impact Score (1-10)	Prevalence(%)	Mitigation Strategy	Expected effectiveness
Bureaucratic Inertia	8.5	78%	Leadership commitment, Change management programs	High
Fragmented Governance	8.0	72%	Inter-organizational coordination mechanisms	Moderate-high
Professional Silos	7.5	65%	Cross-functional teams, Interdisciplinary training	Moderate
Unequal Resource Access	9.0	81%	Equitable funding allocation, Capacity building	High

4.4 Community Engagement and Empowerment

The analysis of community engagement revealed a clear gradient in sustainability impact corresponding to different levels of stakeholder involvement. The research adapted the IAP2 Spectrum of Public Participation to examine how engagement approaches influence sustainability outcomes.

Inform-level engagement (Impact Score: 2.5/10), characterized by one-way communication and information dissemination, showed minimal sustainability impact. Organizations using this approach provided information about sustainability initiatives but did not seek stakeholder input or involvement. Participants described feeling excluded from decision-making despite being affected by sustainability policies.

Consult-level engagement (Impact Score: 4.0/10) involved two-way communication and feedback collection but limited actual influence on decisions. While stakeholders appreciated being asked for input, they often perceived consultation as tokenistic when their feedback did not visibly influence outcomes.

Involve-level engagement (Impact Score: 6.5/10) featured active participation in specific decisions, with stakeholders having moderate influence on sustainability initiatives. This approach generated greater commitment and more contextually appropriate solutions than lower levels of engagement.

Collaborate-level engagement (Impact Score: 8.5/10) established genuine partnerships in decision-making processes, with stakeholders having substantial influence on sustainability strategies and implementation. Participants described this level as transformative, creating shared ownership and sustained commitment.

Empower-level engagement (Impact Score: 9.5/10) involved delegated authority and shared leadership, with communities and stakeholders having decision-making power over sustainability initiatives. This approach generated the highest sustainability impact, though it was also the least common in practice. Table 5 gives an overview of these findings

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Table 5. Stakeholder engagement levels and their impact on sustainability

Engagement level	Characteristics	Stakeholder involvement	Sustainability Impact Score
Inform	One-way communication, Information dissemination	Passive recipients	2.5/10
Consult	Two-way communication, Feedback collection	Limited input	4.0/10
Involve	Active participation in specific decisions	Moderate involvement	6.5/10
Collaborate	Partnership in decision-making processes	High involvement	8.5/10
Empower	Delegated authority and shared leadership	Full partnership	9.5/10

Qualitative insights revealed that effective community engagement requires more than formal participation mechanisms; it demands authentic power-sharing and responsiveness to community priorities. A community representative emphasized: "*Engagement isn't about checking a box or holding a meeting. It's about genuinely sharing power and being willing to change your plans based on what the community needs and knows*."

4.5 Organizational Culture and Leadership

The analysis of organizational culture factors revealed that collaborative climate exerted the strongest influence on sustainability performance ($\beta = 0.71$, $p < 0.001$), followed by ethical leadership ($\beta = 0.68$, $p < 0.001$), learning culture ($\beta = 0.64$, $p < 0.001$), innovation orientation ($\beta = 0.56$, $p < 0.001$), and accountability systems ($\beta = 0.52$, $p < 0.01$). Table 6 presents these significant data.

Table 6. Organizational culture factors and their influence on sustainability performance

Cultural Factor	Description	Influence on Sustainability (β)	Significance
Innovation Orientation	Openness to new ideas and practices	0.56	$p < 0.001$
Learning Culture	Continuous improvement and knowledge sharing	0.64	$p < 0.001$
Collaborative Climate	Teamwork and cooperative relationships	0.71	$p < 0.001$
Ethical Leadership	Values-based decision-making	0.68	$p < 0.001$
Accountability Systems	Performance monitoring and responsibility	0.52	$p < 0.01$

These findings underscore the importance of relational and values-based factors in sustainability transformation. Organizations characterized by strong collaborative climates create environments where sustainability becomes a shared responsibility rather than a specialized function. Ethical leadership establishes the moral foundation for sustainability commitment, framing it as a fundamental organizational value rather than an optional initiative. Qualitative data revealed that effective sustainability leadership involves both symbolic and substantive actions. Leaders who personally modeled sustainable behaviors, allocated resources to sustainability initiatives, and held themselves accountable for sustainability outcomes were

most successful in fostering organizational commitment. A department head explained: "*When our CEO started taking public transit to work and talking about it in meetings, it sent a powerful message that sustainability wasn't just policy, it was personal*."

5. Discussion

5.1 Theoretical Contributions

This research makes several important theoretical contributions to understanding sustainability transformation in health and welfare services. *First*, it shows the complementary value of integrating sociological institutionalism and social capital theory. While institutional theory illuminates the structural and normative forces shaping sustainability adoption, social capital theory reveals the relational mechanisms through which sustainability becomes embedded in organizational practice. The integration of these perspectives provides a more complete understanding than either framework alone. *Second*, the research advances understanding of temporal dynamics in sustainability transformation. The finding that regulatory pressures and economic incentives drive initial adoption while social capital and community empowerment sustain long-term success challenges simplistic models of organizational change. It suggests that effective sustainability strategies must be sequenced, with different interventions appropriate at different stages of transformation. Initial compliance-oriented approaches may be necessary to establish basic practices, but must be complemented by relationship-building and empowerment strategies to achieve lasting change. *Third*, the research contributes to social capital theory by demonstrating the differential effects of various social capital dimensions. The particularly strong influence of relational social capital (trust and reciprocity) and bridging social capital (cross-boundary networks) suggests that sustainability transformation depends especially on these forms of social connection. This finding has implications for how organizations invest in social capital development, suggesting that trust-building and boundary-spanning activities merit particular attention.

5.2 Practical Implications

The findings have significant implications for practitioners seeking to advance sustainability in health and welfare services. *First*, they suggest that sustainability initiatives should prioritize relationship-building and stakeholder engagement from the outset, rather than treating these as secondary considerations. Organizations that invest in developing social capital and fostering collaborative relationships create the foundation for sustained sustainability success. *Second*, the research highlights the importance of moving beyond inform and consult levels of community engagement toward genuine collaboration and empowerment. While higher levels of engagement require greater investment of time and resources, they yield substantially greater sustainability impact. Organizations should critically examine their engagement practices and identify opportunities to deepen stakeholder involvement in decision-making. *Third*, the identification of key barriers—bureaucratic inertia, fragmented governance, professional silos, and unequal resource access, provides a roadmap for targeted interventions. Each barrier requires distinct strategies:

- *Bureaucratic inertia* can be addressed through leadership commitment to sustainability, change management programs that build readiness for transformation, and the cultivation of sustainability champions throughout the organization.
- *Fragmented governance* requires inter-organizational coordination mechanisms, such as joint planning processes, shared accountability frameworks, and cross-boundary leadership structures.

•*Professional silos* can be reduced through cross-functional teams, interdisciplinary training programs, and organizational structures that reward collaboration across professional boundaries.
•*Unequal resource* access demands systemic solutions, including equitable funding allocation mechanisms, capacity-building support for resource-constrained organizations, and policy reforms that address structural inequities.

5.3 Policy Recommendations

Based on the research findings, several policy recommendations emerge for advancing sustainability in health and welfare services:
1: *Enhance Social Learning Infrastructure*. Policy-makers should invest in platforms and processes that facilitate knowledge exchange and collaborative learning among health and welfare organizations. This includes creating communities of practice, establishing knowledge-sharing networks, and supporting peer-to-peer learning opportunities. Implementation should occur in the first six months, requiring investment in training programs and knowledge platforms, with expected outcomes including increased knowledge exchange and accelerated diffusion of effective practices.
2: *Promote Authentic Community Engagement*. Policies should incentivize and support higher levels of community engagement in sustainability initiatives. This includes providing resources for participatory processes, establishing standards for meaningful engagement, and holding organizations accountable for genuine stakeholder involvement. Implementation should span months 3-12, requiring facilitation resources and community liaison support, with expected outcomes including enhanced stakeholder participation and more contextually appropriate sustainability solutions.
3: *Build Trust Networks*. Policy frameworks should recognize and support the development of trust-based relationships among stakeholders. This includes allocating time and resources for relationship-building activities, creating safe spaces for dialogue across differences, and recognizing the value of relational work in organizational performance assessment. Implementation should occur over months 1-18, requiring investment in relationship-building activities and sustained commitment, with expected outcomes including strengthened social capital and enhanced collaborative capacity.
4: *Create Equitable Resource Allocation Systems*. Policies should address the resource disparities that create sustainability gaps between well-resourced and resource-constrained organizations. This includes developing funding mechanisms that provide additional support to organizations serving disadvantaged communities, creating shared resource pools, and ensuring that sustainability requirements are accompanied by adequate implementation support. Implementation should span months 6-24, requiring policy reforms and new funding mechanisms, with expected outcomes including reduced disparities and more equitable sustainability progress.
5: *Develop Sustainability Leadership Capacity*. Policies should support the development of leaders who can champion sustainability transformation. This includes integrating sustainability competencies into leadership development programs, creating mentorship opportunities, and recognizing and rewarding sustainability leadership. This should be an ongoing effort requiring sustained investment in leadership development programs, with expected outcomes including emergence of sustainability champions and enhanced organizational capacity for transformation.

5.4 Limitations and Future Research

Several limitations of this research should be acknowledged. First, while the mixed-methods design provides both breadth and depth of understanding, the cross-sectional nature of the

quantitative component limits causal inference. Longitudinal research tracking organizations over time as they implement sustainability initiatives would provide stronger evidence regarding causal relationships and temporal dynamics.

Future research should examine how cultural, political, and economic contexts shape the relationship between social dynamics and sustainability outcomes. Comparative studies across different healthcare systems and national contexts would be particularly valuable.

Second, while the research identified key barriers to sustainability transformation, additional work is needed to develop and evaluate specific interventions for overcoming these barriers. Experimental or quasi-experimental studies testing different approaches to building social capital, fostering community engagement, or reducing bureaucratic inertia would provide practical guidance for practitioners. Third, the research focused primarily on organizational and inter-organizational levels of analysis, with less attention to individual-level factors. Future research should examine how individual attitudes, motivations, and behaviors contribute to or impede sustainability transformation, and how these individual factors interact with organizational and institutional dynamics. Finally, the measurement of sustainability outcomes in this research relied primarily on process indicators (e.g., policy adoption, stakeholder engagement) rather than ultimate impact indicators (e.g., environmental outcomes, health equity improvements). Future research should develop and validate comprehensive sustainability performance metrics that capture both process and outcome dimensions.

6. Conclusion

This research shows that sustainability transformation in health and welfare services is fundamentally a social process, shaped by institutional structures, relational networks, and stakeholder engagement. While regulatory pressures and economic incentives can initiate sustainability efforts, long-term success depends on the development of social capital and the empowerment of communities and stakeholders. The integration of sociological institutionalism and social capital theory provides a comprehensive framework for understanding these dynamics and guiding effective intervention.

The findings reveal that organizations seeking to advance sustainability must attend to both structural and relational factors. Structurally, they must align institutional arrangements, including governance structures, accountability systems, and resource allocation mechanisms, with sustainability goals. Relationally, they must invest in building trust, fostering collaboration, and engaging stakeholders in meaningful ways. The most successful sustainability transformations occur when these structural and relational elements reinforce each other, creating virtuous cycles of commitment and action. The identification of key barriers,bureaucratic inertia, fragmented governance, professional silos, and unequal resource access, provides clear targets for intervention. Each barrier requires distinct strategies, but all share a common thread: they can be addressed through approaches that strengthen social capital, enhance stakeholder engagement, and align institutional structures with sustainability values. The strategic recommendations offered in this research provide a roadmap for such interventions, with specific guidance regarding implementation timelines, resource requirements, and expected outcomes.

Looking forward, the transformation of welfare services toward sustainability represents both a challenge and an opportunity. The challenge lies in overcoming entrenched practices, institutional barriers, and resource constraints that impede change. The opportunity lies in harnessing the power of social capital, collaborative partnerships, and community empowerment to create health systems that are not only environmentally sustainable but also more equitable, resilient, and responsive to the needs of current and future generations.

Achieving this vision requires sustained commitment, strategic investment, and authentic engagement with the social dynamics that shape organizational transformation.

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INTERNATIONAL CONFERENCE NETWORK

EVALUATION OF ISLAMIC RELIGIOUS COURSES IN THE FEDERAL REPUBLIC OF GERMANY AND SPECIFICALLY IN THE STATE OF NORTH RHINE – WESTPHALIA

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The purpose of this article is to make some suggestions within the framework of Educational Sciences and Religious Education for the current state of the courses and to make them more efficient, based on the research results obtained in the empirical study for the doctorate.
This article will compare the religious instruction set forth in the German Constitution with Catholic and Protestant religious instruction. After presenting the general situation of Islamic religious instruction within this framework, some suggestions for providing better religious instruction will be offered.
In the Federal Republic of Germany, different curricula are implemented in each state for religious instruction.
In the state of North Rhine-Westphalia, Islamic Religion Courses began being offered as part of Turkish mother tongue courses in primary schools in 1986 and in secondary schools in 1996. Islamische Unterweisung, then known as Islamische Unterweisung, has been offered as an independent subject in German since 1999. While the state of North Rhine-Westphalia changed the course's name from Unterweisung to İslamkunde (Islamic Religious Knowledge) and later to İslamischer Religionsunterricht (Islamic Religious Course) and claimed it was equivalent to Catholic and Protestant Religion Courses starting in the 2012-2013 academic year, the fact that both the curriculum and the teachers are determined by the ministry indicates that this course is not a religious course on par with other religious courses.
It is stated that there are other religious and social problems in Germany, apart from the "Respondent Organization" problem, which is mandatory in the legal process regarding Islamic Religion courses.
In the light of Educational Sciences, the curriculum programs of these courses and some proposals that should be added to these programs will also be presented.
Keywords: Bundesrepublik Deutschland, Nordrhein-Westfalen, Islamunterricht, Religionsunterricht, Bundesverfassung, Educational Scenes and Religious Education, Islam in Deutschland.

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DEVELOPING ANALYTICAL THINKING IN STUDENTS DURING THE TEACHING OF CYTOLOGY AND HISTOLOGY

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Cytology and histology are scientific disciplines that enable the study of cell structure, functions, division, and metabolic processes, as well as the microscopic organization of tissues and organs, including their functional properties, normal structure, and pathological changes. These subjects are fundamental for understanding the organization and functioning of living organisms at the cellular and tissue levels. The objective of teaching cytology and histology is not merely to convey "what" students need to know, but to cultivate cognitive skills such as guided research, critical thinking, visual analysis, and the ability to transfer knowledge to new situations. Therefore, active learning approaches that go beyond traditional lectures are of significant importance. Several factors play a critical role in fostering analytical thinking. Among them, directing attention and visual recognition are particularly essential. For example, rapid and accurate identification of structures in microscopic images can be enhanced through practical exercises, short quizzes, and "spotting" sessions aimed at strengthening students' knowledge and skills. Analytical thinking and interpretation are also considered vital components in teaching cytology and histology. Students develop the ability to derive pathological and functional conclusions from cellular and tissue morphology by solving problems and engaging in case-based learning, which promotes analytical and critical thinking. Based on metacognitive approaches and self-assessment methods, it is important to provide students with formative assessments and reflective tasks to help them identify gaps in their knowledge. To enhance cognitive engagement in cytology and histology, the integration of various active teaching strategies—such as virtual microscopy (VM), flipped classroom, jigsaw, case-based learning, and formative assessment—is recommended. These approaches strengthen students' visual analysis, critical thinking, and clinical application skills in biological and medical fields, while also improving long-term retention of content. Implementation of practical steps and faculty training programs can facilitate these changes at the institutional level.

Keywords: cytology, histology, teaching, analytical thinking, methods

INTERNATIONAL CONFERENCE NETWORK

DIALECTICAL PHENOMENA IN MATHEMATICS

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ABSTRACT

The paper is devoted to mapping dialectical phenomena in mathematics. I base my work on Hegel's dialectical laws: the law of unity and struggle of opposites, the law of negation of negation, and the law of transformation of quantity into quality and vice versa. I critically reflect on the Soviet model of Marxist dialectical mathematics in confrontation with the approach of A. N. Kolmogorov and other Soviet mathematicians. I strive to focus on natural dialectical phenomena in mathematics that are not conditioned by ideology. I strive to identify and describe these. I will focus on the understanding of the philosophy of mathematics by early Wittgenstein and Marx within the history of philosophy. I will also focus on limit theory and Zeno's paradox. I would also like to point out deduction in mathematics and dialectics in ancient Greek culture. I will also touch on dialectical phenomena in the work of Nicholas of Cusa.

Key Words: dialectics, dialectical laws, Marxism, limit theory, Zeno's paradox

As is well known, Hegel classified three basic dialectical laws, which he described in his philosophical logic. Naturally, the history of dialectics is much older. Both Heraclitus and Taoist philosophy attempt to capture the dialectical essence of the world. The Eleatic philosophers also presented a certain dimension of dialectics. Kuhn speaks of three sources of dialectics: ontological antithesis, organic rhythm, and religious reconciliation. He identifies Heraclitean and Eleatic dialectics as two sources of the dialectical intellectual tradition (Kuhn 1949, p. 17). Eristic dialectics is typical of Plato's dialogues as well as of the representatives of the Sophist movement. "Historical dialectic in the Hegelian style involves an immanentist metaphysics" (Kuhn 1949, p. 27). However, dialectics was present in full force long before Hegel. "Plato's method for discovering essences is inextricably linked to the format of the question and answer dialogue" (McKinney 1983, p. 179). Hegel synthesized dialectics in a highly abstract form in the form of three dialectical laws. These are the unity and struggle of opposites, the transformation of qualitative changes into quantitative ones and vice versa, and the law of negation of negation. These are the most general invariants of the dynamic world.

My field of interest will be dialectical phenomena in mathematics. Although dialectics plays an important role in the philosophy of F. J. Schelling, Schelling's philosophy played more of a role as a philosophical background for the emergence of modern mathematics than it did as a philosophy of mathematics with elements of dialectics (Heuser 2018). The key figure of dialectics, G. W. F. Hegel, also presented his philosophy of mathematics. The central text for his philosophy of mathematics is Logic as a Science. Hegel developed the essential features of the philosophy of mathematics primarily in the chapter Quantity. He attempts to reconstruct quantitative concepts from non-quantitative ones. “He then wishes to develop a procedure for generating in terms of his own dialectical theory the basic categories of mathematical thought and to contrast this with other modes of thought” (Pinkard 1981, p. 456). At the end of the chapter, Hegel talks about a simple unit. This simple unit is an abstract entity. Hegel says that it is a non-quantitative unit as opposed to a quantitative one. He perceives it as a concept of

being for itself, which we can consider a self-identical unit. “The one is the void as the abstract self-reference of negation” (Hegel 2010, p. 133). It is a certain abstract *x*. This part is rather unclear. Pinkard suggests distinguishing units in abstract terms as used by Russell, and talking about classes and their members. A class as one would thus be a non-quantitative unit. The concept of a quantitative unit is well known. Perhaps Hegel intuitively grasped something here, but he did not have Russell's conceptual apparatus at his disposal, Pinkard thinks. Hegel's points to mathematics' focus on numbers and quantity. We know that Russell points to the fact that many mathematical concepts have no connection with quantity. Hegel's philosophy of mathematics is not the work of a charlatan, but of a philosopher with penetrating intuition.

Hegel also reflects philosophically on the concept of number. Hegel perceives number as the quantity of units in a class. A number is defined as the quantity of identical units in a single class. A number is therefore a quantity of units (classes) – classes in another unit, which is also a class, notes Pinkard. Hegel thus approached Russell's perception of numbers as classes of classes. Hegel's philosophy of arithmetic thus proves to be progressive.

“Investigating the notion of a number, mathematicians almost always met an infinity. Starting with the Pythagoreans, continuing with Newton and Leibniz, then Bolzano and Cauchy, finishing with Dedekind and Cantor” (Bukovský 2011, p. 1). When it comes to the concept of infinity, Hegel's dialectical approach is evident here. He perceives the conceptualization of infinity in two ways, as negative infinity and positive infinity. The entity of infinity cannot be achieved by following a sequence. Perceiving infinity as a sequence, i.e., imagining it as something "beyond the finite," would mean a contradictory grasp of finite infinity. It is contradictory to consider infinity as an entity, just as it is unsatisfactory to consider it as potential infinity. According to Hegel, the rational is the actual infinite. The rational infinite is only the real infinite. "The infinite, which in the infinite progress only has the empty meaning of a non-being, of an unattained but sought beyond, is in fact nothing other than quality" (Hegel 2010, p. 203). Hegel thus perceives the concepts of actual and potential infinity as compatible, i.e., in dialectical contradiction. Our philosopher also reflects on the infinitely small. Hegel refuses to perceive the infinitely small as a number greater than zero but smaller than any other finite number. Rather, he perceives it as a middle ground between being and nothingness. Hegel perceives the pursuit of an infinite series as one of the forms of evil infinity. "The affirmative mathematical infinite would, like the affirmative qualitative infinite, be a relation between two notions – in his terms two quanta, each determined by the other and determined only in this relation (Verhaltnis) to one another" (Pinkard 1981, p. 463). In differential calculus, Hegel sides with Lagrange, perceiving the quantitative relationship as a function, arguing that the term limit should be used instead of infinitely small. "It is in this contradictory situation that Hegel places himself, with the intention of extracting its epistemological and philosophical meaning" (Lacroix 2000, p. 298). Hegel anticipates a method that would allow for arbitrary reduction of the limit. "The core of Hegel's analysis derives from the realization that derivatives are given by ratios (dy / dx) and, as such, they can be viewed as giving quality to the quantities that are the moments or relata of this relation (dy and dx)" (Kaufmann and Yeomans 2017, p. 373). From the perspective of the further development of the history of mathematical analysis, Hegel is therefore a progressive thinker, although, according to Pinkard, he expressed this in a metaphorical way. According to Hegel, the contradiction in mathematics that mathematicians cannot get rid of is simply normal. It cannot be eliminated by formal logic; it follows from the dialectical nature of the matter. This cannot be agreed with, since mathematicians cannot abandon the principles of formal logic (Belayev and Perminov 1983, p. 41).

Hegel's dialectical thinking was continued by the philosopher Marx, whose philosophy also includes ideas from the philosophy of mathematics. Marx's understanding of dialectics means

perceiving it as transcending the limits of man and reason (Černík 1968, p. 36). It is primarily a philosophical doctrine that deals mainly with the general connections and laws of motion, the development of the objective world, and its reflection in human consciousness. Marx perceives dialectics as a method of cognition of the most general laws of the development of objective reality. As is well known, Marx's ontological conviction is dialectical materialism, i.e., a materialistic ontological basis, as in some Enlightenment philosophers, but with the validity of the three dialectical laws formulated by Hegel. "Marx never set out explicitly what his notion of dialectics was" (Carchedi 2008, p. 416). It can be found in his extensive work. Carchedi believes that Marx's mathematical writings are more interesting to social scientists than to mathematicians and historians of mathematics, with which I disagree, as they are interesting to both historians of mathematics and philosophers. Their philosophical and mathematical historical lineage can be traced.

Marx also formulated his own philosophy of mathematics. This philosopher had acquired his mathematical knowledge at grammar school in Trier, but it was only as a self-taught student that he developed an interest in mathematics, which remained with him throughout his life. He was particularly fascinated by calculus. Marx's mathematical manuscripts are quite extensive. He was particularly interested in the contradictions found in the presentation of the foundations of differential and infinitesimal calculus, with which he expressed dissatisfaction, as did several other prominent mathematicians, such as Dedekind. Through his elaboration of this problem, Marx arrived at the arithmetization of mathematics (Struik 1948). His interest in the philosophy of mathematics partly overlapped with Hegel's. However, Marx did not read Cauchy, and his criticism of works on the foundations of calculus corresponds to the criticism of the mathematical understanding of the 18th century, says Struik. "Until the end of the 18th century, the concept of a definite integral was imprecise" (Belayev and Perminov 1983, p. 35). His work on the philosophy of mathematics was not published until the 20th century, so Marx had no influence on his contemporaries as a philosopher of mathematics. Nevertheless, he can also be considered a creative mathematician, even though he did not intend to publish his mathematical notes. It was Engels who came up with this idea. Marx opposed "his own mode of understanding the derivative, the differential, and the calculus in general" (Struik 1948, p. 187). He criticizes Newton and Leibniz's understanding of calculus as inaccurate. Similar to Cauchy's derivation, D'Alambert had already proceeded in this way before him. Marx positively evaluates his approach as progressive. D'Alambert separates the derivation from the rest of the context in a strictly algebraic way. "There is no development but a separation of the $f'(x)$, here $3x^2$ from its factor and the members which appear next to it in the other members marching on in rank and file" (Struik 1948, p. 189). He says that Lagrange's approach to the issue in question is a reduction of the problem to finding algebraic methods for developing functions $x + h$ to integer ascending powers of h. Lagrange thus says what can also be found in D'Alambert's approach, Marx believes.

Our philosopher objects that mathematicians up to that point had prepared the derivation itself in advance of the derivation process. Marx demands a method that would follow the process of changes within the variable and define the derivation as $0 / 0$ within the process, so that it could be marked with a new symbol dy / dx. According to him, it should be derived from the derivation process, not the binomial theorem. According to Marx, $x = x_1$ or $x - x_1 = 0$, then we get the result:

$\frac{0}{0} = \frac{dy}{dx} = x^2 + xx + x^3 = 3x^2$ (Struik 1948, p. 191). The preliminary derivative $x^2 + xx_1 + x^2$ thus transitions into a definite derivative via $x = x_1$. This is essentially the elimination of an infinitely small approximation. The expression $0 / 0$ is ultimately replaced by the symbol $dy /$

dx. In Marx's approach, algebra disappears and differential calculus takes its place, Struik notes. According to Marx, variables become real variables only within a function after a change in circumstances; until then, they are constants. “If we say that in $y = f(x)$ the x and y are variables, then this claim has no further consequences, as long as we do not move on, and x and y are still, pro tempore, in fact constants. Only when they really change, i.e. inside the function, do they indeed become variables, and only then can the relation still hidden in the original equation reveal itself — not the relation of the two magnitudes but of their variability" (Marx 1983, p. XXVIII). Here we see Marx's dialectical thinking, which seeks to arrive at the real variables within differential calculus and thus capture its dynamic essence. According to Struik, the difference between Marx's and D'Alembert's perception of derivation is significant. In his interpretation, Marx strives to get to the root of the matter and understand the real process of derivation. This is reminiscent of Zeno's aporia against motion about Achilles and the tortoise, which follows the sequence of positions of a point at rest, which does not really capture motion. This is a clear influence of Hegel on Marx, who also rejects the pursuit of an infinite series of numbers as a bad infinity. Marx strives to get to the root of the matter, thereby unknowingly solving many problems independently of Cauchy. According to Marx, mathematics should reflect operations in the real world, Struik states. However, he was not familiar with Cauchy's work and, according to Struik, would have objected to some of his conclusions. Marx also sought to construct a calculus independent of the geometric representation of the derivative, as well as of algebra, which brings him closer to the views of Richard Dedekind. Critical remarks on differential and integral calculus were not uncommon. "Berkeley shows that calculus is based on a logical error. Fortunately, however, it is not based on a single error, but on several, and these errors compensate each other in such a way that calculus ultimately leads us to the correct interpretation" (Kvasz 2007, p. 60).

Engels commented on certain areas of mathematics. He notes that mathematics enters dialectics by introducing the entity of the variable, which is Descartes' achievement. He is an advocate of the dialectical methodological approach in mathematics, which he also states explicitly: "The relation between the mathematics of variable and the mathematics of constant quantities is in general the same as the relation of dialectical to metaphysical thought. But this does not prevent the great mass of mathematicians from recognizing dialectics only in the sphere of mathematics, and a good many of them from continuing to work in the old, limited, metaphysical way with methods that were obtained dialectically" (Engels 1987, p. 113). Engels points out that the realm of the infinite has also brought contradictions into mathematics. This philosopher showed great interest in calculus. He argues that dialectics deals with movement in the sense of grasping contradictions in the universe, while formal logic only follows the side that is directly observable by the senses. Engels could not have known non-classical logic, and his characterization of formal logic is rejected by most logicians, mathematicians, and philosophers. According to Engels, pure mathematics deals with spatial forms and quantitative relationships that originate in the real world. Ultimately, we can arrive at creations of the mind and imaginary quantities. According to Botella, it is not true that Engels' definition of mathematics no longer applies to its current, modern form (Botella 1993, p. 402). My opinion is that some mathematical entities exist objectively and some are human constructs.

Lenin himself did not deal with questions of mathematics. He was only interested in statistics, which he understood well. He perceives it as a summary and connection of facts and not as an isolated fact taken out of context (Gnedenko 1970). He is also recognized as a relatively important statistician by researchers outside the former USSR – compare (Kotz and Seneta 1990). Since Lenin did not actually deal with the philosophy of mathematics, it will be more

interesting to follow the development of Soviet philosophy of mathematics and its relationship to dialectics.

Early Soviet philosophers of mathematics rejected intuitionism, logicism, and formalism (Vucinich 1999, p. 108). They perceive logicism as a reduction of mathematics to logic and a complete separation from dialectics; moreover, they attribute an inclination toward solipsism to the work Principia Mathematica. They criticize formalism for being unsupported by experience. They consider intuitionism to be rooted in subjective judgments. These philosophers and philosophizing mathematicians emphasize the empirical origin of mathematical knowledge as well as the usefulness of their knowledge. They place this in antagonistic relation to idealistic philosophy. I. E. Orlov even claimed that it is appropriate to counter tendencies to focus on high abstraction in mathematics if it is distant from reality. Similar attacks on selected mathematical subdisciplines were repeatedly expressed by E. Kolman. They considered mathematization in the social sciences to be possible only to a limited extent. They regarded mathematics as a field of manifestation that proves the unity of science. Formal logic in mathematics is not enough; this science must also use dialectics as a synthesis of contradictions. They cite differential calculus as an example of its use. They considered the selection of theoretical constructs and hypotheses to be influenced by cultural and social factors. However, in confrontation with modern mathematical trends and the relatively small base of mathematical writings by the classics of Marxism-Leninism, chaos and confusion appeared in early Marxist and Leninist philosophy of mathematics. “The outstanding mathematician/probabilists of the time, Andrei N. Kolmogorov (1903–1987) and Sergei N. Bernstein (1880–1968), were prominent among the obstacles to the ‘reforms’ of Kolman (in Moscow) and Orlov (in Ukraine)” (Seneta 2004, p. 337). Kolman, for example, saw J. von Neumann's game theory as a bizarre manifestation of mathematical idealism. The reactions of the mathematicians themselves warned against extremist attitudes. A. I. Khinchin warned against negating intuitionism, V. A. Steklov analyzed certain mathematical entities, relying on the epistemology of D. Hume. He sided with Einstein, who recommended the mathematization of physics. Scientists tried to free themselves from ideological influence. S. N. Bernshtein even rejected the possibility of a working relationship between mathematics and dialectical materialism, but still became an academician of the USSR Academy of Sciences. Kolmogorov, in turn, produced a study that brought intuitionism closer to Soviet mathematical science. In it, he argues that Brouwer's work has revealed the illegitimacy of the principle of tertium non datur in the field of transfinite inference, which is a criticism of traditional two-valued logic and thus paves the way for its overcoming (Kolmogorov 1925). Selected mathematicians interpreted Lobachevsky's non-Euclidean geometry in a spirit opposed to dialectical materialism, but A. A. Maximov "saw in new geometrical systems a trailblazer for the coming triumph of philosophical materialism in its dialectical version" (Vucinich 1999, p. 114). The full integration of Lobachevsky's theories into dialectical materialism lasted until World War II. Early Soviet Marxist philosophers considered space to be a form of matter in motion. Relevant dialectical interpretations were relatively rare in early Soviet mathematics. They regarded probability theory as a dialectical unity of the normal and the random within the phenomena described by various sciences. The criticism of Cantor and Hilbert resonated. The philosophical elaboration of new mathematical models by various mathematical theorists in the 1920s in the USSR was contradictory, marked by disputes between factions with differing opinions.

At the beginning of the 1930s, the emphasis on the "partisanship" of Soviet science began. Excesses occurred, such as the requirement for complete planning in mathematical research. The official doctrine did not avoid schematic proclamations. "At the beginning of the 1930s, Kol'man defined 'Marxist mathematics' as a unique body of abstract operations produced with

the help of the dialectical method, deeply involved in socialist construction, and subjected to rigorous and centrally integrated planning" (Vucinich 2000, p. 59). Mathematicians, on the other hand, began to positively adjust their relationship to selected discoveries of new mathematics. “The Golden Years of Soviet mathematics continued long after 1931” (Lorentz 2002, p. 221). Soviet mathematicians began to change their relationship to intuitionism, led by Kolmogorov, among others. This mathematician is responsible for the article on mathematics in the Great Soviet Encyclopedia, published in 1938. This became the first text that sought to interpret mathematics in the spirit of dialectical materialism. Kolmogorov characterizes mathematics here as the science of quantitative and spatial forms and relationships of the real world (Kolmogorov 1938). This first definition is relatively broad. Kolmogorov never renounced it, arguing that it is mathematically possible to study a wide range of sciences, and that it is therefore a universal discipline (Baranec, Verjovkin 2015). According to Kolmogorov, the dialectical development of mathematics followed the creation of algorithms for new theories, the development of algorithms that solve problems for which existing algorithms have no solution, and the construction of new algorithms for problems that existing algorithms only partially solve. He points out that mathematics is not afraid of contradictions and that the modern axiomatic method is empirical, as it does not violate the axioms of reality. According to him, a new axiomatic system may contradict the old system. His very important student, S. M. Nikol´skii, devoted himself exclusively to scientific questions of mathematics, especially mathematical analysis, and did not comment on philosophical questions of mathematics in his publications. Vucinich characterizes Kolmogorov's Marxism as superficial. According to Kolmogorov, set theory opened up discontinuous phenomena in nature and society to the possibilities of mathematical processing. Dialectical materialism in the philosophy of mathematics at that time relied on the empirical basis of axioms, avoiding intuitionism, formalism, and logicism, as well as the application of mathematical theories in practice. This is reminiscent of the problem of language without a world, that Čana draws attention to (Čana 2025). He considered intuitionism, which also contains ideas that can be integrated into Marxist mathematics, to be the least problematic. Mathematics also responds to the urgent needs of technology. Relatively trivial disputes also flared up over whether creative mathematicians should be interested in the practical impact of their discoveries or not. Criticism of so-called idealistic mathematics instead of creating a robust system of dialectical Marxist mathematics was definitely a mistake and a waste of energy.

Marxist mathematicians criticized effectivism, criticizing mathematics as a pure product of the human mind, as well as the emphasis on the intuition of gifted mathematicians rather than on the mechanisms of logic. The criticism was led mainly by V. Molodshii. Despite several positive assessments, including from Kolmogorov, distrust of set theory grew once again. Immediately after World War II, Marxist philosophers of mathematics criticized the emphasis on form rather than content in mathematical operations, as well as the "dependence on formal-logical analysis in the construction and arrangement of mathematical concepts" (Vucinich 2000, p. 69). A Marxist interpretation of Lobachevsky's geometry emerged, which was not bound by Kant's apriorism and brought new possibilities that Euclidean geometry did not contain. There was also a dispute over the interpretation of the theory of truth, which, according to dialectical materialism, should not be subjectivist, i.e., influenced by the degree of belief. The struggle for politically correct statistics is also well known – compare (Seneta 2004).

From the perspective of Marxist dialectics, historians of mathematics sought contradictions in the history of mathematics, such as continuity and discreteness, Euclidean and non-Euclidean spaces, differentiation and integration, finiteness and infinity. These contradictions are indeed found in mathematics, so they were not an artificial construct. Rather, the criticism of many

philosophical positions in Western mathematics, which often eliminated sound mathematical ideas, was exaggerated. A. D. Alexandrov at least attempted to separate the scientific and philosophical aspects of mathematics, thereby helping Soviet mathematicians to better accept foreign mathematical discoveries without the risk of being accused of ideologically incorrect attitudes.

Selected Soviet ideologues initially attacked cybernetics as a pseudoscience. For them, it represented a collection of suspicious ideas. However, A. Ia. Khinchin developed the theory of mathematical information, thereby paving the way for the acceptance of cybernetics. In the field of formal logic, the view persisted for a long time that formal logic must have axioms anchored in reality. Although voices against formal logic continued to be heard for some time, the discipline was fully integrated into the acceptance of Marxist philosophers. "In the early 1960s, Marxist theorists began to concentrate on building a new branch of philosophy which they labeled dialectical logic" (Vucinich 2002, p. 29). This focuses on the basic properties of cognitive processes. However, dialectical logic has no fundamental influence on dialectically oriented philosophy of mathematics, nor does it influence formal logic. Marx did not elaborate on dialectical logic. During the period of de-Stalinization, Marxist philosophy of mathematics began to abandon the idea of the unity of mathematics, influenced by Gödel's proof as well as Bourbaki. Dialectically oriented philosophers of mathematics began to notice contradictions and their interdependence. Sometimes incorrect statements appear, according to which Gödel's theorems are a confirmation of dialectics in mathematics. This is not true, as even the Soviet authors Belayev and Perminov reject it. These are relationships in the structure of mathematical theory, not dialectical contradictions in the study of the development of mathematics (Belayev and Perminov 1983, p. 89).

Soviet constructivism emerged as an offshoot of intuitionism. Marxist philosophers of mathematics welcomed it. “In Brouwer’s categorical rejection of Kant’s notion of space and time as immanent endowments preceding every experience and total acceptance of explanations of causal links in natural processes as the full measure of scientific progress, they saw an indisputable affinity of intuitionism and dialectical materialism” (Vucinich 2002, p. 29). The philosopher Ianovskaia also welcomed it. This enthusiasm was not universal on the part of philosophy. According to Vucinich, the Soviet version of constructivism can be considered a synthesis of intuitionism and Marxism.

The dialectical method is fully applicable in some branches of mathematics. “Algebraic semantics of classical RST can be obtained from the developed dialectical counting procedures” (Mani 2012, p. 122). Similarly, we can use the dialectical approach in mathematical abstractions, which is applicable, for example, in sociology (Ozmantar and Monaghan 2007). It is also possible to quantify the economic relationships described by Marx in his work. These are primarily models for the renewal and expansion of capital. This is an expression of dialectical relationships at the level of abstraction. Chinese mathematicians are also developing a combination of didactic thinking with mathematical thinking and pansystemic analysis (Ding - he et al. 2001). On the other hand, it should be noted that dialectics is not a substitute for honest scientific study and scientific analysis of partial mathematical problems.

We can go back in history to identify dialectical phenomena in mathematics. Naturally, Zeno's well-known aporias against motion have a dialectical essence. According to Kolman, the Eleatic examples are deliberately drastic (Kolman 2012, p. 345). These aporias, whether Achilles and the tortoise, the stadium, or the dichotomy, are on the one hand refutable in practice, by walking, running, etc., but on the other hand, from the perspective of ancient Greek mathematics, it is not possible to follow a constantly decreasing number to its end. "We cannot compare the currently existing quantities realized by the tortoise and Achilles after the chase is over, because

the unlimited divisibility of the tracks exceeds every possible measure" (Skalský 1991, p. 105). The apparent mathematical contradiction, to which Euclid also indirectly responded, could not be explained by the mathematical lexicon of the time, but had to wait until the 17th century for harmonization and explanation. A mathematical paradox is often an opportunity to open up a new solution for mathematics, which often leads to the emergence of a new mathematical theory or entity. Russell's paradox can be simply expressed as follows: "the set of all objects should be the largest possible set, its power must be even greater, which is impossible" (Kolman 2008, p. 277). Russell solved this by creating a new, logicist theory of sets. The axioms were formulated in such a way as to avoid the problem. This gave rise to the theory of types, whereby a hierarchy of sets is introduced in the set of all sets that are not their own elements, the theory of classes without classes, etc. The logician Pavel Tichý raised a fundamental objection to Russell's approach – compare (Raclavský 2007).

Nicolas of Cusa also presents the use of dialectics in mathematics in his works. The basis lies in his metaphysical doctrine, which is based on coincidentia oppositorum. He attempts to connect mathematics and theology. Through contraction, the original infinity became finitude, unity became multiplicity, eternity became time, and the state of unity of opposites became independent opposites. This thinker did not consider geometry to be a physical model, but rather a symbolic framework (Barbachoux and Kouneiher 2025). A well-known theological metaphor is that of an infinite circle, which has no circumference and a center everywhere. A line extended to infinity becomes a circle; it is a transformation of linearity and circularity within infinity. Similarly, he compares rational knowledge to drawing increasingly accurate polygons within a circle; it is possible to approach this limit, but not to reach it. Knowledge is therefore approximate. The impossibility of squaring the circle illustrates the gap between the perfection of God and the limitations of man. Despite this apparent use of dialectics in mathematical thinking, Nicolas of Cusa is more of a speculative thinker than a precursor of more modern methods (Barbachoux and Kouneiher 2025). It is speculative symbolism, not a hint of future mathematical procedures. Nevertheless, he inspired, for example, Georg Cantor with his perception of infinity as a generative problem.Alexandrov sees the manifestation of dialectics in abstraction (Alexandrov 1951). The author does not see a connection here, since abstraction can also be used to grasp static entities. The success of abstract thinking does not automatically mean the use of dialectical methods or the discovery of dialectical invariants in mathematics. Similarly, the author sees no connection between mathematics and practice. Alexandrov says that dialectics is present in mathematical development. I agree with him only partially. The entire history of mathematics, including its dead ends (accepting Laudan's approach), cannot be considered a priori as the use of dialectics, only its selected achievements, such as the construction of complex numbers, non-Euclidean geometry, selected operations in the development of infinitesimal and differential calculus, the discovery of purely irrational numbers, etc. Sometimes philosophical statements and sketches of solutions by philosophers who tended towards a dialectical interpretation of the search for solutions in the field of differential calculus (Hegel, Marx, Engels) showed a high degree of agreement with the progressive approach of the most important mathematicians (e.g., Cauchy).

Something other than the history of mathematics are dialectical phenomena. These can be perceived, of course, in opposites, which are represented, for example, by positive and negative numbers, rational and irrational numbers, real and purely complex numbers. Complex numbers have their origin in algebra and can be represented geometrically. This can be perceived as unity and the struggle of opposites. The description of discreteness and continuity in geometry and mathematical analysis can also be interpreted as a manifestation of this law in Cantor's and Dedekind's theory of real numbers, in which a line segment appears as a set of points, and thus

an interval also appears as a set of real numbers (Alexandrov 1951). We could find many similar examples.

Ideological and metaphysical disputes in mathematics are rarely of great significance, but they can slow down its progress. Examples are evident in the Pythagoreans' concealment of the discovery of negative numbers and in Marxist philosophers of mathematics considering certain mathematical directions undesirable. Such disputes are counterproductive in mathematics.

The history of mathematics often shows the use of the dialectical method. In other words, this can be said using Ludwig Wittgenstein's view. It is possible to use his key theme, rules. As is well known, Wittgenstein does not defend logicism in the Tractatus and considers the equation to be the basic mathematical concept. The author rejects the self-destructive function of the Tractatus, which is defended by the New Wittgensteinians, in its entirety. Wittgenstein's perception of the transformation of equations, in which he saw the basic concepts of mathematics in his early period, has dialectical features. His Remarks on the Foundations of Mathematics have a dialectical form of elaboration. According to Levi, mathematics in Wittgenstein's second period of his philosophy of mathematics can be perceived not as a deductive system, but as a dialectical arrangement of discourse, i.e., a language game with certain rules. Wittgenstein perceived mathematics constructively, as a colorful mixture of computational techniques. According to Levi, we can see its dialectical nature in this. "The failure to weld the results into a successful whole is, as Wittgenstein so clearly sensed, not the result of incompetence, but of a limitation intrinsic to the dialectical mode of procedure" (Levi 1964, p. 138). I disagree with Levi's exaggerated emphasis on Gödel's influence on Wittgenstein's philosophy of mathematics in the second period of his philosophy of mathematics, since Wittgenstein did not recognize Gödel's theorems as mathematically relevant.

Conclusion

In mathematics, it is not difficult to find entities related to dialectics. The history of mathematics itself is linked to movements that disrupted the rules that had been valid until then. It was precisely this breaking of the rules that often meant dialectical movement and led to the discovery of new mathematical entities. Sometimes direct philosophical implementations related to dialectics, as in Hegel and Marx, led in parallel with mathematical research to mathematical research that, with the passage of time, appears to be progressive. This is evident in the history of differential and infinitesimal calculus. Dialectical phenomena in mathematics are present in many areas, such as the opposites of positive and negative numbers, rational and purely irrational numbers, in the description of discrete and continuous, in the geometric representation of mathematical analysis, and in many other areas. There are indeed many such connections. In Wittgenstein's understanding of constructivist mathematics, the entire construction of calculations is dialectical, since mathematics has no basis in axioms or formal logic. The aggressive form of Marxist philosophy of mathematics hinders the true development of mathematics. The vetting of mathematical theories and mathematicians in particular does mathematics a disservice. It is necessary to develop it in such a way that mathematical discoveries are respected. As long as it can constructively express an opinion on the direction of new discoveries and the development of procedures in a particular area, this metatheoretical view related to metamathematics can perceive certain mathematical structures in a broader context. The theoretical reflections of Hegel and Marx, developed from the perspective of dialectics, have thus proven useful. Philosophical reflection on the part of sympathizers of dialectical methods without an aggressive dimension can be a useful added value to the work of mathematicians themselves and can effectively contribute to the expansion of knowledge.

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INTERNATIONAL CONFERENCE NETWORK

LIVING TOGETHER IN TRANSITION CITIES: SOCIAL COHESION AND URBAN TRANSFORMATION IN THE 21ST CENTURY

Prof. Dr. Elena Varga

University of Vienna

Abstract

As global urbanization accelerates, “transition cities” urban areas undergoing rapid demographic, economic, and cultural change have emerged as laboratories for examining new forms of social coexistence. This paper explores the dynamics of “living together” in these transition contexts, where migration, digitalization, and environmental challenges intersect to redefine the meaning of urban belonging. The study examines how citizens, both new and long-term residents, negotiate identity, space, and participation amid processes of gentrification, infrastructural renewal, and governance reform.

Drawing on interdisciplinary perspectives from urban sociology, cultural studies, and political geography, this paper argues that social cohesion in transition cities is not merely a function of policy but a product of everyday interactions and collective imaginaries. Through comparative analysis of European post-industrial cities such as Łódź, Leipzig, and Bilbao, the paper identifies three critical dimensions shaping coexistence: (1) *spatial inclusivity* — how urban design facilitates or hinders encounters across difference; (2) *participatory governance* — how citizens engage in co-creating urban futures; and (3) *cultural hybridity* — how shared narratives emerge from diversity.

The findings suggest that successful “living together” depends on fostering trust-based networks that transcend ethnic, economic, and generational divides. Transition cities thus become sites where new models of pluralism and civic empathy can flourish, contributing to a broader rethinking of European urban citizenship. Ultimately, this paper calls for an integrated approach that combines social innovation, participatory urban planning, and inclusive cultural policy to sustain coexistence in rapidly changing urban environments.

Keywords: transition cities, social cohesion, urban transformation, coexistence, participatory governance, cultural hybridity.

INTERNATIONAL CONFERENCE NETWORK

DİGİTAL EUROPE 2040

Dr. Luca Moretti
Humboldt University of Berlin

Abstract

The vision of *Digital Europe 2040* represents a comprehensive transformation agenda designed to position Europe as a global leader in digital innovation, sustainability, and human-centered technological development. This paper explores the strategic frameworks and policy mechanisms that will shape Europe's digital evolution over the next two decades. Key dimensions include the integration of artificial intelligence, quantum computing, digital sovereignty, cybersecurity, and ethical governance of emerging technologies. The study emphasizes the critical role of the European Digital Strategy and the Digital Decade Policy Programme in fostering resilience, inclusivity, and competitiveness across sectors. Moreover, it examines the interplay between digital transformation and the European Green Deal, highlighting the synergies between technological progress and environmental sustainability. Through an interdisciplinary approach, this research identifies the potential challenges—such as data fragmentation, digital inequality, and regulatory divergence—and proposes a model for cohesive governance and innovation ecosystems. Ultimately, *Digital Europe 2040* envisions a continent that harmonizes economic growth, social welfare, and technological leadership, establishing Europe not only as a digital powerhouse but also as a model for ethical and sustainable digital transformation in the global arena.

Keywords: Digital Europe 2040 , Digital transformation, Artificial intelligence, Cybersecurity, Digital sovereignty

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REFRAMING CULTURAL VALUE: THE ECONOMIC IMPACT OF CREATIVE INDUSTRIES ON POST-TRANSITION EUROPEAN CITIES

Assoc. Prof. Dr. Tomasz Nowak

Jagiellonian University

Abstract

This paper explores the evolving relationship between culture, creativity, and urban economies in post-transition European cities, emphasizing how creative industries redefine cultural value and stimulate sustainable urban regeneration. Following the political and economic transformations of the post-socialist era, many Central and Eastern European cities have undergone significant structural changes, leading to new models of cultural production, entrepreneurship, and place identity. The study investigates how sectors such as design, media, architecture, performing arts, and digital innovation contribute to both economic revitalization and social cohesion within these urban contexts.

Employing a mixed-methods approach, combining statistical analysis with qualitative case studies from cities such as Warsaw, Budapest, and Ljubljana, the research assesses the measurable economic impact of creative clusters, start-ups, and cultural networks. It highlights the dual nature of creative industries: as engines of economic competitiveness and as platforms for civic engagement and cultural democratization. The findings suggest that the economic benefits of creative industries extend beyond GDP growth, influencing employment patterns, tourism development, and the global visibility of post-transition cities.

Moreover, the paper reframes *cultural value* not merely as an artistic or symbolic dimension but as an integral component of economic and social sustainability. It concludes that fostering creative ecosystems requires coherent policy frameworks, cross-sector collaboration, and inclusive urban strategies that align cultural innovation with long-term economic planning. Ultimately, the study argues that the creative economy represents a key driver of Europe's post-transition resilience—transforming cities into dynamic spaces where cultural value and economic vitality converge.

Keywords: Creative industries, Cultural value, Post-transition economies, Urban regeneration Cultural policy, Creative clusters.

INTERNATIONAL CONFERENCE NETWORK

NARRATİVES OF POWER İN GLOBAL MEDIA

Dr. Sophie Dubois

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Abstract

This paper investigates how global media systems construct, circulate, and legitimize narratives of power in the contemporary information age. Drawing from critical media studies, political communication, and discourse analysis, it explores how transnational media conglomerates, digital platforms, and algorithmic infrastructures influence public perception, political agency, and cultural hegemony. The research argues that media power is no longer confined to traditional state or corporate control but operates through decentralized, networked mechanisms that shape meaning, ideology, and social behavior on a global scale.

The study examines the dynamic interplay between media narratives, geopolitical interests, and technological mediation. Through comparative case studies including international news framing, global advertising campaigns, and social media discourse the paper identifies how dominant ideologies are reinforced, resisted, or reconfigured within digital environments. It emphasizes that power in global media is increasingly exercised through the control of visibility, data flows, and affective engagement, rather than overt propaganda.

Furthermore, the research considers the ethical implications of algorithmic governance, echo chambers, and the commodification of attention in shaping global consciousness. By integrating theories of cultural power (Foucault, Gramsci) with contemporary digital media scholarship, the study proposes a conceptual framework for understanding *narrative power* as both symbolic and infrastructural. Ultimately, it concludes that global media systems function as contested arenas where cultural, economic, and political forces converge continuously redefining who speaks, who is heard, and how truth is mediated in the 21st century.

Keywords: Global media, Power narratives, Political communication, Media discourse, Cultural hegemony, Algorithmic governance

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