



NJD-iScience

№182

The Norwegian Journal of Development of
the International Science





№182/2026

Norwegian Journal of development of the International Science

ISSN 3453-9875

It was established in November 2016 with support from the Norwegian Academy of Science.

DESCRIPTION

The Norwegian Journal of Development of the International Science, established in 2016 with support from the Norwegian Academy of Science, offers a platform for global researchers, academics, and students. Publishing 24 times annually, it covers current science topics. Submitting your article provides exposure to a diverse audience, enhancing your career. Our commitment to research and SEO ensures timely visibility. Submit to the Norwegian Journal of Development of the International Science today and join esteemed authors.

Editor in chief – Karin Kristiansen (University of Oslo, Norway)

The assistant of the editor in chief – Olof Hansen

- James Smith (University of Birmingham, UK)
- Kristian Nilsen (University Centre in Svalbard, Norway)
- Arne Jensen (Norwegian University of Science and Technology, Norway)
- Sander Svein (University of Tromsø, Norway)
- Lena Meyer (University of Gothenburg, Sweden)
- Hans Rasmussen (University of Southern Denmark, Denmark)
- Chantal Girard (ESC Rennes School of Business, France)
- Ann Claes (University of Groningen, Netherlands)
- Ingrid Karlsen (University of Oslo, Norway)
- Terje Gruterson (Norwegian Institute of Public Health, Norway)
- Sander Langfjord (University Hospital, Norway)
- Fredrik Mardosas (Oslo and Akershus University College, Norway)
- Emil Berger (Ministry of Agriculture and Food, Norway)
- Sofie Olsen (BioFokus, Norway)
- Rolf Ulrich Becker (University of Duisburg-Essen, Germany)
- Lutz Jäncke (University of Zürich, Switzerland)
- Elizabeth Davies (University of Glasgow, UK)
- Chan Jiang (Peking University, China) and other independent experts

1000 copies

Norwegian Journal of development of the International Science

Iduns gate 4A, 0178, Oslo, Norway

email: publish@nor-ijournal.com

site: <https://nor-ijournal.com>

CONTENT

ARCHITECTURE

Ohonok Yu.

FROM PLANS TO PRACTICE: INSTITUTIONAL
CHALLENGES IN IMPLEMENTING URBAN
DEVELOPMENT POLICY IN TERNOPIL, UKRAINE.....4

ARTS

QILEGERI

A STUDY ON INSTRUMENTAL ACCOMPANIMENT IN
MONGOLIAN GESER NARRATION9

EARTH SCIENCES

Shevchenko I.

'WATER MEMORY' NOT A DELUSION. EVALUATION OF
THE STABILITY OF WATER CLUSTERS19

ECONOMIC SCIENCES

Tleshbayeva R.

FROM ACADEMIC INSTITUTIONS TO DIGITAL
INNOVATION HUBS: THE TRANSFORMATION OF
BUSINESS SCHOOL – CORPORATE ECOSYSTEMS IN
CHINA23

Bayu Zam Zam, Darsono, Kurniawati

Darmaningrum

PRICING STRATEGIES FOR COFFEE PRICE VOLATILITY:
A QUALITATIVE STUDY OF A COFFEE ROASTERY IN
KUWAIT27

**Yuzbashieva G., Abdullayev K., Maulidizen A.,
Aliyeva E., Mirzayev E.**

DISPROPORTIONS IN THE ECONOMY AND THE
IMPACT OF THE "MIDDLE-INCOME TRAP" ON
STRUCTURAL TRANSFORMATION36

Lutsiv N., Levytska O.

EFFICIENCY OF MARKETING ACTIVITY IN THE
CONDITIONS OF MARTIAL LAW41

Maksymov S., Dimoglova O.

ADAPTIVE STRATEGIC MANAGEMENT OF TRANSPORT
ENTERPRISES IN THE CONTEXT OF MILITARY AND
ECONOMIC CHALLENGES49

HISTORICAL SCIENCES

Kalybekova M.

SOCIOCULTURAL ADAPTATION OF REPATRIATES OF
POLISH ORIGIN FROM KAZAKHSTAN IN
CONTEMPORARY POLAND (BASED ON ORAL HISTORY
MATERIALS).....53

MEDICAL SCIENCES

Kapsametov N.

MODELS OF WORKFORCE SUCCESSION
MANAGEMENT IN HEALTHCARE SYSTEMS:
INTERNATIONAL EXPERIENCE AND MANAGERIAL
IMPLICATIONS57

Mgeladze M.

ANTIBIOTICS: RETROSPECTIVE AND PERSPECTIVE61

Ormanbekov Ye.

REVIEW OF INTERNATIONAL PRACTICES FOR
INTEGRATING MEDICAL TECHNOLOGIES INTO
ORGANISATIONAL PROCESSES OF HEALTHCARE
INSTITUTIONS66

PEDAGOGICAL SCIENCES

Tagiyeva E.

BUSINESS GAME AS A METHOD OF DEVELOPING
DIRECT AND INDIRECT SPEECH SKILLS AND ACADEMIC
ETHICS IN THE "SPORTS MANAGEMENT" COURSE ... 71

Ibrahimov F., Ibrahimova S.

TRANSFORMATION OF EDUCATIONAL ACTIVITIES OF
EDUCATORS AND LEARNERS IN THE PROCESS OF
IMPLEMENTING "EDUCATION 4.0" 78

Kubatko A., Atamanyuk S., Kyrychenko O.

THEORETICAL AND METHODOLOGICAL
FOUNDATIONS OF PROFESSIONAL TRAINING OF
FUTURE PHYSICAL CULTURE AND SPORTS SPECIALISTS
UNDER MODERN CHALLENGES83

PHARMACEUTICS

Raghad Abdulsalam Khaleel,

Taif M Maryoosh, Kasim S. Hmood

KNOWLEDGE, ATTITUDE, AND PRACTICES (KAP)
REGARDING RATIONAL ANTIBIOTIC USE AND
ANTIBIOTIC RESISTANCE IN AL-IRAQIA MEDICAL
STUDENTS88

Saba Talib Wahhab,

Raghad Abdulsalam Khaleel

REVIEW ON THE PREVALENCE OF OBESITY AMONG
PRIMARY SCHOOL CHILDREN USING BODY MASS
INDEX BMI103

Verenich V., Bartosh A.

THE ROLE OF THE ESOPHAGEAL PROTECTIVE DRUG
ALFASOXX IN MODERN GASTROENTEROLOGICAL
PRACTICE115

PHILOLOGICAL SCIENCES

Garaeva S.

DEVELOPMENT AND FUNCTIONS OF LANGUAGES IN
DIFFERENT PERIODS118

PHYSICAL SCIENCES

Antonov A.

PLANET EARTH IS DESIGNRD MUCH MORE COMPLEX
THAN IS EXPLAINED BY MODERN SCIENTIFIC
KNOWLEDGE122

SOCIAL SCIENCES

Nutsubidze V.

CRISIS MANAGEMENT CHALLENGES IN SPORTING
EVENTS: THE CASE OF GEORGIA138

TECHNICAL SCIENCES

Nasibzade E.

FRACTAL DIAGNOSTICS A NEW PARADIGM FOR THE
OPERATIONAL MONITORING OF GAS PIPELINE
SYSTEMS.....143

Poidenko A., Danylov V.

INTELLIGENT COMMODITY MARKET FORECASTING
SYSTEM WITH LOCAL TREND CORRECTION145

Mazanova S.

INNOVATIVE APPROACHES TO ANALYZING THE
EFFECTIVENESS OF THE PROJECT METHOD IN THE
MODERN INFORMATION AND EDUCATIONAL
ENVIRONMENT.....147

ARCHITECTURE

FROM PLANS TO PRACTICE: INSTITUTIONAL CHALLENGES IN IMPLEMENTING URBAN DEVELOPMENT POLICY IN TERNOPIL, UKRAINE

Ohonok Yu.

*PhD, Associate Professor
of the Department of Architecture and Construction
King Danylo University, Ivano-Frankivsk, Ukraine
ORCID: 0009-0004-3976-8970
<https://doi.org/10.5281/zenodo.20691158>*

Abstract

This study examines the implementation of urban planning policy in Ternopil, a medium-sized city in western Ukraine, focusing on the discrepancy between approved planning documents and actual development practices. The research is based on the analysis of the city's General Plan, detailed territory plans, zoning regulations, state building standards, municipal planning documents, and field observations of recent development projects. Particular attention is given to the development of the Pivnichnyi (Northern) residential district and to the phenomenon of pseudo-individual housing development within low-rise residential zones.

The findings indicate a systematic divergence between planning objectives and development outcomes. Residential construction has expanded more rapidly than transport, engineering, and social infrastructure, resulting in increased pressure on urban systems and reduced environmental quality. The study also identifies multiple cases in which buildings formally classified as individual housing exhibit characteristics of multi-apartment residential development, creating conflicts with functional zoning requirements and urban planning regulations.

The results suggest that the observed discrepancies are associated with deficiencies in urban planning monitoring, weak enforcement mechanisms, and the predominance of project-specific planning decisions over long-term strategic objectives. The article argues for strengthening planning control procedures and introducing the principle of priority infrastructure development as a prerequisite for large-scale residential construction.

Keywords: urban planning, urban development policy, planning implementation, building density, urban governance, urban infrastructure, Ukraine, Ternopil.

1. Introduction

Urban planning serves as the primary instrument for shaping a city's spatial structure, directly influencing territorial functionality, ecological conditions, and the population's quality of life [14]. The efficacy of urban policy largely depends on the strict implementation of approved urban planning documentation and adherence to its provisions by all stakeholders [3, 4].

Despite Ukraine's declared commitment to global sustainable development goals and UN-Habitat initiatives regarding the formation of inclusive urban environments [11, 12, 17], previous studies and professional discussions have highlighted recurring challenges associated with the implementation of urban planning documentation in Ukraine. While the international community views urban planning documentation as a strategic social contract [13], in the Ukrainian context, planning documents are frequently amended in response to development initiatives, raising questions regarding the balance between strategic planning objectives and project-specific decisions [18]. This divergence between theoretical models and practical implementation is particularly acute in medium-sized Ukrainian cities, where the pressure of private capital may create tensions between development intensity and available infrastructure capacity [19].

Ternopil, as a regional administrative center and a historically formed city, is classified among the historical populated places of Ukraine (according to the Resolution of the Cabinet of Ministers of Ukraine No. 878, 2001). This status mandates elevated requirements for

development regulation and the preservation of the historical environment. Simultaneously, contemporary urban development processes in the city are characterized by substantial discrepancies between the approved urban planning documentation and actual construction practices. Such deviations are not isolated incidents but represent a recurring pattern, indicating institutional challenges in territorial development management [16].

Despite extensive research on sustainable urban development and planning governance, limited attention has been paid to the practical implementation of approved planning documents in medium-sized Ukrainian cities. Most existing studies focus either on legislative reforms or on large metropolitan areas, leaving a gap in understanding how planning decisions are translated into spatial outcomes at the municipal level.

The objective of this study is to conduct a comprehensive analysis of the implementation status of urban planning documentation in Ternopil and to evaluate the impact of deviations from it on the city's architectural-planning structure and the population's quality of life.

2. Materials and methods

The study employs a qualitative case-study approach focused on the city of Ternopil.

The research combines:

- 1) Analysis of urban planning documentation, including the General Plan and Detailed Territory Plans.
- 2) Examination of applicable Ukrainian planning legislation and State Building Regulations (DBN).
- 3) Evaluation of publicly available data regarding completed and ongoing development projects.

Field observations were conducted between 2023 and 2025 and included the assessment of residential development projects in selected districts of Ternopil. The analysis focused on building height, density, land-use compliance, infrastructure provision, and conformity with approved planning documentation.

The collected information was used to compare approved planning parameters with actual development outcomes. Particular attention was paid to development density, building height, land-use compliance, infrastructure provision, and conformity with planning regulations.

3. Study area and research context

Ternopil is a regional administrative center situated on the Seret River. The city covers an area of approximately 3,844.5 hectares, with built-up territories occupying a significant portion. Residential development accounts for roughly 38.7% of the area, while industrial territories constitute 21.7%. The population is approximately 225,000, with a density exceeding 5,800 people/km², indicating a highly compact urban environment.

The city possesses significant landscape and recreational potential; however, its effective utilization heavily relies on the quality of urban planning regulation. The comparison of planning documents and observed development patterns indicates a number of deviations from approved planning decisions [10]. Despite regular updates to the documentation [9], its practical execution remains fragmented and contradictory.

Over the past decade, a growing number of planning decisions have involved site-specific amendments to planning documentation, indicating a shift from comprehensive strategic planning toward project-driven development management. This manifests in land allocations lacking due consideration of urban planning documentation, functional zoning alterations, and ad hoc amendments to the General Plan tailored to specific investment projects. According to the Law of Ukraine "On Regulation of Urban Development Activities" [2], urban planning documentation is legally binding. Therefore, systematic deviations from its provisions indicate a fundamental violation of legal regulation principles in urban planning [1].

The de facto practice of amending the General Plan retroactively - following decisions on the development of specific plots - signifies the substitution of strategic planning with situational reactive measures, directly contradicting the principles of sustainable territorial development [13].

4. Problems of modern urban development

The current stage of Ternopil's urban development is characterized by a complex of interrelated systemic problems arising from the incongruity between projected development parameters and actual implementation practices. A primary trend is the gradual increase in building density, which significantly exceeds the metrics established in urban planning documents. This intensification of land use occurs without concurrent adjustments to infrastructure provision, creating an imbalance between the territorial load and its carrying capacity [19].

The consequence of heightened density is the exacerbation of parking shortages. In most new residential areas, the actual number of parking spaces fails to meet regulatory requirements [7], leading to the chaotic use of adjacent territories, sidewalks, and intra-block driveways for temporary vehicle storage. This compromises pedestrian safety and mobility for vulnerable populations while negatively impacting the spatial organization of the residential environment.

Simultaneously, there is a reduction and fragmentation of green zones, which serve critical ecological and recreational functions. Amidst densification, vegetated areas are frequently viewed as reserves for future construction, leading to a decline in public green space per capita. The loss or degradation of these areas adversely affects the urban microclimate, diminishes ecological comfort, and limits recreational opportunities for residents [14].

Another substantial issue is the lag in social infrastructure development relative to residential construction rates. The erection of new residential complexes often proceeds without the simultaneous establishment of necessary educational, healthcare, and public service facilities. Consequently, existing social infrastructure in adjacent districts becomes overburdened, and the accessibility of corresponding services for residents of newly developed areas is severely reduced.

An additional factor degrading the urban environment is the overburdening of engineering infrastructure - specifically water supply, sewage, electricity, and heating networks. The majority of these systems were designed for significantly lower density metrics, making them highly vulnerable to overloads under intensive construction conditions. The lack of timely modernization leads to decreased reliability and diminished service quality [15].

Collectively, these factors establish a persistent trend toward the deterioration of the urban environment's quality. Comfort levels decline, and the safety, accessibility, and functional efficiency of territories are compromised.

5. Case study: "Pivnichnyi" micro-district

An illustrative example of these processes in Ternopil is the development of the "Pivnichnyi" (Northern) micro-district, which demonstrates the disconnect between approved planning decisions and physical implementation. The document's conceptual foundation emphasized coherence between development parameters, functional zoning, and infrastructural provision. Such integrated planning structures closely align with contemporary international frameworks for evaluating territorial development outcomes [20].

However, an analysis of the actual implementation reveals substantial deviations from the original project designs. Primarily, this manifests in building densities and heights that exceed the projected parameters. Concurrently, the volumetric and spatial solutions of individual objects are incongruent with the overall compositional structure of the micro-district, leading to the fragmentation of the architectural environment and the loss of its spatial integrity.

An equally critical issue is the infrastructure development lag. Specifically, the expansion of the street

and road network fails to meet the needs of the emerging development, negatively impacting the territory's transport accessibility. The lack of proper synchronization between residential construction and the expansion of engineering, transport, and social infrastructure generates a comprehensive functional imbalance within the micro-district [19].

These deviations are systemic rather than isolated incidents. Exceeding development parameters is accompanied by a failure to fulfill social infrastructure requirements, contravening the fundamental principle of comprehensive urban development. These findings indicate weaknesses in existing urban planning monitoring mechanisms.

Currently, the "Pivnichnyi" micro-district is experiencing active construction of multi-story residential complexes (e.g., "Druzhniy Dim", "Sportyvnyi", "Faine Misto", "Shchastia", "Kyivskiy"). Broadly, this construction aligns with the territory's functional designation as a residential district [6]; however, the projects' execution by various developers involves significant deviations from the initial DPT parameters [9].

The density and height of individual buildings differ substantially from project specifications, altering

the micro-district's skyline and disrupting the planned spatial composition. This simultaneously affects the quality of the residential environment, particularly regarding living comfort, accessibility for mobility-impaired groups, and compliance with parking regulations.

A major manifestation of this imbalance is the mismatch between residential construction pacing and infrastructure development. The exploitation of new, previously undeveloped territories occurs without anticipatory development of the road network, public transport systems, or engineering utilities, and lacks timely construction of educational facilities. This creates substantial discomfort for residents and imposes additional strain on the city's existing infrastructure.

Ultimately, this situation is the consequence of the local government's inadequate performance in urban planning monitoring and enforcing construction compliance. This results in the gradual accumulation of spatial disproportions, which in the long term negatively impact the functional efficiency of the urban environment and the population's quality of life.

Figure 1:

Figure 2:



Fragment of the detailed territory plan for the "Pivnichnyi" micro-district, developed by FOP Hora S.B.



Orthophotomap of a fragment of the "Pivnichnyi" micro-district in Ternopil. Source: Compiled by the author based on Google Maps (2024)

6. The problem of pseudo-individual development

One of the most indicative and problematic practices in Ternopil's urban development is the proliferation of so-called pseudo-individual development within low-rise (single-family) residential zones (Zh-1) [8]. The essence of this phenomenon lies in the de facto

substitution of housing typologies: instead of the single-family detached houses stipulated by urban planning documentation, multi-apartment structures are erected on these plots, matching multi-family residential buildings in both spatial characteristics and usage.

Specifically, under the guise of new construction or the reconstruction of individual homes with integrated spaces for commercial activity, buildings containing 16 to 37 apartments and reaching 4-5 stories in height are constructed on plots ranging from 254 to 912 m². The subsequent operation of these buildings involves the alienation of individual apartments as distinct real estate objects - a definitive hallmark of multi-apartment development [7].

Consequently, the land use parameters blatantly violate current State Building Regulations (DBN B.2.2-12:2019) [5]. According to the DBN, the normative adjacent territory for 4-5 story multi-apartment buildings must be 17.0-20.2 m² per person, and the maximum allowable land plot coverage must not exceed 45%. It is objectively impossible to meet these standards when placing multi-apartment buildings on plots of 254-912 m², indicating a severe violation of normative density parameters.

Field analysis has identified numerous instances of this practice in the city, including at the following addresses: 23 Hlyniana St. (plot area 254 m²); 21 Hlyniana St. (545 m²); 11 Vesela St. (900 m²); 13a Vesela St. (600 m²); 16 Shpytalna St. (800 m²); 20 Shpytalna St. (530 m²); 9 Vahylevycha St. (912 m²); 22 Shpytalna St. (512 m²); and 26 Shpytalna St. (890 m²). These structures exhibit all typical features of multi-apartment development despite being formally classified as individual housing.

Particularly concerning is that several of these objects (specifically on Shpytalna St.) are located within the city's historical outline. Available planning documentation does not indicate the presence of approvals from the competent cultural heritage protection authority, creating additional risks of violating historical preservation regimes and degrading the area's intrinsic value.

Analyzing these facts, the observed development pattern suggests the use of regulatory mechanisms originally intended for individual housing construction in projects that functionally resemble multi-apartment residential buildings.

According to DBN B.2.2-12:2019 [5], placing multi-apartment residential buildings in a single-family residential zone is strictly prohibited. Thus, the cases examined demonstrate a comprehensive state of non-compliance, encompassing violations of functional zoning, failure to meet urban planning conditions and restrictions, and deviations from state building norms.

7. Institutional structure of responsibility in urban planning

The accountability framework in urban planning is personalized, delineating clear functions among key construction process participants [16]. The client is responsible for initiating construction and making core project decisions. The designer ensures the project documentation complies with urban planning legislation, state building norms, and urban planning conditions and restrictions. Technical supervision monitors construction work to ensure adherence to approved documentation, while local government bodies enforce legislative compliance and ensure development aligns with urban planning frameworks [4].

In practice, the effectiveness of these institutional mechanisms appears to be limited by the formal nature of oversight procedures and the absence of comprehensive urban planning monitoring systems [18].

8. Conclusions and proposals

The research identified recurring discrepancies between approved planning documentation and actual development practices in Ternopil. The study contributes to the discussion on planning implementation in post-socialist and transitional urban contexts by providing empirical evidence from a medium-sized Ukrainian city.

The findings indicate that modifications to planning decisions, increasing development intensity, and insufficient synchronization between construction activity and infrastructure provision have contributed to growing pressure on urban systems.

The case of the Pivnichnyi district and the documented examples of pseudo-individual development demonstrate the importance of effective planning monitoring and enforcement mechanisms.

Strengthening compliance control, improving transparency in planning amendments, and prioritizing infrastructure provision alongside residential development may contribute to a more balanced implementation of urban planning policy.

References:

1. Law of Ukraine "On Local Self-Government in Ukraine" dated May 21, 1997, No. 280/97-VR.
2. Law of Ukraine "On Regulation of Urban Development Activities" dated February 17, 2011, No. 3038-VI.
3. Law of Ukraine "On the Foundations of Urban Planning" dated November 16, 1992, No. 2780-XII.
4. Law of Ukraine "On Architectural Activity" dated May 20, 1999, No. 687-XIV.
5. DBN B.2.2-12:2019. Planning and Development of Territories. Kyiv: Ministry of Regional Development of Ukraine, 2019.
6. DBN B.1.1-22:2017. Composition and Content of the Territory Zoning Plan (Zoning). Kyiv: Ministry of Regional Development of Ukraine, 2017.
7. DBN V.2.2-15:2019. Residential Buildings. Basic Provisions. Kyiv: Ministry of Regional Development of Ukraine, 2019.
8. NK 018:2023. Classifier of Buildings and Structures. Kyiv: Ministry of Regional Development of Ukraine, 2023.
9. DBN B.1.1-14:2021. Composition and Content of Urban Planning Documentation. Kyiv: Ministry of Regional Development of Ukraine, 2021.
10. Urban planning documentation "Amendments to the General Plan of Ternopil City." Ternopil City Council, 2022.
11. UN-Habitat. Urban Planning for City Leaders. Nairobi: United Nations Human Settlements Programme, 2012.
12. UN-Habitat. World Cities Report 2022: Envisaging the Future of Cities. Nairobi: UN-Habitat, 2022.
13. OECD. Principles on Urban Policy. Paris: Organisation for Economic Co-operation and Development, 2019. URL: <https://www.oecd.org>

14. Gukalova I. V. Quality of life as a goal of urban development concepts: conclusions for Ukraine // Ukrainian Geographical Journal. 2018. №1. P. 30-38. DOI: 10.15407/ugz2018.01.030
15. Chauvin J., Pauls J., Strobl L. Building codes: an often overlooked determinant of health // Journal of Public Health Policy. 2016. Vol. 37(2). P. 136-148. DOI: 10.1057/jphp.2016.5.
16. Kvasnitska O. On the issue of codification of urban planning legislation // ScienceRise: Juridical Science. 2023. №4(26). P. 13-18. DOI: 10.15587/2523-4153.2023.293648
17. UN-Habitat. Urbanization in Ukraine: Building inclusive and sustainable cities [Electronic resource]. URL: <https://unhabitat.org/ukraine>
18. Brenner J. Urban planning law in Ukraine - reforms since independence and how can law support reconstruction? In: Urban Regeneration in Europe. Springer, 2024.
19. Nikolić D.S., Pantić M.D., Jokić V.T. Urban and Spatial Planning: Pragmatic Considerations for Plan Implementation Improvements (A Case Study of the City of Bor). SAGE Open. 2021. Vol. 11(1). DOI: 10.1177/2158244021994554.
20. Wang J., Li Z., et al. Evaluation of Urban Planning Implementation from Spatial Dimension: An Analytical Framework for Chinese Cities and Case Study of Beijing. Habitat International. 2020. Vol. 101. Article 102197. DOI: 10.1016/j.habitatint.2020.102197

ARTS

A STUDY ON INSTRUMENTAL ACCOMPANIMENT IN MONGOLIAN GESER NARRATION

QILEGERI

(1987–): Female, Mongolian ethnicity, Lecturer at Inner Mongolia Arts University, Doctoral Candidate at National University of Mongolia

<https://doi.org/10.5281/zenodo.20691166>

Abstract

One of the three major heroic epics found within China, the Geser epic has been widely transmitted among ethnic groups such as the Mongols and Tibetans, forming a living oral tradition. Instrumental accompaniment constitutes a core feature of Mongolian Geser narration, contrasting sharply with the Tibetan tradition of unaccompanied acappella singing. This study examines the classification of instruments used in Mongolian Geser performances, the multifaceted functions of instrumental accompaniment within the tradition, and regional variations across different artistic lineages from an interdisciplinary perspective of oral poetics and ethnomusicology. Findings reveal that instruments such as the *chör* and *sihu* (*dörvön utast khuur* in Mongolian) serve not only as accompaniment tools but also as memory-evoking mediators and performative context-builders. Regional variations in instrumental accompaniment illustrate the tradition's adaptation and reconstruction throughout history.

Keywords: Geser; epic narration; instrumental accompaniment; oral tradition; Mongolian music

Introduction

The heroic epic Geser, which has circulated across the vast Mongolian plateau for centuries, continues to be transmitted as an oral folk tradition today. While the Mongolian Geser shares origins with the Tibetan Gesar, the two traditions have since diverged in their developmental paths. Scholars of epic poetry have long observed that Mongolian epic singers predominantly employ instrumental accompaniment: "Epic recitation alternates prose and verse, with vivid descriptive prose sections and melodically rich poetic passages. Unlike Tibetan singers who perform without instruments, Mongolian singers typically use accompaniment from instruments such as the *chör* and *sihu*." This difference is not only a distinction in performance style, as it also relates to the mechanics of oral composition, memory recall methods, and aesthetics of transmission of these epics.

Yet within Geser studies, the research of instrumental accompaniment has long been marginalized. Traditional epic research centers on textual analysis—plot, characterization, and thematic ideas—often reducing the importance of the music. Even within ethnomusicology, research on epic music predominantly emphasizes melodic analysis and its application and rarely explores the structural function and cultural significance of instruments. In *A Study of Epic Music Paradigms*, Yao Hui proposes that "by cross-referencing the audio archives and field research of Tibetan, Mongolian, and Tu epics, "it is possible to "expand the theoretical discourse space of Chinese epic studies from a musical perspective."¹ This study builds upon the ideas of this proposed methodology.

This paper attempts to situate Geser musical accompaniment within the broader context of oral tradition, exploring the following questions: What

instruments are used in Mongolian Geser performances, and what functions do these instruments serve in the performance? How does instrumental accompaniment vary across different regions and performer traditions? By examining these questions, this study seeks to reveal the deeper significance of instrumental accompaniment within the Mongolian Geser tradition.

I. Instrumental System in Geser Narration

1.1 Core Instruments: Chör and Sihu

Mongolian Geser artists primarily employ bowed string instruments, with the *chör* and *sihu* being the most central. Both field research and historical records demonstrate that these two instruments dominate the Geser narration tradition in Inner Mongolia.

1.1.1 Chör

The *chör* is an ancient bowed string instrument that, in modern times, has primarily been preserved in the Khorchin region of eastern Inner Mongolia. It stands as a significant representative of traditional Mongolian bowed string instruments. In traditional society, the *chör* was mainly used by epic performers to accompany the Khorchin heroic epic "Mangusiin Uliger," which established a profound connection with the heroic epic tradition. The body of the *chör* consists of a neck, soundbox, and strings, typically constructed with a wooden frame, its soundboard covered by cow hide or sheep skin. Strings are usually made from horsehair and tuned in perfect fourths.

When playing, the performer holds the instrument with their left hand to press the strings and their right hand to hold the bow. The outer strings are primarily used for high-pitched melodies, while the inner strings sustain the sustained lower notes. The fingering is distinctive: the left hand primarily uses the second joints of the inside of the index and ring fingers to touch

¹ Yao Hui: Research on the Paradigm of Epic Music: Focusing on the Inter-Ethnic Transmission of the Geser Epic [M]. Beijing: China Social Sciences Press, March 2021.

the strings, while the little finger is rarely used and the middle finger almost entirely ignored. When playing in the second position, the thumb is frequently used to play harmonics on the inner strings to emphasize the effect. Bowing techniques which often employ a strong, powerful attack; combinations of long and short bows; as well as legato and staccato bowing, are frequently used to express rich musical imagery.

Chor repertoire can be categorized into three types based on its origin: heroic epic music, traditional folk music, and folk song tunes. In traditional society, the chor, as a core instrument for heroic epic performers, was primarily used to accompany heroic epics. Therefore, many chor pieces evolved from heroic epic melodies, such as "The Opening," "The Galloping Horse Tune," and "The Demon Tune." These pieces closely correspond to the epic narrative, forming a stylized musical vocabulary.

As the core traditional instrument of epic singers, the *chör* primarily accompanied heroic epics. Consequently, numerous *chör* pieces evolved from epic melodies—such as "The Opening," "Galloping

Horses," and "Demon's Tune"—forming a stylized musical repertoire closely aligned with epic narratives.

Numerous Geser chanters have completed significant performances with *chör* accompaniment. Geser chanter Jinbazhamusu² began learning the "Avralt Bogd Geser Khaan Epic" from a *chör* player from his hometown of Noyanzhab. His artistic journey illustrates the master-apprentice lineage of *chör* accompaniment techniques. Geser chanter Badama Renqin³, a student of Jinbazhamusu, systematically inherited the performance techniques of the *chör* and *sihu*, along with the Geser recitation tradition. He recorded over 1,800 hours of the Geser epic using both the *chör* and *sihu* as accompaniment instruments. The sheer scale of his recitations and the comprehensive use of instruments demonstrate the significant role of the *chör* in contemporary transmission. Epic artist Bai Qishan⁴ completed a 500-hour recording of The Epic of Geser with *chör* accompaniment in 2020. This practice, further confirming the continuation of the *chör* tradition in the contemporary era.

² Jinbazhamusu (1934–2025): Mongolian male singer; native of Barin Right Banner, Chifeng, Inner Mongolia; National Intangible Cultural Heritage Representative Transmitter of the Geser Epic.

³ Badama Renqin (1961–): Male, Mongolian ethnicity, native of Barin Right Banner, Chifeng, Inner Mongolia. Regional-

level inheritor of the Geser (S) Epic Narration, a national intangible cultural heritage representative project.

⁴ Bai Qishan (1981–): Male, Mongolian ethnicity, native of Khorchin Right Middle Banner, Xing'an League, Inner Mongolia; regional-level inheritor of "Mangusiin Uliger"

Figure One⁵

1.1.2 Sihu

The *sihu* (also known as the *dörvön utast khuur*) is one of the most important bowed string instruments of the Mongolian people and a common accompaniment in Geser epics. Its four strings are divided into two sets of identical pitch relationships, tuned in perfect fifths. The *sihu* has a bright tone and rich expressiveness, serving both as melodic accompaniment in epic narratives and enhancing the narrative rhythm through rhythmic bowing techniques. Compared to the *chör*, the *sihu* offers greater flexibility in portraying joyful or intense scenes, making it widely adopted in the epic storytelling traditions of eastern Inner Mongolia.

Based on differences in construction and playing techniques, the *sihu* can be divided into three types: the large *sihu*, the medium *sihu*, and the small *sihu*. The large *sihu*, also known as the bass *sihu*, is primarily found in the Khorchin, Kharchin–East Tumed, Zuu Uud, and Uzemchin regions of eastern Inner Mongolia's Shilingol League. It is mainly used for accompanying Khuren Uliger, narrative folk songs, *kholboo*, and heroic epics. The medium *sihu*, or alto *sihu*, is primarily used in folk instrumental ensembles and is popular in Eastern Mongolia. The small *sihu*, or soprano *sihu*, is the most widely found, mainly used for solo performances and folk ensembles. Stylistically,

sihu music has developed three distinct regional styles: Eastern Mongolia, Chahar, and Ordos, reflecting the aesthetic differences across these areas.

Numerous Geser masters have made significant recordings accompanied by the *sihu*. The renowned Geser chanter Pajie⁶ recorded an 80-hour Geser epic with *sihu* accompaniment in 1958, creating the seminal scholarly resource “Pajie Geser.”⁷

The Geser chanter Luobusang⁸ recorded Khur Geser with *sihu* accompaniment in 1988. Badama Renqin also completed a 100-hour recording of The Geser Story using the *sihu* in 2009. These precious recordings are not only carriers of the epic text but also living archives of the *sihu* accompaniment tradition.

1.1.3 The Coexistence and Complementarity of Two Core Instruments

Within the Mongolian Geser narrative tradition, scholars and local Geser chanters have long held differing views on whether the *chör* or the *sihu* is older. Scholar U. Xinbaya'er notes, “In Qinghai, Geser narratives are performed without instrumental accompaniment, with Geser chanters reciting stories in a unified rhythm and cadence. The Inner Mongolian style, featuring *chör* or *sihu* accompaniment, emerged under the influence of traditional narrative forms like

⁵ Bai Qishan demonstrating *chör* accompaniment to Geser epic singing.

⁶ Pajie (1902–1962): Male, Mongolian ethnicity, native of Jarud Banner, Tongliao, Inner Mongolia; celebrated culture bearer of the Geser

⁷ Preserved in both audio and written formats, the recording of Pajie Geser spanned 1958–1959, totaling 80 hours, 60,000 poetic lines, and approximately 3 million characters. In 1959, the Inner Mongolia People's Publishing House released the book *The Hero Geser Khan*, compiled and edited by Yimude Daorji from Pajie's recitations. In 1989, scholars Daorongga and Na Asarlatu—who had participated in the entire recording, documentation, and compilation process—condensed the original transcripts into a two-volume manuscript written in traditional Mongolian script. This edition comprises over 40,000 lines of poetry (2 million characters) and includes musical scores for 56 melodies in both staff notation and simplified notation. It was published by the Ethnic Publishing House in 1989.

⁸ Mangusiin Uliger chanter (1943–): Male, Mongolian ethnicity, native of Ulaanchab League, Inner Mongolia. In 1988, Longmei and Tuoya recorded Luobusang's rendition of “The Story of Khur Geser” on tape over an autumn and winter at the Quyi Hall in downtown Hohhot, Inner Mongolia. The 60-minute tape was recorded on 50 cassettes.

'Mangusin Uliger,' Uliger, and *kholboo*."⁹ This perspective reveals the developmental path of the instrumental accompaniment tradition in Inner Mongolia—namely, its integration and mutual influence with local oral art forms. Boteletu and Hasibate'er further elaborate in their work, *Research on the Music of Mongolian Heroic Epics*¹⁰ further elaborates: "As an imported epic, Geser did not develop its own distinct musical melody system. Instead, it integrated its narrative content with the traditional expressive forms of local heroic epics, resulting in regional variations in its presentation." The traditional modes of expression for heroic epics refer to a system combining singing, music, narrative conventions, and social functions. As Geser spread across regions, it inevitably merged with existing local epic traditions, resulting in distinct regional characteristics in the use of musical instruments.

In her study "Research on Geser Artists",¹¹ Cui Siqin categorizes Geser artists by historical era into ancient, modern, contemporary, and post-modern Geser masters, citing influential performers from each period. This classification provides crucial reference points for examining the historical trajectory of the *chör* and *sihu* within the Mongolian Geser tradition.

According to the book, the *khuur*, a four stringed fiddle relative of the *sihu*, was used in ancient *togetohu* (a type of traditional Chinese opera) to narrate Geser, indicating that the *khuur* was already used as an accompanying instrument in the formative stages of the Geser performance tradition. Dawa Aosi'er, a renowned *khuur* player from Wengniute Banner, Chifeng, Inner Mongolia, taught the Geser performer, Jinbazhamusu, *khuur* and Geser narration techniques. This teacher-student lineage clearly demonstrates the continuity of the *sihu* tradition. Gongga (1886–1963), a *khuur* player from Wangwangqinporlai in Ar Khorchin Banner, Chifeng, also frequently performed Geser narratives accompanied by the *khuur*. Babageba (1895–1955) likewise employed the *khuur* as Geser accompaniment. These practitioners demonstrate that

from ancient to modern times, the *khuur* and *sihu* have remained a vital accompaniment instrument in Geser recitations.

From the modern to contemporary periods, the *chör* coexisted and developed alongside the *sihu*. In the contemporary era, Pasunsugaba (1902–) employed the *chör* in his performance practice. Contemporary artist Bate'er (1923–), also performs Geser using the *chör*, indicating the continued application of the instrument in modern Geser recitation. By examining the tradition of the Qinba Zhamusu lineage—through artists such as Erburinqin Chaoerqi—as well as the *sihu* performance practices of artists like Pajie and Luobusang it is clear that throughout the historical evolution of Geser recitation, the *chör* and *sihu* have always coexisted, each maintaining its own representative lineage of artists.

Chör accompaniment derives from the traditional performance style of "Mangusiin Uliger," possessing unique strengths in conveying the solemnity, grandeur, and mystique of the epic. Conversely, the *sihu* accompaniment, influenced by traditional forms like Uliger, *kholboo*, and narrative folk songs, offers richer expressive capabilities, such as portraying joyful and vibrant musical imagery. The coexistence of these two instruments offers Geser performers diverse possibilities in artistic expression. These regional variations in instrument usage reflect the adaptation and reconstruction of Geser performance traditions throughout its historical development.

Field research further indicates that instrumental performance skills and epic singing techniques are often taught simultaneously, contributing to holistic the development of a performer's artistic proficiency. The transmission lineages—from the lineage of Jinbazhamusu to Yanzhabu Chaoerqi, through the *sihu* playing of Pajie and Luobusang, to Badama Renqin's mastery of both instruments—prove that both *chör* and *sihu* are grounded in a long, culturally significant oral tradition and continue to act as core instruments in Mongolian Geser performance.

⁹ The author interviewed Professor U. Xinbaya'er via WeChat in May 2025 to discuss a series of issues concerning the Tibetan and Mongolian versions of Geser.

¹⁰ Boteletu, Hasibate'er: *Research on the Music of Mongolian Heroic Epics* [M]. Beijing: China Social Sciences Press, March 2012.

¹¹ Cui Siqin: *Research on Geser Artists* [M]. Hohhot: Inner Mongolia Culture Publishing House, 2020

Figure Two¹²

1.2. Other Accompanying Instruments

The Mongolian Geser narrative tradition also utilizes a wide variety of accompaniment and performance styles beyond the *chör* and *sihu*. Depending on their own traditions and individual talents, Geser chanters from different regions employ percussion, stringed instruments, or even perform entirely unaccompanied recitations, presenting a rich artistic landscape.

Regarding string instruments, the horsehead fiddle or *morin khuur* has also served as an accompaniment instrument in addition to the *chör* and *sihu*. Bayan Doureng, who lived before the early 20th century, was an early professional epic artist in the Shilingol region of Inner Mongolia. Records indicate that he frequently used the horsehead fiddle to accompany performances of epics such as the Geser and Jangar,¹³ illustrating an early example of the horsehead fiddle's role in epic recitation for posterity. Furthermore, the *tovshuur*, a plucked string instrument unique to the Oirat Mongol region, was traditionally used to accompany The Epic of Jangar though it also appeared in some recitations of The Epic of Geser. Geser performer Bayan Douren (1959–) has carried on this tradition, combining *khöömei* singing with *tovshuur* accompaniment to perform chapters of the Geser epic.¹⁴ His performances demonstrate the fusion of Oirat style with Geser tradition.

Regarding the use of percussion and ritual instruments, some Geser performance practices highlight deep connections to religious ceremonies. The mentor of renowned Geser singer Luobusang, Awang (religious name Luobusang Daoerji), often held prayer beads in his hands while performing, or used traditional Mongolian percussion instruments such as bells and cymbals.¹⁵ Mude Su Rong, formerly a scripture master at the Lama Temple in Balin Left Banner, Chifeng, similarly held prayer beads while chanting Geser;¹⁶ his performance was known to carry a strong chanting melody. This usage of prayer beads or small percussion instruments to assist with rhythm reflects the cultural traces of mutual influence between the spread of Geser and Tibetan Buddhist rituals.

Unaccompanied recitation is also occasionally found within the Mongolian Geser tradition. Geser chanter Aogengbaya'er (1933–2004) once performed six Geser epics entirely without instrumental accompaniment, solely relying on recitation.¹⁷ This performance style aligns more closely with the recitation tradition of the Geser epic in Qinghai and confirms that the practice of unaccompanied recitation persists in Inner Mongolia as well.

In summary, the instrumental accompaniment for Geser is not confined to the binary system of *chör* and *sihu* traditions. Instead, in different historical periods and regional traditions, a diverse system has formed, primarily based on stringed instruments, but also

¹² Badama Renqin demonstrating *sihu* accompaniment to Geser narration.

¹³ Botelteu, Hasibata'er: *Research on the Music of Mongolian Heroic Epics* [M]. Beijing: China Social Sciences Press, 2012, p. 314.

¹⁴ Cui Siqin: *Research on Geser Artists* [M]. Hohhot: Inner Mongolia Culture Publishing House, 2020, p. 110.

¹⁵ You Longmei, Zhuona: *The Evolution and Research of the Geser Transmission Version* [M]. Hohhot: Inner Mongolia Culture Publishing House, 2022, p. 19.

¹⁶ Batu: *Geser Dictionary* [M]. Hohhot: Inner Mongolia Culture Publishing House, 2022, p. 381.

¹⁷ Cui Siqin: *Research on Geser Artists* [M]. Hohhot: Inner Mongolia Culture Publishing House, 2020.

incorporating percussion and unaccompanied forms. Together, the incorporation of instruments like the horsehead fiddle and *tovshuur*, the use of accessories such as prayer beads and pendants, and the integration of unaccompanied recitation and *khöömei* or throat singing techniques collectively form the rich musical landscape of the Geser narrative tradition. These diverse accompaniment forms not only reflect a Geser performer's personal artistic choices but also stand as historical evidence of Geser's deep integration with local musical traditions and religious rituals when it was disseminated across Mongol territories.

II. The Multiple Functions of Instruments in Narrative Performance

The phenomenon of Tibetan Gesar performers requiring no instruments offers an instructive reference for understanding the instrumental tradition of the Mongolian Geser. Mongolian Geser chanters rely significantly on musical instruments: instrumental preludes set the atmosphere, interludes connect segments, and accompaniment runs throughout the narrative, collectively forming the performance's overall framework.

2.1 Accompaniment as a Memory Device

The performance of oral epics relies on complex memory mechanisms. Epic artists typically do not recite fixed texts word for word but improvise on the spot based on established formulas and themes. From an oral poetics perspective, this performance style shares similarities with the "oral-formulaic theory" proposed by Milman Parry and Albert Lord—namely, that epic narration is an ongoing performance process continuously generated within established formulas and thematic frameworks. Within this process, stable musical rhythms and melodic structures provide crucial memory anchors for performers, enabling them to maintain narrative coherence during lengthy performances.

The academic history of Qishan (formerly known as Bai Qishan) provides a vivid case for us to understand this function. Born in 1981 in Aili, Shijiazhi, Xinjiamu Sum, Beizi Prefecture, Khorchin Right Wing Middle Banner, Xing'an League, Inner Mongolia, he developed an early fondness for Khuren Uliger. In his village lived an elderly man known as "Vala Lama"—tall, with limited mobility, and a solitary disposition. In his later years, he lived with Qishan's great-aunt. According to local legends, he had been a novice lama in the Zhen area of Mongolia (present-day Fuxin, Liaoning) during his childhood. Learning of Qishan's love for stories, the old man shared ancient legends and *Khöllöbö* with him, and the two gradually formed a close bond despite their age difference. Qishan often recorded the stories he heard the night before the next

day, hoping to compile them into a book. The two epic series he currently possesses were learned from the old man's oral traditions: the first comprises eight works, including "Dokhiuryin Doloon Övgön Shüteen (Seven Old Gods of the Signs)," *Zarlagyn Zurgan Tengeriin Elch*, (Six Angels of the Annunciation)", and "Gaisakhamshigt Gurvan Agt (Three Miraculous Angels)".

However, at that time, Qishan possessed only the basic outlines of these epics. He could not play musical instruments and had never delivered a complete performance. A transformation began in 2013. Starting in December of that year, with the support of Professor Yang Yucheng and his academic team, Qishan visited the Inner Mongolia Ethnic Music Heritage Station¹⁸ multiple times. Between 2013 and 2019, he received systematic guidance on seven occasions, focusing on mastering the performance style of Buren Chugula and the recitation techniques of Khorchin epics, with the most crucial element being *chör* techniques.

To date, Qishan has fully recorded five epic poems, having mastered the ability to perform self-accompanied singing with *chör* accompaniment. He employs Buren Chugula's five epic melodies along with their associated conventions, themes, and archetypal scenes to improvise the epic series "The Seven Stars of the Big Dipper." Through practice, he has gradually grasped the intrinsic mechanism of *chör* epic narration—a delicate equilibrium between "fixed" and "free"; "flexibility" and "random modulation." In 2021, Qishan was recognized as an inheritor of "Manggus Uligel", a representative project of the seventh batch of intangible cultural heritage at the Inner Mongolia Autonomous Region level.

Although I started learning the instrument relatively late, the performance of Geser absolutely required the accompaniment of the *chör*; otherwise, I simply couldn't continue." Building on this foundation, starting in 2020, he systematically recorded 13 volumes of The Epic of Geser, totaling over 500 hours, based on Geser chanter Pa Jie's 1958 audio recordings of The Epic of Geser. This work was carried out with the continuous support of Professor Yang Yucheng and his academic team. In an interview, he stated, "Before performing Geser, I carefully read The Biography of Geser Khan, the Holy Ruler of the Ten Directions twice.¹⁹ I employed melodies entirely learned from my teacher Buren Chaogula, improvising them as needed and integrating them with the *chör* accompaniment to complete the recording. Although I began learning the instrument relatively late, the narration of Geser absolutely requires *chör* accompaniment—otherwise, I simply couldn't continue."²⁰

¹⁸ Established on July 17, 2011, the Inner Mongolia Ethnic Music Heritage. The station is affiliated with the Music College of Inner Mongolia University of Arts. It comprises six interconnected platforms and projects: "Heritage Station—Specialized Station—Audio-Visual Resource Library—Inheritance Class—Typical Series CDs—Oral History Database."

¹⁹ In 1955, Inner Mongolia People's Publishing House combined the Beijing woodblock edition of Geser with the Longfu Temple edition of Geser, publishing them as The Biography

of Geser Khan, the Holy Ruler of the Ten Directions (Volumes 1 and 2); In 1997, the same publisher combined the two volumes into a single edition and republished it under the same title. The edition Bai Qishan read twice was the 1997 version.

²⁰ Interviewee: Bai Qishan; Interviewer: Qilgeri. Date: February 23, 2026; Location: Bai Qishan's residence, Shijiazhi Aili, Xinjia Mu Sum, Beizi Prefecture, Khorchin Right Middle Banner, Xing'an League, Inner Mongolia.

This statement reveals the profound function of musical instruments in oral epic recitation—they are not merely vehicles for musical expression but the very framework supporting the narrative. When the artist's fingers touch the strings, when the bow creates rhythmic vibrations, the instrument becomes an anchor for memory, weaving scattered motifs and themes into a continuous narrative. The rhythmic patterns of accompaniment interlock with the lyrical cadences of the verses, gradually crystallizing into a form of "muscle memory." In this state, the performer no longer consciously recalls the story; instead, the narrative flows naturally, guided by the instrument's melody.

2.2 The Construction of Instruments and Performance Contexts

Epic recitation is not merely textual transmission but a specific communicative event—a sociocultural practice unfolding within particular spatiotemporal contexts that connects performers and audiences. Within this practice, musical instruments play an integral role in constructing the performance context. When the artist picks up the instrument and tunes it, this seemingly simple action itself marks the demarcation between the mundane and the sacred, signaling that the recitation is about to begin. The physical presence of the instrument and the spatial diffusion of its sound imbue the recitation with a ritualistic solemnity.

In the Mongolian epic recitation tradition, this function of constructing the performance context is particularly evident in the opening procedures. Before completing his 500-hour thematic performance of the Geser stories, Bai Qishan strictly followed traditional protocol. He first performed three opening chants—"Uqiledagatagala," "Wunimuxilemagedala," and "Galabatao Galala"—accompanied by the *chör*, before proceeding to the main content of the first Geser epic. Bai Qishan explained: "According to the recitation tradition of Mangusiin Ulger, the 'Uqile' sound is used to summon spirits. A prayer is made to all the gods through the sound, to deities in all directions, to inform them that one is about to tell their stories, and to ask for their permission and approval. Especially when there are flaws or errors in the epic recitation, 'Uqile' is sung to apologize to the gods and express repentance. Therefore, before reciting the Geser Epic, I sing 'Uqiledagatagala,' 'Wunimuxilemagedala,' and 'Galabatao Galala' to pray to Geser and the Mangsu's spirit."²¹ This procedural opening ceremony, using music as medium, offers multiple functions before the formal narration begins: First, it informs the divine realm of the narration event, seeking permission and protection; second, it purifies the narrator's mind and establishes a ritual mindset.

When recording the 100-hour "Geser Stories" accompanied by the *sihu* and the 1,800-hour Geser accompanied by the *chör*, Geser performer Badama Renqin similarly followed a rigorous opening protocol. He first performed the "Chör Praise," extolling the instrument itself through its sound as it prepared to undertake the narrative mission. Then, he performed

the "Geser Song," offering lyrics to the epic's protagonist and associated deities. Only after the opening procedures did he proceed to the main narrative of "Geser." Though differing in specific content from the Seven Mountains practice, this sequence shares the same logic of situational construction—using musical sound as a medium to delineate boundaries between secular and epic time-space, thereby creating an appropriate ritual atmosphere.

From the perspective of oral poetics, these opening rituals are by no means optional, but rather an organic component of the epic performance tradition. These instruments fulfill multiple functions: on a religious level, they communicate with deities, pray for protection, and ensure the smooth progress of the performance; on a psychological level, they help performers focus their minds and enter a state of readiness, preparing them physically and mentally for long, impromptu performances. Furthermore, the instruments act as a musical bond, connecting the performer and the audience.

While opening rituals vary across different regions and performers, their function remains consistent: using music as a medium to construct the performance context. The physical presence of the instruments provides the visual markers of the context; the spatial permeation of the music creates the auditory atmosphere of the context; and the ritual content of the lyrics imbues the context with sacred meaning. These three elements intertwine, jointly completing the transformation from the secular to the sacred, from the mundane to the epic. In this transformation, Geser's heroic world is repeatedly reborn on the performance stage, the spiritual bloodline of the epic continued through instruments.

III. Diversity of Regional Traditions and Artist Styles

3.1 Differences Among Three Stylistic Regions

According to historical records, beginning in the 16th century, the large-scale introduction of Buddhist culture into Mongolia led to an increase in exchanges between devout Buddhist followers and lamas traveling between Tibetan and Mongolian regions. This cultural interaction manifested in the introduction of numerous translated Buddhist scriptures. Simultaneously, Tibetan literary works were widely translated and introduced into the Mongolian psyche. It was during this period of extensive Tibetan cultural interaction that the Epic of Geser was introduced to the Mongolian Plateau and gradually integrated into the local oral epic tradition. Scholars widely acknowledge that the peak period of Geser's transmission and dissemination in Mongolia coincided with the era of Buddhism's widespread dissemination and influence throughout the region.

The renowned scholar Querilezhabu offers insights regarding why Geser gained such widespread popularity and deep affection among the Mongolian people. He points out that the spread of Geser in Mongolia was closely intertwined with the political

²¹ Interviewee: Bai Qishan; Interviewer: Qilegeri. Interview Date: February 23, 2026; Interview Location: Bai Qishan's residence, Shijiazai Aili, Xinjia Mu Sum, Beizi Prefecture,

Khorchin Right Middle Banner, Xing'an League, Inner Mongolia.

landscape, historical context, and cultural transmission of the time. From a political perspective, as the Yuan Dynasty's rule weakened, Mongolia descended into feudal fragmentation. Compounded by the prolonged warfare between Mongolia and the Ming Dynasty, Mongolian society suffered severe blows to its social productivity. The populace endured turbulent living conditions and the hardships of constant warfare. Thus, against this historical backdrop, the narrative depicted in the Geser epic—of heroes battling enemies and ultimately ushering in peace and prosperity—resonated profoundly with the Mongolian people's yearning for stability. It became a spiritual anchor for hope amidst their suffering.²²

Simultaneously, while Mongolian communities adapted the Geser tales introduced from Tibetan regions, they did not merely passively receive and recite them. Instead, they actively reimagined the narratives by integrating local cultural characteristics, lived experiences, and aesthetic preferences. Drawing upon regional customs and traditions, they blended indigenous heroic epic traditions with oral performance practices, creating numerous Geser stories imbued with distinct local characteristics. This process not only demonstrated the creativity of Mongolian oral literature but also gradually transformed Geser from an imported epic into a living tradition rooted in Mongolian culture. It was within this complex interplay of political, cultural, and popular psychological factors that Geser achieved widespread dissemination and deep resonance across Mongolian regions, ultimately becoming an important piece of heritage, transcending boundaries between the Tibetan and Mongolian cultural spheres.

In their book *A Study of Mongolian Heroic Epic Music*, Boteletu and Hasibate'er, when exploring the regional styles of Mongolian heroic epic music, divided Mongolian epics within China into three stylistic regions—Oirat, Inner Mongolia, and Khorchin—based on the differences in epic performance styles across different regions. This paper uses this classification as a framework to conduct a regional analysis and comparison of the use of musical instruments in the performance of Geser.

In the book *Research on the Music of Mongolian Heroic Epics*, Boteletu and Hasibate'er, divide Mongolian epics within China into three styles based on differences in regional performance practices: Oirat, Inner Mongolia, and Khorchin.²³ This paper adopts this classification framework to conduct a regional analysis and comparison of musical instrument usage in Mongolian Geser performances.

The performance of the Mongolian Geser epic is not a single, homogeneous tradition; significant differences in instrument usage exist across regions. In the Oirat style (primarily covering Qinghai, Northern Suibei, and other areas), performers "no longer use instruments when singing the epic, focusing instead on narration, occasionally supplemented by a cappella singing." This characteristic is closely tied to the local cultural environment—Mongols in Qinghai have long

coexisted with Tibetans and are deeply influenced by Tibetan religious beliefs and oral traditions. The "withdrawal" of musical instruments may be seen as a result of cultural integration, where performers gradually adopted unaccompanied recitation through prolonged interaction with Tibetan Gesar artists.

In the Inner Mongolia style, most performers use the *sihu* for accompaniment, followed by the *chör*. A minority employ the horsehead fiddle, while some recite entirely without instruments—the latter category of Geser chanters often originate from lama backgrounds, their delivery bearing distinct chanting intonations that reflect the fusion of Tibetan Buddhism with epic traditions. It is noteworthy that while other types of traditional Mongolian music in Inner Mongolia (such as long songs or *urtyn duu*, short songs or *bogino duu*, and *morin khuur* music) remains popular, the living transmission of the Geser epic has declined in some areas, even experiencing transmission gaps. Since the 1950s, with the advancement of efforts to rescue and revive Geser culture, certain regions such as Barin Right Banner, have revitalized Geser storytelling by leveraging their local traditional resources.

The Khorchin style has developed a distinctive instrumental arrangement. Performers in this area primarily use the *chör* and *sihu* as accompaniment instruments for their Geser recitations, a tradition deeply influenced by local oral narrative traditions such as "Mangusiin Uliger," Uliger, and *kholboo*. In the Khorchin region, the *chör* is deeply intertwined with the epic tradition of demon-subduing themes, while the *sihu* is closely associated with narrative folk songs and *khöömei*. The coexistence of both instruments in Geser performances reflects the diverse fusion of Khorchin's oral traditions.

The aforementioned regional variations are closely related to the migration history of various Mongol tribes. The cultural contact between the Oirat Mongols and Tibetan culture led to the "withdrawal" of musical instruments. Central Inner Mongolia exhibits both rich traditional musical resources and a weakening of living transmission, revealing the complexity of its inheritance patterns. The Khorchin region developed a performance style emphasizing both the *chör* and *sihu* due to the strong continuity of its indigenous epic traditions. These regional differences in instrument use reflect the dynamic process of the Geser performance tradition constantly adapting and reconstructing itself amidst historical changes.

Yin Hubin notes, "Geographically speaking, the Qinghai Plateau, Khalkha Mongolia, the Lake Baikal region, and the Barin and Zhalute grasslands of eastern Inner Mongolia are separated by thousands of miles, with distinct historical and cultural differences. Yet the Geser epic transmitted across this vast Mongolian cultural sphere exhibits little variation in its main plotlines." This observation reveals that the plot structure of Geser possesses a high degree of stability, enabling it to maintain a unified core narrative across vast geographical distances. Yet simultaneously, its

²² Querilezhabu: *Research on Mongolian Geser* [M]. Hohhot: Inner Mongolia Culture Publishing House, 2017, p. 104.

²³ Boteletu, Hasibate'er: *Research on the Music of Mongolian Heroic Epics* [M]. Beijing: China Social Sciences Press, 2012, p. 46.

varying performance practices demonstrates remarkable flexibility in how the epic has become deeply integrated with local musical traditions, presenting a richly diverse regional landscape. The consistency of the plot and the variability of form together constitute the vitality of Geser as a living epic.

3.2 Personal Style and Master-Disciple Traditions

Beyond regional variations, the personal styles of performers play a large role in how instruments are utilized. In Geser performance practices, different artists have distinctive attitudes and techniques toward their instruments: some excel at simulating natural and supernatural sounds through their instruments, treating them as a core narrative medium, with instrumental sections occupying a significant portion of their performances. Others prioritize lyrical expression, using instruments for simple rhythmic accompaniment in a subordinate role. These differences often stem from the artist's lineage—a master's playing style, performance habits, and even understanding of an instrument's function shape their student's practice, forming stylistic continuity across generations.

The renowned Geser artist Pajie is celebrated for his masterful *sihu* playing. In his performances, the instrumental sections possess independent expressive power; the *sihu*'s melody not only accompanies the vocals but also serves as a crucial means of advancing the narrative. In contrast, the distinguished Geser chanter Qimabazamusu is celebrated for the rich variations in his vocal delivery. The instrumental function in his performances is relatively focused on providing rhythmic support and maintaining the modal framework, while the lyrics and vocal style are the core of his performance. The divergence between their styles stems from the interplay of personal artistic expression and lineage traditions—in Pajie's tradition, instrumental music holds significant importance, while Jinbazhamusu's lineage places greater emphasis on vocal ornamentation and emotional expression.

Geser chanter Badama Renqin's performance practice offers another rich case study for understanding this diversity. Reflecting on his two recording experiences, he notes, "The Geser Stories accompanied by the *sihu* strictly follows the form of Khuren Uliger, employing a narrative structure blending prose and verse. The *sihu* primarily serves a supporting role, advancing the storytelling. In contrast, the *chör* accompanied recording of Geser employs the epic's seven-song framework, combined with rhymed verses structured in four-line stanzas. Here, the *chör* performance assumes a more structurally defining role.²⁴ The differing approaches adopted by the same artist when encountering different instruments and performance traditions not only demonstrate their mastery of multiple styles but also reflect the flexibility and inclusivity inherent within the Geser tradition itself.

This diversity is precisely the essence of a living tradition. Tradition is not a rigid template but one that

continually revitalizes itself through the creative practice of each individual artist. Boteletu states, "The oral nature of a melody manifests in variations based on the framework of a tune and is influenced by the rhythmic patterns of the lyrics, changes in tempo, and the rise and fall of tones. Moreover, it is significantly shaped by the performer's proficiency, artistic expression, psychological state, emotions, instrument tuning, and the performance context—all of which contribute to variations in melody."²⁵ This observation applies not only to the oral nature of melodies but also to the diversity in instrumental techniques—within a unified traditional framework, each artist interprets, practices, and enriches tradition through their unique individual approach. This individual creativity is what enables the Geser tradition to continue and flourish.

IV. Conclusion

This paper examines the instrumental accompaniment tradition in Mongolian Geser performances from an interdisciplinary perspective of oral poetics and ethnomusicology. By mapping the typology of instruments, analyzing their multifaceted functions in performance, and comparing regional and performer-specific variations, the study reveals the profound cultural significance of musical instruments within the epic tradition. Instruments serve not merely as narrative accompaniment, but as integral components of the oral tradition, deeply engaged in evoking memory, generating meaning, and constructing performance contexts.

The study indicates that instrumental practices in Mongolian Geser performances exhibit a diverse pattern centered on the *chör* and *sihu*, supplemented by other instruments and a cappella forms. These two instruments have coexisted and evolved throughout history, each possessing representative lineages of performers and collectively forming the sonic foundation of the Geser performance tradition. Functionally, instrumental accompaniment serves multiple roles: as a mnemonic device, the melodies provide performers with a stable rhythmic framework, linking formulas and themes into a continuous narrative flow. As a form of meaning generation, the instruments form a "paralanguage" system running parallel to the lyrics, conveying emotions and setting the atmosphere through non-semantic means. As a medium for contextual construction, the presence and sound of instruments demarcate the boundary between the mundane and the sacred, conferring ritualistic solemnity upon the performance through opening ceremonies. Thus, the diversity of instrumentation found in regional traditions and performance styles demonstrates the living, dynamic nature of the Geser narrative tradition.

References:

1. Badama Renqin. Interview Transcript [Z]. Interviewer: Qilegeri. Barin Right Banner, Inner Mongolia, July 2023.
2. Bai Qishan. Interview Transcript [Z].

²⁴ Interviewee: Badama Renqin; Interviewer: Qilegeri; Interview Date: July 2023; Interview Location: Barin Right Banner.

²⁵ Boteletu: *Khuur Players: Narrative Artists and Their Music in the Traditional Culture of Khorchin* [M]. Shanghai: Shanghai Conservatory of Music Press, 2007, p. 133.

Interviewer: Qilegeri. Xing'an League, Inner Mongolia, February 23, 2026.

3. Bao Qingqing. From Melody to "Repertoire": Melodies and Their Derivative Formation in Bai Qishan's Performance of "The Marriage Story of Azhumelgen Gengsir Khan" [J]. *Chinese Music*, 2025, Issue 5.

4. Batu: *Geser Dictionary* [M]. Hohhot: Inner Mongolia Culture Publishing House, 2022, p. 381.

5. Boteletu, Hasibate'er. *Research on the Music of Mongolian Heroic Epics* [M]. Beijing: China Social Sciences Press, 2012.

6. Boteletu. *An Introduction to Traditional Mongolian Music* [M]. Hohhot: Inner Mongolia University Press, 2012.

7. Boteletu: *Khuur Players: Narrators and Their Music in the Local Traditions of Khorchin* [M].

Shanghai: Shanghai Conservatory of Music Press, 2007.

8. Buhe Chaolu. 99 Questions and Answers on Gusir Culture [M]. Hohhot: Inner Mongolia People's Publishing House, 2023.

9. Cui Siqin. *Research on Geser Storytellers* [M]. Hohhot: Inner Mongolia Culture Publishing House, 2020.

10. Querilezhabu: *Research on Mongolian Geser* [M]. Hohhot: Inner Mongolia Culture Press, 2017.

11. Yao Hui. *Research on Epic Music Paradigms: Focusing on the Inter-Ethnic Transmission of the Geser Epic* [M]. Beijing: China Social Sciences Press, 2021.

12. You Longmei & Zhuona: *Evolution and Research of Gegeer Manuscript Versions* [M]. Hohhot: Inner Mongolia Culture Publishing House, 2022, p. 19.

EARTH SCIENCES

'WATER MEMORY' NOT A DELUSION. EVALUATION OF THE STABILITY OF WATER CLUSTERS

Shevchenko I.

PhD, Senior Researcher, M. P. Semenenko Institute of Geochemistry Mineralogy and Ore Formation; Kyiv, 03142 Ukraine

<https://doi.org/10.5281/zenodo.20691168>

Abstract

It has recently been discovered that muons produced in the Earth's atmosphere by solar radiation have a strong dynamic influence on hydrolytic processes on Earth. Muons break hydrogen bonds between water molecules, destroy water clusters and increase their hydrolytic activity. Due to constant fluctuations in the intensity of the solar influence and position of the Sun in the sky, the rate of hydrolytic processes is very dynamic and can change over the course of a year within very large limits (up to 200 times). Damage to water clusters by muons changes their properties. This explains well the instability of the mysterious phenomenon widely known as 'Water Memory'.

Keywords: water; clusters; solar influence; muons; hydrolysis

Introduction

We have recently found that muons constantly generated in the upper atmosphere by the solar wind and cosmic rays, perform an important function on the Earth in hydrolytic processes. [1] Muons destroy water clusters breaking hydrogen bonds between water molecules and increase their hydrolytic activity, as small clusters contain much more free hydroxyl groups. Due to the high penetrating ability of muons, such their influence is crucial for all biological processes not only on the Earth's surface, but also underground, since in the absence of muons water clusters become highly structured and hydrolytic reactions are greatly slowed down. This was confirmed experimentally after the discovery of the muon shielding method. [2] This is also

confirmed by the fact that at night and during solar eclipses the hydrolysis of triethyl phosphite slows down significantly. [3] Water clusters are destroyed not only by muons, but also by ultraviolet irradiation. Due to constant fluctuations in solar activity and the redistribution of solar energy as the Earth rotates around its axis and around the Sun, the rate of hydrolytic processes constantly changes (up to 200 times) during the 11-year solar cycle, year, day, and can suddenly change even in a few minutes. This was shown by regular measurements of the rate of hydrolysis of triethyl phosphite [(EtO)₃P] in acetonitrile for 6 years 2015-2020 which included 5 years of the second half of the 24-th solar cycle 2015-2019 and the first year 2020 of the 25-th cycle. (Fig.1) [1]

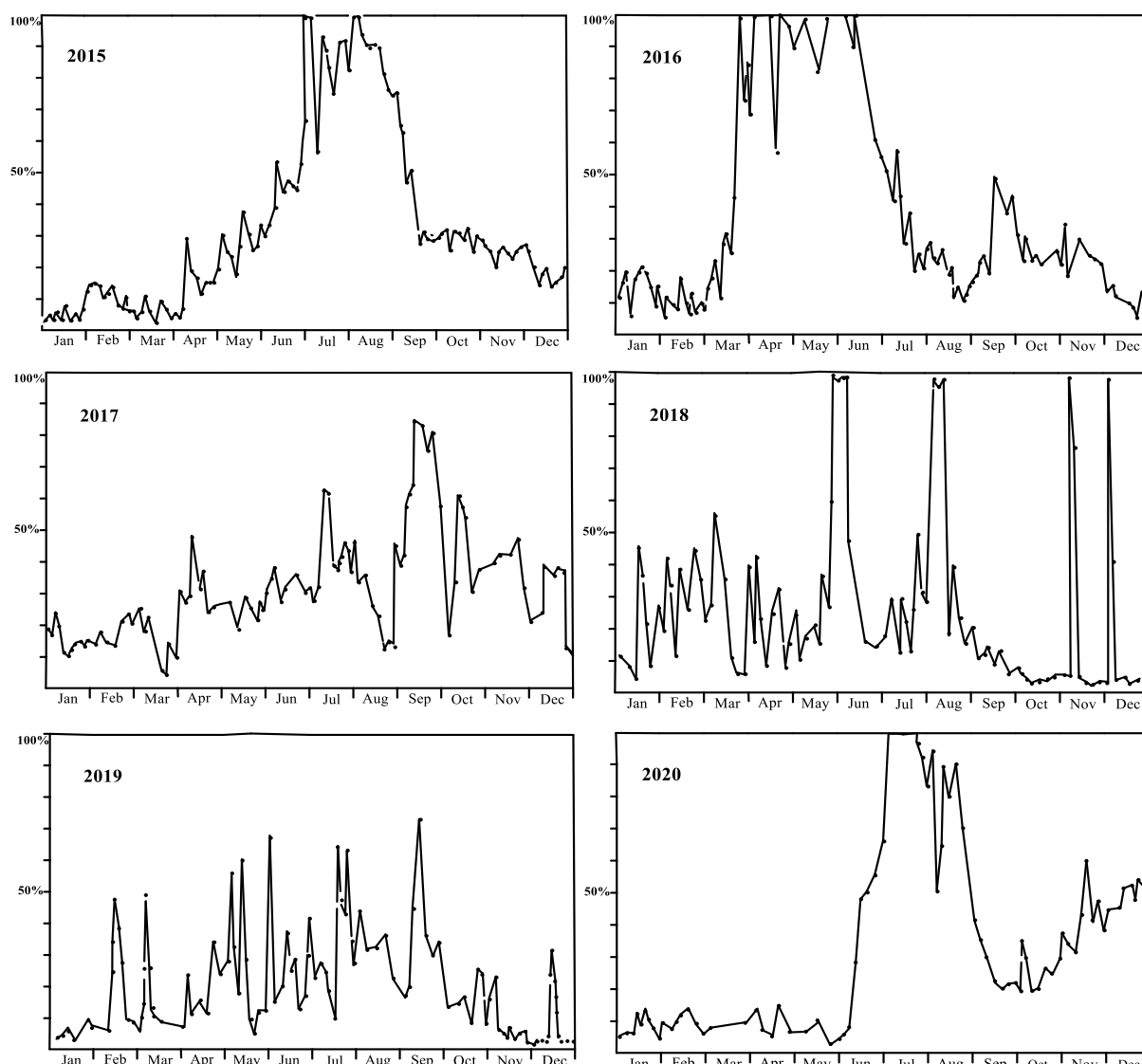


Fig. 1. Variations of the rate of hydrolysis of triethyl phosphite $[(EtO)_3P + H_2O]$ in acetonitrile in 2015-2020 (conversion after 25 minutes of heating at $80^\circ C$). This period includes the second half of the 24-th solar cycle 2015-2019 and the first year 2020 of the 25-th cycle.

Discussion

The destruction of water clusters by muons under the influence of the Sun explains another mysterious phenomenon, well known as 'water memory'. In 1988 French scientists Jacques Benveniste and his colleagues published the results of their research, which showed that an aqueous solution of anti-IgE antibody retains high biological activity even after very strong dilution (up to 10^{120} times) with bulk water. [5] This can only be explained by the ability of bulk water, added to some aqueous solution, to form clusters that copy the properties of the substances originally dissolved in the copied solution.

This mysterious phenomenon had no scientific explanation and generated great distrust therefore it required experimental confirmation. In July 1988, a special commission arrived at Jacques Benveniste's laboratory in Paris to carry out such an inspection. Seven identical experiments were conducted, four of which confirmed this phenomenon, and the remaining three experiments, for some unknown reason, gave negative result. Similar instability was also noticed by French

discoverers. They also found periods of time when the biological activity of the original solution of anti-IgE antibody was not reproduced after its high dilution with water.

Due to contradictory and inconsistent results, the expert committee concluded that the claim that aqueous solutions retain the biological properties of dissolved substances after very strong dilution with pure water is a delusion. [6] However, this conclusion itself was a delusion, since it contradicted the results of the conducted test. Four control experiments confirmed the phenomenon being tested. This would not be possible if the original clusters and their biological activity were not copied and reproduced by the added bulk water.

Grate distrust to this phenomenon and the commission's negative decision are consistent with the existing very low assessment of the stability of water clusters. Today, in mainstream science, the lifetime of water clusters is estimated to be no more than 10 picoseconds. However, this contradicts the experimental results. The phenomenon of 'water memory'

could not have been confirmed in four control experiments in such a short period of time. In our studies, at such instability of water clusters, the hydrolytic activity of the same aqueous solution could not have been different (up to 200 times) in summer and winter (Fig. 1). It also could not have been depended on the geometric shape of the solution and on its position in space. [4]

Interestingly, the discrepancy between the experimental results and the very low estimate of the stability of water clusters is similar to the same paradox with muons, whose lifetime is estimated at 2.2 microseconds. Muons are reliably detected by physical methods even underground. For example, muons were used to study the interior structure of the Egyptian pyramids. [6] To reach the Earth's surface in that time and even penetrate underground, muons, which are 207 times larger than electrons, must travel through the atmosphere at a speed approximately 3 times the speed of light in a vacuum.

The sudden destruction of water clusters by atmospheric muons explains the disappearance of the copying effect in three of the seven control experiments conducted in July 1988. We also consistently recorded very strong and sharp fluctuations in the stability of water clusters during regular measurements of their hydrolytic activity, especially in summer in the middle of the 11-year solar cycle, when the sun's influence is at its maximum. For example, in 2015, a sharp and very strong destruction of clusters began at the end of June and continued until the beginning of September. (Fig. 1) The sharp increase in muon intensity at the end of June is also confirmed by physical methods. [8,9]

The stability of water clusters should also depend on their habitat. The phenomenon of water cluster copying at high dilution was discovered in an aqueous environment in which water clusters are surrounded by unstructured water molecules interacting with other water molecules. Under these conditions, surrounding water molecules can constantly and dynamically form temporary hydrogen bonds with the clusters. This interaction should reduce the clusters' stability.

In an aquatic environment, cluster stability and the phenomenon of their replication can only be assessed by measuring the biological activity of already formed, replicated clusters. The influence of muons on the stability of water clusters and on the replication process itself, when measured in this way, is only evident upon abrupt clusters disruption. To study the stability of water clusters, it is necessary to measure their hydrolytic activity using a chemical method, but this is impossible in an aquatic environment. Therefore, it was important to confirm and investigate the formation and replication of clusters by water in other solvents that do not contain oxygen atoms. For this purpose, for our 6-year study (Fig. 1), the industrial acetonitrile, which initially contains a small amount of water (<0.02%), was chosen.

We have found that even such a small amount of water in acetonitrile does not break down into individual water molecules, but exists in the form of clusters. Their size constantly changes under the influence of muons, depending on fluctuations in the intensity of solar radiation and the position of the Sun in the sky. If bulk water is added to such wet acetonitrile, it will copy these present clusters and reproduce them in large

quantities. The resulting water solution acquires very different hydrolytic activities, since it contains either a large number of small active clusters or a small number of large passive clusters. [10] Therefore, under the influence of the Sun, the rate of hydrolysis of triethyl phosphite (Fig. 1) constantly changed dynamically within very large limits, from several minutes at mid-day in summer to 2 days in winter. [1] This result proves that in acetonitrile, the replicated water clusters are stable at low and unstable at high solar influence.

Daily fluctuations in cluster stability are also significant. At night, muons are not formed, clusters reunite, their size increases significantly, and hydrolytic activity strongly decreases. After sunrise, large clusters immediately begin to disintegrate under the influence of muons. With sharp increases in solar influence, especially in summer, the hydrolytic activity of clusters can strongly increase within minutes. This is confirmed by sharp fluctuations in the rate of triethyl phosphite hydrolysis (Fig. 1). Biological activity should be extremely sensitive to the effects of muons and should disappear immediately and irreversibly even with minor damage to the clusters. Such sudden damage to clusters by muons explains the disappearance of their biological activity in three of the seven test experiments in July 1988.

The experimental test of the 'Water Memory' phenomenon in Paris was conducted in July 1988. This was the maximum solar activity for both the year and the 22nd 11-year solar cycle. At this time, the destruction of water clusters and the increase in their hydrolytic activity can occur very dynamically and abruptly. Therefore, under these conditions, the 'Water Memory' effect was confirmed in four of the seven experiments. Under low solar influence, for example in winter, the copying of water clusters with a large excess of bulk water will be much more stable, although sudden destruction of clusters can also occur at this time, as for example in November and December 2018. (Fig. 1)

Conclusion

The assertion that an aqueous solution of anti-IgE antibody cannot retain high biological activity after being highly diluted with bulk water is a delusion. It was based on an incorrect analysis of the experimental verification of this phenomenon in 1988. Four experiments confirmed the phenomenon of "water memory", and the lack of confirmation in three experiments is explained by the sudden collapse of water clusters after a sharp increase in the number of muons in the atmosphere. This newly discovered phenomenon was unknown in 1988, so the experimental test conducted then was misinterpreted. In fact, it confirmed two new phenomena: the copying of the biological activity of other molecules by bulk water at high dilution and the easy disruption of water clusters by muons.

The phenomenon of copying and reproducing water clusters by bulk water was also confirmed in an organic solvent (CH_3CN). This made it possible to study this phenomenon by chemical methods using NMR spectroscopy. It has been established that water clusters are quite stable, but they are easily destroyed by muons, which are constantly formed in the Earth's atmosphere under solar influence. As a result of fluctuations in solar activity and the redistribution of solar influence as the

Earth rotates around the Sun and its axis, the stability of water clusters constantly and dynamically fluctuates over very wide limits. At low solar influence water clusters are stable, and the phenomenon of 'Water Memory' has been reliably confirmed by chemical method. The constant formation of muons in the atmosphere under the solar radiation and the destruction of water clusters under their influence are necessary conditions for the existence of life on Earth. Without muons water clusters would be highly structured and would not have the necessary hydrolytic activity for biological processes, and bulk water would have a 'good memory' and would contribute to the spread of epidemics.

References:

1. Shevchenko, I.V., Self-organizations of water molecules over 11-year solar cycle. *Journal of Molecular Liquids* **355**, 118866 (1 June 2022). DOI:10.1016/j.molliq.2022.118866
2. Shevchenko, I.V., Influence of the Sun on the night side of the Earth. *Journal of Molecular Liquids*, **410**, 125559 (2024). DOI:10.1016/j.molliq.2024.125559
3. Shevchenko I.V., Influence of muons on hydrolytic processes on Earth. Explanation of the 'Water Memory' mystery. *Norwegian Journal of development of the International Science* **164**, 18-21 (2025). DOI:10.5281/zenodo.17121584
4. Shevchenko, I.V., Influence of the Sun on water. Dependence on geometry of solution and its position in space. *Journal of Molecular Liquids*, **379**, 121681 (2023). DOI:10.1016/j.molliq.2023.121681
5. Davenas, E., Beauvais, F.J., Amara, M., Oberbaum, Robinzont, B., Miadonna, A., Tedeschi, A. Pomeranz, B., Fortner, P., Belon, P., Sainte-Laudy, J., Poitevin, B., Benveniste, J. Human basophil degranulation triggered by very dilute antiserum against IgE. *Nature* **333**, 816–818 (1988). DOI:10.1038/333816a0
6. Maddox, J., Randi, J., Stewart, W. W., 'High-dilution' experiments a delusion. *Nature* **334**, 287–290 (1988). DOI:10.1038/334287a0
7. Alvarez, L.W., Anderson, J.A., Bedwei, F.El., Burkhard, J., Fakhry, A., Girgis, A., Goneid Amr., Hassan, F., Iverson, D., Lynch, G., Miligy, Z., Moussa, A.H., Sharkawi, M., Yazolino, L., Search for hidden chambers in the pyramids. *Science* **167**, 832-839 (1970). DOI:10.1126/science.167.3919.832
8. Agafonova, N., Alexandrov, A.S., Anokhina, A., Aoki, S., Ariga, A., Ariga, T., Bertolin, A., Bozza, C., Brugnara, R., Buonauro, A., et. al., Measurement of the cosmic ray muon flux seasonal variation with the OPERA detector. *Journal of cosmology and astroparticle and astroparticle physics* **10**, 003 (2019). DOI:10.1088/1475-7516/2019/10/003
9. Mauri N., Annual modulation of the atmospheric muon flux measured by the OPERA experiment. *J. Phys. Conf. Ser.* **1342**, 012013 (2020). Doi:10.1088/1742-6596/1342/1/012013
10. Shevchenko, I.V., Structuring of water clusters under the solar influence and their coping by bulk water. *Journal of Molecular Liquids* **393**, 123576 (2024). DOI:10.1016/j.molliq.2023.123576

ECONOMIC SCIENCES

FROM ACADEMIC INSTITUTIONS TO DIGITAL INNOVATION HUBS: THE TRANSFORMATION OF BUSINESS SCHOOL – CORPORATE ECOSYSTEMS IN CHINA

Tleshbayeva R.

DBA Doctoral Student,

Almaty Management University,

Kazakhstan, Almaty

<https://doi.org/10.5281/zenodo.20691170>

Abstract

The rapid development of digital technologies, artificial intelligence, and platform-based business models has fundamentally transformed the role of business schools in the global knowledge economy. Contemporary business schools are increasingly moving beyond their traditional educational functions and evolving into digital innovation hubs that connect academic knowledge, corporate expertise, technological infrastructure, and executive learning ecosystems. This study investigates the transformation of business school–corporate interaction in China through a comparative analysis of three leading institutions: China Europe International Business School (CEIBS), Tsinghua University School of Economics and Management (Tsinghua SEM), and PKU Guanghua School of Management. Using a mixed-method research design that combines comparative analysis, content analysis, KPI assessment, and ROI evaluation, the study examines how digital governance mechanisms, AI-driven analytics, executive education platforms, and strategic partnerships contribute to institutional competitiveness and corporate integration. The findings demonstrate that digital transformation has enabled Chinese business schools to establish highly institutionalized corporate ecosystems characterized by strong industry collaboration, internationalization, lifelong learning infrastructures, and data-driven management systems. The study argues that the Chinese model represents a new stage in the evolution of business education, where universities function as strategic partners in corporate innovation and talent development. Practical implications for the modernization of business education systems in Kazakhstan and other emerging economies are discussed.

Keywords: digital transformation, business schools, executive education, corporate ecosystems, digital governance, artificial intelligence, corporate partnerships, innovation hubs.

Introduction

The global transition toward a digital economy has generated profound changes in higher education systems, particularly in institutions responsible for preparing managerial and entrepreneurial talent. Business schools are experiencing unprecedented pressure to adapt their educational models to rapidly changing technological environments, evolving labor market demands, and the growing importance of digital competencies [1-3]. Traditional business education models based primarily on classroom instruction are increasingly being replaced by flexible, technology-enabled ecosystems that integrate academic knowledge, corporate practice, and digital innovation.

The emergence of artificial intelligence, big data analytics, cloud-based learning platforms, and digital collaboration technologies has significantly altered the mechanisms through which business schools interact with corporate stakeholders. As a result, the concept of business school–corporate interaction has evolved from conventional internship and recruitment arrangements toward comprehensive partnership ecosystems encompassing executive education, joint research initiatives, consulting activities, innovation laboratories, and digital learning environments [4,5]. China represents one of the most dynamic examples of this transformation. During the past two decades, Chinese business schools have achieved remarkable progress in international rankings and have established themselves as influential actors within the global business education landscape. Institutions such as CEIBS, Tsinghua SEM, and PKU

Guanghua School of Management have developed sophisticated models of corporate engagement supported by digital governance systems, AI-enabled educational technologies, and extensive international partnerships [6-9].

Literature Review

The digital transformation of higher education has become one of the most extensively discussed topics in contemporary educational and management research. The emergence of artificial intelligence, learning analytics, cloud-based educational environments, and platform ecosystems has significantly altered the traditional functions of universities and business schools. Modern business schools are increasingly expected to provide not only academic knowledge but also practical competencies, digital skills, innovation capabilities, and strategic leadership competencies required in the contemporary corporate environment [1,4,5].

Scholars argue that digitalization has transformed universities into active participants in innovation ecosystems [10]. According to ecosystem theory, educational institutions no longer operate as isolated organizations but as interconnected actors within broader networks that include corporations, government agencies, research centers, technology providers, and international partners. Within this framework, business schools play a particularly important role because they serve as intermediaries between knowledge production and business practice.

The concept of business school–corporate interaction has evolved substantially during the last two decades. Traditional forms of cooperation, including internships, guest lectures, and recruitment activities, have gradually been replaced by more integrated partnership models. These models involve executive education programs, corporate consulting, joint research centers, innovation laboratories, startup accelerators, digital learning platforms, and strategic talent development initiatives [10, 11].

The emergence of Executive Education Ecosystems has further strengthened collaboration between business schools and corporations. Executive education is increasingly recognized as a strategic instrument for organizational transformation, leadership development, and innovation management. Unlike traditional degree programs, executive education provides flexible learning opportunities tailored to the specific needs of corporate clients [12,13].

Artificial intelligence has become another important factor shaping the evolution of business education. AI-driven analytics enables institutions to monitor student engagement, personalize learning pathways, predict educational outcomes, and improve decision-making processes. Research indicates that AI-based educational technologies enhance learning effectiveness while simultaneously improving institutional efficiency.

Chinese business schools represent a unique case in the global business education landscape. During the last twenty years, institutions such as CEIBS, Tsinghua SEM, and PKU Guanghua have achieved significant progress in international rankings and accreditation systems. Their success has been largely attributed to the integration of digital governance mechanisms, strategic corporate partnerships, and innovation-oriented educational models [14,15].

The literature suggests that successful business school transformation depends on several interrelated factors: digital platform integration, internationalization, executive education development, corporate partnership intensity, innovation ecosystem participation, and research collaboration. However, relatively limited attention has been devoted to understanding how these factors interact within integrated business school–corporate ecosystems. This study contributes to the literature by examining these relationships within the context of leading Chinese business schools.

Research Methodology

This study adopts a mixed-method research design combining quantitative and qualitative approaches. The

methodological framework was developed to capture both the institutional characteristics of Chinese business schools and the strategic mechanisms underlying their corporate partnerships [16].

The research consists of three interconnected stages.

The first stage involved a comparative institutional analysis of three leading Chinese business schools: China Europe International Business School (CEIBS), Tsinghua University School of Economics and Management (Tsinghua SEM), and PKU Guanghua School of Management. These institutions were selected because of their international reputation, accreditation status, strong corporate partnerships, and advanced digital learning infrastructures.

The second stage included content analysis of official institutional documents, executive education materials, annual reports, accreditation reports, corporate partnership policies, and publicly available strategic documents. Content analysis enabled the identification of recurring themes and strategic priorities associated with business school – corporate interaction [6,8,9].

The third stage involved quantitative assessment using KPI and ROI frameworks. Performance indicators were developed to evaluate the effectiveness of executive education ecosystems and corporate partnership management systems [13].

The KPI model was calculated using the following formula:

$$KPI = (Actual Performance / Target Performance) \times 100$$

The ROI model was calculated as:

$$ROI = ((Net Benefit - Investment Cost) / Investment Cost) \times 100$$

The study also employed comparative scoring techniques to assess institutional performance across six strategic dimensions:

- Digital Platform Integration;
- Internationalization;
- Corporate Partnerships;
- Executive Education Development;
- Research Collaboration;
- Innovation Ecosystem Participation.

Scores were normalized on a 100-point scale to facilitate comparison among institutions.

Results

The analysis demonstrates that Chinese business schools have successfully transformed from traditional educational institutions into complex corporate learning ecosystems.

Table 1.

Comparative Assessment of Strategic Development Indicators

Indicator	CEIBS	Tsinghua SEM	PKU Guanghua
Digital Platform Integration	92	95	88
Internationalization	96	82	80
Corporate Partnerships	91	93	86
Executive Education Development	95	89	84
Research Collaboration	88	91	93
Innovation Ecosystem Participation	90	94	87

The findings indicate that Tsinghua SEM demonstrates the strongest performance in digital transformation and innovation ecosystem development. Its close collaboration with technology companies and AI-oriented industries provides a significant competitive advantage [8,13,18].

CEIBS achieved the highest scores in internationalization and executive education development. The institution has successfully established a global executive education platform supported by extensive multinational corporate partnerships and international faculty networks [6,7,12,17].

PKU Guanghua exhibited superior performance in research collaboration. The institution's strategy focuses on integrating academic research with corporate innovation activities through joint research centers and innovation laboratories [9,19,20].

The results also demonstrate substantial institutional convergence. All three schools have established highly developed digital learning environments and maintain active participation in corporate governance processes through advisory boards and strategic partnerships.

Table 2.

KPI Assessment of Executive Education Ecosystems			
Institution	Actual Performance	Target Performance	KPI (%)
CEIBS	92	100	92
Tsinghua SEM	95	100	95
PKU Guanghua	88	100	88

Tsinghua SEM achieved the highest KPI score, reflecting its strong digital governance architecture and technology-driven educational model [8,13].

Table 3.

ROI Assessment of Executive Education Programs			
Institution	Net Benefit (USD million)	Investment Cost (USD million)	ROI (%)
CEIBS	18.5	10.0	85.0
Tsinghua SEM	21.3	11.5	85.2
PKU Guanghua	15.4	9.0	71.1

The ROI analysis demonstrates that executive education programs generate substantial value for corporate stakeholders. Tsinghua SEM achieved the highest return due to strong integration between executive education and innovation ecosystems [6,8].

Discussion

The findings reveal several important trends shaping the future of business education.

First, Chinese business schools have moved beyond the traditional educational paradigm and adopted ecosystem-based governance models [10-16]. Within these models, business schools function as strategic coordinators connecting corporations, students, researchers, technology providers, and international partners.

Second, digital transformation has become the primary driver of institutional competitiveness. Digital platforms facilitate continuous interaction between business schools and corporate stakeholders, enabling real-time knowledge exchange and flexible executive learning.

Third, AI technologies increasingly influence educational decision-making processes. Institutions that effectively integrate AI-driven analytics demonstrate higher levels of operational efficiency and educational effectiveness [1,4,5].

Fourth, executive education has emerged as a central component of business school strategy. Unlike conventional degree programs, executive education creates long-term relationships with corporate clients and generates sustainable revenue streams.

The comparative analysis also reveals distinct institutional specialization patterns. CEIBS focuses on

internationalization and executive leadership development; Tsinghua SEM emphasizes technological innovation and AI integration; PKU Guanghua prioritizes research-driven corporate collaboration.

These differences suggest that successful business school ecosystems can be developed through multiple strategic pathways. There is no universal model of excellence; rather, institutional success depends on alignment between organizational capabilities, market positioning, and strategic priorities.

The Chinese experience also provides important insights for emerging economies. The integration of digital governance, corporate partnerships, and executive education can significantly enhance institutional competitiveness and support national innovation strategies.

Conclusion

This study examined the transformation of business school – corporate ecosystems in China through the comparative analysis of CEIBS, Tsinghua SEM, and PKU Guanghua School of Management.

The results indicate that Chinese business schools have successfully evolved into digital innovation hubs characterized by advanced governance systems, strong corporate partnerships, extensive executive education ecosystems, and high levels of digital integration.

The research confirms that digital transformation, AI-driven analytics, executive education development, and strategic corporate collaboration constitute the main determinants of institutional competitiveness in contemporary business education.

The KPI and ROI analyses demonstrate that corporate partnership ecosystems generate significant educational, managerial, and economic benefits for participating stakeholders. Executive education programs, in particular, have become important instruments for leadership development, organizational innovation, and corporate transformation.

The findings suggest that universities seeking to strengthen their competitive position should prioritize digital governance, ecosystem-based partnership models, AI integration, and lifelong learning infrastructures.

For Kazakhstan and other emerging economies, the Chinese experience offers a valuable framework for modernizing business education systems and enhancing collaboration between universities and the corporate sector. Future research may expand the comparative analysis to include European and North American business schools and examine the long-term impact of AI technologies on executive education ecosystems.

References:

1. OECD. Digital Education Outlook 2023. Paris: OECD Publishing, 2023.
2. Schwab K. The Fourth Industrial Revolution. Geneva: World Economic Forum, 2020.
3. World Economic Forum. Future of Jobs Report 2024. Geneva: World Economic Forum, 2024.
4. Kaplan A.M., Haenlein M. Rulers of the World, Unite! The Challenges and Opportunities of Artificial Intelligence // *Business Horizons*. 2020. Vol. 63(1). P. 37–50.
5. Li H., Chen Y. Artificial Intelligence and Learning Analytics in Executive Education // *International Journal of Educational Technology in Higher Education*. 2022. Vol. 19(4). P. 1–18.
6. CEIBS. Shanghai CEIBS Education Foundation Annual Report 2024. Shanghai: China Europe International Business School, 2024.
7. CEIBS. CEIBS Education Foundation Annual Report 2025. Shanghai: China Europe International Business School, 2025.
8. Tsinghua University School of Economics and Management. Annual Report 2025. Beijing: Tsinghua University, 2025.
9. Guanghua School of Management. Official Website. Peking University, 2025.
10. Nonaka I., Takeuchi H. The Wise Company: How Companies Create Continuous Innovation. Oxford: Oxford University Press, 2021.
11. Almaty Management University (AlmaU). Sharing Information on Progress (SIP) Report 2024. Almaty, 2024.
12. CEIBS. CEIBS–Harvard–Tsinghua Joint Senior Executive Program. Shanghai, 2024.
13. Tsinghua SEM Executive Education. Executive Education Programs and Strategic Development. Beijing, 2025.
14. AACSB International. China Europe International Business School (CEIBS): Accredited Member. Tampa, FL, 2025.
15. AACSB International. School of Economics and Management, Tsinghua University: Accredited Member. Tampa, FL, 2025.
16. CEIBS. Rankings and Accreditation. Shanghai: CEIBS Official Publications, 2025.
17. CEIBS. EQUIS Reaccreditation Reaffirms CEIBS' Internationalisation Efforts and Commitment to Excellence. Shanghai, 2022.
18. Tsinghua SEM. About Executive Education and Lifelong Learning Platform. Beijing, 2024.
19. Guanghua School of Management. MBA Program Brochure and International Programs. Beijing: Peking University, 2024.
20. Guanghua School of Management. Guanghua-Kellogg Executive MBA Program Information. Beijing: Peking University, 2024.

PRICING STRATEGIES FOR COFFEE PRICE VOLATILITY: A QUALITATIVE STUDY OF A COFFEE ROASTERY IN KUWAIT

Bayu Zam Zam

Departement of Management, Faculty of Economics and Business, Tunas Pembangunan University, Indonesia

Darsono

Departement of Management, Faculty of Economics and Business, Tunas Pembangunan University, Indonesia

Kurniawati Darmaningrum

Departement of Management, Faculty of Economics and Business, Tunas Pembangunan University, Indonesia

<https://doi.org/10.5281/zenodo.20691172>

Abstract

Price volatility in green and roasted coffee beans has become a major challenge for coffee roasteries in maintaining profitability and market competitiveness. While previous studies have widely examined coffee price fluctuations at the producer and export levels, limited research has focused on pricing management strategies at the coffee roastery level, particularly in Middle Eastern markets. Therefore, this study aims to analyze the pricing management strategies implemented by Stockroom Coffee Roasters in Kuwait in responding to coffee bean price volatility. This study employs a qualitative case study approach using operational data, company records, and in-depth interviews with business management. The analysis focuses on the relationship between green bean price fluctuations, cost structure, selling price adjustments, and sales performance during the 2024–2025 period. The findings reveal that the company adopts adaptive pricing strategies by combining cost-plus pricing for green bean products and value-based pricing for roasted coffee products. In addition, supplier diversification, bulk purchasing, and gradual price adjustments are implemented to mitigate the impact of global price volatility. The study also finds that pricing flexibility plays a significant role in maintaining profitability and customer retention under fluctuating market conditions. Theoretically, this study contributes to the literature on pricing management in commodity-based industries by highlighting the integration of multiple pricing approaches under volatile market conditions. Practically, the findings provide insights for coffee roasteries in developing adaptive pricing strategies to sustain business performance in dynamic global markets.

Keywords: pricing strategy, coffee price volatility, coffee roastery, value-based pricing, business sustainability

1. Introduction

The global coffee industry has experienced significant growth over the past two decades, driven by increasing coffee consumption, changing consumer lifestyles, and the rapid expansion of specialty coffee markets. Coffee is no longer perceived merely as a beverage but has evolved into a lifestyle product and a high-value commodity within the global food and beverage industry (International Coffee Organization, 2024) (Statista, 2025). The growth of coffee consumption is not limited to Western countries but has also expanded rapidly in emerging markets and Middle Eastern countries, including Kuwait, where specialty coffee culture continues to develop alongside rising consumer demand for premium coffee products (Helgi Library, 2022).

Despite the continuous growth of the coffee industry, the sector faces substantial challenges related to price volatility in global coffee markets. Coffee prices, particularly green bean prices, are highly fluctuating and difficult to predict due to multiple external factors such as climate change, supply chain disruptions, geopolitical instability, exchange rate movements, and changes in global supply and demand conditions (Pindyck, 2004); (Tadesse, G., Algieri, B., & Kalkuhl, 2020); (Bank & Group, 2024). In recent years, global coffee prices have experienced sharp increases due to extreme weather conditions in major coffee-producing countries such as Brazil and Colombia, combined with

increasing logistics and transportation costs. This condition creates uncertainty across the coffee supply chain and directly affects firms operating in coffee-related industries.

Price volatility represents a major concern for coffee roasteries because green beans constitute the largest component of production costs. As firms that rely heavily on imported raw materials, coffee roasteries are highly vulnerable to fluctuations in international coffee prices and exchange rates. Increases in green bean prices lead to higher production costs, declining profit margins, and difficulties in determining competitive selling prices. Conversely, when coffee prices decline, market competition intensifies and often triggers aggressive price competition among coffee businesses. Consequently, coffee roasteries face a strategic dilemma between maintaining profitability and preserving customer demand (Thomas T. Nagle, n.d.); (Kotler, P., & Keller, 2016).

In addition, the specialty coffee industry differs from traditional commodity markets because roasted coffee products contain additional value dimensions beyond raw material costs. Product quality, roasting consistency, brand image, customer experience, and perceived value play important roles in determining pricing decisions for roast bean products (Hinterhuber, 2004); (Hinterhuber, 2016).

Therefore, pricing management in coffee roasteries cannot rely solely on cost-based calculations but

must also incorporate market conditions, customer perceptions, and competitive positioning. This condition requires coffee roasteries to adopt adaptive and flexible pricing strategies in order to maintain operational sustainability under volatile market conditions. (Porter, 1985); (Monroe, 2021). Companies must adopt adaptive and flexible pricing strategies to maintain stability in performance while responding to dynamic market conditions.

Although previous studies have extensively discussed coffee price volatility, most of the existing literature primarily focuses on coffee farmers, commodity trading, export performance, and agricultural supply chains. Limited studies examine how downstream coffee businesses, particularly coffee roasteries, manage pricing strategies in response to volatile raw material prices. Moreover, studies focusing on pricing management strategies in Middle Eastern specialty coffee markets remain relatively scarce despite the rapid growth of coffee consumption in the region. Existing research generally emphasizes macroeconomic aspects of coffee price fluctuations rather than managerial responses at the firm level. As a result, there is still limited understanding regarding how coffee roasteries integrate cost-based pricing, value-based pricing, and market-oriented pricing strategies under conditions of price uncertainty.

This study attempts to address these gaps by focusing on Stockroom Coffee Roasters, a specialty coffee roastery operating in Kuwait. Kuwait represents an important research context because the country has experienced rapid growth in specialty coffee consumption while remaining highly dependent on imported coffee beans. As a non-producing coffee country, Kuwait is particularly vulnerable to fluctuations in global coffee prices, logistics costs, and exchange rate movements. Furthermore, the specialty coffee market in Kuwait is characterized by intense competition and increasing consumer expectations regarding coffee quality and brand value. These conditions make Kuwait a relevant setting for examining how coffee roasteries respond strategically to price volatility in imported coffee commodities.

In addition, this study offers several contributions to the existing literature. First, the study focuses on coffee roasteries as downstream actors in the coffee value chain, which have received less scholarly attention compared to producers and exporters. Second, the research compares pricing approaches between green bean and roasted bean products, which possess different market characteristics and pricing sensitivities. Third, the study contributes empirical evidence from the Middle Eastern coffee market, particularly Kuwait, which remains underexplored in coffee business research. Finally, the study highlights the importance of integrating multiple pricing approaches, including cost-plus pricing, value-based pricing, and adaptive pricing strategies, in responding to volatile commodity markets.

Several recent studies have also highlighted the increasing complexity of coffee price volatility and market uncertainty. Recent research shows that global coffee prices continue to exhibit strong volatility persistence due to climate risks and supply chain

disruptions (Massrie, 2025). Other studies emphasize that commodity price shocks increasingly affect downstream business sustainability and pricing flexibility in food and beverage industries (Nyamwaro et al., 2025). Furthermore, recent literature on specialty coffee markets indicates that perceived value and product differentiation play increasingly important roles in determining coffee pricing decisions beyond raw material costs. These findings further strengthen the importance of examining pricing management strategies within coffee roasteries operating under volatile market conditions.

Based on these issues, this study aims to analyze the pricing management strategies implemented by Stockroom Coffee Roasters in responding to the volatility of green and roasted coffee bean prices. Specifically, this study seeks to answer the following research questions: (1) How does coffee bean price volatility affect pricing decisions at coffee roasteries? and (2) What pricing strategies are implemented by coffee roasteries to maintain profitability and competitiveness under volatile market conditions? Through this analysis, the study is expected to provide both theoretical and practical insights regarding pricing management in commodity-based industries and contribute to a better understanding of strategic adaptation in the specialty coffee business.

2. Method

2.1 Research Design

This study employs a qualitative case study approach to analyze the pricing management strategies implemented by Stockroom Coffee Roasters in responding to the volatility of green and roasted coffee bean prices. A qualitative case study is considered appropriate because the research focuses on understanding managerial responses, pricing decisions, and operational strategies within a real business context under conditions of market uncertainty. The study emphasizes the interpretation of business processes and organizational decision-making rather than statistical generalization.

Although numerical data such as green bean prices, selling prices, operational costs, and sales volumes are utilized in the analysis, these data function as supporting evidence to strengthen the interpretation of pricing strategies and business responses. Therefore, the study does not aim to test causal relationships using inferential statistical methods but instead seeks to provide an in-depth understanding of pricing management practices within the coffee roasting industry. The research was conducted between September and November 2025 at Stockroom Coffee Roasters, Kuwait.

2.2 Research Setting and Unit of Analysis

The study was conducted at Stockroom Coffee Roasters, a specialty coffee company operating in Kuwait that focuses on importing, roasting, and distributing coffee products. The company imports green coffee beans from several major coffee-producing countries, including Brazil, Colombia, Ethiopia, Kenya, and Honduras. The unit of analysis in this study consists of pricing management activities, operational cost structures, and strategic business responses related to coffee price volatility.

The selection of Stockroom Coffee Roasters as the research object was based on purposive considerations. First, the company operates in a specialty coffee market characterized by high competition and increasing customer demand. Second, the company relies heavily on imported coffee beans, making it highly exposed to global coffee price fluctuations, logistics costs, and exchange rate volatility. Third, the company manages both green bean and roasted bean products, allowing the study to compare different pricing approaches under volatile market conditions.

2.3 Data Sources

This study uses both primary and secondary data sources to provide a comprehensive understanding of pricing management strategies.

Primary data were obtained through in-depth interviews and internal operational documents from the company. Interviews were conducted with business owners and operational managers who are directly involved in pricing decisions, procurement, and production management. Internal company documents include production records, roasting logs, operational cost reports, pricing records, and sales reports covering the period of 2024–2025.

Secondary data were obtained from external sources, including reports from the International Coffee Organization (ICO), market reports, global coffee price data, and relevant academic literature related to commodity price volatility, pricing strategy, and specialty coffee business management. Additional supporting data related to logistics costs, exchange rates, and market trends were also collected from industry publications and company financial records.

2.4 Data Collection Techniques

Data collection in this study was conducted using three main techniques: in-depth interviews, documentation, and direct observation.

First, semi-structured in-depth interviews were conducted to explore managerial perspectives regarding pricing strategies, operational challenges, and responses to coffee price fluctuations. The semi-structured format allowed flexibility in exploring emerging issues while maintaining consistency with the research objectives.

Second, documentation techniques were used to collect operational and financial data related to green bean prices, production costs, selling prices, and sales performance. The documents analyzed included invoices, procurement records, roasting reports, and sales reports covering a 24-month period.

Third, direct observation was conducted within the operational environment of the company to understand roasting activities, inventory management, procurement processes, and pricing practices implemented by the company. Observation was used to strengthen the interpretation of interview findings and operational records.

2.5 Data Validity and Reliability

To ensure the validity and reliability of the findings, this study applied data triangulation techniques. Triangulation was conducted by comparing information obtained from interviews, operational documents, and direct observations. The use of multiple data sources allowed the researcher to verify

the consistency and accuracy of the findings related to pricing management and operational decision-making.

In addition, source triangulation was applied by collecting information from different managerial perspectives within the company, including operational management and business management. Method triangulation was also implemented through the integration of interviews, documentation analysis, and direct observation.

The credibility of the findings was further strengthened through member checking, where several interview results and interpretations were reviewed and confirmed by company representatives to ensure the accuracy of the information provided. Furthermore, the study maintained consistency in data collection and analysis procedures to enhance the dependability of the research findings.

2.6 Data Analysis Techniques

Data analysis in this study was conducted using qualitative descriptive analysis combined with trend analysis of operational data. The analysis process consisted of several stages.

First, all interview results, field notes, and operational documents were organized and categorized based on key themes related to pricing management, cost structure, price volatility, and business strategy. Second, the data were reduced and classified to identify recurring patterns and strategic responses implemented by the company.

Third, trend analysis was conducted on operational data such as green bean prices, selling prices, operational costs, and sales volumes during the 2024–2025 period. The analysis aimed to identify patterns of price fluctuations and their relationship with pricing decisions and sales performance.

Finally, the findings from interviews, documentation, and operational analysis were interpreted comprehensively to explain how the company adapts its pricing strategies under volatile market conditions. The interpretation process focused on understanding the interaction between cost pressures, market competition, customer value perception, and managerial decision-making within the specialty coffee business context.

2.7 Ethical Considerations

This study was conducted with the consent and cooperation of Stockroom Coffee Roasters management. The company granted permission for the use of operational and business data for academic purposes. All information obtained during the research process was used solely for research purposes and treated confidentially to protect the company's business interests and operational privacy.

3. Results

3.1 Overview of the Research Object

This study was conducted at Stockroom Coffee Roasters, a specialty coffee company operating in Kuwait that focuses on importing, roasting, and distributing coffee products. The company imports green coffee beans from several major coffee-producing countries, including Brazil, Colombia, Ethiopia, Kenya, and Honduras. As a coffee roastery that relies heavily on imported raw materials, the company is highly exposed to fluctuations in global

coffee prices, logistics costs, and exchange rate movements.

During the observation period, the company experienced continuous operational growth despite unstable market conditions. The company recorded total sales of 20,990 kg in 2024 and projected sales of 22,064 kg in 2025, indicating approximately 5.1% sales growth. However, this growth occurred alongside significant increases in green bean procurement costs and operational expenses.

The findings indicate that coffee price volatility became one of the most dominant external factors affecting operational and pricing decisions within the company. Consequently, the company implemented several adaptive pricing strategies to maintain

profitability and competitiveness in the specialty coffee market.

3.2 Green Bean Price Volatility

The results indicate that green bean prices experienced substantial fluctuations during the 2024–2025 period. The volatility was primarily influenced by climate-related disruptions in major coffee-producing countries, increasing logistics costs, supply chain uncertainty, and global market speculation. Arabica coffee prices showed the highest increase during the second half of 2024 and continued to fluctuate throughout early 2025.

Figure 1 presents the trend of green bean prices based on coffee origin during the observation period.

Figure 1.

Trend of Green Bean Prices by Origin (2024–2025)

Month	Brazil	Colombia	Ethiopia	Kenya	Honduras
Jan 2024	6.2	6.5	7.1	7.4	6.3
Apr 2024	6.8	7.0	7.5	7.9	6.9
Jul 2024	7.5	7.8	8.2	8.5	7.6
Oct 2024	8.1	8.4	8.9	9.1	8.2
Jan 2025	8.5	8.8	9.2	9.5	8.6
Apr 2025	8.9	9.1	9.6	9.8	8.9

Unit: USD/kg

Figure 1 shows that all coffee origins experienced upward price trends throughout the observation period. Kenya and Ethiopia recorded the highest average prices, while Brazil and Honduras remained relatively lower despite continuous increases. The findings demonstrate that coffee roasteries operating in import-dependent markets are highly vulnerable to fluctuations in international coffee commodity prices.

In addition, the company reported that the unpredictability of coffee prices complicated procurement planning and inventory management. Sudden price increases forced the company to adjust purchasing schedules and prioritize inventory efficiency to minimize operational risks.

3.3 Impact on Cost Structure

The increase in green bean prices significantly affected the company's cost structure. Green bean procurement represented the largest component of production costs, followed by roasting operations, packaging, labor, and logistics expenses. As coffee prices increased, the company experienced rising Cost of Goods Sold (COGS) and declining profit margins, particularly in wholesale market segments that were highly sensitive to price changes.

Table 1 presents the comparison of production costs and estimated profit margins across several coffee origins.

Table 1.

Comparison of Production Costs and Estimated Profit Margins

Origin	Green Bean Cost/kg (USD)	Roasting & Operational Cost	Selling Price/kg (USD)	Estimated Margin
Brazil	8.9	2.1	14.5	18%
Colombia	9.1	2.3	15.2	19%
Ethiopia	9.6	2.5	16.4	21%
Kenya	9.8	2.5	16.8	20%
Honduras	8.9	2.0	14.3	17%

The findings indicate that higher green bean prices directly increased overall production costs. However, the company did not immediately transfer all cost increases to customers because of concerns regarding customer retention and market competition. As a result, profit margins fluctuated depending on product type, market segment, and customer purchasing behavior.

Furthermore, the company experienced increasing inventory costs due to bulk purchasing strategies implemented during relatively stable market periods. Operational costs such as gas, electricity, and packaging materials also showed gradual increases throughout the observation period.

3.4 Pricing Strategies Implemented by the Company

The results reveal that the company implemented different pricing approaches for green bean and roasted bean products. Green bean products were primarily priced using a cost-plus pricing approach because these products were highly sensitive to market competition and global commodity prices. In contrast, roasted bean products utilized value-based pricing by considering perceived customer value, roasting quality, brand image, and customer experience.

The company also implemented several adaptive strategies to mitigate the impact of coffee price volatility.

Table 2.

Pricing Strategies Implemented by the Company		
Strategy	Purpose	Operational Impact
Supplier diversification	Reduce dependency on single suppliers	Improved supply stability
Bulk purchasing	Secure lower procurement costs	Reduced short-term price exposure
Gradual price adjustment	Maintain customer retention	Stable market demand
Value-based pricing	Strengthen brand positioning	Higher perceived product value
Flexible margin adjustment	Respond to market conditions	Improved pricing flexibility

The findings suggest that the company did not rely on a single pricing model but instead integrated multiple pricing approaches simultaneously. This adaptive pricing strategy enabled the company to balance internal cost pressures with external market expectations.

In addition, value-based pricing played a significant role in maintaining customer loyalty despite increasing prices. Customers purchasing specialty roasted coffee products were found to place greater

emphasis on quality consistency and brand reputation rather than price alone.

3.5 Sales Performance Trends

Despite increasing raw material and operational costs, the company maintained positive sales growth during the observation period. The findings indicate that adaptive pricing strategies and product differentiation contributed to sustaining customer demand and market competitiveness.

Figure 2 presents the monthly sales volume trends during 2024–2025.

Figure 2.

Monthly Sales Volume Trends (2024–2025)	
Period	Sales Volume (kg)
Q1 2024	4,820
Q2 2024	5,060
Q3 2024	5,320
Q4 2024	5,790
Q1 2025	5,110
Q2 2025	5,420
Q3 2025	5,630
Q4 2025*	5,904

Projected sales

The results demonstrate that sales performance remained relatively stable despite fluctuations in green bean prices. Although several customer segments showed sensitivity to price increases, demand for specialty roasted coffee products remained positive due to strong product differentiation and customer loyalty.

The company also reported that wholesale customers were generally more price-sensitive compared to retail consumers. Consequently, pricing flexibility and relationship management became important factors in maintaining long-term business relationships with wholesale buyers.

3.6 Dominant Factors Affecting Pricing Decisions

The findings indicate that green bean price volatility was the most dominant factor affecting pricing decisions within the company. As the largest component of production costs, fluctuations in green bean prices directly influenced selling prices, operational planning, and profit margins.

In addition to raw material costs, several other factors also influenced pricing decisions, including logistics costs, exchange rate movements, market competition, and customer value perception. However, these factors were considered secondary compared to the influence of green bean price fluctuations.

The findings also show that pricing decisions were influenced by customer segmentation. Wholesale customers generally prioritized price competitiveness,

while retail consumers emphasized quality consistency, roasting profile, and overall customer experience.

3.7 Summary of Findings

Overall, the results demonstrate that global coffee price volatility significantly affected the operational and pricing management practices of Stockroom Coffee Roasters. The company experienced increasing production costs, fluctuating profit margins, and operational uncertainty due to rising green bean prices and logistics expenses.

To address these challenges, the company implemented adaptive pricing strategies combining cost-plus pricing, value-based pricing, supplier diversification, bulk purchasing, and gradual price adjustments. The findings further indicate that pricing flexibility and product differentiation played important roles in maintaining business sustainability and competitiveness under volatile market conditions.

Despite increasing operational costs, the company maintained stable sales growth throughout the observation period, suggesting that effective pricing management and strong customer value perception contributed positively to overall business performance.

4. Discussion

This study demonstrates that green bean price volatility significantly affects pricing management decisions within coffee roasteries, particularly those operating in import-dependent markets such as Kuwait. The findings indicate that fluctuations in global coffee

prices not only increase production costs but also create operational uncertainty related to procurement planning, inventory management, and profit margin stability. This finding can be interpreted through commodity price volatility theory proposed by Pindyck (2004), which argues that commodity markets are inherently unstable because prices are influenced by unpredictable external factors such as climate conditions, supply disruptions, and market expectations. In commodity-dependent industries, volatility does not merely affect pricing levels but also alters strategic decision-making processes related to production planning and resource allocation. Therefore, coffee roasteries operating in import-based markets become particularly vulnerable because they possess limited control over upstream market dynamics.

The results reveal that green bean products and roasted coffee products require different pricing approaches due to differences in market characteristics and customer behavior. Green bean products are primarily treated as commodity-based products characterized by high price sensitivity and low differentiation. Consequently, the company relies heavily on cost-plus pricing strategies in determining selling prices. According to pricing theory proposed by Thomas T. Nagle and Holden, cost-plus pricing is commonly implemented in industries where cost structures become the primary determinant of selling prices and market value differentiation remains limited. Since green bean products are highly influenced by international commodity prices, firms prioritize cost recovery and margin protection in pricing decisions.

Conversely, roasted coffee products contain stronger intangible value dimensions including roasting consistency, sensory quality, customer experience, and brand perception. Consequently, value-based pricing becomes more effective because customers purchasing specialty coffee products tend to evaluate products based not only on production costs but also on perceived value. This finding strongly supports the value-based pricing framework developed by Hinterhuber (2004; 2016), which emphasizes that firms can reduce dependence on cost fluctuations when customers perceive superior value and are willing to pay premium prices. Within specialty coffee markets, consumers frequently associate product quality, exclusivity, and brand reputation with greater value, allowing firms to maintain profitability despite increasing production costs.

Furthermore, these findings support strategic pricing theory proposed by Kotler and Keller (2016), which suggests that firms operating in highly competitive and uncertain markets tend to adopt hybrid pricing approaches by integrating both cost considerations and customer value perceptions. Rather than relying exclusively on a single pricing method, businesses often combine multiple approaches to balance internal financial pressures with external market expectations. This study extends previous discussions because it demonstrates how downstream businesses such as coffee roasteries implement adaptive pricing strategies under fluctuating commodity market conditions.

The findings further indicate that pricing flexibility plays an essential role in maintaining business sustainability under volatile market conditions. The company avoided immediate and aggressive price increases despite rising operational costs and instead implemented gradual price adjustments. Such a strategy can be explained through customer relationship and perceived fairness theory in pricing literature, which suggests that abrupt price changes may negatively affect customer trust and long-term purchasing behavior. Monroe (2021) argues that pricing decisions influence not only short-term revenue outcomes but also customer perceptions regarding fairness and value. Therefore, gradual pricing adjustments become strategically important in preserving customer loyalty while maintaining market competitiveness.

Interestingly, the findings suggest that specialty coffee consumers demonstrated relatively lower price sensitivity compared to wholesale buyers. This result aligns with consumer value theory and Porter's (1985) competitive advantage framework, which explains that differentiated products possess greater resistance to price competition because customers evaluate broader value attributes beyond price alone. Product differentiation through roasting quality, service experience, and brand identity creates competitive advantages that reduce customer sensitivity toward moderate price increases. Therefore, specialty coffee businesses may sustain profitability through differentiation strategies rather than relying solely on price competition.

The effectiveness of supplier diversification and bulk purchasing strategies can also be interpreted using supply chain risk management theory. Christopher and Peck's supply chain resilience perspective suggests that procurement flexibility and supplier diversification improve organizational resilience under uncertain environments. By sourcing coffee beans from multiple suppliers and origins, firms reduce dependency risks associated with specific markets or regions. Likewise, bulk purchasing strategies during stable market periods allow firms to reduce exposure to sudden short-term price increases and supply disruptions. Thus, procurement decisions become strategic instruments for mitigating operational risks associated with commodity price fluctuations.

Nevertheless, the findings also reveal several strategic limitations. Despite implementing adaptive pricing and procurement strategies, the company remains highly dependent on global coffee market conditions that cannot be controlled at the firm level. During periods of extreme market shocks, pricing flexibility alone may be insufficient to fully protect profitability. In addition, wholesale customers demonstrated higher price sensitivity than retail consumers, limiting the company's ability to transfer rising costs uniformly across all market segments. This finding indicates the increasing importance of market segmentation theory in pricing decisions because customer groups differ in their responses toward price changes and perceived value.

From a theoretical perspective, this study contributes to pricing management literature by

demonstrating the importance of integrating multiple pricing theories under uncertain market conditions. Unlike previous studies that primarily focus on producers and exporters, this study emphasizes how downstream coffee businesses strategically balance internal cost pressures and external customer expectations. The findings also provide empirical support for theories of value-based pricing, strategic pricing, and supply chain flexibility within specialty coffee industries.

From a managerial perspective, the findings suggest that coffee roasteries and food and beverage firms operating under volatile commodity markets should avoid rigid cost-based pricing systems. Instead, businesses should adopt adaptive pricing systems that integrate operational costs, customer value perception, market positioning, and procurement flexibility. Strengthening product differentiation and customer loyalty may reduce sensitivity toward raw material price volatility and support long-term business sustainability.

Despite these contributions, this study has several limitations. First, the research focuses on a single coffee roastery operating in Kuwait, which limits generalizability across different market contexts. Second, the study primarily employs qualitative analysis supported by operational data without extensive quantitative modeling. Future studies are encouraged to employ comparative or mixed-method approaches involving multiple coffee businesses and broader financial performance analyses to generate deeper insights regarding pricing management under commodity market volatility.

5. Theoretical and Managerial Contributions

This study contributes to the existing literature on pricing management, commodity price volatility, and specialty coffee business management in several important ways. Previous studies on coffee price volatility have primarily focused on upstream sectors such as coffee farmers, agricultural production, export performance, and commodity market dynamics. Limited attention has been given to downstream businesses, particularly coffee roasteries, which directly face operational and pricing challenges resulting from fluctuating raw material costs. Therefore, this study extends the discussion of commodity price volatility by examining how coffee roasteries strategically manage pricing decisions under uncertain market conditions.

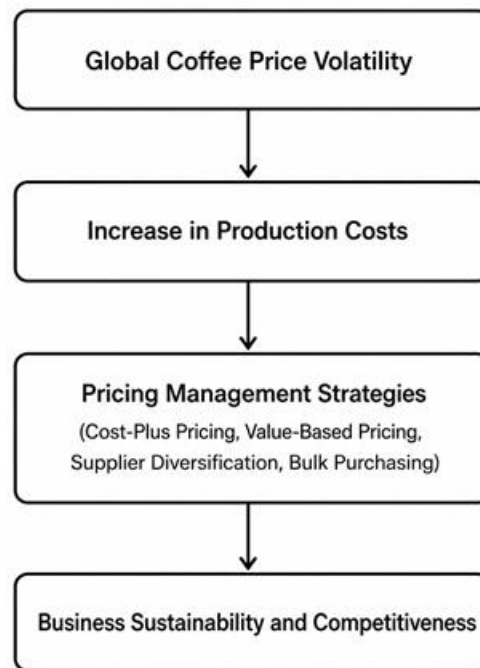
In addition, this study contributes to pricing management literature by demonstrating the integration of multiple pricing approaches within a single business context. The findings reveal that coffee roasteries do not rely solely on cost-based pricing but instead combine cost-plus pricing, value-based pricing, and adaptive pricing strategies simultaneously. This finding enriches previous discussions on strategic pricing by showing how firms operating in volatile commodity markets balance internal cost pressures with external customer expectations and competitive market dynamics.

The study also contributes to the growing literature on specialty coffee businesses by highlighting the importance of perceived customer value in determining pricing flexibility. Unlike traditional commodity products, specialty roasted coffee products possess intangible value dimensions such as roasting consistency, customer experience, and brand perception. As a result, value-based pricing becomes increasingly relevant in maintaining competitiveness and customer loyalty despite rising production costs.

Furthermore, this research provides empirical evidence from Kuwait, a Middle Eastern country with a rapidly growing specialty coffee market that remains underexplored in academic research. Most existing studies on coffee business management focus on Western markets or coffee-producing countries, whereas this study emphasizes the strategic challenges faced by import-dependent coffee businesses operating in emerging specialty coffee markets. Therefore, the study broadens the geographical perspective of coffee business research and contributes to a better understanding of pricing management within non-producing coffee economies.

From a managerial perspective, the findings provide practical insights for coffee roasteries and food and beverage businesses operating under volatile commodity market conditions. The study suggests that firms should develop flexible pricing systems that integrate operational cost considerations, customer value perception, and market positioning simultaneously. In addition, strategies such as supplier diversification, gradual price adjustments, and product differentiation may help businesses reduce vulnerability to raw material price fluctuations and improve long-term operational sustainability.

The conceptual framework of this study is presented in this Figure



Acknowledgments

This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The author would like to acknowledge the management of Stockroom Coffee Roasters for their cooperation and for providing access to the data and information necessary for this research. The author also expresses gratitude to academic supervisors and colleagues who provided valuable feedback and insights during the research and manuscript preparation process. There are no special agreements concerning authorship in this study. Finally, the author would like to thank all parties who provided personal support and assistance during the completion of this manuscript.

6. Conclusion

This study examined the pricing management strategies implemented by Stockroom Coffee Roasters in responding to the volatility of green and roasted coffee bean prices. The findings demonstrate that fluctuations in global coffee prices significantly affect production costs, pricing decisions, operational planning, and profitability within coffee roasteries operating in import-dependent markets.

The study reveals that the company adopts multiple pricing approaches simultaneously, including cost-plus pricing for green coffee bean products and value-based pricing for roasted coffee products. In addition, adaptive strategies such as supplier diversification, bulk purchasing, gradual price adjustments, and flexible margin management play important roles in mitigating the impact of commodity price volatility.

The findings also indicate that pricing flexibility and product differentiation contribute positively to maintaining customer loyalty and business sustainability despite increasing operational costs. Furthermore, the study highlights the importance of integrating operational cost considerations with customer value perception and competitive market

positioning in developing effective pricing strategies within specialty coffee businesses.

Theoretically, this study contributes to the literature on pricing management and commodity price volatility by providing empirical evidence from the specialty coffee industry in Kuwait, a context that remains underexplored in previous research. Practically, the findings provide managerial insights for coffee roasteries and food and beverage businesses in developing adaptive pricing systems under volatile market conditions.

Despite these contributions, this study is limited to a single coffee roastery operating in Kuwait and primarily applies a qualitative approach. Future studies are recommended to employ comparative or mixed-method approaches involving multiple coffee businesses and broader financial analyses to provide deeper insights into pricing management and business sustainability under commodity price volatility.

References:

1. Bank, W., & Group, P. (2024). *Global Economic Prospects* (Issue June).
2. Helgi Library. (2022). *Coffee consumption per capita in Kuwait*.
3. Hinterhuber, A. (2004). *Towards value-based pricing — An integrative framework for decision making*. 33(January 2003), 765–778. <https://doi.org/10.1016/j.indmarman.2003.10.006>
4. Hinterhuber, A. (2016). *Value quantification capabilities in industrial markets*. 76, 163–178. <https://doi.org/10.1016/j.jbusres.2016.11.019>
5. International Coffee Organization. (2024). *World coffee consumption report*.
6. Kotler, P., & Keller, K. L. (2016). *Marketing Management (15th ed.)* Pearson Education.
7. Massrie, K. D. (2025). Why is the price of coffee rising globally? Future prospects for Ethiopian coffee. *Frontiers in Sustainable Food Systems*, 9,

1545168.

8. Monroe, K. B. (2021). *Pricing: Making profitable decisions (4th ed.)*. Routledge.

9. Nyamwaro, L. K., Wachiuri, E., & Namusonge, E. (2025). PRICE FLUCTUATIONS ON PERFORMANCE OF FOOD AND BEVERAGE MANUFACTURING FIRMS IN KENYA. *International Journal of Social Sciences Management and Entrepreneurship (IJSSME)*, 9(1).

10. Pindyck, R. S. (2004). *VOLATILITY AND COMMODITY PRICE DYNAMICS*. 24(11), 1029–1047. <https://doi.org/10.1002/fut.20120>

11. Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. Free Press.

12. Statista. (2025). *Coffee market in Kuwait – Revenue and forecast*.

13. Tadesse, G., Algieri, B., & Kalkuhl, M. (2020). *Food Price Volatility and Its Implications for Food Security and Policy* (Issue 72164).

14. Thomas T. Nagle, G. M. and E. G. (n.d.). *The Strategy and Tactics of Pricing*.

DISPROPORTIONS IN THE ECONOMY AND THE IMPACT OF THE "MIDDLE-INCOME TRAP" ON STRUCTURAL TRANSFORMATION

Yuzbashieva G.

*Professor, Doctor of Sciences in Economics, D.Sc. (Economics),
Institute of Economics of the Ministry of Science and Education of the Azerbaijan Republic, Baku, Azerbaijan*

Abdullayev K.

*Doctor of Sciences in Economics, D.Sc. (Economics),
Institute of Economics of the Ministry of Science and Education of the Azerbaijan Republic, Baku, Azerbaijan*

Maulidizen A.

*Doctor of Sharia Economics,
Universitas Dian Nusantara,
Jakarta, Indonesia*

Aliyeva E.

*Ph.D in Economics,
Institute of Economics of the Ministry of Science and Education of the Azerbaijan Republic, Baku, Azerbaijan*

Mirzayev E.

*Senior lecturer,
Azerbaijan University,
Baku, Azerbaijan*

<https://doi.org/10.5281/zenodo.20691174>

Abstract

The article "Economic Disproportions and the Impact of the 'Middle-Income Trap' on Structural Transformation" explores existing structural imbalances within the domestic economy and analyzes how the "middle-income trap" affects economic modernization. The author identifies systemic regularities that impede structural shifts and demonstrates that the middle-income trap dampens GDP growth rates, amplifies vulnerability to external shocks, exacerbates income inequality, induces human capital flight, and accelerates capital outflows. Concurrently, the paper underscores that the strategic course pursued by the Government of Azerbaijan has successfully generated positive socio-economic developments. The nation's steady, incremental, and sustainable development path validates the selected trajectory, demonstrating the viability and real-world efficacy of the Azerbaijani model of socio-economic development.

Keywords: investment, transformation, development, economic regularities, innovations, productivity, effectiveness.

Introduction

Activating state intervention in national economic development facilitates the optimization of production structures, thereby ensuring the operational efficiency of economic systems. The primary goal is to drive economic growth and development through qualitative growth factors, which encompass scientific advancements and new knowledge. Achieving a rational alignment between innovation and professional qualifications is essential to generate synergistic effects. Human capital stands out as the ultimate competitive advantage of the post-oil economy. Under conditions of rapid economic volatility and high uncertainty, the emergence of a new technological paradigm satisfies expanding societal needs while facilitating a transition from quantitative accumulation to qualitative transformation.

It is highly advisable to implement a product-priority strategy designed to advance economic complexity and bolster the economy's innovative development trajectory. The foundational premise is that long-term economic resilience is achieved not through resource rent or financial reserves, but via the continuous capacity of the economy to generate complex, knowledge-intensive goods. The successful implementation of

large-scale projects depends less on the volume of financial injections and more on the quality and efficacy of the governance framework. Consequently, optimizing public expenditures represents a vital avenue for discovering latent financial resources [1].

Modern economic growth is fundamentally characterized by the leading role of scientific, technical, and technological progress, alongside the intellectualization of core production factors [6]. A defining feature of contemporary growth is the institutionalization of continuous innovation within management practices. The existing economic structure serves as a pivotal determinant of growth, as it dictates the potential growth ceiling and determines which structural adjustments will catalyze future expansion or stall necessary modernization [7]. The urgency of this issue stems from the fact that the macroeconomic impacts of innovative development are currently delayed. Based on established development patterns, identifying mechanisms to rectify structural disproportions is essential for executing a successful structural transformation [2].

Regularities in national economic development

The contemporary economic trajectory of the country exhibits several distinct patterns and systemic regularities:

- Conceptual understandings of these patterns are rooted in theories of uneven, cyclical development, which consist of successive stages corresponding to specific structural states of the economy.

- Regressive structural shifts have occurred historically, causing economic growth to remain predominantly extensive and limiting the establishment of a foundation for qualitative development.

- The technological and production layout is highly fragmented and heterogeneous, exhibiting a simultaneous coexistence of obsolete, intermediate, and advanced technologies that signals a structural imbalance in production.

- A contraction of investment potential within the machinery sector has triggered technological degradation, reduced total output volumes, and diminished overall market competitiveness and operational efficacy.

- The minimal decline observed in the Fuel and Energy Complex (FEC) highlights the persistent resource-dependent orientation of the industrial sector and the wider economy.

- The expansion of the private sector occurred primarily through the privatization of state assets, which led to the fragmentation of the state sector's industrial base while producing a private sector initially hesitant to invest in high-risk innovations.

- While structural efficiency by share of output declined in the public sector and rose in the private sector, the aggregate efficiency of these structural reallocations remains marginal.

- Trends in fixed capital investment show an expanding private sector share and a contracting public sector share, demonstrating a shift in investment flows; however, this trend has not consistently triggered the renewal or replacement of fixed assets.

- The domestic economic structure exhibits high structural inertia, as evidenced by structural distortions between accumulation and consumption, monopolistic tendencies, resource dependence, and low inter-sectoral capital mobility, alongside a low share of qualitative structural adjustments in manufacturing.

- Structural shifts have historically unfolded spontaneously, failing to optimize industrial composition while disproportionately strengthening the financial sector, creating a disconnect between the financial and real production sectors.

- Economic growth remains highly dependent on resource rents and public expenditures; this growth has yet to translate into sustained productivity gains or a broader tax base, rendering a reform of rent allocation and expenditure control critical [8].

Under these conditions, economic diversification is essential to establish the prerequisites for structural transformation. Sustainable development can only be realized by transitioning from a resource-stabilization model toward an "endogenous-diversified and institutionally-inclusive model" of economic development. In this proposed framework, systemic resilience is built upon technological complexity, inclusive institutions, and innovations within the real sector of the economy. Structural transformation must fundamentally reshape

the growth paradigm by boosting productivity, stimulating private investment, and channeling resource revenues into human capital and advanced technologies. This necessitates large-scale diversification to avoid economic stagnation, particularly since historical rapid growth was heavily supported by resource revenues, public spending, and external price factors [3].

Comparative theoretical approaches to structural transformation

The economic policy executed between 2020 and 2025 represents a hybrid model combining Keynesian, institutional, neoclassical, and socially oriented approaches, reflecting an adaptive response to shifting internal and external environments. While state reserves and state-led initiatives have successfully maintained macroeconomic stability, a complete structural transformation for post-oil development remains a long-term priority. The theoretical foundations of this structural transformation model rely on:

- Endogenous growth: maximizing knowledge, human capital, and continuous innovation.
- Economic complexity: enhancing technological depth and diversifying export complexity.
- Institutional economics: strengthening inclusive institutions and promoting open market competition.
- New industrial policy: utilizing the state as a strategic coordinator and facilitator.
- Sustainable/green economy: integrating environmentally conscious growth trajectories.

The main features of the "Middle-income trap"

The middle-income trap profoundly alters the course of structural transformation. Upon entering this trap, a nation's extensive growth factors become exhausted while new growth engines fail to develop maturely. The competitive advantage of low-cost labor diminishes, and technical-technological innovation capacity slows down. This necessitates an immediate transition toward intensive, innovation-driven economic growth rooted in high productivity [5].

In this context, structural transformation is defined as the transition toward a knowledge-based economy prioritized around complex, high-tech industries that generate substantial added value. Elevating the role of human capital through advanced education and scientific research is critical to building the innovation capacity required to exit the trap [6]. Structural vulnerabilities associated with the trap include industrial stagnation, low export diversification, a prominent low-productivity service sector, insufficient protection of intellectual property rights, and educational pipelines aligned with obsolete economic models [4].

Ultimately, the middle-income trap acts as a major barrier preventing an economy from advancing from a "catching-up" paradigm to an endogenous-diversified and institutionally-inclusive model. To break this cycle, the state must take an active role, as unguided market mechanisms may lack the regulatory capacity to correct these deep imbalances on their own.

Key priorities of modern socio-economic development.

The government's economic policy focuses on generating inclusive rather than merely aggregate

growth, ensuring that developmental benefits are distributed evenly across the socio-economic spectrum. Inclusive development guarantees equal socio-economic starting conditions, allowing every citizen to realize their creative and productive potential. This approach relies on optimized labor organization, enhanced workforce motivation, and strong strategic planning alongside high-tech adoption.

The Republic of Azerbaijan has achieved notable milestones by emphasizing non-oil sector diversification, implementing transparency reforms, and improving the broader investment climate. Poverty and unemployment rates have been minimized to historically low levels of approximately 5 percent. Furthermore, initiatives like the "Digital Silk Road" project—which includes deploying a fiber-optic network across the Caspian Sea floor—aim to establish the nation as a key regional digital hub.

The current economic model integrates five inter-dependent pillars tailored to the country's governance structure and strategic goals:

- Strong and effective governance: clarifying and strengthening the state's strategic management and coordination capabilities.
- Investment inflow model: maximizing investment efficiency as a core engine of broader economic development.
- Export development model: prioritizing import substitution and channeling export revenues into domestic economic diversification.
- Priority industrial and agricultural development: targeting strategic non-oil real sectors to build a balanced domestic output.
- Effective social policy: maintaining social equity and human welfare as the core foundation of the economic paradigm.

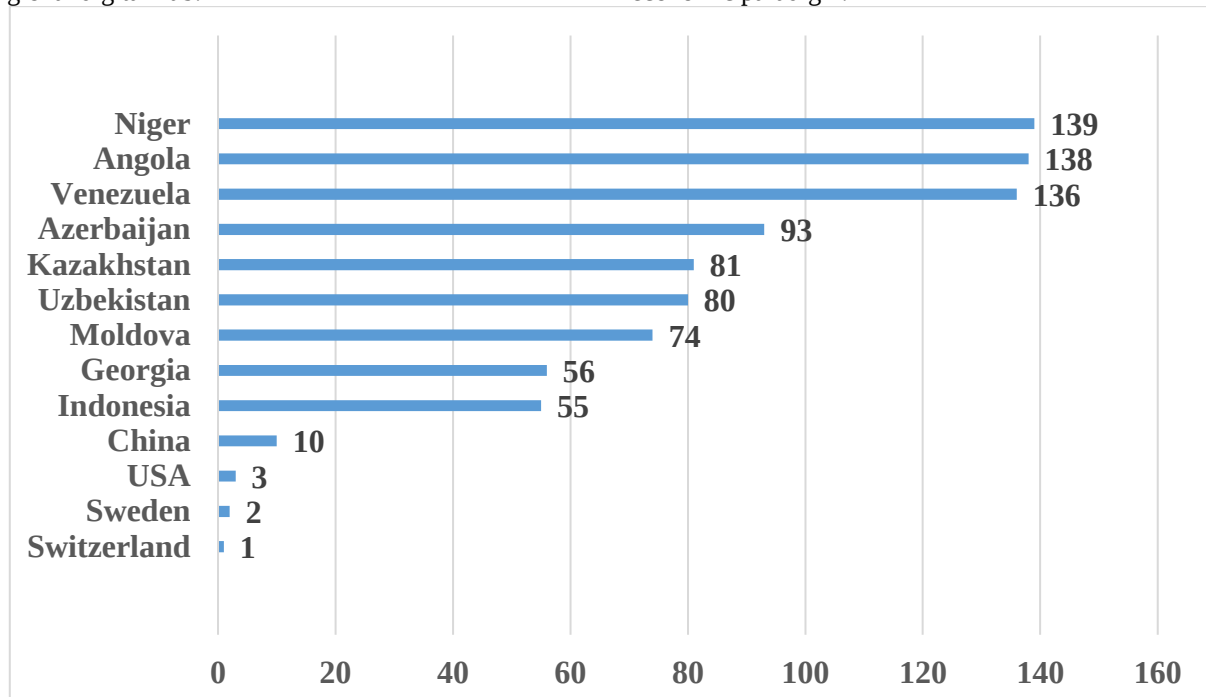


Figure 1. Comparison of the Global Innovation Index (GII) by selected countries (2025)

Source: Innovation index by country, around the world https://www.theglobaleconomy.com/rankings/gii_index/

In recent years, highly volatile fluctuations have been recorded in the Global Innovation Index parameters on a worldwide scale. To illustrate, empirical metrics for 2025 reveal that Switzerland, Sweden, and the United States continuously maintained their dominance within the top three global tiers. Concurrently, a structural divergence is observed within post-soviet economies; specifically, Georgia advanced to the 56th position, followed by Moldova at 74th, and Kazakhstan at 81st, whereas the Republic of Azerbaijan was situated at the 93rd rank. Regarding the Asian macroeconomic

landscape, China consolidated its position within the elite echelon at 10th place, while Indonesia secured the 55th spot. Conversely, evaluating the Sub-Saharan African context, acute technological disparities persist, with Angola and Niger occupying the lower limits at 138th and 139th places, respectively. The resulting diagnostic synthesis underscores that mitigating these technological gaps necessitates an imperative, state-led deployment of cutting-edge innovative systems across core economic sectors within post-soviet jurisdictions, most notably in the Republic of Azerbaijan (Figure 1).

Table 1.

Comparative Macroeconomic matrix between Azerbaijan and Indonesia (in USD)		
Indicators	Azerbaijan	Indonesia
GDP (US\$)	72,36 billion USD (2023)	1,37 trillion USD (2023)
GDP growth (annual %)	1,2% (2023)	5,05% (2023)
Tax revenue (% of GDP)	13,42% (2021)	11,60 (2022)
Employment in services (% total employment)	49,26 % (2022)	48,85 % (2022)

Source : Azerbaijan vs Indonesia - Country Comparison [https://globalstatcompare.com/compare?countries\[\]=AZE&countries\[\]=IDN](https://globalstatcompare.com/compare?countries[]=AZE&countries[]=IDN)

In recent years, robust macroeconomic growth trajectories have been recorded in the Gross Domestic Product (GDP) volumes of the Republic of Azerbaijan, within the post-Soviet landscape, and Indonesia, within the Asian economic sphere. To illustrate, empirical data from 2023 indicates that the nominal GDP of Azerbaijan reached 72.36 billion USD, whereas the corresponding Indonesian metric expanded to approximately 1.37 trillion USD. Concurrently, divergent paths were

observed in real GDP growth dynamics, with Azerbaijan registering a 1.2% expansion rate compared to a more accelerated 5.05% growth rate exhibited by Indonesia. Furthermore, structurally evaluating labor market allocations reveals a striking symmetry in tertiary sector engagement; specifically, the services sector accounted for 49.26% of total employment in the Republic of Azerbaijan, closely mirrored by Indonesia at 48.85% (Table 1).

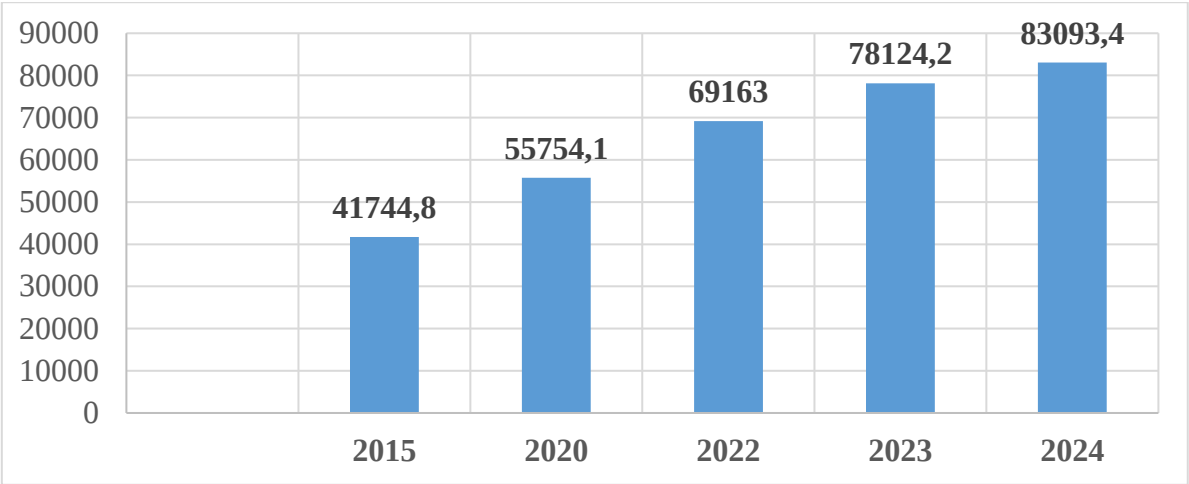


Table 2. Statistical indicators of fluctuations in nominal income of the population in the Republic of Azerbaijan (Million AZN, fixed exchange rate: 1 USD = 1.70 AZN)

Source: Statistical yearbook 2025. https://www.stat.gov.az/menu/6/statistical_yearbooks/source/stat-yearbook_2025.pdf

In recent years, substantial evolutionary shifts and transformative trends have been documented within the dynamic trajectories of aggregate population income inflows in the Republic of Azerbaijan. To illustrate, empirical metrics indicate that while the nominal volume of personal income generated nationwide stood at 41,744.8 million AZN in 2015, this macroeconomic parameter expanded significantly to reach 69,163.0 million AZN by 2022. Furthermore, by 2024, the total income volume further accelerated, culminating in an unprecedented high of 83,093.4 million AZN. This sustained and exponential upward trajectory in household income accumulation is fundamentally driven by the successful implementation of comprehensive socio-economic strategic structural reforms and robust state-led initiatives executed across the Republic of Azerbaijan in recent periods (Table 2).

Conclusion

A synthesis of the research reveals that while economic policies have successfully maintained short-term

macroeconomic stability, addressing the tension between short-term stability and long-term structural transformation remains vital. The nation possesses the financial reserves necessary to execute structural reforms and mitigate middle-income trap risks. The performed analysis indicates that implementing required economic measures is crucial for ensuring the sustainable economic development of the Republic of Azerbaijan. Ongoing initiatives including green energy clusters in Karabakh and Eastern Zangezur, the expansion of the Middle Corridor, and the digitalization of public services are actively building the foundation for an innovation-driven knowledge economy. Transitioning from a resource-stabilization model to an endogenous-diversified and institutionally-inclusive framework will allow the country to continuously generate complex products, secure sustainable growth, and solidify its role as a regional economic and logistics hub. Overall, the performed analysis indicates that ensuring the economic development of the Republic of Azerbaijan requires the study and implementation of the economic

development models of countries like China, Malaysia, South Korea, Singapore, and Indonesia.

References:

1. Abdullayev, K., Hasanov, P., Aliyeva, A., Aliyeva, N., & Mustafayev, A. The non-oil sector of the Republic of Azerbaijan's economy: Prospects and directions for development within the framework of contemporary economic policy. *Economics of Development*, 2024. 23(4), 82-94. <https://doi.org/10.57111/econ/4.2024.82>
2. Abdullayev, K., Tkachenko, A., Metreveli, S., Maziashvili, N., Bichai, V. Strategies for Enhancing Global Economic Resilience: A Focus on International Financial Structures and Their Impact. – *Economic Studies (Ikonomicheski Izsledvania)*, 2025. 34(6), pp. 3-20. <https://econ-studies.iki.bas.bg/articles/K5HHpgSw5aXbBF6NIKDf>
3. Akhundov, Ch. The World Bank and Azerbaijan: How to overcome the middle-Income Trap?, 2024. https://caliber.az/posgt/vseмирnyj_bank-i-azerbajdzhan-kak-preodolet-lovushki-srednego-dohoda//
4. Korsunska, M., Butorina, V., Abdullayev, K., Kravtsov, Y., Ustymenko, L. The role of Creative Potential in the Project Management Process for the Implementation of the Company's Strategies, *Review of Economics and Finance*, 2022. 20(1), pp. 255–262. <https://doi.org/10.55365/1923.x2022.20.30>.
5. Mamedli, I. Strategic Review of Economic Dynamics. *Region Plus*, February 15, 2025. available at: <https://regionplus.az/ru/artickes/view/8601/15/02/2025/>.
6. Rozhelovskaya, E.D. Macroeconomic effects of the "middle-income trap": The case of China. 2021. eLibrary Article ID: 46706289 .
7. Yuzbashieva, G.Z. Qualitative indicators of a competitive economy. *ENECO (Proceedings of the Center for Energy Economics)*, 2024. 20(05), issue 04, Baku, pp. 30-44. <http://bsj.esif.net/index.php/peerc>
8. Yuzbashieva, G.Z., & Abasova, S.G. Structural GDP growth rates: a Comparative analysis of Eurasian countries. *International Scientific Journal "Endless Light in Science"*, Kazakhstan, May 6, 2024, pp. 37-45

UDC 658.8:339.13:330.3

JEL Classification: M31, L81, D22

EFFICIENCY OF MARKETING ACTIVITY IN THE CONDITIONS OF MARTIAL LAW**Lutsiv N.**

*Associate Professor of the Department of Marketing
PhD in Technical Sciences, Associate Professor
Ivan Franko National University of Lviv,
Lviv, Ukraine*

ORCID: <https://orcid.org/0000-0003-2880-1478>**Levytska O.**

*Associate Professor of the Department of Marketing
PhD in Economics, Associate Professor
Ivan Franko National University of Lviv,
Lviv, Ukraine*

ORCID: <https://orcid.org/0009-0004-2686-4592>**ЕФЕКТИВНІСТЬ МАРКЕТИНГОВОЇ ДІЯЛЬНОСТІ В УМОВАХ ВІЙСЬКОВОГО СТАНУ****Луців Н.**

*доцент кафедри маркетингу
кандидат технічних наук, доцент
Львівський національний університет імені Івана Франка,
м. Львів, Україна*

ORCID: <https://orcid.org/0000-0003-2880-1478>**Левницька О.**

*доцент кафедри маркетингу
кандидат економічних наук, доцент,
Львівський національний університет імені Івана Франка,
м. Львів, Україна*

ORCID: <https://orcid.org/0009-0004-2686-4592><https://doi.org/10.5281/zenodo.20691176>**Abstract**

In the conditions of economic instability, martial law, and transformation of consumer behavior, there is an increasing need to improve approaches to assessing the effectiveness of marketing activities of trade enterprises. The purpose of the article is to substantiate methodological approaches to the analysis of the effectiveness of marketing activities of trade enterprises taking into account modern crisis challenges.

The research is based on methods of system and comparative analysis, economic and statistical methods, analysis of marketing performance indicators, as well as tools of strategic diagnostics, including PESTLE+R analysis.

The article analyzes modern approaches to evaluating the effectiveness of marketing activities through assessment of advertising, sales promotion, merchandising, pricing policy, online promotion, and other sales activities of trade enterprises, as well as their competitiveness. A methodological approach to assessing marketing activity effectiveness is proposed, taking into account the level of enterprise adaptation to consumer needs in the conditions of economic crisis and martial law.

The scientific novelty of the study lies in the development and substantiation of indicators for integral assessment of marketing effectiveness, including: advertising efficiency coefficient, marketing adaptation coefficient, efficiency of marketing costs, additional sales volume obtained due to marketing expenditures, integral coefficient of marketing effectiveness, and overall marketing effect.

Special attention is paid to the assessment of enterprise adaptation under conditions of uncertainty through the analysis of its "static" and "dynamic" adaptation, which improves the accuracy of evaluating marketing performance. The influence of marketing activities on key performance indicators such as sales volume, revenue, and profit is also analyzed.

The main internal and external factors influencing marketing decision effectiveness in retail and e-commerce are identified. A comprehensive approach to evaluating marketing effectiveness is proposed, combining financial, market, and behavioral indicators. The necessity of adapting marketing strategies to conditions of high risks, logistical constraints, and changing demand is substantiated.

The practical significance of the results lies in the possibility of their application by trade enterprises to improve the validity of marketing decisions and management efficiency in crisis conditions.

Анотація

В умовах економічної нестабільності, воєнного стану та трансформації поведінки споживачів зростає потреба в удосконаленні підходів до оцінки ефективності маркетингової діяльності торговельних підприємств. Метою статті є обґрунтування методологічних підходів до аналізу ефективності маркетингової діяльності торговельних підприємств з урахуванням сучасних кризових викликів.

Дослідження базується на методах системного та порівняльного аналізу, економіко-статистичних методах, аналізі показників маркетингової ефективності, а також інструментах стратегічної діагностики, включаючи PESTLE+R-аналіз.

У статті аналізуються сучасні підходи до оцінки ефективності маркетингової діяльності шляхом оцінки реклами, стимулювання збуту, мерчандайзингу, цінової політики, онлайн-просування та іншої збутової діяльності торговельних підприємств, а також їх конкурентоспроможності. Запропоновано методичний підхід до оцінки ефективності маркетингової діяльності, що враховує рівень адаптації підприємства до потреб споживачів в умовах економічної кризи та воєнного стану.

Наукова новизна дослідження полягає в розробці та обґрунтуванні показників для інтегральної оцінки ефективності маркетингу, зокрема: коефіцієнт ефективності реклами, коефіцієнт адаптації маркетингу, ефективність маркетингових витрат, додатковий обсяг продажів, отриманий за рахунок маркетингових витрат, інтегральний коефіцієнт ефективності маркетингу та загальний маркетинговий ефект.

Особлива увага приділяється оцінці адаптації підприємства в умовах невизначеності шляхом аналізу його «статичної» та «динамічної» адаптації, що підвищує точність оцінки ефективності маркетингу. Також аналізується вплив маркетингової діяльності на ключові показники ефективності, такі як обсяг продажів, виручка та прибуток.

Визначено основні внутрішні та зовнішні фактори, що впливають на ефективність маркетингових рішень у роздрібній торгівлі та електронній комерції. Запропоновано комплексний підхід до оцінки ефективності маркетингу, що поєднує фінансові, ринкові та поведінкові показники. Обґрунтовано необхідність адаптації маркетингових стратегій до умов високих ризиків, логістичних обмежень та зміни попиту.

Практичне значення результатів полягає в можливості їх застосування торговельними підприємствами для підвищення обґрунтованості маркетингових рішень та ефективності управління в кризових умовах.

Keywords: marketing efficiency, trade enterprises, marketing activity, adaptation coefficient, integral indicator, martial law, crisis conditions

Ключові слова: ефективність маркетингу, торговельні підприємства, маркетингова діяльність, коефіцієнт адаптації, інтегральний показник, воєнний стан, кризові умови

Постановка проблеми. В умовах сталого розвитку торговельних підприємств ключовою умовою підвищення конкурентоспроможності товарів, формування попиту та зростання результативності діяльності є ефективне планування і реалізація маркетингової діяльності. Гнучкі маркетингові заходи є важливими для забезпечення потреб споживачів в якісних товарах в умовах воєнного стану та економічної кризи, тому їх подальше дослідження є актуальним для підприємств торгівлі. Багато вчених аналіз маркетингової діяльності підприємств пов'язують з аналізом ринку збуту, його сегментів і складових, прогнозуванням обсягу продажу, оцінкою конкурентного середовища та конкурентоспроможності товару, аналізу місткості та частки ринку, оцінки ефективності збутової та рекламної діяльності підприємств [5, 6, 10, 13]. Перелік методів оцінки складових маркетингової діяльності можна продовжити і розширити. Однак, варто зауважити, що у науковому дискурсі та на практиці не існує єдиного підходу серед дослідників до інтегральної оцінки ефективності маркетингової діяльності через аналіз певних показників. Відсутність стандартизованих показників створює небажані наслідки у практичній діяльності торговельних підприємств, такі як:

- здійснення маркетингових заходів не цілеспрямовано, а заради маркетингової діяльності;
- фінансові перевитрати на маркетингові дослідження, які не дають очікуваних результатів;

- відірваність маркетингової діяльності від виробничої, що призводить до випуску неконкурентоспроможних, морально застарілих і неякісних товарів.

В сучасних умовах розвитку економіки та воєнного стану в Україні торговельний бізнес зацікавлений в економії коштів, підвищенні прибутку, рентабельності підприємства, збільшення частки підприємства на ринку та зростанні його іміджу, конкурентоспроможності. Через це торговельні підприємства максимально адаптують свої можливості, ресурси до вимог певних сегментів ринку, максимально задовольняючи потреби споживача. Ключову роль у розв'язанні цих завдань відіграє ефективний менеджмент і маркетинг. Вважаємо за доцільне поглиблювати та удосконалювати сучасні методи оцінки маркетингової діяльності з урахуванням аналізу рівня адаптації торговельних підприємств до умов сучасного ринку та зростаючих вимог споживачів. Зокрема, нами подано адаптований структурований аналіз торгового підприємства в умовах економічної кризи та воєнного стану з конкретними викликами та ризиками в маркетинговій діяльності.

Аналіз останніх досліджень і публікацій. Аналізом маркетингової діяльності займалися багато вітчизняних і зарубіжних вчених. Вагомий внесок у дослідження маркетингу та конкурентоспроможності торговельних підприємств зробили вітчизняні вчені: Герасимчук В.Г. [6], Майовець

Є.Й., Майовець Я.М. [10], П'ятницька Г.Т., Григоренко О. [13], Балабанова Л.В., Холод В.В., Балабанова І.В. [5] та інші. Серед зарубіжних значний внесок в аналіз маркетингової діяльності зробили Котлер Ф. [2], Келлер К.Л. [3], Аакер Д.А., Мурман К. [1] та інші.

Слід зауважити, що дослідники аналізують результати маркетингової діяльності функціонально, тобто оцінюючи ефективність рекламної та збутової діяльності через аналіз попиту та ціноутворення. У дослідженнях вчених не представлено інтегрального аналізу маркетингової діяльності. Ми вважаємо, що інтегральна оцінка маркетингової діяльності дасть точну оцінку її результатів за аналізований період часу, що безумовно, підвищить точність аналізу та оцінки ефективності маркетингової діяльності підприємства загалом.

Мета статті - обґрунтувати та систематизувати методологічні підходи до аналізу ефективності маркетингової діяльності підприємств торгівлі,

а також розробити комплексну систему показників оцінювання результативності маркетингових заходів з урахуванням сучасних умов функціонування торговельних підприємств.

Методи дослідження. Для досягнення поставленої мети нами використовувались як загальнонаукові, так і спеціальні методи дослідження. Зокрема, використано теоретичний метод для аналізу результатуючих показників маркетингової діяльності в сучасній науці, а також методи системного та порівняльного аналізу, економіко-статистичні методи, аналіз маркетингових показників ефективності, а також інструменти стратегічної діагностики PESTLE+R-аналізу.

Виклад основного матеріалу дослідження. В сучасній науці не існує єдиного підходу щодо оцінки інтегрального показника результатів маркетингової діяльності. Нами запропоновано алгоритм із 6 етапів для аналізу ефективності маркетингової діяльності в торгівлі (рис.1).

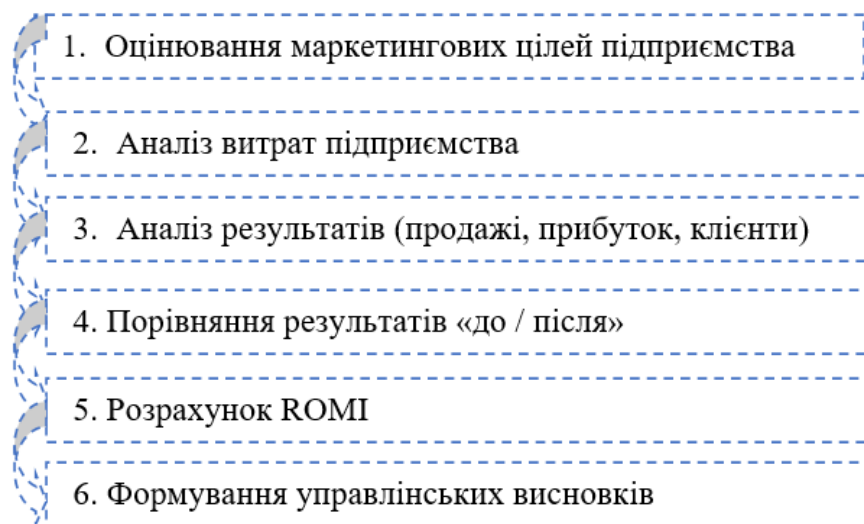


Рис. 1. Схема аналізу ефективності маркетингової діяльності в торгівлі

Джерело: побудовано авторами

Під час аналізу цілей маркетингової стратегії в торгівлі доцільно оцінити, чи чітко сформульовані маркетингові цілі та чи узгоджені вони з цілями підприємства в цілому. Наприклад, у сучасних умовах ведення бізнесу підприємства торгівлі ставлять наступні цілі - збільшити товарообіг, підвищити середній чек, залучити нових покупців, скоротити залишки товарів. Під час аналізу витрат на маркетинг доцільно оцінити обсяг бюджету на маркетинг і структуру витрат (реклама, знижки, просування). При цьому доцільно використовувати такі показники: частка маркетингових витрат у товарообігу; витрати на одного покупця і витрати на залучення клієнта (CAC). Під час аналізу результатів маркетингових заходів доцільно оцінити: динаміку продажів, прибутковість і поведінку покупців. При цьому доцільно використовувати такі ключові показники: товарообіг, валовий прибуток, середній чек, кількість покупців і повторні покупки. Під час проведення порівняльного аналізу (до / після) доцільно порівняти показники до впровадження маркетингового заходу та показники після його реалізації. Під

час розрахунку економічної ефективності маркетингової діяльності використовують такі показники, як ROMI й рентабельність маркетингових витрат.

У табл.1 зазначено порівняльні результати ефективності маркетингової діяльності для українських торговельних мереж (АТБ, Сільпо, Rozetka, Епіцентр тощо). Дані про дохід підприємств торгівлі як ключовий показник результативності взяті з відкритих інформаційних джерел [16].

Дані табл.1 свідчать про те, що економіка України витримує наслідки війни. В 2025 р. відбулось зростання галузі на 2,7% [16]. Важливу роль у збільшенні доходів ТОВ «АТБ-Маркет», ТОВ «Сільпо-ФУД», ТОВ «Розетка.UA» і ТОВ «Епіцентр К» відіграла ефективна маркетингова діяльність, яка спрямована на зростання продажів і впізнаваність бренду. ТОВ «АТБ-Маркет» три роки поспіль є лідером у сегменті продуктових мереж, велика частка ринку забезпечує масштабні маркетингові кампанії. ТОВ «Сільпо-ФУД» займає друге місце за річним доходом, у мережі стабільне зростання, її маркетингова стратегія «Assortment&loyalty» та постійні акції є середніми

за ефективністю. На третьому місці за річним доходом ТОВ «Розетка.UA», digital-маркетинг та стратегія «SEO/ads» якого демонструє високу ефектив-

ність. ТОВ «Епіцентр К» зі спеціалізацією на товари для дому і будівництва займає останнє місце. Його бізнес зростає, але значно нижчими темпами, ніж продуктові мережі чи е-комерція.

Таблиця 1

Порівняльна оцінка ефективності маркетингової діяльності вітчизняних підприємств торгівлі 2024–2025 рр.

Економічні показники	ТОВ «АТБ-Маркет»	ТОВ «Сільпо-ФУД»	ТОВ «Розетка.UA»	ТОВ «Епіцентр К»
Річний дохід (виручка за 2025 р.), млрд. грн.	208,9	93,02	29,74	близько 38,9
Темп росту виручки, % до 2024 р.	+15–20%	+10–16%	+17%	+3%
Лідер у сегменті	Продуктові мережі	Продуктові мережі	E-commerce	Товари для дому/будівництво
Маркетингова стратегія	Масові акції, дисконт, широка мережа	Assortment & loyalty, акції	Digital-маркетинг, SEO/ads	Комбінований: онлайн + офлайн
Тип маркетингових каналів	TV, зовнішня, digital, акції	Loyalty програми, соцмережі	Digital (контекст, соцмережі)	TV, інтернет, каталог
Динаміка відкриття нових магазинів	Зростання мережі	Стабільне зростання	Онлайн-розвиток	Активно розширює
Висновок щодо ефективності	Висока через масштаб і потужні продажі	Середня, висока у продуктовому сегменті	Висока для e-commerce	Середня (повільніший ріст)

Джерело: систематизовано авторами на основі даних [15-20]

Економісти пропонують оцінювати ефективність різних функцій маркетингу (товарорух, товаропросування тощо) через аналіз ефективності рекламної діяльності і збутової роботи підприємства. Зокрема, В.Г. Герасимчук вважає, що до показників ефективності рекламної діяльності варто віднести:

- кількість актів продажу, зумовлених рекламою;
- витрати на рекламу на тисячу потенційних покупців по кожному виду реклами;
- відсоток покупців, що звернули увагу на рекламу;
- грошові витрати на тисячу потенційних покупців по всіх використовуваних засобах реклами;
- зміна популярності товарів підприємства внаслідок рекламування [6].

На наш погляд, аналіз вище зазначених показників доцільний для отримання відповідей на запитання: «Наскільки зросла популярність товарів внаслідок проведеної рекламної кампанії? Який відсоток покупців звернули увагу на рекламу?» тощо. Проте він не дає відповіді на запитання «Які маркетингові заходи дозволяють утримати клієнта з мінімальними витратами?». Однозначно, оцінка даних показників є недостатньою для аналізу ефективності рекламної діяльності підприємства і не відображає адаптацію маркетингового аналізу до кризових умов і воєнного стану. Відомо, що на рекламні компанії торгівля виділяє значні кошти, про що йдеться в статті одного з авторів [8]. Зокрема, вважаємо, що ефективність рекламної діяльності підприємства доцільно аналізувати за зміною обсягів реалізації

товарів за досліджуваний період часу по відношенню до зміни рекламних витрат за цей же період часу, тобто за формулою (1):

$$E_p = \frac{\Delta V}{\Delta B} = \frac{(V_2 - V_1)}{B_2 - B_1}, \quad (1)$$

де E_p – коефіцієнт ефективності рекламної діяльності підприємства;

V_1, V_2 – дохід від реалізації товарів на початок і кінець досліджуваного періоду часу, грн.;

B_1, B_2 – обсяг реалізованих товарів в кінці та на початку досліджуваного періоду часу (рік, місяць), грн.

Вважаємо, що коли зміна обсягів продажу впродовж досліджуваного періоду буде зменшуватись, а рекламні витрати зростатимуть протягом того ж періоду, то ефективність рекламної діяльності буде низькою і, навпаки. За формулою (1) неможливо здійснити інтегральну оцінку маркетингової діяльності, проте даний показник доцільно включити в практику аналізу ефективності маркетингу, оскільки витрати на рекламу з року в рік на торгових підприємствах зростають і становлять високу частку в бюджеті маркетингових витрат.

Головними маркетинговими дослідженнями є аналіз ринку, тому, наскільки науково обґрунтовано цей аналіз, настільки ефективною буде маркетингова діяльність підприємства торгівлі. Вважаємо, що саме маркетологи перед початком випуску товарів повинні виробникам надати вичерпну інформацію про попит, конкурентів, сегменти ринку, основних споживачів товарів, про місткість ринку цих товарів, а також про прогнозовану частку на ринку підприємства. Маркетологи також повинні

приймати активну участь при виборі технологій виробництва товарів, дизайну упаковки. В іншому випадку, на етапі спаду життєвого циклу товарів, коли різко знижується попит через моральне старіння товару, рекламна компанія є неефективною. Вважаємо, що маркетингова діяльність повинна починатись з планування виробничих потужностей і виробничого потенціалу як виробничого підприємства, так і торгівлі. Кожне підприємство володіє виробничою потужністю, що відображає його максимальну здатність виготовляти продукцію. Кожен виробник зацікавлений у максимальному збуті продукції. В іншому випадку, виготовлена продукція

буде морально та фізично старіти, не буде користуватися попитом, що призведе до скорочення обсягів продаж та до падіння ефективності виробництва. Тому ми вважаємо, що в ідеальному варіанті виробнича потужність підприємств галузі повинна максимально наближатись до місткості ринку, тобто того максимального обсягу, якого в даний час потребує ринок і споживач. В іншому випадку, на підприємстві потрібно або знижувати виробничі потужності або шукати нові ринки збуту продукції.

В умовах воєнного стану в торговельному бізнесі все дуже швидко і непередбачувано змінюється, адже додається фактор війни (табл.2).

Таблиця 2

PESTLE+R -аналіз зовнішнього середовища торгового бізнесу в Україні

№з/п	Фактор	Прояв в умовах війни
1	Політичний	Воєнний стан, мобілізація, регулювання цін
2	Економічний	Інфляція, падіння доходів населення, дефіцит енергоресурсів
3	Соціальний	Міграція населення, зміна споживчих пріоритетів
4	Технологічний	Діджиталізація, е-комерція
5	Логістичний	Руйнування маршрутів, дефіцит пального
6	Ризики	Фізичні, фінансові, репутаційні

Джерело: складено авторами

З табл. 2 видно, що в умовах воєнного стану змінюється сам підхід до аналізу маркетингової діяльності. Торговельний бізнес переміщує свою увагу на виживання і стійкість, де пріоритетними стають такі показники: безперервність діяльності, контроль витрат, ліквідність, збереження клієнта і адаптація логістики та форматів торгівлі. Відбувається також збільшення цін і зменшення доходів у споживачів, що впливає на купівельну неспроможність та зміну конкурентного середовища й макроекономічні зміни в цілому. Тому важливо адаптувати маркетингову діяльність до цих змін, а також оцінювати рівень адаптації як важливу складову в процесі аналізу. На наш погляд, рівень адаптації маркетингової діяльності можна оцінити як відношення місткості ринку певних товарів до величини виробничої потужності цих товарів, тобто розрахувати за формулою (2):

$$K_a = \frac{M_i}{ВП_i}, \quad (2)$$

де K_a – коефіцієнт адаптації маркетингової діяльності;

M_i – місткість ринку товарів, шт.;

$ВП_i$ – виробнича потужність товарів, шт.

Згідно формули (2), якщо величина виробничої потужності підприємств є максимально наближена до місткості ринку, то рівень адаптації маркетингової діяльності є максимальним, і, навпаки. Відомо декілька методів оцінки місткості ринку, одним з яких є метод ланцюгових підстановок [11]. Найчастіше метод ланцюгових підстановок використовують тоді, коли підприємство виходить на споживчий ринок із новим товаром. Місткість ринку визначається за формулою (3):

$$Q_p = n_p \times q_p \times p, \quad (3)$$

де $ΔQ_p$ – місткість ринку;

n_p – кількість потенційних покупців даного товару;

q_p – кількість покупок, здійснених середнім покупцем;

p – середня ціна одиниці товару.

При використанні цього методу «ланцюжок» можна будувати і на підставі інших характеристик. На ринку непродовольчих товарів для визначення місткості ринку використовують метод сумування ринків. На ринку харчових продуктів вчені рекомендують місткість товарного ринку визначати за допомогою статистичних методів, які враховують всі роки збуту товарів [12]. Наведені методи оцінки місткості ринку товарів є необхідними для прогнозування фахівцями майбутніх обсягів продажу. Однак, для точної оцінки рівня адаптації підприємства до вимог сучасного ринку, маркетингологи мають оцінити коефіцієнт адаптації по основних групах товарів за запропонованою нами формулою (2) з метою збільшення обсягів продаж.

Слід зауважити, що в сучасній теорії маркетингових досліджень більше аналізують прогнозуючі показники маркетингової діяльності, а не результативні, зокрема, прогнозуються методи та алгоритми аналізу конкурентоспроможності товару, підприємства, місткості ринку, частки підприємства на ринку тощо. В економіці при визначенні прогнозованих показників також не існує єдиного підходу.

Далі проаналізуємо різні підходи до визначення поняття конкурентоспроможності товару, її оцінки різними вченими. Вважаємо, що конкурентоспроможність товару, підприємства в цілому є визначальним результуючим показником для успішної діяльності підприємства торгівлі. Так, М. Портер пов'язує її передусім із продуктивністю та здатністю фірм конкурувати на ринку [4]. На наш погляд, конкурентоспроможність є багатограним поняттям, що охоплює відповідність товару умовам ринку, конкретним вимогам споживачів за якісними, економічними, технічними, естетичними, ергономічними показниками, а також комерційними

умовами постачання реалізації (строки поставки, ціна, канали збуту, сервіс, реклама» [9].

Цікавим є погляд Л.В. Балабанової, В.В. Холод та І.В. Балабанової, які зазначають, що конкурентоспроможність підприємства визначається рівнем його компетентності порівняно з конкурентами за такими параметрами: технологія, практичні навички та професійні знання персоналу; рівень стратегічного і поточного планування; політика збуту; рівень управління, комунікації; якість систем управління, виробництва продукції тощо [5]. Т.О. Партута і Т.В. Фесенко пропонують застосовувати системно цільовий підхід при формуванні напрямів в галузі забезпечення конкурентоспроможності підприємства [14].

Слід відмітити, що єдиного підходу до визначення даної категорії у вітчизняній та зарубіжній науці не існує. Як бачимо, не зважаючи на дослідження даної категорії з 60-х років XX ст., кожен вчений вкладає в поняття конкурентоспроможності свій зміст. Сьогодні всі підприємства хочуть бути успішними, працювати в умовах стабільності, мінімального фінансового ризику, враховуючи перспективу і збільшення прибутків. Тому, підприємство в умовах змін повинне забезпечувати адекватну оцінку рівня своєї конкурентоспроможності з метою подальшого її підвищення. З огляду на вищевикладене, вважаємо, що в сучасних практичних умовах змін діяльності підприємств існує проблема не тільки оцінки, але й існування різних підходів вчених до розуміння суті категорії «конкурентоспроможність». Розглянемо власний підхід до розуміння економічної категорії «конкурентоспроможність торговельного підприємства».

У сучасних умовах виробничо-господарська діяльність підприємств відбувається в досить нестійкому та нестабільному зовнішньому середовищі. Тому, аналізуючи власне розуміння конкурентоспроможності підприємства, ми аналізуємо підприємство як складну динамічну систему, діяльність якого залежить не лише від кількісних та якісних складових матеріально-технічної бази та характеру взаємозв'язку впливу один на другий, але й від дії зовнішнього середовища. Потрібно зазначити, що поняття конкурентоспроможності є досить багатограним, а тому на рівень конкурентоспроможності впливає дуже багато чинників. Основними факторами є рівень якості наданих послуг, новизна виробничих технологій, професіоналізм та компетентність працівників і підприємства, кількість конкурентів та вид конкуренції, макроекономічні фактори тощо.

Дослідження показує, що конкурентоспроможність підприємства з однієї сторони залежить від якісного та кількісного рівня виробничого потенціалу підприємства. А з іншої сторони, від здатності виробничого потенціалу гнучко реагувати на зовнішні зміни ринку, потреби споживачів, конкурентне і середовище, зміни законодавчої бази та інші макроекономічні зміни. Оскільки конкурентоздатність підприємства з часом змінюється, тому вважаємо, що рівень конкурентоспроможності підприємства є залежним від рівня його адаптації до ринкових умов господарювання.

Стверджуємо, що поняття «адаптація» в умовах діяльності підприємств повинно охоплювати більш широке коло завдань організації, ніж тільки її пристосування до змін зовнішнього середовища. Сам процес пристосування повинен бути зумовлений особливостями діяльності підприємства, його техніко-економічними, нормативними чи організаційними особливостями, рівнем інформаційного забезпечення про зовнішнє середовище. Тобто, підприємство повинно заздалегідь володіти властивостями та характеристиками свого виробничого потенціалу, які дають можливість йому гнучко реагувати на зміни зовнішнього середовища, наближати кінцеві результати своєї діяльності до потреб ринку, як зовнішнього середовища торгового підприємства.

Пропонуємо оцінювати та аналізувати рівень адаптації підприємства до ринкових умов господарювання за досягнутими рівнями його «статичної» та «динамічної» адаптації. Вважаємо, що динамічна адаптація підприємства - це процес пристосування до різноманітних змін зовнішнього середовища (зміни кон'юнктури ринку, поява нових конкурентів, зрив матеріальних поставок чи ін.), яке, в цілому, є похідною «статичної» адаптації і залежить від рівня її якості, а також від її особливостей.

Наведемо тлумачення поняття «статична адаптація». Вважаємо, що для забезпечення ефективного регулювання ринковим середовищем, статична адаптація є первинною по відношенню динамічної. «Статична адаптація» підприємства є основою забезпечення належного рівня пристосування підприємств до змінних ринкових ситуацій, тобто, для реалізації його «динамічної адаптації». Зрозуміло, якщо підприємство використовує застарілі технології виробництва продукції, або володіє високим рівнем морально та фізично зношеної системи машин, не проводить маркетингового аналізу потреб ринку, не «відчуває» конкурентної ситуації, то таке підприємство, ймовірно, налагодить випуск продукції, яка не користуватиметься попитом. Тому, в даному у випадку підприємству важко адаптуватись до зовнішнього середовища. Статична адаптація підприємства повинна забезпечити йому належний рівень пристосування до змін внутрішнього характеру з метою ефективного функціонування. Пофакторний аналіз підприємства, як виробничої системи, з метою визначення поняття «статична» та «динамічна» адаптація є недоцільним, оскільки на діяльність підприємства, в першу чергу, впливає рівень організаційного забезпечення, а також рівень поєднання всіх факторів виробництва [9].

Аналіз та оцінка рівня «статистичної» і «динамічної» адаптації підприємства торгівлі є складним процесом, який потребує залучення системного, експертного, економіко-математичного методів та моделювання і не є предметом дослідження даної статті, потребує більш ґрунтовного подальшого наукового аналізу. Тому для спрощеної оцінки, вважаємо, що рівень конкурентоспроможності підприємства торгівлі можна аналізувати за часткою ринку, яку займає таке підприємство в сучасних умовах.

Проаналізуємо власний підхід до інтегральної оцінки ефективності маркетингової діяльності підприємства торгівлі. Найбільш спрощений підхід базується на аналізі обсягу продаж (доходу чи прибутку) по відношенню до маркетингових витрат за аналізований період часу, тобто за формулою (5):

$$E = \frac{V_n(D, \Pi)}{B_m}, \quad (5)$$

де E – ефективність маркетингових витрат за аналізований період часу;

V_n, D, Π – обсяг реалізації продукції, дохід, прибуток за даний момент часу;

B_m – маркетингові витрати за аналізований період часу.

Вважаємо, що точність аналізу ефективності маркетингових витрат буде вищою, якщо аналізувати динаміку змін величин V_n, D, Π, B_m в часі, тобто за формулою (6):

$$E = \frac{\Delta V_n(\Delta D, \Delta \Pi)}{\Delta B_m}, \quad (6)$$

Одночасно, можна провести розрахунок додаткового доходу внаслідок вкладення маркетингових витрат за формулою.

Будемо вважати, що приріст доходу відбувається внаслідок додаткового товарообороту через маркетингові витрати, тобто за формулою (7):

$$\Delta V = \frac{V_c \times \Pi \times D}{100\%}, \quad (7)$$

де ΔV – додатковий обсяг продажу товарів внаслідок маркетингових витрат, грн;

V_c – середньоденний обсяг продажу без маркетингових витрат, грн;

Π – приріст середньоденного обсягу продажу внаслідок маркетингових витрат;

D – кількість днів аналізу доходу у різні періоди (до та після маркетингових витрат).

З огляду на вищесказане, вважаємо, що інтегральну оцінку ефективності маркетингової діяльності можна визначити як відношення ефекту маркетингової діяльності (E) по відношенню до маркетингових витрат за аналізований період часу (B_m), тобто за формулою (8):

$$E = \frac{E}{B_m}, \quad (8)$$

Ефект від маркетингової діяльності пропонуємо визначити за формулою (9):

$$E = \Delta D(\Delta V) - B_m, \quad (9)$$

де $\Delta D(\Delta V)$ – це додатковий дохід чи обсяг продажу (або зростання) внаслідок маркетингових витрат, грн;

B_m – маркетингові витрати за досліджуваний період часу.

Висновки та перспектива подальших досліджень. У ході дослідження встановлено, що ефективність маркетингової діяльності підприємств торгівлі не може оцінюватися виключно за показниками обсягу продажів або прибутковості. Вона потребує комплексного підходу, який поєднує фінансові, ринкові та поведінкові індикатори. Доведено, що в сучасних умовах економічної нестабіль-

ності та воєнного стану пріоритети аналізу маркетингової діяльності торговельних підприємств зміщуються з орієнтації на зростання до забезпечення стійкості, ліквідності, збереження клієнтської бази.

Обґрунтовано доцільність використання системи показників ефективності маркетингової діяльності, яка включає ROMI, частку маркетингових витрат у товарообігу, рівень лояльності споживачів, оборотність запасів та стабільність грошових потоків.

Виявлено, що адаптація маркетингових інструментів до кризових умов (зміщення акценту на digital-канали, програми лояльності, соціально відповідальну комунікацію) дозволяє торговельним підприємствам, наприклад, ТОВ «АТБ-Маркет», ТОВ «Сільпо-ФУД», ТОВ «Розетка.UA» і ТОВ «Епіцентр К» мінімізувати витрати, підтримувати конкурентні позиції навіть в умовах зниженої купівельної спроможності населення. Встановлено, що рівень ефективності маркетингової діяльності значною мірою залежить від здатності підприємства торгівлі оперативно реагувати на зміни зовнішнього середовища, у т.ч. логістичні обмеження, кадрові ризики, регуляторні виклики.

Обґрунтовано, що маркетингову діяльність потрібно аналізувати та оцінювати в умовах постійних змін зовнішнього середовища та економічної кризи. А тому доцільно аналізувати потребу та необхідність оцінки рівня адаптації маркетингової діяльності до сучасних вимог ринку та змінних потреб споживача. Нами обґрунтовано, що ефективність маркетингової діяльності зростатиме, якщо задавати важливі параметри виробничій діяльності підприємства такі як обсяги виробництва, виробничі потужності та технології виробництва, виробничий потенціал. Це дасть можливість задовільнити потреби споживачів у випуску якісної продукції, наблизити виробничі потужності підприємства до місткості ринку, а також зекономити кошти на рекламну діяльність на останніх етапах життєвого циклу товару.

Нами запропоновано авторський підхід до аналізу й оцінки рівня конкурентоспроможності підприємства торгівлі через аналіз «статичної» та «динамічної» адаптації до сучасних вимог бізнес-середовища. Зокрема, «динамічна» адаптація підприємства – це процес пристосування до різноманітних змін зовнішнього середовища, зміни кон'юнктури ринку, появи нових конкурентів, зрив матеріально-технічного постачання, падіння платоспроможного попиту населення, зростання цін, інших непередбачуваних обставин. «Статична» адаптація підприємства повинна забезпечити йому належний рівень пристосування до змін внутрішнього характеру з метою ефективного функціонування. Тобто, якщо підприємство забезпечене сучасними технологіями та системою машин, які відповідають потребам ринку, то рівень «статичної» адаптації є високим, і, навпаки. На «статичну» важливий вплив має висока організація виробництва (налагодження виробничих потужностей, матеріально-технічного постачання, належних умов праці тощо).

Вважаємо, що відношення рівня «статичної» адаптації дасть можливість оцінити певний рівень

конкурентоздатності підприємства. Найбільш повно рівень конкурентоздатності підприємства відображає його ринковий показник – частка на ринку. Провідні підприємства з сучасними брендами займають максимальну частку світових ринків і є найбільш конкурентоздатними.

У статті запропоновано власний підхід до оцінки рівня адаптації маркетингової діяльності через коефіцієнт адаптації, який можна визначити, як відношення місткості ринку товарів підприємства до величини виробничої потужності підприємства. Якщо величина виробничої потужності є максимально наближена до місткості ринку, то рівень адаптації маркетингової діяльності до ринку є високим, і, навпаки.

Запропоновані методологічні підходи до аналізу ефективності маркетингової діяльності підприємств торгівлі можуть бути використані в практиці управління для прийняття обґрунтованих управлінських рішень та формування антикризових стратегій розвитку підприємств у сучасних умовах змін, постійної невизначеності, економічної кризи та воєнного стану в Україні.

Вважаємо, що деякі підходи та показники потребують подальшого наукового дослідження, обґрунтування та поглиблення. У перспективі важливо оцінювати «статичну» та «динамічну» адаптацію підприємства як важливу запоруку зростання ефективності його маркетингової діяльності.

Список літератури:

1. Aaker D.A., Moorman Chr. Strategic Market Management. Wiley, 2017. 400 p. URL: <https://www.perlego.com/book/2237417/strategic-market-management-pdf>
2. Kotler F. A framework for marketing management. Second Edition. New Jersey: Upper Saddle River, 2006. 464 p.
3. Kotler P., Keller K.L. Marketing Management. Always learning. Pearson, 2016. 692 p.
4. Porter M.E. The Competitive Advantage of Nations. New York: Free Press, 1990.
5. Балабанова Л.В., Холод В. В., Балабанова І. В. Маркетинг підприємства: підручник. Київ: Центр учбової літератури, 2019. 612 с.
6. Герасимчук В.Г. Маркетингове забезпечення виведення промислової продукції на міжнародні ринки. *Реінжиніринг бізнес-процесів маркетингової сфери промислових підприємств*: монографія / За ред. проф. Л.М. Таранюка. Суми: ШНАУ, 2018. С. 9-23.
7. Конкурентоспроможність підприємства: оцінка рівня та напрями підвищення: монографія / За ред. О. Г. Янкового. Одеса: Атлант, 2013. 470 с
8. Левицька О.М., Павлишин М.Л., Бурак Є.І. Оцінювання ефективності рекламних витрат підприємств торгівлі. *Вісник Львівського університету. Серія економічна*. 2025. Вип. 69. URL: <https://publications.lnu.edu.ua/bulletins/index.php/economics/article/view/14050/14640>
9. Левицька О.М., Савицька О.П. Сучасний підхід до оцінки конкурентоздатності підприємств. *Формування ринкової економіки в Україні*. 2021. Вип. № 46. С.150-157 URL: <https://publications.lnu.edu.ua/collections/index.php/economics/article/view/3839/4344>
10. Майовець Є.Й., Майовець Я.М. Маркетинг у роздрібній торгівлі: навч. посібник. Львів: «Галіч-Прес», 2022. 220с
11. Маркетинг: підруч. / за ред. М. М. Єрмошенка, С.А. Єрохіна. Київ: Національна академія управління, 2011. 632 с.
12. Маркетинговий менеджмент: навч. посібник / За ред. І.М. Комарницького. Львів: Априорі, 2007. С.864-865
13. П'ятницька Г., Григоренко О., Шевчун М. Внутрішня торгівля України: структурно-динамічний аналіз. *Товари і ринки*. 2020. №. 3. С. 5-21. URL: [https://doi.org/10.31617/tr.knute.2020\(35\)01](https://doi.org/10.31617/tr.knute.2020(35)01)
14. Партута Т. О., Фесенко Т. В., Конкурентоспроможність підприємства та механізм її забезпечення. *Інвестиції: практика та досвід*. 2012. №12. С.91-96. URL: http://www.investplan.com.ua/pdf/12_2012/25.pdf
15. Роздрібна торгівля в Україні: оборот зріс на 17%, але реальне зростання менш помірне. *Коммерсант Україна*. URL: https://komersant.ua/en/ryteyl-v-ukraini-oboroty-zrosly-na-17-ale-realnyy-pryrist-skromnishyy/?utm_source=chatgpt.com
16. Роздрібні компанії у індексі Opendatabot 2025 року збільшили доходи на 17%. *Opendatabot*. URL: https://opendatabot.ua/en/analytics/index-retail-2025?utm_source=chatgpt.com
17. ТОВ АТБ-МАРКЕТ. *Opendatabot*. URL: <https://opendatabot.ua/c/30487219>
18. ТОВ Епіцентр К. *Opendatabot*. URL: <https://opendatabot.ua/c/32490244>
19. ТОВ РОЗЕТКА. УА. *Opendatabot*. URL: <https://opendatabot.ua/c/3719307>
20. ТОВ Сільпо-Фуд. *Opendatabot*. URL: <https://opendatabot.ua/c/40720198>

ADAPTIVE STRATEGIC MANAGEMENT OF TRANSPORT ENTERPRISES IN THE CONTEXT OF MILITARY AND ECONOMIC CHALLENGES**Maksymov S.***Doctor of Philosophy (PhD),**Associate Professor of the Engineering Department,**Danube Institute,**National University «Odesa Maritime Academy», Ukraine, Izmail***Dimoglova O.***Doctor of Philosophy (PhD),**Associate Professor of the Engineering Department,**Danube Institute,**National University «Odesa Maritime Academy», Ukraine, Izmail*<https://doi.org/10.5281/zenodo.20691178>**Abstract**

In the article, the authors examine the features of adaptive strategic management of transport enterprises under conditions of military and economic challenges. The need to improve existing approaches to strategic planning is substantiated due to the high level of uncertainty in the external environment caused by the consequences of the COVID-19 pandemic, military aggression against Ukraine, destruction of transport infrastructure, and transformation of logistics supply chains. A review of theoretical approaches to strategic management is conducted, and the main problems of transport enterprises' functioning under current conditions are identified. An adaptive strategic planning mechanism is proposed, based on the principle of continuous adaptation of strategic decisions to changes in the internal and external environment. It is demonstrated that the application of adaptive strategic planning contributes to increasing the resilience of transport enterprises, ensures timely response to risks and opportunities, improves the quality of managerial decisions, and creates prerequisites for long-term competitive development. The practical value of the study lies in the possibility of implementing the proposed mechanism at maritime, inland waterway, road, and railway transport enterprises under martial law conditions and in the post-war recovery of the Ukrainian economy.

Keywords: adaptive strategic management, transport enterprises, transport industry, military challenges, economic instability, competitiveness.

Introduction. The current stage of development of Ukraine's transport industry is characterized by a high level of uncertainty, turbulence, and dynamism of the external environment. These conditions are shaped by globalization processes, increasing geopolitical tensions, digital transformation of the economy, and growing requirements for logistics systems. Taken together, these factors significantly complicate the forecasting of transport enterprises' development and increase the importance of strategic management as a tool for ensuring their resilience.

Recent years have been a period of severe challenges for transport enterprises. Initially, the COVID-19 pandemic led to a significant reduction in transportation volumes, disruption of global and regional supply chain logistics, and an increase in transaction costs. Subsequently, the full-scale military aggression of the Russian Federation against Ukraine resulted in even more profound negative consequences, including the destruction of transport infrastructure, blockage of certain transport corridors, changes in freight flow directions, increased insurance and operational risks, and a higher overall level of economic uncertainty.

Under such conditions, traditional approaches to strategic management, based on the extrapolation of stable development trends, have proven to be insufficiently effective. In modern economic theory, such approaches are increasingly considered limited, as they do not account for the high variability of the external environment and the rapid pace of changes in key influencing factors. Accordingly, there is an objective need

to transition to adaptive strategic planning models that ensure flexibility of managerial decisions, timely response to changes, and the maintenance of long-term enterprise competitiveness.

Therefore, the aim of the study is to provide theoretical substantiation and develop a mechanism of adaptive strategic planning for transport enterprises, focused on improving managerial efficiency under conditions of an unstable external environment.

Research materials and methods. Issues of strategic planning have been studied by many Ukrainian and international scholars. A significant contribution to the development of strategic management theory has been made by I. Ansoff [2], M. Porter [7], P. Drucker [4], and other researchers. In the works of these scholars, strategic planning is considered a multi-level process that combines analytical, forecasting, and managerial components, and ensures the formation of long-term competitive advantages.

In Ukrainian academic literature, the issues of strategic planning are represented by the works of V. Andrieiev [1], Z. Shershnova [8], M. Butko [3], I. Horbachova [5], S. Kulakova [6], and other researchers, who emphasize the adaptation of strategic approaches to the conditions of a transformational economy and an unstable market environment.

At the same time, the conducted analysis of academic sources and business practice has shown that most existing approaches to strategic planning are either oriented toward the macroeconomic level of man-

agement or do not take into account the sectoral specifics of the transport industry. Moreover, a significant number of models are static in nature and insufficiently adapted to conditions of high uncertainty and risk.

In this context, the development of dynamic, adaptive, and risk-oriented strategic planning mechanisms has become particularly relevant in modern conditions, as they allow integrating processes of external environment monitoring, risk assessment, and strategic decision adjustment in real time.

In this regard, I. Ansoff [2] viewed strategic planning as a formalized process of environmental analysis, formulation of strategic alternatives, and selection of an optimal enterprise development strategy, emphasizing the importance of portfolio analysis tools, in particular the product–market matrix. In contrast, M. Porter focused on building sustainable competitive advantages through the selection of basic competitive positioning strategies in the market [7].

Results and discussion. The study shows that, in practice, many enterprises mistakenly equate strategic planning with the development of business plans or separate development programs. However, in academic terms, strategic planning is a continuous cyclical process of forming, implementing, and adjusting long-term managerial decisions aimed at ensuring competitiveness, financial stability, and adaptability of the enterprise.

This is particularly relevant for the transport sector, as transport enterprises are critically dependent on external factors. Key determinants include fluctuations in transport demand, changes in route networks, instability of the fuel and energy market, geopolitical risks, regulatory changes, and increasing competitive pressure. The combination of these factors necessitates a shift toward flexible management models capable of ensuring rapid adaptation of strategic decisions.

Within the study, an adaptive strategic planning mechanism for transport enterprises has been proposed, the conceptual foundation of which is the principle of continuous adaptation of strategic decisions to changes in both external and internal environments. This approach involves the integration of strategic analysis, monitoring, forecasting, and managerial decision adjustment into a unified cyclical process.

The initial stage of the proposed mechanism involves the formation of prerequisites for strategic planning. Such prerequisites include significant changes in market conditions, fluctuations in transportation volumes, transformation of the regulatory framework, implementation of technological innovations, as well as the emergence of new risks and threats affecting enterprise performance.

The next stage involves comprehensive monitoring of enterprise activities. It includes the study of internal and external influencing factors, system analysis of operations, and identification of strategic development priorities.

Special attention within the proposed adaptive strategic planning mechanism is given to the use of

modern analytical tools that ensure a comprehensive analysis of the internal and external environment of the enterprise, as well as the formation of well-founded managerial decisions.

SWOT analysis is a basic strategic analysis tool that involves the identification and systematization of internal strengths and weaknesses of the enterprise, as well as external opportunities and threats. Its application allows determining the strategic position of the enterprise in the market, formulating development directions, and ensuring alignment between internal resources and external environmental requirements.

PEST analysis is used to assess the macro-environment of enterprise functioning through the examination of Political, Economic, Social, and Technological factors. This tool enables the identification of systemic trends and external determinants shaping the conditions of transport enterprises' activity, including regulatory changes, economic conditions, demographic processes, and technological innovations.

Scenario planning is a strategic forecasting method based on the construction of alternative scenarios of external environment development. It allows for the consideration of a high level of uncertainty by forming several possible trajectories of development events (optimistic, baseline, and crisis scenarios), thereby enhancing the adaptability of managerial decisions.

Matrix methods of strategic analysis (in particular the BCG matrix, GE/McKinsey matrix, and Ansoff matrix) are applied to evaluate the enterprise's business portfolio, determine priority development directions, and optimize resource allocation. They enable the classification of business units according to criteria of market attractiveness and competitive position.

Forecasting and modeling methods include a set of quantitative and qualitative approaches to predicting future values of key performance indicators of the enterprise. These include econometric modeling, simulation models, and trend models, which allow assessing possible outcomes of managerial decisions under different operating conditions.

Expert assessment methods are based on engaging industry specialists to form generalized judgments regarding market trends, risk levels, and the effectiveness of strategic alternatives. This method is particularly important under conditions of high uncertainty, when quantitative data are limited or insufficiently reliable.

Correlation and regression analysis is used to identify and quantitatively assess relationships between economic indicators of enterprise performance. It allows determining the degree of influence of individual factors on performance indicators, as well as constructing dependency models for further forecasting.

Trend extrapolation involves projecting identified historical patterns into future periods. This method is based on the assumption of relative stability of key development trends and is used for short- and medium-term forecasting of key performance indicators of the enterprise.

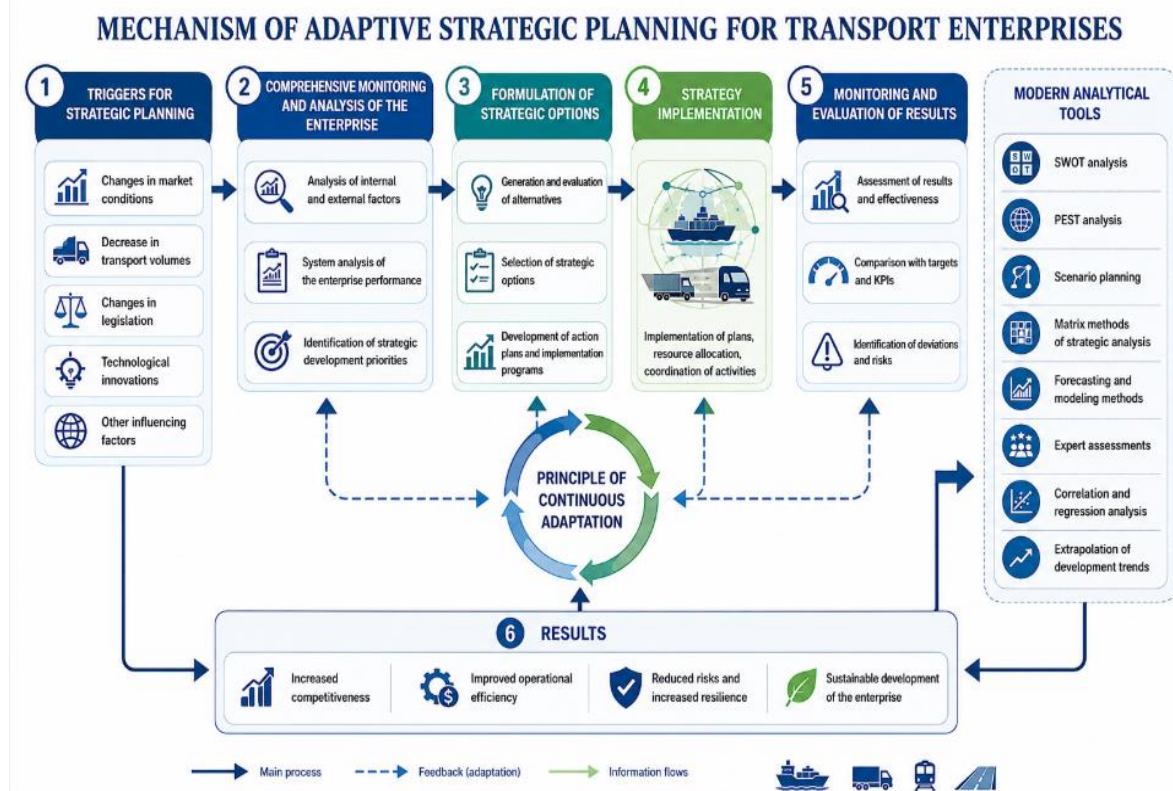


Fig. 1 – Block diagram of comprehensive monitoring and analytical tools for strategic management of a transport enterprise

The integrated use of the aforementioned methods enables the acquisition of more objective information regarding the current state of the enterprise and the prospects of its development.

One of the key features of the proposed mechanism is the use of a dual-term approach to strategic planning. Its essence lies in the combination of medium-term and long-term strategic plans. The medium-term plan is focused on achieving specific quantitative indicators in the near-term perspective, whereas the long-term plan defines the strategic development guidelines of the enterprise over an extended period.

Such an approach ensures a balance between strategic stability and operational flexibility of management. In the event of changing market conditions, the enterprise can adjust its medium-term objectives without the need for a complete revision of the long-term strategy.

In our view, an important element of the mechanism is the system of strategic indicators. It covers all key areas of transport enterprise activity, including:

- economic indicators;
- financial indicators;
- technical indicators;
- production indicators;
- environmental indicators;
- social indicators;
- human resource potential indicators.

Based on these indicators, an assessment of the effectiveness of strategic plan implementation is conducted, and decisions regarding its adjustment are made.

The principle of adaptability acquires particular importance under current conditions. The proposed mechanism предусматривает the continuous revision of forecast indicators depending on changes in influencing factors. This allows timely response to emerging risks and opportunities.

In addition to adaptability, the key principles of the mechanism's functioning include:

- systemness;
- scientific validity;
- comprehensiveness;
- flexibility;
- creativity;
- social orientation;
- continuous monitoring.

Conclusion. The implementation of the above-mentioned principles contributes to improving the quality of managerial decisions and ensures the formation of the enterprise's competitive advantages.

Thus, the practical significance of the proposed mechanism lies in the possibility of its application at enterprises operating in different transport modes, including maritime, inland waterway, road, and railway transport. Its use is particularly relevant for transport enterprises in Ukraine operating under martial law conditions and in the post-war economic recovery period.

Summarizing the results of the study, it can be concluded that adaptive strategic planning is one of the key instruments for ensuring the sustainable development of transport enterprises. The proposed mechanism enables the integration of a strategic vision of the future with the capacity for rapid response to changes in the external environment.

Further scientific research should be directed toward the development of a detailed algorithm for the formation of a transport enterprise strategic plan, as well as the creation of a system of quantitative indicators for assessing the effectiveness of adaptive strategic management.

References:

1. Andrieiev, V. M. (2017). Strategic planning of enterprise development in a turbulent environment. *Ekonomichnyi Prostir*, (124), 45–54.
2. Ansoff, H. I. (1965). *Corporate strategy: An analytic approach to business policy for growth and expansion*. McGraw-Hill.
3. Butko, M. P. (2016). *Stratehichnyi menedzhment* [Strategic management]. Tsentr uchbovoi literatury.
4. Drucker, P. F. (2008). *Management: Tasks, responsibilities, practices*. HarperBusiness. (Original work published 1973).
5. Horbachova, I. V. (2018). Strategic planning as a tool for enterprise development management. *Efektivna Ekonomika*, (11), 1–8.
6. Kulakova, S. Yu. (2020). Strategic planning in the system of enterprise management under conditions of economic instability. *Ekonomika ta Derzhava*, (10), 82–87.
7. Porter, M. E. (1996). What is strategy? *Harvard Business Review*, 74(6), 61–78.
8. Shershnova, Z. Ye. (2004). *Stratehichne upravlinnia* [Strategic management] (2nd ed.). KNEU.

HISTORICAL SCIENCES

SOCIOCULTURAL ADAPTATION OF REPATRIATES OF POLISH ORIGIN FROM KAZAKHSTAN IN CONTEMPORARY POLAND (BASED ON ORAL HISTORY MATERIALS)

Kalybekova M.

Candidate of Historical Sciences,

Leading researcher

Ch. Valikhanov Institute of History and Ethnology

Almaty, Kazakhstan

<https://orcid.org/0000-0001-5194-6136>

СОЦИОКУЛЬТУРНАЯ АДАПТАЦИЯ РЕПАТРИАНТОВ ПОЛЬСКОГО ПРОИСХОЖДЕНИЯ ИЗ КАЗАХСТАНА В СОВРЕМЕННОЙ ПОЛЬШЕ (НА МАТЕРИАЛАХ УСТНОЙ ИСТОРИИ)

Калыбекова М.

кандидат исторических наук,

Ведущий научный сотрудник

Института истории и этнологии им. Ч.Ч. Валиханова

г. Алматы, Казахстан

<https://orcid.org/0000-0001-5194-6136>

<https://doi.org/10.5281/zenodo.20691180>

Abstract

This article examines the distinctive features of the social adaptation and integration of Poles repatriated from Kazakhstan to Poland during the period 1990-2025. This process constitutes a consequence of the Soviet resettlement policies of the 1930s-1950s, as a result of which Poles, alongside other ethnic groups, were deported to the territory of Kazakhstan. Prolonged residence away from their historical homeland affected the preservation of their ethnocultural identity. Decades later, when Poles and their descendants were granted the opportunity to return to their historical homeland, they encountered a range of social, linguistic, and economic challenges in the process of adapting to new living conditions.

To address these issues, the receiving state has, over recent decades, continuously refined its legislative framework and mechanisms of support for repatriates aimed at facilitating their successful integration into society. The empirical basis of the study consists of interview materials collected using the oral history methodology. The application of this method made it possible to obtain information on various aspects of the everyday lives of repatriates, including family and domestic life, health status, education, employment, social contacts, and other related matters. The use of oral history methodology provides an opportunity to investigate the adaptation process of repatriates through the prism of their personal experiences, emotions, and collective memory, thereby substantially broadening the understanding of repatriation as a complex sociocultural phenomenon and complementing official documentary sources.

Аннотация

В данной статье рассматриваются особенности социальной адаптации и интеграции поляков, репатрировавшихся из Казахстана в Польшу в период 1990-2025 гг. Данный процесс является следствием переселенческой политики советского союза 1930–1950-х гг., в результате которой поляки наряду с другими этносами были депортированы на территорию Казахстана. Длительное пребывание вдали от исторической родины оказало влияние на сохранение этнокультурной идентичности. Спустя десятилетия, когда поляки и их потомки получили возможность вернуться к себе на историческую родину, они столкнулись с рядом социальных, языковых, экономических трудностей в процессе адаптации к новым условиям жизни. На сегодня для решения всех вопросов принимающая сторона на протяжении последних десятилетий совершенствует законодательную базу и механизмы поддержки репатриантов, направленную на их успешную интеграцию в общество. Эмпирическую базу исследования составили материалы интервью, собранные с использованием методологии устной истории. Применение данного метода позволило получить сведения о различных аспектах повседневной жизни репатриантов, включая семейно-бытовую сферу, состояние здоровья, образование. Трудоустройство, социальные контакты и др. Использование метода устной истории предоставляет возможность исследовать процесс адаптации репатриантов через призму их личных переживаний, эмоций, коллективной памяти, что существенно расширяет представления о репатриации как сложном социально-культурном явлении и дополняет официальные документальные источники.

Keywords: repatriation, Poles, identity, adaptation, deportation, rehabilitation.

Ключевые слова: репатриация, поляки, идентичность, адаптация, депортация, реабилитация.

В последние десятилетия в исторической науке все большее внимание уделяется изучению социальной истории и истории повседневности. Для современных исследований характерен перенос акцента с исследования социально-экономических, политических систем и больших общностей на изучение небольших групп, индивидуальных жизненных стратегий и практик поведения людей в конкретных исторических условиях.

В этой связи особое значение приобретают микроисторические исследования, которые, благодаря своей высокой степени детализации и углубленному анализу позволяют раскрыть механизм социальных процессов через призму индивидуального опыта. Такой подход способствуют более всестороннему и многомерному пониманию исторических явлений, характерных для определенной эпохи. В условиях преобладания представлений о тоталитарном характере советского общества только через микроисторию можно прийти к выводу о том, в какой степени поведение советского человека, зависело от его личного выбора, общественных настроений или воздействия государственного аппарата.

Таким образом, современная интерпретация истории признает важность не только глобальных политико-экономических событий или деятельности выдающихся личностей, но и структур повседневности, отражающих обычный человеческий опыт. Поэтому особое внимание привлекают вопросы адаптации, интеграции и трансформации идентичности различных социальных групп в условиях исторических перемен. Несмотря на введение в научный оборот огромного массива архивных документов о репатриации депортированных поляков и их потомков из Казахстана в Польшу, многие аспекты этой проблемы остаются недостаточно изученными. В первую очередь это касается повседневной жизни репатриантов, их адаптации к новым культурным и социальным условиям, а также формирования идентичности после возвращения на историческую родину. В связи с этим, на основе метода устной истории и анализа воспоминаний респондентов рассматриваются вопросы адаптации и интеграции поляков, вернувшихся на историческую родину в рамках репатриационных процессов.

В современной польской научной литературе принято выделять четыре основных этапа репатриации населения польского происхождения из СССР и постсоветского пространства в Польшу. Первый этап охватывает 1944–1948 гг. и связан с послевоенным изменением государственных границ и массовыми миграционными процессами в Центрально-Восточной Европе; второй этап приходится на 1955–1959 гг. и затрагивает как польское, так и еврейское население СССР. Третий этап начался в условиях политической трансформации и демократизации в Польше в 1989 г. и распадом Советского Союза в 1991 г., то есть 1989–2017 гг. Четвертый этап продолжается с 2017 года по настоящее время и характеризуется совершенствованием законодательной базы и расширением государственной поддержки репатриантов.

Начало первого этапа репатриации было обусловлено последствиями Второй мировой войны, изменением государственных границ и массовых перемещений людей. Польша, из-за этнической политики оккупантов (СССР и Германия), зафиксировала самые высокие демографические потери в Европе [1, с. 23]. Поэтому, когда появилась возможность репатриации, вскоре начались двусторонние переговоры между Польшей и СССР, касающиеся организации возвращения людей, которые имели польское гражданство до 17 сентября 1939 г. и проживали в восточных приграничных районах. Репатрианты были разношерстны и очень отличались друг от друга в ментальном и культурном плане. Этнические поляки и евреи возвращались на свою родину, как с Востока, так и из Запада. По оценкам Яна Чернякевича репатриация поляков со всего СССР, в те годы составило более 1,5 млн человек. Организация переездов, а также проживание и административные вопросы осуществлялись Государственным управлением по репатриации PUR (Państwowy Urząd Repatriacyjny), созданным в октябре 1944 г. [2, с. 194–204].

Второй этап репатриации был связан с политическими изменениями в СССР после смерти И.В. Сталина. Специальный надзор над поляками был упразднен в 1956 году. Еще одна кампания по репатриации началась в середине 50-х, и касалась прежде всего, поляков и евреев, живущих в отдаленных районах СССР и по разным причинам не имевших возможности вернуться в Польшу [3, с. 69]. Масштабы переселения поляков в Польшу из СССР составили примерно 250 000 человек в период с 1955 по 1959 год в [4, с. 385]. Архивные материалы свидетельствуют, что среди репатриантов были и жители Казахстана. Так из Караганды был отправлен специальный эшелон в составе 10- пассажирских и 2-х товарных вагонов с гражданами, изъявившими желание выехать в Польскую Народную Республику в количестве 437 человек, в том числе 50 детей до 16 лет. Всем выехавшим было выдано единовременное денежное пособие из расчета по 300 рублей на каждого взрослого и по 200 рублей на ребенка. Настроение выезжавших было хорошее. Многие высказывались, что если бы с них сняли ссылку, то они никогда не согласились бы выезжать из СССР. А выезжали лишь потому, что стыдно ходить с «белым билетом», так они называли справку взамен паспорта для ссыльных [5, л. 204–205]. Это была малая часть поляков, так как по результатам переписи населения в СССР за 1959 и 1970 гг. в Советском Союзе все еще оставалось более миллиона поляков [6, с. 121–123]. Социально-культурные последствия репатриации оказали свое влияние на дальнейшее развитие страны, неустанно шел процесс адаптации и ассимиляции. Часто возникали конфликты между вновь прибывшими и местным населением, которые не были готовы к их приезду. Споры чаще всего касались жилья, трудоустройства, конфискованного имущества и взаимоотношений друг с другом. Социальные процессы, имевшие место тогда можно назвать «культурным столкновением» [7, с. 501].

Третий этап репатриации был связан с демократическими преобразованиями в Польше и распадом Советского Союза. После 1989 г. возникли предпосылки для пересмотра государственной политики в отношении зарубежных польских общин. До этого времени переселение лиц польского происхождения регулировалось главным образом Законом о польском гражданстве 1962 г. [8]. Однако, поскольку данный закон не был доработан, репатриация в Польшу до 1990 года имела эпизодический характер. Большинство членов семей репатриантов в 1944–1957 гг. были переселены в рамках кампании по воссоединению семей. Для оставшихся граждан СССР польского происхождения, которые не имели родственников в Польше, единственным способом получить право на проживание было вступление в брак с гражданином Польской Народной Республики. Конкретные формальные и правовые изменения, касающиеся репатриации, произошли в 1996 году. Лишь в 1997 году Сейм принял закон по делам иностранцев [9]. Среди прочего, в нем содержалась информация о том, как получить гражданство полякам, независимо от обстоятельств, в которых они оказались за пределами своей родины. В то же время он возлагал на центральные органы власти обязательство заниматься правовыми и административными аспектами переселения этнических поляков. Подробные правила переселения людей польского происхождения были регламентированы в «Законе о репатриации» от 9 ноября 2000 г. [10, 23–31].

Четвертый современный этап репатриации связан с вступлением в силу в 2017 г. изменений в законодательство о репатриации, направленных на совершенствование механизмов возвращения лиц польского происхождения на историческую родину. Обновленная нормативно-правовая база действует по настоящее время и определяет порядок получения статуса репатрианта, предоставления жилья и мер государственной поддержки. Именно на ее основе осуществляется работа дипломатических представительств Польши в государствах постсоветского пространства. По мнению Станислава Чишельского изучавшего репатриантов из Казахстана, пять основных групп факторов оказали наибольшее влияние на адаптацию репатриантов с Казахстана к новой среде: культурно-языковые (принятие широкими слоями населения культурных и языковых моделей, характерных для других районов Польши); структурно-институциональные (создание групп с совместными интересами), брачные (с течением времени все чаще и чаще стали вступать в брак представители разных групп населения); личностные (исчезновение взаимных стереотипов и предрассудков, чувство интеграции с остальным польским обществом) и идентификационно-гражданские (чувство ответственности за государство, в котором репатриант проживает) [7, с. 505]. Их совокупность определяет степень включенности репатриантов в принимающее общество и формирование чувства принадлежности к польскому государству.

Большинство современных репатриантов из Казахстана являются потомками поляков, депортированных в 1936 г. из приграничных районов Украинской ССР в северные районы Казахстана. Наиболее интенсивный приток репатриантов наблюдался после вступления в силу законодательных изменений 2017 г. Материалы устной истории свидетельствуют о том, что наиболее сложным этапом после переезда стала социокультурная адаптация. Особенно остро проблемы интеграции проявлялись среди представителей старшего поколения, для которых переезд сопровождался утратой привычного социального окружения и необходимостью приспособиться к новым условиям жизни. Показательным является интервью с репатрианткой В. Левкович из Северо-Казахстанской области, которая переехала в Польшу вместе с родителями и другими членами семьи в 2019 г. До репатриации она работала учителем географии и истории в средней школе. В настоящее время проживает в г. Сырода-Велькопольска и осуществляет уход за престарелыми родителями, которым около 90 лет. По словам респондента, ее родители, пережившие депортацию в детском возрасте, до конца сохранили сильную эмоциональную связь с Казахстаном и до сих пор «они живут воспоминаниями той жизни в Казахстане и время как будто остановилось для них. Переехали только потому что не могли оставаться сами без присмотра детей» [11]. Несмотря на успешное переселение, пожилые члены семьи продолжали воспринимать Казахстан как важную часть своей биографии и личной памяти. Данное свидетельство позволяет сделать вывод о том, что для старшего поколения репатриантов процесс адаптации нередко осложнялся ностальгией по прежнему месту жительства и сохранением устойчивой эмоциональной привязанности к месту, где проживали до репатриации.

Схожие мотивы прослеживаются и в других интервью. Так, семья репатриантов, прибывшая в Польшу в 2020 г. Показательным, является интервью супругов Заклицких, подчеркивали, что решение о переезде было связано прежде всего с будущим детей. Первоначально в Польшу переехал сын, получивший приглашение от польского университета. Впоследствии это стало важным фактором принятия решения о переезде всей семьей. Вместе с тем процесс получения статуса репатрианта оказался длительным, ждали 8 лет. По их рассказам, большую роль в сохранении национальной этничности сыграла семейная память. Религиозные традиции, польский язык передавались через старшее поколение – бабушек, дедушек, которые сохранили традицию, культуру, язык даже в условиях многолетнего проживания в Казахстане. Наиболее серьезными трудностями после переезда для многих стали языковой барьер, необходимость профессиональной переквалификации и различия в социальных и культурных нормах. Несмотря на наличие высшего образования и многолетнего опыта работы бухгалтером в сельском хозяйстве, после переезда пришлось осваивать новую профессию в судостроительной отрасли. Впоследствии ему удалось подняться до уровня руководящей должности.

Особый интерес представляет высказывание респондентов о восприятии собственной идентичности: «В Казахстане мы были поляками, а здесь нас считают русским». Данное свидетельство отражает характерную для многих репатриантов проблему двойственной идентичности, возникающей в результате проживания вне страны этнического происхождения.

Обобщая материалы интервью, можно выделить несколько наиболее распространенных проблем адаптации репатриантов: языковой барьер, длительные бюрократические процедуры при оформлении документов, необходимость профессиональной переквалификации и трудоустройства. Вместе с тем большинство респондентов отмечали, что со временем данные проблемы постепенно разрешались благодаря государственной поддержке, помощи родственников и собственным адаптационным стратегиям.

Особое место в коллективной памяти занимает Казахстан. Практически все опрошенные положительно отзывались о стране своего рождения и подчеркивали сохранение социальных связей с родственниками, друзьями, бывшими коллегами и соседями. Многие продолжают поддерживать контакты посредством социальных сетей, а также периодически посещают Казахстан. Подобные практики свидетельствуют о формировании транснационального социального пространства, объединяющий жизненный опыт, социальные связи и культурную память, связанные с двумя государствами.

Интересно, что даже после успешной интеграции в польское общество многие репатрианты сохраняют привычные элементы повседневной культуры, сформировавшиеся в Казахстане. Это проявляется в особенности питания, семейных традициях, организации быта и досуга. Таким образом, адаптация не предполагает полного отказа от прежней культурного опыта, а представляет собой процесс сочетания различных культурных моделей и практик.

По мнению Павла Хута, основные проблемы репатриантов можно разделить на четыре группы: формально-юридические, связанные с профессиональной активностью, материально-бытовые трудности, культурно-общественные [1, с. 149]. Материалы проведенных интервью подтверждают данную квалификацию и показывают, что успешность интеграции во многом зависит от способности репатриантов преодолевать трудности во всех перечисленных сферах.

Адаптация является необходимым условием успешной интеграции репатриантов в принимающее общество. Интеграция представляет собой сложный и многоуровневый процесс, в которой вовлечены как сами репатрианты, так и принимающее общество. Ее конечной целью является достижение самостоятельного функционирования репатрианта в социально-экономической и культурной жизни

страны, зависимости от государственной социальной поддержки. [1, с. 144].

Успешная интеграция репатриантов способствует не только их личной и профессиональной самореализации, но и укреплению демографического и кадрового потенциала государства. Вместе с тем результаты исследования показывают, что, несмотря на существенную государственную поддержку со стороны государства, многие репатрианты продолжают сталкиваться с определенными трудностями в адаптации к местным социальным и культурным реалиям.

Важно отметить, что ни один из опрошенных респондентов не высказывал негативного отношения к Казахстану. Напротив, большинство подчеркивало, что решение о репатриации было обусловлено не неудовлетворенностью жизнью в стране проживания, а стремлением обеспечить детям лучшие образовательные и профессиональные перспективы, а также восстановить связь с исторической родиной. По мнению многих участников исследования, если не социально-экономические последствия распада СССР и экономический кризис в 1990-х гг., вопрос о переезде в Польшу мог бы и не возникнуть. Опыт репатриантов из Казахстана показывает важность сохранения исторической памяти, поддержки семейных миграционных стратегий и дальнейшего совершенствования механизмов социальной интеграции лиц польского происхождения, возвращающихся на историческую родину.

Список литературы:

1. Paweł Hut. Warunki życia i proces adaptacji repatriantów w Polsce w latach 1992–2000. Warszawa, 2002. 270 s.
2. Czerniakiewicz Jan Repatriacja ludności polskiej z ZSRR 1944–1948. Warszawa, 1987. 263 s.
3. Małgorzata Ruchniewicz. Repatriacja ludności polskiej z ZSRR w latach 1955–59. Warszawa, 2000. 411 s.
4. Rytelewska. E. Prawne i polityczne aspekty przemieszczeń ludności polskiej z ZSRR do Polski w latach 1955-1959. *Studia Prawnoustrojowe*, (63). 2024. S. 385
5. Архив Комитета по правовой статистике и специальным учетам по Карагандинской области. Д. 58. Л. 204-205
6. Siedlecki J. Losy polaków z ZSRR w latach 1939-1986, Londyn. 1987. 404 s.
7. Cisielski S., Kuczynski A. Polacy w Kazachstanie. Historia I współczesność. Wrocław 1996, 601 s.
8. Ustawa z dnia 15 lutego 1962 r. o obywatelstwie polskim (Dz.U. 1962 nr 10 poz. 49)
9. Ustawa o cudzoziemcach z dnia 25 czerwca 1997 r. (Dz.U. 1997 nr 114 poz. 739)
10. Kosci-Ryzko K. Dylematy samookreslenia polskich repatriantów z Kazachstanu Studium etno psychologiczne. Warszawa, 2014. 275 s.
11. Личный архив Калыбековой М.

MEDICAL SCIENCES

MODELS OF WORKFORCE SUCCESSION MANAGEMENT IN HEALTHCARE SYSTEMS: INTERNATIONAL EXPERIENCE AND MANAGERIAL IMPLICATIONS

Kapsametov N.

DBA program doctoral candidate, AlmaU, Kazakhstan

МОДЕЛИ УПРАВЛЕНИЯ КАДРОВОЙ ПРЕЕМСТВЕННОСТЬЮ В СИСТЕМАХ ЗДРАВООХРАНЕНИЯ: МЕЖДУНАРОДНЫЙ ОПЫТ И УПРАВЛЕНЧЕСКИЕ ВЫВОДЫ

Капсаметов Н.

докторант программы DBA, Алматы Менеджмент Университет, Казахстан

<https://doi.org/10.5281/zenodo.20691182>

Abstract

The article examines international models and practices of workforce succession management in healthcare systems. It considers succession not as a formal replacement of positions, but as a management mechanism aimed at preserving professional experience, developing future leaders, transferring competencies, and ensuring the sustainability of healthcare organisations. The article reviews approaches used in the United Kingdom, Canada, the United States, and the international agenda of health workforce sustainability. Attention is paid to talent management, leadership competency frameworks, mentoring, knowledge transfer, and the identification of critical roles. The article also identifies managerial implications that may be relevant for adapting international experience to healthcare organisations in the Republic of Kazakhstan.

Аннотация

Статья посвящена обзору международных моделей и практик управления кадровой преемственностью в системах здравоохранения. Кадровая преемственность рассматривается не как формальное замещение должностей, а как управленческий механизм, направленный на сохранение профессионального опыта, развитие будущих руководителей, передачу компетенций и обеспечение устойчивости медицинских организаций. В статье обобщаются подходы, применяемые в Великобритании, Канаде, США, а также международная повестка кадровой устойчивости здравоохранения. Особое внимание уделяется управлению талантами, рамкам лидерских компетенций, наставничеству, передаче знаний и выявлению критически важных ролей. Также определены управленческие выводы, значимые для адаптации международного опыта в медицинских организациях Республики Казахстан.

Keywords: workforce succession, healthcare systems, succession management, leadership development, talent management, mentoring, health workforce, Kazakhstan.

Ключевые слова: кадровая преемственность, системы здравоохранения, управление преемственностью, развитие лидерства, управление талантами, наставничество, кадровые ресурсы здравоохранения, Казахстан.

1. Введение

Кадровая преемственность является одним из значимых направлений управления медицинскими организациями и системами здравоохранения. Её значение связано с необходимостью сохранения профессионального опыта, подготовки будущих руководителей, передачи управленческих и клинических компетенций, а также обеспечения устойчивости медицинской помощи при кадровых изменениях. Для здравоохранения данная проблема имеет особую значимость, поскольку кадровые решения напрямую связаны с качеством медицинской помощи, безопасностью пациентов, устойчивостью подразделений и способностью организации развиваться в условиях возрастающих требований к медицинским услугам.

Международная практика показывает, что кадровая преемственность всё чаще рассматривается как часть более широкой системы кадрового планирования, развития лидерства, наставничества и передачи организационных знаний. В разных странах применяются различные модели преемственности:

от подготовки кадрового резерва и будущих руководителей до интегрированных программ развития компетенций, оценки критических ролей и сохранения профессионального опыта.

Для Республики Казахстан изучение международного опыта в данной сфере имеет практическое значение. Медицинские организации нуждаются в механизмах, которые позволяют заранее готовить преемников, развивать руководителей среднего звена, сохранять профессиональные знания и снижать риски, связанные со сменой поколений работников. Поэтому международные модели кадровой преемственности могут быть использованы как основа для управленческих выводов, применимых в медицинских организациях Казахстана.

Целью статьи является обзор международных моделей управления кадровой преемственностью в системах здравоохранения и определение управленческих выводов, значимых для медицинских организаций Республики Казахстан. В статье рассматриваются международные подходы к кадровому резерву, развитию лидерства, наставничеству,

передаче компетенций и организационной устойчивости медицинских организаций.

2. Управление кадровой преемственностью в системах здравоохранения: международная рамка

В международной практике управление кадровой преемственностью рассматривается как часть долгосрочного развития кадрового потенциала здравоохранения. Оно связано не только с подготовкой сотрудников к замещению ключевых должностей, но и с удержанием персонала, развитием руководителей, передачей опыта и снижением рисков, возникающих при уходе квалифицированных специалистов. Интегративный обзор по планированию преемственности в здравоохранении показывает, что данный инструмент может использоваться для рекрутинга, удержания персонала, наставничества и развития управленческого потенциала [1].

В общем управленческом подходе планирование преемственности направлено на обеспечение непрерывности руководства и развитие внутреннего кадрового потенциала организации [2]. Для систем здравоохранения это особенно важно, поскольку устойчивость медицинской помощи зависит не только от численности персонала, но и от наличия подготовленных руководителей, преемников для ключевых позиций и механизмов передачи профессионального опыта.

Современные исследования по сестринскому управлению показывают, что планирование преемственности и развитие лидерства являются взаимосвязанными направлениями, поскольку дефицит подготовленных руководителей может влиять на устойчивость медицинских услуг и безопасность пациентов [3]. Следовательно, программы преемственности должны учитывать не только кадровое замещение, но и подготовку сотрудников к управленческой ответственности.

Международный опыт позволяет выделить несколько моделей управления кадровой преемственностью в здравоохранении. Первая модель связана с кадровым резервом и замещением ключевых должностей. Вторая модель ориентирована на развитие лидерства и подготовку будущих руководителей. Третья модель опирается на наставничество и передачу профессионального опыта. Четвёртая модель связана с управлением знаниями и сохранением организационной памяти. В реальной практике эти модели часто используются не изолированно, а как взаимосвязанные элементы кадровой политики медицинской организации.

Таким образом, международная рамка управления кадровой преемственностью показывает, что эффективная модель должна соединять кадровое планирование, развитие компетенций, наставничество, подготовку руководителей и сохранение организационных знаний. Благодаря чему формируется основа для анализа конкретных международных практик и их возможной адаптации в медицинских организациях Республики Казахстан.

3. Международные модели и практики управления кадровой преемственностью в здравоохранении

Международный опыт показывает, что управление кадровой преемственностью в здравоохранении реализуется через разные модели и практики. Они могут отличаться по уровню централизации и набору инструментов, однако чаще всего объединяют кадровое планирование, развитие лидерства, наставничество, оценку критических ролей и передачу профессионального опыта.

1) Великобритания: преемственность как часть управления талантами

В системе Национальной службы здравоохранения Великобритании кадровая преемственность рассматривается как часть управления талантами. NHS Leadership Academy определяет планирование преемственности как процесс выявления и развития будущих руководителей, старших менеджеров и сотрудников, способных занять критически важные должности в краткосрочной или долгосрочной перспективе [4]. Особенность данного подхода состоит в том, что преемственность связывается не только с заменой конкретного руководителя, но и с развитием внутреннего кадрового потенциала организации.

В британской практике также применяется Модель лидерства в здравоохранении (Healthcare Leadership Model), предназначенная для развития клинических и неклинических руководителей, а также сотрудников, готовящихся к лидерским функциям [5]. Для кадровой преемственности это важно, поскольку подготовка будущих руководителей строится через развитие управленческого поведения, оценку лидерских качеств и поддержку профессионального роста.

2) Канада: рамка лидерских компетенций LEADS

В Канаде значимое распространение получила рамка LEADS in a Caring Environment, что можно перевести как «LEADS: лидерство в среде заботы». Она описывает ключевые навыки, поведение, способности и знания, необходимые для лидерства на разных уровнях системы здравоохранения [6]. Для управления кадровой преемственностью данная рамка важна тем, что задаёт единое понимание компетенций будущего руководителя в медицинской организации.

Канадский опыт показывает, что преемственность может быть связана не только с кадровым резервом, но и с общей системой развития лидерских компетенций. Такая модель позволяет медицинским организациям оценивать управленческий потенциал сотрудников и планировать подготовку будущих руководителей более последовательно.

3) США: компетентностная модель лидерства в здравоохранении

В США одним из известных подходов является компетентностная модель Национального центра лидерства в здравоохранении (National Center for Healthcare Leadership, NCHL). Эта модель определяет знания, навыки и поведение, необходимые для эффективного руководства в современной системе здравоохранения [7]. Её значение для кадровой преемственности состоит в том, что подготовка преемников может быть связана с конкретными управленческими компетенциями.

Практическое значение такого подхода состоит в переходе от формального назначения возможного преемника к оценке его готовности к будущей роли. Медицинская организация может определить, какие компетенции сотруднику необходимо развивать для выполнения управленческих функций и обеспечения устойчивости подразделения.

4) Международная рамка кадровой устойчивости

На наднациональном уровне кадровая преемственность связана с общей проблемой устойчивости кадровых ресурсов здравоохранения. Всемирная организация здравоохранения подчёркивает, что системы здравоохранения нуждаются в достаточном количестве подготовленных, распределённых и удерживаемых работников здравоохранения [8]. В этом контексте кадровая преемственность выступает одним из механизмов долгосрочного сохранения компетенций, подготовки специалистов и снижения рисков кадровых разрывов.

Обобщение международных практик позволяет выделить несколько общих элементов управления кадровой преемственностью в здравоохранении: выявление критических ролей, развитие будущих руководителей, оценка компетенций, наставничество, передача профессионального опыта и сохранение организационных знаний. Данные элементы могут использоваться как ориентир при разработке управленческих механизмов кадровой преемственности в медицинских организациях Республики Казахстан.

4. Управленческие выводы для медицинских организаций Республики Казахстан

Международный опыт показывает, что управление кадровой преемственностью в здравоохранении не должно ограничиваться формальным созданием кадрового резерва. Для медицинских организаций Республики Казахстан более значимым является системный подход, при котором преемственность связывается с выявлением ключевых должностей, развитием руководителей, передачей профессионального опыта, наставничеством и сохранением организационных знаний.

Прежде всего, медицинским организациям важно заранее определять должности и компетенции, критичные для устойчивости подразделений, качества медицинской помощи и внутренней координации. Речь идёт не только о руководящих позициях, но и о специалистах, обладающих уникальным опытом, профессиональным авторитетом и знанием внутренних процессов. Без такой оценки кадровая преемственность становится реактивной и начинает рассматриваться только после возникновения кадрового разрыва. Важным направлением является подготовка будущих руководителей среднего звена. Международные модели показывают, что устойчивость медицинской организации во многом зависит от заведующих отделениями, старших медицинских сестёр и других руководителей подразделений, которые обеспечивают связь между управленческими решениями и повседневной клинической практикой. Для казахстанских медицин-

ских организаций это означает необходимость развивать не только профессиональные, но и управленческие компетенции сотрудников, способных в будущем принимать ответственность за работу подразделений.

Отдельное значение имеет наставничество и передача опыта. В медицинских организациях значительная часть знаний существует в практической форме и не всегда может быть полностью закреплена в инструкциях, регламентах или образовательных программах. Поэтому преемственность должна включать профессиональное сопровождение молодых сотрудников, участие опытных специалистов в подготовке преемников и создание условий для передачи неформализованных знаний. Кадровая преемственность также должна быть связана с управлением знаниями. Уход опытного специалиста или руководителя может приводить к потере профессиональной памяти подразделения, снижению согласованности действий и ослаблению внутренних управленческих механизмов. Поэтому медицинским организациям важно не только готовить замену на должность, но и фиксировать ключевые знания, практические решения, внутренние правила взаимодействия и опыт работы с типичными организационными рисками.

Следовательно, кадровая преемственность должна быть закреплена в управленческой практике медицинской организации. Она должна быть связана с кадровой политикой, профессиональным обучением, оценкой персонала, наставничеством и подготовкой управленческого резерва. Только в этом случае преемственность перестаёт быть разовой реакцией на уход сотрудника и становится постоянным управленческим механизмом.

Таким образом, международные модели управления кадровой преемственностью могут быть полезны для медицинских организаций Республики Казахстан не как готовые схемы для прямого переноса, а как ориентиры для формирования собственной управленческой практики. Их адаптация требует учёта кадровой структуры медицинских организаций, уровня управленческой зрелости, профессиональной культуры, доступных ресурсов и реальных потребностей подразделений.

5. Заключение

Проведённый обзор показывает, что международные подходы к управлению кадровой преемственностью в здравоохранении формируются вокруг нескольких взаимосвязанных направлений: кадрового планирования, развития лидерства, подготовки будущих руководителей, наставничества, передачи профессионального опыта и сохранения организационных знаний. В разных странах данные элементы могут быть оформлены по-разному, однако их общая логика состоит в переходе от реактивного замещения должностей к системному развитию кадрового потенциала медицинских организаций.

Опыт Великобритании показывает значение управления талантами и подготовки сотрудников к занятию критически важных позиций. Канадская рамка LEADS подчёркивает необходимость развития лидерских компетенций на разных уровнях

здравоохранения. Американский подход демонстрирует роль компетентностной оценки будущих руководителей, а международная рамка кадровой устойчивости обращает внимание на долгосрочное сохранение, развитие и удержание кадровых ресурсов здравоохранения.

Для медицинских организаций Республики Казахстан данный опыт имеет практическое значение, однако не может быть перенесён механически. Его адаптация требует учёта кадровой структуры организаций, уровня управленческой зрелости, профессиональной культуры, доступных ресурсов и реальных потребностей подразделений. Наиболее значимыми направлениями являются выявление ключевых должностей, подготовка кадрового резерва, развитие руководителей среднего звена, наставничество и сохранение профессионального опыта. На основании чего делается заключение о том, что управление кадровой преемственностью может рассматриваться как один из механизмов повышения устойчивости медицинских организаций. Его развитие позволяет снижать риски кадровых разрывов, сохранять критические компетенции, поддерживать непрерывность медицинской помощи и формировать внутренний управленческий потенциал системы здравоохранения.

Список литературы:

1. Carriere, B. K., Muise, M., Cummings, G., & Newburn-Cook, C. (2009). *Healthcare Succession Planning: An Integrative Review*. *Journal of Nursing Administration*, 39(12), 548-555. <https://doi.org/10.1097/NNA.0b013e3181c18010> (accessed: 06.06.2026).
2. Rothwell, W. J. (2015). *Effective Succession Planning: Ensuring Leadership Continuity and*

Building Talent from Within. 5th ed. New York: AMACOM. Retrieved from <https://www.oreilly.com/library/view/effective-succession-planning/9780814449165/> (accessed: 06.06.2026).

3. Al Hajri, A. K. (2024). *Succession Planning and Leadership Development in Nursing: A Bibliometric Analysis (2000-2023)*. *Nursing Forum*, 2024, 6191008. <https://doi.org/10.1155/2024/6191008> (accessed: 06.06.2026).

4. NHS Leadership Academy. *Succession Planning* [Electronic resource]. Retrieved from <https://www.leadershipacademy.nhs.uk/talent-management-hub/succession-planning/> (accessed: 06.06.2026).

5. NHS Leadership Academy. *Healthcare Leadership Model* [Electronic resource]. Retrieved from <https://www.leadershipacademy.nhs.uk/healthcare-leadership-model/> (accessed: 06.06.2026).

6. Canadian College of Health Leaders. *The LEADS Framework* [Electronic resource]. Retrieved from <https://cchl-ccls.ca/pld-leads/the-leads-framework/> (accessed: 06.06.2026).

7. National Center for Healthcare Leadership. *Health Leadership Competency Model* [Electronic resource]. Retrieved from <https://www.nchl.org/research-2/> (accessed: 06.06.2026).

8. World Health Organization. (2016). *Global Strategy on Human Resources for Health: Workforce 2030*. Geneva: World Health Organization. Retrieved from <https://iris.who.int/handle/10665/250368> (accessed: 06.06.2026).

ANTIBIOTICS: RETROSPECTIVE AND PERSPECTIVE**Mgeladze M.***The Doctoral Student at the Faculty of Medicine of the European University*<https://doi.org/10.5281/zenodo.20691184>**Abstract**

The history of antibiotics is one of the major revolutions in medicine, transforming deadly infectious diseases into easily treatable ones. It has evolved from the ancient use of mold to the development of modern, precision-guided drugs. The discovery of antibiotics helped overcome plague, tuberculosis, pneumonia, syphilis, and sepsis. They also made complex surgeries, organ transplants, and chemotherapy possible, which carry a high risk of infection. Today, there are approximately 200 different antibiotics worldwide. They are divided into groups based on their mechanism of action (for example, penicillins, cephalosporins, and macrolides). However, the main problem in modern medicine has become antibiotic resistance - the ability of bacteria to mutate and develop resistance to drugs due to improper or excessive use.

Keywords: Revolutions in medicine, precision-guided drugs, antibiotic resistance.

Introduction

If a piece of bread develops an unsightly bluish-green growth somewhere on the crust, it's likely thrown away. And that's a reasonable thing to do. But if the same thing had happened in ancient Egypt, the bread would have been used to treat people with a nasty cut or infection. In fact, some scientists have discovered that ancient civilizations in Egypt, Greece, China, and Rome used rather strange substances, such as bread mold and certain muds, to treat wounds. The question is: why did they do this? And the most obvious answer is: it must have worked! The idea of using microbes against microbes, along with observations of microbial antagonism, dates back to Louis Pasteur. In particular, Pacier wrote that "in the process of fighting each other, microbes produce specific substances as weapons of defense and attack." And what else are antibiotics if not weapons of attack by one microbe against another? Modern antibiotics—penicillin, streptomycin, and others—are derived from the metabolic products of various organisms—bacteria, molds, and actinomycetes. These substances either kill or inhibit the growth and reproduction of pathogenic microbes.

Results

It wasn't until the late 1800s that more modern scientists began to understand why things like mold and dirt were so effective at treating infections. One of the most important clues was the discovery of a scientist named Paul Ehrlich. He discovered that when he added certain dyes to a dish of bacteria, only some of the bacteria were stained—meaning they absorbed the dye. This led him to believe that if he could create a chemical that acted like a dye but killed bacteria, it could be very useful for treating diseases. He began by modifying a drug already in use to treat several other illnesses.

In his lab, he tweaked the molecule in different ways and then tested how well the new molecule killed bacteria in rabbits. He tried 605 different chemical combinations before discovering that he could kill the germs that cause syphilis, a disease common at the time. This drug is considered an antibiotic because it kills or inhibits bacterial growth. Could it be that the bread pans and mud used by ancient civilizations also contained antibiotics?

The era of antibiotics, in the modern sense of the word, began with the remarkable discovery of penicillin by Alexander Fleming. In 1929, the English scientist Alexander Fleming published a paper that brought him worldwide fame: he reported a new substance isolated from mold colonies, which he named penicillin. This marked the beginning of the "biography" of antibiotics, which are rightfully considered the "drug of the century." The paper noted the high sensitivity of staphylococci, streptococci, and pneumococci to penicillin. The anthrax pathogen and diphtheria bacillus were less sensitive to penicillin, while the typhoid bacillus, cholera vibrio, and others were completely insensitive.

It may seem crazy at first, but an accidental contamination in another scientist's laboratory, that of Alexander Fleming, not only showed that these ancient doctors were onto something but also changed the way scientists and doctors treated disease.

Alexander Fleming was a Scottish biologist with a keen interest in bacteria that cause infections. He served in the army during World War I, where he saw many soldiers die from infections in their wounds rather than from the wounds themselves. After years of research, repeatedly trying to find a substance capable of killing harmful bacteria, he decided to take a leave of absence. However, before leaving, he accidentally left a Petri dish containing bacteria open on his lab bench. Upon returning from leave, he noticed a bluish-green mold (like mold on bread) growing in one of the Petri dishes. He also noticed that the bacteria in the Petri dish failed to grow near the mold. Upon noticing this, he remarked, "That's funny." He then took samples of the mold to determine why bacteria wouldn't grow near it. Fleming discovered that the mold belonged to the species *Penicillium notatum* and produced a substance that destroyed many types of harmful bacteria. This substance, which he named penicillin, was the first antibiotic produced in a living organism to be isolated and described by a scientist.

Alexander Fleming discovered an antibiotic that forever changed medicine. However, it took another decade before a pair of chemists was able to extract enough penicillin to treat infections. Fortunately, penicillin could be produced on a mass scale around the time the United States entered World War II, saving thousands of lives.

While penicillin is still used for some treatments today, it is not as effective against bacteria as it was in the mid-1900s. This is because many types of bacteria have developed resistance to penicillin. In fact, many types of bacteria have developed resistance to many different antibiotics, which is a huge problem for both patients and the doctors trying to treat them.

However, A. Fleming did not report the type of mold from which he isolated penicillin. This was clarified by the renowned mycologist Charles Westling. However, the penicillin discovered by Fleming had several drawbacks. In liquid form, it quickly lost its potency. Due to its low concentration, it had to be administered in large quantities, which was very painful.

Fleming's penicillin also contained many harmful and undesirable protein substances from the broth in which the penicillium mold was grown. As a result, the use of penicillin for treating patients was delayed for several years. Only in 1939 did doctors at Oxford University Medical School begin studying the possibility of using penicillin to treat infectious diseases. G. Florey, B. Hayne, B. Chain, and other specialists drew up a plan for a detailed clinical trial of penicillin. Recalling this period of work, Professor Florey wrote: "We all worked on penicillin from morning until night. We fell asleep thinking about penicillin, and our only desire was to unravel its mystery."

This intense work bore fruit. In the summer of 1940, the first white mice, experimentally infected with streptococci in Oxford University laboratories, were saved from death thanks to penicillin. The results helped clinicians test penicillin on humans. On February 12, 1941, E. Abrabam administered the new drug to terminally ill patients dying from blood poisoning. Sadly, after several days of improvement, the patients eventually died. However, the tragic outcome occurred not as a result of penicillin but due to its unavailability in sufficient quantities.

Beginning in the late 1930s, studies of the natural distribution of actinomycetes and subsequent research by G. Gause and other scientists on the antibacterial properties of soil microorganisms laid the foundation for antibiotic production. The domestic drug penicillin was developed in 1942, and during World War II, thousands of wounded and sick people were saved.

The triumphant advance of penicillin and its worldwide recognition ushered in a new era in medicine—the era of antibiotics. The discovery of penicillin stimulated the search for and isolation of new active antibiotics. Thus, gramicidin was discovered in 1942 (G.F. Gause et al.). In late 1944, S. Waksal and his team conducted experimental testing of streptomycin, which soon became a rival to penicillin. Streptomycin proved highly effective in the treatment of tuberculosis, explaining the rapid growth of the industry producing this antibiotic. S. Waksal first coined the term "antibiotic," referring to a chemical substance produced by microorganisms that can inhibit the growth or even destroy bacteria and other microorganisms. This definition was subsequently expanded.

In 1947, another penicillin antibiotic, chloromycetin, was discovered and demonstrated its effectiveness. It was successfully used to treat typhoid fever, pneumonia, and Q fever. Between 1948 and 1950, aureomycin

and terramycin were introduced, with clinical use beginning in 1952. They proved effective against many infections, including brucellosis and tularemia. In 1949, neomycin, an antibiotic with a broad spectrum of activity, was discovered. Erythromycin was discovered in 1952.

Thus, the arsenal of antibiotics expanded annually. Streptomycin, biomycin, albomycin, chloramphenicol, synthomycin, tetracycline, terramycin, erythromycin, colimycin, mycerin, imaninin, ecmolin, and several others were developed. Some of these have a targeted effect on specific microbes or groups of microbes, while others have a broader spectrum of antimicrobial activity across a variety of microorganisms.

Hundreds of thousands of microbial cultures are isolated, resulting in tens of thousands of drugs. However, all of these require careful study.

The history of antibiotic development is full of unexpected and even tragic events. Even the discovery of penicillin was accompanied by both success and disappointment. Penicillinase, a substance capable of neutralizing penicillin, was soon discovered. This explained why many bacteria are resistant to penicillin (for example, the colibacillus and typhoid fever bacteria contain penicillinase).

Following this, other observations shook the belief in penicillin's all-conquering power. It was established that certain microbes acquire resistance to penicillin over time. This accumulated evidence supported the idea that there are two types of antibiotic resistance: natural (structural) and acquired.

It also became known that several microbes can produce a similar protective substance against streptomycin - the enzyme streptomycinase. This would seem to have led to the conclusion that penicillin and streptomycin were becoming ineffective treatments and should not be used. As important as the findings were, and as threatening as they were for antibiotics, scientists did not jump to such hasty conclusions. Instead, they reached two important conclusions: first, to seek ways to suppress microbes' protective properties, and second, to study this self-defense mechanism more deeply.

In addition to enzymes, some microbes are protected by vitamins and amino acids.

A major drawback of long-term treatment with penicillin and other antibiotics was the disruption of the physiological balance between microorganisms and macroorganisms. Antibiotics do not discriminate but suppress or kill any organism within their range of action. As a result, microbes that facilitate digestion and protect mucous membranes are destroyed, and a person begins to suffer from microscopic fungi.

Great care is required when using antibiotics. Precise dosages must be observed. After testing, each antibiotic is submitted to the Antibiotic Committee, which decides on its suitability for practical use.

Antibiotics with prolonged action in the body continue to be developed and improved. Another direction in antibiotic improvement is the development of formulations that allow administration via injection rather than by syringe.

Phenoxymethylpenicillin tablets are formulated for oral administration. The new drug has successfully

passed experimental and clinical trials. It possesses several valuable properties, the most important of which is its resistance to gastric acid. This is precisely what ensures the success of its production and use. Once dissolved and absorbed into the bloodstream, it exerts its therapeutic effect.

The success of phenoxymethylpenicillin tablets has met scientists' expectations. The arsenal of tablet antibiotics has been expanded to include several others with broad-spectrum activity against various microbes. Tetracycline, terramycin, and biomylin are currently well-known. Chloramphenicol, synthomycin, and other antibiotics are administered orally.

Thus, the semisynthetic drug ampicillin was developed, inhibiting the growth of not only staphylococci but also the microbes that cause typhoid fever, paratyphoid fever, and dysentery.

All of this was a new and significant development in the study of antibiotics. Conventional penicillins are ineffective against the typhoid-paratyphoid-dysenteric group. New prospects are now opening up for the wider practical use of penicillin.

A major scientific development was the discovery of new streptomycin preparations—pasomycin and streptosaluside—for the treatment of tuberculosis. It turns out that this antibiotic can lose its effectiveness against tuberculosis bacteria that have become resistant to it.

The development of dibiomycin at the All-Union Research Institute of Antibiotics was an undoubted achievement. It has proven effective in the treatment of trachoma.

Science is moving forward, and the search for antibiotics against viral diseases remains one of the most pressing scientific challenges. In 1957, the English scientist Isaacs reported the discovery of a substance he called interferon. This substance is formed in the body's cells as a result of viral penetration. The therapeutic properties of interferon have been studied. Experiments have shown that the viruses that cause influenza, encephalitis, polio, and smallpox are most sensitive to its action. Moreover, it is completely harmless to the body.

Liquid antibiotics in suspension form have been created. Due to its potent therapeutic properties, pleasant aroma, and sweet taste, this liquid form of the antibiotic has found widespread use in pediatrics to treat various diseases. They are so convenient to use that they are even given to newborns as drops.

In the era of antibiotics, oncologists could not help but consider using them in cancer treatment. Could microbes produce anti-cancer antibiotics? This task is much more complex and challenging than discovering antimicrobial antibiotics, but it fascinates and excites scientists. Antibiotics produced by actinomycetes, fungi with ray-like properties, have generated great interest among oncologists.

Several antibiotics are being carefully studied in animal experiments, and some are being used to treat cancer in humans. Actinomycin, actinoxanthin, pluramycin, sarcomycin, and auratin are important components in the search for active yet safe drugs. Unfortunately, many of the anticancer antibiotics developed so far do not meet this requirement.

Hope for success lies ahead. We dream of defeating cancer. The dream of conquering space once seemed impossible, but it has come true. These dreams will also come true.

Thus, the most effective antibiotics have proven to be those produced by actinomycetes, molds, bacteria, and other microorganisms. The search for new antibiotic-producing microbes continues on a broad front worldwide.

As early as 1909, Professor Pavel Lashchenkov discovered the remarkable ability of fresh chicken egg whites to kill many microbes. During destruction, they dissolve (lyse). In 1922, the English scientist Alexander Fleming studied this interesting biological phenomenon in depth and named the microbe-dissolving substance lysozyme. The discovery of lysozyme sparked great interest among biologists, microbiologists, pharmacologists, and physicians of various specialties.

Experimenters were interested in the nature, chemical composition, and effects of lysozyme on microbes. Of particular importance was the question of which pathogenic microbes lysozyme was effective against and which infectious diseases it could treat.

Lysozyme has been found in varying concentrations in tears, saliva, sputum, spleen, kidneys, liver, skin, intestinal mucosa, and other organs of humans and animals. Furthermore, lysozyme has been found in various fruits and vegetables (horseradish, turnips, radishes, cabbage), and even flowers (primrose). Lysozyme has also been found in various microbes. Lysozyme is used to treat certain infectious diseases of the eyes, nose, and oral cavity, among others.

The widespread popularity of antibiotics has led to them often becoming a kind of "home remedy" and being used without a doctor's prescription. Of course, such use is often dangerous and leads to adverse reactions and complications. Careless use of high doses of antibiotics can cause more severe reactions and complications. It's important to remember that antibiotics can damage microbial cells, introducing toxic microbial breakdown products into the body and causing poisoning. This often affects the cardiovascular and nervous systems and disrupts normal kidney and liver function.

Antibiotics have a potent effect on many microbes, but certainly not on all. There are no universally effective antibiotics yet. Scientists are striving to develop so-called broad-spectrum antibiotics. This means that such antibiotics should be effective against a wide range of microbes, and such antibiotics have been developed. These include streptomycin, tetracycline, chloramphenicol, and others. However, precisely because they kill a wide variety of microbes (though not all), the ones that remain become aggressive and can cause harm. At the same time, they have a bright future.

Antibiotics are now also used to treat animals and birds. Thanks to antibiotics, many infectious diseases in birds are no longer a scourge in poultry farming. In livestock and poultry farming, antibiotics have come to be used as growth promoters. When combined with certain vitamins added to the feed of chickens, turkeys, piglets, and other animals, antibiotics promote growth and weight gain.

Conclusion

Scientists have every reason to believe that, in addition to stimulating growth, antibiotics will also have a preventative effect on poultry diseases. Studies have shown that among birds, calves, and piglets, morbidity and mortality, for example, from intestinal infections (diarrhea), have been significantly reduced with the use of antibiotics.

Bacterial evolution occurs much faster than our drug development process. This means that bacteria resistant to a particular antibiotic develop soon after its development. This also means that the same type of antibiotic won't work next time. Doctors will need to develop a better plan to combat the new infection.

Thus, antibiotic resistance occurs when some bacteria acquire a gene that allows them to survive the antibiotics intended to kill them. New genes can arise in bacteria through mutation, or a gene can be transferred from one bacterium to another through horizontal gene transfer. When these bacteria multiply and spread, they create a major problem because many people become ill. When treating antibiotic-resistant infections, doctors must use other antibiotics. Sometimes, these other options may not work or cause serious side effects.

Let's hope that antibiotics will also defeat other diseases.

References:

1. Abraham EP, Chain E (1940). An enzyme from bacteria can destroy penicillin. *Nature* 146:837
2. Baumann S, Herrmann J, Raju R, Steinmetz H, Mohr KI, Hüttel S, Harmrolfs K, Stadler M, Müller R (2014) Cystobactamids: myxobacterial topoisomerase inhibitors exhibiting potent antibacterial activity. *Angew Chem Int Ed* 53:1–6
3. Béchamp MA (1863) De l'action de la chaleur sur l'arséniate d'aniline et sur la formation d'un anilide de l'acide arsenique. *Compt Rend* 56:1172–1175
4. Binda E, Marinelli F, Marcone GL (2014) Old and new glycopeptide antibiotics: action and resistance. *Antibiotics* 3:572–594
5. Burchard G-D, Kaufmann SHE, Schulz TF (2012) *Medizinische Mikrobiologie und Infektiologie*. 7. Auflage. Springer, Berlin
6. Carter GT (2009) Natural products in drug discovery. In: Stromgaard K, Krogsgaard-Larsen P, Madsen U (eds.) *Textbook of drug design and discovery*, 4th edn. CRC Press Boca Raton, pp. 89–106
7. Cha JY, Ishiwata A, Mobashery S (2004) A novel β -lactamase activity from a penicillin-binding protein of *Treponema pallidum* and why syphilis is still treatable with penicillin. *J Biol Chem* 279:14917–14921
8. Chellat MF, Raguz L, Riedl R (2016) Antibiotikaresistenzen gezielt überwinden. *Angew Chem* 128:2–32
9. Collin F, Karkare S, Maxwell A (2011) Exploiting bacterial DNA gyrase as a drug target: current state and perspectives. *Appl Microbiol Biotechnol* 92:479–497
10. De la Bédoyère G (2005) The discovery of penicillin (milestones in modern science). Evans Brothers Ltd
11. Ehrlich P, Bertheim A (1912): Über das salzsaure 3,3-Diamino-4,4-dioxy-arsenobenzol und seine nächsten Verwandten. *Berichte der Deutschen Chemischen Gesellschaft* Bd 45(1):756–766
12. Ferber D (2003) Triple-threat microbe gained powers from another bug. *Science* 302:1488
13. Gottlieb D, Bhattacharyya PK, Anderson HW, Carter HE (1948) Some properties of an antibiotic from a species of *Streptomyces*. *J Bact* 55:409–417
14. Grundy WE, Sinclair AC, Theriault RJ, Goldstein AW, Rickher CJ, Warren HB Jr, Oliver TJ, Sylvester JC (1956–1957) Ristocetin, microbiologic properties. *Antibiot Annu* 687–692
15. Guttman P, Ehrlich P (1891) Über die Wirkung des Methylenblau bei Malaria. *Berl Klin Wochenschr* 28:953–956
16. Haensch S, Bianucci R, Signoli M, et al. (2010). Distinct clones of *Yersinia pestis* caused the Black Death. Ed Nora J Besansky *PLoS Pathogens* 6(10):e1001134
17. Harris DA, Reagan MA, Ruger M, Wallick H, Woodruff HB (1955) Discovery and antimicrobial properties of cathomycin, a new antibiotic produced by *Streptomyces spheroides* n. sp. *Antibiot Annu* 3:909–917
18. Hart GD (2001) Descriptions of blood and blood disorders before the advent of laboratory studies. *Histol Rev Brit J Haem* 115:719–728
19. Hawgood BJ (2008) Alexandre Yersin (1863–1943): discoverer of the plague bacillus, explorer and agronomist. *J Med Biog* 16:167–172
20. Heide L (2014) New aminocoumarin antibiotics as gyrase inhibitors. *Int J Med Microbiol* 304:31–36
21. Herrmann J, Lukežič T, Kling A, Baumann S, Hüttel S, Petković H, Müller R (2016) Strategies for the discovery and development of new antibiotics from natural products: three case studies. *Curr Top Microbiol Immunol Springer EBook*
22. Husain MA (2004) Bacitracin, glycopeptide antibiotics, and the polymyxins. In: Craig CR, Stitzel RE (eds) *Modern pharmacology with clinical applications* 48:552
23. Jovetic S, Zhu Y, Marcone GL, Marinelli F, Tramper J (2010) β -Lactam and glycopeptide antibiotics: first and last line of defense? *Trends Biotechnol* 28:596–604
24. Kretz J, Kerwat D, Schubert V, Grätz S, Pesic A, Semsary S, Cociancich S, Royer M, Süßmuth RD (2015) Total synthesis of albicidin: A lead structure from *Xanthomonas albilineans* for potent antibacterial gyrase inhibitors. *Angew Chem Int Ed* 54:1969–1973
25. Lloyd NC, Morgan HW, Nicholson BK, Ronimus RS (2005) The composition of Ehrlich's Salvarsan: resolution of a century-old debate. *Angew Chem Int Ed* 44:941–944
26. McCormick MH, McGuire JM, Pittenger GE, Pittenger RC, Stark WM (1955–1956) Vancomycin, a new antibiotic. I. Chemical and biologic properties. *Antibiot Annu* 3:606–611
27. Morar M, Bhullar K, Hughes DW, Junop M, Wright GD (2009) Structure and mechanism of the lincosamide antibiotic adenylyltransferase LinB. *Structure* 17:1649–1659
28. Oliver TJ, Ptokop JF, Bower RR, Otto RH (1962). Chelocardin, a new broad-spectrum antibiotic.

I. Discovery and biological properties. Antimicrob Agents Chemother 583–591

29. Oppolzer W, Prelog V, Sensi P (1964) Experientia 20:336–339

30. Pandit N, Singla RK, Shrivastava B (2012) Current updates on oxazolidinone and its significance. Int J Med Chem. doi:[10.1155/2012/159285](https://doi.org/10.1155/2012/159285)

31. Parenti F, Beretta G, Berti M, Arioli V (1978) Teicomycins, new antibiotics from *Actinoplanes teicomyceticus* nov. sp. I. Description of the producer strain, fermentation studies and biological properties. J Antibiot 31:276–283

32. Rubin RP (2007) A brief history of great discoveries in pharmacology. In celebration of the centennial anniversary of the founding of the American Society of Pharmacology and Experimental Therapeutics. Pharmacol Rev 59:289–359

33. Shaw KJ, Rather PN, Hare RS, Miller GH (1993) Molecular genetics of aminoglycoside resistance genes and familial relationships of the aminoglycoside-modifying enzymes. Microbiol Rev 57:138–163

34. Takeuchi T, Hikiji T, Nitta K, Yamazaki S, Abe S, Takayama H, Umezawa H (1957) Biological studies on kanamycin. J Antibiot (Tokyo) 10:107–114

35. Thomas HW (1905) Some experiments in the treatment of trypanosomiasis. Brit Med J 1140

36. Tyndall J (1877) The optical deportment of the atmosphere in relation to the phenomena of putrefaction and infection. Philos Trans R Soc Lond 166:27–74

37. Waksman SA, Woodruff HB (1940) Bacteriostatic and bacteriocidal substances produced by soil actinomycetes. Proc Soc Exp Biol 45:609–614

38. Williams C (2013) Medicinal plants in Australia Vol 4: An antipodean apothecary. Rosenberg Publishing

39. Würth I (2012) Geißler in Thüringen: Die Entstehung einer spätmittelalterlichen Häresie (Hallische Beiträge zur Geschichte des Mittelalters und der Frühen Neuzeit, Band 10

40. Zimdahl, R. L. (2015). Six chemicals that changed agriculture. 1st edn. Academic Press Elsevier

REVIEW OF INTERNATIONAL PRACTICES FOR INTEGRATING MEDICAL TECHNOLOGIES INTO ORGANISATIONAL PROCESSES OF HEALTHCARE INSTITUTIONS**Ormanbekov Ye.***DBA program doctoral candidate, AlmaU, Kazakhstan***ОБЗОР МЕЖДУНАРОДНЫХ ПРАКТИК ИНТЕГРАЦИИ МЕДИЦИНСКИХ ТЕХНОЛОГИЙ В ОРГАНИЗАЦИОННЫЕ ПРОЦЕССЫ МЕДИЦИНСКИХ УЧРЕЖДЕНИЙ****Орманбеков Е.***докторант программы DBA, Алматы Менеджмент Университет, Казахстан*<https://doi.org/10.5281/zenodo.20691186>**Abstract**

The article examines international practices for integrating medical technologies into the organisational processes of healthcare institutions. It considers medical technologies not only as equipment, digital tools or clinical solutions, but also as factors of organisational change. The article reviews approaches used in the United Kingdom, the United States, Estonia and international digital maturity assessment practices. Attention is paid to management support, staff training, adaptation of clinical pathways, data interoperability and monitoring of implementation results. The article also identifies conditions that may be relevant for adapting international experience to healthcare institutions in the Republic of Kazakhstan.

Аннотация

Статья посвящена обзору международных практик интеграции медицинских технологий в организационные процессы медицинских учреждений. Медицинские технологии рассматриваются не только как оборудование, цифровые инструменты или клинические решения, но и как фактор организационных изменений. В статье обобщаются подходы, применяемые в Великобритании, США, Эстонии, а также международные практики оценки цифровой зрелости медицинских организаций. Особое внимание уделяется управленческому сопровождению, подготовке персонала, адаптации клинических маршрутов, интероперабельности данных и мониторингу результатов внедрения. Также определены условия, значимые для адаптации международного опыта в медицинских учреждениях Республики Казахстан.

Keywords: medical technologies, healthcare institutions, organisational processes, digital health, change management, Kazakhstan.

Ключевые слова: медицинские технологии, медицинские учреждения, организационные процессы, цифровое здравоохранение, управление изменениями, Казахстан.

1. Введение

Внедрение новых медицинских технологий является одним из ключевых направлений развития современного здравоохранения. Диагностические, лечебные, цифровые и организационно-технологические решения позволяют повысить качество медицинской помощи, ускорить принятие клинических решений, улучшить маршрутизацию пациентов и повысить эффективность работы медицинских учреждений. Вместе с тем сама по себе технологическая модернизация не гарантирует устойчивого результата, если новые решения не встроены в повседневные клинические и управленческие процессы.

Международная практика показывает, что успешная интеграция медицинских технологий требует системного организационного сопровождения. Речь идет не только о приобретении оборудования или запуске цифровых инструментов, но и об изменении внутренних регламентов, подготовке персонала, распределении ответственности, настройке междисциплинарного взаимодействия, адаптации маршрутов пациентов и последующем мониторинге результатов. Поэтому внедрение медицинских технологий следует рассматривать как управленческий процесс, связанный с организационными изменениями в медицинском учреждении.

Для Республики Казахстан изучение международного опыта в данной сфере имеет особое значение. Система здравоохранения страны находится в процессе технологического и цифрового развития, однако эффективность таких изменений во многом зависит от готовности медицинских организаций к их практическому применению. Международные подходы могут быть полезны для определения условий, при которых медицинские технологии становятся частью устойчивой организационной практики, а не остаются отдельными техническими решениями.

Целью статьи является обзор международных практик интеграции медицинских технологий в организационные процессы медицинских учреждений и определение управленческих условий, значимых для адаптации данного опыта в системе здравоохранения Республики Казахстан. В статье рассматриваются подходы к внедрению медицинских технологий, международные примеры их организационной интеграции, а также возможные направления применения зарубежного опыта в казахстанских медицинских учреждениях.

2. Медицинские технологии как фактор организационных изменений в здравоохранении

Медицинские технологии в современном здравоохранении включают не только оборудование,

диагностические и лечебные методы, но и цифровые решения, информационные системы, телемедицинские инструменты, системы поддержки клинических решений и организационные технологии, направленные на повышение качества медицинской помощи. Их внедрение меняет не только техническую сторону работы медицинского учреждения, но и порядок взаимодействия между врачами, пациентами, подразделениями и управленческим контуром организации.

Внедрение новых медицинских технологий требует пересмотра клинических маршрутов, внутренних регламентов, распределения функций между специалистами, порядка обмена информацией и требований к компетенциям персонала. Поэтому медицинская технология не должна рассматриваться только как отдельное оборудование или программный продукт. В практическом смысле она становится элементом организационного изменения, поскольку влияет на структуру рабочих процессов, принятие решений, контроль качества и ответственность участников медицинской помощи.

Международные подходы к развитию цифрового и технологического здравоохранения показывают, что устойчивый эффект от внедрения технологий достигается только при наличии организационной готовности, кадровой подготовки, управленческой поддержки и последующего мониторинга результатов. ВОЗ подчёркивает необходимость системного подхода к цифровым и технологическим решениям в здравоохранении, включая развитие инфраструктуры, компетенций, нормативной базы и механизмов оценки их влияния на систему медицинской помощи [1]. ОЭСР также указывает, что использование данных и цифровых технологий требует не только технических решений, но и изменения управленческих процессов, обеспечивающих применение информации для повышения эффективности здравоохранения [2].

Сложность внедрения медицинских технологий связана с тем, что медицинская организация является профессиональной системой с высокой степенью ответственности, регламентации и зависимости от человеческого фактора. Новая технология может быть клинически перспективной, но её практическая эффективность зависит от того, насколько она понятна персоналу, совместима с существующими процессами, не создаёт избыточной нагрузки и поддерживается руководством учреждения. При отсутствии таких условий технология может использоваться формально либо не давать ожидаемого управленческого и клинического результата.

В исследованиях, посвящённых внедрению технологий в здравоохранении, подчёркивается, что успешная интеграция зависит от взаимодействия нескольких факторов: характеристик самой технологии, потребностей пациентов, готовности пользователей, организационной среды, внешнего регулирования и способности учреждения адаптировать процессы в ходе применения технологии [3]. Данный подход показывает, что внедрение медицинских технологий является не разовым техническим действием, а последовательным процессом организационной адаптации.

С позиции теории диффузии инноваций пространство новых решений зависит от того, насколько пользователи видят их преимущество по сравнению с прежней практикой, совместимость с текущими условиями работы, простоту применения, возможность предварительного испытания и наблюдаемость результата [4, с. 15-16]. Для медицинских учреждений это означает необходимость не только представить новую технологию персоналу, но и показать её практическую пользу, обеспечить обучение, организовать обратную связь и постепенно встроить технологию в повседневную деятельность.

Таким образом, медицинские технологии выступают важным фактором организационных изменений в здравоохранении. Их успешная интеграция требует управленческого сопровождения, подготовки персонала, адаптации процессов, внутренней коммуникации и оценки результатов. Именно поэтому международные практики внедрения медицинских технологий представляют интерес не только с клинической, но и с организационно-управленческой точки зрения.

3. Международные практики интеграции медицинских технологий в организационные процессы медицинских учреждений

Международная практика показывает, что внедрение медицинских технологий становится результативным тогда, когда оно сопровождается изменением организационных процессов медицинского учреждения. Наиболее значимыми условиями являются предварительная оценка технологии, подготовка персонала, адаптация клинических маршрутов, цифровая инфраструктура, управленческая поддержка и последующий мониторинг результатов.

1) Великобритания: ускорение внедрения медицинских инноваций через NHS

Одним из показательных примеров является опыт Национальной службы здравоохранения Великобритании (National Health Service, NHS). Через механизм ускоренного доступа к инновациям (Accelerated Access Collaborative) система NHS поддерживает внедрение различных типов инноваций, включая лекарственные препараты, диагностические решения, медицинские изделия, цифровые продукты, изменения маршрутов пациентов и новые модели работы персонала [5].

Особенность данного подхода заключается в том, что инновация рассматривается не как отдельный продукт, а как решение, которое должно быть встроено в реальные потребности системы здравоохранения. Для этого применяются механизмы оценки, сопровождения, распространения и масштабирования. В результате медицинские учреждения получают не только технологическое решение, но и организационную поддержку его практического применения.

Для медицинских организаций данный опыт показывает важность системного сопровождения внедрения. Новая технология должна быть связана с клинической потребностью, внутренними регламентами, обучением персонала и оценкой результата. Такой подход снижает риск фрагментарного

применения инноваций и повышает вероятность их устойчивого использования в медицинской практике.

2) Международная практика оценки цифровой зрелости медицинских организаций

Важным направлением международной практики является оценка цифровой зрелости медицинских учреждений. Общество информационных и управленческих систем в здравоохранении (Healthcare Information and Management Systems Society, HIMSS) развивает инструменты оценки цифрового развития, включая Индикатор цифрового здравоохранения (Digital Health Indicator), который позволяет медицинским организациям анализировать использование цифровых технологий, данных и информационных систем для улучшения медицинской помощи и управленческих процессов [6].

Практическое значение таких инструментов состоит в том, что они помогают оценить не только наличие информационных систем, но и степень их фактической интеграции в работу организации. Медицинское учреждение может определить, насколько данные используются в клинических решениях, административном управлении, взаимодействии с пациентами и контроле качества.

Данный опыт особенно важен для стран, где цифровизация здравоохранения развивается поэтапно. Оценка цифровой зрелости позволяет руководству медицинской организации видеть проблемные зоны, определять приоритеты развития и переходить от отдельных цифровых проектов к последовательной технологической трансформации.

3) США: интеграция цифровых решений и искусственного интеллекта в клинические процессы

В США одним из заметных примеров является платформа клиники Мэйо (Mayo Clinic Platform), ориентированная на развитие цифрового здравоохранения, решений на основе искусственного интеллекта и инструментов, которые могут применяться в клинической и административной практике медицинских организаций. В рамках платформы цифровые решения оцениваются с точки зрения точности, справедливости, безопасности и соответствия заявленному назначению [7].

Данный пример показывает, что внедрение цифровых медицинских решений требует не только разработки технологии, но и организационного механизма её проверки и адаптации. Для медицинского учреждения важно заранее определить, как технология будет использоваться врачами, какие данные необходимы для её работы, как она повлияет на клинические решения и какие риски должны быть учтены до масштабирования.

Особенность такого подхода заключается в соединении клинической экспертизы, цифровой инфраструктуры и управленческого сопровождения? кто позволяет сократить разрыв между разработкой медицинской технологии и её практическим применением в процессе оказания медицинской помощи.

4) Эстония: интеграция медицинских данных через электронную систему здравоохранения

Эстония представляет интерес как пример системной цифровой интеграции здравоохранения.

Электронные медицинские записи объединяют данные разных поставщиков медицинских услуг и обеспечивают пациентам доступ к информации через цифровые сервисы [8]. Такая модель способствует повышению преемственности медицинской помощи и улучшению обмена информацией между участниками системы здравоохранения.

Организационное значение данного опыта состоит в том, что электронная медицинская запись выступает не только как база данных, но и как инструмент координации медицинской помощи. Она позволяет врачам и пациентам работать с единой информационной основой, снижает дублирование данных и поддерживает более согласованное принятие клинических решений.

Для медицинских учреждений данный пример показывает, что интеграция технологий требует интероперабельности, правил работы с данными, защиты персональной информации и доверия пользователей. Поэтому цифровые решения должны сопровождаться не только технической инфраструктурой, но и организационными, правовыми и коммуникационными механизмами.

Обобщение международных практик позволяет выделить несколько общих условий успешной интеграции медицинских технологий. Во-первых, внедрение должно быть связано с конкретной клинической или организационной потребностью. Во-вторых, необходима предварительная оценка эффективности, безопасности и готовности к применению. В-третьих, технология должна быть встроена в клинические маршруты, информационные системы и управленческие процессы. В-четвёртых, устойчивость результата обеспечивается через обучение персонала, обратную связь, мониторинг и последующую корректировку практики.

Таким образом, международный опыт показывает, что медицинские технологии дают наибольший эффект тогда, когда они становятся частью организационной модели медицинского учреждения. Их успешное внедрение требует не только финансовых вложений и технической подготовки, но и системного управления изменениями.

4. Управленческие условия адаптации международного опыта в медицинских учреждениях Республики Казахстан

Для Республики Казахстан адаптация международного опыта интеграции медицинских технологий имеет практическое значение, поскольку система здравоохранения страны находится в процессе технологического и цифрового развития. В Концепции развития здравоохранения Республики Казахстан на 2022-2029 годы среди приоритетных направлений обозначены развитие интегрированной медицинской помощи, цифровизация, укрепление кадрового потенциала и повышение эффективности управления отраслью [9]. Это создаёт институциональную основу для внедрения новых медицинских технологий, однако их результативность зависит от способности медицинских учреждений встроить такие решения в повседневную клиническую и управленческую практику.

Международные практики показывают, что медицинская технология должна внедряться не как

отдельное техническое решение, а как элемент изменения организационного процесса. Для казахстанских медицинских учреждений это означает необходимость предварительно определять, какую задачу решает технология: повышение точности диагностики, сокращение времени ожидания, улучшение маршрутизации пациента, снижение нагрузки на персонал, повышение качества мониторинга или оптимизацию управленческих решений. Такой подход позволяет избежать формального внедрения оборудования или цифрового инструмента без реального влияния на качество медицинской помощи.

Важным условием адаптации международного опыта является оценка готовности медицинского учреждения. Перед внедрением новой технологии необходимо учитывать состояние инфраструктуры, квалификацию персонала, наличие внутренних регламентов, качество медицинских данных, готовность руководителей подразделений и способность организации сопровождать изменения после запуска технологии. Без такой оценки даже перспективное решение может использоваться фрагментарно либо создавать дополнительную нагрузку на персонал.

Особое значение имеет подготовка сотрудников. Новые медицинские технологии меняют привычные функции врачей, среднего медицинского персонала, административных работников и технических специалистов. Поэтому обучение должно включать не только технические инструкции, но и разъяснение целей внедрения, новых маршрутов пациента, порядка обмена информацией, зон ответственности и ожидаемых результатов. В этом процессе важна роль руководителей подразделений, которые обеспечивают связь между управленческим решением и практической работой персонала.

Ещё одним условием является включение технологии во внутренние регламенты и клинические маршруты. Если новая технология существует отдельно от рабочих процессов, она не становится частью устойчивой практики. Поэтому необходимо заранее определить, на каком этапе оказания медицинской помощи она применяется, кто отвечает за её использование, какие данные фиксируются, каким образом передаётся информация между подразделениями и как оценивается результат.

Для казахстанских медицинских учреждений также важны вопросы интероперабельности, защиты персональных данных и доверия пользователей. Международный опыт показывает, что цифровые и медицинские технологии дают больший эффект тогда, когда данные могут использоваться между подразделениями, системами и уровнями оказания помощи. При этом технологическое развитие должно сопровождаться понятными правилами работы с информацией и управленческим контролем качества данных.

Таким образом, адаптация международного опыта в Республике Казахстан требует перехода от технического подхода к управленческой модели внедрения медицинских технологий. Такая модель должна включать оценку потребности, анализ го-

товности учреждения, подготовку персонала, адаптацию процессов, управление данными и мониторинг результата. При соблюдении этих условий медицинские технологии могут стать не только инструментом модернизации, но и фактором устойчивого организационного развития медицинских учреждений.

5. Заключение и рекомендации

Проведённый обзор показывает, что интеграция медицинских технологий в организационные процессы медицинских учреждений требует системного управленческого подхода. Международные практики свидетельствуют, что новые медицинские технологии дают устойчивый эффект не только при наличии оборудования, цифровых решений или клинических инструментов, но и при их включении в маршруты пациентов, внутренние регламенты, систему подготовки персонала и механизмы оценки результатов.

Для медицинских учреждений Республики Казахстан данный опыт имеет практическое значение в условиях технологического и цифрового развития здравоохранения. При этом зарубежные модели не могут быть перенесены механически. Их адаптация должна учитывать уровень организационной готовности медицинских учреждений, кадровые ресурсы, состояние информационных систем, управленческую культуру и реальные потребности пациентов.

Для успешной интеграции медицинских технологий рекомендуется предварительно оценивать готовность учреждения к внедрению, связывать каждую технологию с конкретной клинической или управленческой задачей, обеспечивать обучение персонала, включать новые решения во внутренние регламенты и клинические маршруты, а также проводить мониторинг их влияния на качество, доступность и эффективность медицинской помощи. Такой подход позволит рассматривать медицинские технологии не только как инструмент модернизации, но и как фактор устойчивого организационного развития медицинских учреждений Республики Казахстан.

Список литературы:

1. World Health Organization. (2021). *Global Strategy on Digital Health 2020-2025*. Geneva: World Health Organization. Retrieved from <https://www.who.int/publications/i/item/9789240020924>
2. OECD. (2019). *Health in the 21st Century: Putting Data to Work for Stronger Health Systems*. OECD Health Policy Studies. Paris: OECD Publishing. <https://doi.org/10.1787/e3b23f8e-en>
3. Greenhalgh, T., Wherton, J., Papoutsis, C., Lynch, J., Hughes, G., A'Court, C., Hinder, S., Fahy, N., Procter, R., & Shaw, S. (2017). Beyond Adoption: A New Framework for Theorizing and Evaluating Non-adoption, Abandonment, and Challenges to the Scale-Up, Spread, and Sustainability of Health and Care Technologies. *Journal of Medical Internet Research*, 19(11), e367. <https://doi.org/10.2196/jmir.8775>
4. Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed.). New York: Free Press.

5. NHS England. *Accelerated Access Collaborative* [Electronic resource]. Retrieved from <https://www.england.nhs.uk/aac/> (accessed: 25.05.2026).
6. Healthcare Information and Management Systems Society. *Digital Health Indicator: Measure Your Healthcare Outcomes* [Electronic resource]. Retrieved from <https://www.himss.org/maturity-models/digital-health-indicator/> (accessed: 25.05.2026).
7. Mayo Clinic Platform. *Digital Health* [Electronic resource]. Retrieved from <https://www.mayo-clinicplatform.org/focus-areas/digital-health/> (accessed: 25.05.2026).
8. e-Estonia. *Estonian e-Health Records* [Electronic resource]. Retrieved from <https://e-estonia.com/solutions/e-health-2/e-health-records/> (accessed: 25.05.2026).
9. Правительство Республики Казахстан. (2022). *Об утверждении Концепции развития здравоохранения Республики Казахстан на 2022-2029 годы: Постановление Правительства Республики Казахстан от 24 ноября 2022 года № 945* [Электронный ресурс]. Retrieved from <https://adilet.zan.kz/rus/docs/P2200000945> (accessed: 25.05.2026).

PEDAGOGICAL SCIENCES

BUSINESS GAME AS A METHOD OF DEVELOPING DIRECT AND INDIRECT SPEECH SKILLS AND ACADEMIC ETHICS IN THE "SPORTS MANAGEMENT" COURSE

Tagiyeva E.

*PhD in Education, Associate Professor,
Azerbaijan Sports Academy (ASA),
Baku, Azerbaijan
orcid.org/0000-0002-6948-8791*

ДЕЛОВАЯ ИГРА КАК МЕТОД ФОРМИРОВАНИЯ НАВЫКОВ ПРЯМОЙ И КОСВЕННОЙ РЕЧИ И АКАДЕМИЧЕСКОЙ ЭТИКИ В КУРСЕ „СПОРТИВНЫЙ МЕНЕДЖМЕНТ“

Тагиева Э.С.

*PhD по педагогике, доцент
Азербайджанская спортивная академия (ASA)
Баку, Азербайджан
orcid.org/0000-0002-6948-8791
<https://doi.org/10.5281/zenodo.20691190>*

Abstract

The article explores the scientific and methodological aspects of implementing game-based educational technologies into the training of Bachelor's and Master's students at the Azerbaijan State Academy of Physical Culture and Sports (ASA). Special attention is paid to the business game as a method of teaching direct and indirect speech, as well as the fundamentals of academic ethics within the context of professional training for sports management specialists. The development of these competencies is examined through the lens of core academic disciplines: "Sports Management", "Business and Academic Communication in a Foreign Language", and "Academic Writing and Ethics". The study incorporates the works of contemporary Azerbaijani and foreign researchers in the fields of professional ethics and linguodidactics. The efficiency of using business games as a tool for fostering a culture of academic ethics and professional integrity among future managers is substantiated. The author provides a detailed scenario of a business game that models the processes of intellectual property protection, anti-plagiarism efforts, and adherence to the principles of fair play in both the sports industry and research activities. The paper presents the results of the experimental implementation of the business game method in the educational process of students at the Faculty of Health and Management. It was established that participating in and preparing for the business game stimulated students' cognitive activity and enhanced the communication skills necessary for professional managerial activity.

Аннотация

Статья посвящена исследованию научно-методических аспектов внедрения игровых образовательных технологий в процесс подготовки бакалавров и магистрантов в Азербайджанской спортивной академии (ААА). Особое внимание уделяется деловой игре как методу обучения прямой и косвенной речи, основам академической этики в контексте профессиональной подготовки специалистов для сферы спортивного менеджмента. Формирование указанных компетенций рассматривается на примере профильных академических дисциплин «Спортивный менеджмент», «Деловая и академическая коммуникация на иностранном языке» и «Академическое письмо и этика». Учтены труды современных азербайджанских и зарубежных исследователей в области профессиональной этики и лингводидактики. Обоснована эффективность использования деловой игры как инструмента формирования культуры академической этики и профессиональной честности у будущих управленцев. Автор предлагает детально разработанный сценарий деловой игры, моделирующей процессы защиты интеллектуальной собственности, противодействия плагиату и соблюдения принципов fair play в спортивной индустрии и научно-исследовательской деятельности. В работе представлены результаты экспериментального внедрения метода деловой игры в образовательный процесс студентов факультета «Здоровье и менеджмент». Установлено, что проведение деловой игры и подготовка к ней способствовали развитию познавательной активности студентов, коммуникативных навыков, необходимых в области профессиональной управленческой деятельности.

Keywords: business game, academic ethics, sports management, professional communication, direct and indirect speech, interactive teaching methods.

Ключевые слова: деловая игра, академическая этика, спортивный менеджмент, профессиональная коммуникация, прямая и косвенная речь, интерактивные методы обучения

Введение

В современных условиях глобализации спортивной индустрии и усиления конкуренции в спортивной сфере особую значимость приобретают креативные специалисты в области спортивного менеджмента, способные оперативно реагировать на изменения внешней среды, предлагать нестандартные управленческие решения, генерировать оригинальные идеи, а также разрабатывать эффективные стратегии развития организаций. При этом важным условием их профессиональной деятельности выступает соблюдение норм академической и профессиональной этики, обеспечивающих ответственность, добросовестность и прозрачность принимаемых управленческих решений.

Деловое общение является составной частью профессиональной деятельности спортивного специалиста. Прежде всего, навыки прямой и косвенной речи необходимы для эффективной профессиональной коммуникации в менеджменте. Важно отметить, что успешное формирование указанных речевых навыков невозможно без освоения основных знаний академической этики и академической культуры. Иными словами, обучение данным навыкам должно осуществляться посредством их интеграции в содержание базовых учебных дисциплин.

Современный этап развития индустрии спорта в Азербайджанской Республике, характеризующийся масштабированием проектов в сфере массово-оздоровительного спорта, ставит перед высшей школой новые задачи. Для Азербайджанской государственной академии физической культуры и спорта (АСА) как флагмана в области спортивного образования вопросы формирования академической честности (*academic integrity*) имеют приоритетное значение. Выпускник Азербайджанской спортивной академии (АСА) по направлению «Менеджмент» должен обладать не только теоретической базой управления, но и высокоразвитой коммуникативной компетенцией. В современных условиях реальной научной проблемой является исследование эффективности применения деловых игр в преподавании гуманитарных дисциплин, в частности курса «Спортивный менеджмент, и их влияния на формирование коммуникативной компетентности студентов спортивного вуза. Индустрия спорта в Азербайджанской Республике переживает этап институциональной зрелости, требующий от управленческих кадров не только высокого уровня операционной и финансовой грамотности, но и безупречного следования этическим стандартам. Модернизация высшего образования в стране, закреплённая государственными образовательными программами, ориентирует вузы на подготовку специалистов, способных работать в условиях прозрачности, уважения к интеллектуальной собственности и честной конкуренции.

Термин «этика» в переводе с греческого языка означает- обычай, нрав. Первым ввел в оборот этот термин основоположник множества наук Аристотель. Античный философ считал, что общественные отношения тесно связаны с этикой, которая изучает благо отдельного человека, сообщества лю-

дей [11, с.37]. Этика – учение о нравственности (морали), о правилах и нормах человеческого поведения, об их обязанностях по отношению друг к другу, к обществу, к государству. Традиционно элементы академической этики рассматриваются в курсах общего гуманитарного цикла, однако их изолированное изучение часто носит декларативный характер. Студенты первого и второго курсов бакалавриата, сталкиваясь с необходимостью написания рефератов, курсовых работ или бизнес-проектов, не всегда до конца осознают практическую значимость понятий «плагиат», «фальсификация данных» или «конфликт интересов» в их будущей управленческой практике.

В этой связи критически актуальным становится поиск интерактивных методов обучения, способных связать абстрактные категории этики с реальной практикой спортивного управления. Наиболее перспективным инструментом в данном контексте выступает деловая игра, позволяющая смоделировать профессиональные риски и дилеммы, с которыми сталкивается менеджер спортивной организации.

Анализ последних исследований и публикаций

Проблемы внедрения интерактивных методов в современной высшей школе, а также вопросы профессиональной подготовки специалистов-менеджеров в сфере физической культуры и спорта находятся в центре внимания многих отечественных исследователей. Общие методологические основы интерактивного обучения, игрового моделирования и развития академической речи студентов-билингвов подробно освещены в трудах Х. А. Шахбазовой [15]. В исследовании Р. А. Джавадова подчеркивается важность формирования ценностных ориентаций студенческой молодежи Азербайджана, лежащих в основе профессиональной и академической культуры будущих специалистов [4].

Специфика спортивной этики, принципов *fair play* («честной игры») и их проекции на сферу спортивного менеджмента в Азербайджане всесторонне изучены в монографиях и статьях Ф. Х. Гаджиева [3] и Э. С. Султанова [12]. Авторы справедливо указывают на то, что этика в спорте не ограничивается поведением атлетов на поле; она напрямую транслируется на управленческие решения – распределение бюджетов, трансферную политику, антидопинговый контроль и маркетинг. Вопросам институционального развития массового оздоровительного спорта и внедрения международных стандартов управления посвящены последние публикации Э. М. Насирова [9]. Ученые справедливо отмечают, что до 80% рабочего времени спортивного менеджера занимает коммуникация. При этом, несмотря на обширный теоретический базис, методика интеграции конкретных синтаксических и грамматических макротем русского языка в практику подготовки менеджеров массового спорта в Азербайджане остается разработанной недостаточно, что обуславливает актуальность данной статьи. Вместе с тем следует отметить, что деловая игра как способ

интерактивного обучения студентов не являлась предметом специальных экспериментальных исследований, а в образовательном процессе используется очень редко.

В исследовании Н.В.Добровольской указывается, что игровой метод характеризуется педагогической эффективностью для развития креативности управленцев в процессе профессиональной подготовки [5, с.158]. Осмыслению различных ситуаций, связанных с этической составляющей предпринимательской деятельности в профессии спортивного менеджера посвящена монография О.В.Арсениной [1]. Тем не менее, методический аспект формирования профессиональной этики в реальном спортивном бизнесе посредством игрового моделирования на основе аутентичных профессиональных коммуникативных ситуаций остается недостаточно освещенным в научно-методической литературе, что определило вектор нашего исследования, включая лингводидактический аспект, связанный с обучением прямой и косвенной речи.

Обратимся к трактовке ключевых терминов. Менеджер - специалист «управляющий, обладающий профессиональными знаниями по организации и научному управлению трудовыми коллективами». Менеджмент – «искусство управлять интеллектуальными, финансовыми, сырьевыми, материальными и трудовыми ресурсами в целях наиболее эффективной деятельности и использования их в сфере ФКиС» [1, с.154].

Профессиональная деятельность спортивного менеджера – это непрерывный цикл межличностного и межкультурного взаимодействия: от ведения переговоров со спонсорами до координации работы фитнес-центров и разрешения конфликтных ситуаций внутри команд.

По нашему мнению, деловая игра в спортивном менеджменте — это симуляция реальной профессиональной среды, где студенты отрабатывают навыки принятия решений, учатся выстраивать прямую и косвенную коммуникацию, а также применяют нормы академической этики при подготовке документов. **Прямая речь** используется в ходе симуляций деловых переговоров, пресс-конференций или общения со спонсорами. Студенты учатся формулировать четкие ответы на вопросы, аргументировать позицию, выступать перед аудиторией и убеждать оппонентов. **Косвенная речь** проявляется при подготовке письменных отчетов, пересказе чужих тезисов, составлении официальных деловых писем или обзоров спортивного рынка. Обучающиеся осваивают навык корректного цитирования и интерпретации мнений без искажения исходного смысла. Изучение темы «Прямая и косвенная речь» традиционно вызывает у студентов-билингвов определенные трудности, связанные с трансформацией личных местоимений, временных форм глаголов и синтаксической структуры сложноподчиненного предложения. Чтобы преодолеть этот барьер, авторами была разработана система профессионально-ориентированных модулей.

Цель исследования – теоретически разработать и экспериментально проверить методику подготовки и проведения деловых игр, способствующих развитию у студентов познавательной активности.

Методология и организация исследования. Методологическую основу исследования составили компетентностный подход, направленный на формирование универсальных и общепрофессиональных компетенций, включая этические стандарты поведения; игровое моделирование, воспроизводящее социальное и профессиональное содержание будущей деятельности специалиста; принцип междисциплинарности, обеспечивающий интеграцию этики, академического письма и прикладного спортивного менеджмента. Экспериментальная работа проводилась в 2025–2026 гг. на базе кафедры Менеджмента и общих дисциплин Азербайджанской спортивной академии (АСА). В исследовании приняли участие студенты бакалавриата факультета «Здоровье и менеджмент», обучающиеся по специальностям «Массово-оздоровительный спорт» и «Спортивный менеджмент». Для проведения педагогического эксперимента были сформированы контрольная и экспериментальная группы по 15 человек в каждой (всего 30 студентов). Материалы и методы исследования включали: анализ и обобщение научно-методической литературы; анкетирование 50 преподавателей; педагогическое тестирование 30 студентов; метод экспертной оценки (в качестве экспертов выступали преподаватель и два магистранта); педагогический эксперимент; методы математической и статистической обработки данных.

Результаты анкетирования 50 преподавателей АСА показали, что у большинства респондентов (80 %) сформировано положительное отношение к активным методам обучения. Вместе с тем 50 % преподавателей отметили, что редко используют деловые игры в образовательном процессе, 15 % применяют их часто, а 35 % не используют данный метод вовсе.

Важным этапом проектирования деловой игры является выбор актуальной и интересной темы. В качестве ключевого дидактического инструмента была разработана и внедрена деловая игра «Спортивный стартап: битва за грант и этический аудит».

Сценарий и структура деловой игры.

Целью игры является не просто закрепление теоретических знаний по структуре спортивного менеджмента, а проживание студентами ситуаций, где нарушение академической этики ведет к краху бизнес-проекта.

Ход игры и распределение ролей

Студенческая группа делится на четыре основные фракции, каждая из которых решает специфические задачи в рамках моделируемого кейса:

«Разработчики спортивных стартапов» (3–4 подгруппы): Их задача – разработать концепцию проекта в сфере массово-оздоровительного спорта (например, «Сеть инклюзивных воркаут-площадок в Баку» или «Мобильное приложение для координации любительских футбольных лиг в регионах Азербайджана»). Студенты должны предоставить краткий бизнес-план, маркетинговую

стратегию и обоснование актуальности со ссылками на статистические данные.

«Комитет по этическому аудиту и защите авторских прав» (Эксперты): Группа студентов, выполняющая роль независимых регуляторов. Они оценивают проекты на предмет заимствований, корректности использования чужих идей, точности

статистических данных и соблюдения экологических и социальных стандартов.

«Инвесторы / Грантодатели» (Представители Министерства молодежи и спорта или частных фондов): Оценивают финансовую жизнеспособность проектов, но ориентируются на вердикт Комитета по этике.

Таблица 1.

Этапы проведения деловой игры в рамках курса «Спортивный менеджмент»

Этап игры	Действия студентов	Методическая цель (Этический компонент)
1. Подготовительный (Сбор данных)	Поиск информации, анализ рынка спортивных услуг Азербайджана, составление теоретической базы проекта.	Отработка навыков корректного цитирования. Понимание разницы между компиляцией и плагиатом.
2. Проектирование и защита	Презентация стартап-проектов перед «Инвесторами» и «Комитетом по этике».	Формирование навыка честной аргументации, недопущение фальсификации прогнозных данных.
3. Этический аудит (Критическая фаза)	Внедрение «скрытых триггеров» преподавателем. Проверка работ на плагиат. Анализ кейсов недобросовестной конкуренции.	Осознание неотвратимости репутационных потерь при нарушении академической честности.
4. Рефлексия и дебрифинг	Общее обсуждение результатов. Выступление экспертов. Самооценка участников.	Декомпозиция игрового опыта, перенос академических правил на практику реального менеджмента.

Игровой триггер: Моделирование дилеммы

Основной дидактический эффект достигается на третьем этапе. Преподаватель умышленно закладывает в условия игры скрытые этические ловушки (провокации). Например, одной из команд «случайно» становится доступен драфт маркетингового плана их конкурентов. Перед студентами встает выбор: использовать чужую интеллектуальную собственность (совершить плагиат/кражу идеи) ради гарантированной победы в конкурсе грантов или остаться в рамках академической честности.

В процессе реализации игры в группе студентов специальности «Массово-оздоровительный спорт» одна из подгрупп поддалась деструктивной модели поведения и скопировала графические элементы и расчетную часть исследования, опубликованного в открытых источниках без указания авторства (использовались материалы статьи Насирова [8]).

Действия «Комитета по этическому аудиту», вооруженного алгоритмами поиска текстовых совпадений и фактчекинга, привели к публичной

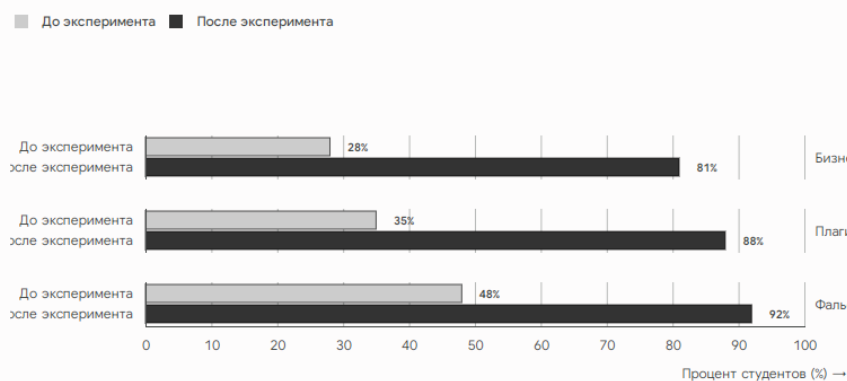
дисквалификации проекта на этапе презентации. Для студентов это стало наглядным уроком: в реальной индустрии спортивного менеджмента кража чужого концепта или фальсификация отчетов о посещаемости фитнес-клуба ведет к потере лицензии, судебным искам и краху деловой репутации руководителя [14].

Анализ результатов и обсуждение.

Внедрение деловой игры позволило перевести абстрактные этические нормы (прописанные в Кодексе чести студента ASA) в разряд лично значимых ориентиров. До проведения игры многие студенты воспринимали требования преподавателей оформлять ссылки в квадратных скобках и проверять тексты в системе «Антиплагиат» как избыточную бюрократию.

Для оценки эффективности предложенной методики авторами было проведено анкетирование студентов до и после участия в цикле деловых игр. Вопросы были направлены на выявление уровня осознания деструктивности академического мошенничества.

Сравнение этических установок студентов



Данные опроса наглядно демонстрируют качественный сдвиг в сознании будущих спортивных менеджеров. Осознание недопустимости использования чужих идей без корректной ссылки выросло более чем в два с половиной раза (с 28% до 81%). Студенты осознали, что академическая этика в вузе – это проекция корпоративной этики, комплаенс-контроля и прозрачности, принятых в международных спортивных федерациях (FIFA, FIBA, IOC) [11].

Методический эксперимент также показал, что студенты стали бережнее относиться к трудам национальных исследователей. В библиографических списках их итоговых презентаций появились ссылки на актуальные работы азербайджанских авторов, изучающих рынок физической культуры страны. Так, использование теоретических положений из работ Бабаевой [2] и Мамедовой [8] позволило студентам глубже обосновать специфику спортивного маркетинга в условиях СНГ и Кавказского региона, избегая слепого копирования западных моделей, не адаптированных к реалиям Азербайджана.

Междисциплинарный эффект метода. Участие в деловой игре способствует не только освоению лексической темы „Спортивный менеджмент“, но и закреплению знаний по теме „Прямая и косвенная речь“, а также совершенствованию пунктуационных навыков. Особое значение имеет интеграция деловой игры с курсом «Деловая и академическая коммуникация на иностранном (русском) языке», который студенты изучают параллельно. Прямая речь в спортивном менеджменте – это инструмент фиксации официальных заявлений (цитаты спортсменов, требования инвесторов, формулировки контрактов, регламенты соревнований).

Косвенная речь – это базовый инструмент реферирования, аннотирования, составления аналитических отчетов, передачи поручений руководства подчиненным (делегирование задач) и проведения брифингов.

Ниже представлена разработанная нами трехэтапная методическая матрица, внедренная в практику обучения группы 345А6.

Таблица 1.

Матрица интеграции грамматической темы в профессиональный контекст

Этап обучения	Лингвистическое содержание	Профессионально-коммуникативный контекст	Метод/Форма активности
1. Рецептивный (Ознакомление)	Правила перевода прямой речи в косвенную. Глаголы речи и мысли (говорить, заявлять, утверждать, требовать).	Анализ пресс-релизов Международного олимпийского комитета (МОК) и Министерства молодежи и спорта Азербайджана.	Работа с текстом, вычленение ключевых тезисов первоисточника.
2. Репродуктивно-продуктивный	Трансформация побудительных и вопросительных предложений. Использование союзов что, чтобы, частицы ли.	Делегирование распоряжений высшего руководства персоналу фитнес-клуба или оздоровительного центра.	Ролевой тренинг «Директор – Менеджер – Инструктор».
3. Интерактивно-креативный	Свободное оперирование цитированием, ведение протокола, устный отчет о переговорах.	Урегулирование конфликта между клиентом фитнес-зоны и тренерским составом. Пресс-конференция.	Кейс-метод (Case Study), деловая игра.

Рассмотрим практическую реализацию интерактивного этапа на примере конкретных учебных

ситуаций, разработанных для студентов специальности «Массово-оздоровительный спорт».

Модуль А. Ролевая игра «Брифинг после переговоров»

Управленческая задача: Спортивный менеджер провел встречу с потенциальным спонсором (например, представителем крупной азербайджанской компании, такой как SOCAR или Pasha Insurance) по поводу финансирования районного марафона по массовому бегу. Менеджеру необходимо передать своей команде суть требований спонсора, используя косвенную речь.

Грамматический практикум:

Студентам предлагается исходный текст (прямая речь спонсора):

«Мы готовы выделить 20 000 манатов, но мы требуем, чтобы наш логотип был размещен на всех баннерах. Также ответьте мне: когда точно завершится регистрация участников?»

Задача студента-менеджера – трансформировать это в официальный отчет для сотрудников:

«Спонсор заявил, что они готовы выделить двадцать тысяч манатов, при условии, если их логотип будет размещен на всех баннерах. Также представитель компании поинтересовался, когда именно завершится регистрация участников».

В ходе этого упражнения отрабатывается не только грамматический навык (устранение местоимения «мы», ввод союза «чтобы» и «ли» для косвенного вопроса), но и развивается навык компрессии текста, профессиональной дипломатии и корректной передачи информации без потери управленческого смысла.

Модуль Б. Кейс-метод «Разрешение рекламаций в оздоровительном спорте»

Для будущих менеджеров массово-оздоровительного спорта критически важно уметь работать с жалобами клиентов. В рамках группы 345А6 был смоделирован кейс: «Жалоба посетителя фитнес-центра на нарушение санитарных норм или графика работы бассейна».

Студенты делятся на тройки: Клиент (высказывает эмоциональные претензии в прямой речи), Менеджер (фиксирует претензии, переводит их в конструктивное русло), Управляющий директор (получает от менеджера доклад в косвенной речи).

Анализ устной речи студентов показал, что типичной ошибкой билингвов является калькирование синтаксических конструкций из родного (азербайджанского) языка, где сказуемое всегда находится в конце предложения [2]. Нами было замечено, что интеграция профессионального контекста повышает мотивацию студентов к самоконтролю. Студент понимает, что ошибка в косвенной речи в деловой среде («Директор сказал, что марафон переносится ли...» вместо «Директор спросил, переносится ли марафон...») ведет к дезинформации персонала и подрыву авторитета менеджера.

Дидактический потенциал междисциплинарных связей

Эффективность разработанной методики обусловлена тесной интеграцией с базовыми

дисциплинами кафедры менеджмента и общих дисциплин АСА. В частности, при подборе лексического минимума учитывались терминосистемы таких предметов, как «Основы менеджмента», «Теория и методика массового спорта» и «Маркетинг в спорте» [3; 9].

В процессе обучения активно использовались работы современных азербайджанских исследователей. Например, концепция спортивного кластера и менеджмента здоровья, описанная в трудах Насирова [9], послужила содержательной основой для составления текстов-первоисточников. Студенты не просто читали абстрактные тексты, а изучали статьи о динамике развития спортивной инфраструктуры Баку, Гянджи и других регионов республики, одновременно тренируя навыки реферирования и трансформации чужой речи.

Для оценки уровня сформированности коммуникативной компетенции до и после проведения эксперимента в группе 345А6 (24 человека) был проведен мониторинг по трем критериям: лингвистический (грамотность построения конструкций косвенной речи), прагматический (точность передачи управленческой информации) и стратегический (умение достигать консенсуса в ролевой игре).

Оформление документации к игре (бизнес-планы, экспертные заключения Комитета по этике, протоколы нарушений) требовало от студентов владения академическим стилем речи, использования специализированных вводных конструкций («по утверждению профессора...», «согласно данным министерства...», «исходя из анализа, проведенного...»).

Таким образом, решалась двойная дидактическая задача:

Синтаксическая и лексическая грамотность: Студенты на практике отрабатывали сложные синтаксические конструкции делового русского языка, правила библиографического описания и реферирования [7].

Деонтологическая грамотность, или **профессионально-этическая компетентность**. Формировалось понимание профессионального долга, честности и ответственности управленца перед обществом, государством и спортивным сообществом [10].

Заключение. Деловая игра выступает эффективным лингводидактическим инструментом, способствующим формированию навыков использования прямой и косвенной речи в условиях профессионального общения. Навыки академической этики представляют собой совокупность умений, обеспечивающих соблюдение норм научной честности, академически корректного общения и ответственного поведения в профессиональной деятельности будущего менеджера.

Использование деловой игры «Спортивный стартап: битва за грант и этический аудит» в Азербайджанской спортивной академии доказало свою высокую эффективность как метода трансляции ценностей академической этики. Моделирование ситуаций, где сиюминутная выгода

от использования плагиата или подлога данных оборачивается долгосрочной потерей репутации и дисквалификацией всего проекта, формирует у студентов устойчивый этический иммунитет.

Будущие бакалавры направления «Массово-оздоровительный спорт» через призму игрового взаимодействия осознают, что академическая честность в период обучения в АСА – это залог их будущей востребованности и авторитета в профессиональной среде спортивного менеджмента. Перспективным направлением развития данной методики представляется создание совместных игровых платформ между кафедрами АСА и реальными спортивными клубами и федерациями Азербайджана для проведения регулярных сквозных этических тренингов и аудитов реальных кейсов спортивной индустрии.

Таким образом, внедрение игровых технологий, в частности деловых игр, в систему профессиональной подготовки специалистов в области спортивного менеджмента обеспечивает интенсивное формирование интеллектуальных и практических умений, а также опыта творческой и коммуникативной деятельности. В деловой игре реализуется основная концепция аутентичного и контекстного обучения - моделирование реальных управленческих ситуаций и отношений в сфере спортивного менеджмента (переговоры, брифинги, разбор конфликтных ситуаций), что позволяет преодолеть разрыв между теоретической подготовкой и практической деятельностью будущих менеджеров. В процессе такого моделирования и разрешения проблемных ситуаций развивается творческое и критическое мышление, формируется способность принимать нестандартные управленческие решения, брать на себя ответственность, а также соблюдать нормы академической и профессиональной этики.

Список литературы:

1. Арсенина, О. В. (2020). Этика предпринимательства : практикум . Владимир : Изд-во ВлГУ, 172 с.
https://op.vlsu.ru/fileadmin/Programmy/Kolledg/49.02.01/Metod_doc/19.01/PRAKTIKUM_ENP_RIO.pdf
2. Бабаева, Р. А. (2023). Особенности преподавания делового русского языка студентам-экономистам и менеджерам в вузах Азербайджана. Вестник Бакинского славянского университета, (2), 45–52.
3. Гаджиев, Ф. Х. (2022). Менеджмент и маркетинг в индустрии физической культуры и спорта:

Учебное пособие для спортивных вузов. Баку: Мутарджим.

4. Джавадов, Р. А. (2021). Формирование ценностных ориентаций и профессиональной ответственности студенческой молодежи. Баку: Элм и тахсил.
5. Добровольская, Н. В. ((2013). (Деловая игра как форма контекстного обучения, способствующая развитию креативности будущих менеджеров. (22), 156-160. [delovaya-igra-kak-forma-kontekstnogo-obucheniya-sposobstvuyuschaya-razvitiyu-kreativnosti-buduschih-menedzherov\(1\).pdf](#)
6. Исмаилова, Л. М. (2023). Проблемы академической честности в высших учебных заведениях Азербайджана в эпоху цифровизации. Азербайджанская школа, 704(2), 89-98.
7. Кузнецов, И. Н. (2022). Научное исследование: методика проведения и оформление. Москва: Дашков и Ко.
8. Мамедова, Р. К. (2024). Профессионально-ориентированное обучение русскому языку как фактор повышения конкурентоспособности выпускников азербайджанских вузов. Язык и культура на Кавказе, 8(1), 112–119.
9. Насиров, Э. М. (2025). Развитие массово-оздоровительного спорта и менеджмента здоровья в Азербайджане: тенденции и вызовы. Баку: Техсил.
10. Панова, О. В. (2020). Деловая игра как метод формирования профессионально-этической компетентности менеджера. Высшее образование сегодня, (5), 34–41.
11. Сирота Э.Л., (2026). Философия: коротко о главном. М.: Изд-во «Бомбора», 128 с.
12. Султанов, Э. С. (2023). Управление человеческими ресурсами в спортивных федерациях. Баку: Шарг-Гарб.
13. Тагиева Э.С., (2025). Академическое письмо и этика. Программа для уровня образования магистратуры. Баку: АСА, 31 с.
14. Хейл, Р., & Витмарш, Д. (2021). Управленческая коммуникация в спорте. (Пер. с англ.). Минск: Попурри.
15. Шахбазова, Х. А. (2022). Роль интерактивных методов в формировании академической речи студентов-билингвов. Известия Педагогического университета (Азербайджан), 70(3), 181–189.
16. Эфендиева, Т. Э. (2024). Деловая коммуникация на русском языке: теория и практика преподавания в неязыковом вузе Азербайджана. Баку: Нурлан.

TRANSFORMATION OF EDUCATIONAL ACTIVITIES OF EDUCATORS AND LEARNERS IN THE PROCESS OF IMPLEMENTING "EDUCATION 4.0"

Ibrahimov F.

Sheki Branch of the Azerbaijan State University of Pedagogical professor,

<https://orcid.org/0000-0002-0775-10>

Ibrahimova S.

Honored Teacher, Sheki Branch of the Azerbaijan State University of Pedagogical
<https://doi.org/10.5281/zenodo.20691192>

Abstract

The article focuses on the continuous and gradual development of the civilization process in accordance with the calls of the industrial revolutions, the formation of adequate bases and superstructures, the main features of the "Techno-democratic-information society" that exists in the modern era, which currently makes people stronger, the education system that is formed adequately to these features, the concepts that reveal its nature, among which the concept of "teaching activity" is given a laconic scientific commentary. It is stated that teaching activity is one of the most important elements of the process of implementing education, understood as a system, this element has an important "enabling function" in the efficiency of the system in question. It is emphasized that in the process of implementing education, "interest → action → a new qualitative state of the party involved in the process (the student) to the desired level of development, education and upbringing" determines the management vector. In the research work, teaching activity is perceived as a type of personality activity, a specific form of social activity, and the essence and functions of the components (teaching situation, teaching operations, control, evaluation) included in its structure are clarified; the interpretation of the transformation (dialectics) of the aforementioned components into the sides of the unit in the organization and management of the joint teaching activity of the student and the teacher, as components of the educational implementation process, and their enabling functions are given.

Keywords: Base and superstructure; education; teaching activity; teaching situation; task; opportunity; action; cognitive operations; measurement and evaluation.

Relevance of the research topic: It is known that educational activity includes creative acts that exist between the educator and the learners in the process of implementing education, this type of activity has a complex structure, and the effectiveness (quality level) of the implementation of the educational process is determined by the transformation of the educational activities of the learner and the educator into parts of a unit. The regulation (facilitation) of the emphasized state in the process of implementing education directly depends on the understanding of the essence of the concept of educational activity. Therefore, we claim the relevance of conducting research on the topic "Transformation of educational activities of the educator and learners in the process of implementing Education 4.0".

Methodological basis of the research: In the process of conducting the research, L. Bertalanfi's "Idea of System Analysis" [7; 104-108] was used (the idea, which is interpreted as an attempt to study the properties of an object based on the properties of its parts - italics are ours - F.I., SI) The "System-structural approach", which has been formed as an important branch of dialectics and has risen to the level of its alternative, empirical, empirical-theoretical and theoretical methods of scientific cognition, the internal relationships of the forms of scientific cognition, and various pedagogical and psychological research generalizations were used as a methodological basis.

Interpretation of research generalizations: As is known, the process of civilization has been continuously formed in response to the calls of the "Industrial Revolutions", systems of socio-economic relations have been established on the basis of

dialectical conditioning of one another (logical expectation), and superstructures based on the aforementioned bases have been formed. Currently, there is such a system-basis as the "Techno-democratic-information society", which makes a person stronger, the implementation of information services at a sufficiently high level is a specific feature of the society in question. The information society, unlike the industrial society, is a more intellectual society and creates conditions for the highly educated, skilled, determined, and comprehensive development of people. According to our subjective understanding, members of the "Techno-democratic-information society" are characterized by information culture (this is the knowledge, intellectual skills and habits necessary for a person to adapt to the information society) and technological literacy (this is the ability of people to use various digital technologies, analyze information and operate safely in a digital environment. The development of digital skills is essential to ensure their safe and effective interaction with digital technologies in the future [9; 78-94].

A comprehensive and integrated approach of education systems is necessary to support the development of the skills of all learners to be active and ethical users of digital technologies [12; 57-79]. Digital education allows people to participate independently in social life. In addition, the reality of digital education and the digital revolution requires fundamental changes in the forms and methods of moral education, leading to the transformation of digital skills into the most important skills [11; 58-64]. There is no doubt that the development of digital skills of learners will lead to

their more active participation in society as digital citizens in the future [10], [12; 57-79]. This skill is not limited to using a computer and the Internet, but also: 1) Observing digital safety and cybersecurity rules; 2) Working with artificial intelligence and automation; 3) Digital analytics and data processing skills; 4) Using cloud technologies; 5) Includes rapid adaptation to new technologies), otherwise they will not be able to assert themselves as active and creative members of the society in question.

Due to the rapid development of technology, the knowledge and skills that students acquire during their education become obsolete by the time they graduate. In order to help develop and shape the use of today's fastest-growing technologies in scientific and technical education, it is necessary to train students and prepare them for the digital environment. Adapting to a rapidly changing environment will make it necessary for students to stay in touch with educational institutions even after graduation, providing both workers with updated skills and young students (and faculty) with a new direction related to the rapidly changing realities of the industrial and corporate sectors [13; 25-30], [14; 579-592].

Education, which is a process of sharing human experience, has been formed on a basis that includes the characteristics of industrial revolutions in stages as a product of social practice. According to our subjective understanding, it is appropriate to formulate the aforementioned sharing process as "the process of mastering systematized knowledge, skills and habits in accordance with the nature of the state, society and individual and its result" [5; 260]. "General education", which is an important stage of the education system, has taken its place on the superstructure of the basis formed on the basis of the calls of the IV industrial revolution and has become a "system formulated as a student-centered "SS" in general education schools".

It is worth emphasizing that this system is open to the application of the theories of "Multiple Intelligences" (Howard Gardner), "Stages of Intellectual Development" (Jean Piaget), "Social Development" (Lev Vygotsky), "Thinking Styles" (Carol Dweck), "Spiritual Development" (Lawrence Kohlberg), "Conditions of Learning" (Robert Gagne), and "Emotional Intelligence" (Daniel Goleman).

The establishment of a new pedagogical mindset and the successes achieved in the field of the concept of activity have led to the emergence of many concepts related to education, which can be interpreted with the concepts of "value", "process", "result", "system", and a change in views on it. Among the aforementioned concepts, the concept of "teaching activity" has also taken its place.

Teaching activity is one of the most important elements of the process of implementing education, understood as a system; this element has an important "enabling function" in the effectiveness of the system in question.

By the way, let's clarify the concept of "enabling function." In doing so, we argue that the concept of "teaching activity" includes the creative activity that exists between the educator and the learners in the process of implementing education.

It is known that something cannot come from nothing, and the new can only arise from certain preconditions, the essence of which is laid in the bosom of the old. The potential existence of the new is precisely the possibility. The possibility arises in the existing reality and is realized, embodied in the new reality. Being hidden tendencies expressing various directions in the development of an object, possibilities characterize reality in terms of its future. Dialectics assumes that development does not consist in expanding the set of ready possibilities, but in the process of the constant emergence of possibilities within the framework of reality and their transformation into a new reality. The process of realization of possibilities, their transformation into reality is possible thanks to activity and communication. Possibility does not mean action in itself. It is absurd to talk about a new quality if there is no idea that causes action. By "idea" we understand an idea that has risen to a high degree of objectivity, completeness and concreteness and is at the same time directed towards practical implementation [6; 16-17]. As a variation of one of the interesting ideas of ancient Greek philosophers, we should say that the teacher affirms himself when he has the opportunity for action that conditions his creative pursuits. From his mixed and vague ideas, clear pedagogical thinking emerges. Here it is appropriate to say that the idea that causes action is a vital being that creates a new model of development.

It is worth drawing attention to the very relevant analysis of Professor R.F. Mustafayev on the internal unity of possibility, action and personality. He rightly emphasizes that the concept of "possibility" plays a special role in our thinking and is in a certain sense equivalent to our existence, our everyday life. Being acquires essence when it has the possibility of action. The latter is impossible without deep creative searches. Where there is possibility, this means action. In turn, this creates a dialectical unity between particles and the whole. The idea that creates action is a vital being that forms a new model of development [4; 88].

It is undeniable that interest is always an opportunity. It is interest that drives opportunity. Interest can be transformed by the inner world of the personality and acquire value in its actions. Personality is always an opportunity. In our opinion, in the process of implementing education, "interest-action determines the management vector of the desired level of development, education and upbringing of the party involved in the process". In this process, the "choice" factor is of particular importance. At least the algorithmic and heuristic activity ratios are related to choice. In the process of implementing education, "opportunities", not "probabilities", correspond to the function of belonging. →→

In our opinion, we can talk about the "specificity function" by referring to Lutfizadeh's idea, which allows modeling human thoughts, finding methods in various options, and implementing accepted decisions. Determining what is most consistent with the specificity functions in the process of implementing

education actually means revealing the essence of this process.

Let us emphasize that “teaching activity” is multifaceted. Although training is an important characteristic of teaching activity, it does not cover all its aspects. Training, in the broad sense of the word, involves the acquisition of new knowledge, skills and habits. However, acquisition and teaching activity are essentially different phenomena. Acquisition is not only the learning process, but also an integral part of every field of activity, for example, play or work. Teaching activity is a type of activity, a specific form of social activity of the individual [2;150].

The concept of educational activity (D.Velkonin, V.V.Davydov, etc.) distinguishes the following components in the structure of educational activity: 1) educational situation; 2) educational operations; 3) control; 4) assessment (evaluation). Educational activity is a type of activity, a specific form of social activity of the individual [15].

Educational activity is a type of activity of both the teacher and the student in the “S-S” (“subject” “subject”) system, which is absurd to imagine these types of activity without assessment. The joint activity of the educator and the students in the pedagogical process begins to be realized with the transformation of the goal set by the educator into the goal of the student [7; 130-134]. In other words, when the part of human experience, adequate to the purpose of its presentation by the educator, which should become the subject of education, developed on scientific-pedagogical grounds and systematized, becomes the object of satisfaction of its cognitive needs, the event of the implementation of education in one form or another - the joint creative activity of the student and the educator begins, the students are ready to accept the educational task of the educator [8; 289-290].

Educational activity begins with the solution of educational tasks. The question is: “What do they mean when they say educational tasks?” Although its essence is reflected in the meaning of the task, its character is connected with the meaning of “educational”. Educational tasks are distinguished from any scientific, military, sports, etc. tasks by one important feature. Educational tasks involve the discovery and mastering of educational-general solution methods (principles, regularities) by students (students).

By presenting teaching tasks, the teacher places students in a unique teaching situation: in this situation, they become familiar with the content of general methods for solving teaching tasks, taking into account all specific and concrete options, and acquire the appropriate knowledge, skills, and habits.

By the way, let us note that the meaning of knowledge (information) includes the following: certain facts, terminology; methods of selecting facts; conceptual symbols; development trends; classification; criteria for verification and evaluation; research methods applied in a relevant field or problem; general concepts, structures and theories; principles and regularities necessary to explain and interpret phenomena and foresee their future development; knowledge of theories and structures [4;152].

Educational tasks have many unique characteristics, but one thing is clear: to solve them, students must master the necessary educational operations.

Teaching operations are diverse. Many of them are of a general nature and are used almost equally in the mastering of various teaching materials. Some teaching operations are more specific for the mastering of certain teaching materials (mathematical, linguistic, etc.). They also distinguish teaching operations applied in special cases. Intellectual processes - analysis, composition, comparison, generalization, etc. are always carried out by applying them to the content of a certain subject (mathematics, grammar, etc.) and therefore appear in the form of various subject operations (for example, mathematical). From this point of view, the formation of teaching operations is directly related to the acquisition of mental activity by students.

As a side note, J. Guilford distinguished 120 intellectual abilities in the structure of intelligence (“SOI”). Analyzing experimental materials, he came to the conclusion that intellectual abilities differ from each other according to three parameters: 1) the nature of intellectual operations; 2) the content of intellectual processes and 3) the products of intellectual activity. J. Guilford distinguished 5 operations, 4 types of content and 6 types of products of intellectual activity and considered them separately as factors. Thus, in J. Guilford’s model, 120 intellectual abilities are characterized by 15 (5+4+6) factors. Of the three parameters distinguished in the “SOI” model, the first (the nature of intellectual operations) is of greater importance. The second and third parameters can be explained precisely on its basis. J. Guilford distinguished the following according to the nature of mental operations: cognition, memory, divergent productive thinking, convergent productive thinking, and evaluation (evaluative thinking) [2;43-44].

The structural analysis of the intellect has shown that its core is thought. This provision had a special scientific and methodological significance for the concept of developmental education. In order to develop students intellectually, it is necessary, first of all, to develop thinking in them. In this process, it was necessary to take into account the genetic and functional interaction of thinking with emotions and perception, on the one hand, and with memory, and finally, with imagination, on the other. In the structural model of J. Guilford, thinking was systematically considered, its genetic and functional connections with various cognitive processes were explained.

By the way, let us also emphasize that the formation of learning operations in learners is a major requirement of modern times. The successful implementation of the principles of developmental learning depends, first of all, on the solution of this issue (for more information, see: [1]).

Control also plays a significant role in the formation of educational activity. The effectiveness of the activity is directly related to the level of control, as well as to the educational operations. From this point of view, it seems that two aspects should be noted separately: 1) The student compares the educational operations he performs and their results with the purpose of his activity, identifies and eliminates his own mistakes. It is necessary to always draw the attention of students

to this aspect - the results of educational operations, teach them to mentally plan educational operations, primarily to carry them out internally and analyze their results. When analyzing metacognitive functions, Flavell distinguished two aspects in terms of control: in the first case, the student controls himself by organizing his attention, and in the second case, he controls the problem-solving process (problems are solved through cognitive issues). Both functions are of particular importance in educational activity. 2) When control is effective, the student's educational activity is carried out as a manifestation of his will: he makes efforts to overcome the difficulties encountered, shows special activity for the implementation of the goal, and the direction of his activity is already conditioned by mediated interest. In this situation, control gradually turns into self-control, begins to develop effectively on the basis of reflection. Control is directly related to assessment, which is of great importance as a unique component of educational activity. The question may be asked: "What is the difference between assessment and control?" When examining educational activity from this point of view, it is necessary to distinguish its two sides - the final result and the methods of achieving the result.

In the control process, more attention is paid to the extent to which these methods are effective and adequate. In other words, in the control process, the results of individual teaching operations are examined, not the final result of teaching activities. However, in the assessment process, the final result of teaching activities is analyzed, and its compliance with the purpose of teaching activities is determined. The assessment situation is characterized by psychologically complex features. In this situation, more than the assessment itself, perhaps the aspects that emphasize the teacher's attitude to the student with emotional shades play a special role. When assessment is psychologically effective, it gradually turns into self-assessment, playing an important role in the formation of the student's self-awareness. It creates radical changes in the dynamics of the student's level of assertion in the field of assessment. It creates qualitatively new features in his learning motivation. Psychologically favorable conditions are created for the actualization of cognitive interests in teaching activities.

During the monitoring and evaluation of pedagogical processes and events, the activities of learners and educators, one often encounters the problem of measuring one or another quality indicator. Therefore, the question "Is it possible to measure the quality indicators of processes in numbers?" worries many specialists. In this regard, the American scientist J. Morrissey showed that the most difficult problem is to overcome the emotional opinions of people working in the field of management about the quantitative assessment of quality, such as "there are no accurate and reliable methods for quantitative assessment of creative work", and to monitor the solution of this problem and develop new approaches to their solution [3;38].

To solve these and similar problems, first of all, it is necessary to get acquainted in some detail with the concepts of "measurement", "measurement scale". Measurement is the implementation of appropriate algorithmic operations to express the observed states of

an object (process, event) with appropriate signs (unit, number or symbol). As a result of measurement, information about the studied object is obtained, in other words, the state of the studied object is assessed. Depending on the purpose of measurement (evaluation), such rules for measurement are selected and determined that allow assessing the main properties of the object. Each such rule requires determining its own "measurement scale". Currently, the following measurement scales and their modifications accepted by specialists are used: named (nominal) scale; ranked (degree) scale; interval scale; ratio scale; absolute scale [3;39].

Scientific novelty and practical significance of the research. 1. A specific (laconic) scientific explanation of the main features of the "Techno-democratic-information society" that makes a person stronger at the current stage of civilization development is given to the education system, to the concepts that reveal its nature, among which the concept of "educational activity"; 2. The attention of educational theorists and practitioners has been drawn to the fact that educational activity includes creative acts existing between the educator and the students in the process of implementing education, and that the efficiency (quality level) of the implementation of the educational process is determined by the transformation of the educational activities of the student and the educator into the parties of the unit; The direct dependence of the correct regulation of the emphasized state in the process of implementing education on the understanding of the essence of the concept of educational activity has been emphasized; 3. The interpretation of the educational activities of the student and the educator as parties of the unit will greatly facilitate the work of the educator in terms of the systematic selection of creative acts existing between them in the real pedagogical process (in the process of implementing education).

Result. 1. Educational activity is one of the most important elements of the process of implementing education, understood as a system (as well as a process, result, value), this element has an important "enabling function" in the effectiveness of the system in question; 2. In the process of implementing education, "interest → action → a new qualitative state of the desired level of development, education and upbringing of the party involved in the process" determines the management "vector", which plays the main role in the organization and management of the joint activity of the educational activity (its components - educational situation; educational operations; control; assessment (value)) as a component of the educational implementation process, transforming the unit into parties (dialectics), and directing the enabling functions.

References:

1. Abbasov, A. N., Mammadzade, R. R., & Mammadli, L. A. (2021). *Pedaqogika: Ünsiyyət (Ali təhsil müəssisələri üçün dərslik)* [Pedagogy: Communication (Textbook for higher education institutions)]. Mütərcim.
2. Alizadeh, A. E. (2004). *Müasir Azərbaycan məktəbinin psixoloji problemləri* [Psychological problems of the modern Azerbaijani school]. Pedagogy.

3. Mardanov, M. C., Aghamaliyev, R. A., Mehrabov, A. O., & Gardashov, T. B. (2003). *Təhsil sistemində monitoring və qiymətləndirmə* [Monitoring and evaluation in the education system]. Chasioglu.
4. Mustafayev, R. F. (2000). *Düşüncə azaddır* [Thought is free]. [Publisher Unknown].
5. Ibrahimov, F. N., & Huseynzade, R. L. (2014). *Pedaqogika (Dərslik)* [Pedagogy (Textbook)] (Vol. 1). Mütərcim.
6. Ibrahimov, F. N. (2002). *Tədris prosesi: imkan-fəaliyyət-yeni keyfiyyət* [Educational process: opportunity-action-new quality]. Mütərcim.
7. Ibrahimov, F. N. (1998). *Təlimdə alqoritmik və evristik fəaliyyətlərin optimal nisbətlərinin əsaslarına dair очерlər (monoqrafiya)* [Essays on the basics of optimal ratios of algorithmic and heuristic activity in training (monograph)]. Mütərcim.
8. Feyziyev, J. A., Ibrahimov, F. N., & Bediyev, S. R. (2011). *Didaktika (Dərslik)* [Didactics (Textbook)]. Mütərcim.
9. Hristian, K. (2019). Challenges and opportunities for education in the Fourth Industrial Revolution. *African Journal of Public Affairs*, 11(3), 78–94.
10. Sari, L., & Arif, S. (2019). The roles of digital literacy, technology literacy, and human literacy to encourage work readiness of accounting education students in the Fourth Industrial Revolution era. In *Proceedings of the International Conference on Economics, Education, Business and Accounting*. KnE Social Sciences.
11. Priya, S. (2019). Digital Revolution of Education 4.0. *International Journal of Engineering and Advanced Technology (IJEAT)*, 9(2), 58–64.
12. Mascheroni, G., & Olafsson, K. (2016). The mobile internet: Access, use, opportunities and divides among European children. *New Media & Society*, 18(8), 57–79.
13. Ercan, Ö. (2018). Development of new directions in education and Education 4.0. *University Research Magazine*, 1(1), 25–30.
14. Li, L. (2020). Education supply chain in the era of Industry 4.0. *Systems Research and Behavioral Science*, 37(4), 579–592.
15. Elkonin, D. V. (1996). *Vozrastnye vozmozhnosti usvoeniya znaniy* [Age-related possibilities of assimilation of knowledge]. Prosveshchenie

THEORETICAL AND METHODOLOGICAL FOUNDATIONS OF PROFESSIONAL TRAINING OF FUTURE PHYSICAL CULTURE AND SPORTS SPECIALISTS UNDER MODERN CHALLENGES**Kubatko A.***National University Zaporizhzhia Polytechnic*
<https://orcid.org/0000-0001-8542-8804>**Atamanyuk S.***National University Zaporizhzhia Polytechnic*
<https://orcid.org/0000-0002-4800-5965>**Kyrychenko O.***National University Zaporizhzhia Polytechnic*
<https://orcid.org/0000-0001-7136-0984>**ТЕОРЕТИКО-МЕТОДИЧНІ ЗАСАДИ ПРОФЕСІЙНОЇ ПІДГОТОВКИ МАЙБУТНІХ ФАХІВЦІВ ФІЗИЧНОЇ КУЛЬТУРИ ТА СПОРТУ В УМОВАХ СУЧАСНИХ ВИКЛИКІВ**

Кубатко А.

Національний університет “Запорізька політехніка”, Україна
<https://orcid.org/0000-0001-8542-8804>

Атаманюк С.

Національний університет “Запорізька політехніка”, Україна
<https://orcid.org/0000-0002-4800-5965>

Кириченко О.

Національний університет “Запорізька політехніка”, Україна
<https://orcid.org/0000-0001-7136-0984>
<https://doi.org/10.5281/zenodo.20691194>**Abstract**

The article provides a comprehensive analysis of the theoretical and methodological foundations of training future specialists in the field of physical culture and sports. It is determined that the foundation of training is a combination of the theory of physical education, sports physiology, and pedagogy. The relevance of the study is due to the global decline in physical activity among youth, which requires specialists to form new motivational attitudes. The key methods of professional development are considered: theoretical-fundamental, practice-oriented, and the method of individualization. Special attention is paid to the integration of innovative technologies, such as biomechanical monitoring and virtual reality, which increase the safety and efficiency of the training process. The list of professional competencies necessary for successful implementation in the modern digital educational environment is formulated. The prospects for further research in the context of using mobile applications for monitoring the state of students are outlined.

Анотація

У статті здійснено комплексний аналіз теоретичних та методичних засад підготовки майбутніх фахівців у галузі фізичної культури та спорту. Визначено, що фундаментом навчання є поєднання теорії фізичного виховання, спортивної фізіології та педагогіки. Актуальність дослідження зумовлена глобальним зниженням фізичної активності молоді, що потребує від спеціалістів формування нових мотиваційних установок. Розглянуто ключові методи фахового становлення: теоретико-фундаментальний, практико-орієнтований та метод індивідуалізації. Особливу увагу приділено інтеграції інноваційних технологій, таких як біомеханічний моніторинг та віртуальна реальність, які підвищують безпеку та ефективність тренувального процесу. Сформульовано перелік професійних компетентностей, необхідних для успішної реалізації в сучасному цифровому освітньому середовищі. Окреслено перспективи подальших розвідок у контексті використання мобільних додатків для моніторингу стану студентів.

Keywords: professional training; physical culture; sports; innovative technologies; professional competencies; physical activity.

Ключові слова: професійна підготовка; фізична культура; спорт; інноваційні технології; професійні компетентності; фізична активність.

Постановка проблеми. Глобальні тенденції, зафіксовані Всесвітньою організацією охорони здоров'я, вказують на критичну роль фізичної активності як ключового фактора у підтримці та зміцненні здоров'я населення. Водночас актуальна статистика свідчить про тривожну динаміку: рівень фізичної активності серед молоді невпинно зни-

жується. Зокрема, результати профільних досліджень демонструють, що лише 23% молодих людей у віці 18–24 років дотримуються рекомендованого рівня фізичних навантажень [8].

Такий стан речей створює додаткові стратегічні виклики у системі підготовки фахівців галузі фізичної культури та спорту. Сучасний

спеціаліст має не лише володіти технічними професійними навичками, а й бути здатним ефективно формувати мотиваційні установки до активного способу життя серед різних верств населення.

Аналіз останніх досліджень та публікацій.

Проблематика професійної підготовки майбутніх фахівців фізичної культури та спорту активно розробляється як вітчизняними, так і зарубіжними науковцями, що зумовлено трансформацією освітнього середовища, цифровізацією суспільства та зміною вимог до професійної компетентності спеціалістів галузі.

У сучасних українських дослідженнях значна увага приділяється модернізації змісту професійної освіти та пошуку ефективних моделей її оновлення. Так, Sohokon O., Donets O., Novik S., Fazan V. (2024) розглядають тенденції вдосконалення підготовки фахівців фізичної культури у закладах вищої освіти України, підкреслюючи необхідність використання інноваційних та інформаційно-комунікаційних технологій як важливого чинника підвищення якості навчання та реформування освітньої системи. У зарубіжній науковій літературі значний масив досліджень присвячено цифровій трансформації фізкультурної освіти. Зокрема, G. Martínez-Rico, M. Alberola-Albors, C. Pérez-Campos, R. González-García (2021) досліджують рівень цифрової компетентності викладачів фізичного виховання та підкреслюють необхідність постійного професійного оновлення у зв'язку зі швидким розвитком технологій.

Мета дослідження: теоретичне обґрунтування та узагальнення сучасних підходів до професійної підготовки майбутніх фахівців фізичної культури та спорту в умовах актуальних суспільних і технологічних викликів, а також визначення напрямів удосконалення освітнього процесу з урахуванням інтеграції інноваційних технологій, компетентнісного підходу та практико-орієнтованого навчання.

Методи дослідження. Для реалізації дослідження було використано аналіз і узагальнення науково-методичної літератури, порівняльний аналіз моделей підготовки спеціалістів, з метою виокремлення основних напрямів модернізації професійної освіти, педагогічних умов і методичних засад підготовки майбутніх фахівців було застосовано систематизація та класифікація наукових положень.

Виклад основного матеріалу дослідження.

Фізична культура та спорт відіграють важливу роль у суспільному житті, сприяючи зміцненню здоров'я, формуванню здорового способу життя та професійній реалізації спеціалістів у цій сфері.

Сучасний етап розвитку вищої освіти в Україні характеризується глибокими трансформаційними процесами, зумовленими цифровізацією суспільства, євроінтеграцією, реформуванням системи вищої освіти та функціонуванням закладів вищої освіти в умовах воєнного стану. Відповідно до положень Закону України «Про вищу освіту» та Закону України «Про фізичну культуру і спорт» професійна підготовка майбутніх фахівців фізичної культури і спорту має забезпечувати формування

конкурентоспроможних спеціалістів, здатних до інноваційної діяльності.

Теоретичні основи підготовки фахівців у галузі фізичної культури та спорту є фундаментом для розробки навчальних програм, методик тренувань і освітніх стратегій. Вони охоплюють широкий спектр дисциплін, що включають фізіологію, анатомію, психологію, педагогіку, а також різні підходи до навчання і тренування [4].

Ключовими сучасними викликами професійної підготовки є цифровізація освітнього процесу, яка спрямована на використання інноваційних технологій, різних платформ, відеоаналізу техніки виконання рухів. Також дуже актуально при воєнному стані і дистанційному навчанні адаптувати практичну підготовку фахівців до змішаного формату. Зростання ролі фітнес-індустрії впливає на ринкові трансформації спортивної галузі і безумовно це Європейська інтеграція освіти.

Теорія фізичної культури розглядає фізичну культуру як важливий елемент культурного, соціального та особистісного розвитку людини. Вона є основою для створення ефективних методик фізичного виховання, тренувань і спортивної підготовки. Ключові аспекти теорії фізичної культури включають:

1. Педагогічний підхід до фізичного виховання, який спрямований на розвиток особистості студента через фізичні вправи та спортивну діяльність [1].

2. Фізіологічні основи фізичних вправ, які включають вивчення впливу фізичних навантажень на організм, принципи адаптації до фізичних навантажень [9].

3. Психологічні аспекти фізичної активності, що включають мотивацію, психологічну стійкість та розвиток особистості через спорт [6].

Теорія спортивного тренування розглядає організацію та проведення тренувальних процесів у різних видах спорту. Вона базується на наукових даних про фізіологічні, біомеханічні та психологічні аспекти тренувального процесу [8]. Основні компоненти цієї теорії:

1. Принципи тренувального процесу: індивідуалізація, системність, поступовість, різноманітність і оптимальне навантаження.

2. Фазова структура тренувального процесу: підготовчий, змагальний, відновлювальний періоди, кожен з яких має свої специфічні завдання та методи впливу на спортсмена.

3. Види тренувальних навантажень: аеробні, анаеробні, силові тренування та їх поєднання для досягнення оптимальних результатів.

Для підготовки фахівців у галузі фізичної культури та спорту важливо застосовувати принципи педагогіки, які забезпечують правильну організацію навчального процесу та взаємодію викладача і студента [1, 3]. Теоретичні основи педагогіки вимагають знання і застосування таких принципів:

- індивідуальний підхід до студентів з урахуванням їх фізичних та психологічних можливостей;

- диференційований підхід до навчання, коли програма адаптується до різних рівнів підготовленості студентів;

- виховна функція фізичної культури — розвиток у студентів таких якостей, як самодисципліна, відповідальність, командний дух та інші соціальні та моральні якості.

Усвідомлення важливості наукових досліджень у галузі фізичної культури та спорту дозволяє викладачам і тренерам застосовувати сучасні досягнення науки у навчальному процесі. Вивчення таких дисциплін, як фізіологія, біомеханіка, спортивна медицина, спортивна психологія, сприяє розвитку глибоких теоретичних знань, необхідних для підготовки висококваліфікованих фахівців [7]. Наукові дослідження допомагають:

- підвищити ефективність тренувального процесу через застосування нових методик і технологій;

- розробити нові підходи до спортивної реабілітації та відновлення;

- вивчити та адаптувати інноваційні методи навчання для студентів і спортсменів.

Теоретичні основи підготовки фахівців не повинні бути відірвані від практичного застосування. Це означає, що знання, які отримують студенти, повинні бути застосовані у реальних умовах — під час тренувань, змагань і спортивних заходів [2,4]. Інтеграція теорії і практики є запорукою того, що фахівець буде здатен адаптувати свої знання до конкретних умов, що часто змінюються.

Ефективність професійного становлення майбутніх спеціалістів забезпечується через реалізацію низки фундаментальних методів:

1. Теоретико-фундаментальний метод. Ключовим інструментом підготовки виступає систематичне вивчення наукового доробку та профільної літератури, що передбачає глибокий аналіз концептуальних засад і базових принципів фізичної культури [1]. Застосування цього методу сприяє формуванню у здобувачів освіти чіткого розуміння стратегічних векторів та актуальних тенденцій розвитку сучасної спортивної науки.
2. Практико-орієнтований метод. Органічним доповненням до теоретичної бази є метод практичної підготовки, що полягає в апробації та імплементації отриманих знань безпосередньо в умовах тренувального процесу та спортивної діяльності [7,9]. Це дає можливість студентам здобути автентичний досвід взаємодії з різними цільовими аудиторіями та групами населення.
3. Метод індивідуалізації. Вагоме місце в освітній траєкторії займає індивідуальний підхід, що ґрунтується на врахуванні специфічних потреб, фізіологічних особливостей та потенційних можливостей кожного

студента [1,5]. Такий підхід дозволяє максимально розкрити професійний потенціал майбутнього фахівця.

4. Метод цілісного (комплексного) розвитку. Стратегія підготовки також передбачає використання методу комплексного впливу, який синтезує фізичний, психологічний та соціальний аспекти виховання [2]. Реалізація цього методу спрямована на формування гармонійно розвиненої особистості, здатної до ефективної професійної самореалізації.

Процес підготовки майбутніх фахівців у галузі фізичної культури та спорту є предметом активного наукового осмислення, що зумовлено необхідністю підвищення якості професійної освіти відповідно до сучасних суспільних і технологічних викликів. У наукових дослідженнях значна увага приділяється застосуванню активних методів навчання, які забезпечують залучення студентів до освітнього процесу на основі інтерактивної взаємодії, формування внутрішньої мотивації та розвитку професійно значущих компетентностей. Окремий напрям становить упровадження новітніх тренінгових технологій, що сприяють підвищенню ефективності навчально-тренувальної діяльності та оптимізації засвоєння практичних навичок [5, 9].

У сучасній системі підготовки дедалі ширше використовуються інтегровані технології навчання, які передбачають поєднання традиційних педагогічних підходів із мультимедійними засобами, віртуальними тренажерами та інтернет-ресурсами, що розширює можливості освітнього середовища та забезпечує його гнучкість і наочність. Перспективним інструментом удосконалення практичної підготовки є біомеханічний моніторинг, який дає змогу здійснювати об'єктивний аналіз рухових дій студентів у процесі тренувань, своєчасно коригувати техніку виконання вправ і підвищувати рівень безпеки занять завдяки використанню сенсорних та цифрових вимірювальних систем [11]. Важливу роль також відіграють технології віртуальної реальності (VR), що забезпечують моделювання реалістичних тренувальних умов і сприяють формуванню професійних умінь у контрольованому та безпечному середовищі [1].

Фахова підготовка майбутніх спеціалістів сфери фізичної культури та спорту характеризується наявністю низки викликів і водночас відкриває значні перспективи для подальшого розвитку системи професійної освіти. До основних викликів належить необхідність інтеграції новітніх технологій у навчальний процес, що потребує відповідного матеріально-технічного забезпечення, підвищення кваліфікації викладацького складу та адаптації традиційних педагогічних підходів до цифрового освітнього середовища [9]. Важливим завданням є також оновлення змісту навчальних програм відповідно до актуальних вимог ринку праці, що передбачає узгодження професійних умінь і навичок здобувачів освіти з реальними потребами сучасної індустрії фізичної культури та спорту [5]. Окремої уваги потребує психологічна

підготовка майбутніх фахівців, спрямована на розвиток стресостійкості, мотивації до професійної діяльності та здатності до ефективної комунікації [4].

Водночас сучасні трансформаційні процеси створюють нові перспективи вдосконалення професійної підготовки. Серед них — активне впровадження цифрових технологій, зокрема розвиток віртуальних тренажерів і спеціалізованих програм, що підвищують якість практичної підготовки та забезпечують моделювання професійних ситуацій [9]. Значний потенціал мають міжнародні програми академічного обміну та науково-освітньої співпраці, які сприяють інтеграції світового досвіду та впровадженню інноваційних методик навчання. Перспективним напрямом є також індивідуалізація підготовки, що передбачає розроблення персоналізованих освітніх траєкторій і навчальних планів з урахуванням професійних інтересів і можливостей здобувачів освіти [10].

Ефективність професійної діяльності майбутнього фахівця зумовлюється сформованістю комплексу професійних компетентностей, серед яких ключове місце займають компетентність у сфері фізичного виховання і тренувальної діяльності [1], педагогічна компетентність як основа організації освітнього процесу [3], знання психології спорту для забезпечення результативної взаємодії зі здобувачами та спортсменами [6], а також здатність до аналізу, контролю та моніторингу фізичної активності з використанням сучасних технологій [9]. Важливого значення набувають крос-функціональні компетентності, що охоплюють комунікативні, організаційні, аналітичні вміння, а також дотримання принципів професійної етики, необхідних для успішної діяльності в умовах міждисциплінарної взаємодії.

Висновки і перспективи подальших досліджень. У результаті проведеного дослідження здійснено комплексний аналіз системи підготовки майбутніх фахівців галузі фізичної культури та спорту, що дало змогу визначити її концептуальні засади, які ґрунтуються на міждисциплінарному поєднанні теорії фізичного виховання, спортивної фізіології та педагогіки. З'ясовано, що одним із ключових викликів сучасності є стійка тенденція до зниження рівня фізичної активності молоді, що актуалізує необхідність формування у майбутніх фахівців не лише професійно-технічних умінь, а й розвинених мотиваційних, комунікативних і просвітницьких компетентностей, спрямованих на популяризацію активного способу життя.

Систематизація наукових підходів дозволила виокремити провідні методи фахового становлення майбутніх спеціалістів, серед яких визначальними є теоретико-фундаментальний, практико-орієнтований та індивідуалізований підходи. Доведено, що саме органічне поєднання ґрунтовної теоретичної підготовки з її практичною апробацією у процесі навчально-тренувальної діяльності забезпечує формування цілісного професійного досвіду, здатності до адаптації в реальних умовах професійної діяльності та готовності до розв'язання комплексних завдань галузі.

Важливим результатом дослідження стало обґрунтування ролі інноваційних технологій як необхідного складника сучасної системи підготовки фахівців. Використання засобів біомеханічного моніторингу, цифрових аналітичних систем і технологій віртуальної реальності сприяє підвищенню ефективності освітнього процесу, забезпечує можливість моделювання професійних ситуацій, здійснення об'єктивного контролю рухових дій і підвищення безпеки навчально-тренувальної діяльності.

Таким чином, професійна підготовка майбутніх фахівців фізичної культури і спорту повинна розглядатися як динамічна система, яка здатна оперативного реагувати на цифрові, соціальні та безпекові виклики. Її ефективність визначається інтеграцією теоретичних завдань, практичної підготовки, інноваційних технологій та формуванням стійкої професійної мотивації.

Перспективи подальших досліджень полягають в моделюванні цифрового освітнього середовища, у розробці інноваційних моделей підготовки тренерів нового покоління, які поєднують традиційні методи навчання та цифрові, вміють впроваджувати дуальну і змішану форму освіти, оцінювати компетентності у контексті воєнного та кризового стану. Актуальним є готувати майбутніх фахівців до професійної діяльності в умовах соціальної, економічної та безпекової нестабільності. Необхідно вивчати можливості адаптації українських програм підготовки фахівців фізичної культури до європейських стандартів, а також досліджувати механізми підвищення стресостійкості майбутніх тренерів у кризових умовах.

Список використаних джерел:

1. Атаманюк С.І. Інноваційні види рухової активності та підготовка майбутніх фахівців фізичної культури і спорту до їх використання: монографія / С.І. Атаманюк - Суми: ФОП Цьома, 2020. - 404с.
2. Гулько Т., Рибалко Л. Професійна підготовка майбутніх фахівців фізичної культури та спорту в умовах воєнного стану в Україні / Психолого-педагогічні проблеми сучасної школи. — 2023. — Вип.2(10). — С. 87-94. DOI:10.31499/2706-6258.2(10).2023.290564.
3. Гребенюк, А. С. Педагогічні засади фізичного виховання студентів у системі вищої освіти: монографія / А. С. Гребенюк. — Львів: ЛНУ імені Івана Франка, 2016. — 180 с.
4. Конох А.П., Товстопятко Ф.Ф. та ін. Особливості професійної підготовки майбутніх фахівців фізичної культури і спорту до фізкультурно-оздоровчої діяльності в ринкових умовах // Фізичне виховання і спорт. — 2025. — №1. — С.45-53. DOI: 10.26661/2663-5925-2025-1-12.
5. Кравченко, Т. С. Підготовка фахівців з фізичної культури та спорту: теоретичні і практичні аспекти / Т. С. Кравченко, О. В. Мороз. — Чернівці: Чернівецький національний університет, 2019. — 160 с.
6. Олійник Н.А., Войтенко С.М. Психологічні особливості спортивної діяльності: монографія — 2020. — 240 с.

7. Рожко, А. М. Фізична культура і спорт: методичні підходи до підготовки фахівців / А. М. Рожко, Т. В. Дудченко. — Київ: Міжнародна академія управління персоналом, 2019. — 220 с.

8. Шиян, В. О. Спортивна педагогіка: теорія і практика підготовки тренерів / В. О. Шиян, І. В. Грекова. — Харків: ХНАУ, 2018. — 248 с.

9. Atamanyuk, S., Semenikhina, O., Shyshenko I. Pedagogical conditions of formation of readiness of future specialists of physical culture to use of innovative types of motor activity in professional activity/ Norwegian Journal of development of the International Science, 2021. №64 Pp 16-20.

10. W. Kenney, J. Wilmore, D. Costill, Physiology of Sport and Exercise/ 7th ed. Champaign, IL: Human Kinetics, 2021. — 648 p.

11. Martínez-Rico, M. Alberola-Albors, C. Pérez-Campos, R. González-García, Physical Education Teachers' Perceived Digital Competences: Are They Prepared for the Challenges of the New Digital Age? // Sustainability (MDPI), 2021. volume 14, issue 1, article No. 321.

12. Sohokon O., Donets O., Novik S., Fazan V. Trends in improving professional training of physical education specialists in he i in Ukraine//Pedagogical Sciences, 1(2024), Pp.39–45

References:

1. Atamanyuk S.I. Innovative types of motor activity and training of future specialists in physical culture and sports for their use: monograph / S.I. Atamanyuk - Sumy: FOP Tsoma, 2020.-404p.

2. Gulko T., Rybalko L. Professional training of future specialists in physical culture and sports in conditions of martial law in Ukraine / Psychological and pedagogical problems of modern school. – 2023. - Issue 2(10). – P. 87-94. DOI:10.31499/2706-6258.2(10).2023.290564.

3. Grebenyuk, A. S. Pedagogical principles of physical education of students in the higher education system: monograph / A. S. Grebenyuk. — Lviv: Ivan

Franko Lviv National University, 2016. — 180 p.

4. Konokh A.P., Tovstopyatko F.F. et al. Peculiarities of professional training of future specialists in physical culture and sports for physical culture and health activities in market conditions // Physical Education and Sports. – 2025. – No. 1. – P.45-53. DOI: 10.26661/2663-5925-2025-1-12.

5. Kravchenko, T. S. Training of specialists in physical culture and sports: theoretical and practical aspects / T. S. Kravchenko, O. V. Moroz. — Chernivtsi: Chernivtsi National University, 2019. — 160 p.

6. Oliynyk N.A., Voitenko S.M. Psychological features of sports activity: monograph – 2020. – 240 p.

7. Rozhko, A. M. Physical culture and sports: methodological approaches to the training of specialists / A. M. Rozhko, T. V. Dudchenko. — Kyiv: International Academy of Personnel Management, 2019. — 220 p.

8. Shiyany, V. O. Sports pedagogy: theory and practice of training coaches / V. O. Shiyany, I. V. Grekova. — Kharkiv: KhNAU, 2018. — 248 p.

9. Atamanyuk, S., Semenikhina, O., Shyshenko I. Pedagogical conditions of formation of readiness of future specialists of physical culture to use of innovative types of motor activity in professional activity/ Norwegian Journal of development of the International Science, 2021. №64 Pp 16-20.

10. W. Kenney, J. Wilmore, D. Costill, Physiology of Sport and Exercise/ 7th ed. Champaign, IL: Human Kinetics, 2021. — 648 p.

11. Martínez-Rico, M. Alberola-Albors, C. Pérez-Campos, R. González-García, Physical Education Teachers' Perceived Digital Competences: Are They Prepared for the Challenges of the New Digital Age? // Sustainability (MDPI), 2021. volume 14, issue 1, article No. 321.

12. Sohokon O., Donets O., Novik S., Fazan V. Trends in improving professional training of physical education specialists in he i in Ukraine//Pedagogical Sciences, 1(2024), Pp.39–45.

PHARMACEUTICS

KNOWLEDGE, ATTITUDE, AND PRACTICES (KAP) REGARDING RATIONAL ANTIBIOTIC USE AND ANTIBIOTIC RESISTANCE IN AL-IRAQIA MEDICAL STUDENTS

Raghad Abdulsalam Khaleel

University of Al-Iraqia College of Medicine Departement of Pharmacology, Baghdad,Iraq

Taif M Maryoosh

Department of Pharmacology&Toxicology, College of Pharmacy,University of Kut, Wasit, Iraq,52001

Kasim S. Hmood

Department of Pharmaceutical Chemistry, College of Pharmacy, University of Kut, Wasit, Iraq, 52001

<https://doi.org/10.5281/zenodo.20691196>

Abstract

Background

Antimicrobial resistance is a serious problem that affects the health care system and the global economy, particularly in the developing countries , this cross section study aims to assess knowledge , attitude and practice regarding antibiotics use and antimicrobial resistance among medical students.

Methodology

A descriptive cross-sectional study was conducted during the academic year 2025– 2026 at the college of medicine, Al-Iraqia university. A total of 208 undergraduate medical students were recruited using a convenience sampling technique. data were collected through a structured, self-administered questionnaire distributed via electronic google forms. The questionnaire, adapted from validated previous studies and reviewed by pharmacology experts, consisted of four sections covering demographics, knowledge, attitudes, and practices (KAP) regarding antibiotic use and antimicrobial resistance. Participation was voluntary, and informed consent was obtained electronically, applying descriptive statistics including frequencies and percentages. ethical approval was obtained, and confidentiality of participants was strictly maintained.

Results

The overall findings showed high knowledge regarding antibiotic use and resistance, with 90.4% correctly identifying that antibiotics treat bacterial infections and 91.3% understanding antibiotic resistance. Despite this, 73.6% reported self- medication and 71.1% saved leftover antibiotics for future use.

Conclusions

Although medical students showed good baseline knowledge regarding antibiotic use and resistance, notable gaps in attitudes and practices persist. These findings highlight the need for enhanced educational strategies focusing on antimicrobial stewardship, practical training, and stricter policies to promote rational antibiotic use and reduce the risk of AMR.

Antimicrobial Resistance (AMR)

Introduction:

1. Historical Significance And Applications

The discovery of antibiotics in 1928 by Alexander Fleming revolutionized the world of medicine. It is used to:

- Treat bacterial infections [1].
- As prophylaxis following surgeries to prevent surgical site infection (SSI) [2].

2. The challenge of antimicrobial resistance

(AMR)

Nowadays their effectiveness decreases due to antimicrobial resistance (AMR), which means the pathogens no longer respond to the medicine that previously work on them [3]. There are many factors that lead to antimicrobial resistance (AMR) categorized into:

A. Human related factors: improper usage of antibiotics including (Self medication, dispense of antibiotics without prescription, inappropriate adherence to the prescription, keeping leftovers antibiotics, sharing antibiotics with family and friends, patient's expectations and medico legal pressure) [4].

B. Bacterial related factors: Bacteria themselves have many mechanisms to resist antibiotics classified as:

■ **Intrinsic mechanism:** Bacteria naturally overcome the antibiotics due to lack of specific target site.

■ **Acquired mechanism:** Gene mutation or getting gene coded to resist certain drug from their environment.

■ **Adaptive mechanism:** Getting resistance to the antibiotics under certain conditions only [5].

■ **Animals related factors:** Playing a significant role in the dissemination of antimicrobial resistance (AMR) due to giving animals the same antibiotics used by humans, improper handling of food of animal origin, and direct contact with animal wastes [4].

■ **Environmental factors:** Unsuitable disposal of antibiotics and environmental pollution from pharmaceutical industries [4, 6].

■ **Industrial related factors:** Involving antibiotics in cosmetics and hygiene Products (shampoo, shower gel, soaps, lotions, and creams) due to disinfection properties [4, 7].

3. Global health and economic impact

The World Health Organization (WHO) has expressed concern regarding the dissemination of antimicrobial resistance (AMR) globally [8]:

- **Resistance rates:** Monitoring antibiotics in-

creased over 40% between 2018 and 2023, with an average annual increase of 5-15% [8].

- **Mortality:** Antimicrobial resistance (AMR) has led to the death of one million lives each year since 1990 [9]. In low- and middle-income countries, it causes 337,000 deaths per year due to unstable living conditions and inadequate health systems [10, 11].

- **Economy:** The impact extends beyond health, with an estimated cost to the global economy up to \$100 trillion by 2050 [12]. Antimicrobial resistance (AMR) raises the cost of health care by US\$ 66 billion [13].

4. Local context and study objective

The results from previous studies highlighted the significant correlation between insufficient knowledge and inappropriate practices in countries like Saudi Arabia [14], Jordan [15], Syria [16] and Egypt [17].

In Iraq:

- The Iraqi ministry of health released a statement prohibiting the dispensing of a limited number of antibiotics without prescription [18].

- Despite several cross-section studies assessing knowledge, attitude and practice (KAP) in Iraq [19, 20, 21], the evidence regarding students at our college remains insufficiently evaluated.

Objective

The objective of this study is to assess and evaluate the current understanding, beliefs and behaviors of these future healthcare professionals concerning antibiotics and the global threat of antimicrobial resistance (AMR).

Materials and Methods

Study design

This descriptive cross-sectional study was conducted during the academic year 2025–2026 to assess the knowledge, attitudes, and practices related to antibiotic use and antimicrobial resistance (AMR) among undergraduate medical students (general medicine) at Al-Iraqia university using a convenience sampling technique. Student from different academic years were included to provide a comprehensive

overview of current antibiotic-related awareness among future physicians.

Study setting

The study was carried out at the college of medicine, Al-Iraqia university, during the academic year 2025–2026 from 1st November 2025 to 31 January 2026.

Sample size

The total sample size of the study was 208 participants.

Study tool

A Structured questionnaire was specifically developed for this study to evaluate the knowledge, attitudes, and practices of medical students regarding antibiotic use and antimicrobial resistance (AMR). The questionnaire was adapted from previously published, peer-reviewed (KAP) studies [23–25] to ensure content validity and clarity. The questionnaire was reviewed by a panel of experts from the department of Pharmacology, college of medicine, Al-Iraqia university. The experts

evaluated the items for their relevance to the study objectives, clinical accuracy, and appropriateness for medical students, and necessary modifications were made accordingly.

The final version of the questionnaire consisted of four sections:

1. **Demographics:** Age, gender, academic year, and clinical rotation experience.

2. **Knowledge:** Eight multiple-choice questions assessing students' understanding of antibiotic use and antimicrobial resistance (AMR).

3. **Attitudes:** Nine items measured using a five-point likert scale (strongly disagree, disagree, neutral, agree, strongly agree) to evaluate students' perspectives toward antibiotic use and antimicrobial resistance.

4. **Practices:** Ten questions examining students' actual behaviors regarding antibiotic use.

Data collection procedures

Following the development and validation of the questionnaire, it was disseminated in English using Google Forms [26] to medical students across all academic years via official student groups on multiple digital platforms. Participation was entirely voluntary, and informed consent was obtained from all respondents prior to completing the questionnaire. Data were collected anonymously to ensure confidentiality. Clear instructions and definitions were provided at the beginning of the questionnaire to standardize responses and minimize potential misunderstandings.

Statistical analysis

The collected data were entered and analyzed. Descriptive statistics were applied to summarize the data, including frequencies and percentages. These analyses were used to describe the demographic characteristics of the participants and to evaluate their knowledge, attitudes, and practices regarding antibiotic use and antibiotic resistance among medical students. The results were presented in table, pie chart, and bar chart to facilitate clear interpretation of the findings.

Ethical considerations

Ethical approval for this study was obtained from the ethical approval committee at Al-Iraqia university. Informed consent was obtained electronically from all participants, and consent was considered granted when participants agreed to participate and completed the online questionnaire. Participants' privacy was respected and all collected data were kept strictly confidential and used solely for scientific research purposes. The study was self-funded, and the researchers declared that there were no conflicts of interest.

Results

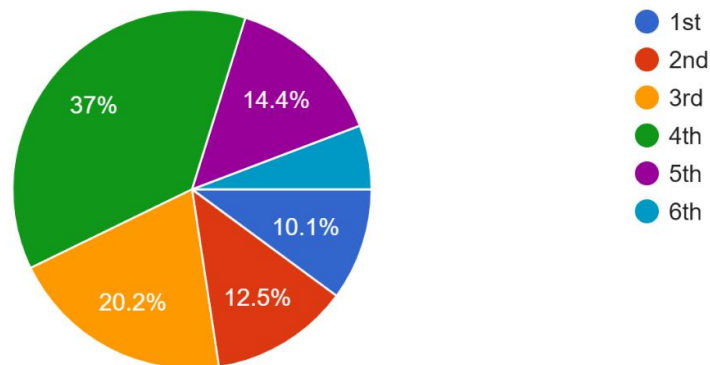
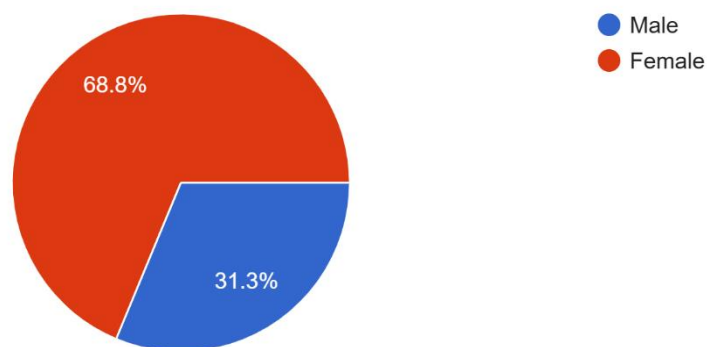
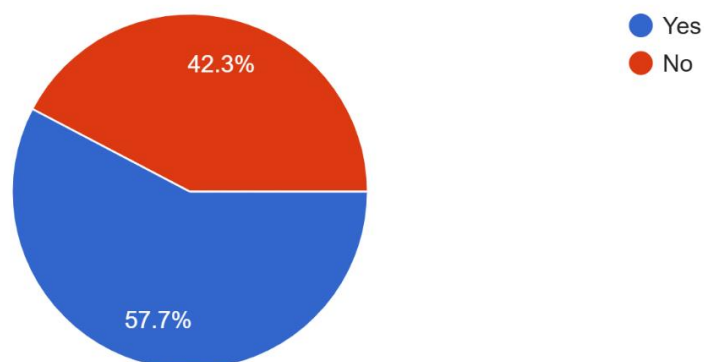
Sample Information :

The study sample consisted of 208 participants. Analysis of Demographic data showed that 68.8% were female and 31.3% were male. The age of participants ranged across several years, with the highest concentration at 21 years old (31.7%), followed by 20 years (17.3%) and 22 years (16.3%). Regarding academic progression, 37% were in their 4th year, while the 3rd year accounted for 20.2% furthermore, 57.7% of the participants reported having clinical rotation experience in hospital wards, while 42.3% had no such experience.

Table 1:

Demographic characteristics of the study participants(N=208)

Character	Variable	Frequency (N)	Percentage (%)
Gender	Male	65	31.3%
Gender	Female	143	68.8%
Academic year	1st Year	21	10.1%
Academic year	2nd Year	26	12.5%
Academic year	3rd Year	42	20.2%
Academic year	4th Year	77	37%
Academic year	5th Year	30	14.4%
Academic year	6th Year	12	5.8%
Students on clinical rotations	Yes	120	57.7%
Students on clinical rotations	No	88	42.3%

*Figure 1: pie chart- gender distribution**Figure 2 : pie chart – academic year distribution**Figure 3: pie chart – clinical rotation experience*

Knowledge regarding antibiotics and resistance

:

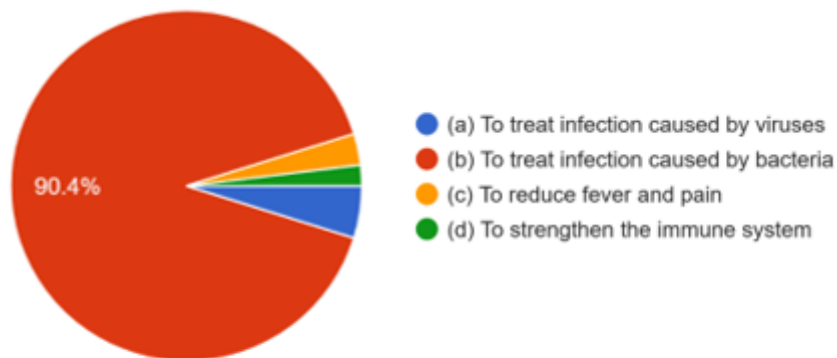
Participants demonstrated a high level of general knowledge regarding antibiotics. A majority (90.4%) correctly identified that antibiotics treat bacterial infections. Additionally, 91.3% accurately defined antibiotic

resistance. However, only 56.3% recognized that resistance is caused by a combination of factors such as stopping treatment early, viral use, and excessive use. regarding safety, 72.6% knew that amoxicillin is safe during pregnancy.

Table 2:

Knowledge levels regarding antibiotic use and resistance

Variable	Correct Response (%)	Incorrect/Unsure (%)
Primary function (bacterial infections)	90.4%	9.6%
Definition of antibiotic resistance	91.3%	8.7%
Main reason of antibiotics resistance	56.3%	43.7%
Broad-Spectrum antibiotic definition	88.9%	11.1%
Antibiotic use for bacterial pneumonia	85.1%	14.9%
Safety of amoxicillin in pregnancy	72.6%	27.4%
Consequences of resistance	78.4%	21.6%
Main way to stop resistance	81.3%	18.7%

**Figure 4: pie Chart – primary function Of antibiotics**

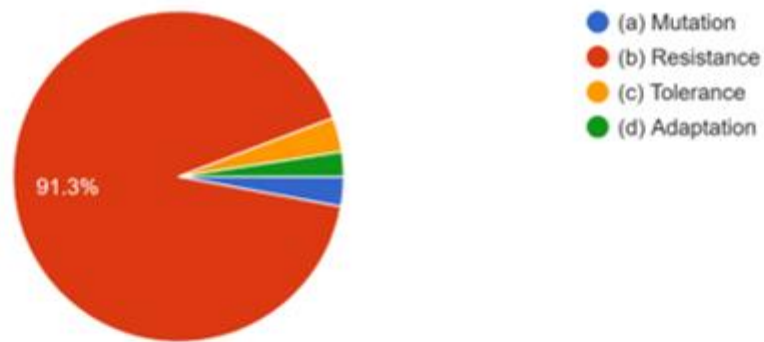


Figure 5: pie Chart – definition Of Antibiotic Resistance

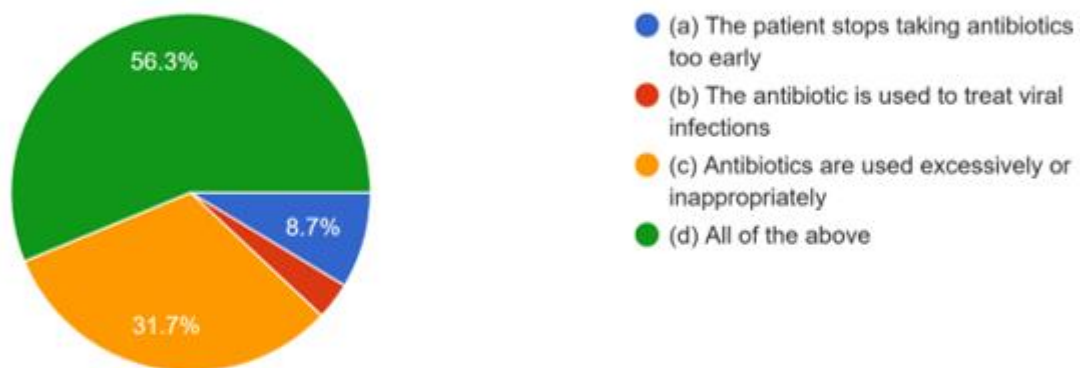


Figure 6: pie Chart – Reason Of Antibiotic Resistance

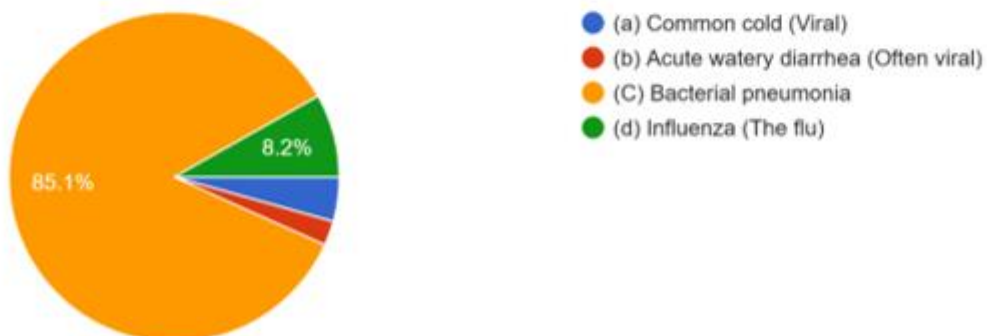


Figure 7: pie Chart – antibiotic Use in bacterial pneumonia

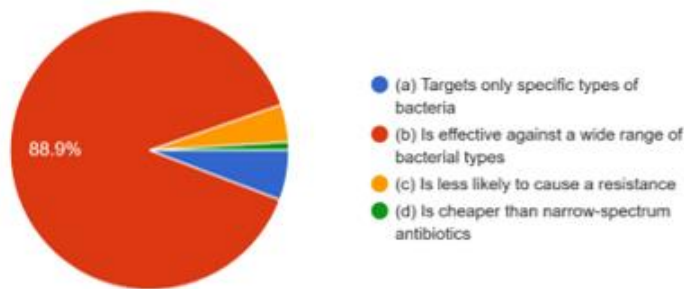


Figure 8: pie Chart
Broad-Spectrum Antibiotic Knowledge

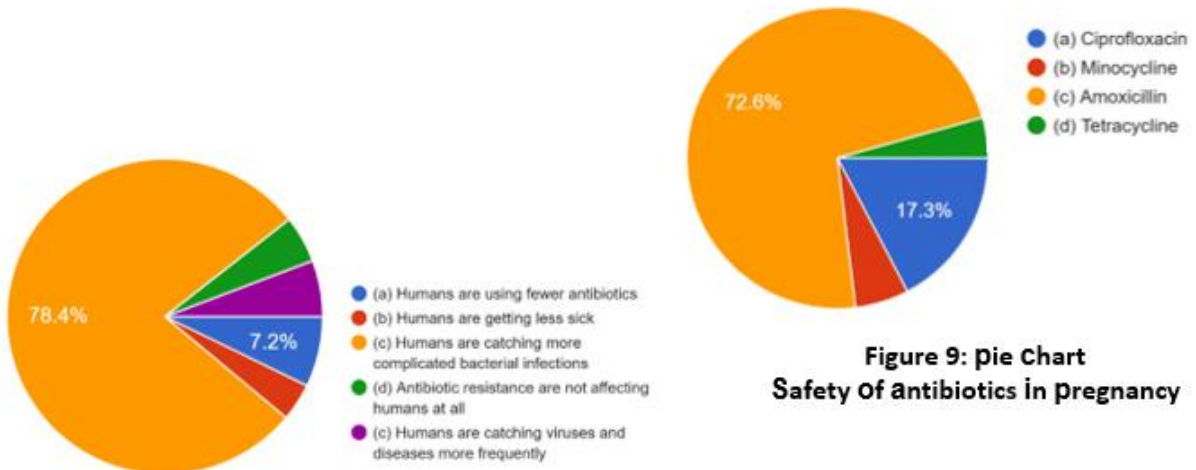
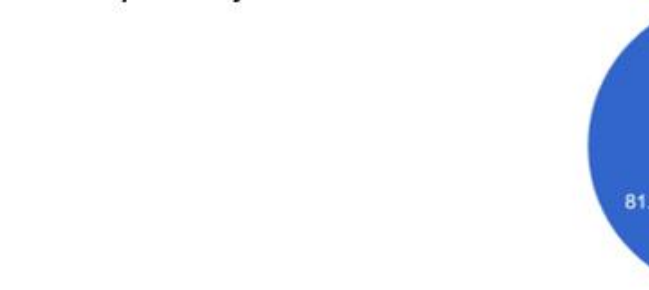


Figure 9: pie Chart
Safety Of antibiotics in pregnancy

Figure 10 pie Chart
Consequences Of Antibiotic Resistance



Attitudes and beliefs on rational use :

Attitudes toward antibiotic use showed strong support for regulation. **74%** agreed that pharmacists should not dispense antibiotics freely. **86.5%** believed

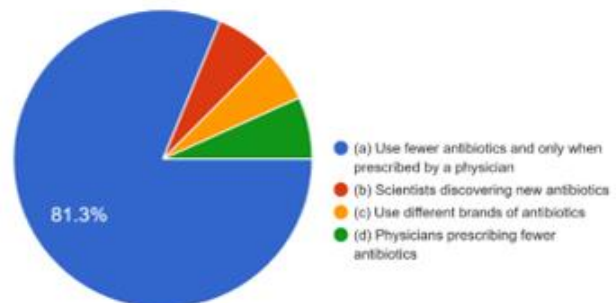


Figure 11: pie Chart
Ways to prevent Antibiotic Resistance

that doctors should avoid unnecessary prescriptions. **87.3%** agreed that national campaigns are necessary in Iraq to educate the public.

Participants` attitudes toward rational antibiotic use

Strongly Disagree/Disagree	Neutral	Strongly Agree/Agree	Statement
18.3%	23.1%	66.8%	Self-medication is harmful
75.9%	13.9%	10.1%	Antibiotics help recover faster from viral cold
13%	17.3%	74 %	Pharmacists should not dispense freely
59.1%	23.1%	25.9 %	Pressuring doctors for antibiotics prescription is acceptable
7.2%	9.1%	86.5%	Doctors should avoid unnecessary prescription
5.2%	12%	83.5%	Future doctors responsibility
4.8%	15.4%	82.5%	It is necessary to establish workshops for training on rational use of antibiotics at university
4.4%	9.6%	87.3%	National campaigns needed in Iraq
5.3%	9.1%	87.5%	Antibiotics resistance is a serious global problem

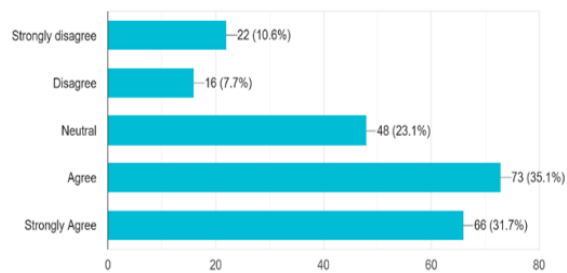


Figure 12: stacked bar chart
Self-medication is harmful

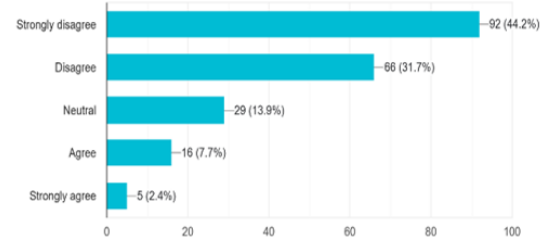


Figure 13: stacked bar chart
Antibiotics help

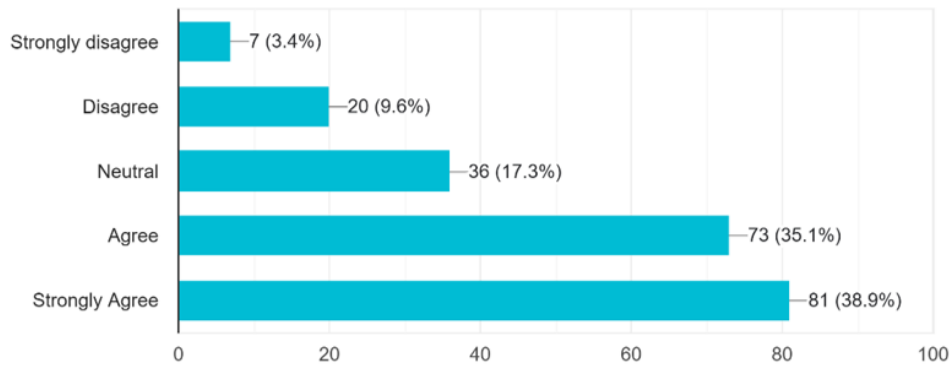


Figure 14: stacked bar chart - pharmacists should not dispense freely

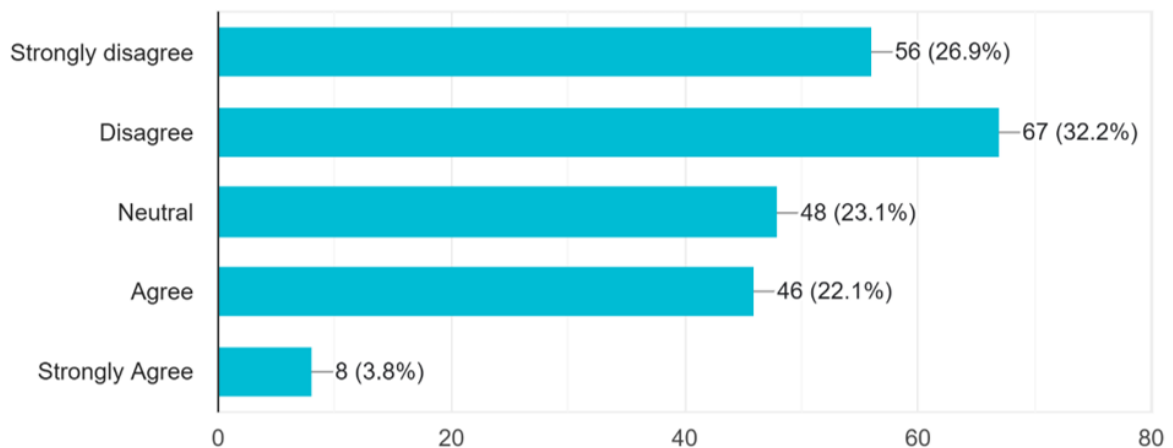


Figure 15: stacked bar chart – pressuring doctors for antibiotics Prescription is Sometimes acceptable

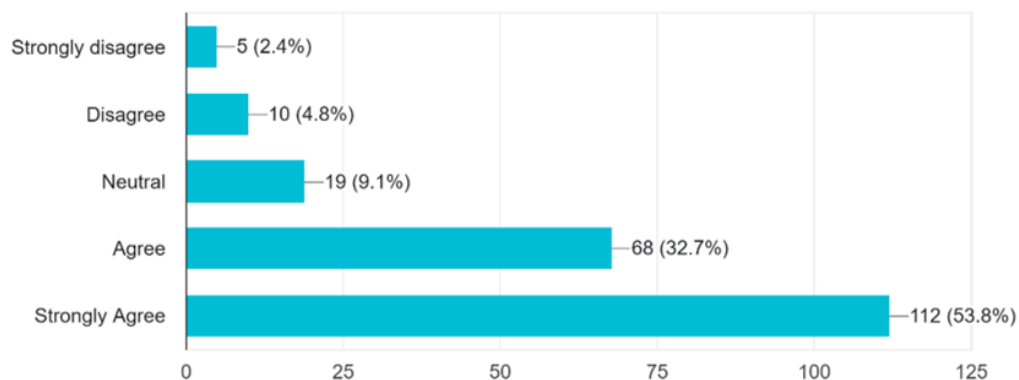


Figure 15: stacked bar chart - doctors should avoid unnecessary prescriptions

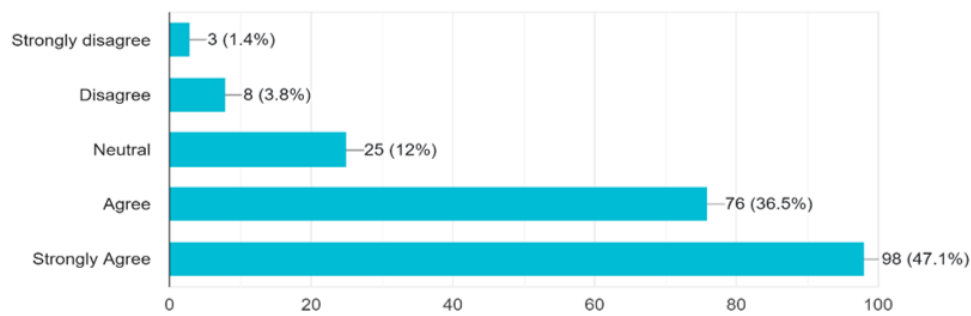


Figure 16: stacked bar chart future doctors responsibility

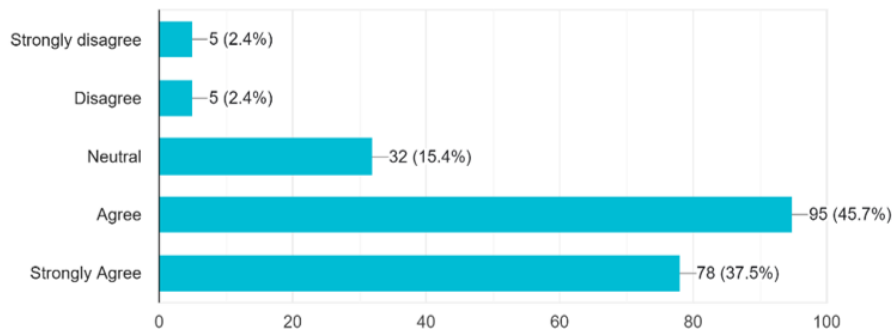


Figure 17: stacked bar chart – Workshops on rational antibiotic Use at University are necessary

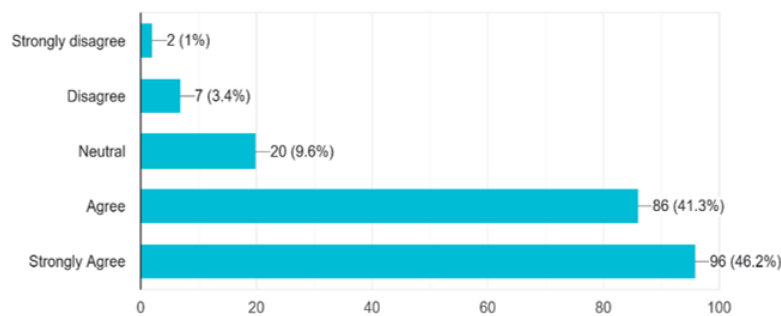


Figure 18: stacked bar chart –national Campaign's needed in Iraq

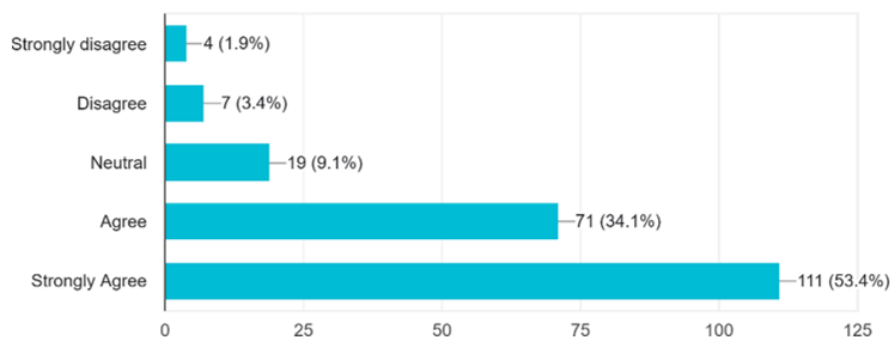


Figure 19: stacked bar chart – antibiotics resistance is a serious global problem

Self-reported practices :

However, despite good knowledge and attitudes, the study revealed several concerning practices. A high percentage of participants (69.1%) reported self-medi-

cation with antibiotics without a prescription. Amoxicillin was the most frequently used antibiotic for self-treatment (41.3%). In addition, 71.1% of participants reported saving leftover antibiotics for future use. Only 22.6% indicated that they never stop their antibiotic

course early when they start feeling better.

Table 4:

Reported practices regarding antibiotic use		
Practice Variable	Category	Percentage (%)
Self-medication history	Yes (without Prescription)	73.6%
Side effects experience	No	69.1%
Adherence behavior	Always/often stop Course early	47.6%
Adherence behavior	Never stop Course early	22.6%
Leftover management	Discard or return to pharmacy	28.8%
Leftover management	Save for future self-treatment	71.1%
Information source	Medical school Curriculum	49.5%
Information source	Doctors/clinicians	20.2%
Management of cold	Rest and drink fluids	57.7%
Management of cold	Take leftovers or ask for Antibiotic	16.3%

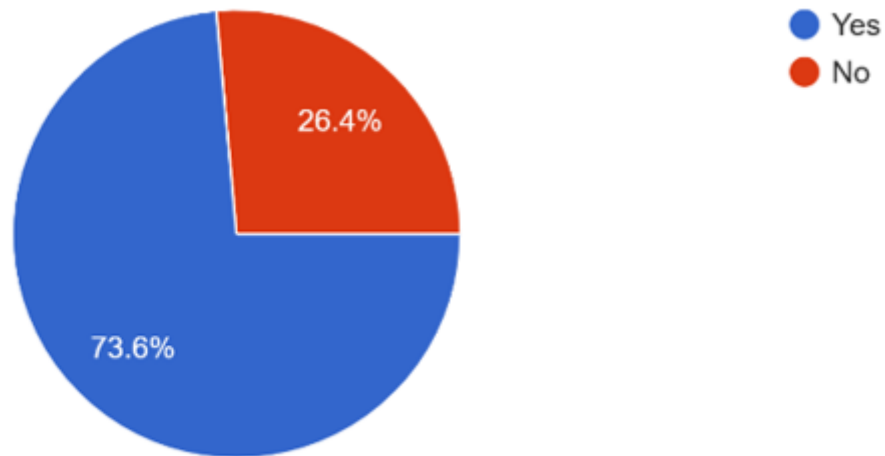


Figure 20: pie chart - Self-medication history

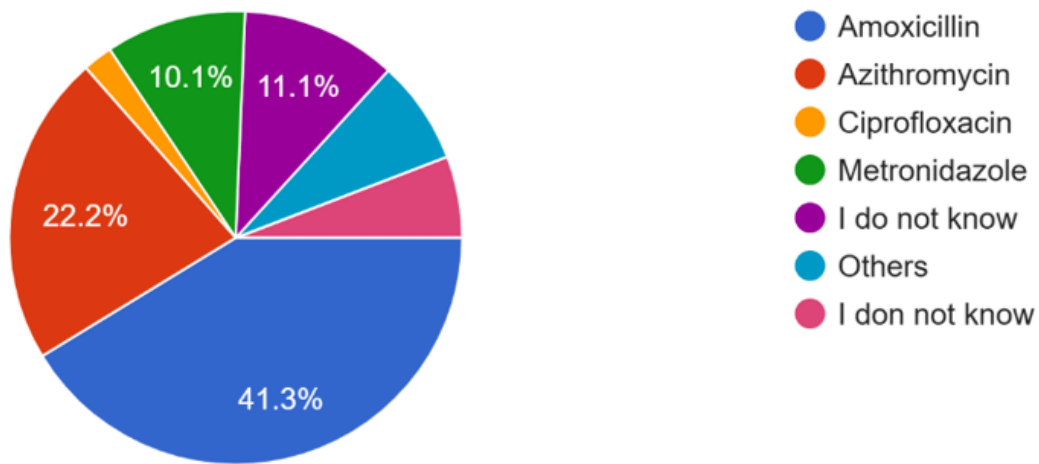


Figure 21: pie chart - the most taken antibiotics

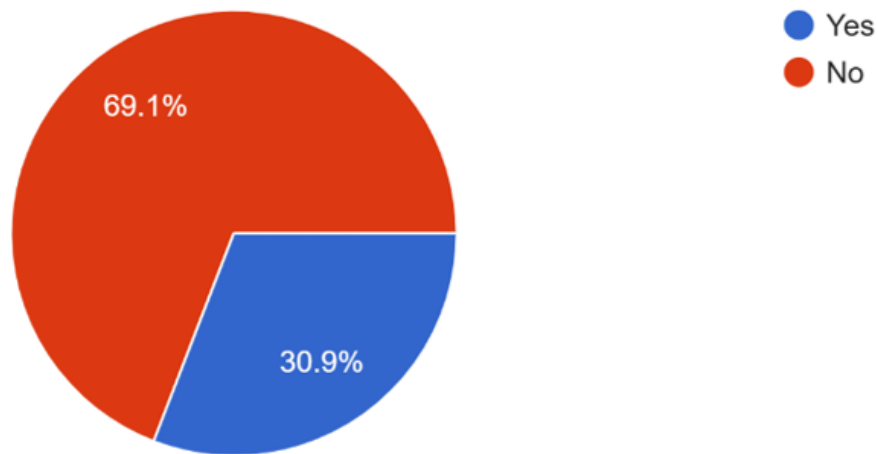


Figure 22: pie chart - *experience Of Side effects*

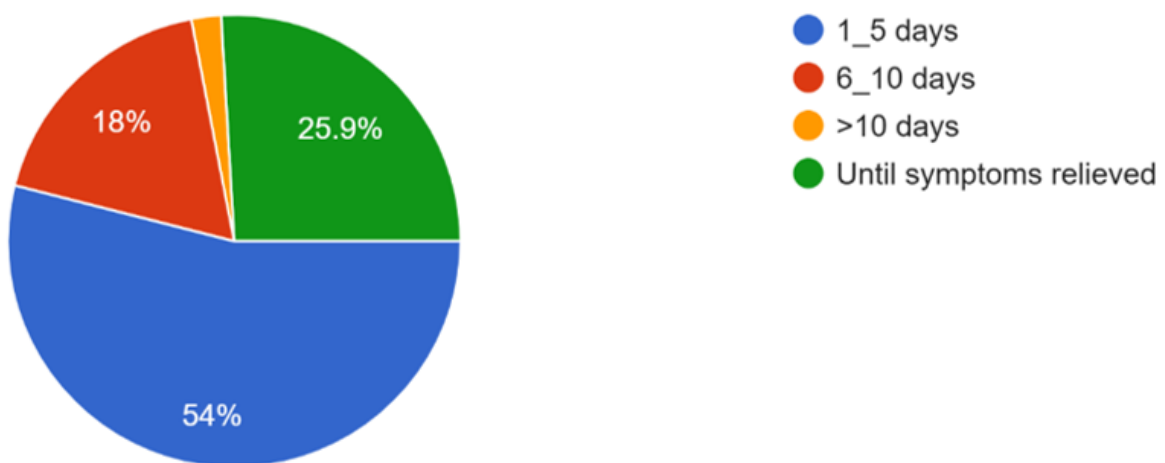


Figure 23: pie chart - duration of Self-medication

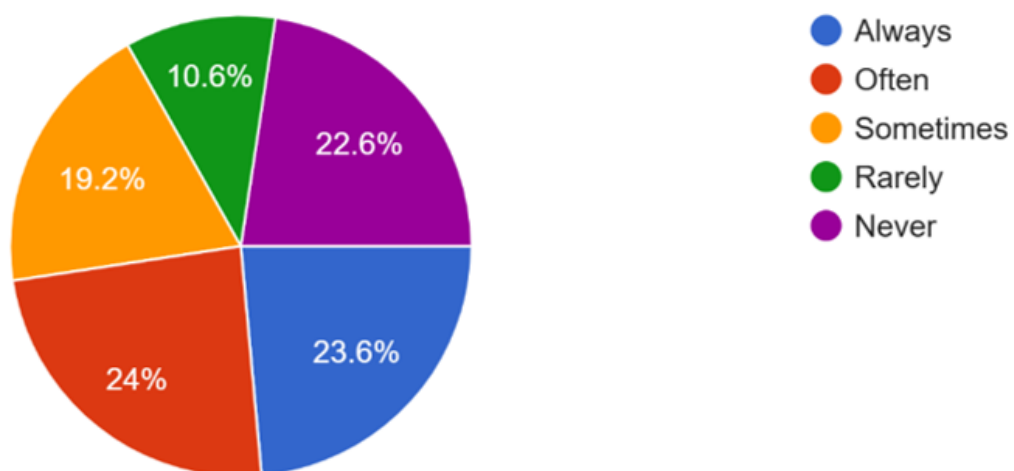


Figure 24: pie chart - adherence behavior

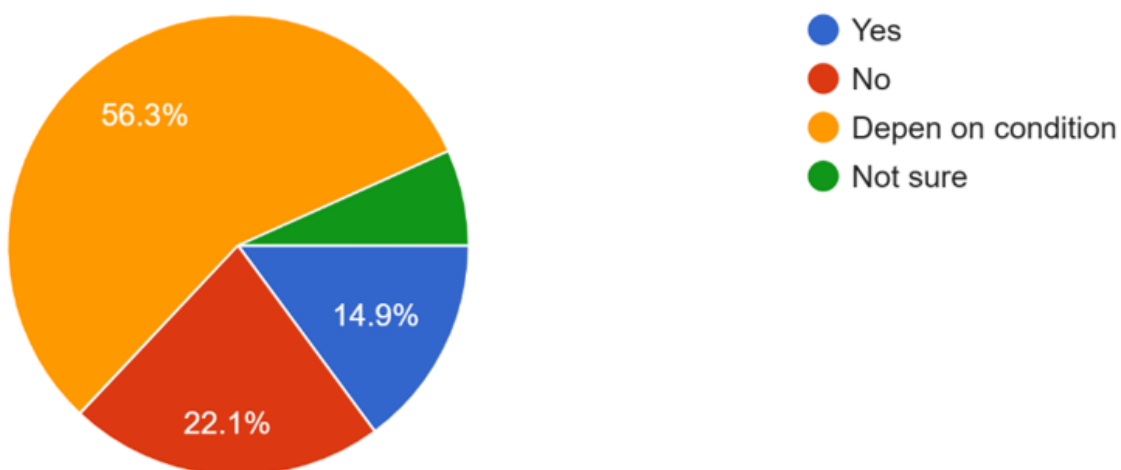


Figure 25: pie chart - adherence behavior

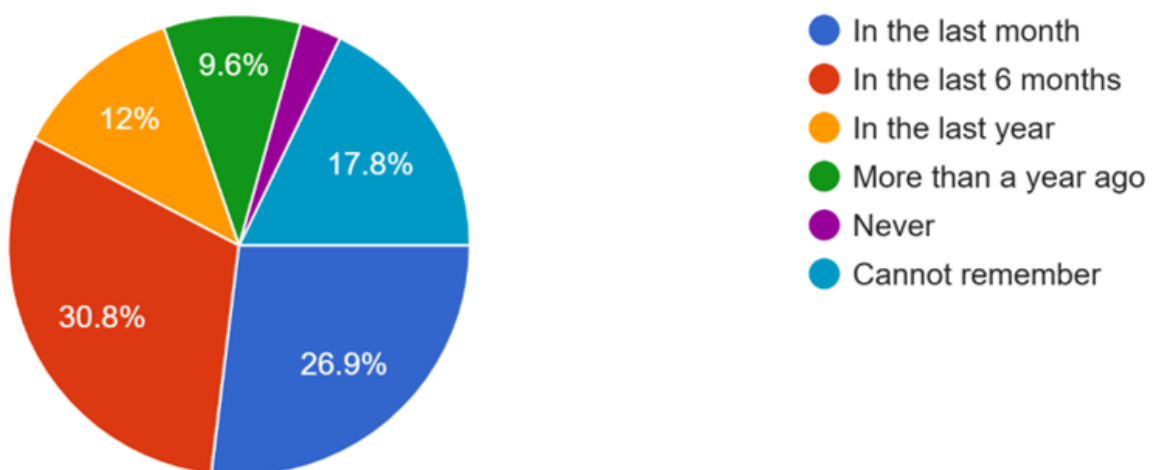


Figure 26: pie chart - last time took antibiotics

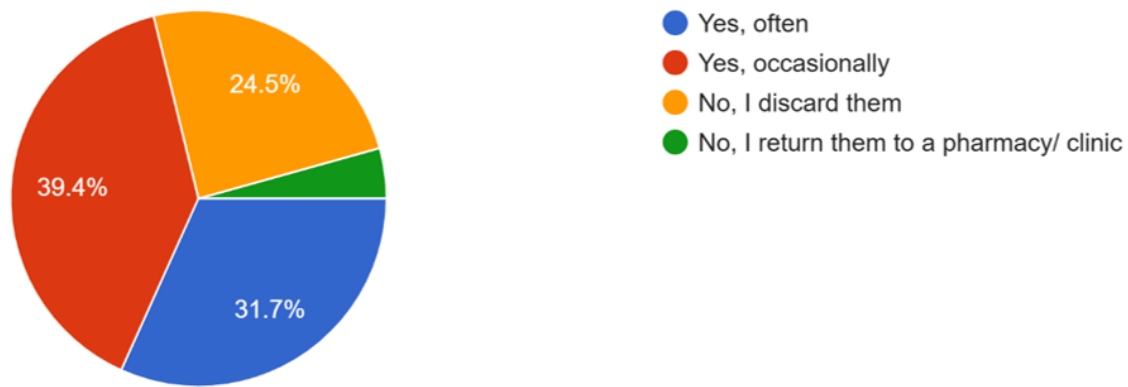


Figure 27: pie Chart - leftover management

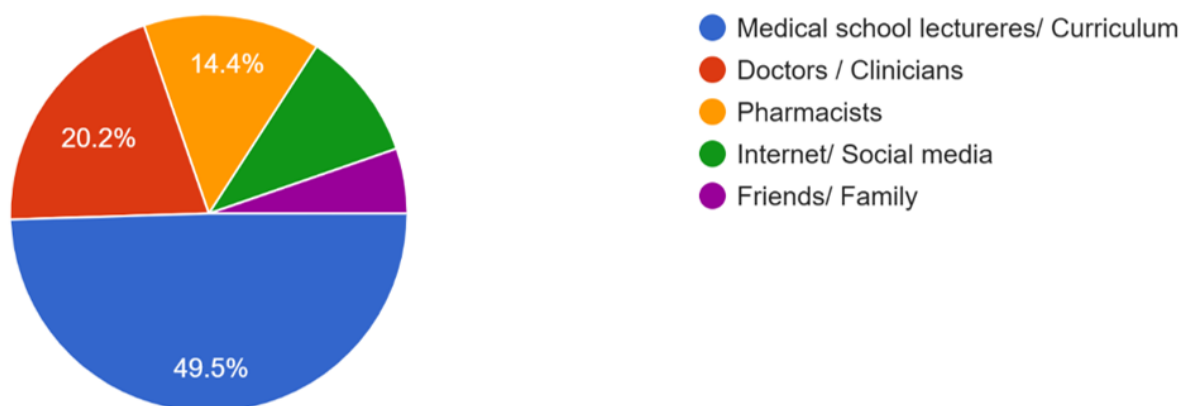


Figure 28: pie chart - Source of information

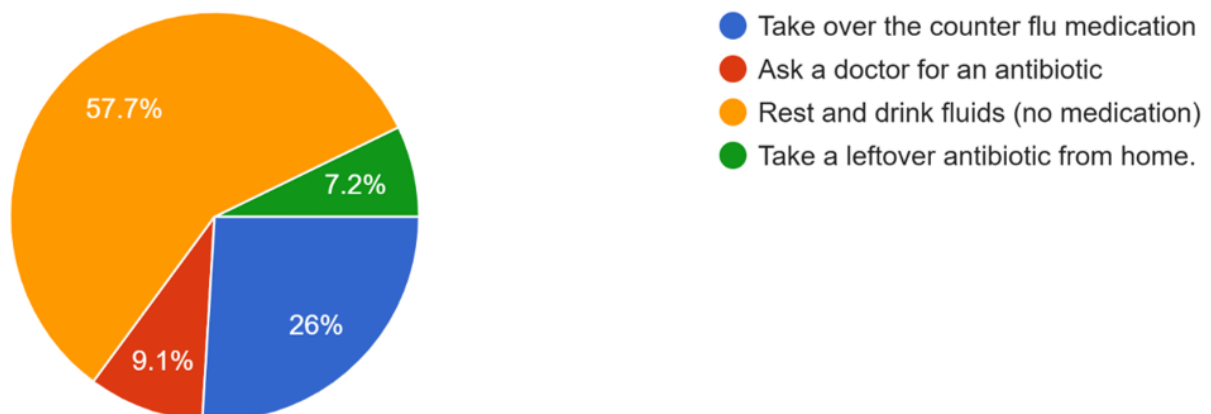


Figure 29: pie chart - Source of information

Discussion

This study evaluated the knowledge, attitudes, and practices (KAP) regarding antibiotic use and antimicrobial resistance (AMR) among medical students. The findings revealed that while participants generally possess high levels of theoretical knowledge and positive attitudes toward rational antibiotic use, several inappro-

priate practices remain alarmingly common. A substantial majority of participants demonstrated a solid academic foundation; approximately 90.4% correctly identified that antibiotics are indicated for bacterial infections, 91.3% accurately defined the concept of antibiotic resistance, and 88.9% understood the clinical application of broad-spectrum antibiotics. Further-

more, 85.1% recognized the appropriate use of antibiotics in cases of bacterial pneumonia, suggesting that the medical curriculum effectively imparts core theoretical principles. However, a significant knowledge gap persists, as only 56.3% of participants recognized that antimicrobial resistance (AMR) is driven by a complex interplay of factors, including excessive use, early discontinuation of treatment, and inappropriate administration for viral infections. This indicates that while students are familiar with the broader concept of resistance, a considerable proportion may lack a comprehensive understanding of the specific mechanisms and behaviors that accelerate its development.

Regarding attitudes, participants demonstrated a strong commitment to professional stewardship, with 74% agreeing that pharmacists should strictly adhere to prescription-only dispensing and 86.5% believing that physicians must avoid unnecessary antibiotic prescriptions. Additionally, the broad support (87.4%) for national educational campaigns in Iraq reflects a proactive stance among future healthcare professionals in leading public awareness efforts. Despite these positive attitudes, a stark contradiction emerged when examining actual practices. A high percentage of participants (73.6%) reported self-medicating with antibiotics. This alarmingly high rate could be attributed to the easy over-the-counter access to antibiotics in the local region, combined with a sense of "professional overconfidence" among medical students who may perceive their emerging clinical knowledge as sufficient to bypass formal medical consultation.

Furthermore, 71.1% admitted to saving leftover medications for future use. Adherence to treatment regimens was also notably poor; only 22.6% of participants reported never stopping their course early. This highlights a dangerous "symptomatic improvement trap," where students prioritize immediate personal relief over clinical adherence. Such behavior is a primary driver of selective pressure, as it allows the most resistant bacterial strains to survive and proliferate, posing a grave long-term risk to public health.

These findings underscore a critical "knowledge-practice gap" among medical students, where academic proficiency does not necessarily translate into responsible clinical behavior. Although nearly half of the participants (49.5%) cited the medical school curriculum as their primary information source, the current educational framework appears more effective at delivering facts than fostering sustainable behavioral changes. This discrepancy emphasizes the urgent need for strengthened educational interventions that go beyond theoretical instruction. To effectively bridge this gap, it is essential to implement robust antibiotic stewardship programs, enforce stricter dispensing regulations, and integrate practical, case-based learning that highlights the long-term clinical and public health consequences of antibiotic misuse.

Conclusion

This cross-sectional study among 208 medical students at Al-Iraqia university demonstrated generally good knowledge regarding antibiotic use and antimicrobial resistance (AMR), particularly in recognizing bacterial infections and the consequences of resistance.

However, a noticeable gap between knowledge and actual practice was identified, especially concerning self-medication and incomplete antibiotic courses.

Although encouraging attitudes were observed—such as rejecting the use of antibiotics for viral infections and supporting prescription-based dispensing—unsafe behaviors still persist among a considerable proportion of students. This indicates that theoretical knowledge alone does not necessarily translate into responsible clinical practice.

These findings emphasize the need for stronger educational strategies that go beyond traditional teaching. Incorporating antimicrobial stewardship into the curriculum, alongside practical training, case-based learning, and continuous awareness campaigns, is essential. Additionally, reinforcing regulations on antibiotic dispensing and aligning with guidelines from the World Health Organization can further support rational use.

In conclusion, bridging the gap between knowledge and practice is critical. By enhancing both education and policy implementation, medical students can be better prepared to play an effective role in combating antimicrobial resistance (AMR) and ensuring safe antibiotic use in the future.

References:

1. Gaynes R. The Discovery of Penicillin—New Insights After More Than 75 Years of Clinical Use. *Emerg Infect Dis.* 2017 May;23(5):849-854. doi:10.3201/eid2305.161556.
2. Menz BD, Charani E, Gordon DL, Leather AJM, Moonesinghe SR, Phillips CJ. Surgical Antibiotic Prophylaxis in an Era of Antibiotic Resistance: Common Resistant Bacteria and Wider Considerations for Practice. *Infect Drug Resist.* 2021 Dec 7;14:5235-5252. doi:10.2147/IDR.S319780.
3. World Health Organization. Antimicrobial resistance [Internet]. Geneva: World Health Organization; 2023 [cited 2026 Mar 27].
4. Endale H, Mathewos M, Abdela D. Potential Causes of Spread of Antimicrobial Resistance and Preventive Measures in One Health Perspective-A Review. *Infect Drug Resist.* 2023 Dec 8;16:7515-7545. doi:10.2147/IDR.S428837.
5. Belay WY, Getachew M, Tegegne BA, Tefera ZH, Dagne A, Zeleke TK, et al. Mechanism of antibacterial resistance, strategies and next-generation antimicrobials to contain antimicrobial resistance: a review. *Front Pharmacol.* 2024 Aug 16;15:1444781. doi:10.3389/fphar.2024.1444781.
6. Wang K, Zhuang T, Su Z, Chi M, Wang H. Antibiotic residues in wastewaters from sewage treatment plants and pharmaceutical industries: Occurrence, removal and environmental impacts. *Sci Total Environ.* 2021 Sep 20;788:147811. doi:10.1016/j.scitotenv.2021.147811.
7. Wang Y, Li G, Zhu Q, Liao C. Occurrence of parabens, triclosan and triclocarban in paired human urine and indoor dust from two typical cities in China and its implications for human exposure. *Sci Total Environ.* 2021 Sep 10;786:147485. doi:10.1016/j.scitotenv.2021.147485.

8. World Health Organization. WHO warns of widespread resistance to common antibiotics worldwide [Internet]. Geneva: World Health Organization; 2025 Oct 13 [cited 2026 Mar 27].
9. University of Oxford. Antibiotic resistance has claimed at least one million lives each year since 1990 [Internet]. Oxford: University of Oxford; 2024 Sep 17 [cited 2026 Mar 27].
10. GBD 2021 Antimicrobial Resistance Collaborators. Global burden of bacterial antimicrobial resistance 1990–2021: a systematic analysis with forecasts to 2050. *Lancet*. 2024 Sep 16;404(10459):1199–1226. doi: 10.1016/S0140-6736(24)00862-6.
11. Kovacevic J, Ilic I, Ilic M. Global, regional, and national burden of bacterial antimicrobial resistance, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021. *BMJ Public Health*. 2024;2(1):e000511. doi:10.1136/bmjph-2023-000511.
12. Ullman MA, Kleinschmidt J, Sitaras NW, et al. Association Between Antimicrobial Stewardship Programs and Antibiotic Use Globally: A Systematic Review and Meta-analysis. *JAMA Netw Open*. 2023 Feb 1;6(2):e230119. doi:10.1001/jamanetworkopen.2023.0119.
13. Thomas SM, Chadi N, Chalkidou K, et al. Forecasting the Fallout from AMR: Economic Impacts of Antimicrobial Resistance in Humans [Internet]. Washington, DC: Center for Global Development; 2024 Sep 23 [cited 2026 Mar 27].
14. Akeel MA. A Cross-Sectional Study To Assess Knowledge, Attitudes, And Practices (KAP) Regarding Antibiotic Use In Upper Respiratory Tract Infections In Saudi Arabia. *J Innov Pharm Biol Sci*. 2020;7(4):112–118.
15. Shehadeh M, Suaifan G, Darwish RM, Al-Igoze M, Al-Bakri A, Al-Amoleh H. Knowledge, attitudes and behavior regarding antibiotics use and misuse among adults in the community of Jordan. A pilot study. *Saudi Pharm J*. 2012 Apr;20(2):125–133. doi:10.1016/j.jsps.2011.11.001.
16. Kalkreuth-Mayer S. Zusammenhang von Ernährung und Antibiotikaresistenz am Beispiel einer Kohorte der DONALD Studie [Dissertation]. Gießen: Justus-Liebig-Universität Gießen; 2021.
17. Tawfik AH, Ibrahim AF, El-Gazar HE. Knowledge, Attitude and Practice of Antibiotic Use Among University Students in Mansoura University – Egypt: A Cross Sectional Study. *J Nurs Pract*. 2021;4(1):108–117. doi:10.30994/jnp.v4i1.134.
18. Iraqi Ministry of Health. Communicable Disease Control Department holds a training course on the rational use of antibiotics [Internet]. Baghdad: Ministry of Health; 2023 [cited 2026 Mar 27].
19. Othman ZY, Noaman BR, Muhammed RA. Knowledge, Attitude, and Practice of Antibiotics Usage and Resistance Among Dental Students. *Eurasian J Sci Eng*. 2023 Jun 22;9(2):208–216. doi:10.23918/eajse.v9i2p16.
20. Shanjar AM, Aziz MM. Knowledge, Attitude and Practice (KAP) towards Resistance and use of Antibiotic among Veterinary Medicine and Healthcare Students in DhiQar Province / Iraq. *Ann Rom Soc Cell Biol*. 2021 May 5;25(4):18585–18596.
21. Al-Maliki AS, Al Mohammed RA, Albazoony JK. Knowledge, Attitudes, and Practices of Antibiotic Use and Antimicrobial Resistance Among Medical Students in Southern Iraq. *Cureus*. 2026 Jan 1;18(1):e100550. doi:10.7759/cureus.100550.
22. Al-Ashwal FY, Kubas M, Zawiah M, et al. Knowledge, attitude, and practice of antibiotic use and its resistance among undergraduate students at the University of Science and Technology, Sana'a, Yemen. *Journal of Global Antimicrobial Resistance*. 2020;22:110–116.
23. Al-Dabbagh SA, Al-Mathkhury HJ, Al-Badri HJ. Knowledge, attitudes, and practices towards antibiotic use and antimicrobial resistance among medical students in Southern Iraq. *Journal of Ideas in Health*. 2021;4(1):250–256.
24. Hameed HA, Al-Fadhil SA. Assessment of antibiotic knowledge among final-year pharmacy students at the University of Baghdad. *Iraqi Journal of Pharmaceutical Sciences*. 2019;28(2):45–52.
25. Sumarni S, et al. Utilization of online questionnaire platforms for academic research data collection. *Proceedings of the International Conference on Education and Technology*. 2025;1:112–118.

REVIEW ON THE PREVALENCE OF OBESITY AMONG PRIMARY SCHOOL CHILDREN USING BODY MASS INDEX BMI

Saba Talib Wahhab

University of Al-Iraqia College of Medicine Departement of Pharmacology, Baghdad,Iraq

Raghad Abdulsalam Khaleel

University of Al-Iraqia College of Medicine Departement of Pharmacology, Baghdad,Iraq

<https://doi.org/10.5281/zenodo.20691198>

Abstract

Background and objective:

Obesity in children is a growing health concern with serious medical and psychological implications. The objective of this study is to investigate the prevalence of childhood obesity, identify contributing factors, and propose effective interventions to reduce its occurrence

Methods:

A random sample of 250 primary school students was selected for the study. Data was collected through surveys, anthropometric measurements (height, weight, BMI), and parental questionnaires evaluating lifestyle factors such as diet, physical activity, and chronic health conditions.

Results:

- **Gender Distribution:** 47.2% male, 52.8% female.
- **Age Range:** 6-12 years.
- **Weight & Height:** Categorized into different BMI ranges.
- **Health Findings:** 21% of children had health issues.
- **Dietary Habits:** 52% consumed at least one fast-food meal daily.
- 81.4% ate snacks between meals.
- 45.4% ate sweets twice a day.
- 45.8% consumed fruits/vegetables only once daily.
- **Physical Activity:** 30.4% engaged in <30 minutes of daily activity.
- **Lifestyle Impact:** High consumption of unhealthy foods and low physical activity correlated with obesity.

Conclusion:

The study highlights poor dietary habits and insufficient physical activity as key contributors to childhood obesity. Despite 60% of parents being aware of healthy lifestyles, their children's habits do not reflect this awareness. Increased education and structured interventions are needed to address these issues.

Discussion:

- **Dietary Patterns:** Frequent consumption of fast food, sweets, and lack of fruits/vegetables contribute to obesity.
- **Physical Inactivity:** Sedentary lifestyles exacerbate weight gain.
- **Parental Role:** Awareness does not always translate into action.
- **Health Implications:** Obesity-related conditions such as diabetes, respiratory, and digestive disorders were prevalent.
- **Intervention Needs:** Schools and families must adopt healthier eating habits and encourage more physical activity.

Keywords: Obesity, Childhood Obesity, Diet, Physical Activity, Fast Food, Sedentary Lifestyle, BMI, Chronic Diseases, Parental Awareness, Public Health. Let me know if you need any modifications or additional details!

1- Introduction, Background and Definition

The term obesity refers to an excess of fat. Because of the unavailability and high cost of techniques that directly measure body fat, body mass index (BMI), derived from the body weight and height, has emerged as the accepted clinical standard measure of overweight and obesity for children 2 years and older. Body mass index is calculated by dividing the body weight in kilograms by the height in meters squared. In general, BMI provides a decent estimate of adiposity in the healthy pediatric population. However, BMI may underestimate adiposity in a significant percentage of children, such as those with decreased muscle mass because of low body fat, and somewhat overestimate fatness in children who are short or have relatively high muscle mass. As such, BMI should be regarded as a proxy for adiposity, and when applying it

in clinical and research contexts, its advantages and disadvantages should be taken into account. Weight for length is the recognised indicator of overweight and obesity in children under the age of two. While skinfold thickness is useful as a predictor of adiposity, waist circumference and the waist-to-hip ratio can be utilised to evaluate abdominal obesity. The standards for the absolute level of BMI in children change with age and sex since children's height and weight are always fluctuating due to natural growth and development.

2- Epidemiology Of Obesity In Childhood

The current obesity and overweight rates among children and adolescents in the United States are approximately one-third. One With increasing age, the prevalence of overweight or obesity rises: 8.4% of pre-school-aged children (ages 2–5), 17.7% of school-aged children (ages 6–11), and 20.5% of adolescents (ages

12–19) suffer from overweight or obesity, and 22.8% of preschool-aged children (ages 2–5), 34.2% of school-aged children, and 34.5% of adolescents suffer from these conditions. Globally, there were millions of obese children in 2015. According to data from the World Obesity Federation, the trend is still on the rise,

with an estimated 158 million children and adolescents between the ages of 5 and 19 becoming obese in 2020, 206 million in 2025, and 254 million in 2030. There is growing recognition that the epidemiological burden of childhood obesity has resulted in additional costs for society and individuals.

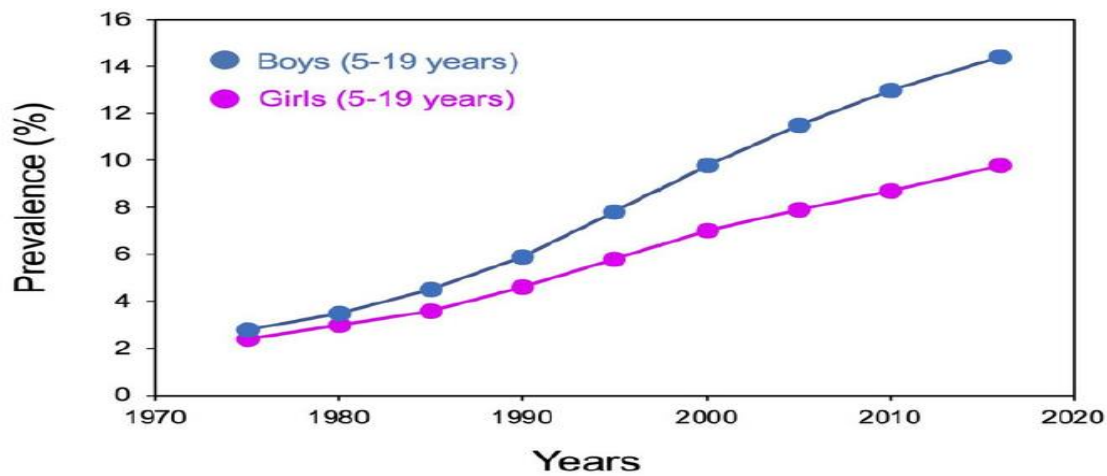


Figure 1. Increase in the prevalence of obesity among Canadian children over the past 40 years. From NCD Risk Factor Collaboration (2017).

Obesity raises the risk of early puberty in children, irregular menstruation in teenage girls, sleep disorders like obstructive sleep apnea (OSA), and cardiovascular risk factors like type 2 diabetes, prediabetes, high cholesterol, hypertension, non-alcoholic fatty liver disease, and metabolic syndrome.

overweight is usually determined by BODY MASS INDEX(BMI), which is a relationship of the the

person's weight to his height BMI is computed by taking the body weight in kilograms and dividing it by the square of the height in meters $BODY\ MASS\ INDEX(BMI) = \frac{weight\ (kg)}{height(m)^2}$ BMI does not measure the body fat but relates well with the degree of obesity Table

Table 1.

the categories of obesity as pronounced by the who.

Classification	B.M.I (kg/m ²)	Risk of co-morbidities
Underweight	<18.50	Low
Normal	18.50–24.99	Average
Overweight	≥25.00	
Preobese	25.00–29.99	Increased
Class 1 obesity	30.00–34.99	Moderate
Class 2 obesity	35.00–39.99	Severe
Class 3 / morbid obesity	≥40.00	Very severe

3- Risk Factors Of Childhood Obesity

It is well known that obesity development is multifactorial and correlates with the child's developmental process, even though the problem of relatively disproportionate energy intake from diets and energy consumption by the body for daily usage can be attributed to the incidence of obesity in general.

3.1 Nutrition and Diet

According to reports, people who consume at least one fast food item and more than two carbonated soft drinks per day are significantly more likely to be overweight or develop obesity. This is because meals and beverages have a high energy content, which leads to a positive energy balance.

3.2 Socioeconomic Factors

Low socioeconomic level, low parental education, non-parental carers, a reduced frequency of fruit consumption, short sleep duration, and parental obesity are

further socioeconomic factors that contribute to childhood obesity.

3.3 Comorbidities and Healthcare System-Related Factors

Regarding related medical illnesses, children with comorbidities, including autistic spectrum disorders, as well as those who struggle with sleep and affective issues, were shown to be overweight.

3.4 Maternal-Related Factors

Higher pre-pregnancy BMI has been linked to childhood obesity, according to research. The BMI of parents has also been shown to have a significant impact on the body weight of their offspring. Intrauterine life is a critical time for the development of childhood obesity since it is believed that fetal growth contributes to the development of lean body mass later in life. In a similar vein, children who are tiny for gestational age are more likely to gain body fat, especially around the

abdomen .According to a study that looked at the relationship between birth weight and childhood obesity and overweight, people who were heavier at birth had a higher chance of becoming overweight or obese later in life.

3.5 Physical Activity

Another danger that is directly linked to dietary intake is the frequency of physical exercise in youngsters. The positive energy balance, which is generally acknowledged as the primary cause of the prevalence of obesity, is directly linked to a lack of physical activity and unhealthy eating habits

3.6 Sleep Duration and Quality

increased risk of childhood obesity is accompanied by short sleeping durations ,especially in children less than 6 and 6–10 years old. Additionally, decreased sleep timing was associated with adverse dietary intake behavior such as a decrease in the intake of fruits .

4- Etiology Of Childhood Obesity

Childhood obesity is the consequence of an interaction among a complex set of factors that are related to the environment, genetics ,and ecological effects such as the family, community, and school.

4.1 Environmental Factors

The causes of childhood disorders are very complicated .Maladaptive coping mechanisms like eating to numb unpleasant feelings, appetite upregulation, and low-grade inflammation are some of the ways that psychosocial and emotional strain contributes to children gaining too much weight.

4.2 Factors related to genetics

Between 30 and 50 percent of the variation in adiposity seems to be due to hereditary factors .Several single gene abnormalities and obesity-related disorders have been identified, despite the fact that polygenetic obesity is by far the most prevalent.

4.3 Endocrine Conditions

Less than 1% of obese children and adolescents have endocrine reasons of weight gain.^{56,57} The majority of kids who gain weight due to endocrine issues have hypogonadism , small stature, and/or poor linear growth.

4.4 Medications

Several medications can contribute to weight gain such as glucocorticoids, antipsychotics drugs including Risperidone and olanzapine, and antiepileptic drugs.

4.5 Hypothalamic Obesity

Patients may have symptoms of increased intracranial pressure such as headache and vomiting. Weight gain may also be seen in patients after cranial trauma or inflammatory disease affecting the hypothalamus.

5- CLINICAL COMORBIDITIES OF OBESITY IN CHILDREN

5.1 Growth and Puberty

Children's growth and pubertal development may be impacted by excessive weight gain. For both boys and girls, childhood obesity can result in advanced bone age and a prepubertal acceleration of linear growth velocity.

5.3 Other Comorbidities

Compared to teenagers, children with OSA experience fewer detrimental effects in terms of cardiovascular stress and metabolic syndrome .In children and adolescents, obesity is a risk factor for obstructive sleep apnea (OSA) in and of itself.

5.2 Sleep Disorders

A broad range of liver abnormalities, including nonalcoholic fatty liver disease (NAFLD) , the leading cause of liver disease in children , are associated with obesity .Steatosis , or increased liver fat without inflammation, and NASH(non –alcoholic steatohepatitis), or increased liver fat with inflammation and hepatic damage, are both included in NAFLD.

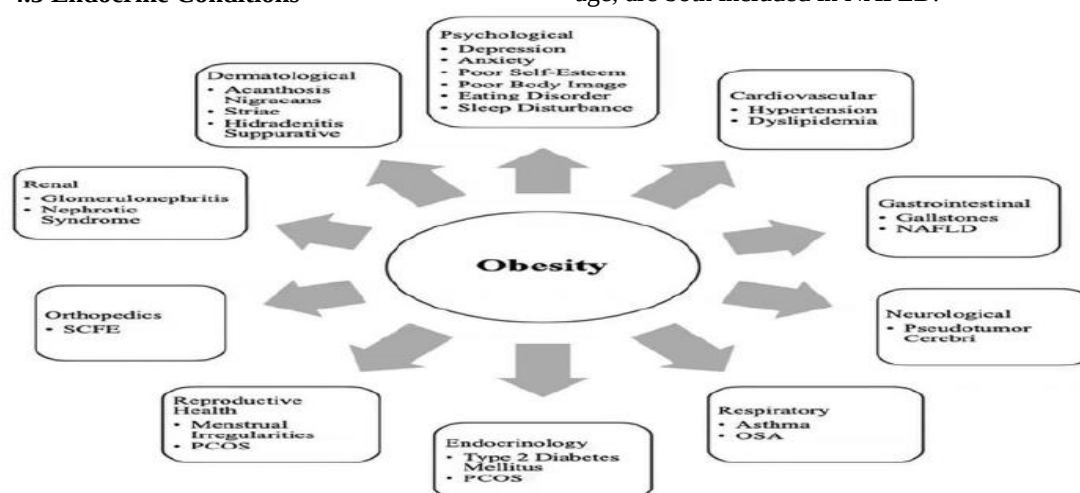


Figure 2 Obesity related comorbidities in children and adolescents. a, NAFLD, Non-Alcoholic Fatty Liver Disease; SCFE, Slipped Capital Femoral Epiphysis ;PCOS, Polycystic Ovary Syndrome; OSA, Obstructive Sleep Apnea.

6- Aim of the Study

The aim of this study is to assess the prevalence of obesity among primary school children, identify key contributing factors such as dietary habits, physical activity levels, and lifestyle choices, and evaluate the impact of obesity on children's health. Additionally, the

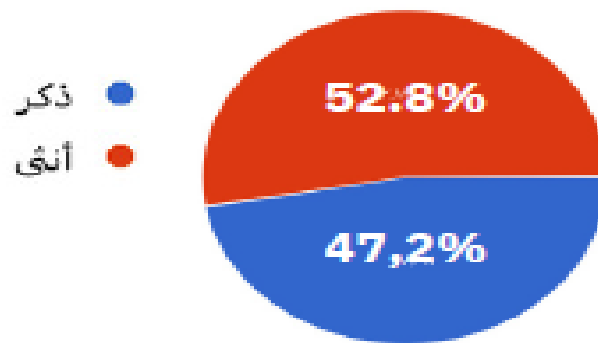
study seeks to raise awareness among parents and educators and propose effective preventive measures to reduce childhood obesity and its associated health risks.

7-Method of Study

-this study was conducted in a duration of two months (from beginning of November to January

in2025).the study design was cross sectional In this research, for data collection, we visit a primary schools in aladhamyia to ask the children questions about their lifestyle that could be the cause of high prevalence of obesity in school age children .The sample size was 250 collected from children with age(6-12) years old. A ran-

dom sample of 250 primary school students was selected for the research study. After analyzing the results, we found the following: The percentage of **male** students participating in the survey was **47.2%**. The percentage of **female** students participating in the survey was **52.8%** .



The children's ages ranged from 6 to 12 years:

- 11.3% were 6 years old
- 13% were 10 years old
- 15.4% were 7 years old
- 19.4% were 9 years old
- 13% were 11 years old
- 13% were 8 years old
- 15% were 12 years old

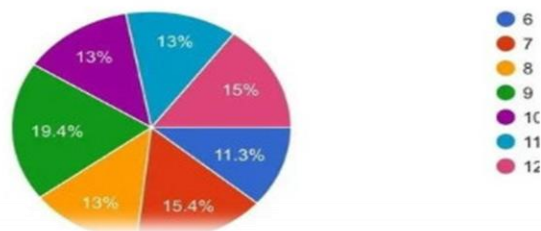


Figure 3. Age of children involved in study .

The children's weight ranged from 20 kg to 60 kg:

Figure 4. of children involved in study.

The children's height ranged from 120 cm to 160 cm:

- 25.6% were 120-130 cm tall
- 32.8% were 130-140 cm tall
- 30.8% were 140-150 cm tall
- 8.8% were 150-160 cm tall
- 2% were above 160 cm tall

- 24.8% weighed between 20-30 kg
- 30.8% weighed between 30-40 kg
- 23.6% weighed between 40-50 kg
- 14.4% weighed between 50-60 kg
- 6.4% weighed more than 60 kg

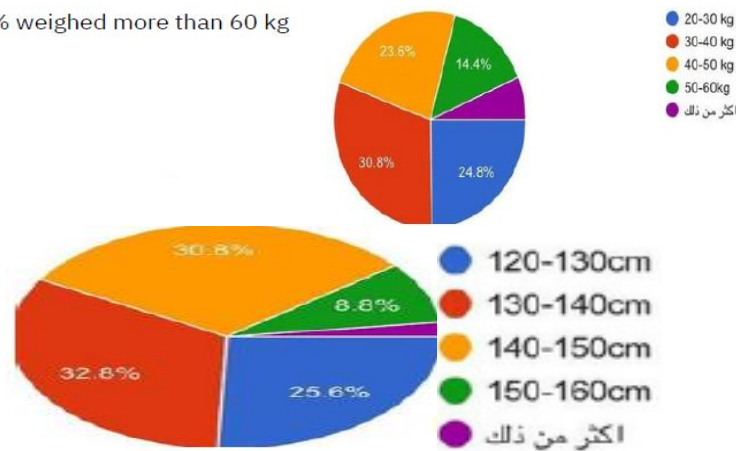


Figure 5. The height of children involved in study.

The percentage of children who suffered from illnesses was 21%.

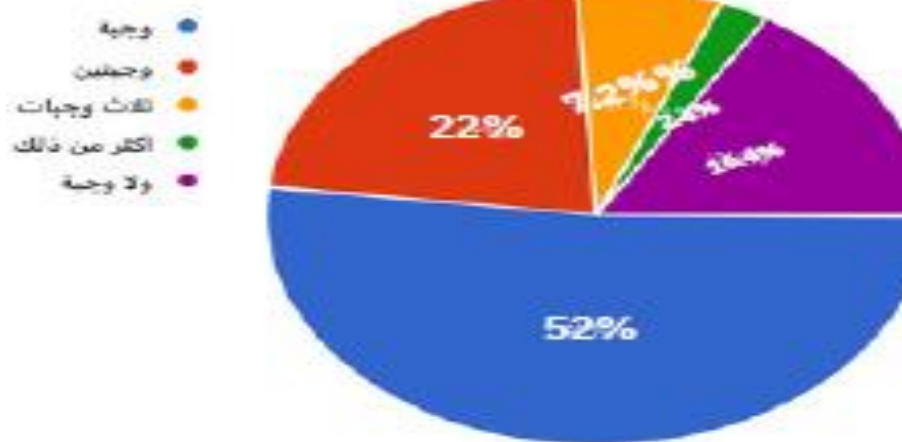
The percentage of parents who were aware of a healthy lifestyle was 60%.

8- Result of the study

Questions we asked to evaluate the lifestyle of the child's :-

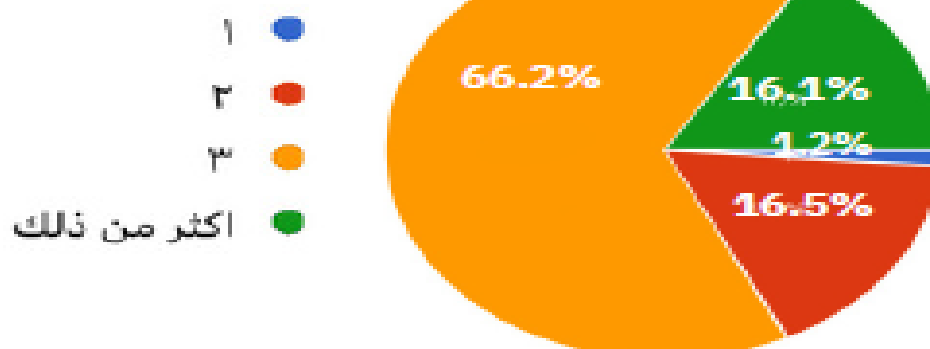
1- (How many fast-food meals does the child consume daily?)

- 52% of children consume one fast-food meal daily.
- 22% consume two meals.
- 16.4% do not consume any fast-food meals.
- 7.2% consume three meals.
- 2.4% consume more than three meals.



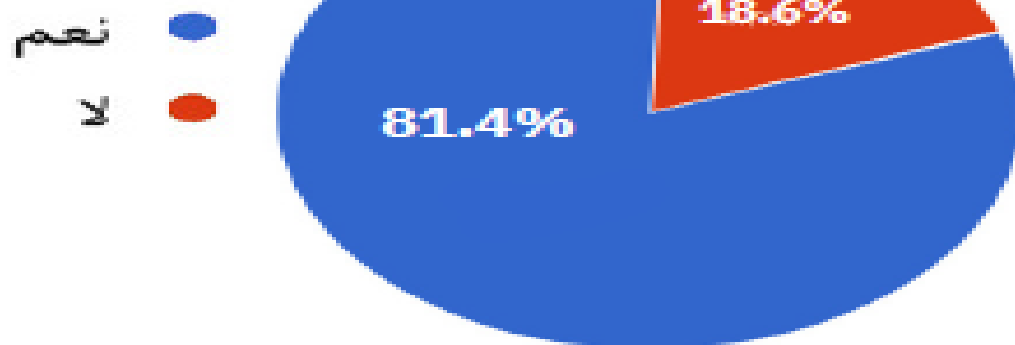
2- (How many meals the child eats daily?)

- 66.2% eats three meals daily, while 16.5% eats two meals. 16.1% eats more than three meals. only 1.2% eats one meal daily.



3- (Does the child consume snacks between main meals?)

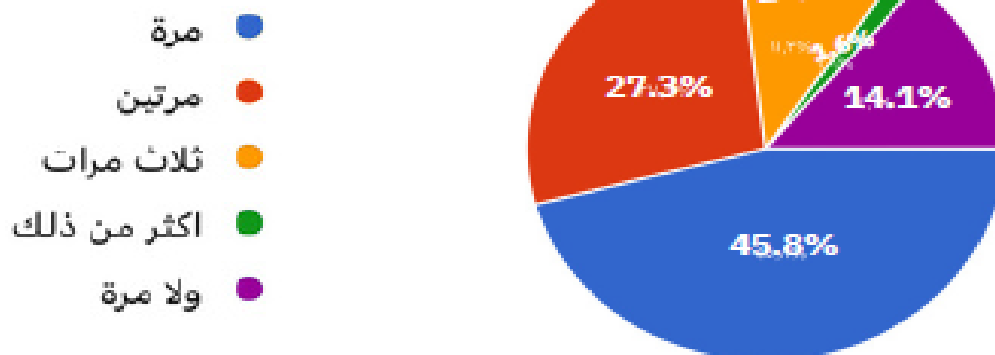
○ 81.4% of children consume snacks between meals. 18.6% do not consume snacks.



4- (How much the child consume Fruits and Vegetables)

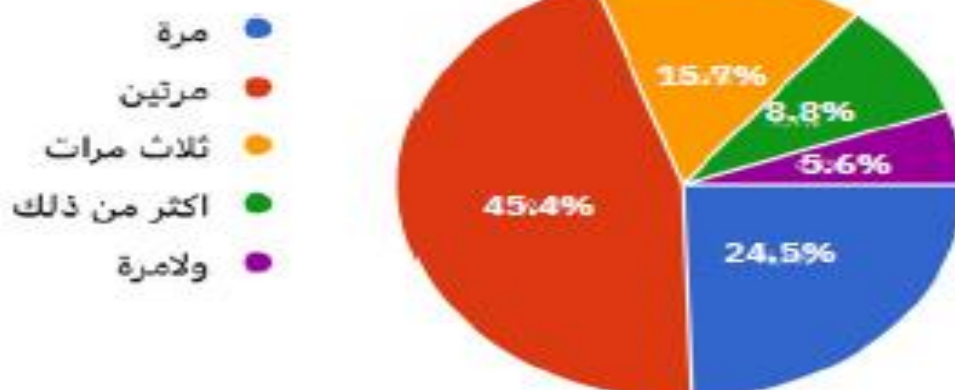
○ 45.8% of children consume fruits and vegetables once a day, while 27.3% consume them

twice daily. Only 11.2% eat them three times or more, 1.6% consume more than three times a day, 14.1% never consume them.



5- (How many times the child consume Sweets in the day?)

○ 45.4% of children eat sweets twice a day, while 24.5% consume them once. 15.7% eat sweets three times or more, whereas only 8.8% consume them more than three times a day 5.6% not consume

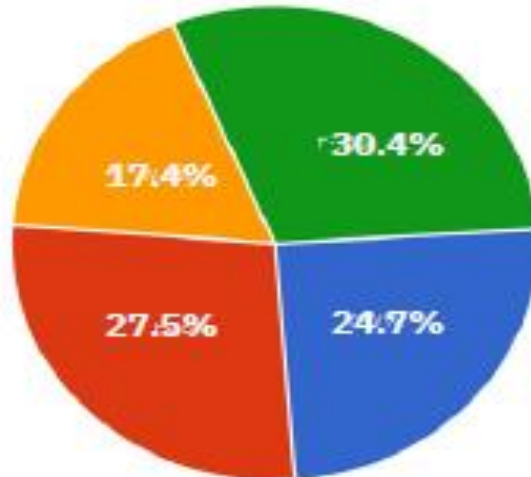


6- (How many times the child spent doing physical activity?)

○ 30.4% of children spend less than 30 minutes on physical activity, and 17.4% spend more than an

hour. 27.5% are active for an hour, while 24.7% engage for only half an hour.

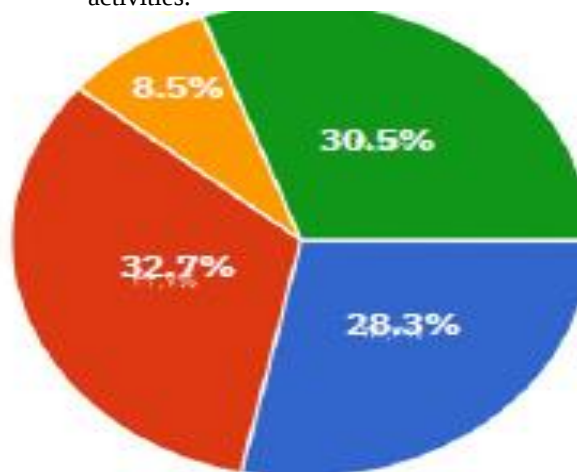
● نصف ساعة
 ● ساعة
 ● اكثر من ذلك
 ● اقل من ذلك



7- (What are the activities that the child did?)

○ 28.3% playing football.
 ○ 32.7% running.
 ○ 8.5% swimming, and
 ○ 30.5% doing other activities.

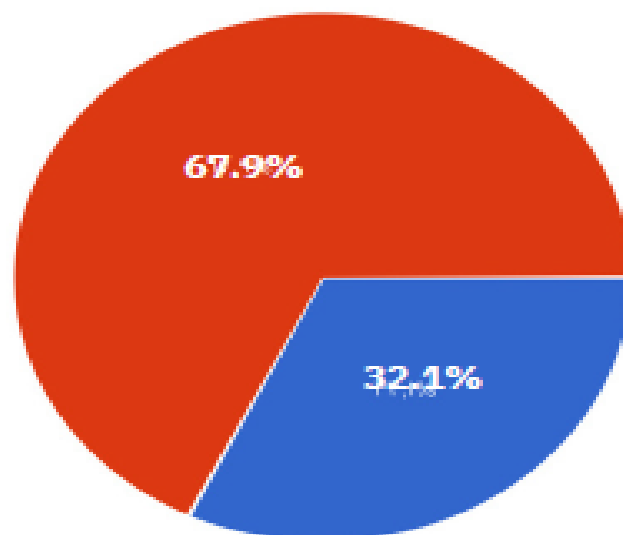
● كرة القدم
 ● الركض
 ● السباحة
 ● غير ذلك



8- (Did the child eat when he felt angry or depressed?)

○ The answer was yes for 32.1% of children and
 No for 67.9% of children.

● نعم
 ● لا



9- (What chronic diseases does the child suffer from?):

○ 63.3% of children do not suffer from chronic diseases.

○ 14.4% suffer from gastrointestinal diseases.
 ○ 13.7% suffer from respiratory diseases.
 ○ 8.6% suffer from diabetes.

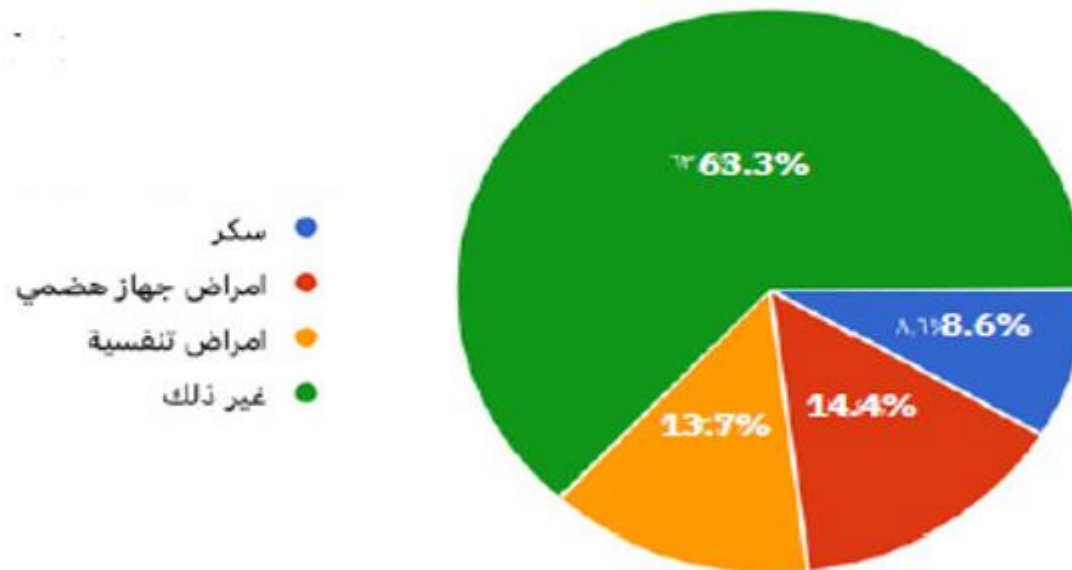


Table 2 :

The percentage variable among a sample in school aged children

variable	Percentage variable
Fast food intake	
one meal	52%
Two meals	22%
Three meals	7.2%
More than three meals	2.4%
Not consume any meal	16.4%
Meals that the child consume daily	
1	1.2%
2	16.5%
3	66.2%
More than 3	16.1%
snacks between main meals	
No	18.6%
Yes	81.4%
consume of Fruits and Vegetables	
1	45.8%
2	27.3%
3	11.2%
More than	1.6%
Never consume	14.1%
Consume of Sweets in the day	
1	24.5%
2	45.4%
3	15.7%
More than 3	8.8%
Never consume	5.6%
Time doing physical activities	
1/2 hour	24.7%
An hour	27.5%
More than that	17.4%
Less than that	30.4%
type of activities	
Football	28.3%
Running	32.7%
Swimming	8.5%
another	30.5%
Emotional eating (with depression and anger)	

No	32.1%
Yas	67.9%
Chronic diseases	
DM	8.6%
GIT	14.4%
Respiratory	13.7%
others	63.3%

Table 3:

Percentage of obesity correlated to BMI for each age group and gender.

character	Total N=250%	Underweight N=19%	Normal N=123%	Overweight N=89%	Obesity N=19%
Age					
6	N=29 11.6%	N=1 5.26%	N=24 19.51%	N=4 4.49%	non
7	N=38 15.4%	non	N=28 22.76%	N=10 11.24%	non
8	N=32 12.8%	N=7 36.84%	N=12 9.76%	N=9 10.11%	N=4 21.05%
9	N=48 19.4%	non	N=17 13.82%	N=26 29.21%	N=5 26.31%
10	N=32 12.8%	N=4 21.05%	N=13 10.57%	N=13 14.61%	N=2 10.53%
11	N=34 13%	N=2 10.53%	N=10 8.13%	N=16 17.98%	N=6 31.58%
12	N=37 15%	N=5 26.32%	N=19 15.45%	N=11 12.36%	N=2 10.53%
gender					
male	N=118 47.2%	N=8 42.1%	N=64 49.6%	N=35 39.3%	N=11 57.8%
female	N=132 52.8%	N=11 57.9%	N=60 50.4%	N=54 60.7%	N=8 42.2%

According to the previous table :

This table provides a breakdown of BMI categories (underweight, normal, overweight, and obesity) among children grouped by age and gender. Key observations and comments are as follows:

1- General Trends Across Age Groups:

▪ **Underweight:** The proportion of underweight children varies across age groups. The highest percentage is observed in 8-year-olds (36.84%) and 12-year-olds (26.32%), suggesting a nutritional or health concern in these age brackets.

▪ **Normal BMI:** Most children fall into the "normal BMI" category, particularly in younger age groups like 6-year-olds (19.51%) and 7-year-olds (22.76%). However, the proportion decreases slightly in older age groups.

▪ **Overweight:** The percentage of overweight children increases steadily with age, peaking at 9 years old (29.21%) and remaining significant in older age groups.

▪ **Obesity:** Obesity is most prevalent in 9-year-olds (26.31%) and 11-year-olds (31.58%), indicating a concerning trend in these age groups.

2- Gender Differences:**▪ Males:**

• - The majority of boys fall in the normal BMI category (49.6%), but they have a higher proportion of obesity (57.8%) compared to girls (42.2%).

• Overweight males make up 39.3%, while underweight males account for 42.1% of the underweight population.

▪ Females:

• - More females are classified as "normal BMI" (50.4%) compared to males.

• Overweight females make up 60.7%, a significantly higher proportion than males. - Underweight females are 57.9% of the underweight population, suggesting a higher prevalence of under nutrition among girls.

3- Age-Specific Observations :

▪ **6-Year-Olds:** This age group has no cases of obesity and the lowest proportion of overweight children (4.49%). Most children fall into the normal BMI range (19.51%).

▪ **8-Year-Olds:** There is a spike in underweight children (36.84%) and a relatively high proportion of obesity (21.05%), indicating potential disparities in health or nutrition within this group.

▪ **-9Year-Olds:** This group sees the highest percentage of overweight children (29.21%) and a significant proportion of obesity (26.31%).

▪ **10 - Year - Olds:** This group has (14,61%) overweight and the obesity (10.53%).

▪ **11-Year-Olds:** This group has the highest obesity rate (31.58%), which is alarming and may warrant targeted interventions.

▪ **12-Year-Olds:** While obesity decreases slightly (10.53%), the underweight proportion remains relatively high (26.32%).

4- Key Concerns:

▪ The prevalence of obesity in certain age groups (9 and 11 years old) is concerning and may indicate lifestyle or dietary issues specific to these age ranges.

▪ The high proportion of underweight children in some groups (e.g., 8 and 12 years old) suggests a need to address under nutrition alongside obesity.

▪ Gender-related differences in obesity and underweight prevalence highlight the need for gender-sensitive health interventions.

9- Conclusion:

▪ Obesity among primary school children based on various factors such as eating habits, awareness of healthy lifestyles, and the prevalence of chronic diseases among children.

▪ Fast-food consumption among children, which could be associated with weight gain.

▪ Snack consumption can either be healthy or unhealthy, depending on the type of snacks, which affects overall weight and health.

▪ Excessive sugar intake is strongly associated with childhood obesity due to high calorie consumption and poor satiety control.

▪ Imbalance between energy intake and expenditure.

▪ Limited physical activity contributes to weight gain and obesity due to an.

▪ Low intake of fruits and vegetables is linked to poor dietary habits and increased obesity risk due to a lack of essential nutrients and fiber.

▪ This indicates a need to increase awareness of the importance of healthy living among children and their parents.

▪ Regular intake of sweets (especially more than twice daily) contributes to excessive calorie intake, leading to weight gain.

▪ High sugar consumption is associated insulin resistance, increasing the risk of obesity and type 2 diabetes.

▪ Frequent consumption of fast food is linked to high fat and calorie intake, which promotes obesity.

▪ Processed fast food often lacks essential nutrients, contributing to poor dietary habits and metabolic disorders.

▪ Eating due to stress or sadness (rather than hunger) can result in overeating, especially of unhealthy foods.

▪ Children with metabolic disorders (such as diabetes) or digestive issues may have altered eating habits that contribute to weight fluctuations.

▪ Obesity itself increases the risk of respiratory problems and digestive disorders, creating cycle of poor health.

Table 4 .

Variables that effects on childhood obesity

Variables Findings	Variables Findings	Variables Findings
Age	6-12 years old	Obesity risks increased with age
Height	120-160 cm	Growth factors may affected with obesity
Weight	20-60 Kg	Higher weight associated with increased BMI and obesity
BMI	Range from 12.8 - 26.6	Higher BMI Linked with overweight and obesity
Fruit and vegetable intake	45.8% once/day , 27.3%twice/day , 14.1 never	Low intake linked to poor diet and weight gain
Sweet Consumption	%45.4twice/day ,15.7% three/day	High sugar intake increases calorie consumption and obesity
Fast Food Consumption	52% once/day , 22% twice/day	High calorie intake contribute to obesity
Physical Activity	30.4 less than 30 min , 27.5% one hour	Low activity leads to energy imbalance and weight gain
Screen Time	High usage	Less physical activity contributing to obesity
Emotional eating	32.1% eat due stress	Stress-related overeating leads to weight gain
Parental Awareness	60% aware of healthy lifestyle	Awareness does not always translate into action good habits
Chronic Diseases	21% have illnesses	Obesity increase risk of diabetes, digestive and respiratory issues

10- Discussion:

The study results highlight significant trends in childhood obesity among primary school children, emphasizing key lifestyle factors such as diet, physical activity, and parental awareness. These findings provide valuable insights into the causes and potential interventions for childhood obesity.

10.1 Gender and Age Distribution

The study sample consisted of 250 children, with 47.2% males and 52.8% females, aged between 6 to 12 years. The results showed that obesity prevalence increased with age, indicating that as children grow older, they are more likely to develop weight-related issues. This could be attributed to increased independence in food choices and reduced physical activity over time.

10.2 Dietary Habits and Their Role in Obesity

The most striking findings was the high consumption of unhealthy foods: • 52% of children consumed at least one fast-food meal daily.

• 45.4% ate sweets twice a day, while 24.5% ate sweets once daily.

• Only 45.8% consumed fruits and vegetables once a day, and 14.1% never consumed them.

These dietary patterns indicate a reliance on high-calorie, low-nutrient foods, which contribute significantly to obesity. The limited intake of fruits and vegetables suggests a lack of essential nutrients and fiber, which are crucial for maintaining a balanced diet and preventing excessive weight gain.

10.3 Physical Activity Levels

The study found that many children engaged in limited physical activity: • 30.4% of children exercised for less than 30 minutes a day.

• Only 17.4% engaged in physical activity for more than an hour.

This indicates a sedentary lifestyle, which is a major contributing factor to obesity. Increased screen time, reduced outdoor play, and a preference for passive activities, such as watching TV or playing video games, contribute to a positive energy balance, where calorie intake exceeds expenditure, leading to weight gain.

10.4 Chronic Health Conditions Linked to Obesity

Among the children studied:

• 21% had health issues, including diabetes (8.6%), respiratory diseases (13.7%), and digestive disorders (14.4%).

• Obese children were more likely to have metabolic conditions, such as insulin resistance and high cholesterol.

These findings confirm that childhood obesity is not just a weight issue but a serious health concern with long-term consequences. Obesity increases the risk of developing chronic diseases, which can persist into adulthood and lead to severe health complications.

10.5 Parental Awareness and Its Effect on Children's Lifestyle

Despite 60% of parents being aware of healthy lifestyle choices, their children continued to follow unhealthy eating habits and sedentary lifestyles. This suggests a gap between awareness and action. Many parents may struggle to implement healthier practices due to time constraints, financial limitations, or lack of enforcement at home. These findings highlight the need for a holistic approach that addresses both diet and physical activity to effectively reduce obesity rates among children.

9- Recommendations

Based on the study findings, the following recommendations are proposed to address childhood obesity effectively:

9.1 Promote Healthy Eating Habits

• Encourage children to consume a balanced diet rich in fruits, vegetables, whole grains, and lean proteins.

• Reduce the intake of fast food, sugary snacks, and carbonated drinks.

• Educate parents and children about the importance of proper nutrition through school programs and community initiatives.

• Implement school meal programs that provide nutritious, well-balanced meals.

9.2 Increase Physical Activity

• Ensure that children engage in at least 60 minutes of physical activity daily through sports, outdoor play, or structured exercise programs.

• Schools should incorporate more physical education sessions and active learning strategies.

• Parents should encourage outdoor activities, reduce screen time, and promote active play at home.

9.3 Reduce Sedentary Behavior

• Limit screen time (TV, video games, mobile devices) to no more than two hours per day for children.

• Encourage interactive and educational activities that involve movement.

• Create public parks and playgrounds to promote physical engagement in the community.

9.4 others

• Schools should integrate health education programs that focus on nutrition, physical activity, and obesity prevention.

• Recognize and manage emotional eating behaviors by providing psychological support and counseling for children struggling with obesity-related stress or low self-esteem.

References:

- 1- Ogden CL, Carroll MD, Kit BK, Flegal KM. *Prevalence of childhood and adult obesity in the United States*, 2011-2012. *JAMA*. 2014;311(8):806-814.
- 2- Dietz WH, Robinson TN. *Clinical practice: overweight children and adolescents*. *N Engl J Med*. 2005;352(20):2100-2109.
- 3- Sahoo K, Sahoo B, Choudhury AK, Sofi NY, Kumar R, and Bhadoria. AS. *Childhood obesity: causes and consequences*. *J Family Med Prim Care*.(2015) 4:187-92.
- 4- Brown CL, Halvorson EE, Cohen GM, Lazorick S, Skelton JA. *Addressing childhood obesity: opportunities for prevention*. *Pediatr Clin North Am*.(2015) 62:1241-61.
- 5- Rinninella E, Raoul P, Cintoni M, Fransceschi F, Miggianno GAD, Gasbarrini A, et al. *What is the healthy gut microbiota composition? a changing ecosystem across age, environment, diet, and diseases*. *Microorganisms*. (2019) 7:14.
- 6- Ahmad A., Zulaily N., Shahril M.R., Wafa S.W., Amin R.M., Piernas C., Ahmed A. *Obesity determinants among Malaysian 12-year old school adolescents: Findings from the HAT study*. *BMC Pediatr*. 2021;21:418.
- 7- Janssen I., Katzmarzyk P., Boyce W.F., King M.A., Pickett W. *Overweight and obesity in Canadian adolescents and their associations with dietary habits and physical activity patterns*. *J. Adolesc. Health*. 2004;35:360-367.
- 8- Edwin Thanarajah S., Tittgemeyer M. *Food reward and gut-brain signalling*. *Neuroforum*. 2020;26:1-9.

- 9- Parekh N., Deierlein A.L. **Health behaviours during the coronavirus disease 2019 pandemic: Implications for obesity.** *Public Health Nutr.* 2020;23:3121–3125.
- 10- Hill A.P., Zuckerman K.E., Fombonne E. **Obesity and Autism.** *Pediatrics.* 2015;136:1051–1061.
- 11- Puhl R.M., Liu S. **A national survey of public views about the classification of obesity as a disease.** *Obesity.* 2015;23:1288–1295.
- 12- Dantas R.R., da Silva G.A.P. **The role of the obesogenic environment and parental lifestyles in infant feeding behavior.** *Rev. Paul. Pediatr.* 2019;37:363.
- 13- Yang Z., Li Y., Dong B., Gao D., Wen B., Ma J. **Relationship between parental overweight and obesity and childhood metabolic syndrome in their offspring: Result from a cross-sectional analysis of parent-offspring trios in China.** *BMJ Open.* 2020;10:e03633.
- 14- Adair L.S. **Child and adolescent obesity: Epidemiology and developmental perspectives.** *Physiol. Beh av.* 2008;94:8–16.
- 15- Noorwali E., Potter G., Ford H., Mulla U., Murphy D., Wark P., Frost G., Hardie L., Cade J. **Sleep timing and vegetable intakes in UK adults: A cross-sectional study.** *Proc. Nutr. Soc.* 2018;77.
- 16- Incledon E., Wake M., Hay M. **Psychological predictors of adiposity: systematic review of longitudinal studies.** *Int J PediatrObes.* 2011;6(2-2):e1-e11.
- 17- Hemmingsson E. **A new model of the role of psychological and emotional distress in promoting obesity: conceptual review with implications for treatment and prevention.** *ObesRev.* 2014;15(9):769-779.

THE ROLE OF THE ESOPHAGEAL PROTECTIVE DRUG ALFASOXX IN MODERN GASTROENTEROLOGICAL PRACTICE

Verenich V.

Grodno State Medical University, Belarus, Grodno, 230009, Gorky str., 80

Bartosh A.

ORCID: 0009-0001-5946-3320

Grodno State Medical University, Belarus, Grodno, 230009, Gorky str., 80

<https://doi.org/10.5281/zenodo.20691200>

Abstract

Objective. The aim of this review is to determine the role of the esophageal protective drug Alfasoxx in the treatment of gastroesophageal reflux disease, non-erosive reflux disease and refractory forms of reflux-associated pathology based on experimental and clinical data.

Research materials and methods. An analytical review of relevant literature and publications, primarily published between 2013 and 2025, focusing on the use of hyaluronic acid and chondroitin sulfate-based medications in gastroenterology, was performed. The results of randomized clinical trials, experimental studies, as well as reviews and meta-analyses, evaluating the mechanisms of action and clinical efficacy of Alfasoxx and other similar esophageal mucosal protective agents, were analyzed.

Results. Current evidence indicates that impaired esophageal mucosal integrity is a key mechanism in the pathogenesis of gastroesophageal reflux disease. The esophageal protector Alfasoxx, which contains hyaluronic acid and chondroitin sulfate in a bioadhesive carrier, promotes the formation of a protective barrier on the surface of the esophageal mucosa, thereby reducing epithelial permeability and alleviating the severity of reflux symptoms. The use of Alfasoxx in combination with proton pump inhibitors provides faster symptom relief, improved quality of life, and increased treatment efficacy in patients with non-erosive reflux disease and partial resistance to proton pump inhibitors.

Conclusion. Alfasoxx represents a promising approach to mucosal protective therapy in gastroenterology. The use of esophageal protectors allows physicians to simultaneously target two targets: gastric acid secretion and restoration of the esophageal mucosal barrier function. This is especially important in patients with refractory gastroesophageal reflux disease and non-erosive reflux disease.

Keywords: Alfasoxx, gastroesophageal reflux disease, non-erosive reflux disease, esophageal protection, hyaluronic acid, chondroitin sulfate

INTRODUCTION

Gastroesophageal reflux disease (GERD) remains one of the most common gastrointestinal disorders worldwide. According to epidemiological studies, the prevalence of the disease in Europe and North America reaches 20–30% of the adult population [1, 2]. GERD significantly reduces patients' quality of life, is characterized by a chronic, relapsing course, and is associated with the risk of complications, including erosive esophagitis, Barrett's esophagus, and esophageal adenocarcinoma [3].

Over the past decades, acid-suppressive therapy, primarily proton pump inhibitors (PPIs), has been the mainstay of GERD treatment. Despite the high efficacy of PPIs, approximately 30–50% of patients continue to experience reflux symptoms even with adequate treatment [4, 5]. A particularly challenging category is patients with non-erosive reflux disease (NERD), in which the severity of symptoms does not always correlate with the level of acid exposure [6].

Current understanding of the pathogenesis of GERD has expanded significantly. In addition to the acid-peptic factor, significant attention is now being paid to damage of the esophageal mucosal barrier, increased permeability of intercellular junctions, inflammatory response, and increased visceral sensitivity [7]. To solve this pressing medical problem, in recent years a strategy for protecting the esophagus has been actively developed, that is, protecting the esophageal mucosa by creating a mechanical barrier and stimulating

reparative processes [8]. One of the most studied esophageal protective agents is Alfasoxx, a medicinal product based on hyaluronic acid and chondroitin sulfate in a bioadhesive matrix. The components of the drug form a protective film on the surface of the esophageal mucosa, reducing the damaging or irritating effects of hydrochloric acid, pepsin and bile acids [9]. Interest in Alfasoxx stems from its potential to pathogenetically affect damaged esophageal mucosa, which is particularly important in NERD, refractory GERD, and extraesophageal manifestations of the disease.

RESEARCH MATERIALS AND METHODS

An analysis of the scientific literature devoted to the use of hyaluronic acid and chondroitin sulfate in the treatment of reflux-associated diseases was performed. Publications were searched in the PubMed, PMC, Scopus, and Google Scholar databases. The review included clinical studies, experimental works, systematic reviews, and international guidelines published during the above-mentioned period. Scientific articles that met the main inclusion criteria were: (1) studies devoted to the mechanisms of esophageal protection; (2) clinical trials of drugs based on hyaluronic acid and chondroitin sulfate; (3) publications on the problems of NERD and refractory GERD; and (4) studies evaluating the efficacy of combination therapy with esophageal protectors in combination with PPIs. The following parameters were analyzed in these publications: (1) effect on the esophageal mucosa and severity of symptoms; (2) rate of clinical response; (3) indicators of improvement

in quality of life; and (4) safety and tolerability of therapy.

RESULTS AND DISCUSSION

To understand the problem, we need to recall modern concepts about the pathogenesis of GERD. Traditionally, GERD was considered an acid-related disease caused by pathological gastroesophageal reflux. However, modern research has shown that the severity of symptoms is determined not only by the level of acid aggression but also by the condition of the esophageal mucosal barrier [10].

Patients with NERD exhibit dilated intercellular spaces with defective tight junctions between epithelial cells, increased permeability of the esophageal mucosa, and activation of inflammatory mechanisms [11]. These changes lead to increased sensitivity of sensory nerve endings and the development of clinical symptoms even with moderate acid exposure.

This is why the sole use of acid-suppressant therapy, particularly PPIs, does not always provide sufficient effectiveness. Therefore, there was a need to develop drugs that could restore the protective properties of the esophageal mucosa.

Alfasoxx is a combination drug containing hyaluronic acid and chondroitin sulfate, incorporated into a bioadhesive base (Poloxamer 407). Hyaluronic acid is involved in tissue repair processes, promotes epithelial cell migration, and accelerates the healing of damaged mucous membranes [12]. Chondroitin sulfate has cytoprotective and anti-inflammatory properties and inhibits the damaging effects of pepsin [13]. The bioadhesive base (matrix) ensures long-term contact of the active components with the esophageal mucosa, forming a mechanical barrier against the aggressive effects of refluxate [14]. Experimental studies have shown that esophageal protective drugs reduce epithelial permeability and prevent damage to the mucous membrane under the influence of hydrochloric acid and pepsin [15].

One of the first clinical trials to examine the effectiveness of a combination of hyaluronic acid and chondroitin sulfate was a randomized, double-blind, placebo-controlled study by B. Palmieri et al. [16]. This combination therapy was shown to significantly reduce the severity of heartburn and the degree of regurgitation in patients with NERD.

Later, V. Savarino et al. conducted a multicenter study involving 154 patients with NERD [17]. The addition of a combined esophageal protector to PPI therapy provided a more pronounced reduction in symptoms compared to PPI monotherapy. Particularly important was the rapid onset of clinical effect and improvement in patients' quality of life.

According to current data and concepts, disruption of the esophageal mucosal barrier and visceral hypersensitivity significantly contribute to the pathogenesis of NERD. Therefore, the use of esophageal protective agents is considered one of the most promising treatment options for this form of the disease.

The problem of refractory GERD remains relevant despite the widespread use of PPIs in gastroenterological practice. According to various studies, up to 40% of patients continue to experience symptoms despite standard acid-suppressive therapy [18]. Reasons for the insufficient effectiveness of PPIs may include: (1)

weakly acidic or alkaline reflux; (2) impaired esophageal motility; (3) increased mucosal sensitivity; and (4) impaired mucosal and epithelial barriers.

In such cases, the use of esophageal protectors, in particular Alfasoxx, allows for the impact on additional links in the pathogenesis of the disease, reducing the contact of aggressive components of the refluxate with the esophageal mucosa, which helps reduce the severity of inflammation and epithelial reparation.

Modern reviews highlight the stated advantages of combination therapy with PPIs in combination with esophageal protectors in patients with NERD and GERD and incomplete response to acid-suppressive treatment [19].

Of particular interest is the potential use of Alfasoxx for the treatment of extraesophageal symptoms of reflux-associated disease. These include chronic cough, laryngitis, hoarseness, a feeling of a lump in the throat and other ENT symptoms.

A study by G. Pellegatta et al. showed that the combined use of PPIs in combination with hyaluronic acid and chondroitin sulfate helps to reduce the severity of extraesophageal symptoms of GERD [20]. The mechanism of this effect is likely associated with a reduction in damage to the mucous membrane of the upper gastrointestinal tract and a decrease in the inflammatory response.

One of the advantages of Alfasoxx is its high safety profile. Since the drug acts primarily locally, the risk of systemic side effects is minimal. In clinical trials, serious adverse events were observed extremely rarely [16, 17].

This is particularly important in the context of growing concerns about long-term use of PPIs, which may be associated with a small but still increased risk of intestinal infections, hypomagnesemia, bone metabolism disorders and other complications [21].

In recent years, the concept of mucoprotective therapy has been actively developing, supplemented by increasingly new clinical trial results. Data from large studies indicate that restoring the mucosal barrier may become a key treatment option for acid-related diseases [22].

Therefore, esophageal protectors can potentially be used: (1) in NERD; (2) in refractory GERD as an adjunct to PPIs; (3) in extraesophageal manifestations of reflux-associated disease; and (4) after endoscopic interventions on the esophagus.

Further large randomized studies are needed to evaluate the long-term effectiveness of esophageal protectors and to develop optimal treatment regimens using these drugs, and in particular, Alfasoxx.

CONCLUSION

Current understanding of the pathogenesis of GERD indicates a significant role for impaired esophageal mucosal barrier function in the development of this disease and its complications. Therefore, esophageal protective therapy is becoming increasingly important in gastroenterological practice.

Alfasoxx is a combination mucoprotective therapy that includes hyaluronic acid, chondroitin sulfate, and a bioadhesive matrix, thereby combining the clinically significant properties and benefits of these components. The drug promotes the protection and restoration of the

esophageal mucosa, reduces the severity of reflux symptoms, and enhances the effectiveness of standard PPI therapy.

The most promising applications of Alfasoxx appear to be in patients with non-esophageal reflux disease (NERD), as well as those with partial resistance to PPIs and extraesophageal manifestations of GERD. This combination treatment regimen, aimed at both reducing acid aggression and restoring the esophageal mucosal barrier, is consistent with the latest understanding of the pathogenesis of reflux disease.

References:

1. El-Serag HB, Sweet S, Winchester CC, Dent J. Update on the epidemiology of gastro-oesophageal reflux disease: a systematic review. *Gut*. 2014;63(6):871-880. doi:10.1136/gutjnl-2012-304269
2. Eusebi LH, Ratnakumaran R, Yuan Y, Solaymani-Dodaran M, Bazzoli F, Ford AC. Global prevalence of, and risk factors for, gastro-oesophageal reflux symptoms: a meta-analysis. *Gut*. 2018;67(3):430-440. doi:10.1136/gutjnl-2016-313589
3. Vakil N, van Zanten SV, Kahrilas P, Dent J, Jones R. The Montreal definition and classification of gastroesophageal reflux disease. *Am J Gastroenterol*. 2006;101(8):1900-1920. doi:10.1111/j.1572-0241.2006.00630.x
4. Scarpignato C, Gatta L, Zullo A, Blandizzi C. Effective and safe proton pump inhibitor therapy in acid-related diseases. *BMC Med*. 2016;14:179. doi:10.1186/s12916-016-0718-z
5. Savarino E, Zentilin P, Savarino V. NERD: an umbrella term including heterogeneous subpopulations. *Nat Rev GastroenterolHepatol*. 2013;10(6):371-380. doi:10.1038/nrgastro.2013.50
6. Patel A, Sayuk GS, Gyawali CP. Parameters on esophageal pH-impedance monitoring that predict outcomes of patients with gastroesophageal reflux disease. *ClinGastroenterolHepatol*. 2015;13(5):884-891. doi:10.1016/j.cgh.2014.09.041
7. Woodland P, Sifrim D. The role of mucosal integrity in GERD and functional heartburn. *GastroenterolClin North Am*. 2014;43(1):39-54. doi:10.1016/j.gtc.2013.11.001
8. Scarpignato C, De Bortoli N, Iovino P, et al. Hyaluronic acid and chondroitin sulfate-based medical devices: formulations, esophageal mucosal protection, and their place in the management of GERD. *TherAdvGastroenterol*. 2025;18:17562848251337822. doi:10.1177/17562848251337822
9. Zentilin P, Dulbecco P, Savarino E, et al. Barrier effect of Esoxx® on esophageal mucosal damage: experimental study on ex-vivo swine model. *ClinExpGastroenterol*. 2012;5:103-107. doi:10.2147/CEG.S30022
10. Farré R, Blondeau K, Clement D, et al. Evaluation of oesophageal mucosa integrity by the intraluminal impedance technique. *Gut*. 2011;60(7):885-892. doi:10.1136/gut.2010.233049
11. Woodland P, Al-Zinaty M, Yazaki E, et al. In vivo evaluation of acid-induced changes in oesophageal mucosa integrity and sensitivity in non-erosive reflux disease. *Gut*. 2013;62(9):1256-1261. doi:10.1136/gutjnl-2012-303086
12. Litwiniuk M, Krejner A, Speyrer MS, Gauto AR, Grzela T. Hyaluronic acid in inflammation and tissue regeneration. *Wounds*. 2016;28(3):78-88.
13. Palmieri B, Merighi A, Corbascio D, et al. Fixed combination of hyaluronic acid and chondroitin-sulphate oral formulation in a randomized double blind, placebo controlled study for the treatment of symptoms in patients with non-erosive gastroesophageal reflux. *Eur Rev Med Pharmacol Sci*. 2013;17(24):3272-3278.
14. Pecora TMG, Ragazzo B, Bertin W, et al. Rheological behavior of a new mucoadhesive oral formulation based on sodium chondroitin sulfate, xyloglucan and glycerol. *J FunctBiomater*. 2021;12(2):28. doi:10.3390/jfb12020028
15. Zentilin P, Dulbecco P, Savarino E, et al. Barrier effect of Esoxx® on esophageal mucosal damage. *ClinExpGastroenterol*. 2012;5:103-107. doi:10.2147/CEG.S30022
16. Palmieri B, Merighi A, Corbascio D, et al. Fixed combination of hyaluronic acid and chondroitin-sulphate oral formulation in non-erosive gastroesophageal reflux disease. *Eur Rev Med Pharmacol Sci*. 2013;17(24):3272-3278.
17. Savarino V, Pace F, Scarpignato C, et al. Randomised clinical trial: mucosal protection combined with acid suppression in the treatment of non-erosive reflux disease – efficacy of Esoxx. *Aliment Pharmacol-Ther*. 2017;45(5):631-642. doi:10.1111/apt.13914
18. Gyawali CP, Kahrilas PJ, Savarino E, et al. Modern diagnosis of GERD: the Lyon Consensus. *Gut*. 2018;67(7):1351-1362. doi:10.1136/gutjnl-2017-314722
19. Scarpignato C. Current advances in the treatment of gastroesophageal reflux disease: a focus on esophageal protection. *TerArkh*. 2020;92(8):4-10. doi:10.26442/00403660.2020.08.000748
20. Pellegatta G, Mangiavillano B, Semeraro R, et al. The effect of hyaluronic acid and chondroitin sulphate-based medical device combined with acid suppression in the treatment of atypical symptoms in gastroesophageal reflux disease. *J Clin Med*. 2022;11(7):1890. doi:10.3390/jcm11071890
21. Freedberg DE, Kim LS, Yang YX. The risks and benefits of long-term use of proton pump inhibitors. *Gastroenterology*. 2017;152(4):706-715. doi:10.1053/j.gastro.2017.01.031
22. Scarpignato C, Hunt RH. Non-acid reflux and impaired mucosal integrity in GERD: new therapeutic targets. *Gut*. 2019;68(4):558-560. doi:10.1136/gutjnl-2018-317687

PHILOLOGICAL SCIENCES

DEVELOPMENT AND FUNCTIONS OF LANGUAGES IN DIFFERENT PERIODS

Garaeva S.

Teacher at the department "Foreign languages". Azerbaijan State Oil and Industry University. Baku

РАЗВИТИЕ И ФУНКЦИИ ЯЗЫКОВ В РАЗНЫЕ ИСТОРИЧЕСКИЕ ЭПОХИ

Караева С.П.

Преподаватель кафедры «Иностранные языки» Азербайджанского Государственного Университета Нефти и Промышленности, город Баку
<https://doi.org/10.5281/zenodo.20691202>

Abstract

Language and society are closely connected with each other. As there can be no language outside of society exist without language. Their influence on each other is mutual. Language plays a very significant role in public life, it is the basis of mutual understanding, social peace and development.

Language is a phenomenon of the spiritual culture of mankind, one of the forms of social consciousness. Along with ordinary consciousness, morality and the right religious consciousness and art, ideology, politics and science. The peculiarity of language as form of social consciousness is that, firstly, the language along with the psychophysiological ability to reflect the world is a prerequisite of social consciousness. Secondly: language is a semantic foundation and a universal shell of different forms of a social consciousness. Through the language, a specific human form of transferring the social experience of cultural nouns and traditions is realized, naturally scientific and technological knowledge. The development of language is more than the development of law ideology or art, regardless of the social history of society, but ultimately it is conditioned and directed by social history.

Аннотация

Язык и общество тесно связаны друг с другом. Как не может существовать язык вне общества, так и общество не может существовать без языка. Их взаимное влияние друг на друга неизбежно. Язык играет очень важную роль в общественной жизни, являясь основой взаимопонимания, социального мира и развития.

Язык – это феномен духовной культуры человечества, одна из форм общественного сознания. Наряду с обыденным сознанием, он включает в себя мораль, религиозное сознание, искусство, идеологию, политику и науку. Особенность языка как формы общественного сознания заключается в том, что, во-первых, язык, наряду с психофизиологической способностью отражать мир, является предпосылкой общественного сознания. Во-вторых: язык – это семантическая основа и универсальная оболочка различных форм общественного сознания. Через язык реализуется специфическая человеческая форма передачи социального опыта, культурных сущестительных и традиций, естественно, научных и технологических знаний. Развитие языка – это больше, чем развитие права, идеологии или искусства, независимо от социальной истории общества, но в конечном итоге оно обусловлено и направляется социальной историей.

Keywords: development, speech, society, formation, converse, communication, culture, connect, consciousness, dialect.

Ключевые слова развитие, речь, общество, формирование, общение, коммуникация, культура, связано, сознание, диалект

Развитие языков всегда было тесно связано с судьбами их носителей и, в частности, с развитием устойчивых социальных форм объединения людей. Поскольку отдельные коллективы наших далёких предков были ещё слабо связаны между собой, закрепление в их языке определённого содержания за определённым экспонентом не было одинаковым даже в пределах сравнительно небольших территорий. Поэтому формировавшиеся родовые, языки были изначально хотя и довольно сходными, но всё же разными. Однако в меру расширения брачных и иных контрактов между родами, а затем и хозяйственных связей между племенами начинается взаимодействие между языками. В эпоху разложения первобытнообщинного строя, с возникновением частнособственнических отношений и появлением классов на смену племенам приходят народности.

Соответственно, складываются языки народностей. Взамен племенной организации формируется чисто территориальная. Поэтому диалектное членение языка народности обычно бывает лишь отчасти связано со старыми различиями племенных языков и диалектов; в большей степени оно отражает складывающиеся территориальные объединения и их границы. Иногда язык формирующейся или уже сформировавшейся народности дополнительно получает функции становясь языком межэтнического общения для ряда родственных и неродственных сопредельных племён, даже и не объединяющихся в народность. Примерами могут служить языки у индейских племён Тихоокеанского побережья Америки, хауса в Западной Африке, суахили в Восточной Африке южнее экватора, малайский язык на

островах Юго-Восточной Азии. С развитием капитализма и ликвидацией феодальной раздробленности народности развиваются в нации. Соответственно языки народностей перерастают в национальные языки. Но это процесс не механический, не прямолинейный. В некоторых случаях язык народности не становится национальным, а низводится на положение диалекта того или иного национального языка. В других случаях, напротив, из языка одной народности формируется два-три разных, хотя и близкородственных, национальных языка.

Национальный язык обслуживает нацию не только в сфере устного общения, как это часто бывает с языком народности, а обязательно и в сфере письменного общения в качестве ее литературного языка. С повышением народной грамотности письмо и письменный язык становятся орудием общения широких масс. Там, где литературный язык был чужим, совершается постепенный переход письменности на язык народный. Вслед за художественной литературой на народный язык переходит наука, нередко и церковь. В тех странах, где литературный язык был хотя и не совсем чужим, но все же довольно далеким от народного, наблюдается его сближение с народным языком, укрепление его народной основы. В эту эпоху встает вопрос о единой норме литературного языка в его письменном, а затем и в устном употреблении — вопрос, который ранее либо не возникал (допускалось сосуществование нескольких региональных норм), либо не имел той остроты, какую он приобретает в период формирования нации. Ведь устно-разговорный народный язык характеризуется значительной диалектной раздробленностью. Поэтому приближение литературного языка к народному чревато утратой единства литературного языка. Между потребностью в единстве языка и стремлением сблизить литературный язык с народным возникает противоречие. Во многих случаях оно разрешается таким образом, что в основу единой нормы ложится один из диалектов — тот, который ходом исторического развития выдвигается на первое место.

С возникновением и распространением письма начинается формирование письменных языков. В условиях массовой неграмотности такой язык — достояние крайне узкого слоя владение этим языком достигается лишь в результате специальной профессиональной выучки. Кроме того, письменный язык консервативен, он придерживается авторитетных образцов, нередко рассматриваемых как священные. Разговорный же язык народа развивается по своим законам. Постепенно разрыв между письменным и разговорным языком становится всё больше. Свой письменный язык развивается не у всех народностей. В силу тех или иных причин функции языка литературы и деловой переписки выполняет в течение определённого времени другой язык — язык завоевателей, авторитетной чужой культуры, религии, получившей международное распространение и т.д. Так, в большинстве стран средневековой Европы языком науки, религии и в значительной мере языком деловой переписки и литературы была «средневековая латынь». Устно-раз-

говорный язык характеризуется значительной диалектной раздробленностью. Поэтому приближение литературного языка к народному чревато утратой единства литературного языка. Между потребностью в единстве языка и стремлением сблизить литературный язык с народным возникает противоречие. У некоторых народов формирование национальных языков протекало в условиях отсутствия объединяющего центра, в обстановке конкуренции или последовательной смены нескольких центров и длительного сохранения феодальной раздробленности. Так было в Европе у немцев, итальянцев. Наконец, многие народности развиваются в нации, вообще не имея своего государства, в условиях более или менее сильного национального угнетения. Это, разумеется, накладывает отпечаток на развитие соответствующих языков, затрудняет формирование их литературной нормы. Характерной чертой нового времени наряду с развитием наций и национальных языков является также неуклонный рост международных связей, всесторонних и всё более массовых контактов между народами, в том числе контактов языковых. Большое распространение получают в современном мире двуязычие и многоязычие больших групп населения. Велика и всё больше возрастает роль языков межнационального общения и международных организаций — английского, французского, испанского, русского, китайского, арабского (эти шесть языков являются официальными языками ООН).

Функции языка

Функция языка как научное понятие есть практическое проявление сущности языка, реализации его назначения в системе общественных явлений, специфическое действие языка, обусловленное самой его природой, то, без чего язык не может существовать, как не существует материя без движения. Коммуникативная и познавательные функции являются основными. Они почти всегда присутствуют в речевой деятельности, поэтому их иногда называют функциями языка в отличие от остальных, не таких обязательных, функций речи. Австрийский психолог, философ и лингвист Карл Бюлер, описывая в своей книге «Теория языка» различные направления знаков языка, определяет 3 основные функции языка:

- 1) Функция выражения, или экспрессивная функция, когда выражается состояние говорящего;
- 2) Функция призыва, обращения к слушающему, или аппеллятивная функция;
- 3) Функция представления, или репрезентативная, когда один другому что-то говорит или рассказывает

Ученые-лингвисты вслед за видным исследователем русского языка академиком Виктором Владимировичем Виноградовым, иногда определяют основные функции языка несколько по-другому. Они выделяют. - сообщение, то есть изложение какой-то мысли или информации. - воздействие, то есть попытка с помощью речевого убеждения изменить поведение воспринимающего человека; - общение, то есть обмен сообщениями. Сообщение и воздействие относятся к монологической речи, а общение — к диалогической речи. Строго говоря,

это, действительно, функции речи. Если же говорить о функциях языка, то и сообщение, и воздействие, и общение являются реализацией коммуникативной функцией языка. Коммуникативная функция языка является более объемлющей по отношению к этим функциям речи. Ученые-лингвисты также выделяют порой, и небезосновательно, эмоциональную функцию языка. Иначе говоря, знаки, звуки языка часто служат людям для передачи эмоций, чувств, состояний. Собственно говоря, именно с этой функции, скорее всего, и начинался человеческий язык. Более того, у многих социальных или стадных животных именно передача эмоций или состояний (тревоги, испуга, умиротворения) является главным способом сигнализации. Эмоционально окрашенными звуками, возгласами животные оповещают соплеменников о найденной пище или приближающейся опасности. При этом передается не информация о пище или опасности, а именно эмоциональное состояние животного, соответствующее удовлетворению или испугу. В этом смысле эмоциональная функция языка также является одним из способов реализации более объемлющей коммуникативной функции языка. Итак, различными видами реализации коммуникативной функции языка являются сообщение, воздействие, общение, а также выражение чувств, эмоций, состояний. Ученые все еще не пришли к однозначному выводу о том, что является первичным - язык или мышление. Возможно, неверна сама постановка вопроса. Ведь слова не только выражают наши мысли, но и сами мысли существуют в виде слов, словесных формулировок даже до их устного произнесения. По крайней мере, зафиксировать дословную, до языковую форму сознания пока никому не удавалось. Любые образы и понятия нашего сознания осознаются нами самими окружающими только тогда, когда облечены в языковую форму. Отсюда и представление о неразрывной связи мышления и языка. Посредством языка осуществляется специфическая человеческая форма передачи социального опыта (культурных норм и традиции, естественнонаучного и технологического знания). Развитие языка в большей мере, чем развитие права, идеологии или искусства, независимо от социальной истории общества, хотя в конечном счете оно обусловлено и направлено именно социальной историей.

Характерной чертой нового времени наряду с развитием наций и национальных языков является также неуклонный рост международных связей, всесторонних и все более массовых контактов между народами, в том числе контактов языковых. Большое распространение получают в современном мире двуязычие и многоязычие больших групп населения. Велика и все больше возрастает роль языков межнационального общения и международных организаций — английского, французского, испанского, русского, китайского, арабского (эти шесть языков являются официальными и рабочими языками Организации Объединенных Наций), далее португальского, в отдельных сферах науки и культуры немецкого, итальянского, японского, в

отдельных регионах — хинди, индонезийского, суахили. Кроме того, некоторое применение Получили в ряде стран искусственные между-: народные языки, особенно эсперанто'. Во всех языках мира наблюдается непрерывный рост общих элементов - интернационализмов

Словарный состав представляет собой ту сторону языка, которая более всех других подвержена историческим изменениям. Если изменения в фонологической системе и звуковой «материи» языка, в его грамматическом строе трудно заметить на протяжении жизни одного поколения, то изменения в словарном составе наблюдаются повседневно: любое нововведение в технике, в быту, в общественной жизни, в области идеологии и культуры сопровождается появлением новых слов и выражений либо новых значений у старых слов, и наоборот, устаревание и уход в прошлое тех или иных орудий, форм быта, общественных институтов неуклонно влекут за собой и уход из языка соответствующих слов. Бывает и так, что слова меняют свои значения и даже вовсе выходят из употребления без какой-либо связи с изменениями в соответствующих денотатах или же денотаты меняют свои словесные обозначения, несколько не меняя, однако, своей природы или роли в жизни человека.

Важнейший процесс - появление неологизмов, т. е. новых лексических единиц и новых значений в связи с появлением нового в жизни данного языкового коллектива.

Глобальность языка, его включенность во все формы общественного бытия и общественного сознания порождают его надгрупповой и надклассовый характер. Однако, надклассовость языка не означает его внесоциальности. Общество может быть разделённым на классы, но оно остаётся обществом, т.е. известным единством, общностью людей. Своеобразие языка как формы общественного сознания состоит в том, что, во-первых, язык, наряду с психофизиологической способностью отражать мир, является предпосылкой общественного сознания; во-вторых, язык представляет собой семантический фундамент и универсальную оболочку разных форм общественного сознания.

Список литературы:

1. Маслов Ю.С. Введение в языкознание. М, 1987.
2. Леонтьев А.А. Язык, речь, речевая деятельность. М. 1969.
3. Реформатский А.А. Введение в языковедение. М. 1967.
4. Мечковская Н.Б. Социальная лингвистика. 1996.
5. Норман Б.Ю. Теория языка. Вводный курс. 2004.
6. Живлакова А. Е. Теоретические подходы к социолингвистическому анализу социально- политической дифференциации языка // Вестник Саратовского государственного технического университета, 2010, Т. 1, №1 (44)
7. Китанина Э. А., Божинская Т. Я. Проблема неоднородности общества и социальная дифференциация языка на рубеже XX-XXI веков //Теория и

практика общественного развития, 2009, №3-4.

8. Попова Т. Г., Тимофеева О. В., Бокова Ю. С. Язык как главный фактор этнической интеграции // Вестник Южно-Уральского государственного университета. Серия: Лингвистика 2011, №1 (218).

9. Крылова М. Н. Проблема взаимодействия языка и культуры И Актуальные проблемы общественного вознания. Межвузовский сборник научных трудов.

Вып. 10. Зерноград: ФГОУ, ВПО, АЧТАА, 2010.

10. Липатов А. Т. Русский язык на лингвокарте мира в условиях глобализации // Вестник Нижегородского университета. Им. Н. И. Лобачевского 2010, №4.

11. Редер Д. Г., Черкасова Е. А. История древнего мира. Москва, Просвещение, 1985.

PHYSICAL SCIENCES

PLANET EARTH IS DESIGNRD MUCH MORE COMPLEX THAN IS EXPLAINED BY MODERN SCIENTIFIC KNOWLEDGE

Antonov A.

PhD, HonDSc, H.Prof.Sci

Independent researcher, Ukraine

<https://doi.org/10.5281/zenodo.20691204>

Abstract

The article argues that, in accordance with the corrected version of the special theory of relativity (STR), the planet Earth is much more complex than this is explained by modern scientific knowledge. The Earth is probably a three-dimensional spiral structure in four-dimensional space. It will be possible to verify this by traveling through time as a result of around-the-world flight by plane. It will be possible to verify this by traveling through time as a result of around-the-world flight by plane. Until very recently, such flights belonged to the genre of science fiction and were denied by modern science. However millions of air passengers now make such time travel every day, which is confirmed by the translation of their watches to local time after the planes land. And such time travels is very necessary for people, as it allows, for example, to predict and prevent disasters and accidents, to bring back to life people who died as a result of accidents and crimes, to significantly reducing the criminal manifestations, by increasing the information transparency of human activity, as well as to solve many other important problems.

Keywords: special theory of relativity; relativistic formulas; physical reality of imaginary numbers; Multi-verses; universes and anti-universes; anti-time; external and internal time; time zones on Earth; time travel

1. Introduction: fundamental mistake of the authors of special theory of relativity

Created the 20th century by Joseph Larmor [1], Nobel laureate Hendrik Anton Lorentz²⁶ [2], Jules Henri Poincaré [3], Nobel laureate Albert Einstein²⁷ [4], and other talented scientists, the special theory of relativity (STR) are rightly considered the outstanding scientific achievement of the 20th century due to their use of principle of relativism. However, at the beginning of the twentieth century, science lacked much of the knowledge necessary to create STR. Because of this, the missing knowledge had to be replaced with postulates that turned out to be partially incorrect. Therefore, this STR itself turned out to be largely incorrect [5]-[9].

And most importantly, all the relativistic formulas obtained in it turned out to be incorrect

$$m = \frac{m_0}{\sqrt{1 - (v/c)^2}} \quad (1)$$

$$\Delta t = \Delta t_0 \sqrt{1 - (v/c)^2} \quad (2)$$

$$l = l_0 \sqrt{1 - (v/c)^2} \quad (3)$$

and others, in which m_0 is the rest mass of a moving body;

m is the relativistic mass of a moving body;

Δt_0 is the rest time of a moving body;

Δt is the relativistic time of a moving body;

l_0 is the rest length of a moving body;

l is the relativistic length of a moving body

The creators of STR made this fundamental mistake without understanding that the argument v in formulas (1)-(3) according to Newton's first law is the fourth²⁸, in addition to length, width and height, spatial dimension [10]-[21]. Albert Einstein also failed to use the concept of four-dimensional space in STR..

Albert Einstein also failed to use the concept of four-dimensional space in STR. Nevertheless, at that time he still managed to preserve the STR, introducing into it the principle of not exceeding the speed of light.

2. The special theory of relativity taught in physics textbooks is incorrect.

From the principle of not exceeding the speed of light, which is in fact a postulate, that this STR drew the conclusion that imaginary numbers are physically unreal. But a postulate is merely an assumption. Consequently, a conclusion drawn from a postulate is also merely an assumption, which has no evidential value. Therefore, the assertion regarding the physical unreality of imaginary numbers could simply have been called a postulate. However, the authors of the version of the STR, taught in textbooks, ignored this fact, as they needed to explain the relativistic formulas in some way. And to do so, they had to at least give the impression that the principle of not exceeding the speed of light had been proven. And since these textbooks are still used in the educational process, it follows that the goal was achieved.

Therefore, further in the article we will continue to explain that the version of STR studied in textbooks is

²⁶ Who received his Nobel Prize in Physics in 1902 for explaining the Zeeman effect.

²⁷ Who received his Nobel Prize in Physics in 1921 for his services to theoretical physics and especially for his research into the photoelectric effect.

²⁸ Not to be confused with the fourth dimension in four-dimensional space-time (Minkowski space).

incorrect. [22]-[54]. Let us recall that the problems of the authors of STR began from the very beginning due to their inability to explain the relativistic formulas (1)-(3) published in 1905. After all, no one would need a theory that even its creators could not explain. And relativistic physicists have still not been able to explain these formulas, since all the quantities $m(v)$, $\Delta t(v)$, $l(v)$ in these formulas in the hyper-light range of speeds $v > c$ took on values measured by imaginary numbers incomprehensible to physicists. Therefore, as not to explain relativistic formulas in the superluminal range of speeds, the principle of the non-exceeding of the speed

of light was used in the STR.

However, yet in 1897, Charles Proteus Steinmetz published [55] a theory of linear electrical circuits of alternating current, in which the imaginary resistances $-j/\omega C$ of capacitors and $+j\omega L$ ²⁹ of inductors were de facto recognised as physically real. This provided experimental proof of the physical reality of imaginary numbers.

Therefore, for more than half a century, the radio industry has been mass-producing frequency response meters³⁰ (Fig. 1), which by their very existence prove the physical reality of imaginary

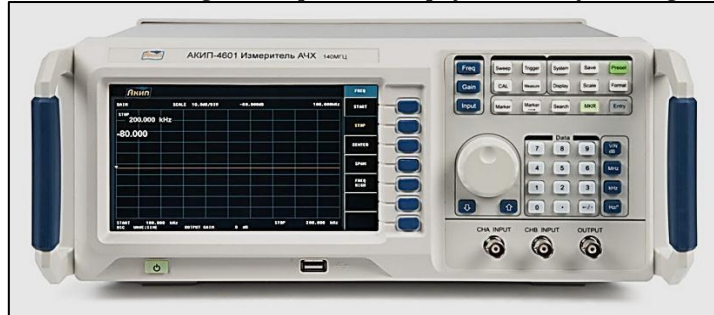


Fig. 1. In any radio engineering laboratory there are devices called frequency response meters, which already by their very existence prove the physical reality of imaginary numbers

numbers, since you can only measure what actually physically exists. And such devices measured frequency characteristics, mathematically described using imaginary numbers.

But even if any of the relativist physicists were to learn that Charles Proteus Steinmetz had already proven the physical reality of imaginary numbers, this would not save the STR. For it turns out that the relativistic formulas are not correct, since, in the superluminal speed range $v > c$, function (1) describes a physically unstable process that cannot exist in nature. Therefore, relativistic physicists did not really need any proof of the physical reality of imaginary numbers. On the contrary, in order to refuse to explain their relativistic formulas in the hyperluminal speed range $v > c$, they needed the principle of not exceeding the speed of light. And this is precisely why proof of the physical unreality of imaginary numbers was needed. Which, however, do not exist in nature.

This is why Albert Einstein continued to work on developing available for use version of the STR. He therefore argued that there is no known physical process in nature that is described using imaginary numbers³¹. On this basis, he introduced into STR a postulate known as the principle of the non-exceeding of the speed of light. From this, it was concluded that there was no need to explain formulas (1)–(3) in the superluminal range of velocities $v > c$. And when Cherenkov radiation [56] was discovered, refuting the claim that

there is no known process in physics in which anything moves at a speed exceeding the speed of light, the STR was saved by the clarification that the principle of the non-exceeding of the speed of light referred to processes in a vacuum.

And later, at the Large Hadron Collider (costing \$10 billion), the widely publicised OPERA [57] experiment was conducted over 15 years³² (between 2003 and 2018), involving over a hundred of the most eminent physics professors, the aim of which was to prove the physical reality of imaginary numbers. In 2011, the OPERA collaboration even announced the successful completion of this experiment. But six months later, at the same Large Hadron Collider, the OPERA experiment was refuted by the ICARUS experiment. This created the impression that the principle of the non-exceeding of the speed of light is irrefutable. And it is in this form that the generally accepted version of STR is now presented in all physics textbooks in all countries.

However, articles [58]–[75] have been published, including five articles in 2008–2010³³ [58]–[62], containing descriptions of radio engineering experiments that successfully proved the physical reality of imaginary numbers. Moreover, these publications also contain descriptions of well-known physical processes³⁴ – a tsunami, the ringing of bells, music created by a piano, and even a swing swinging on the playground after a push from parents – proving the physical reality of imaginary numbers.

²⁹ In radio engineering and electrical engineering, the imaginary unit is conventionally denoted by the letter j , as the letter i is used to denote electric current

³⁰ Also called frequency response analyzers

³¹ Although in fact there are many of them. And they are mentioned further.

³² And for any radio engineering experiment proving the physical reality of imaginary numbers, one day is more than enough for one engineer

³³ That is, even before the publication in 2011 of the message about the supposedly successful completion of the OPERA experiment

³⁴ Contrary to Albert Einstein's assertion that there are no processes in nature that can be described using imaginary numbers,

Thus we live not only in the visible and tangible world described by real numbers, but also in existing invisibl and intangible world – one far less familiar to us – described by imaginary, complex and hypercomplex numbers.

3. A corrected version of the special theory of relativity.

3.1. Corrected relativistic equations

Since we have just have proven.the physical reality of imaginary numbers in the most indisputable manner, we shall now explain formulas (1)–(3) in full. And since people tend to understand visual information better, Fig2a,b,c show the graphs of formulas (1)–(3). As can be seen, these graphs in the sub-light speed range $v < c$ differ significantly from the graphs in the hyper-light speed range $v > c$. It therefore becomes clear that the same processes cannot occur in the sub-light and

hyper-light speed ranges v . And for the same processes to occur in these ranges, the graphs of formulas (1)–(3) must be identical, as shown in Fig2d,e,f. To achieve this, since the velocity v in formulas (1)–(3) is the fourth spatial dimension, the factor³⁵ i^q must be introduced

$$m(q) = \frac{m_0 i^q}{\sqrt{1 - (v/c - q)^2}} = \frac{m_0 i^q}{\sqrt{1 - (w/c)^2}} \quad (4)$$

$$\Delta t(q) = \Delta t_0 i^q \sqrt{1 - (v/c - q)^2} = \Delta t_0 i^q \sqrt{1 - (w/c)^2} \quad (5)$$

$$l(q) = l_0 i^q \sqrt{1 - (v/c - q)^2} = l_0 i^q \sqrt{1 - (w/c)^2} \quad (6)$$

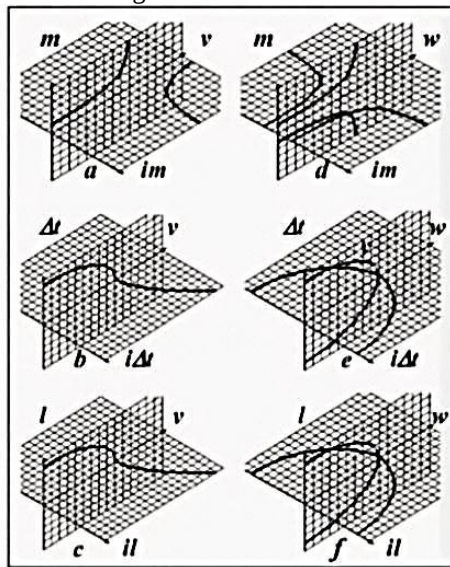


Fig. 2. Graphs of the functions $m(v)$, $\Delta t(v)$ and $l(v)$ corresponding to the existing and corrected versions of the STR in the subluminal $v < c$ and superluminal $v > c$ velocity ranges

where $q(v) = \lfloor vq/c \rfloor$ – the “floor” function from discrete mathematics defined for the argument vq/c which constitutes the fourth spatial dimension;

$w = v - qc$ – the velocity that is local to all universes.

And since the fourth spatial dimension v is a vector quantity, the formulas (4)–(6) must be revised once again. To this end, three factors i^q , i^r and i^s must be introduced into formulas (4)–(6)

$$m(q, r, s) = \frac{m_0 i_1^q i_2^r i_3^s}{\sqrt{1 - [v/c - (q + r + s)]^2}} \quad (7)$$

$$\Delta t(q, r, s) = \Delta t_0 i_1^q i_2^r i_3^s \sqrt{1 - [v/c - (q + r + s)]^2} \quad (8)$$

$$l(q, r, s) = l_0 i_1^q i_2^r i_3^s \sqrt{1 - [v/c - (q + r + s)]^2} \quad (9)$$

where $q(v) = \lfloor v_q/c \rfloor$ – the “floor” function in discrete mathematics of the argument v_q/c , which

is one of the orthogonal coordinates q of the fourth spatial dimension v ;

$r(v) = \lfloor v_r/c \rfloor$ – the “floor” function of discrete mathematics of the argument v_r/c , which is the other orthogonal coordinate r of the fourth spatial dimension v ;

$s(v) = \lfloor v_s/c \rfloor$ – the “floor” function of discrete mathematics of the argument v_s/c which is yet another

³⁵ In the theory of functions of a complex variable, the function i^q is defined only for integer values of the argument q . However, his definition can be extended as follows. For integer values of the argument ... $-2, -1, 0, +1, +2, +3, +4, +5, \dots$ the function i^q is equal to ... $-1, -i, +1, +i, -1, -i, +1, +i, \dots$ But for the same integer values of the argument ... $-2, -1, 0, +1, +2, +3, +4, +5, \dots$ the same values ... $-1, -i, +1, +i, -1, -i, +1, +i, \dots$ is also equal to the function $e^{iq\pi/2}$, which, in accordance with Euler's formula $e^{iq\pi/2} = \cos(q\pi/2) + i\sin(q\pi/2)$,

is defined also for non-integer values of the argument q . Therefore, definition of the function i^q can be extended to any values of the argument q by the formula $i^q = \cos(q\pi/2) + i\sin(q\pi/2)$, analogous to Euler's formula. The resulting formula will allow the value of the function i^q to be determined for any values of the argument q , including non-integer values. And it will be required in astro-geophysical studies of portals, which will be discussed further on.

orthogonal coordinate s of the fourth spatial dimension
 v ;

v_q, v_r, v_s – projections of the velocity vector v onto
 the orthogonal co-ordinates q, r, s (see Fig. 3).

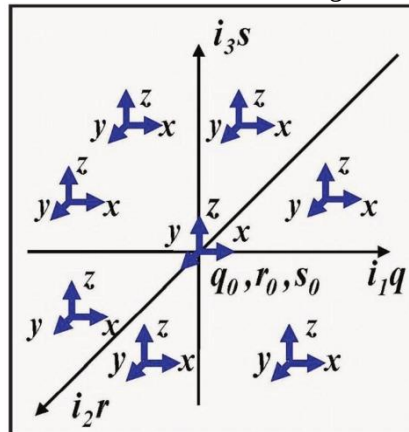


Fig.3. The six-dimensional space of the hidden Multiverse, where q, r, s are the coordinates of mutually invisible parallel universes and anti-universes, and x, y, z are the coordinates of the material content of these parallel universes and anti-universes

This function i^q (as well as the functions i^r and i^s) in formulas (7)–(9), which defines the nature of each universe, for integer values of the argument $q(v)$, equal to ... 0, 1, 2, 3, 4, 5, ..., successively takes the values ..., +1, +i, -1, -i, +1, +i, ... and so on. Its value $q(v) = 0$ in formulas (7)–(9) for the sublight speed range $v < c$ corresponds (since $i^0 = 1$) to our visible universe, which we shall call, for the sake of clarity, the tardion³⁷ universe. The value $q(v) = 1$ in the superluminal speed range $2c > v > c$ corresponds (since $i^1 = i$) to some other, already invisible universe, as it lies beyond the event horizon. For the sake of clarity, we shall therefore call it the tachyon³⁸ universe. Then the value $q(v) = 2$ in the velocity range $3c > v > 2c$ will correspond (since $i^2 = -1$) to an invisible tardion anti-universe. The value $q(v) = 3$, in the velocity range $4c > v > 3c$, will correspond (since $i^3 = -i$) to an invisible tachyon anti-universe. The value $q(v) = 4$ in the speed range $5c > v > 4c$ will correspond (since $i^4 = +1$) to another (and therefore also invisible) tardion universe. The value $q(v) = 5$ in the velocity range $6c > v > 5c$ will correspond (since $i^5 = +i$) to another tachyon universe. And so on.

Consequently, nature contains not only our visible universe - which, as stated in the generally accepted version of STR, corresponds to formulas (1)–(3) but also a multitude of other mutually invisible³⁹ universes and anti-universes that correspond to formulas (7)–(9). And these mutually invisible universes and anti-universes, together with our visible universe, form an invisible Multiverse [76]–[84], which we have therefore called the hidden Multiverse.

3.2. Explanation of the phenomena of dark matter and dark energy by the existence of universes and anti-universes of the hidden Multiverse

Therefore, having explained the meaning of the basic concepts we need, it would seem time to clarify

the structure of the hidden Multiverse. However, at present, no explanation of the structure of the Multiverse can be considered convincing unless it explains the phenomena of dark matter and dark energy [85]–[90], discovered in the XX century. Which are so named because they are so obscure, as not a single chemical element has been detected in them, and also because they do not emit, absorb, reflect, or refract electromagnetic radiation and, therefore, are invisible. The persistent search for dark matter and dark energy, which account for more than 95% of all mass-energy contained in the hidden Multiverse, at the Large Hadron Collider exclusively in the microcosm of our only visible universe also seems inconsistent with common sense.

A more logical assumption is that dark matter and dark energy [85]–[90] are everything except our visible universe, mutually invisible universes and anti-universes, the hidden Multiverse. In this case, dark matter is neighboring to our visible universe invisible universes and anti-universes, and dark energy - the remaining invisible universes and anti-universes of the hidden Multiverse. Therefore, the phenomena of dark matter and dark energy will be a gravitational shadow⁴⁰ on our visible universe from the remaining mutually invisible universes and anti-universes included in the hidden Multiverse. This assumption explains all the incomprehensibility of the phenomena of dark matter and dark energy simply and clearly. That's why we will use it.

Then, assuming that over the billions of years of its existence, the mass-energy of all universes and anti-universes of the hidden Multiverse, due to the presence of a huge number of portals between them according to the law of communicating vessels, has been largely averaged, it becomes possible, using the data obtained by the WMAP and Planck spacecraft, to determine the structure of the hidden Multiverse. And according to data obtained by the WMAP spacecraft [96], the mass-energy of our visible universe (actually, our hidden

³⁶ If we start counting the value of q from our visible universe.

³⁷ The term "tardion universe" is borrowed from Isaac Asimov's short story "Take a Match."

³⁸ The term "tachyon universe" is borrowed from Isaac Asimov's short story "Take a Match."

³⁹ Because they are all beyond the event horizon

⁴⁰ And therefore, like our shadow on a sunny day, they do not contain a single chemical element..

Multiverse) consists of 4.6% baryonic matter, 22.4% dark matter and 73.0% dark energy. And according to more recent data obtained by the Planck spacecraft [97], the mass-energy of our visible universe (again, actually, our hidden Multiverse) consists of 4.9% baryonic matter, 26.8% dark matter and 68.3% dark energy. As you can see, these data differ little from each other, which proves their truth. Therefore, it is permissible to assert that:

- our hidden Multiverse according to data obtained by the WMAP spacecraft, it consists of $100\% / 4.6\% = 21.8^{41}$ parallel universes and anti-universes, and according to data obtained by the Planck spacecraft, it consists of $100\% / 4.9\% = 20.4$ parallel universes and anti-universes;
- dark matter, according to experimental data obtained by the WMAP spacecraft, consists of $22.4\% / 4.6\% = 4.9$ parallel universes and anti-universes, and according to data obtained by the Planck spacecraft, it consists of $26.8\% / 4.9\% = 5.5$ parallel universes and anti-universes;
- dark energy, according to experimental data obtained by the WMAP spacecraft, consists of $73.0\% / 4.6\% = 15.9$ parallel universes and anti-universes, and according to data obtained by the Planck spacecraft, it consists of $68.3\% / 4.9\% = 13.9$ parallel universes and anti-universes;
- and our visible universe, of course, is only one.

3.3. The structure of the hidden Multiverse

Fig. 4 shows an example, corresponding to the re-

sults of calculations of the possible structure of the hidden Multiverse. In this structure of the hidden Multiverse, the distribution of material content in each invisible universe and anti-universe will be determined by some function $f_{q,r,s}(x,y,z)$, and the coordinates of these universes will be determined by the quantities i_1q, i_2r, i_3s . Those. such a hidden Multiverse will be six-dimensional and it will be described by the quaternion $f_{q,r,s}(x,y,z) + i_1q + i_2r + i_3s$, in which the imaginary units i_1, i_2, i_3 are related by the relations [98]-[100]

$$i_1^2 = i_2^2 = i_3^2 = -1 \quad (10)$$

$$i_1i_2i_3 = i_2i_3i_1 = i_3i_1i_2 = -1 \quad (11)$$

$$i_1i_3i_2 = i_2i_1i_3 = i_3i_2i_1 = 1 \quad (12)$$

This is exactly what Lisa Randall predicted⁴²: “*We may be living in a three-dimensional pocket of higher-dimensional space.*”

From formulas (10)-(12) it follows that such a hidden Multiverse has a helical structure, and its mutually invisible universes and anti-universes (in addition to our visible universe) form dark matter and dark energy. In this case, it is possible to move into the tardion anti-universe from the tardion universe and into the tardion universe from the tardion anti-universe in various, but not arbitrary, ways, but only in such a way (see Fig. 4), in which the value of i^q will successively take

⁴¹ Naturally, the number of universes and anti-universes is an integer, and a non-integer number was obtained only due to experimental errors, including due to failure to take into account unknown factors influencing the result of the experiment.

⁴² Lisa Randall is a professor in the Department of Physics at Harvard University and a member of the American Academy of Arts and Sciences and also the National Academy of Sciences of the United States.

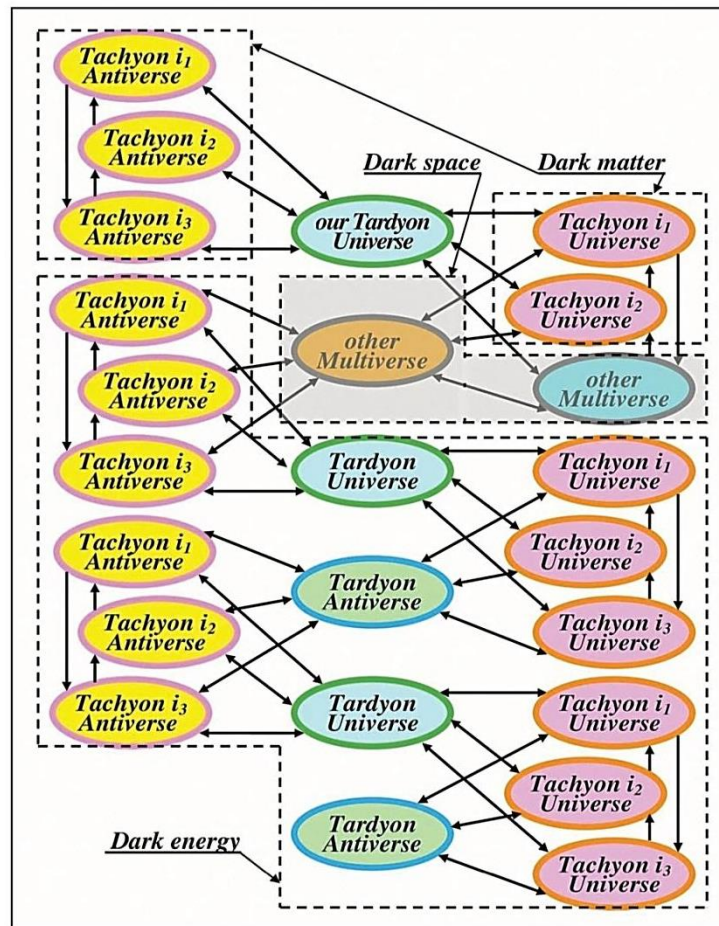


Fig. 4. An example of the structure of the hidden Multiverse, corresponding to the principle of physical reality of hypercomplex number

the values $\dots +1, +i_1 \oplus i_2 \oplus i_3, -1, -i_1 \oplus i_2 \oplus i_3, +1, \dots$ and etc., where $\oplus$ is the symbol of the logical operation of discrete mathematics 'exclusive OR'. In this case, different trajectories of movement from one universe (or anti-universe) to another can differ only due to the replacement of some tachyon universes from i_1, i_2, i_3 with others and some tachyon anti-universes from i_1, i_2, i_3 with others. Consequently, tachyon universes i_1, i_2, i_3 in the hidden Multiverse are located parallel to each other. Tachyon anti-universes i_1, i_2, i_3 are also located parallel to each other for the same reasons. And therefore, in the hidden Multiverse, when transitioning from any tardion universe to a tardion anti-universe and then to another tardion universe, parallel universes and antiverses must alternate in the following sequence - 'tardion universe', 'one of the tachyon universes', 'tardion anti-universe', 'one of the tachyon anti-universes', 'tardion universe', 'one of tachyon universes', etc.

Moreover, portals in such a structure of the Multiverse are not only bidirectional, corresponding to formula (10) and shown by two-way arrows, but also unidirectional, corresponding to formulas (11), (12) and shown by one-way arrows. And since the structure of our hidden Multiverse, as shown in Fig. 4, is open in some places, then in these places it is connected to other Multiverses through the corresponding portals. And all together they collectively form the Hyperuniverse.

3.4. How can we be convinced of the real physical existence of invisible universes and anti-universes?

However, in science, any evidence, even the most seemingly impeccable one, can be trusted only if it is confirmed experimentally. And such experimental evidence of the existence of invisible parallel universes⁴³ and anti-universes shown in Fig. 4 adjacent to our visible universe can be two hundred thousand anomalous zones [101]-[104], existing on Earth, serving as entrances to portals leading to planets of various star systems. Most of the portals probably lead to astronomical objects in our universe and even in our solar system. A smaller number of portals connect us with other universes and anti-universes of the hidden Multiverse. And, perhaps, some portals even connect us with astronomical objects in other Multiverses of the Hyperverses. All these possible options in Fig. 4 are shown. The classification of anomalous zones after astro-geophysical studies of the corresponding portals will help determine where each portal leads.

And the possible distrust of the claim that anomalous zones are entrances to portals can presumably be eliminated by astronomical observations [105]-[122] of the star sky in anomalous zones. This would require comparing on computer of maps of the starlit sky observed in anomalous zones and somewhere outside of

⁴³ I.e. such that do not intersect

anomalous zones. Moreover, some observatories are already in anomalous zones. For example, the Main Astronomical Observatory of the National Academy of Sciences of Ukraine, which is located 12 km from the center of its capital, Kyiv in Goloseyevo Forest. And if such differences are found, it is evidence that the corresponding portal to this anomalous zone leads to another planet in our solar system or further afield. After all, the starry sky is different for every planet.

4. Time Travel on Earth

4.1. Where are the anti-matter and the anti-time located?

And now we can explain the problem that is inexplicable in the version of STR studied in textbooks - where exist antimatter, the existence of which this version of STR does not deny. It is clear that she cannot be in our hidden Multiverse, because her annihilation with matter would make our universe no longer exist.

However, it exists. In 1995 CERN performed a sensational experiment that produced nine antihydrogen atoms lasting about 40 billionth parts of second. And just one gram of such an antihydrogen would have

cost \$662.5 trillion. So the existence of antimatter has even been proven experimentally. But where does it exist then? After all, in all physics textbooks it is claimed that nature has our only visible universe. Therefore, the experiment at CERN can also be considered as proof that the version of the STR studied in textbooks is incorrect.

And in accordance with formulas (7)-(9) of the corrected version of STR, anti-matter in nature exists in the invisible tardyon and tachyon anti-universes of the hidden Multiverse. Moreover, in these invisible tardyon and tachyon anti-universes, anti-time and anti-space [105]-[122] also exist.

4.2. Time Travel on Earth, Inner Time and Outer Time

The existence of antitime makes it possible, in accordance with formulas (8) and (9), due to travels in space, also travels in time. But since the portals, the universes and anti-universes of the hidden Multiverse, are still unexplored, time travel in space is now inaccessible to us. Therefore,

Table 1.

Examples of business jet characteristics that can be used for time travels

Aircrafts	Maximum range	Cruising speed	Hourly rates	Seats
Citation Latitude	5 300 km	815 km/h	3 500 €/hour	8
Citation Longitude	7 400 km	910 km/h	5 000 €/hour	12
Challenger 300	5 700 km	850 km/h	4 900 €/hour	8
Challenger 350	5 926 km	850 km/h	4 000 €/hour	9
Challenger 600	5 500 km	850 km/h	4 600 €/hour	12
Challenger 3500	6 297 km	985 km/h	5 500 €/hour	10
Falcon 20	4 200 km	987 km/h	3 900 €/hour	8
Falcon 50/50EX	5 600 km	850 km/h	4 900 €/hour	8-10
Global 5500	10 927 km	900 km/h	8 000 €/hour	16
Gulfstream G150	5 200 km	850 km/h	3 900 €/hour	6-8
Gulfstream G200	5 000 km	870 km/h	6 200 €/hour	8
Hawker 850 XP	4 800 km	750 km/h	3 400 €/hour	6-8
Hawker 900XP	5 400 km	865 km/h	3 700 €/hour	6-8
Hawker 4000	5 280 km	890 km/h	5 400 €/hour	10
Learjet 70	3 815 km	967 km/h	3 500 €/hour	7
Legacy 450	5 370 km	860 km/h	3 300 €/hour	8
Praetor 600	7 400 km	850 km/h	6 000 €/hour	12

Table 2.

The value of external time at different latitudes

Location of departure and arrival airfields	Geographic coordinates of the airfield	Size of 24 time zones for a round-the-world flight	Size of one time zone.
Santiago de Chile	33,45° S.	33422 km	1393 km
Buenos Aires	34,60° S.	33021 km	1375 km
Melbourne	37,82° S.	31339 km	1306 km
New York City	40,72° N.	30456 km	1269 km
Reykjavík	64,15° N.	17616 km	734 km
Murmansk	69,58° N.	14424 km	601 km
Kirkenes	69,73° N.	14376 km	599 km
Longyearbyen (Spitsbergen, Norway)	78,13° N.	8184 km	341 km
Alert, (Canada)	82,5° N.	5230 km	218 km

further we will consider only the possibility of time travel on Earth [10]-[21]. As the presence of time zones on Earth also makes time travel possible due to space travel.

However, although official modern science admits

the possibility of time travel in some exotic situations

in the special⁴⁴ and general⁴⁵ theories of relativity, as well as in quantum physics⁴⁶, refuting the erroneous statements of the incorrect version of STR studied in textbooks.

And when explaining time travels on Earth, it is necessary to take into account the existence in nature, in addition to internal time, which we always use, also of external time, which we have never used before. And which are generated by different circumstances and have different peculiarities. Internal time can be called

biological human time, since one second is one contraction of the human heart. And it cannot flow backwards. A person cannot return to his youth. But external time is generated by the rotation of the Earth around its axis. One revolution of the Earth is 24 time zones. Therefore, by changing the direction of our movement in space, we can move both into the past and into the future external time. Consequently, time travel is always movement only in external time.



Fig. 5. One of the business jets

Time travels can be very useful, since traveling into the future will allow, for example, to recognize and avoid unforeseen disasters, accidents, natural disasters, etc. in advance. And traveling to the past will allow the same situations in the present to be corrected by visiting the past. Even, for example, to bring back to life people who died as a result of an accident, a terrorist attack⁴⁷ or for other reasons [141]-[151].

And although time travel on Earth is not currently used due to the fact that it always occurs together with long-distance travel, this problem is completely solvable. To do this, the aircraft must make a round-the-world trip around the north or south pole and land after 24 hours of outside time at the same airfield from which the journey began. Thus eliminating the unnecessary factor of space in time travel.

And there are many aircraft models suitable for use in time travel. They are called business jets⁴⁸ (see Fig. 5). There are currently 22,000-24,000 business jets in operation on Earth. Table 1 shows the flight performance characteristics of some business jets. And Table 2 shows airfields quite close to the North Pole⁴⁹ that can provide the shortest routes for round-the-world flights.

Moreover, time travel can be accomplished not only on airplanes. Time travel on airplanes is only needed if a person needs to travel to the past or future. And if it is necessary to transmit information to the past or future, then radio communications can be used, like airplane flights, using round-the-world communication lines⁵⁰

4.3. The structure of planet Earth differs significantly from the structure corresponding to modern scientific knowledge

Thus, time travels on Earth is physically possible and is currently already technically feasible [152]-[162], since there are suitable aircraft and acceptable flight routes. However, neither business jets nor other aircraft have ever made the round-the-world flights we need, because there was no need for them. Indeed, any airfield that is most distant from the airfield from which the plane took off is located where its antipodes are located, that is, at a diametrically opposite point on Earth. But this is only half of the trip around the world. The distance to other airfields is shorter. And because of this, the features of round-the-world flights are completely unknown to us. Therefore, now they must be identified and studied in the process of actual flights around the world.

But while we haven't actually made such a flight, let's take an imaginary round-the-world air trip. Let's start with the initial situation, i.e. from a completely understandable trip around the world, during which two identical planes will simultaneously take off from the same airfield in two opposite directions - one to the west, the other to the east. If they fly at the same speed and provided that the Earth does not rotate, everything will be clear. We are confident that they will arrive at the same airfield from which they flew away, at the same time, having spent on this flight

$$T_0 = 2\pi R / V$$

⁴⁴ For example, in the "twin paradox"

⁴⁵ For example, in the ultra-high gravity region of a black hole's event horizon

⁴⁶ For example, as a result of teleportation of not information, but of physical objects.

⁴⁷ Perhaps President Kennedy could have been saved in a similar way after the assassination attempt.

⁴⁸ A business jet is a small private jet aircraft for transporting a limited number of passengers (usually from 6 to 20) on an individual order for businessmen, officials and VIPs; it is

characterized by a higher level of comfort, the ability to take off/land from small airfields and high speed, allowing you to quickly get to anywhere in the world

⁴⁹ Since the existing airfields are further from the south pole. But, probably, such airfields can be created in Antarctica.

⁵⁰ But also with its transmission around the north or south pole.

of its time, where V is the cruising speed of such a flight relative to the stationary

Earth, i.e. aircraft speed;

R is the radius of the circle on the surface of the Earth at the latitude along which the aircraft will fly;

$2\pi R$ is the length of this circle.

And therefore, the distance that these two planes will fly towards each other before landing will naturally be equal to twice the length of the weapon, i.e. $4\pi R$.

But if we take into account that the Earth rotates, then these planes will not arrive at the same time. One of them will fly through

$T_1 = 2\pi R / (V + \Delta V)$ hours, (13)

and the other through

$T_2 = 2\pi R / (V - \Delta V)$ hours, (14)

where ΔV is an increase or decrease in the flight speed of aircraft relative to the surface of the Earth due to its rotation around its axis..

And they will arrive at different speeds for different times $T_1 \times (V + \Delta V) = 2\pi R$ and $T_2 \times (V - \Delta V) = 2\pi R$, it turns out, the same distances. As in the situation when the Earth is motionless. And it looks like both planes will arrive at the same airfield from which they took off. Those. both planes will again safely complete their round-the-world travels.

But then, after some time, both planes will already be at this airfield. It would seem obvious. But this is most likely impossible. Since it is impossible to combine what is at different times. And this situation, which is unusual for us, therefore raises great doubts. Probably, among the readers there will be people to whom one of these situations seems quite possible, and those who will hold the opposite opinion.

The point is that a clear answer to the question posed is very important. Indeed, if these two planes arrived at the same airfield from which they flew away, then in our consciousness the world familiar to us will continue to exist, in which round-the-world travels are possible. And vice versa, if these two planes arrived at different airfields, and even not at the same one from which they took off, then our world is completely different. And round-the-world flights are impossible in it. Moreover, each such airfield and its surroundings would have their own life.. And it will exist regardless of whether we arrive at these airfields or not. And in this life, in the past and in the future, we will somehow exist. And we can even meet ourselves. And all this must be posted somewhere. Then our Earth is very different from the globe. It will be some kind of multilayer three-dimensional (i.e. volumetric) structure in four-dimensional (or more complex) space. For example, corresponding to the fourth dimension mentioned at the beginning of the article, which follows from Newton's first law.

But to know and understand all this will require serious scientific research.

5. Conclusion

Thus, the really existing physical world turned out to be in many ways different from the way it is explained in the version of STR studied in physics textbooks. However, although over the past hundred years since the creation of this STR, much has been refuted, the content of the sections of physics textbooks that present it has not essentially changed. Its main difference

from pre-existing classical physics is its use of the principle of relativism. But all the formulas obtained in SRT using the principle of relativism nevertheless turned out to be incorrect. And even the creators of this theory themselves could not explain them. Moreover, these formulas are not explained in textbooks even now.

Therefore, Albert Einstein, in his version of STR, in order to make it explainable, had to prove not physical reality, but, on the contrary, the physical unreality of imaginary numbers. And for this it was necessary that this physical unreality of imaginary numbers should follow from something indisputably true. And as such an initial supposedly indisputably true truth, a postulate was used, called the principle of not exceeding the speed of light.

But at the same time, Albert Einstein ignored the fact that in fact there are many well-known processes in nature - tsunamis, Indian summers, bell ringing, music created by a piano, and even swings swinging on the playground after a push from parents - proving the physical reality of imaginary numbers.

Albert Einstein also ignored the fact that back in 1897, Charles Proteus Steinmetz, in his proposed interpretation of Ohm's law, had essentially already proven the physical reality of imaginary numbers. Since his theory stated that the imaginary resistances $-j/\omega C$ of capacitors and $+j\omega L$ of inductors actually physically exist. And since then, radio engineers have never had the slightest reason to doubt it, since when the frequency of a sinusoidal voltage applied to any electrical *L**C**R*-circuit changes, the amount of current flowing through it always changes. This fact, which occurs in the practical activities of radio engineers literally at every step, is an extremely simple, absolutely understandable and irrefutable proof of the physical reality of imaginary numbers.

Nevertheless, Albert Einstein still needed to somehow doubt this in his proposed version of STR. Otherwise, it would be necessary to admit that the creators of this version of STR are unable to explain the obtained relativistic formulas in the hyperluminal speed range $v > c$. And then this theory, which even its creators could not explain, would naturally be of no use to anyone. That is why a postulate, was introduced into the STR, called the principle of not exceeding the speed of light, from which a conclusion was made about the physical unreality of imaginary numbers, which was not confirmed by any experiments. This made it possible not to explain relativistic formulas in the hyperluminal speed range $v > c$. Therefore, despite the fact that Albert Einstein was nominated for the Nobel Prize 66 times for the creation of STR, due to the lack of any experimental evidence of its truth, he never received it for his version of this theory.

In order to prove the denial of the physical reality of imaginary numbers in the incorrect version of special relativity, relativistic physicists had to undertake enormous and costly efforts. In particular, to create at least illusion of the impossibility of refuting the STR's assertion of the physical unreality of imaginary numbers, on the Large Hadron Collider (worth ten billion dollars) a collaboration OPERA, which included more than one hundred of the most authoritative professors-physicists,

for almost 15 years (2003-2018) was the unsuccessful physical experiment OPERA, which aimed to prove the physical reality of imaginary numbers but failed to do so. And thereby supposedly proved the impossibility of refuting the assertion about the physical unreality of imaginary numbers. In 2011, it was even announced that the OPERA experiment had been sensationally successful, but then half a year later in 2012, the OPERA experiment was refuted by another ICARUS experiment on the same Large Hadron Collider

Therefore, physicists are still ignoring publications that cite simple and comprehensible radio-technical experiments successfully proving the physical reality of imaginary numbers and explaining that if the imaginary numbers were, as claimed in the incorrect version of STR, physically unrealistic, there should be nor radio nor computer technics.

Moreover, because of the assertion of the physical unreality of imaginary numbers and thus of the existence in nature of our only visible universe, it has become apparent that there was no place for antimatter and tachyons in this only visible universe. Although their existence in nature was not denied. And where they are located is explained only by the corrected version of the corrected version of STR.

It also transpired that, because of the assertion of the physical unreality of imaginary numbers and therefore of the existence in nature of our only visible universe, the phenomena of dark matter and dark energy had never been and would never be explained, because the dark matter and dark energy are, according to the corrected version of the STR, all reciprocally invisible universes and anti-universes existing outside our visible universe in the hidden Multiverse.

More than 200,000 anomalous zones have been discovered on Earth, which are entrances of portals to the planets of not only our Solar System, but also other star systems in the hidden Multiverse and even in the Hyperverse. And it also proves the existence of other universes and anti-universes. Moreover, in the existence of these invisible outside the portals of of universes and anti-universes can be ascertained by astronomical observations of the star sky in portals. But these low-cost astronomical observations, which would allow for sensational scientific discoveries of other universes and anti-universes, are still not being made, probably because of the fear that invisible neighboring universes and antuniverses ones will be discovered. And then the version of the STR studied in textbooks on physics would have to be undeniably disbelieved.

The version of STR taught in physics textbooks also leads to the conclusion that time travel is impossible for humans. Although, in fact, millions of air passengers already make such time travel every day, as evidenced by the fact that passengers of planes reset their clocks to local time after landing. However, since such time travel by air passengers occurs simultaneously with long distances travel, it is currently not used. The article explains how, through quasi-round-the-world

flights, time travel may become physically and technically feasible.

Less-expensive radiotelephone time travel is also possible, and once it's in demand, it could be implemented quickly and inexpensively. This would make it possible to communicate and exchange information with people (including oneself) in the past or future relative to our own time.

And, finally, among other things, such quasi-round-the-world time travel will prove that our Earth is much more complex than is explained by modern science. It is probably a three-dimensional spiral structure⁵¹ in four-dimensional space, the existence of which follows from Newton's first law.

References:

1. Larmor J.J. (1897). A Dynamical Theory of the Electric and Luminiferous Medium. Part III. Relations with Material Media. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences. 190, 205-300.
2. Lorentz H.A. (1899). Simplified Theory of Electrical and Optical Phenomena in Moving Systems. Proceedings of the Netherlands Academy of Arts and Science. Amsterdam. 1, 427-442.
3. Poincaré H. (1905). On the Dynamics of the Electron. Comptes Rendus. 140. 1504-1508.
4. Einstein A. (1905). Zur Elektrodynamik bewegter Körper. Annals of Physic. 17. 891-921.
5. Terletsky Ya. P. (1966). Paradoxes of the theory of relativity. Nauka Publishing House. Moscow. (In Russian)
6. Logunov A. A. (1987). Lectures on the theory of relativity and gravitation. Nauka Publishing House. Moscow. (In Russian)
7. Atsyukovsky V. A. (2003). General ether dynamics. Energoatomizdat. Moscow. (In Russian)
8. Kalinin S. A. (2003). Einstein's cardinal errors. Editorial Urss Publishers. Moscow. (In Russian)
9. Arteha S. H. (2007). Critique of the foundations of the theory of relativity. 2nd ed. LKI Publishing House. Moscow. (In Russian)
10. Antonov A. A. (2025). Time Travels are Already Possible Nowadays. European Journal of Applied Sciences. Services for science and education. U.K. 13(03). 47-70. DOI: 10.14738/aivp.1303.18764.
11. Antonov A. A. (2025). Time travels are already possible for people on Earth. German International Journal of Modern Science. 104. 64-76. DOI: 10.5281/zenodo.15480577
12. Antonov A. A. (2025). Discovery of the possibility for people on Earth of time travels. Norwegian Journal of development of the International Science. 156. 84-98. <https://doi.org/10.5281/zenodo.15397809>
13. Antonov A. A. (2025). The discovery of physically real time travels. Journal of Science. Lyon. 66. 33- 48. <https://doi.org/10.5281/zenodo.15584655>

⁵¹ A one-dimensional (in the form of a line) spiral is, for example, the well-known Archimedes spiral. A two-dimensional (in the form of a tape) spiral of Archimedes is a medical bandage or medical plaster in three-dimensional space. And our

Earth is a three-dimensional Archimedes spiral made in a similar way in four-dimensional space, the existence of which follows from Newton's first law.

14. Antonov A. A. (2025). The physical reality of time travels available to people. *Annali d'Italia*. 67. 58-72. DOI: 10.5281/zenodo.15545211
15. Antonov A. A. (2025). The physical possibility for people on Earth of time travel. The scientific heritage. 163. 44-58. DOI: 10.5281/zenodo.15728017
16. Antonov A. A. (2025). Proof of the physical reality of time travels available to humans. *Danish Scientific Journal*. 96. 72-86. <https://doi.org/10.5281/zenodo.15553087>
17. Antonov A. A. (2025). Discovery of the possibility for people on Earth of time travels. *International independent scientific journal*. 74. 37- 52. <https://doi.org/10.5281/zenodo.15634030>
18. Antonov A. A. Time travels is now physically possible. XX international scientific conference "The modern vector of the development of science". Philadelphia. USA. 12-13.06.2025. DOI: <https://doi.org/10.5281/zenodo.15691366>
19. Antonov A. A. The physical possibility for people on Earth of time travels. *Polish journal of Science*. 87. 39-53. DOI: 10.5281/zenodo.15700637
20. Antonov A. A. Time travels is now physically possible. XVI international scientific conference "Theoretical and practical perspectives of modern science". Stockholm. Sveden. 27-28.05.2025. DOI: <https://doi.org/10.5281/zenodo.15577281>
21. Antonov A. A. The discovery of physical possibility of time travels. II International Scientific Conference "Expanding knowledge through interdisciplinary research". Sydney. Australia. 15-16.05.2025.2. DOI: <https://doi.org/10.5281/zenodo.1549756>
22. Antonov A.A. (2021). The special theory of relativity stated in physics textbooks is incorrect. 77th International Scientific Conference of the Eurasian Scientific Association "Theoretical and practical issues of modern science". Moscow. ESA. 11-15. (In Russian)
23. Antonov A. A. (2021). Version of the special theory of relativity that is studied in all physics textbooks is incorrect. *Österreichisches Multiscience Journal* (Innsbruck, Austria). 43(1). 17-22. <http://osterr-science.com>
24. Antonov A. A. (2021). The fallacy of the STR version studied in physics textbooks proved experimentally. *Österreichisches Multiscience Journal* (Innsbruck, Austria). 45(1). 17-26.
25. Antonov A. A. (2021). Generally accepted version of the special theory of relativity contained in physics textbooks is incorrect. The scientific heritage. (Budapest, Hungary). 7 3(2). 39-43. DOI: 10.24412/9215-0365-2021-73-2-39-43
26. Antonov A. A. (2021). Special theory of relativity presented in physics text-books is wrong. *Norwegian Journal of development of the International Science* 68(1). 3-7. DOI: 10.24412/3453-9875-2021-68-3-7.
27. Antonov A. A. (2021). In all physics textbooks an erroneous version of special theory of relativity is given. *International independent scientific journal*. 31.34-39 <http://www.iis-journal.com>
28. Antonov A. A. (2021). All physics textbooks study incorrect special theory of relativity. *Sciences of Europe*. (Praha, Czech Republic) 79(1). 30-35. DOI: 10.24412/3162-2364-2021-79-30-35
29. Antonov A. A. (2021). Special theory of relativity, which is studied in physics text-books, is incorrect. *German International Journal of Modern Science*. 16, 49-53. DOI: 10.24412/2701-8369-2021-16-49-53
30. Antonov A. A. (2021). Special theory of relativity, which is studied in all physics textbooks, is incorrect. *Danish Scientific Journal*. 51(1). 31-35. <http://www.danish-journal.com>
31. Antonov A. A. (2021). Special theory of relativity taught in all physics text-books is incorrect. *Annali d'Italia*. 22(1). 39-44. <https://www.anditalia.com/>
32. Antonov A. A. (2021). Special theory of relativity taught in physics textbooks is wrong. *Journal of science*. Lyon. 23. 47-52. <https://www.joslyon.com/>
33. Antonov A. A. (2021). Experimental proofs of infidelity of the version of the special theory of relativity studied in physics textbooks and the truth of its alternative version. 80th International Scientific Conference of the Eurasian Scientific Association "Development of science and education in the conditions of world instability". Moscow. ESA. 8-17. <https://esa-conference.ru/sborniki/?y=2021> (In Russian)
34. Antonov A. A. (2021). Experimental evidences for the fallacy of the STR version in the physics textbooks. *European Journal of Applied Sciences*. Services for Science and Education. UK. 9(6). 349-364. DOI: 10.14738/aivp.96.11304.
35. Antonov A. A. (2021). If the STR version in physics textbooks were true, we would never have heard the music of the piano and the bell ringing, there would be no television, no cellular telephony, no radar or GPS navigation, we would not even be aware of the existence of resonance and Ohm's law as interpreted by Steinmetz, and our children could not swing on the swings. The scientific heritage (Budapest, Hungary). 78(2). 41-50. DOI: 10.24412/9215-0365-2021-78-2-41-50
36. Antonov A. A. (2021). The STR version in physics textbooks must be corrected, because if it were true, there would be no tsunamis or indian summer in nature, we would be never have heard piano music, engineers would be not have been able to create television, cell phones, GPS trackers, and even children would not be able to swing on swings. *Danish Scientific Journal*. 54(1). 29-38. <http://www.danish-journal.com>
37. Antonov A. A. (2021). Experimental refutations of the STR version contained in physics textbooks and confirmations of the truth of its alternative version. *German International Journal of Modern Science*. 22. 52-61. DOI: 10.24412/2701-8369-2021-22-52-61
38. Antonov A. A. (2021). Experimental evidence of the incorrectness of the STR version studied in physics textbooks. *Annali d'Italia*. 25(1). 32-41. <https://www.anditalia.com/>
39. Antonov A. A. (2021). The incorrectness of the STR version presented in physics textbooks proven experimentally. *Norwegian Journal of development of the International Science*. 74(1). 3-7. DOI: 10.24412/2453-9875-2021-74-53-62.
40. Antonov A. A. (2021). Experimental refutations of the generally accepted version of the STR studied in physics textbooks. *International independent scientific journal*. 34(1). 23-32. <http://www.iis-journal.com>

41. Antonov A. A. (2021). Experimental refutations of the STR version in the physics textbooks. *Journal of science*. Lyon. 26(1). 29-37. <https://www.joslyon.com/>
42. Antonov A. A. (2021). Experimental evidences for the fallacy of the STR version in physics textbooks. *Sciences of Europe (Praha, Czech Republic)*. 82(2). 19-28. DOI: 10.24412/3162-2364-2021-82-2-19-28
43. Antonov A. A. (2021). The version of STR stated in physics textbooks is incorrect, as it denies the existence of radio engineering. 82nd International Scientific Conference of the Eurasian Scientific Association "Scientific results in theory and practice". Moscow. ESA. 11-15. (In Russian). <https://esa-conference.ru/sborniki/?y=2021>
44. Antonov A. A. (2022). The version of STR presented in physics textbooks is incorrect, since it follows from it that radio engineering should not exist. *European Journal of Applied Sciences. Services for Science and Education*. UK. 10(1). 440-445. DOI://doi.org/10.14738/aivp.101.2022
45. Antonov A. A. (2022). The existence of radio engineering refutes the physics textbooks' version of STR. *The scientific heritage*. (Budapest, Hungary). 83(1). 19-22. DOI: 10.24412/9215-0365-2022-83-1-19-22
46. Antonov A.A. (2022). The fundamental Ohm's law in radio engineering as interpreted by Steinmetz, which proves the physical reality on imaginary capacitive and inductive reactances, refuted the version of the STR presented in physics textbooks even before its creation. *German International Journal of Modern Science*. 26. 50-53. DOI: 10.24412/2701-8369-2022-26-50-63
47. Antonov A.A. (2022). The version of STR stated in physics textbooks is refuted by the existence of radio engineering. *Danish Scientific Journal*. 56. 56-59. <http://www.danish-journal.com>
48. Antonov A.A. (2022). The version of STR presented in physics textbooks is incorrect because it denies the possibility of the existence of Ohm's law as interpreted by Steinmetz and, consequently, the existence of radio engineering. *Annali d'Italia*. 28(1), 43-47. <https://www.anditalia.com/>
49. Antonov A.A. (2022). The version of STR stated in physics textbooks is refuted by the existence of radio engineering. *Norwegian Journal of development of the International Science*. 78(1). 63-67. DOI: 10.24412/3453-9875-2022-78-63-66.
50. Antonov A.A. (2022). If the physics textbook version of STR were true, then Ohm's law should not exist in nature, and therefore all radio engineering would not exist. *International independent scientific journal*. 36. 16-19. <http://www.iis-journal.com>
51. Antonov A.A. (2022). If the version of STR in physics textbooks were true, then there would be no radar, no television, no radio navigation, no telecommunication and many other things. *Journal of science*. Lyon. 28. 76-79. <https://www.joslyon.com/>
52. Antonov A.A. (2022). The version of STR set out in physics textbooks is incorrect because it states that Ohm's law as interpreted by Steinmetz does not really exist, and therefore radio engineering does not exist either. *Sciences of Europe (Praha, Czech Republic)*. 87(1). 54-57. DOI: 10.24412/3162-2364-2022-1-54-57
53. Antonov A.A. (2022). The version of STR set out in physics textbooks is in-correct because it states that Ohm's law as interpreted by Steinmetz does not really exist, and therefore radio engineering does not exist either. *Sciences of Europe (Praha, Czech Republic)*. 87(1). 54-57. DOI: 10.24412/3162-2364-2022-1-54-57
54. Antonov A.A. (2022). Why the physics textbooks teach an incorrect version of the special theory of relativity which denies the existence of radio- and electrical engineering. III international scientific conference "Challenges and problems of modern science." London. Great Britain. 78-86. DOI: <https://doi.org/10.528/zenodo.7486814>
55. Steinmetz C. P. (2010). *Theory and Calculation of Electric Circuit*. Nabu Press. Charlstone.
56. Cherenkov P.A. (1959). Radiation of particles with superluminal speed and some applications of this radiation in experimental physics. *Advances in Physical Sciences*. 68(3). 377-386. (In Russian). DOI: <https://doi.org/10.3367/UFNr.0068.195907b.0377>
57. Adam T., Agafonova N., Aleksandrov A. et al. (2012). Measurement of the neutrino velocity with the OPERA detector in the CNGS beam. arxiv: 1109.4897v4 [hep-ex].
58. Antonov A. A. (2008). Physical Reality of Resonance on Complex Frequencies. *European Journal of Scientific Research*. 21(4). 627-641.
59. Antonov A. A. (2009). Resonance on Real and Complex Frequencies. *European Journal of Scientific Research*. 28(2). 193-204.
60. Antonov A. A. (2010). New Interpretation of Resonance. *International Journal of Pure and Applied Sciences and Technology*. 1(2). 1-12. http://doi.org/10.17686/sced_rusnauka_2010-888
61. Antonov A. A. (2010). Oscillation processes as a tool of physics cognition. *American Journal of Scientific and Industrial Research*. 1(2). 342-349. doi: 10.5251/ajsir.2010.1.2.342.349
62. Antonov A. A. (2010). Solution of algebraic quadratic equations taking into account transitional processes in oscillation systems. *General Mathematics Notes*. 1(9). 11-16. http://doi.org/10.17686/sced_rusnauka_2010-887
63. Antonov A. A. (2013). Physical Reality of Complex Numbers. *International Journal of Management, IT and Engineering*. 3(4). 219-230. http://doi.org/10.17686/sced_rusnauka_2013-898
64. Antonov A. A. (2015). Physical reality of complex numbers is proved by research of resonance. *General Mathematics Notes*. 31(2). 34-53. http://www.emis.de/journals/GMN/yahoo_site_admin/assets/docs/4GMN-9212-V31N2.1293701.pdf
65. Antonov A.A. (2015). Principle of physical reality of imaginary and complex numbers in the modern cosmology: the nature of dark matter and dark energy. *Journal of the Russian physico-chemical Society*. 87(1). 328-355. http://doi.org/10.17686/sced_rusnauka_2015-1119
66. Antonov A. A. (2016). Physical Reality and Nature of Imaginary, Complex and Hypercomplex

Numbers. General Mathematics Notes. 35(2). 40-63. http://www.geman.in/yahoo_site_admin/as-sets/docs/4_GMN-10932-V35N2.31895146.pdf

67. Antonov A.A. (2017). The physical reality and essence of imaginary numbers. Norwegian Journal of development of the International Science. 6. 50-63. <http://www.njd-iscience.com>

68. Antonov A. A. (2024). Physical reality of imaginary numbers and their physical essence. Danish Scientific Journal. 80. 25-35. <https://doi.org/10.5281/zenodo.10594282>

69. Antonov A. A. (2024). Proof of physical reality of imaginary numbers and explanation of their physical essence. German International Journal of Modern Science. 72. 17-27.

70. Anonov A. A. (2024). Physical reality of imaginary numbers and their physical essence. Sciences of Europe. (Praha, Czech Republic). 133(1). 79-90. DOI: 10.5281/zenodo.10575590

71. Antonov A. A. (2024). Physical reality of imaginary numbers and their physical essence. The scientific heritage. (Budapest, Hungary). 129. 43-53. DOI: 10.5281/zenodo.10558263

72. Antonov A. A. (2024). Proving Physical Reality and Explaining the Physical Essence of Imaginary Numbers. European Journal of Applied Sciences. Services for Science and Education. UK. 12(2). 362-381. DOI: 10.14738/aivp.122.16273

73. Antonov A. A. (2024). Proving Physical Reality and Explaining Physical Essence of Imaginary Numbers. Journal of science. Lyon. 50. 25-35. <https://doi.org/10.5281/zenodo.10609816>

74. Antonov A. A. (2024). Physical reality of complex numbers and their physical essence. International independent scientific journal. 58. 3-13. <https://doi.org/10.5281/zenodo.10491923>

75. Antonov A. A. (2024). Proof of physical reality of imaginary numbers and explanation of their physical essence. Annali d'Italia. 51, 25-35. DOI: 10.5281/zenodo.10573831

76. Antonov A. A. (2011). Structure of the Multiverse. British Journal of Science. 2(2). 51-60. http://doi.org/10.17686/sced_rusnauka_2011892

77. Antonov A. A. (2012). Multiverse. Time Travels. International Journal of Pure and Applied Sciences and Technology. 12(2). 43-56. http://doi.org/10.17686/sced_rusnauka_2012-896

78. Antonov A.A. (2012). Discovery of the real Multiverse. Encyclopaedia of Russian thought, Papers to the Russian Physical Society. 16(3). 3-20. (In Russian). http://doi.org/10.17686/sced_rusnauka_2012-1115

79. Antonov A.A. (2013). Cognition of the Multiverse as a factor in accelerating the development of human civilisation. Journal of Russian physical thought. 1-12, 6-77. http://doi.org/10.17686/sced_rusnauka_2011-1117. (In Russian)

80. Antonov A. A. (2015). Hidden Multiverse. International Journal of Advanced Research in Physical Science. 2(1). 25-32. http://doi.org/10.17686/sced_rusnauka_2015-903.

81. Antonov A.A. (2015). The astrophysical phenomenon of dark matter and dark energy proves the existence of the hidden Multiverse. American Journal of Modern Physics. 4(4). 180-188. doi: 10.11648/j.jamp.20150404.14

82. Antonov A. A. (2015). Why dark matter and dark energy are invisible? Optics. 4(6), 43-47. doi: 10.11648/j.optics.20150406.12

83. Antonov A. A. (2016). Stargates of the hidden Multiverse. Philosophy and cosmology. 6. 11-27. (In Russian) <http://ispcjournal.org/journals/2016-16/Antonov16.pdf>

84. Antonov A. A. (2016). What Physical World do We Live in? Journal of Modern Physics. 7(14). 1933-1943. <http://dx.doi.org/10.4236/jmp.2016.714170>

85. Nicolson I. (2007). Dark Side of the Universe: Dark Matter, Dark Energy, and the Fate of the Cosmos. Johns Hopkins University Press. Baltimore.

86. Ruiz-Lapuente, P. Ed. (2010). Dark Energy: Observational and Theoretical Approaches. Cambridge university press. Cambridge. UK.

87. Amendola L., Shinji T.S. (2010). Dark Energy: Theory and Observations. Cambridge university press. Cambridge. UK.

88. Bertone G. Ed. (2013). Particle Dark Matter: Observations, Models and Searches. Cambridge university press. Cambridge. UK.

89. Sanders R.H. (2014). The dark matter problem: a historical perspective. Cambridge university press. Cambridge. UK.

90. Tyson N. de Grasse. (2017). Astrophysics for People in a Hurry. W. W. Norton & Company. NY. London.

91. Antonov A.A. (2022). Dark Matter and Dark Energy, Which are Inexplicable in the Microcosm, are Mutually Invisible Universes and Anti-universes of the Hidden Multiverse. European Journal of Applied Sciences, Services for Science and Education. UK. 13(06). 84-107. DOI: 10.14738/aivp.1306.19658.

92. Antonov A. A. 2025. Dark matter and dark energy are mutually invisible universes and anti-universes of the hidden Multiverse. German International Journal of Modern Science. 113. 27- 42. DOI: 10.5281/zenodo.17286973

93. Antonov A. A. 2025. Dark matter and dark energy are invisible universes and anti-universes of the hidden Multiverse. Journal of science. Lyon. 71. 38-52. <https://doi.org/10.5281/zenodo.17533496>

94. Antonov A. A. 2025. Dark matter and dark energy are mutually invisible universes and anti-universes of the hidden Multiverse. Annali d'Italia. 72. 28-42. DOI: 10.5281/zenodo.17463768

95. Antonov A. A. 2025. Dark matter and dark energy, which are inexplicable in the microcosm, are universes and anti-universes of the hidden Multiverse. XVIII International Scientific and Practical Conference "Theoretical and practical perspectives of modern science". 28-29.10.2025, Stockholm. Swe-den. 69-86. DOI: <https://doi.org/10.5281/zenodo.17513357>

96. Hinshaw G., Larson D., Komatsu E., et al. (2013) Nine Year Wilkinson Anisotropy Probe (WMAP) Observations: Cosmological Parameter Results. arXiv: 1213.5226 [astro-ph/CO].

97. Adam R., Ade P.A.R., Aghanim N., et al. (2015). Plank 2015 Results. 1. Overview of Products and Scientific Results. arXiv: 1502.01582v2 [astro-ph.CO].
98. Korn G., Korn T. (1968). Handbook of mathematics for scientists and engineers. Nauka Publishing House. Moscow. (In Russian)
99. Encyclopaedia of Mathematics. (1979). Edited by Vinogradov I. M. Vol. 2. Publishing house "Soviet Encyclopaedia". Moscow. (In Russian)
100. Kantor I.L., Solodovnikov A.S. Hypercomplex Numbers. An Elementary Introduction to Algebras Springer. NY. 2011.
101. Chernobrov V. (2000). Encyclopaedia of mysterious places of the Earth. Veche Publishing House. Moscow. (In Russian)
102. Chernobrov V. (2004). Encyclopaedia of mysterious places of Russia. Veche Publishing House. Moscow. (In Russian)
103. Chernobrov V. (2007). Encyclopaedia of mysterious places of the Earth and space. Veche Publishing House. Moscow. (In Russian)
104. Chernobrov V. (2009). Encyclopaedia of mysterious places of Moskva and Moscow region. Helios ARV. Moscow. (In Russian)
105. Antonov A. A. (2020). How to See Invisible Universes. Journal of Modern Physics. 11(05), 593-607. DOI: 10.4236/jmp.2020.115039
106. Antonov A. A. (2020). Universes Being Invisible on Earth outside the Portals Are Visible in Portals. Natural Science. 12(8). 569-587. <https://doi.org/10.4236/ns.2020.128044>
107. Antonov A. A. (2020). Invisible universes can be seen in anomalous zones. Danish Scientific Journal. 43(1). 9-24. <http://www.danish-journal.com>
108. Antonov A. A. (2024). Existence of other mutually invisible universes adjacent to our visible universe can be experimentally proven by astronomical observations in the portals of constellations invisible outside the portals. German International Journal of Modern Science. 92. 67-80. DOI: 10.5281/zenodo.14181333
109. Antonov A. A. (2024). Experimental evidence for the existence of other mutually invisible universes neighboring our visible universe. European Journal of Applied Sciences. Services for Science and Education. UK. 12(5). 385-408. DOI: 10.14738/aijp.125.17785.
110. Antonov A. A. (2024). Experimentally proved and actually physically existing imaginary numbers as a tool to explain the principle of relativism in STR. Norwegian Journal of development of the International Science. 144. 69-82. <https://doi.org/10.5281/zenodo.14169132>
111. Antonov A. A. (2020). Can invisible universes be seen? International independent scientific journal. 21(2). 51-60. <http://www.iis-journal.com>
112. Antonov A. A. (2020). How to discover invisible universes. Norwegian Journal of development of the International Science. 42(1). 36-48. <http://www.njd-iscience.com>
113. Antonov A. A. 2024. Proof of the existence of other mutually invisible universes neighboring to our visible universe by astronomical observations in the portals of constellations invisible outside the portals. Sciences of Europe (Praha, Czech Republic). 153. 93-106. DOI: 10.5281/zenodo.14227583
114. Antonov A. A. (2021). Invisible universes can be seen in anomalous zones. International independent scientific journal. 23(1). 28-44.
115. Antonov A. A. (2024). Proof of the existence of other mutually invisible universes neighboring to our visible universe by astronomical observations in the portals of constellations invisible outside the portals. Annali d'Italia. 61. 43-57. DOI: 10.5281/zenodo.14230824
116. Antonov A. A. (2024). Proof of the existence of other mutually invisible universes neighboring to our visible universe. Danish Scientific Journal. 90. 111-125. <https://doi.org/10.5281/zenodo.14236925>
117. Antonov A. A. (2024). Discovery of other constellations in portals that are invisible outside the portals is experimental proof of the existence of mutually invisible universes adjacent to our visible universe. Polish journal of Science. 80. 24-38. DOI: 10.5281/zenodo.14176574
118. Antonov A. A. (2024). It is possible to prove the existence of other mutually invisible universes adjacent to our visible universe by astronomical observations in the portals of constellations that are invisible outside the portals. Slovak international scientific journal (Bratislava, Slovakia). 89. 51-65. DOI: 10.5281/zenodo.14167109
119. Antonov A. A. (2024). Experimentally proved and actually psychically existing imaginary numbers as a tool to explain the principle of relativism in STR. The scientific heritage (Budapest, Hungary). 149. 50-63. DOI: 10.5281/zenodo.14214530
120. Antonov A. A. (2024). Existence of other mutually invisible universes adjacent to our visible universe can be experimentally proven by astronomical observations in the portals of constellations invisible outside the portals. International independent scientific journal. 67. 29-42. <https://doi.org/10.5281/zenodo.14055388>
121. Antonov A. A. (2024). Besides our visible universe, there are other invisible universes. Journal of Science. Lyon. 59. 13-26. <https://doi.org/10.5281/zenodo.14049575>
122. Antonov A. A. (2024). Discovery of constellations in portals that are invisible outside the portals proves the existence of mutually invisible universes adjacent to our visible universe. Sciences of Europe (Praha, Czech Republic). 94. 34- 48. DOI: 10.5281/zenodo.14167218
123. Antonov A. A. (2020). How to See Invisible Universes. Journal of Modern Physics. 11(05), 593-607. DOI: 10.4236/jmp.2020.115039
124. Antonov A. A. (2020). Universes Being Invisible on Earth outside the Portals Are Visible in Portals. Natural Science. 12(8). 569-587. <https://doi.org/10.4236/ns.2020.128044>
125. Antonov A. A. (2020). Invisible universes can be seen in anomalous zones. Danish Scientific Journal. 43(1). 9-24. <http://www.danish-journal.com>
126. Antonov A. A. (2024). Existence of other mutually invisible universes adjacent to our visible universe can be experimentally proven by astronomical

observations in the portals of constellations invisible outside the portals. German International Journal of Modern Science. 92. 67-80. DOI: 10.5281/zenodo.14181333

127. Antonov A. A. (2024). Experimental evidence for the existence of other mutually invisible universes neighboring our visible universe. European Journal of Applied Sciences. Services for Science and Education. UK. 12(5). 385-408. DOI: 10.14738/aivp.125.17785.

128. Antonov A. A. (2024). Experimentally proved and actually physically existing imaginary numbers as a tool to explain the principle of relativism in STR. Norwegian Journal of development of the International Science. 144. 69-82. <https://doi.org/10.5281/zenodo.14169132>

129. Antonov A. A. (2020). Can invisible universes be seen? International independent scientific journal. 21(2). 51-60. <http://www.iis-journal.com>

130. Antonov A. A. (2020). How to discover invisible universes. Norwegian Journal of development of the International Science. 42(1). 36-48. <http://www.njd-iscience.com>

131. Antonov A. A. 2024. Proof of the existence of other mutually invisible universes neighboring to our visible universe by astronomical observations in the portals of constellations invisible outside the portals. Sciences of Europe (Praha, Czech Republic). 153. 93-106. DOI: 10.5281/zenodo.14227583

132. Antonov A. A. (2021). Invisible universes can be seen in anomalous zones. International independent scientific journal. 23(1). 28-44.

133. Antonov A. A. (2024). Proof of the existence of other mutually invisible universes neighboring to our visible universe by astronomical observations in the portals of constellations invisible outside the portals. Annali d'Italia. 61. 43-57. DOI: 10.5281/zenodo.14230824

134. Antonov A. A. (2024). Proof of the existence of other mutually invisible universes neighboring to our visible universe. Danish Scientific Journal. 90. 111-125. <https://doi.org/10.5281/zenodo.14236925>

135. Antonov A. A. (2024). Discovery of other constellations in portals that are invisible outside the portals is experimental proof of the existence of mutually invisible universes adjacent to our visible universe. Polish journal of Science. 80. 24-38. DOI: 10.5281/zenodo.14176574

136. Antonov A. A. (2024). It is possible to prove the existence of other mutually invisible universes adjacent to our visible universe by astronomical observations in the portals of constellations that are invisible outside the portals. Slovak international scientific journal (Bratislava, Slovakia). 89. 51-65. DOI: 10.5281/zenodo.14167109

137. Antonov A. A. (2024). Experimentally proved and actually psychically existing imaginary numbers as a tool to explain the principle of relativism in STR. The scientific heritage (Budapest, Hungary). 149. 50-63. DOI: 10.5281/zenodo.14214530

138. Antonov A. A. (2024). Existence of other mutually invisible universes adjacent to our visible universe can be experimentally proven by astronomical observations in the portals of constellations invisible

outside the portals. International independent scientific journal. 67. 29-42. <https://doi.org/10.5281/zenodo.14055388>

139. Antonov A. A. (2024). Besides our visible universe, there are other invisible universes. Journal of Science. Lyon. 59. 13-26. <https://doi.org/10.5281/zenodo.14049575>

140. Antonov A. A. (2024). Discovery of constellations in portals that are invisible outside the portals proves the existence of mutually invisible universes adjacent to our visible universe. Sciences of Europe (Praha, Czech Republic). 94. 34- 48. DOI: 10.5281/zenodo.14167218

141. Antonov A. A. (2025). Discovery of constellations in portals that are The physical ability to bring a person who has died, for example as a result of an accident or a crime, back to life. Polish journal of Science. 89(1). 36-39. DOI: 10.5281/zenodo.16917782

142. Antonov A. A. (2025). The use of the laws of physics allows a person who has died, for example, as a result of an accident or crime, to be brought back to life. European Journal of Applied Sciences. Services for Science and Education. UK. 13(04). 174-179. DOI: 10.14738/aivp.1304.19179.

143. Antonov A. A. (2025). By using the laws of physics, it is possible to bring back to life a person who has died, for example, as a result of an accident or crime. The scientific heritage. 166. 65-68. DOI: 10.5281/zenodo.1676353

144. Antonov A. A. (2025). It is physically possible to bring back to life a person who has died, for example, as a result of an accident or crime, using time travels. German International Journal of Modern Science. 109. 24-27. DOI: 10.5281/zenodo.16752567

145. Antonov A. A. (2025). The laws of physics allow a person who has died, for example, as a result of an accident or crime, to be brought back to life. Danish Scientific Journal. 98. 67-71. <https://doi.org/10.5281/zenodo.16615081>

146. Antonov A. A. (2025). It is physically possible to bring back to life a person who has died as a result of an accident or crime by using time travels. Annali d'Italia. 69. 46-49. DOI: 10.5281/zenodo.16419980

147. Antonov A. A. (2025). Possibility in accordance with the laws of physics, of bringing back to life people who have died as a result of accident and other causes by time travels using time zones on Earth. XVI International scientific conference. Beijing. China. "Science in modern society"22-23.07.2025. DOI: <https://doi.org/10.5281/zenodo.16562393>

148. Antonov A. A. (2025). How the laws of physics can be used to bring back to life a person who has died as a result of an accident or crime. Norwegian Journal of development of the International Science. 160. 69-72. <https://doi.org/10.5281/zenodo.15879906>

149. Antonov A. A. (2025). A person who has died in an accident or crime, for example, can be brought back to life through the use of time travels. International independent scientific journal. 76. 17-20. <https://doi.org/10.5281/zenodo.16778574>

150. Antonov A. A. (2025). The laws of physics allow a dead person to be brought back to life. Journal of Science. Lyon. 68.15-18. <https://doi.org/10.5281/zenodo.16758455>

151. Antonov A. A. (2025). The laws of physics allow by time travelling with using time zones on Earth to bring back to life people who died as a result of accidents, in war and for other reasons. XVII International scientific conference "Theoretical and practical perspectives of modern science". Stockholm. Sweden. 12-13.08.2025. DOI: <https://doi.org/10.5281/zenodo.16892861>

152. Antonov A. A. (2026). From the corrected version of the STR it follows that time travel for people on Earth is physically possible and technically feasible. European Journal of Applied Sciences. Services for Science and Education. UK. 14(01). 723-744. <https://doi.org/10.14738/aivp.1401.19957>

153. Antonov A. A. (2026). Time travels on Earth is already available to peoples. VI International scientific conference "Dialogue of Times: Past, Present, Future" Brussels. Belgium. DOI: <https://doi.org/10.5281/zenodo.19823915>

154. Antonov A. A. (2026). From the corrected version of the STR it follows that time travels is now available to people on Earth. Danish Scientific Journal my article.107. 74-88. DOI: <https://doi.org/10.5281/zenodo.19823915>

155. Antonov A. A. (2026). Time travel for people on Earth physically is possible and now already technically feasible. XXIII International Scientific Conference "Modern Science: Theoretical and Practical View". Madrid. Spain. 31.03-01.04.2026. DOI: <https://doi.org/10.5281/zenodo.19442313>

156. Antonov A. A. (2026). Time travel on Earth is available for use. Annali d'Italia. 76. 52- 65. DOI: [10.5281/zenodo.18803259](https://doi.org/10.5281/zenodo.18803259).

157. Antonov A. A. (2026). From the corrected version of the STR it follows that time travels is now available to people on Earth. XIX international scientific conference. "Questions. Hypotheses. Answers: science XXI century". Toronto. Canada. 17-18.03.2026 DOI: <https://doi.org/10.5281/zenodo.19188055>.

158. Antonov A. A. (2026). How to call yourself to yesterday? Norwegian Journal of development of the International Science. 172. 23-36. <https://doi.org/10.5281/zenodo.18268393>

159. Antonov A. A. (2026). Time travels according to the corrected version of STR is physically feasible" in the XXIII international scientific conference "The modern vector of the development of science". Philadelphia. USA. 29-30.01.2026. DOI: <https://doi.org/10.5281/zenodo.18472454>

160. Antonov A. A. (2026). Time travels is already technically feasible for people on Earth" in the VI international scientific conference" Innovative scientific forum". Helsinki. Finland. 02-03.04.2026. DOI: <https://doi.org/10.5281/zenodo.19460273>

161. Antonov A. A. (2026). Time travel on Earth is physically and technically feasible. Journal of Science. Lyon. 75. 28-41. <https://doi.org/10.5281/zenodo.18888329>

162. Antonov A. A. (2026). Time travels according to the corrected version of the special relativity theory. XIX International Scientific and Practical Conference "Theoretical and practical perspectives of modern science", 13-14.01.2026., Stockholm. Sweden. DOI: <https://doi.org/10.5281/zenodo.18303431>

SOCIAL SCIENCES

CRISIS MANAGEMENT CHALLENGES IN SPORTING EVENTS: THE CASE OF GEORGIA

Nutsubidze V.

*PhD student, Faculty of Business and Social Sciences,
Sokhumi State University, Tbilisi, Georgia
<https://doi.org/10.5281/zenodo.20691206>*

Abstract

History shows that organized sports have played an important role in the development of society, and from this beginning began the large-scale sports events industry. Today, organized sports competitions, or events, are simply big business. It is extremely important to properly conduct the complex process of sports event management. In this paper, we will consider a situation that disrupts the normal functioning of a sports event and has an uncertain, potentially negative, and damaging outcome. These are crisis situations that arise during an event. A crisis is an incident that can potentially disrupt the course of an event or damage its results. We have discussed the impact of international experience and practice in sports event management on the practice in the reality of Georgia. The study identified a number of shortcomings, which were reflected in the presented conclusions, and for their elimination, in our opinion, important recommendations were developed.

Keywords: sport events, crisis management challenges, solutions.

Introduction

History demonstrates that organized sport has played a significant role in the development of society, and it was from this foundation that the large-scale sports event industry emerged. Today, organized sports competitions, or sporting events, constitute a major business sector. This industry is so extensive that determining its full scale is difficult. Participation rates in certain sports are available and may be supplemented by annual growth percentages. Unfortunately, statistical data remain limited not only on a global scale, but even at the national level.

Participants in sporting events are often perceived solely as athletes competing in the event. However, the number of other “players” involved is equally important. The stakeholders listed below may also be considered participants, as the conduct of an event without them would be inconceivable. These include: players (athletes), officials (referees, registrars), support personnel (coaches, physicians, team managers, agents), suppliers (providers of event-related equipment and services, sponsors, security services, manufacturers of sports equipment), event management personnel, staff (stewards, kiosk and ticket vendors, ball boys, etc.), spectators, media representatives, and other stakeholders.

The proper management of the highly complex process of sports event administration is of paramount importance. The functions of sports event management include the fundamental principles of planning, organizing, staffing, leadership, and control. These functions extend to specific areas such as budgeting, venue selection, marketing, logistics, stakeholder relations, and post-event evaluation, all of which contribute to ensuring a successful, seamless, and memorable sporting experience from conception to completion.

This paper examines situations that disrupt the normal functioning of sporting events and produce uncertain, potentially negative, and harmful consequences. These situations are referred to as crises arising during sporting events. A crisis is an incident that

has the potential to disrupt the course of an event or damage its outcomes. Since certain crises are almost inevitable in the course of any event, their proper forecasting and management are of utmost importance. Crisis management must be conducted in accordance with the specific circumstances of each situation. Whenever people gather together, an element of risk always exists, and neglecting this important issue, or failing to plan for its management, may negatively affect not only the course and results of an event, but also the overall development of sport itself.

The literature review was conducted using the databases of Google Scholar, Research Gate, and Academia.edu. Twenty-two printed and electronic publications were selected for the study, involving scholars from ten countries. The review was guided by the following research question: what challenges does risk management face in sports event management?

Risks within the event industry may manifest in various forms. Some of these risks arise from potential violence, health and safety concerns, or sudden adverse weather conditions such as torrential rain, hurricanes, floods, earthquakes, and others.

Broad social divisions based on religion, culture, and race also affect sport (Ugwueze, 2017). In turn, Layman (2017) noted that there is always a tendency in sport to favor a particular team on the basis of tribe, race, skin color, or geographical location. He explained that, due to partisan and personal interests, some officials disregard the rules of the game and openly display biased interests by ignoring the opposing team, fans, and spectators, thereby placing the event in a state of crisis. Wamplew (2017) observed that local, national, and international hostilities are also transferred into sport. He emphasized that such developments not only provoke crises, but also hinder the development of sport itself [1, p. 99].

Every risk has a certain probability of occurrence. This probability is influenced by various factors, some of which are controllable, while others are beyond hu-

man control. Once a risk materializes, it creates problems for both the event and its organizers, leading to: a/ temporary suspension or termination of the event process, damage to or loss of the organizer's or venue's resources and other assets; b/ physical injury, health problems, or accidents affecting event participants, service personnel, or spectators; and c/ other adverse consequences.

Several researchers (Danielle La Gree, Douglas Wilbur, and Glen T. Cameron) study sports crisis strategy from both marketing and public relations perspectives. They described how strategic efforts protect a sports organization's reputation [2, p. 407].

Crisis management in sporting events involves a proactive, multi-stage process aimed at preparing for, responding to, and recovering from unexpected incidents. The stages of this process include:

1. Preparation and Prevention – identifying potential crises, establishing a crisis management team, developing a risk management plan, creating communication protocols, and conducting training sessions;
2. Response – prioritizing safety, acting quickly yet cautiously, ensuring effective communication, coordinating among stakeholders, and maintaining operations;
3. Post-crisis Analysis and Recovery – evaluating the response, updating protocols, providing support, and resolving critical issues.

Several authors describe the key components of a sports event crisis management plan. For example, Terrence A. Duncan, Ashlie Ardoin, Dr. Darrell Smith, et al from Grace Christian Academy consider the following key components:

1. Crisis Management Plan Personnel
2. Emergency Communications
3. Emergency Equipment
4. Roles of Licensed Sports Coaches, Student Coaches, Trainers, and Administrators
5. Event Venue Directions [3, p.3].

In developed countries, every sporting event, regardless of type or level, is managed by organizations possessing relevant expertise. For example, in the United States, the best sports event management organizations are identified annually based on their experience in planning and conducting sporting events of various scales and disciplines [4].

Best practices for emergency planning in sporting events have been established, including the development of comprehensive policies for specific risk management issues on the basis of the latest research. Sports Planning Guide highlights the importance of having an Emergency Action Plan (EAP) for a sports event. An EAP is the cornerstone of risk management in event planning. It outlines the procedures to follow during emergencies, ensuring a swift, organized response to medical emergencies, weather incidents, or security threats. The EAP serves as a blueprint for action, minimizing chaos and confusion during critical moments [5].

Some researchers have identified 15 risk issue categories: environment, financial, human resources, infrastructure, interdependence, legacy, media, operations, organizing, participation, political, relationships, sport, threats, and visibility [6, p.191].

It is important to understand the hierarchy of policies between the sports venue and the event organizer. Event organizers must ensure that their policies align with and complement the policies of the venue. Clear communication and cooperation with arena management help prevent conflicts and ensure consistent risk management practices.

A mixed-methods methodology was employed in the study, combining quantitative and qualitative approaches, since mixed methods are ideal for addressing complex research questions that require both numerical measurement and qualitative interpretation. This approach also strengthens the reliability and diversity of the research findings.

Existing data were utilized for the purposes of the study, as this approach is both economical and efficient, relying on previously completed research. Documents and records proved particularly valuable for historical analysis. The selected methodology is objective and relevant to the research problem under consideration, and this methodological choice corresponds well to the objectives of the study.

The study examined the influence of international experience and practices in sports event management on the existing practices within the Georgian context. The research identified a number of shortcomings, which are reflected in the conclusions presented herein and for the elimination of which, in our opinion, significant recommendations have been developed.

Since every event is unique, numerous risk factors exist. These factors must be individually assessed and carefully evaluated with consideration of the previous history of the same or similar events.

There is no dispute that sport carries a great mission in establishing peace and humanism on Earth. However, sport may also become a source of tragedy and significant loss of life. The history of crisis situations arising during sporting events is unfortunately extensive. It is sufficient merely to recall the major tragedies that have occurred in football stadiums.

For example, Glasgow's Ibrox Stadium witnessed several disasters during the previous century. The first tragedy occurred on April 5, 1902, during a match between England and Scotland, when one of the wooden stands collapsed under the weight of spectators, resulting in the deaths of 25 people and injuries to more than 500 others. A far more horrific tragedy occurred at Ibrox later, on January 2, 1971, during the country's principal derby between Rangers and Celtic, attended by nearly 80,000 supporters. A massive crowd crush resulted in the deaths of 66 people and injuries to more than 200 others.

In February 1981, a match between Olympiacos and AEK in the Greek Championship ended in tragedy. The hosts' victory was overshadowed by a crowd crush that killed 21 supporters, most of whom were adolescents.

On May 11, 1985, Bradford was expected to celebrate the success of the local football club competing in England's Third Division, but the sporting occasion was devastated by a fire at the stadium, which claimed the lives of 56 spectators and caused burn injuries to 265 others.

In April 1989, Liverpool's visit to Sheffield to play Nottingham Forest generated enormous excitement in the city. Demand for tickets significantly exceeded the seating capacity of Hillsborough Stadium. Minutes before the match began, thousands of ticketless supporters gathered around the stadium entrances. In an attempt to ease the situation, local police made the disastrous decision to disable the turnstiles and open the gates. Predictably, the crowd surged into the stadium, trampling everything in its path. The resulting crush led to 96 deaths and 766 injuries.

For similar reasons, 93 spectators died in Kathmandu in the spring of 1988. In this case, spectators were attempting to escape torrential rain rather than law enforcement officers, but only one of the stadium's eight exit gates was open.

Similar incidents have repeatedly occurred in Africa. One of the largest tragedies took place on May 9, 2001, during a match between Ghana's two most popular clubs, Accra Hearts and Asante Kotoko. As the home team was leading, enraged supporters of the visiting team began throwing plastic bottles and seats onto the field. In an attempt to restore order, police used tear gas, which triggered panic. Spectators rushed toward the exits, only to find the gates closed. The resulting stampede claimed 127 lives.

In 2012, disorder between rival supporters during a football match in Port Said, Egypt, resulted in the deaths of more than 70 people and injuries to over 1,000 others [7].

All these incidents should have served as historical lessons for both spectators and event organizers in order to prevent similar occurrences in the future. Unfortunately, this has not always been the case. Comparable incidents have recently occurred in Georgian stadiums as well.

For example, in 2024, the UEFA Disciplinary Committee fined the Georgian Football Federation €56,000 for disciplinary violations that occurred during the Georgia–Albania UEFA Nations League match. The federation was fined €14,000 for blocking public passageways, €12,000 for the use of lasers from the stands, and €30,000 for the use of pyrotechnics by fans [8].

Another incident occurred on March 23, 2025, following the football match between Georgia and Armenia. According to eyewitnesses, some supporters entered the field and clashed with Armenian fans, leading to the throwing of bottles. UEFA subsequently fined the Georgian Football Federation €40,000 for pitch invasion, the use of laser devices and pyrotechnics, as well as blocking exits. In addition, the Georgian national team was required to play one home match behind closed doors. Fortunately, these incidents did not result in fatalities, although many supporters sustained injuries and the organizers were sanctioned accordingly by UEFA's Disciplinary Committee [9].

It is evident that, in these cases, insufficient communication existed between event organizers, arena management, and law enforcement agencies for the purpose of preventing disciplinary violations among attendees.

Serious injuries and fatalities among athletes themselves are also not uncommon during sporting

events. Taking Georgia as an example, several sporting events have ended fatally. Among the most well-known and tragic cases involving Georgian athletes who died during competitions or training sessions are the following:

- Nodar Kumaritashvili (Luge): The most famous and tragic case occurred on the opening day of the 2010 Vancouver Winter Olympics. During a training run, he was thrown from his luge sled and collided with the track structure, dying from the injuries sustained.

- Giorgi Targamadze (Motorcycling): In 2021, he was involved in a fatal accident during a motorcycle race at the Rustavi International Motor Park.

- Otar Berianidze (Athletics – strength disciplines): In 2017, during an international tournament, he was struck by a barbell during the “Athletics Classic” competition and later died in hospital from his injuries.

- Giorgi Koberidze (Rugby): He died unexpectedly, because of heart attack, during training in January 2024 [10].

These cases underscore the critical importance of adhering to safety measures in sport. The causes of sports injuries may include: a/ improper or poor-quality training practices; b/ inadequate sports infrastructure and equipment; c/ insufficient monitoring of athletes' health; and d/ other related factors.

Conclusion

These incidents indicate that organizers failed to take existing risks into account and did not implement adequate preventive measures. Such incidents may be explained by the lack of appropriate knowledge and experience in sports event management, or by inadequate assessment of risk factors.

According to the Law of Georgia on Sport, “The National Sports Federation of Georgia is the sole governing body in the respective sport and is responsible for its development” [11]. Thus, the relevant sports federations are responsible for holding sporting events in Georgia.

It should also be noted that, under the same law [12], the competence of the Ministry of Sport in the field of sports is defined as follows: “coordination of the training, distribution, and retraining of personnel in the field of sport; organization of the certification of sports personnel and determination of their professional qualifications.” It appears that greater attention and stricter control from the Ministry are required regarding the certification of sports event organizers and the determination of their professional competence.

The successful organization of sporting events requires detailed planning, coordination, and an understanding of participation and engagement. Sports event management encompasses numerous aspects. Whether through innovative approaches or refinement of existing practices, understanding the full scope of sports and event management is the key to conducting events smoothly and successfully.

It is noteworthy that Article 21, Paragraph 7 of the Law of Georgia on Sport provides that: “An employment contract concluded by a professional athlete, in addition to conditions concerning sports activity and

1. Mong Emeka Usman, Tawo Moses Otu, et. al., (2022) Crisis Management in Sports and Sports Development, European Journal of Physical Education and Sport Science. [http://DOI: 10.46827/ejpe.v8i6.4445](http://DOI:10.46827/ejpe.v8i6.4445).
2. Danielle La Gree, Douglas Wilbur, Glen T. Cameron (2019), A Strategic Approach to Sports Crisis Management, International Journal of Sports Marketing and Sponsorship Vol. 20 No. 3, [http://DOI 10.1108/IJSMS-05-2018-0045](http://DOI10.1108/IJSMS-05-2018-0045).
3. Terrence A. Duncan, Ashlie Ardoin, Dr. Darrell Smith, et. al, (2025), Eagle Athletics Crisis Management Plan, Grace Christian Academy, Houston TX, https://www.gcahtx.com/editoruploads/files/Athletic_Crisis_Management_Plan.pdf.
4. Engine Marketing, Top 10 Sports Event Planning Companies Every Sports Team Should Know in 2025, July 21, 2025, <https://engine.com/business-travel-guide/top-sports-event-planning-companies-every-sports-team-should-know>
5. SPG (2025, November 2), Emergency Action Planning: Mitigating Risk in Sports Event Planning, <https://sportsplanningguide.com/emergency-action-planning-for-sports-events/>.
6. Dag Vidar Hanstad, Risk management in major sporting events: a participating national Olympic team's perspective, Event Management, Vol. 16, pp. 189–201, printed in the USA, <http://dx.doi.org/10.3727/152599512X13459279626683>.
7. Gela Urushadze, Stadium as Battlefields, The Greatest Tragedies on Sports Arenas, Journal Istoriani, April 2012, No. 4/16, <https://www.facebook.com/100042098603434/posts/1112515292154384/>
8. Sportal.ge (November 3, 2025). UEFA fines Georgian Football Federation 56 thousand euros, <https://sportall.ge/article/174306-uepam-sakartvelos-pexburtis-pederacia-56-atasi-evroti-daaajarma/>.
9. Georgian Football Federation (November 3, 2025). Georgia – Armenia, UEFA Disciplinary Committee Decision, <https://gff.ge/ge/media/news/28719>.
10. Georgian athletes who died during competition, AI Overview
11. <https://www.google.com/search?q=%E1%83%A8%E1%83%94%E1%83%AF%E1%83%98%E1%>

83%91%E1%83%A0%E1%83%98%E1%83%A1%E1%83%90%E1%83%A1+%E1%83%93%E1%83%90%E1%83%A6%E1%83%A3%E1%83%9E%E1%83%A3%E1%83%9A%E1%83%98+%E1%83%A5%E1%83%90%E1%83%A0%E1%83%97%E1%83%95%E1%83%94%E1%83%9A+%E1%83%A1%E1%83%9E%E1%83%9D%E1%83%A0%E1%83%A2%E1%83%A1%E1%83%9B%E1%83%94%E1%83%9C%E1%83%94%E1%83%91%E1%83%98

12. Law of Georgia on Sports, with subsequent amendments and supplements. Parliamentary Gazette, No. 24-25/3, November 6, 1996 (Article 10, Paragraph 1).

<https://www.matsne.gov.ge/en/document/view/31552?publication=21>

13. Law of Georgia on Sports, with subsequent amendments and supplements. Parliamentary Gazette, No. 24-25/3, November 6, 1996 (Article 5, Paragraph f)

<https://www.matsne.gov.ge/en/document/view/31552?publication=21>

14. International Organization for Standardization (2022). Information security, cybersecurity and privacy protection Information security management systems - Requirements, ISO Standard № 27001. <https://www.iso.org/standard/27001>.

15. On measures for a high common level of cybersecurity across the Union (2022), DIRECTIVE (EU) 2022/2555 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL NIS2.

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022L2555>.

16. International Organization for Standardization (2015). Quality management systems, International Organization for Standardization - Requirements, ISO/FDIS Standard 9001. <https://fisip.unpatti.ac.id/wp-content/uploads/2019/08/ISO-9001-2015.pdf>.

TECHNICAL SCIENCES

FRACTAL DIAGNOSTICS A NEW PARADIGM FOR THE OPERATIONAL MONITORING OF GAS PIPELINE SYSTEMS

Nasibzade E.

PhD Student

Azerbaijan State Oil and Industry University

<https://doi.org/10.5281/zenodo.20691208>

Abstract

The preservation of environmental integrity and the sustainability of global energy supplies depend heavily on maintaining the structural and operational soundness of gas transport pipelines. Standard non-destructive testing and routine technical diagnostics frequently fail to identify embryonic degradation, minute leakages, or volatile operational irregularities. This limitation stems from the fact that such anomalous signatures are typically obscured by the non-linear, non-stationary, and highly stochastic background noise characteristic of industrial data. To address these technical shortcomings, this study introduces an innovative diagnostic framework grounded in the principles of fractal geometry. By treating variations in fluid pressure, volumetric discharge, and acoustic emissions as fundamentally chaotic time-series, we implement the Hurst exponent (H) alongside Multifractal Detrended Fluctuation Analysis (MFDFA) to isolate latent structural configurations and track the dynamic fractal dimension (D) reflecting the behavior of the transport system. The reliability of this analytical model was verified through empirical testing on industrial datasets embedded with simulated physical defects. The computational outcomes reveal that fractal descriptors possess superior sensitivity regarding the identification of minor transitions in system dynamics. Conclusively, this methodology transitions industry standards from conventional, reactive repair protocols to high-fidelity, predictive operational tracking, providing a powerful mathematical instrument for contemporary intelligent pipeline networks.

Keywords: Gas transmission, Fractal geometry, Structural health monitoring, Anomaly isolation, Chaotic signal processing, Long-range dependence.

Introduction: Industrial gas pipeline distribution networks represent highly intricate, capital-intensive engineering infrastructures that continually experience environmental fluctuations, internal chemical degradation, and cyclic mechanical loads. Traditional diagnostic paradigms, including conventional transient pressure wave techniques and Fourier-transformed spectral evaluations, operate predominantly under idealized linear assumptions. In reality, the complex hydrodynamics governing compressed gas flows—particularly during operational shifts or localized structural failures—are fundamentally non-linear and exhibit chaotic behavior. As a direct consequence, early-stage structural anomalies remain hidden beneath dense layers of stochastic operational noise, frequently resulting in catastrophic detection lags or erroneous system alerts. To mitigate these analytical barriers, the present research utilizes fractal analysis as an advanced mathematical topology engineered to quantify the inherent self-similarity and non-Euclidean irregularities of pipeline sensor streams.

Methodology: The mathematical architecture of the formulated diagnostic protocol centers on evaluating the behavioral complexity of non-stationary time-series captured by localized pipeline sensor arrays. This computational framework is executed through a sequential three-tier process:

1. **Signal Pre-processing:** High-frequency pressure and acoustic waveforms undergo initial filtering to eliminate erroneous data spikes and measurement artifacts, while carefully preserving the underlying stochastic dynamics and natural self-affine fluctuations of the flow.

2. **Quantification of Fractal Dimensions:** The topological complexity and geometric roughness of the processed signal trajectories are indexed via the application of the box-counting algorithm to establish the baseline fractal dimension.

3. **Multifractal Spectrum Characterization:** Recognizing that intricate fluid dynamics within a pressurized pipeline cannot be comprehensively modeled by a single, global fractal scaling factor, Multifractal Detrended Fluctuation Analysis (MFDFA) is integrated into the workflow to capture multi-fractional characteristics across varying time scales.

Conclusion: The proposed diagnostic algorithm was rigorously evaluated utilizing empirical operational parameters that simulated both optimal baseline conditions and micro-structural anomalies, including localized wall thinning from corrosion and low-volume (0.5%) product leakages. The formulation of these fractal-oriented monitoring and control methodologies marks a transformative evolution in pipeline integrity management. By exploiting the mathematical attributes of deterministic chaos and structural self-similarity, this diagnostic framework achieves precise identification of operational deviations at their earliest embryonic stage. Seamlessly incorporating this fractal-driven framework into current supervisory control systems (such as SCADA) holds the potential to significantly diminish ecological hazards, mitigate the probability of sudden pipeline ruptures, and streamline predictive maintenance logistics for modern smart energy infrastructures.

References:

1. Komorska, I., & Puchalski, A. (2021). Rotating machinery diagnosing in non-stationary conditions with Empirical Mode Decomposition-based Wavelet Leaders Multifractal Spectra. *Sensors*, 21(22), 7677. <https://doi.org/10.3390/s21227677>
2. Li, X., & Zhang, J. (2020). Nonlinear dynamic analysis and leak detection of gas pipelines using fractal dimension of pressure transient waves. *Journal of Natural Gas Science and Engineering*, 81, 103421. <https://doi.org/10.1016/j.jngse.2020.103421>
3. Wang, T., Huan, J., & Jiang, Z. (2019). Application of multifractal detrended fluctuation analysis in acoustic emission signals for pipeline small leakage identification. *Measurement*, 145, 421–431. <https://doi.org/10.1016/j.measurement.2019.05.071>
4. Yang, X. (2025). Fractal dynamics modeling of spatiotemporal pore structure evolution in tight reservoirs. *Preprints*, 202511.0412. <https://doi.org/10.20944/preprints202511.0412.v1>
5. Yu, M., & Zhang, L. (2021). A hybrid fault diagnosis method for natural gas pipelines based on multifractal analysis and support vector machine. *Process Safety and Environmental Protection*, 152, 112–124. <https://doi.org/10.1016/j.psep.2021.05.034>
6. Zagretdinov, A. (2025). Monitoring pipeline leaks using fractal analysis of acoustic signals. *Instruments*, 9(3), 178. <https://doi.org/10.3390/instruments9030178>
7. Zagretdinov, A., Ziganshin, S., Izmailova, E., Vankov, Y., Klyukin, I., & Alexandrov, R. (2024). Detection of pipeline leaks using fractal analysis of acoustic signals. *Fractal and Fractional*, 8(4), 213. <https://doi.org/10.3390/fractalfract8040213>
8. Zhang, H., & Liang, W. (2018). Multifractal characteristics of pressure fluctuations in gas-liquid two-phase flow pipelines. *International Journal of Multiphase Flow*, 106, 188–199. <https://doi.org/10.1016/j.ijmultiphaseflow.2018.05.011>
9. Zhao, Y., & Gao, J. (2023). A novel condition monitoring approach for high-pressure gas pipelines based on Higuchi fractal dimension and machine learning. *Mechanical Systems and Signal Processing*, 194, 110283. <https://doi.org/10.1016/j.ymssp.2023.110283>
10. Zhou, J., & Sun, Y. (2022). Detrended fluctuation analysis of non-stationary pressure data for pipeline crack and deformation monitoring. *Structure and Infrastructure Engineering*, 18(6), 843–856. <https://doi.org/10.1080/15732479.2021.1902431>

INTELLIGENT COMMODITY MARKET FORECASTING SYSTEM WITH LOCAL TREND CORRECTION

Poidenko A.

Student, Educational and Scientific Institute of Applied System Analysis, Igor Sikorsky Kyiv Polytechnic Institute

Danylov V.

Professor, Department of Artificial Intelligence, Igor Sikorsky Kyiv Polytechnic Institute
<https://doi.org/10.5281/zenodo.20691210>

Abstract

The article considers the problem of forecasting highly dynamic commodity markets under the conditions of the "concept drift" effect. The use of recurrent neural networks (LSTM) in combination with the developed algorithm for dynamic correction of the local trend (Label Lag Correction) is investigated. It is shown that the hybrid architecture effectively compensates for the phase lag of predictions that occurs during sharp market shocks. Preliminary fractal analysis of time series allows optimizing the model's hyperparameters. The developed system was tested on real streaming data, demonstrating high accuracy and resistance to market noise. The practical value of the proposed approach is confirmed by participation in the international algorithmic trading competition Mitsui & Co. Commodity Prediction Challenge.

Keywords: forecasting, commodity markets, neural networks, LSTM, concept drift, label lag correction.

1. Introduction

Modern commodity markets are characterized by high volatility and chaotic dynamics. Traditional econometric models and classical machine learning algorithms often prove ineffective due to the "concept drift" phenomenon – a sudden change in the statistical properties of the market under the influence of macroeconomic shocks. The relevance of this study lies in the need to develop new intelligent systems that can not only detect long-term patterns in noisy data but also instantly adapt to structural shifts. Solving this problem will significantly improve the accuracy of algorithmic trading and financial risk management [1, p. 45].

2. Methodology and Research Results

2.1. Data Description and Preprocessing

The experiments were conducted on real data from the international competition Mitsui & Co. Commodity Prediction Challenge [4]. The training sample covers 1961 trading days and contains 557 input features (historical prices, trading volumes, macroeconomic indicators, and cross-market indicators). The target space consists of 424 variables (106 trading pairs $\times$ 4 lags). Missing values were filled sequentially using forward-fill and backward-fill, with the remaining gaps replaced by the historical mean of the corresponding feature. Z-standardization was applied for normalization.

2.2. Fractal Analysis

Fractal analysis was performed using the Detrended Fluctuation Analysis (DFA) method. The fractal properties of financial time series are well described in [5]. For the 557 input features, the average Hurst exponent was $H \approx 0.4628$, indicating anti-persistent noise. For the 424 target variables, $H \approx 0.6553$, indicating a trending structure. This "fractal gap" proves that direct mapping $\mathbb{R}^{557} \rightarrow \mathbb{R}^{424}$ is unstable. Therefore, an indirect approach was proposed: first, forecast the features (a more stable task due to high dimensionality), then deterministically recalculate the forecast into targets using logarithmic return and spread formulas.

2.3. LSTM Architecture

The core of the intelligent system is a Long Short-Term Memory (LSTM) recurrent neural network [2, p. 1735]. The sliding window size is 50 days. The architecture consists of one LSTM layer with 256 neurons, dropout 0.2 for regularization, and a fully connected layer projecting the output back to the 557-dimensional feature space. Training is performed with the Adam optimizer (learning rate $1e-3$) and MSE loss function for 25 epochs. During inference, recursive forecasting is applied: the model predicts the next day, appends the forecast to the window, and repeats 5 times to obtain a 5-day forecast (Figure 1).

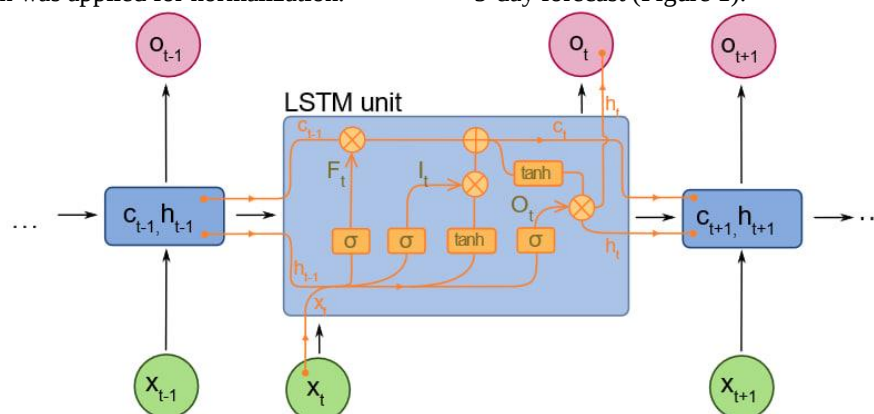


Figure 1 – Architecture of the LSTM cell (based on [2])

2.4. Phase Lag Problem and Label Lag Correction

Testing the baseline LSTM revealed a phase lag effect – the model projected past values into the future and lagged behind real trend reversals. To overcome this, the author's algorithm Label Lag Correction (LLC) was developed. The method consists of a weighted combination of the neural network forecast with the empirical mean of the latest available market values (lags). The final corrected forecast is calculated by:

$$Y_{final} = \alpha \cdot Y_{LSTM} + (1 - \alpha) \cdot Y_{lag_mean}$$

where α is the confidence hyperparameter. On the validation sample, α was optimized by brute force (values from 0.5 to 0.9, step 0.1). The best Score (competition metric based on Spearman rank correlation) was achieved at $\alpha = 0.7$, meaning the system trusts the deep learning model by 70% and fresh market lags by 30%.

2.5. Testing Results

Comparative testing showed: the baseline LSTM achieved Score = 0.287 on validation. Adding the LLC algorithm increased Score to 0.413 – a 44% improvement. On the final leaderboard (unseen data), the system achieved Score = 0.514, which provided 6th place among over 1711 teams worldwide [3]. The hybrid approach proved effective both on validation and on real unknown data.

3. Conclusions

1. Classical linear methods are ineffective for forecasting commodity markets due to the fractal gap and concept drift.
2. A two-stage architecture is proposed: LSTM → feature forecast → deterministic transformation into targets.

3. The original Label Lag Correction algorithm improves accuracy by 44% and eliminates phase lag.

4. The system ranked 6th in the international Mitsui & Co. Commodity Prediction Challenge.

4. Further Research

Future work includes adaptive selection of the coefficient α depending on the current fractal regime, as well as ensemble learning combining LSTM with gradient boosting (XGBoost).

References:

1. Box G. E. P., Jenkins G. M., Reinsel G. C. *Time Series Analysis: Forecasting and Control*. 5th ed. Hoboken, NJ: John Wiley & Sons, 2015. 712 p.
2. Hochreiter S., Schmidhuber J. Long Short-Term Memory. *Neural Computation*. 1997. Vol. 9, No. 8. P. 1735–1780.
3. Пойденко А. В. 6th Place Solution: Recursive LSTM Feature Forecasting & Lag Correction. Kaggle. 2026. URL: <https://www.kaggle.com/competitions/mitsui-commodity-prediction-challenge/writeups/artem777-in-mitsui-6th-Place> (Last accessed: 07.06.2026).
4. Mitsui & Co. Commodity Prediction Challenge. Kaggle. 2025. URL: <https://www.kaggle.com/competitions/mitsui-commodity-prediction-challenge> (Last accessed: 07.06.2026).
5. Mandelbrot B. B. *Fractals and Scaling in Finance: Discontinuity, Concentration, Risk*. Springer, 1997. 551 p.

INNOVATIVE APPROACHES TO ANALYZING THE EFFECTIVENESS OF THE PROJECT METHOD IN THE MODERN INFORMATION AND EDUCATIONAL ENVIRONMENT**Mazanov S.***Azerbaijan State Pedagogical University
Associate Professor of the Department of Computer Science***ИННОВАЦИОННЫЕ ПОДХОДЫ К АНАЛИЗУ ЭФФЕКТИВНОСТИ ПРОЕКТНОГО МЕТОДА В СОВРЕМЕННОЙ ИНФОРМАЦИОННО-ОБРАЗОВАТЕЛЬНОЙ СРЕДЕ****Мазанова С.Б.***Азербайджанский Государственный Педагогический Университет
Доцент кафедры Компьютерные науки
<https://orcid.org/0000-0003-2278-3790>
<https://doi.org/10.5281/zenodo.20691212>*

В современной системе высшего образования организация научно-исследовательского процесса и анализ его результатов на научной основе являются одним из главных направлений, играющих важную роль в повышении качества обучения. Научно-исследовательская деятельность – это сложный интеллектуальный процесс, обеспечивающий не только приобретение знаний, но и их применение, анализ и формирование новых результатов. В этой связи систематическое изучение результатов научно-исследовательского процесса считается необходимым для определения уровня научной подготовки студентов, мониторинга динамики их развития и оценки эффективности методов обучения.

Применение проектного метода имеет особое значение в этом процессе, поскольку такой подход превращает студентов из пассивных субъектов, получающих знания, в активных участников исследования. В ходе проектной деятельности студенты работают над конкретными проблемами, используют различные источники информации, анализируют полученную информацию и приходят к научно обоснованным выводам. Это развивает не только их теоретические знания, но и аналитическое мышление, навыки решения проблем и самостоятельного принятия решений. Однако одной лишь организации деятельности недостаточно для определения эффективности этого процесса; Одновременно необходимо провести глубокий и многосторонний анализ полученных результатов. Анализ результатов исследовательского процесса позволяет выявить реальное педагогическое воздействие проектного метода. Благодаря этому анализу определяется, какие навыки учащихся развились, в каких областях имеются недостатки и какие компоненты образовательного процесса нуждаются в совершенствовании. Таким образом, анализ результатов не только выполняет оценочную функцию, но и создает научную основу для оптимизации образовательных стратегий.

В контексте преподавания информатики актуальность этого вопроса еще выше. Информатика не ограничивается обучением техническим знаниям, а также требует от студентов формирования комплексных навыков, таких как алгоритмическое мышление, обработка данных,

систематический анализ и решение технологических задач. Эффективное развитие этих навыков тесно связано с применением научно-ориентированных подходов к обучению. В этом отношении проектный метод предоставляет студентам возможность работать над реальными или смоделированными задачами в преподавании информатики и позволяет им применять полученные знания на практике.

В то же время стремительное развитие современных цифровых технологий, широкое использование сред программирования и инструментов анализа данных привели к появлению нового содержания и форм научно-исследовательской деятельности в области информатики. В этих условиях студентам недостаточно просто овладеть существующими знаниями; они также должны обладать способностью к обучению, применению новых технологий и представлению инновационных решений на их основе. Это делает анализ результатов научно-исследовательского процесса еще более актуальным и подчеркивает важность системного подхода в этой области.

Таким образом, анализ результатов научно-исследовательской деятельности, организованной на основе проектного метода, имеет большое научное и практическое значение как с точки зрения оценки уровня научно-профессиональной подготовки студентов, так и повышения качества преподавания информатики. Такой подход позволяет более целенаправленно, ориентированно на результат и инновационно организовать образовательный процесс и закладывает основу для подготовки специалистов, отвечающих требованиям современной эпохи.

При систематическом анализе изменений в знаниях и навыках студентов, наблюдаемых в результате применения научно-ориентированной проектной деятельности, выявляется ряд важных научных результатов. Эти результаты отражают не только теоретическую подготовку студентов, но и их практические и аналитические способности. В качестве одного из главных результатов научно-исследовательского процесса в специфических условиях обучения более отчетливо наблюдается развитие навыков аналитического мышления.

Пример 1: Предположим, что студентам, обучающимся по специальности «Информатика и педагогика» дано проектное задание на тему «Сравнительный анализ эффективности алгоритмов поиска и сортировки» на практическом занятии по предмету «Теория алгоритмов». В начале занятия преподаватель создает проблемную ситуацию: необходимо определить, какой алгоритм работает эффективнее на больших объемах данных. Студенты делятся на небольшие группы и изучают принципы работы таких алгоритмов, как линейный поиск, бинарный поиск, пузырьковая сортировка и быстрая сортировка, с теоретической и практической точек зрения, а также реализуют эти алгоритмы в среде программирования. Затем они проводят эксперименты на массивах данных различного размера, измеряют время выполнения и вычислительную эффективность каждого алгоритма и систематизируют полученные результаты с помощью таблиц и графических представлений. На этом этапе студенты не ограничиваются лишь сбором технических показателей, но также пытаются аналитически объяснить, почему алгоритмы дают разные результаты с точки зрения временной сложности, использования памяти и структурных особенностей.

На этапе обсуждения урока каждая группа представляет свои результаты, обосновывает преимущества и недостатки алгоритмов и с помощью научных аргументов объясняет, какой алгоритм является более оптимальным в конкретной ситуации. Учитель, в свою очередь, направляет этот процесс, оценивая, как учащиеся приходят к своим выводам, какие методы анализа они используют и как происходит процесс принятия решений.

Таким образом, этот пример урока показывает, что проектная деятельность позволяет учащимся анализировать проблему поэтапно, определять причинно-следственные связи и принимать обоснованные решения. В результате навыки аналитического мышления развиваются систематически не только на теоретическом уровне, но и посредством реальной практической деятельности. Одним из важных результатов исследовательского процесса является формирование у учащихся способности интегрировать теоретические знания с практической деятельностью, что особенно ярко проявляется на уроках, основанных на проектной деятельности.

Пример 2: Например, на практическом занятии по предмету «Системы управления базами данных» студентам университета по специальности «учитель информатики» предлагается проектное задание на тему «Оптимизация запросов в университетской информационной системе». В начале занятия преподаватель формулирует проблемную ситуацию: необходимо сократить время выполнения запросов в большой базе данных и повысить эффективность системы.

Для решения этой проблемы студенты сначала вспоминают свои теоретические знания о

структуре базы данных, методах индексирования и механизмах оптимизации запросов и пытаются применить их в контексте конкретной задачи. Затем они строят различные варианты запросов в среде SQL, тестируют различные структуры запросов (операции JOIN, применение индексов, подзапросы и т. д.) на одних и тех же данных и сравнивают время выполнения каждого из них. Полученные результаты систематизируются и анализируются с помощью таблиц и диаграмм.

На этапе обсуждения студенты обосновывают выбранные ими подходы, объясняют, какая модель запроса более эффективна, и оценивают эффективность методов, используемых ими в процессе оптимизации. На этом этапе учащиеся проводят сравнительный анализ полученных результатов, рассматривают альтернативные решения и пытаются обосновать преимущества выбранного подхода научными аргументами. Преподаватель, в свою очередь, направляет этот процесс, анализируя, как учащиеся применяют теоретические знания, какие методологические подходы они используют и как обосновывают результаты.

В то же время, целенаправленные вопросы и обратная связь, предоставляемые преподавателем, создают условия для более глубокого осмысления учащимися своих подходов, переоценки своих методов, выявления и исправления возможных ошибок. В процессе обсуждения учащиеся не ограничиваются лишь представлением своих результатов, но также анализируют подходы других групп, сравнивают различные решения и коллективно стремятся к более оптимальному результату. Этот этап вносит существенный вклад в развитие их навыков ведения научных дискуссий, рассуждений и принятия обоснованных решений.

Таким образом, этот пример урока показывает, что проектная деятельность позволяет учащимся применять абстрактные теоретические знания для решения конкретных практических задач и значительно повышает их уровень профессиональной подготовки. В результате такого подхода учащиеся не только осваивают знания, но и учатся эффективно использовать их в реальных ситуациях.

В то же время, целенаправленные вопросы и обратная связь, предоставляемые преподавателем, создают условия для более глубокого осмысления учащимися своих подходов, а также учатся эффективно применять их в реальных ситуациях. Одним из важных результатов исследовательского процесса является формирование у студентов способности связывать теоретические знания с практической деятельностью, что наиболее ярко проявляется в среде проектного обучения.

Пример 3: Дается проектное задание на тему «Повышение эффективности передачи данных в локальной сети» в рамках практического занятия по предмету «Компьютерные сети и мультимедийные технологии». В начале занятия студентам предлагается конкретная задача: определение оптимальной конфигурации для минимизации задержек и потерь пакетов в сети. Для решения этой

задачи студенты сначала систематизируют свои теоретические знания о сетевых протоколах, скорости передачи, пропускной способности и управлении трафиком и пытаются применить их на практике. Затем они моделируют различные конфигурации с помощью программ сетевого моделирования, проводят эксперименты с различными параметрами и анализируют полученные результаты в сравнительном порядке. На этом этапе студенты оценивают влияние различных сетевых структур и механизмов управления на производительность и выбирают наиболее эффективное решение. На заключительном этапе занятия студенты представляют полученные результаты, обосновывают преимущества выбранной конфигурации и объясняют эффективность примененных методов. Таким образом, этот пример урока показывает, что проектная деятельность позволяет студентам применять теоретические знания для решения реальных проблем и оказывает значительное влияние на повышение их уровня профессиональной подготовки. В результате такого подхода студенты не только осваивают знания, но и учатся целенаправленно применять их в практических ситуациях.

Применение проектного метода оказывает значительное влияние на развитие у студентов навыков сотрудничества и командной работы, что особенно наглядно наблюдается на практических уроках, организованных в группах.

Пример 4: На занятии по «Языкам программирования» студентам предлагается проектное задание на тему «Разработка простого веб-приложения и оценка его безопасности». Занятие организовано в заранее спланированном командном формате, студенты разделены на группы по 4–5 человек.

В каждой группе задачи распределены функционально: одни студенты занимаются программированием приложения (разработка фронтенда и бэкенда), другие отвечают за создание базы данных, а третья группа отвечает за исследование аспектов безопасности системы — аутентификацию пользователей, защиту данных и выявление возможных уязвимостей. Хотя такое разделение позволяет студентам работать в конкретной области ответственности, оно также требует от всех членов команды координации действий. В ходе занятия студенты регулярно проводят обсуждения внутри группы, делятся результатами и пытаются совместно решать возникающие проблемы. Педагог, в свою очередь, направляет этот процесс и наблюдает за уровнем сотрудничества внутри команды, правильным распределением задач и тем, как принимаются решения. В конце урока каждая группа представляет подготовленное ею приложение, обосновывает результаты проделанной работы и объясняет, как сотрудничество внутри команды влияет на результаты проекта.

Таким образом, этот пример урока показывает, что проектный метод развивает у студентов не только технические знания, но и навыки

эффективной коммуникации, сотрудничества и коллективного принятия решений. Этот подход выступает важным педагогическим инструментом, обеспечивающим их готовность к работе в команде в будущей профессиональной деятельности. Еще одним важным результатом исследовательского процесса является формирование у студентов проблемно-ориентированного мышления и навыков обоснованного принятия решений. В ходе проектной работы студенты сталкиваются с реальными проблемами, анализируют эти проблемы и предлагают различные альтернативы их решения.

В отличие от традиционного обучения, ориентированного на пассивное усвоение готовой теории, проектный метод переводит студента в роль активного исследователя. В информатике это проявляется наиболее эффективно: при работе над задачами по программированию, базам данных или сетевой безопасности учащиеся не просто запоминают алгоритмы, а трансформируют знания в конкретный продукт. Несмотря на сложности в тайм-менеджменте и оценке результатов, метод обеспечивает ключевое преимущество — развитие аналитического мышления и готовность к решению реальных технологических задач, что невозможно при чисто лекционном подходе.

Развитие высшего образования сегодня диктуется цифровым прогрессом, который трансформирует проектный метод через интеграцию ИИ, Big Data и виртуальных сред. Искусственный интеллект позволяет автоматизировать проверку задач и адаптировать обучение под каждого студента, стимулируя их к созданию собственных исследовательских стратегий. Использование больших данных выводит культуру анализа на новый уровень, позволяя студентам работать не с учебными примерами, а с реальными массивами информации. Виртуальные лаборатории и симуляторы обеспечивают безопасную отработку навыков в сетевых технологиях и информационной безопасности без затрат на дорогостоящее оборудование. Внедрение таких моделей, как «перевернутый класс» и проблемное обучение в гибридной цифровой среде, окончательно переводит студента из позиции слушателя в статус активного исследователя, делая процесс обучения гибким, инновационным и независимым от пространственных границ.

Для эффективного применения проектного метода в образовательном процессе преподаватели не должны ограничивать уроки только передачей теоретической информации, а должны вовлекать студентов в активную исследовательскую деятельность. Для этого следует готовить задания, основанные на реальных проблемах, и создавать условия для проведения студентами самостоятельных исследований. При этом преподаватели должны оценивать деятельность студентов не только по результату, но и по процессу, и предоставлять регулярную обратную связь. Высшие учебные заведения должны сформировать необходимую технологическую и методическую среду для реализации проектного обучения. В образовательный процесс следует

интегрировать виртуальные лаборатории, среды программирования и цифровые платформы, а также повысить методическую подготовку преподавателей. Кроме того, для стимулирования научно-исследовательской деятельности следует создавать возможности для участия студентов в проектной и научной работе. Учебные планы должны систематически охватывать проектную и исследовательскую деятельность. Включать в предметы следует не только теоретические темы, но и практические проекты, лабораторные работы и исследовательские задания. Критерии оценки должны быть направлены на измерение аналитического мышления студентов, навыков решения проблем и научной коммуникации. С научной точки зрения, данное исследование обосновывает систематическое влияние проектного метода на формирование исследовательской культуры и раскрывает его важность в контексте современных образовательных подходов. С практической точки зрения, полученные результаты служат для более эффективной организации занятий по информатике, повышения уровня профессиональной подготовки студентов и формирования из них конкурентоспособных специалистов в их будущей деятельности.

Для эффективного внедрения проектного метода вузам необходимо создать комплексную цифровую среду с виртуальными лабораториями и обновить учебные планы, интегрировав в них реальные исследовательские задачи вместо чистого теоретизирования. Роль преподавателя при этом смещается от трансляции знаний к менторству: важно вовлекать студентов в самостоятельный поиск, оценивать не только финальный результат, но и сам процесс исследования, обеспечивая постоянную обратную связь. Систематическое применение такого подхода в рамках ИТ-дисциплин позволяет развивать аналитическое мышление и научную коммуникацию, что напрямую повышает конкурентоспособность выпускников и закладывает прочный фундамент их профессиональной исследовательской культуры.

Таким образом, широкое применение проектного метода в образовательном процессе является перспективным направлением в плане повышения качества современного высшего образования и формирования инновационной учебной среды.

Анализ результатов, полученных в результате применения научно-ориентированного проектного метода, наглядно демонстрирует взаимное развитие научно-практических навыков студентов. Проведенные наблюдения и анализы показывают, что этот метод, помимо формирования у студентов аналитического мышления, навыков обработки данных, систематического решения проблем и научного рассуждения, также укрепляет их способность проводить самостоятельные исследования.

В то же время, интеграция современных цифровых технологий, инновационных моделей обучения и гибридных учебных сред в учебный процесс дополнительно расширяет возможности применения проектного метода и повышает его эффективность. В этом отношении дальнейшее развитие научно-ориентированного подхода создает условия для более гибкой, практичной и ориентированной на студента организации обучения информатике.

Итог: научно-ориентированная модель обучения на основе проектного метода является научно и методологически обоснованным и перспективным подходом с точки зрения формирования исследовательской культуры студентов в высшем образовании и повышения уровня их профессиональной подготовки.

İstifadə olunan ədəbiyyat

1. Ələkbərov, K. Ə. İnformatikanın tədrisi metodikası. Bakı: Mütərcim, 2018.
2. Quliyev, S. Ə. Layihə əsaslı təlim texnologiyası. Bakı: ADPU, 2018.
3. Demirel, Ö. Eğitimde program geliştirme. Ankara, 2017.
4. Seferoğlu, S. S. Eğitimde teknolojik yeterlikler və öğretmen eğitimi, 2017.
5. Хуторской, А. В. Современные дидактические технологии. Москва, 2018.
6. Bates, A. W. Teaching in a Digital Age. 2022.

İnternet resursları

1. <https://www.sciencedirect.com>
2. <https://www.tandfonline.com>
3. <https://www.arti.edu.az>

№182/2026

Norwegian Journal of development of the International Science

ISSN 3453-9875

It was established in November 2016 with support from the Norwegian Academy of Science.

DESCRIPTION

The Norwegian Journal of Development of the International Science, established in 2016 with support from the Norwegian Academy of Science, offers a platform for global researchers, academics, and students. Publishing 24 times annually, it covers current science topics. Submitting your article provides exposure to a diverse audience, enhancing your career. Our commitment to research and SEO ensures timely visibility. Submit to the Norwegian Journal of Development of the International Science today and join esteemed authors.

Editor in chief – Karin Kristiansen (University of Oslo, Norway)

The assistant of the editor in chief – Olof Hansen

- James Smith (University of Birmingham, UK)
- Kristian Nilsen (University Centre in Svalbard, Norway)
- Arne Jensen (Norwegian University of Science and Technology, Norway)
- Sander Svein (University of Tromsø, Norway)
- Lena Meyer (University of Gothenburg, Sweden)
- Hans Rasmussen (University of Southern Denmark, Denmark)
- Chantal Girard (ESC Rennes School of Business, France)
- Ann Claes (University of Groningen, Netherlands)
- Ingrid Karlsen (University of Oslo, Norway)
- Terje Gruterson (Norwegian Institute of Public Health, Norway)
- Sander Langfjord (University Hospital, Norway)
- Fredrik Mardosas (Oslo and Akershus University College, Norway)
- Emil Berger (Ministry of Agriculture and Food, Norway)
- Sofie Olsen (BioFokus, Norway)
- Rolf Ulrich Becker (University of Duisburg-Essen, Germany)
- Lutz Jäncke (University of Zürich, Switzerland)
- Elizabeth Davies (University of Glasgow, UK)
- Chan Jiang (Peking University, China) and other independent experts

1000 copies

Norwegian Journal of development of the International Science

Iduns gate 4A, 0178, Oslo, Norway

email: publish@nor-ijournal.com

site: <https://nor-ijournal.com>



© 2026 The Norwegian Journal of Development of the International Science

nor-ijournal.com

