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COPYRIGHT AND MARKET DOMINANCE IN ARTIFICIAL INTELLIGENCE PLATFORMS: CHALLENGES OF PROTECTING COMPETITION IN THE CONTEXT OF BIG TECH

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Abstract

This thesis analyzes the relationship between copyright and competition law in the context of artificial intelligence platforms. Modern AI systems rely on large datasets, often involving copyrighted content, which raises significant legal concerns. The research examines the market dominance of Big Tech companies, their privileged access to data, and the resulting impact on competition. It also develops recommendations based on international practices to balance copyright protection and fair competition in AI markets.

Key words: artificial intelligence, copyright, Big Tech, competition law, datasets, market dominance, AI training.

Аннотация

Данная работа посвящена анализу взаимосвязи авторского права и конкурентного права в условиях развития платформ искусственного интеллекта. Современные системы ИИ используют большие объемы данных, включая защищенный авторским правом контент, что создает правовые риски. В исследовании рассматриваются вопросы доминирования крупных технологических компаний, их доступ к данным и влияние на конкурентную среду. Также предложены рекомендации по обеспечению баланса между защитой авторских прав и развитием конкуренции.

Ключевые слова: искусственный интеллект, авторское право, Big Tech, конкурентное право, данные, доминирование на рынке, обучение ИИ.

Artificial intelligence technologies, as one of the fastest-growing fields of the 21st century, are significantly influencing the global economy, information exchange, and legal systems. In particular, the emergence of generative AI platforms necessitates a fundamental reconsideration of the relationship between copyright law and competition law.

Modern AI systems require vast amounts of data—texts, images, audio, and video content—to function effectively. A substantial portion of this data is protected by copyright, and its use in training AI models raises numerous legal concerns. In particular, the use of copyrighted works without the authors' consent, issues of compensation, and the potential infringement of intellectual property rights have become pressing challenges.

At the same time, large technology companies—commonly referred to as Big Tech—are increasingly occupying dominant positions in the AI market. This is primarily due to their access to extensive datasets, advanced computational infrastructure, and significant financial resources. Such advantages create barriers to entry for new market participants and may distort fair competition. As a result, near-monopolistic conditions may emerge in the AI technology market.

The research indicates that exclusive access to training data constitutes a critical strategic advantage for companies. This leads to the phenomenon known as “data advantage,” which hinders the development of small and medium-sized technology firms. In addition, algorithmic advantages and network effects further intensify market concentration.

From a copyright perspective, the legal status of AI-generated content remains a highly debated issue. In particular, the question of ownership—whether it belongs

to the developer, the user, or the platform—remains unresolved. This highlights the inadequacy of existing legal frameworks in addressing the unique challenges posed by AI technologies.

An analysis of international practices shows that different jurisdictions have adopted various approaches to balance AI development and copyright protection. For instance, in the United States, the “fair use” doctrine allows limited use of copyrighted materials under certain conditions. In the European Union, specific exceptions for text and data mining (TDM) have been introduced.

At the same time, within the framework of competition law, the importance of antitrust measures aimed at limiting the market dominance of Big Tech companies is increasing. In particular, it is necessary to ensure equal access to data, promote interoperability between platforms, and create fair conditions for the use of AI infrastructure.

The findings of this study demonstrate that effective legal regulation in the field of artificial intelligence requires a careful balance between copyright protection and competition law. In this regard, the following priorities are identified:

- establishing clear legal boundaries for the use of copyrighted materials in AI training processes;
- introducing fair compensation mechanisms for authors;
- promoting open and equitable access to data;
- strengthening oversight of Big Tech companies’ market dominance and fostering competition.

Furthermore, aligning national legislation with international standards is of particular importance. In the context of Uzbekistan, it is essential to implement comprehensive legal reforms in the fields of artificial intelligence and intellectual

property, ensuring both the promotion of innovation and the effective protection of copyright.

Conclusion

The above analysis demonstrates that the rapid development of artificial intelligence platforms is significantly reshaping the traditional balance between copyright law and competition law. The possession of large-scale datasets, which serve as a key resource for AI technologies, provides major technological companies with substantial advantages and contributes to increased market concentration. This, in turn, may limit market entry opportunities for new participants and negatively affect the development of a healthy competitive environment.

The findings of the study indicate that the use of copyrighted content in training AI models still lacks a comprehensive legal solution. Existing legal frameworks often fail to adequately account for the specific characteristics of artificial intelligence technologies, which may result in insufficient protection of authors' interests. At the same time, the legal status of AI-generated content remains an unresolved issue.

Furthermore, the exclusive access of Big Tech companies to data, combined with their advanced technological infrastructure and the use of network effects, further strengthens their market dominance and acts as a barrier to competition. Addressing this issue requires not only the application of copyright law mechanisms but also the active use of competition law instruments.

An analysis of international practices shows that developed countries are adopting comprehensive approaches to address these challenges. In particular, mechanisms such as "fair use," compulsory licensing, and exceptions for text and data mining (TDM) are used to balance copyright protection and innovation. At the

same time, antitrust policies aimed at limiting the market dominance of large companies are being strengthened.

Based on the research, the following key conclusions and recommendations can be proposed:

- it is necessary to establish a clear legal regime governing the use of data in AI training processes;
- fair compensation mechanisms for copyright holders should be developed;
- open and equal access to data should be ensured to promote competition in the market;
- competition law norms should be strengthened to monitor and limit the dominant position of Big Tech companies;
- national legislation should be modernized in line with the development of artificial intelligence technologies.

In conclusion, ensuring a balanced relationship between copyright law and competition law is of strategic importance for establishing a stable and fair legal framework in the field of artificial intelligence. The scientifically grounded approaches developed in this area will not only foster innovation but also create equal and transparent conditions for all market participants.

REFERENCE

1. Varian, H. R. (2019). Artificial intelligence, economics, and industrial organization. NBER Working Paper No. 24839.
2. European Commission. (2020). Competition policy for the digital era. Brussels.
3. World Intellectual Property Organization (WIPO). (2019). WIPO Technology Trends: Artificial Intelligence. Geneva.

4. OECD. (2021). Artificial Intelligence, Data and Competition. Paris: OECD Publishing.
5. Lemley, M. A., & Casey, B. (2020). Fair learning. Texas Law Review, 99(4), 743–786.
6. Samuelson, P. (2023). Copyright and artificial intelligence. Communications of the ACM, 66(1), 20–23.
7. European Parliament. (2019). Directive on copyright in the Digital Single Market (Directive (EU) 2019/790).
8. U.S. Copyright Office. (2023). Copyright Registration Guidance: Works Containing Material Generated by Artificial Intelligence.
9. Ezrachi, A., & Stucke, M. E. (2016). Virtual competition: The promise and perils of the algorithm-driven economy. Harvard University Press.
10. Crémer, J., de Montjoye, Y. A., & Schweitzer, H. (2019). Competition policy for the digital era. European Commission Report

Formation of vocabulary in students of non-linguistic specialties in higher education institutions during russian language classes

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Abstract. This article examines the formation and expansion of Russian vocabulary among students of national groups studying non-linguistic specialties. The selection of a lexical minimum is determined by the following principles: common usage of words, frequency, and pedagogical and methodological appropriateness.

Keywords: vocabulary, vocabulary acquisition, formation of lexical skills, assimilation of specialized information, various types of speech activity.

Аннотация. В данной статье рассматривается формирования и пополнения лексического запаса русского языка у студентов национальных групп неязыковых специальностей. Отбор лексического минимума определяется следующими принципами: употребительность слов, частотность, учебно-методическая целесообразность.

Ключевые слова: лексический запас, овладение лексикой, формирование лексических навыков, усвоение специальной информации, различные виды речевой деятельности.

Формирование и пополнение лексического запаса русского языка у студентов неязыковых специальностей остаётся до сих пор ещё недостаточно лингвистически разработанным и методически организованным. Это обстоятельство объясняется тем, что, «во-первых, системность в лексике - самое сложное явление в структуре языка, так как лексика пока ещё трудно поддаётся упорядочению, и во-вторых, само по себе слово как основная базисная единица языка- тоже очень сложное, разноплановое и многомерное явление,

универсальное по характеру и уникальное по объёму выполняемых в языке функций».

Без овладения словарным запасом невозможно ни понимание речи, ни выражение собственных мыслей, поэтому лексическому аспекту речи в обучении русскому языку как неродному отводится большое место. Учёный-лексиколог Морковкин В.В. утверждает, что «обучение языку- это, прежде всего, обучение правильному пониманию употреблению его слов, лексики. Если извлечь лексику, то в ней не останется ничего. Всё в языке начинается со слов и кончается словами, вследствие чего овладение словарным запасом языка является центральной проблемой обучения иностранному языку .

Основная потребность студентов- узбеков в группах с родным языком обучения- это стремление получить не только навыки говорения на русском языке, но и знать его на профессиональном уровне. Отсюда ведущей сферой общения в вузе становится учебно- профессиональная. Основными потребностями в этой сфере являются следующие:

1. потребности в усвоении специальной информации, сообщаемой преподавателем на занятиях по профильным дисциплинам;
2. потребность в усвоении специальной информации, содержащейся в профессионально ориентированных текстах;
3. потребности в воспроизведении специальной информации в устной и письменной формах.

Студенты под руководством преподавателя стремятся к осмысленному овладению специальными словами, соотнося их с той или иной лексической группой. При этом студент идёт от понятий, известных ему в родном языке, к выражению этих понятий словами изучаемого языка , в данном случае- русскому. Знать русское слово-это, во- первых ,запомнить значение и форму

предусмотренного учебной программой минимума лексических единиц; во-вторых, научиться пользоваться этими единицами в различных видах речевой деятельности; в – третьих, научиться понимать лексические единицы на слух и при чтении научно -учебных текстов. Владение необходимым лексическим запасом нужно как для осуществления продуктивной речевой деятельности (говорения, письменной речи, так и рецептивной (аудирования, чтения).

Овладение лексикой связано со значительными трудностями, главными из которых являются: большой объём словарного состава русского языка, сложность каждой лексической единицы, различия в значении слов русского и родного (узбекского) языка обучаемых. Сказанное позволяет конкретизировать основные цели работы над лексикой в вузовской аудитории- это формирование лексических навыков. Отбор лексического минимума определяется следующими принципами употребительность слов, частотность, актуальность выражаемого данным словом понятия, ситуативно - тематическая отнесённость, учебно- методическая целесообразность, сочетаемость , словообразовательная ценность многозначность. Как известно, работа над лексикой, предназначена для пассивного и активного усвоения словарного запаса языка. В активный словарь входят слова, которые обучаемые должны усвоить и употреблять для выражения своих мыслей, а пассивный – слова, которые студенты должны понимать при чтении и слушании русской речи. Пассивный словарь увеличивается за счёт потенциального словаря, т.к. включает слова, о значении, которых учащихся могут догадаться по сходству со словами родного языка, по контексту и по словообразовательным элементам. Практическая работа по системному предъявлению лексического материала велась нами на занятиях по русскому языку со студентами – будущими математиками, физиками, информатиками на разных факультетах Бухарского

государственного университета. На основе различных пособий, применяемых нами на занятиях, нами был составлен словарь - минимум по научному стилю речи для студентов неязыкового профиля. При отборе лексического материала лексических единиц и словосочетаний – мы, во-первых, руководствовались принципом общей частотности. Во-вторых, мы ориентировались на конкретные темы по математике, физике, химии, истории. Преподавателями кафедры русского языка и литературы были созданы карточки, которые составляют сочетания заголовочных слов с существительными, прилагательными и глаголами. В карточках нашла отображение наиболее частотная лексика, работа с которой представляет наибольшие трудности. В качестве иллюстрации приведём следующий пример : слово «способ» с точки зрения его научной трактовки:

Способ -комплекс действий, которые применяются при использовании какой – либо работы или при осуществлении чего – либо:

Способ – какой?; современный, устаревший, традиционный, быстрый, простой, сложный, трудный.

Какой способ чего: использовать чего, обработки чего, объяснения чего, определения чего , применения чего...

Какой способ + инфинитив делать что, понять что, получить что, создать что...

В своей работе мы пытались органически сочетать лексические единицы с грамматическим материалом. Обычно рекомендуется вводить новую лексику небольшими дозами (5- 10 лексических единиц), чтобы новый материал можно было закрепить в сознании студентов на том же занятии. Кроме того, идёт отработка ранее введённых лексических единиц.

Одним из главных условий понимания текста по специальности является знание терминологической лексики, поэтому преподавателю необходимо определить

способы её семантизации вследствие выполнения ею большой информационной нагрузки. Именно в этом процессе и происходит накопление терминологической лексики и её последующее усвоение и запоминание.

Литература

1. Колесникова А.Ф. Проблемы обучения лексике. – М.: Русский язык, 1977. - 156с.
- 2.Методика преподавания русского языка как иностранного/ Под ред. Щукина А.Н.-М.: Русский язык, 1990 – 231с.
- 3.Щукин А.Н. Методика преподавания русского языка как иностранного, - М.: Русский язык, 2003. -334с.

***LINGUOCULTURAL ANALYSIS OF POLITENESS STRATEGIES IN
ENGLISH AND UZBEK LITERATURE***

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ABSTRACT

This article examines politeness strategies in English and Uzbek literary discourse from a linguocultural perspective. The analysis demonstrates that English literary tradition prioritizes the protection of individual autonomy through indirect speech and negative politeness strategies, while Uzbek literary tradition reflects a collectivist orientation in which hierarchical respect and communal solidarity predominate. Drawing on the works of Jane Austen, Harold Pinter, Alisher Navoi, and Abdulla Qodiriy, the study reveals that despite their cultural differences, both traditions employ indirectness as a primary politeness vehicle and use politeness conventions as instruments of social critique.

Keywords: politeness strategies, linguocultural analysis, English literature, Uzbek literature, individualism, collectivism, indirect speech, literary discourse

In every culture, the relationship between language and society finds its clearest expression in the phenomenon of politeness. Politeness is not merely a matter of speaking courteously — it is a sophisticated social mechanism through which individuals regulate interpersonal relationships, establish social distance, and prevent conflict. Literary texts represent an exceptionally valuable source for studying this mechanism, since writers construct their characters' speech on the basis of real communicative norms operating within their respective societies.

Examining the English literary tradition, one observes that politeness is built primarily around the principle of “protecting individual autonomy”. Characters in

English literary texts rarely express requests directly — instead, they soften their intentions through modal verbs, conditional constructions, and indirect phrasing. This tendency is equally visible in Austen's heroines and Pinter's characters, yet it serves different purposes in each case: in Austen's work, indirect speech preserves social harmony, while in Pinter's drama it becomes a tool for concealing psychological conflict beneath a surface of impeccable courtesy.

The Uzbek literary tradition, by contrast, rests on a fundamentally different foundation. Here the central principle is “collective harmony and hierarchical respect”. In Navoi's works, forms of address are not merely grammatical categories — they function as expressions of social and spiritual order. In Qodiriy's novels, the elaborate rituals of hospitality and extended greeting formulas appear at first glance to be simple depictions of everyday life; in reality, the author elevates them to the level of literary devices through which he conveys a core value of the Uzbek worldview — the individual's consciousness of their place within the community.

Comparing the two traditions, the most fundamental distinction becomes clear: in English literature, politeness serves to protect the “individual”, while in Uzbek literature it serves to preserve the “collective” as a unified whole. This difference manifests not only at the lexical or grammatical level but in the entire logical structure of communication. When an English literary character delivers a refusal, they typically appeal to personal freedom; when an Uzbek literary character faces the same situation, they tend to refer to external obligation or established tradition.

At the same time, meaningful convergences exist between the two traditions. Both employ “indirectness” as a primary vehicle of politeness, even though the cultural motivations behind this choice differ considerably. In both traditions, authors are capable of turning politeness conventions into instruments of irony: just as Austen uses refined dialogue to critique English society, Qodiriy employs the ceremonial politeness

of traditional life to expose the contradictions embedded within his own era. In conclusion, studying politeness strategies through literary texts deepens our understanding of intercultural communication. The comparison of English and Uzbek literary traditions demonstrates that linguistic phenomena cannot be fully understood in isolation from cultural values — behind every communicative act lies the worldview of a particular society.

CONCLUSION

In the English literary tradition, politeness is constructed primarily around the principle of protecting individual autonomy. Realized through modal verbs, conditional constructions, and indirect forms of address, this strategy serves in Austen's heroines as a means of preserving social harmony, while in Pinter's dramaturgy it becomes a literary device through which psychological conflict is concealed beneath a surface of impeccable courtesy.

The Uzbek literary tradition, by contrast, is grounded in the principle of collective harmony and hierarchical respect. In Navoi's works, forms of address function as expressions of social and spiritual order, while in Qodiriy's novels the elaborate rituals of hospitality and greeting formulas are elevated to the level of artistic devices through which the author conveys the core values of the Uzbek worldview. A comparison of the two traditions reveals that the most fundamental distinction lies not merely at the lexical or grammatical level, but in the entire logical structure of communication: when an English literary character delivers a refusal, they appeal to personal freedom, whereas an Uzbek literary character tends to invoke external obligation or established tradition.

At the same time, meaningful convergences exist between the two traditions. Indirectness functions as the primary vehicle of politeness in both, and authors in each tradition demonstrate the capacity to transform politeness conventions into instruments of social critique.

The study confirms that examining the linguocultural phenomenon of politeness through literary texts deepens our understanding of intercultural communication, and reveals that behind every communicative act lies the worldview of a particular society.

REFERENCES

1. Brown P., Levinson S. C. Politeness: Some Universals in Language Usage. — Cambridge: Cambridge University Press, 1987. — 345 p. — URL: <https://www.cambridge.org/core/books/politeness/>
2. Navoi A. Khamsa. — Tashkent: Gafur Ghulam Publishing House, 1960. — URL: https://ziyouz.com/books/alisher_navoiy/
3. Qodiriy A. Days Gone By (O'tgan kunlar). — Tashkent: Uzbekistan Publishing House, 1925. — URL: https://ziyouz.com/books/abdulla_qodiriy/
4. Leech G. N. Principles of Pragmatics. — London: Longman, 1983. — 250 p. — URL: <https://archive.org/details/principlesofprag0000leec>
5. Goffman E. Interaction Ritual: Essays on Face-to-Face Behavior. — New York: Anchor Books, 1967. — 270 p. — URL: <https://archive.org/details/interactionritua00goff>
6. Yusupova Z. D. Speech Etiquette and Communicative Culture in the Uzbek Language. — Tashkent: Fan Publishing House, 2015. — 180 p. — URL: <https://ziyouz.com/kutubxona/>

Programming — A New Form of Art in the Modern Era

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Abstract

This article explores the creative and innovative nature of programming in the context of modern information technology transformation. The main objective of the study is to analyze programming not merely as a technical tool, but as a fundamental phenomenon that shapes digital art and systematic thinking. Based on the cognitive approaches of Jan Sebastian Zipp, the article highlights the concept of creativity in the field of information technology and its impact on the methodology of teaching computer science. The author substantiates the pedagogical advantages of project-based learning (PBL) and the development of algorithmic thinking in computer science education. The research findings indicate that perceiving programming as an art increases students' intrinsic motivation and prepares them for innovative activities. The results of the study can be used by computer science teachers and educational methodologists.

Keywords:

Programming, Innovation, Digital Art, Computer Science Teaching Methodology, Algorithmic Thinking, Project-Based Learning, Cognitive Approach.

Dasturlash — zamonamizning yangi sanʼat turi

Toʻrayeva Madina Sunnatilloevna

Buxoro davlat universiteti, Fizika, Matematika va Axborot texnologiyalar fakulteti
1-1KIDTM 22-guruh 4-bosqich talabasi

Annotatsiya:

Ushbu maqolada zamonaviy axborot texnologiyalari transformatsiyasi sharoitida dasturlashning ijodiy va innovatsion mohiyati tadqiq etiladi. Tadqiqotning asosiy

maqsadi dasturlashni shunchaki texnik vosita emas, balki raqamli san'at va tizimli fikrlashni shakllantiruvchi fundamental fenomen sifatida tahlil qilishdan iborat. Maqolada Yan Sebastian Zippning kognitiv yondashuvlari asosida IT sohasidagi ijodkorlik tushunchasi va uning informatika fanini o'qitish metodikasiga ta'siri yoritib berilgan. Muallif informatika darslarida loyihaviy ta'lim (PBL) va algoritmik tafakkurni rivojlantirishning pedagogik afzalliklarini asoslab beradi. Tadqiqot natijalari shuni ko'rsatadiki, dasturlashni san'at sifatida idrok etish talabalarning ichki motivatsiyasini oshiradi va ularni innovatsion faoliyatga tayyorlaydi. Maqola natijalaridan informatika fani o'qituvchilari va ta'lim sohasidagi metodistlar foydalanishlari mumkin.

Kalit so'zlar :

Dasturlash, Innovatsiya, Raqamli san'at, Informatika o'qitish metodikasi, Algoritmik tafakkur, Loyihaviy ta'lim, Kognitiv yondashuv.

Аннотация

В данной статье исследуется творческая и инновационная сущность программирования в условиях трансформации современных информационных технологий. Основной целью исследования является анализ программирования не только как технического инструмента, но и как фундаментального феномена, формирующего цифровое искусство и системное мышление. В статье на основе когнитивных подходов Яна Себастьяна Циппа раскрывается понятие творчества в сфере информационных технологий и его влияние на методику преподавания информатики. Автор обосновывает педагогические преимущества проектного обучения (PBL) и развития алгоритмического мышления на уроках информатики. Результаты исследования показывают, что восприятие программирования как искусства повышает внутреннюю мотивацию студентов и подготавливает их к инновационной деятельности. Результаты статьи могут быть использованы преподавателями информатики и методистами в сфере образования.

Ключевые**слова:**

Программирование, Инновация, Цифровое искусство, Методика преподавания информатики, Алгоритмическое мышление, Проектное обучение, Когнитивный подход.

Kirish

Zamonaviy postindustrial jamiyatda dasturlash shunchaki utilitar funksiyani bajaruvchi texnik vosita bo'lishdan to'xtab, murakkab ijtimoiy-madaniy va intellektual hodisaga aylandi. Bugungi kunda axborot texnologiyalari (IT) va ijodkorlik o'rtasidagi chegara tobora shaffoflashib bormoqda. Tadqiqotchi Yan Sebastian Zipp ta'kidlaganidek, raqamli transformatsiya sharoitida ijodkorlik tushunchasi yirik IT korporatsiyalarida yangicha institutsional shaklga ega bo'lib, u nafaqat individual mahorat, balki ijtimoiy amaliyot sifatida namoyon bo'lmoqda.

Ushbu maqolaning maqsadi dasturlashni uchta asosiy o'lchamda: ijtimoiy-falsafiy paradigma (ijodkorlik), estetik tajriba (san'at) va texnologik drayver (innovatsiya) sifatida tahlil qilishdan iborat. Dasturlash tili rassom uchun mo'yqalam yoki bastakor uchun nota kabi vosita bo'lib xizmat qilsa-da, uning o'ziga xosligi — mantiqiy qat'iyat va sub'ektiv badiiy tafakkurning uyg'unligidadir.

Maqolada Silikon vodiysi madaniyati, "sun'iy ijodkorlik" potentsiali va kod yozish jarayonidagi estetik zavq masalalari ko'rib chiqiladi. Shuningdek, dasturlashning zamonaviy innovatsiyalar — sun'iy intellekt, blokcheyn va buyumlar internetini (IoT) harakatlantiruvchi kognitiv asosi ekanligi ilmiy jihatdan asoslab beriladi. Bu tahlil, dasturlashni shunchaki iqtisodiy faoliyat turi emas, balki insoniyatning intellektual evolyutsiyasidagi yangi bosqich sifatida tushunishga yordam beradi.

Dasturlash va ijodkorlik

IT kontekstida "ijodkorlik" nimani anglatadi va IT uning nomidan ishlaganda nima bo'ladi? Yan Sebastian Zipp raqamli o'zgarishlar davrida yirik IT kompaniyalarida

ijodkorlik tushunchasini, jumladan, yangi ish usullarini yoki insoniy aloqasiz potentsial sun'iy ijodkorlikni o'rganadi. Silikon vodiysi yoki uning kontrmadaniyat bilan aloqasi kabi tarkibiy elementlarga tayanib, uning ijodkorlikni ijtimoiy amaliyot sifatida ifodalash va tashkil etish tahlili IT ijodkorlik hikoyasining ichki mantig'ini tushunishga imkon beradi. Ushbu tadqiqot bugungi kunda ijodkorlik tushunchasini keng tarqalgan tushunish bilan tanqidiy aloqalar uchun muhim asos yaratadi.

2. Dasturlash va san'at

Hozircha asosan dasturlash va san'at o'rtasidagi o'xshashliklarga e'tibor qaratamiz. San'at yaratganingizda sizni qamrab oladigan ijodkorlik tuyg'usini ta'riflay olmaymiz, lekin dasturlash shunga o'xshash tuyg'uni uyg'otishiga sizga yordam beradi. Bunga boshqa nuqtai nazardan qarasak, ba'zi odamlar dasturlash bilan faqat kasb sifatida shug'ullanishlarini, undan zavqlanmasliklarini tan olishimiz kerak.

Ba'zilar dasturlash sohasiga faqat moliyaviy nuqtai nazardan yondashishingiz mumkin va bu sizning ishingiz dasturlash bilan bog'liqligini o'zgartirmaydi. Har qanday kasb singari, unga ishtiyoqmand bo'lganlar ham, ishtiyoqsizlar ham bor. Keyin unga to'liq oshiq bo'lganlar ham bor. Men aynan shu narsaga to'xtalmoqchiman. Xuddi sevgi bilan rasm chizadigan va musiqa yaratadigan odamlar bo'lgani kabi, dasturlashga ham xuddi shunday ishtiyoq bilan yondashadiganlar bor. Bu odamlar har doim bir qadam oldinda, chunki ular o'z ishlariga boshqacha energiya olib kelishadi. Ular qilayotgan ish oddiy ishdan ustun turadi; bu quvonch manbaiga aylanadi.

Dasturlash kodingizni tuzatishga soatlab vaqt sarflash yoqimli bo'lmasligi mumkin, ammo bu qiyinchiliklarni yengib o'tganingizda his qiladigan muvaffaqiyat hissi bunga arziydi. Ishlab chiquvchilar qadrlaydigan narsa shu - muammoni hal qilgandan keyin yengilmaslik hissi. Albatta, keyingisi paydo bo'lguncha. Ammo dasturlashni yoqimli qiladigan narsa shu - ishlab chiqish jarayoni ko'tarilish va pasayishlarga to'la yo'ldan borishga o'xshaydi. Ba'zan siz xatolar bilan kurashasiz, boshqa paytlarda esa

yaratganingizning quvonchidan zavqlanasiz. Muayyan nuqtadan so'ng, siz yozgan dasturingizdan zavqlana boshlaysiz. Siz uni tartibga solishdan va sizga yoqadigan tarzda tartibga solishdan zavqlanasiz. Yangi funksiyalarni qo'shganda, siz ularning mavjud tuzilishga qanday mos kelishini tasavvur qilasiz. Siz takomillashtirish kerak bo'lgan sohalarni aniqlaysiz va kodingizni takomillashtirishga intilasiz. Siz yozayotganingizda quvonch hissi sizni qamrab oladi. Ha, bu juda aqldan ozgandek tuyulishi mumkin, ammo bu haqiqat. Siz hatto kodingizni estetik jihatdan yoqimli deb topishingiz mumkin. Yakuniy natija siz uchun san'at asariga aylanadi, chunki siz unga juda ko'p sevgi va fidoyilik bag'ishladingiz. Bu sizning ijodingiz, farzandingiz kabi tuyuladi ba'zan o'z ishlarini takomillashtirish uchun kunlar davomida o'zlarini yolg'iz qoldiradilar. Bunday fidoyilikning natijasi ko'pincha durdona asar sifatida e'tirof etiladi. Biroq, farq bor. Rasmlar, musiqa va boshqa san'at turlari umumjahon tan olingan va qadrlanadi. Boshqa tomondan, dasturiy ta'minotni faqat dasturlash tilini yaxshi biladiganlar tushunishi mumkin. San'at hamma uchun ochiq bo'lishi, barchaga yoqishi kerak. U hayotning barcha sohalaridan talqin va muhokamalarni taklif qilishi kerak.

Dasturiy ta'minot unday emas. Bu asosan dasturchilar tomonidan tushuniladigan va qadrlanadigan til. Bu dasturlash san'atmi yoki yo'qligini ko'rib chiqishda paradoksni keltirib chiqaradi. Dasturlashni asosan uning tilini biladiganlar tushunadi, ammo bu uni san'at bo'lishdan mahrum qilmaydi. Qaysidir ma'noda, u o'zining badiiy qiymatini chuqurlashtiradi, chunki u o'zida yashirin olam sifatida mavjud. Uning nozikliklarini to'liq anglash uchun uning nozikliklarini tushunishingiz kerak. Uning nafisligiga qoyil qolish uchun uning arxitekturasini tushunishingiz kerak. Shuning uchun, dasturlash hamma uchun emas, balki dasturchilar uchun san'at deb aytishimiz mumkin. Dasturlash san'ati - bu uning tubiga chuqurroq kirib boradigan har bir kishi tomonidan o'rganilishi kutilayotgan olam. Ushbu his-tuyg'ularni va estetik qadrlashni boshdan kechirish uchun siz dasturlashni o'rganishingiz kerak. Siz ushbu san'at turiga uning yashirin tilini

o'rganish orqali kira olasiz. Aslida, dasturlash san'ati o'ziga xos tilda yashiringan dasturchilarga tegishli.

3. Dasturlash va innovatsiyalar

Dasturlash va innovatsiyalar bugungi kunda bir-biridan ayrilmas tushunchalarga aylandi. Agar innovatsiyani yangi g'oya yoki yechim deb bilsak, dasturlash — shu g'oyani hayotga tatbiq etuvchi asosiy vositadir. Zamonaviy dunyoda taraqqiyot tezligini belgilovchi asosiy omil bu — raqamli transformatsiya. Ilgari innovatsiya deganda faqat jismoniy ixtirolar (masalan, bug' dvigateli yoki elektr chirog'i) tushunilgan bo'lsa, bugun eng katta o'zgarishlar kod satrlari ortida sodir bo'lmoqda. Har qanday zamonaviy innovatsion loyiha, xoh u sun'iy intellekt bo'lsin, xoh biotexnologiya, dasturlashsiz mavjud bo'la olmaydi. Kod yozish — bu shunchaki kompyuterga buyruq berish emas, balki murakkab muammolarga optimal yechim topish san'atidir.

Avtomatlashtirish: Inson mehnatini yengillashtirish va xatolarni kamaytirish.

Ma'lumotlar tahlili: Katta hajmdagi ma'lumotlardan (Big Data) foydali xulosalar chiqarish.

Masshtablash: Bir marta yaratilgan raqamli mahsulotni millionlab insonlarga yetkazish imkoniyati.

Bugungi kunda dasturlash quyidagi sohalarda tub burilish yasamoqda:

Texnologiya	Innovatsion ahamiyati
Sun'iy Intellekt (AI)	Mashinalarning mantiqiy fikrlashi va qaror qabul qilishi.
Blokcheyn	Ma'lumotlar xavfsizligi va markazlashmagan iqtisodiyot.
Internet buyumlar (IoT)	Jismoniy qurilmalarning o'zaro bog'lanishi va "aqlli" tizimlar.

Bulutli texnologiyalar	Resurslardan istalgan joyda va istalgan vaqtda foydalanish.

Dasturchi — Zamonaviy ixtirochi

Eski davr ixtirochilari laboratoriyalarda yillarini o'tkazgan bo'lsa, bugungi dasturchilar o'z noutbuklari yordamida dunyoni o'zgartiradigan startaplar yaratmoqdalar. Innovatsion fikrlaydigan dasturchi shunchaki "kod yozuvchi" emas, balki tizimli muhandis va strategdir.

Xulosa

Tahlillar shuni ko'rsatadiki, dasturlash va innovatsiyalar uyg'unligi zamonaviy informatika fanini o'qitish metodikasini tubdan isloh qilishni taqozo etmoqda. Informatika endilikda shunchaki texnik qurilmalar bilan ishlashni o'rgatuvchi fan emas, balki talabalarda algoritmlar orqali olamni anglash va uni qayta qurish imkonini beruvchi kognitiv vositaga aylandi.

Ushbu yo'nalishda amalga oshirilgan tadqiqotlar va metodik tahlillar quyidagi fundamental xulosalarni taqdim etadi:

Metodik yondashuvning ijodiy xarakteri: Informatika o'qitishda an'anaviy "reproduktiv" (nusxa ko'chirish) uslubidan voz kechib, loyihaviy ta'lim (PBL) va evristik modellashtirishga o'tish zarur. Bu jarayonda dasturlash kodi rassomning mo'yqalami kabi talabaning o'zini namoyon qilish vositasi bo'lib xizmat qiladi. Dasturlashni "san'at" darajasida idrok etish talabalarda fanga nisbatan ichki motivatsiyani shakllantiradi va murakkab muammolarni yechishda estetik hamda mantiqiy qoniqish hissini uyg'otadi.

Algoritmik tafakkur — zamonaviy savodxonlik asosi: Informatika fanini o'qitish metodikasi o'quvchilarda nafaqat sintaksisni o'rganishni, balki "Computational Thinking" (hisoblash tafakkuri)ni rivojlantirishni maqsad qilishi kerak. Bu esa ularga har qanday sohada (tibbiyotdan tortib iqtisodiyotgacha) tizimli va strategik qarorlar

qabul qilish imkonini beradi. Innovatsiyalarni pedagogik adaptatsiya qilish: Sun'iy intellekt, blokcheyn va IoT kabi texnologiyalarni o'quv dasturlariga integratsiya qilish nafaqat bilim berish, balki talabalarni "raqamli ixtirochi" sifatida shakllantirish demakdir. Metodik jihatdan to'g'ri tashkil etilgan dars jarayoni talabani passiv iste'molchidan innovatsion g'oyalar generatoriga aylantiradi.

Yakuniy xulosa sifatida aytish mumkinki, informatika fanini o'qitish metodikasini raqamli san'at va innovatsion muhandislik tamoyillari asosida takomillashtirish — barqaror taraqqiyotning kafolatidir. Kelajakda dasturlash asoslarini bilish xuddi o'qish va yozish kabi umuminsoniy madaniyatning ajralmas qismiga aylanadi. Informatika fani esa ushbu yangi dunyo me'morlarini tarbiyalovchi asosiy platforma bo'lib qoladi.

Foydalanilgan adabiyotlar

1. Taylaqov N. I. *Informatika va axborot texnologiyalari*. — Toshkent, 2018.
2. Abduqodirov A. A. *Axborot texnologiyalari nazariyasi va amaliyoti*. — Toshkent: Fan, 2019.
3. Karimov U. U. *Informatika va dasturlash asoslari*. — Toshkent: O'qituvchi, 2020.
4. Xudoyberdiyev A. *Algoritmlar va dasturlash tillari*. — Toshkent, 2021.
5. Jo'rayev R. *Zamonaviy pedagogik texnologiyalar*. — Toshkent: Innovatsiya, 2017.
6. Yo'ldoshev J. G'. *Ta'limda innovatsion texnologiyalar*. — Toshkent, 2018.
7. Begimqulov U. Sh. *Pedagogik ta'limda axborot texnologiyalarini qo'llash*. — Toshkent, 2016.
8. Webiston jamoasi. *Dasturlash bo'yicha zamonaviy qo'llanmalar (o'zbek tilida tarjimalar)* — 2024.

Vebsaytlar

1. https://books.google.co.uz/books/about/Programming_Creativity.html?id=CemKEAAQBAJ&redir_esc=y
2. https://www.researchgate.net/publication/382975505_Is_Programming_An_Art
3. <https://gemini.google.com/app/659bd285582d437b>

Digital Media and the Transformation of Modern Cultural Narratives

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ANNOTATION: Digital media has significantly changed how people communicate, interact and create culture. The shift from traditional forms like newspapers and television to online platforms has reshaped communication patterns, influenced cultural identities and changed social behavior. This study explores how digital media affects modern society and culture, including communication, globalization of culture, social interactions, political processes and cultural production. It also looks at both the positive and negative sides of this change, noting that while digital media increases participation and engagement, it also raises concerns such as misinformation, privacy issues and growing social divisions. Overall, the paper argues that digital media has a dual impact, promoting openness and access while also challenging traditional cultural system.

KEYWORDS: Digital media, communication, social media, cultural identity, political polarization.

INTRODUCTION. In today's highly connected world, digital media has become an important platform for expressing and shaping cultural identities. Tools such as social media, digital art, artificial intelligence (AI), online communities and the other technologies play a key role in how people form and present their identities. These platforms influence not only how individuals express themselves but also how traditional cultural values and practices are effected. Digital media has developed alongside technological progress, evolving through stages such as the agricultural, industrial and information ages. It has expanded from simple text, images and audio to include videos and interactive content. Today, examples of digital media include websites, social media platforms, video games, digital photos and videos, digital art,

online communities, podcasts, electronic books and other digital formats. According to Chassiakos and Stager (2020), digital media is more than just a communication tool – it is a powerful force that shapes societies by transforming communication, information sharing and cultural experiences.

Digital media also promotes cultural diffusion which is the spread of cultural ideas, beliefs and practices across different regions. This process affects various aspects of life such as food, religion, entertainment and health. Through platforms like the internet, social media and e-books, cultures can be shared globally, allowing people to adopt and blend cultural elements. This interaction can create new cultural identities by merging different traditions. Examples include viral trends and global music styles such as hip hop, Afrobeat and Amapiano, which show widespread cultural exchange. Overall, digital media has become a powerful and transformative element in modern society, breaking geographical barriers and enabling real-time communication and interaction. Its connection cultural identity is very important because it not only supports communication but also helps shape and strengthen cultural expression in today's world. Today, digital platforms are widely used to share cultural content. The internet has become a major part of everyday life and many people use digital devices regularly for work, communication and entertainment. Individuals can easily share their interests and cultural experiences online, often evoking strong emotional reactions such as happiness or sadness, which increases the spread of content. This study therefore examines the complex relationship between digital media and cultural identity, focusing on both its positive and negative effects.

Conceptual Clarification.

Digital media refers to content that is created and transmitted in digital form over networks such as the internet. It includes materials converted from analog to digital formats and is used for communication, education, entertainment and cultural

expression. Examples include streaming services, e-books, podcasts, social media, video games and technologies such as augmented and virtual reality. These tools also help promote cultural identity and improve digital literacy. A major development in digital media is artificial intelligence, which uses algorithms to analyze and interpret data, including cultural information. AI can stimulate human-like thinking processes and can be applied across different fields and cultural contexts. Digital media also plays a key role in cultural representation. It influences many aspects of life such as education, entertainment, religion, lifestyle and health. For example, yoga, which originated in India, has evolved into different forms in other regions through digital influence, such as “Buti Yoga” which combines exercise, dance and music. This shows how digital media spreads cultural practices globally.

CULTURAL IDENTITY. Cultural identity refers to the values, beliefs, customs and practices that define a group of people and distinguish them from others (Payne, 2020). It is also a social concept that shapes how individuals see themselves and interact with others. Culture includes language, religion, traditions and social behaviors that vary across groups and generations (Matsumoto, 1996; Pappas & McKelvie, 2022). Cultural identity is formed through shared experiences, memories and social interactions, influencing how individuals think, behave and connect with others. Cultural differences shape how people relate to each other, with some cultures emphasizing individuality while others focus on group unity. Overall, cultural identity plays a key role in shaping personality, values and beliefs. Digital media and cultural identity are closely linked, as both help people build social relationships and express their cultural experiences. They provide platforms for individuals and communities to share and strengthen their identities.

The impact of user-generated content on traditional media industries.

Traditional cultural industries such as television, radio and film have been significantly transformed by the rise of user-generated content. Platforms like YouTube, TikTok and

Instagram allow individuals to produce and distribute their own material, altering the traditional patterns of media creation and consumption. This development not only challenges the dominance of established institutions but also reshapes how audiences interact with cultural content. While conventional media was largely controlled by major organizations, digital platforms have democratized cultural production, enabling a wider range of voices and niche interests to flourish. As Jenkins explains, this shift has led to the emergence of a participatory culture, where people are no longer just consumers but also active contributors, thereby disrupting traditional media hierarchies. Despite these opportunities, traditional media companies face difficulties in adjusting to the rapidly evolving digital landscape. Although some attempt to adapt by collaborating with influencers and incorporating UGC, many still struggle to fully leverage this model. Additionally, the economic aspects of UGC raise concerns, as creators often deal with unequal revenue-sharing systems dictated by platforms. Nevertheless, UGC continues to reshape the media industry, creating space for alternative cultural expressions and fostering more direct connections between creators and their audiences.

CONCLUSION. Digital media continues to reshape how cultural identities are perceived, expressed and preserved in the globalized digital age. While offering unprecedented opportunities for cultural exchange and empowerment , digital media also brings forth complex challenges that require thoughtful consideration and proactive measures. By understanding and addressing these dynamics, stakeholders can foster a more inclusive and sustainable digital cultural landscape that respects and celebrates cultural diversity.

REFERENCE.

1. Chassiakos, Y. L. R., & Stager, M. (2020). Digital media and child and adolescent development. American Academy of Pediatrics.

2. Jenkins, H. (2006). *Convergence culture: Where old and new media collide*. New York University Pre
3. Matsumoto, D. (1996). *Culture and psychology*. Brooks/Cole Publishing Company.
4. Pappas, S., & McKelvie, S. (2022). Cultural identity and its role in modern society. *Journal of Cultural Studies*, 15(2), 45–60.
5. Payne, G. (2020). *Social divisions and cultural identity*. Palgrave Macmillan.
6. Castells, M. (2010). *The rise of the network society*. Wiley-Blackwell.
7. Boyd, D. (2014). *It's complicated: The social lives of networked teens*. Yale university Press.
8. Couldry, N., & Hepp, A. (2017). *The mediated construction of reality*. Polity Press.
9. Appadurai, A. (1996). *Modernity at large: Cultural dimensions of globalization*. University of Minnesota Press.

DEVELOPMENT OF A TECHNOLOGY FOR OBTAINING DRY EXTRACT WITH A TINCHING EFFECT

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Abstract. Research on the development of a technology for obtaining a dry extract containing flavonoids of the *H. scabrum* plant growing in the territory of the Republic of Uzbekistan is a pressing task. This article discusses the industrial technology for obtaining dry extract of coarse sorrel, in particular, the fractional composition of coarse sorrel raw materials ground in mills with various sieves, the indicators of influencing factors, the use of a spray drying device in obtaining dry extract of coarse sorrel, as well as the naturalness, low side effects, and biological compatibility of preparations obtained from plant raw materials, their advantages of wide application in medical practice.

Keywords: flavonoid, dry extract, chamomile raw material, extraction, alcohol, industrial technology, concentration, time, pressure, medicinal plant, concentration, storage, medical practice.

In the territory of Uzbekistan, 3 species of “*Hypericum scabrum*”, “*Hypericum eloncratum*”, and “*Hypericum perforatum*” grow. However, the raw material reserves of *H. eloncratum* are very small. The species *H. perforatum* has been introduced into medical practice. The substance “Dry Dalachoy Extract,” obtained from the aerial parts of *H. perforatum* plants, is an analogue of the imported preparation “*Hypericum - Gelarium*,” which has a sedative and antidepressant effect. However, in the territory of Uzbekistan, the raw material reserves of *H. perforatum* are less than that of *H. scabrum*. It should be noted that both species contain the flavonoid hypericin, which is the main active substance. Based on the foregoing, research on the development of a technology for obtaining a dry extract containing flavonoids of the *H. scabrum* plant growing in the territory of the Republic of Uzbekistan is an urgent task. The literature data indicate that

ethyl alcohol at a concentration of 60% to 80% is indicated as an effective solvent for the extraction of flavonoids from the chamomile plant. However, for technology, this interval is too wide.

The isolation of biologically active substances from plant raw materials is a complex process. Several factors simultaneously influence the efficiency of the extraction process. Therefore, experiments were conducted on the selection of an effective solvent for the extraction of hypericin from the raw material *Hypericum scarbum*, the influence of the degree of grinding of the raw material and temperature on the extraction process, and the study of the dynamics of the extraction process.

The extraction process can be divided into 2 groups - static and dynamic. When extracting biologically active substances under static conditions, the raw material is soaked in the extractant and then allowed to settle for a certain period. In dynamic extraction, one or both of the solvent and the raw material are set in motion. As a result, during the interaction of phases, the exchange of substances intensifies. This leads to a decrease in the duration of the extraction process and the time of action of the phases. Therefore, in order to further increase the efficiency of the extraction process of hypericin flavonoid from the raw material *Hypericum scarbum*, such methods of dynamic extraction as with a mobile solvent and constant stirring were studied.

Extraction by mobile solvent method. For this, a pump was installed in an extractor with a capacity of 10 l, 2.0 kg of *Hypericum scarbum* raw material was loaded, and 8.0 l (hydromodule 1:4) of 80% ethyl alcohol was added. The extract was drawn from the lower part of the extractor by a specially installed pump, and the extractor was drained from the upper part of the extractor at a rate of 200 l/min per 1m³ of volume. The process was carried out until the extractant transfer of the extractive substances ceased during the phase interaction. For this, the yield of extractive substances was analyzed every 30 minutes. After the extraction process, the extract (6.0 l) was poured out, and 6.0 l of 80%

ethyl alcohol was added again, and the extraction process was carried out under the same conditions as the first. Extraction was carried out in this way three more times, and the yield of extractive substances was determined.

Extraction with constant stirring. 1.0 kg of *Hypericum scarbum* raw material was placed in an extractor with a capacity of 10.0 l and equipped with a mixer. To ensure smooth rotation of the mixer, 10.0 l (hydromodule 1:10) of 80% ethyl alcohol was added, and the extraction process was carried out at room temperature with constant stirring. The yield of extractive substances was analyzed every half hour. After the extraction process was completed, the extract (9.0 l) was poured out, and 9.0 l of 80% ethyl alcohol was added again, and the extraction process was carried out under the same conditions as the first. Extraction was carried out in this way three more times, and the yield of extractive substances was determined.

Remothering method. To compare the statistical and dynamic methods, the raw material *Hypericum scarbum* was extracted five times at room temperature with 80% ethyl alcohol. When selecting the type of drying of the ethyl acetate solution of flavonoids for obtaining the dry extract of roughage, vacuum and non-vacuum conditions were used.

Experiments were conducted on devices operating under vacuum and non-vacuum conditions, under the influence of infrared radiation, forced ventilation and spray drying.

For this, 5.0 kg of air-dried and ground raw material *Hypericum scarbum*, ground in a mill with a hole diameter of 4 mm, was placed in an extractor with a capacity of 50.0 l and 20.0 l of 80% ethyl alcohol was added. The extraction process was carried out at room temperature for 6 hours. After the specified time, the first 15.0 l of extract was poured out. 15.0 l of fresh 80% ethyl alcohol was poured into the extractor, and the extraction was carried out under the same conditions as the first extraction. As a result, 15.0 l of the second extract was obtained. In this way, the extraction process was carried

out three more times. Five extracts were combined, and the resulting 75.0 l of extract was filtered and thickened until 5.0 l remained. At the end of the process, another 5 liters of purified water was supplied to the evaporator to remove the residual ethyl alcohol, and the condensation process continued until 3 liters remained. The resulting aqueous concentrate was treated 5 times with 3 liters of extraction gasoline, followed by the extraction of flavonoids 5 times with 3 liters of ethyl acetate. The ethyl acetate extracts were first combined and then divided into five equal parts (by 5.0 liters). Each piece of ethyl acetate extract was dried on various equipment as follows:

Example 1. The first batch of ethyl acetate extract was condensed in a rotary evaporator until a thick mass was formed and dried in a "SHSV-45K" (Russia) drying oven at 70-80°C under vacuum-free conditions.

Example 2. The second part of the ethyl acetate extract was evaporated until a thick mass was formed and dried in a "SHSV-45K" (Russia) drying oven at a temperature of 70-80°C and a vacuum of 0.6-0.8 kgf/cm².

Example 3. The third piece of ethyl acetate extract was condensed in a rotary evaporator until a thick mass was formed and dried in a drying cabinet of the "IKS-2M" brand (Russia), under the influence of infrared radiation and at a temperature of 70°C.

Example 4. The fourth piece of ethyl acetate extract was evaporated until a thick mass was formed and dried in a sublimation dryer at a temperature of 80-85°C under a vacuum of 0.9-1.0 kgf/cm².

Example 5. The fifth piece of ethyl acetate extract was thickened to 1.0 liters in a rotary evaporator. To remove residual ethyl alcohol from the concentrate, 3.0 l of purified water was supplied to the evaporator at the end of the process, and the thickening process was continued until the dry matter content in the drying solution reached 10%. The resulting concentrate (dried solution) was dried in a spray drying unit of the "Anhydro No. 2" (Denmark) under the following conditions: the temperature of

the drying agent (hot air) is 180-190°C, at the outlet 85-90°C; the speed of the injected aqueous solution is 4 l/hour; the pressure of the injected aqueous solution on the spray nozzle is 0.2 MPa.

Due to the fact that the obtained dry extracts of samples 1-4 were in the form of pieces, they were ground in a knife mill and passed through a sieve with a hole diameter of 0.5 mm.

From the presented data, it can be observed that the drying process, carried out by spray drying, took the least time compared to other considered types. By methods 1-4, dry extracts in the form of a non-uniform powder consisting of dark brown and brown particles were obtained. In the 5th method, a dry extract was obtained in the form of a light brown powder with a uniform appearance. In addition, the dry extracts obtained by methods 1-4 undergo the following stages of grinding and sieving. This led to the loss of a certain part of the dry extracts at these stages, including the impossibility of sieving 10-12% of the dry extracts even with 3-4 repeated grinding. In the 2nd and 4th methods, since the dry extracts partially contain porous particles, their grinding was easier. However, in this regard, the 5th method is also superior to others, since at the end of the process, a fine-grained powdered dry extract is obtained, and such processes as grinding and sifting are not required. Another advantage of this type is the low moisture content of the dry extract obtained by the 5th method compared to other types.

Based on the foregoing, it was deemed preferable to use a spray drying unit for obtaining the dry extract of coarse sorrel.

Bibliography

1. Abdurakhmanov B.A., Umarova O.U., Tilovova G.Kh., Khalilov R.M. Selection of optimal drying conditions for aboveground parts of *Hypericum scabrum* and *Hypericum perforatum* // Sciences of Europe. - 2021. - No. 116 (1). - P. 47-54.

Drozd G.A., Lishuk N.G. Safety of the Use of Medicinal Plant Raw Materials // Development, Research and Marketing of New Pharmaceutical Products. - Тошкент, 2020. - Pp. 467-468.

3. Zavrazhnov V.N. Kitayeva R.I., Khmelev K.F. Medicinal Plants: Therapeutic and Prophylactic Use // - Voronezh, 1993. - Б. 227-229.

4. Ibragimov T.I., Begimova D.I., Abdurakhmanov B.A., Ismailova M.G. // Standardization of the medicinal substance based on *Hypericum scabrum* // Materials of the conference of young scientists "Actual problems of the chemistry of natural compounds," dedicated to the memory of Academician S.Yu. Yunusov. Tashkent, March 12, 2015

Annotatsiya. O‘zbekiston Respublikasi hududida o‘sadigan *H. scabrum* o‘simligining flavonoidlarini saqlagan quruq ekstrakt olish texnologiyasini ishlab chiqish bo‘yicha tadqiqotlar dolzarb vazifa hisoblanadi. Ushbu maqolada dag‘al dalachoy quruq ekstraktini olish sanoat texnologiyasi, xususan, turli elaklar o‘rnatilgan tegirmonlarda maydalangan Dag‘al dalachoy xomashyoni fraksion tarkibi, ta’sir qiluvchi omillarning ko‘rsatkichlari, dag‘al dalachoy quruq ekstraktini olishda purkab quritish qurilmasidan foydalanish, shuningdek, o‘simlik xomashyosidan olingan preparatlarning tabiiyligi, kam nojo‘ya ta’sirga egaligi va biologik mosligi ularning tibbiyot amaliyotida keng qo‘llanilishi afzalliklari haqida fikr yuritiladi.

Kalit so‘zlar: flavonoid, quruq ekstrakt, dalachoy xomashyosi, ekstraksiya, spirt, sanoat texnologiyasi, konsentratsiya, vaqt, bosim, dorivor o‘simlik, konsentratsiya, saqlash, tibbiy amaliyoti.

O‘zbekiston hududida dalachoyning 3 turi - *Hypericum scabrum*, *Hypericum eloncratum* va *Hypericum perforatum* o‘sadi. Biroq, *H. eloncratum* xomashyo zaxiralari juda kam. Tibbiy amaliyotga *H. perforatum* turi joriy yetilgan. *H. perforatum* o‘simliklarining yer ustki qismidan olingan «Dalachoy quruq ekstrakti» substansiyasi

chet eldan import qilinadigan tinchlantiruvchi va tushkunlikka qarshi ta'sirga ega bo'lgan «Giperikum - Gelarium » preparatining analogi hisoblanadi. Ammo O'zbekiston hududida *H. perforatum* xomashyo zaxirasi *H. scabrum* dan kam. Shuni ta'kidlash kerakki ikkala turda ham asosiy faol modda bo'lgan giperitsin flavonoidi mavjud. Yuqoridagilardan kelib chiqqan holda, O'zbekiston Respublikasi hududida o'sadigan *H. scabrum* o'simligining flavonoidlarini saqlagan quruq ekstrakt olish texnologiyasini ishlab chiqish bo'yicha tadqiqotlar dolzarb vazifa hisoblanadi. Adabiyot ma'lumotlari shuni ko'rsatadiki, 60% dan 80% gacha konsentratsiyadagi etil spirti dalachoy o'simligidan flavonoidlarni ekstraksiya qilish uchun samarali erituvchi sifatida ko'rsatilgan. Biroq, texnologiya uchun ushbu interval juda keng hisoblanadi.

O'simlik xomashyosidan biologik faol moddalarni ajratib olish murakkab jarayon hisoblanadi. Ekstraksiya jarayonining samaradorligiga bir vaqtning o'zida bir necha omillar ta'sir ko'rsatadi. Shu sababli *Hypericum scarbum* xomashyosidan giperitsinni ekstraksiyasi uchun samarali erituvchi tanlab olish, ekstraksiya jarayoniga xomashyo maydalik darajasi va haroratni ta'siri, ekstraksiya jarayoni dinamikasini o'rganish bo'yicha tajribalar olib borildi.

Ekstraksiya qilish jarayonini 2 guruhga bo'lish mumkin – statik va dinamik. Biologik faol moddalarni statik sharoitda ekstraksiya qilishda xomashyo ekstragentga bo'ktirib so'ng ma'lum vaqt davomida tindirib qo'yiladi. Dinamik sharoitda ekstraksiya qilishda erituvchi va xomashyoning biri, yoki har ikkisi harakatga keltiriladi. Natijada fazalarning o'zaro ta'siri vaqtida moddalar almashinuvi jadallashadi. Bu holat ekstraksiya jarayonini borish vaqtini va fazalarning ta'sir vaqtini kamayishiga sabab bo'ladi. Shu sababli *Hypericum scarbum* xomashyosidan giperitsin flavonoidini ekstraksiya jarayonini samaradorligini yanada oshirish maqsadida harakatdagi erituvchi va doimiy aralashtirishli kabi dinamik ekstraksiya usullari o'rganildi.

Harakatdagi erituvchi usulidagi ekstraksiya. Buning uchun sig'imi 10 l bo'lgan

ekstraktorga nasos o'rnatildi va 2,0 kg *Hypericum scarbum* xomashyosi joylandi va 8,0 l (gidromodul 1:4) 80% li etil spirti quyildi. Ekstraktor quyi qismidan maxsus o'rnatilgan nasos orqali ekstrakt tortib olinib, ekstraktorning yuqori qismidan ekstraktorni 1m³ hajmiga nisbatan 200 l/min tezlik bilan oqizib qo'yildi. Jarayon fazalar ta'siri vaqtida ekstraktiv moddalarning ekstragent o'tishi to'xtaguncha olib borildi. Buning uchun har 30 minutda ekstraktiv moddalar unumi tahlil qilib borildi. Ekstraksiya jarayoni tugagach ekstrakt (6,0 l) quyib olindi va 6,0 l yangidan 80% li etil spirti quyib birinchisi kabi sharoitda ekstraksiya jarayoni olib borildi. Ekstraksiya shu yo'sinda yana uch marotaba amalga oshirildi va ekstraktiv moddalar unumi aniqlandi.

Doimiy aralashtirishli ekstraksiya. Sig'imi 10,0 l bo'lgan va aralashtirgich bilan jihozlangan ekstraktorga 1,0 kg *Hypericum scarbum* xomashyosi joylandi. Aralashtirgichni ravon aylanishini ta'minlash maqsadida 10,0 l (gidromodul 1:10) 80% li etil spirti quyildi va xona haroratida, doimiy aralashtirgan holda ekstraksiya jarayoni olib borildi. Har yarim soatda ekstraktiv moddalar unumi tahlil qilib borildi. Ekstraksiya jarayoni tugagach ekstrakt (9,0 l) quyib olindi va 9,0 l yangidan 80% li etil spirti quyib birinchisi kabi sharoitda ekstraksiya jarayoni olib borildi. Ekstraksiya shu yo'sinda yana uch marotaba amalga oshirildi va ekstraktiv moddalar unumi aniqlandi.

Rematseratsiya usuli. Statistik va dinamik usulni taqqoslash maqsadida *Hypericum scarbum* xomashyosi 80% li etil spirti bilan xona haroratida besh marta ekstraksiya qilindi. Dag'al dalachoy quruq ekstraktini olishda flavonoidlarni etilatsetatli eritmasini quritish turini tanlab olishda vakuumtsiz va vakuumli sharoitdan foydalanildi.

Vakuumsiz va vakuumli sharoitda, infraqizil nur ta'siri ostida, havoni majburiy shamollatish va purkab quritish kabi sharoitlarda ishlovchi qurilmalarda tajribalar olib borildi.

Buning uchun havoda quritilib maydalangan va teshiklari diametrining o'lchami 4 mm bo'lgan tegirmonda maydalanilgan 5,0 kg *Hypericum scarbum* xomashyosi sig'imi

50,0 l bo'lgan ekstraktorga joylandi va 20,0 l 80% etil spirti quyildi. Ekstraksiya jarayoni 6 soat davomida xona haroratida olib borildi. Belgilangan vaqt tugagach birinchi 15,0 l ekstrakt quyib olindi. Ekstraktorga 15,0 l miqdorda yangi 80% etil spirti quyildi va birinchi ekstraksiya kabi sharoitda ekstraksiya olib borildi. Natijada 15,0 l ikkinchi ekstrakt olindi. Shu yo'sinda yana uch marta ekstraksiya jarayoni amalga oshirildi. Beshta ekstrakt birlashtirildi va hosil bo'lgan 75,0 l ekstrakt filtrlendi va 5,0 l qolguncha quyultirildi. Jarayon so'ngida qoldiq etil spirtini chiqarib tashlash uchun bug'latish jihoziga yana 5 l tozalangan suv uzatildi va quyultirish jarayoni 3 l qolguncha davom ettirildi. Hosil bo'lgan suvli konsentrat 5 marta har biri 3 l bo'lgan ekstraksion benzin bilan ishlov berildi va keyingi navbatda har biri 3 l bo'lgan etilatsetat bilan 5 marta flavonoidlar ekstraksiya qilib olindi. Etilatsetatli ajratmalar avval birlashtirildi va so'ng teng besh bo'lakka bo'lindi (5,0 litrdan). Har bir bo'lak etilatsetatli ajratmalar turli jihozlarda quyidagicha quritildi:

1 - namuna. Birinchi bo'lak etilatsetatli ajratma quyuuq massa hosil bo'lguncha rotorli bug'latgichda quyultirildi va "SHSV-45K" (Rossiya) markali quritish shkafida 70-80°C harorat ostida vakuumsiz sharoitda quritildi.

2 - namuna. Ikkinchi bo'lak etilatsetatli ajratma quyuuq massa hosil bo'lguncha bug'latildi va "SHSV-45K" (Rossiya) markali quritish shkafida 70-80°C harorat va 0,6-0,8 kgs/sm² vakuum ostida quritildi.

3 - namuna. Uchinchi bo'lak etilatsetatli ajratma quyuuq massa hosil bo'lguncha rotorli bug'latgichda quyultirildi va "IKS-2M" (Rossiya) markali quritish shkafida, infraqizil nur ta'siri va 70°C harorat ostida quritildi.

4 - namuna. To'rtinchi bo'lak etilatsetatli ajratma quyuuq massa hosil bo'lguncha bug'latildi va 80-85°C haroratda, 0,9-1,0 kgs/sm² vakuum ostida sublimatsion quritgichda quritildi.

5 - namuna. Beshinchi bo'lak etilatsetatli ajratma rotorli bug'latish jihozida 1,0

litrgacha quyultirildi. Konsentrat tarkibidagi qoldiq etil spirtini chiqarib yuborish maqsadida jarayon so'ngida bug'latish jihoziga 3,0 l tozalangan suv berildi va quyultirish jarayoni quritilayotgan eritma tarkibida quruq moddalar miqdori 10%-ga yetguncha davom ettirildi. Hosil bo'lgan konsentrat (quritilayotgan eritma) quyidagi sharoitda "Anhydro No. 2" (Daniya) markali purkab quritish qurilmasida quritildi: quritish vositasinig (issiq havo) harorati 180-190°C, chiqishda 85-90°C; yuborilayotgan suvli eritmani tezligi – 4 l/soat; yuborilayotgan suvli eritmani purkash forsunkasiga bosimi 0,2 MPa.

Olingan 1-4 namunadagi quruq ekstraktlar bo'lakchalar ko'rinishida bo'lganligi sababli pichoqli tegirmonda maydalandi va teshiklari diametrining o'lchami 0,5 mm bo'lgan elakdan o'tkazildi.

Keltirilgan ma'lumotlardan shuni kuzatish mumkinki purkab quritish turida olib borilgan quritish jarayoniga boshqa ko'rilgan turlarga nisbatan eng kam vaqt sarflangan. 1-4 usullarda to'q jigarrang va qo'ng'ir rangli zarrachalardan iborat bir hil ko'rinishga ega bo'lmagan kukunsimon ko'rinishidagi quruq ekstraktlar olindi. 5-usulda esa bir hil ko'rinishga ega bo'lgan och jigarrang kukunsimon ko'rinishidagi quruq ekstrakt olindi. Bundan tashqari 1-4 usullarda olingan quruq ekstraktlar keyingi bosqichda maydalash va elash jarayonidan o'tiladi. Bu bosqichlarda quruq ekstraktlarning ma'lum bir qismi yo'qotilishiga olib keldi, jumladan, 3-4 marta qayta maydalashda ham 10-12 % quruq ekstraktlarni elakdan o'tkazishni iloji bo'lmadi. 2 va 4 usulda esa quruq ekstraktlar qisman g'ovvaksimon bo'lakchalarga ega bo'lganligi uchun ularni maydalash osonroq kechdi. Lekin bu borada 5-usul yana boshqalariga nisbatan ustun, chunki jarayon so'ngida mayda zarrachali kukunsimon quruq ekstrakt olinadi va maydalash, elash kabi jarayonlar zarur bo'lmaydi. 5-usulda olingan quruq ekstraktning namlik ulushi boshqa ko'rilgan turga nisbatan kamligi, mazkur turning yana bir ustunligi hisoblanadi.

Yuqoridagilardan kelib chiqib, dag'al dalachoy quruq ekstraktini olishda purkab

quritish qurilmasidan foydalanish afzal deb topildi.

Adabiyotlar ro‘yxati

1. Абдурахманов Б.А., Умарова О.У., Тилова Г.Х., Халилов Р.М. Подбор оптимальных условий сушки надземных частей *Hypericum scabrum* и *Hypericum perforatum* // Sciences of Europe. – 2023. – № 116 (1). – Р. 47–54.
2. Дрозд Г.А., Лищук Н.Г. Безопасность использования лекарственного растительного сырья // Разработка, 209 исследование и маркетинг новой фармацевтической продукции. - Пятигорск, 2007. - С. 467-468.
3. Завражнов В.Н. Китаева Р.И., Хмелев К.Ф.. Лекарственные растения: Лечебное и профилактическое использование // - Воронеж, 1993. - С. 227-229.
4. Ибрагимов Т.И., Бегимова Д.И., Абдурахманов Б.А., Исмаилова М.Г. // *Hypericum scabrum* asosida dorivor substantsiyani standartlashitirish // Ёш олимлар конференцияси материаллари «Табий бирикмалар кимёсининг долзарб муаммолари», академик С.Ю. Юнусов хотирасига бағишланган. Тошкент, 12 март 2015 й., 159-б.

Morphological Features of Uzbek Dialects

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Abstract. This article comprehensively analyzes the morphological features found in regional dialects of the Uzbek language. During the study, the formal and functional changes of plural, possessive, conjugation and verb tense suffixes used in Uzbek dialects are highlighted on the basis of examples. Also, the morphological differences between the literary Uzbek language and various regional dialects are studied on the basis of comparative analysis, and their formation factors, historical roots and linguistic significance are revealed. The article separately considers the system of morphological units found in the dialects of the Karluk, Kipchak and Oghuz groups of the Uzbek language, and their specific features and impact on the literary language are substantiated by scientific evidence. In addition, the reduction of suffixes in dialects, the transformation of morphological forms as a result of phonetic changes, as well as the features of some ancient grammatical forms were studied.

Keywords: Uzbek language, dialect, morphology, morphological features, suffixes, conjugation, possession, verb forms, Karluk dialects, Kipchak dialects, Oghuz dialects, dialectology, literary language.

O‘zbek shevalarining morfologik xususiyati

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Annotatsiya. Mazkur maqolada o'zbek tilining hududiy shevalarida uchraydigan morfologik xususiyatlar har tomonlama tahlil qilinadi. Tadqiqot davomida o'zbek shevalarida qo'llaniladigan ko'plik, egalik, kelishik va fe'l zamon qo'shimchalarining shakli va funksional o'zgarishlari misollar asosida yoritib beriladi. Shuningdek, adabiy o'zbek tili bilan turli hududiy shevalar o'rtasidagi morfologik tafovutlar qiyosiy tahlil asosida o'rganilib, ularning shakllanish omillari, tarixiy ildizlari va lingvistik ahamiyati ochib beriladi.

Maqolada o'zbek tilining qarluq, qipchoq va o'g'uz guruhiga mansub shevalarida uchraydigan morfologik birliklar tizimi alohida ko'rib chiqilib, ularning o'ziga xos xususiyatlari va adabiy tilga ta'siri ilmiy dalillar bilan asoslanadi. Bundan tashqari, shevalarda qo'shimchalarning qisqarishi, fonetik o'zgarishlar natijasida morfologik shakllarning transformatsiyaga uchrashi, shuningdek, ayrim qadimgi grammatik shakllarning xususiyatlari o'rganildi.

Kalit so'zlar:

o'zbek tili, sheva, dialekt, morfologiya, morfologik xususiyatlar, qo'shimchalar, kelishik, egalik, fe'l shakllari, qarluq shevalari, qipchoq shevalari, o'g'uz shevalari, dialektologiya, adabiy til.

Kirish

Til jamiyatning eng muhim aloqa vositasi bo'lib, u xalqning tarixiy taraqqiyoti, madaniyati va tafakkurini o'zida aks ettiradi. Har bir milliy til o'zining adabiy shakli bilan bir qatorda hududiy shevalar va lahjalardan ham tashkil topgan murakkab tizimni tashkil etadi. O'zbek tili ham ana shunday ko'p qatlamli tuzilishga ega bo'lib, unda adabiy til bilan birga turli hududlarda shakllangan shevalar muhim o'rin tutadi.

O'zbek tilining shevalari tarixiy, ijtimoiy va geografik omillar ta'sirida shakllangan bo'lib, ular tilning fonetik, leksik va ayniqsa morfologik tizimida o'ziga xos

xususiyatlarni namoyon etadi. Shevalardagi morfologik farqlar qo‘shimchalarning shakli, qo‘llanishi va grammatik funksiyalarida yaqqol ko‘zga tashlanadi. Bu holat o‘zbek tilining ichki taraqqiyot qonuniyatlarini o‘rganishda, shuningdek, adabiy til me‘yorlarini aniqlash va takomillashtirishda muhim ilmiy ahamiyat kasb etadi.

O‘zbek tili ham turkiy tillar oilasiga mansub bo‘lib, u ko‘p asrlik tarixiy rivojlanish jarayonida turli hududiy shevalarga ajralgan. Ushbu shevalar fonetik, leksik va grammatik jihatdan bir-biridan farqlansa-da, ular umumiy til tizimining tarkibiy qismi sifatida yagona adabiy tilni shakllantirishda muhim rol o‘ynaydi. Ayniqsa, morfologik sathda kuzatiladigan farqlar – qo‘shimchalarning shakli, qo‘llanishi va grammatik vazifasidagi tafovutlar – o‘zbek tilining tarixiy qatlamlari va dialektal rivojlanishini o‘rganishda muhim ilmiy manba bo‘lib xizmat qiladi.

Shevalarning morfologik xususiyatlarini tadqiq etish nafaqat tilshunoslikning dialektologiya yo‘nalishi, balki adabiy til me‘yorlarini belgilash va takomillashtirish jarayonida ham muhim ahamiyat kasb etadi. Chunki adabiy til ko‘p hollarda muayyan sheva asosida shakllansa-da, uning rivojlanishida boshqa hududiy nutq unsurlarining ham ta’siri sezilarli bo‘ladi. Shu bois shevalardagi grammatik shakllarning tahlili tilning umumiy rivojlanish qonuniyatlarini aniqlashga yordam beradi.

Adabiyotlar tahlili

O‘zbek adabiy tilida kelishiklar soni oltita bo‘lib, ularning shakliy va ma’no xususiyatlari XX asrning 50-yillaridayoq professor A.G‘. G‘ulomovning «O‘zbek tilida kelishiklar» nomli asarida batafsil yoritilgan. 1973-yilda M. Shoinoyatova esa o‘zbek shevalaridagi kelishiklar tizimini maxsus tadqiq etib, mazkur mavzuda nomzodlik dissertatsiyasini himoya qilgan.

Shevalarda kelishiklar turlicha qo‘llanadi: ayrim shevalarda oltita, ba’zilarida yettita, boshqa birlarida beshta, hatto to‘rtta kelishik shakli uchraydi. Besh yoki to‘rtta kelishikka ega bo‘lgan shevalarda esa ikki kelishik vazifasini bitta qo‘shimcha bajaradi.

Bu hodisa shevalarning morfologik tizimi adabiy tilga nisbatan soddalashgan yoki o'ziga xos tarzda rivojlanganligini ko'rsatadi.

Masalan, Toshkent shevasida tushum va qaratqich kelishiklari unlidan so'ng -ni qo'shimchasi, undoshdan so'ng esa uning fonetik o'zgarishga uchragan variantlari orqali ifodalanadi. Ushbu shevada kelishik qo'shimchalari 19 xil fonetik shaklda namoyon bo'lishi kuzatiladi. Shuningdek, Qarshi shevasida tushum va qaratqich kelishiklari -ni // -ti qo'shimchalari orqali, o'rin-payt va jo'nalish kelishiklari esa -ya, -ga // -ka // -qa qo'shimchalari yordamida ifodalanadi.

Bosh kelishik o'zbek shevalarida adabiy tildagi kabi alohida grammatik ko'rsatkichga ega emas va nol shakl (Ø) orqali ifodalanadi. Qaratqich kelishigining ifodalanishi esa y-lovchi va dj-lovchi shevalarda ma'lum darajada farq qiladi.

Dj-lovchi shevalarda qaratqich kelishigi qo'shimchasi bir necha fonetik variantlarda qo'llanadi. Unlidan so'ng kelganda qattiq o'zak-negizlarda -ning shakli ishlatiladi: ataning. Yumshoq o'zak-negizlarda esa -ning shakli qo'llanadi: enening. O'zak-negizda lablangan unli tovush mavjud bo'lsa, qo'shimcha -nung, -nüng, -dung, -düng, -tung, -tüng shakllarida ham uchraydi: konunung, urushtung.

Undoshdan so'ng kelganda qo'shimcha o'zak oxiridagi undoshning jarangli yoki jarangsizligiga qarab o'zgaradi. Jarangli undosh bilan tugagan qattiq o'zak-negizlarda -ding (tavding), yumshoq o'zak-negizlarda esa -ding yoki -ding shakllari ishlatiladi: bizding. Jarangsiz undosh bilan tugagan qattiq o'zak-negizlarda -ting yoki -ning, yumshoq o'zak-negizlarda esa fonetik moslashuv natijasida o'zgargan variantlar uchraydi.

Y-lovchi shevalarda esa qaratqich kelishigi asosan -ni, -di // -ti qo'shimchalari bilan ifodalanadi. Bu qo'shimcha ayni vaqtda tushum kelishigi vazifasini ham bajaradi, ya'ni qaratqich va tushum kelishiklari bir xil shakl orqali ifodalanib, kontekst asosida farqlanadi: uyni (qaratqich yoki tushum ma'nosida).

Toshkent va Namangan shevalarida qaratqich kelishigi qo'shimchasi -ni o'zi qo'shiladigan o'zak-negizning qanday undosh bilan tugashiga qarab bir necha xil shaklga ega bo'ladi. Iqon, Qorabuloq va Hazorasp shevalarida qaratqich kelishigi qo'shimchasi unlidan so'ng -ning, -nüng, undoshdan so'ng esa -ing, -ing tarzida ifodalanadi: ating, dashing, tuyzing.

Tushum kelishigi

Tushum kelishigi qo'shimchasi ifodalanish jihatidan y-lovchi va dj-lovchi shevalarda farq qiladi.

Dj-lovchi shevalarda tushum kelishigi quyidagicha ifodalanadi.

Unlidan so'ng:

qattiq o'zak-negizlarda -ni (atanı);

yumshoq o'zak-negizlarda -ni (eneni).

Tushum kelishigi qo'shimchasi o'zak-negizda lablangan unli tovushlar mavjud bo'lsa -nu, -tu shakllarida ham uchraydi: tulkunu, qozunu.

Undoshdan so'ng:

jarangli undosh bilan tugagan qattiq o'zak-negizlarda -dı (tavdı);

yumshoq o'zak-negizlarda -di (keldi);

jarangsiz undosh bilan tugagan qattiq o'zak-negizlarda -tı (attı);

yumshoq o'zak-negizlarda -ti (itti).

Tushum kelishigi qo'shimchasi o'zak-negizda lablangan tovushlarning bo'lishiga qarab -du, -dü, -tu, -tü shakllarida ham keladi: yoldı, sozdı. Masalan: Sozdı bilgän söyläsin, qoshıqtu bilgän tinglasın.

Y-lovchi shevalarda esa bu kelishik -nı, -dı // -tı qo'shimchalari orqali ifodalanadi: sen bashını tartasan (Andijon shevasi).

Toshkent shevasida tushum kelishigi qo'shimchasi -nı o'zi qo'shilgan o'zak-negizning qanday undosh bilan tugashiga qarab turli fonetik shakllarga ega bo'ladi:

-k₁ (pedagogk₁), -m₁ (simm₁), -dj₁ (garadj₁), -r₁ (temirr₁), -t₁ (tutt₁), -s₁ (miss₁), -l₁ (koll₁),
-x₁ (mıxx₁), -sh₁ (eshsh₁), -ch₁ (chachch₁), -q₁ (oqq₁), -g₁ (tugg₁).

Jo‘nalish kelishigi

O‘zbek shevalarida jo‘nalish kelishigi qo‘shimchasining ifodalanishi ham y-lovchi va dj-lovchi shevalarda ma’lum farqlarga ega.

Dj-lovchi shevalarda jo‘nalish kelishigi quyidagicha ifodalanadi.

Qattiq o‘zak-negizlarda:

unli va jarangli undoshdan so‘ng -g‘a: suvg‘a;

jarangsiz undoshdan so‘ng -qa: qapqa, atqa.

Yumshoq o‘zak-negizlarda:

unli va jarangli undoshdan so‘ng -gə: jergə;

jarangsiz undoshdan so‘ng -kə: ishkə, jipkə.

I va II shaxs egalik qo‘shimchalaridan so‘ng dj-lovchi shevalarda jo‘nalish kelishigi qo‘shimchasi qattiq o‘zak-negizlarda -a (atama, atanga), yumshoq o‘zak-negizlarda -ə (ishimə, ishingə) shaklida keladi.

III shaxs egalik qo‘shimchalaridan so‘ng esa qattiq o‘zak-negizlarda -na (bolasina), yumshoq o‘zak-negizlarda -nə (sərkəsinə) qo‘llanadi.

Dj-lovchi shevalarda shaxs va ko‘rsatish olmoshlari jo‘nalish kelishigi bilan turlanganda mag‘an // mæg‘ən, sag‘an // sæg‘ən, og‘an, shog‘an shakllari yuzaga keladi. Bunda n va g‘ tovushlarining metatezasi ro‘y bergan (manga → mag‘an).

Y-lovchi shevalarda jo‘nalish kelishigi qo‘shimchalari bir necha xil ko‘rinishda ishlatiladi.

Toshkent va Farg‘ona shevalarida:

-gə (uygə), -kə (otkə), -qə (boqqə).

Xorazm, Xiva–Urganch shevalarida:

-g‘a (qurvaqag‘a), -yə (tengəyə), -ə (ekizə), -nə (yanına, erkinə).

Qorabuloq shevasida ham joʻnalish kelishigi qoʻshimchalari Xorazm shevasidagiga oʻxshash shakllarda qoʻllanadi.

Shevalarda egalik qoʻshimchalari

Oʻzbek shevalariga xos egalik qoʻshimchalari K. Nazarov tomonidan professor A. Gʻ. Gʻulomov rahbarligida maxsus oʻrganilgan. Egalik qoʻshimchalari predmetning uch shaxsdan biriga qarashlilikini bildiradi hamda birlik va koʻplik shakllariga ega.

Y-lovchi Fargʻona va Xorazm shevalarida egalik qoʻshimchalari adabiy tilga mos holda qoʻllansa-da, boshqa y-lovchi (Jizzax, Toshkent, Parkent) shevalarida hamda j-lovchi oʻzbek shevalarida ular maʼlum darajada farqli xususiyatlarga ega. J-lovchi shevalarda egalik qoʻshimchalari oʻzak-negizning qattiq va yumshoqligiga qarab bir necha variantlarda qoʻllanadi.

Unli bilan tugagan oʻzak-negizlarda

Birlik, qattiq oʻzak-negizda

Shaxs

Qoʻshimcha

Misollar

I sh.

-m

atam, toqlum

II sh.

-ng

atang, toqlung

III sh.

-si, -su

atasi, toqlusu

Namangan shevasi:

Birinchi shaxs birlik: -utt  m  n — misol: kelutt  m  n

Ikkinchi shaxs birlik: -utt  ng — misol: kelutt  ng

Uchinchi shaxs birlik: -utti — misol: kelutti

Birinchi shaxs ko‘plik: -utt  m  z — misol: kelutt  m  z

Ikkinchi shaxs ko‘plik: -utt  ng  z — misol: kelutt  ng  z

Uchinchi shaxs ko‘plik: -utt  lar — misol: kelutt  lar

Xulosa

O‘zbek shevalaridagi morfologik tizim adabiy til bilan bir qator o‘xshash va farqli xususiyatlarga ega ekanligi aniqlandi. Kelishik va tuslovchi qo‘shimchalari shevalarda hududiy xususiyatlar bilan boyitilgan bo‘lib, o‘zak-negizning qattiq yoki yumshoq bo‘lishi, unli yoki undosh bilan tugashi, shuningdek, lablangan tovushlarning mavjudligi fonetik variantlarni belgilaydi.

Kelishiklar tizimi:

Toshkent, Namangan, Farg‘ona, Xorazm va Qarshi shevalarida kelishik qo‘shimchalari bir necha fonetik shaklga ega bo‘lib, tushum, qaratqich, o‘rin-payt, jo‘nalish va chiqish kelishiklarini aniq ifodalaydi.

Bosh kelishik shevalarda adabiy til kabi alohida grammatik ko‘rsatkichga ega emas, bu esa shevalardagi morfologik ixchamlik va sodda struktura bilan bog‘liq.

Tuslovchi va shaxs-son qo‘shimchalari:

Dj-lovchi va y-lovchi shevalarda shaxs, birlik-ko‘plik va zamon ko‘rsatkichlari turlicha ifodalanadi.

Misol uchun, Toshkent shevasida -v  t  rm  n, Namangan shevasida -utt  m  n qo‘shimchalari birinchi shaxs birlikni bildiradi.

Ko‘plik va uchinchi shaxs shakllari ham shevalararo farqlarga ega bo‘lib, hududiy morfologik boylikni namoyon qiladi.

Foydalanilgan adabiyotlar

- 1.. Aliyev A. Namangan guruh shevalari // O‘TA. 5-son. T., 1969.
 - 2.. Abdullaev F.A. O‘zbek tilining o‘g‘uz lahjasi. T., Fan, 1978.
 - 3.Ibrohimov S.I. O‘zbek tilining Andijon shevasi. T., 1967.
 - 4.Mahammadjonov Q. Janubiy Qozog‘istondagi o‘zbek shevalari morfologiyasi. T., Fan, 1983.
 - 5.Nazarov K. Qa'ni shevasida egalik affiksining formalari // O‘TAM. 5-son. T., 1963.
 - 6.Shoinoyatova M.Sh. Padeji v uzbekskix govorax. AKD. T., 1971.
 - 7.O‘zbek shevalari morfologiyasi. T., 1984.
 - 8.G‘ulomov A. G‘. O‘zbek tilida kelishiklar. SSSR FA O‘zbekiston filiali asarlari. 2-seriya, filologiya. T., 1941.
 - 9.Ishayev A. Qoraqalpog‘istondagi o‘zbek lahjasi. T., Fan, 1977.
 - 10.Jumanazarov Yu. Hazorasp shevasining morfologik xususiyatlari. T., 1961.
 - 11.Aliyev A. Uychi shevasi // O‘zbek dialektologiyasidan materiallar. T., 1961. 348–359-betlar.
 - 12.Nazarov K. O‘zbek shevalarida egalik ma’nosining ifodalanish yo‘llari // O‘zbek filologiyasining ba’zi bir masalalari. T., Fan, 1968. 9–15-betlar.
 - 13.Nazarov K. Shimoliy O‘zbek shevalari haqida // O‘zbek filologiyasi masalalari. T., 1970.
- Shermatov A. Qarshi shevasida kelishik va egalik qo‘shimchalari // O‘TA masalalari. 3-son. 45–50-betlar.

DIAGNOSIS OF ATOPIC DERMATITIS IN CHILDREN

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Abstract. Atopic dermatitis is a common chronic allergic disease in children, and its early diagnosis is important in preventing severe disease and relapses. To assess the effectiveness of clinical, laboratory and allergological diagnostic methods for atopic dermatitis in children.

Keywords: atopic dermatitis, children, diagnostics, allergy, IgE, SCORAD, cytokines, early diagnosis.

Annotatsiya: Atopik dermatit bolalarda keng tarqalgan surunkali allergik kasallik bo'lib, uning erta diagnostikasi kasallikning og'ir kechishi va residiylarini oldini olishda muhim ahamiyatga ega. Bolalarda atopik dermatitning klinik, laborator va allergologik diagnostika usullarining samaradorligini baholash.

Kalit so'zlar: atopik dermatit, bolalar, diagnostika, allergiya, IgE, SCORAD, sitokinlar, erta diagnostika.

Аннотация. Атопический дерматит — распространенное хроническое аллергическое заболевание у детей, и его ранняя диагностика важна для предотвращения тяжелых форм заболевания и рецидивов. Цель исследования - оценить эффективность клинических, лабораторных и аллергологических методов диагностики атопического дерматита у детей.

Ключевые слова: атопический дерматит, дети, диагностика, аллергия, IgE, SCORAD, цитокины, ранняя диагностика.

Kirish.

Atopik dermatit bolalar orasida eng ko‘p uchraydigan surunkali yallig‘lanishli allergik kasalliklardan biri bo‘lib, uning tarqalishi so‘nggi yillarda sezilarli darajada ortib bormoqda [1,4,5,6]. Jahon sog‘liqni saqlash tashkiloti ma‘lumotlariga ko‘ra, atopik dermatit bolalarning 10–20% da uchraydi va kasallik ko‘pincha erta yoshda boshlanadi. Bolalarda atopik dermatitning erta diagnostikasi kasallikning og‘ir kechishi, surunkali shaklga o‘tishi va allergik kasalliklar marshining shakllanishini oldini olishda muhim ahamiyatga ega [2,3,7]. Shu munosabat bilan atopik dermatitning zamonaviy diagnostik mezonlarini o‘rganish va takomillashtirish dolzarb vazifalardan biri hisoblanadi.

Tadqiqotning maqsadi bolalarda atopik dermatitning klinik, laborator va allergologik diagnostika usullarining samaradorligini baholash va kasallikni erta aniqlash imkoniyatlarini takomillashtirishdan iborat bo‘ldi. Tadqiqot materiallari sifatida 2023–2025 yillar davomida Respublika ixtisoslashtirilgan allergologiya va klinik immunologiya ilmiy amaliy markazida kuzatuv ostiga olingan 3–12 yoshli 120 nafar atopik dermatit bilan og‘rigan bolalar ma‘lumotlari tahlil qilindi. Nazorat guruhini 30 nafar sog‘lom bolalar tashkil etdi. Barcha bolalarda klinik, allergologik, laborator va instrumental tekshiruvlar o‘tkazildi. Klinik tekshiruvda anamnez yig‘ish, teri holatini baholash, qichishish intensivligini aniqlash, kasallikning lokalizatsiyasi va og‘irlik darajasi SCORAD shkalasi bo‘yicha baholandi. Laborator tekshiruvlar doirasida umumiy IgE, eozinofillar miqdori, sitokinlar profili, shu jumladan IL-4, IL-5, IL-13 ko‘rsatkichlari aniqlandi. Allergologik tekshiruv sifatida skin-prick test va spesifik IgE tahlillari o‘tkazildi.

Material va usullar: 2023–2025 yillarda 3–12 yoshli 120 nafar atopik dermatit bilan og‘rigan bolalar va 30 nafar sog‘lom bolalar tekshirildi. Klinik baholash SCORAD shkalasi asosida olib borildi. Laborator tekshiruvlarda umumiy IgE, eozinofillar va sitokinlar (IL-4, IL-5, IL-13) aniqlangan. Allergologik tekshiruvlar skin-prick test va spesifik IgE yordamida o‘tkazildi.

Tadqiqot natijalariga ko'ra, bolalarda atopik dermatitning asosiy klinik belgilari teri qichishishi (92,5%), teri quruqligi (88,3%), eritema (81,6%), lixenifikatsiya (56,7%) va qaytalanuvchi kechish (63,3%) holatlarda kuzatildi. Kasallikning yoshga xos klinik belgilari tahlil qilinganda, 3–5 yoshli bolalarda ekssudativ o'zgarishlar va yuz sohasida lokalizatsiya ko'proq uchrasa, 6–12 yoshli bolalarda bukilma sohalarda lixenifikatsiya va quruqlik ustunlik qilganligi aniqlandi. Laborator tekshiruv natijalariga ko'ra, umumiy IgE darajasining oshishi 78,4% bolalarda, eozinofiliya 64,2% holatlarda qayd etildi. sitokinlar tahlilida IL-4 va IL-13 darajasining ishonchli oshishi kuzatildi ($p<0,05$), bu esa atopik yallig'lanish jarayoni faolligini ko'rsatadi. Allergologik tekshiruvlar natijasida oziq-ovqat allergenlariga sensibilizatsiya 46,7%, ingalyatsion allergenlarga sezgirlik 38,3% holatlarda aniqlandi. Differensial diagnostika jarayonida seboreya dermatiti, kontakt dermatiti, psoriaz va qo'tir kabi kasalliklar inkor etildi. SCORAD shkalasi bo'yicha bolalarning 41,7% da kasallik yengil, 38,3% da o'rtacha va 20,0% da og'ir darajada kechayotgani aniqlandi. Tadqiqot natijalari bolalarda atopik dermatit diagnostikasida klinik belgilari bilan bir qatorda immunologik va allergologik tekshiruvlar muhim ahamiyatga ega ekanligini ko'rsatdi. Erta diagnostika va kompleks tekshiruvlar kasallikning og'ir kechishini oldini olish, individual davolash strategiyasini tanlash va residivlarni kamaytirish imkonini beradi. Xulosa qilib aytganda, bolalarda atopik dermatitning diagnostikasi klinik, laborator va allergologik tekshiruvlar asosida kompleks yondashuvni talab qiladi va zamonaviy diagnostik mezonlarni qo'llash kasallikni erta aniqlash hamda samarali davolash taktikasini ishlab chiqish imkonini beradi.

Natijalar. Teri qichishishi 92,5%, quruqlik 88,3%, eritema 81,6%, lixenifikatsiya 56,7% holatlarda kuzatildi. Umumiy IgE oshishi 78,4%, eozinofiliya 64,2% bolalarda aniqlangan. Oziq-ovqat allergenlariga sezuvchanlik 46,7%, ingalyatsion allergenlarga 38,3% holatda aniqlangan.

Xulosa. Bolalarda atopik dermatit diagnostikasida klinik belgilar bilan birga laborator va allergologik tekshiruvlar muhim ahamiyatga ega. Kompleks yondashuv kasallikni erta aniqlash imkonini beradi.

Foydalanilgan adabiyotlar:

1. Асадова Д.Ш., Каримов Б.Ш. Персонализированный подход к терапии атопического дерматита у детей в Республике Узбекистан // Здоровоохранение Узбекистана. – 2023. – №2. – С. 51–58.
2. Каримов Б.Ш., Хамраев Н.У. Клинико-иммунологическая эффективность биологических препаратов у пациентов с тяжелым атопическим дерматитом // Вестник ТГМУ. – 2024. – №3. – С. 48–55.
3. Разикова Г.Р. Эффективность персонализированного алгоритма лечения пациентов с атопическим дерматитом//Мед.журнал Узбекистана.-2025, №6, стр.95-100
4. Разикова И. С., Разикова Г. Р. Совершенствование аллергологической службы узбекистана //Аллергическое и иммунопатологические заболевания-проблема XXI века. – 2019. – С. 23-24.
5. Разикова И. С. и др. Распространенность полиморфизмов RS1800925, RS20541 гена IL13 при атопическом синдроме в республике Узбекистан //E-Conference platform. – 2025. – Т. 1. – №. 17-noyabr 2025. – С. 213-213.
6. Разикова И. С., Айдарова Н. П., Ишмухамедова Ш. Б. Дерматореспираторный синдром и атопический марш: диагностика, клиника //Central Asian Journal of Medical and Natural Science. – 2023. – Т. 4. – №. 6. – С. 37-41.
7. Разикова И. С. и др. Оценка динамики различных методов лечения при респираторных аллергиях //Первичные иммунодефициты и COVID-19. – 2023. – С. 84-91.

DUBAI'S CREATIVE ECONOMY STRATEGY

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Abstract

This thesis analyzes the reforms and economic efficiency implemented within the framework of the "Dubai Creative Economy Strategy." The study examines the dynamics of the creative sectors' share in Gross Domestic Product (GDP), the number of enterprises, and employment indicators.

Keywords: Creative economy, Dubai strategy, creative clusters, KPI

DUBAY "KREATIV IQTISODIYOT STRATEGIYASI"

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Annotatsiya

Ushbu tezisda Dubayning "Kreativ iqtisodiyot strategiyasi" doirasida amalga oshirilayotgan islohotlar va ularning iqtisodiy samaradorligi tahlil qilinadi. Tadqiqotda kreativ sohalarning yalpi ichki mahsulotdagi (YaIM) ulushi, korxonalar soni va bandlik ko'rsatkichlari o'rganib chiqilgan.

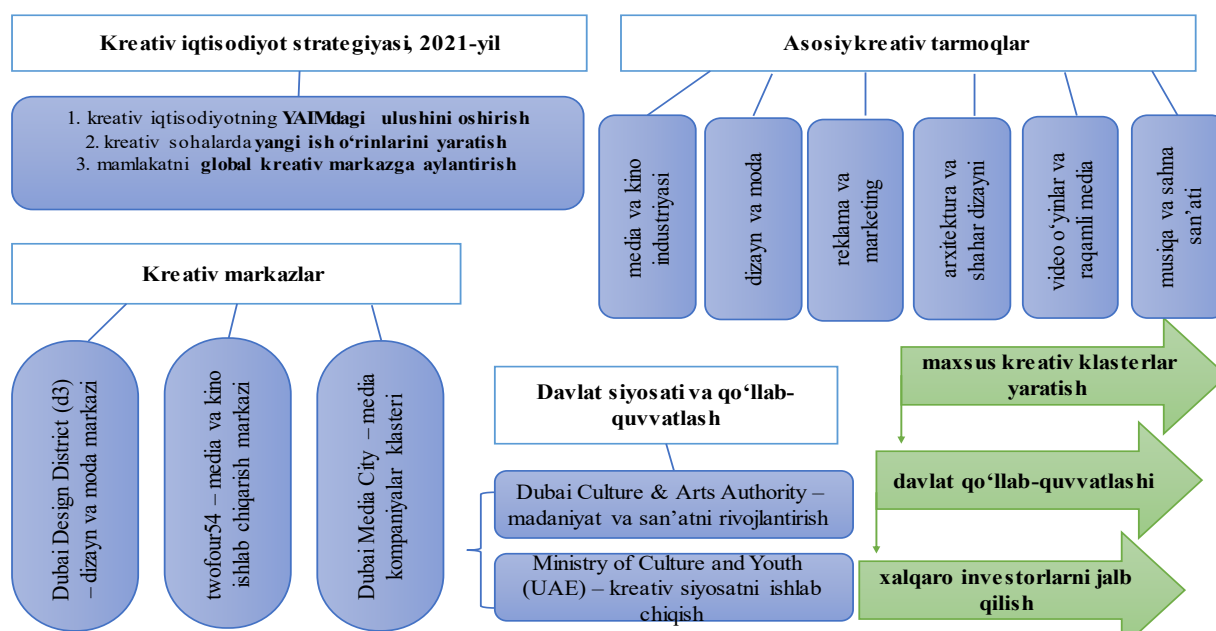
Kalit so'zlar: Kreativ iqtisodiyot, Dubay strategiyasi, kreativ klasterlar, KPI

Bugungi global iqtisodiyotda an'anaviy resurslarga tayangan o'sish modellari o'rnini inson kapitali, intellektual mulk va texnologiyalarga asoslangan "Kreativ

iqtisodiyot" (ijodiy iqtisodiyot) egallab bormoqda. Dunyoning yetakchi megapolislari qatorida Dubay shahri ushbu sohani iqtisodiy diversifikatsiyaning asosiy drayveriga aylantirishni strategik maqsad qilib qo'ygan.

"Dubay kreativ iqtisodiyot strategiyasi" shunchaki madaniy tadbirlar majmuasi emas, balki aniq raqamli ko'rsatkichlar (KPI), institutsional bazalar va investitsion jozibadorlikka tayanuvchi murakkab iqtisodiy modeldir.

Quyidagi 1-rasmda BAA kreativ iqtisodiy rivojlanish tajribasining o'ziga xos jihatlari model sifatida berilgan. Modelda davlat strategiyasi, asosiy kreativ markazlar va tarmoqlar, hamda davlat tomonidan berilgan imtiyozlar to'g'risida qisqacha ko'rsatilgan. 2025-yil noyabr oyida Dubayda BAA Madaniyat vazirligi va WIPO hamkorligida Creative Economy Data Model (CEDM) ishga tushirilgani qayd etilgan. Bu — kreativ iqtisodiyot bo'yicha ma'lumotlarni standartlashtirish va sektorni aniq o'lchash imkonini kuchaytiruvchi muhim institutsional qadam sifatida baholanadi.¹



¹ World Intellectual Property Organization (WIPO). Copyright-based industries iqtisodiy hissasini baholash bo'yicha qo'llanma va creative economy/IP materiallari.

1-rasm. BAA kreativ iqtisodiy rivojlanish modeli²

“Dubay Creative Economy Strategy” doirasida kreativ industriyalarning iqtisodiyotga hissasini aniq ko‘rsatkichlar orqali oshirish vazifasi qo‘yilgan: 2020-yildagi 2,6% ulushdan 2025-yilga borib 5% gacha ko‘tarish maqsadi e‘lon qilingan. Shuningdek, strategiya 5 yil ichida kreativ kompaniyalar sonini 8 300 tadan 15 000 tagacha, kreatorlar (ijodkorlar) sonini esa 70 000 tadan 140 000 tagacha oshirish vazifalarini belgilaydi.³

Dubay tajribasini tahlil qilish natijasida O‘zbekiston iqtisodiyotini diversifikatsiya qilish va kreativ industriyalarni rivojlantirish uchun quyidagi takliflarni ilgari surish mumkin:

1. IT-Park modelini "Kreativ Parklar"ga ko‘chirish: O‘zbekistonda muvaffaqiyatli yo‘lga qo‘yilgan IT-Park tajribasidan foydalanib, dizaynerlar, rassomlar, rejissyorlar va boshqa ijodkorlar uchun maxsus soliq va bojxona imtiyozlariga ega bo‘lgan "Kreativ zonalar" yoki klasterlarni tashkil etish.

2. Statistik hisob-kitoblarni standartlashtirish: Dubayning Creative Economy Data Model (CEDM) tajribasidan kelib chiqib, O‘zbekiston Statistika agentligi doirasida kreativ sohalarning YaIMdagi aniq ulushini o‘lchovchi indikatorlarni joriy qilish.

3. Kreativ tadbirkorlikni qonuniy mustahkamlash: Dubayda bo‘lgani kabi, ijodiy faoliyatni alohida iqtisodiy yo‘nalish sifatida ko‘rib, "Kreativ iqtisodiyot to‘g‘risida"gi qonun doirasida intellektual mulk himoyasini kuchaytirish va "ijodiy frilanserlik" (creative freelance) litsenziyalarini soddalashtirish.

UAE Government portal (u.ae). Dubai Creative Economy Strategy bo‘yicha rasmiy ma‘lumot.; Government of Dubai Media Office. Dubai Creative Economy Strategy bo‘yicha press-relizlar asosida muallif tomonidan tuzildi.

³ UAE Government portal (u.ae). Dubai Creative Economy Strategy bo‘yicha rasmiy ma‘lumot.; Government of Dubai Media Office. Dubai Creative Economy Strategy bo‘yicha press-relizlar.

4. KPI asosida boshqaruv: Strategik rivojlanish rejalarini shunchaki umumiy maqsadlar bilan emas, balki Dubay kabi aniq raqamlar (ish o‘rinlari soni, eksport hajmi, kompaniyalar soni) bilan bog‘lash.

Foydalanilgan adabiyotlar ro‘yxati

1. World Intellectual Property Organization. (n.d.). *Guide on surveying the economic contribution of the copyright-based industries*. WIPO.
2. UAE Government. (n.d.). *Dubai Creative Economy Strategy*. UAE Government Portal (u.ae).
3. Government of Dubai Media Office. (n.d.). *Dubai Creative Economy Strategy: Press releases*.

PEDAGOGICAL MECHANISMS FOR FORMING THE HARMONY OF NATIONAL AND UNIVERSAL VALUES IN STUDENTS

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Annotation

This article provides a theoretical and methodological analysis of the pedagogical mechanisms for forming the integration of national and universal values among students in higher education. The study, based on an axiological approach, reveals the content of value integration and systematizes such mechanisms as content-integrative, motivational-axiological, activity-oriented, reflexive-analytical, and socio-cultural mechanisms. In addition, the pedagogical conditions ensuring the effectiveness of these mechanisms are substantiated. The results of the study contribute to ensuring the moral and ethical development of students within the higher education system.

Keywords: value, national values, universal values, axiological approach, pedagogical mechanism, value integration, educational process.

TALABALARDA MILLIY VA UMUMINSONIY QADRIYATLAR UYG‘UNLIGINI SHAKLLANTIRISHNING PEDAGOGIK MEXANIZMLARI

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Annotatsiya

Mazkur maqolada oliy ta’lim jarayonida talabalarda milliy va umuminsoniy qadriyatlar uyg‘unligini shakllantirishning pedagogik mexanizmlari ilmiy-nazariy

jihtadan tahlil qilinadi. Tadqiqotda aksiologik yondashuv asosida qadriyatlar integratsiyasining mazmuni ochib berilib, mazmuniy-integrativ, motivatsion-aksiologik, faoliyatga yo'naltirilgan, reflektiv-tahliliy hamda ijtimoiy-madaniy mexanizmlar tizimlashtiriladi. Shuningdek, ushbu mexanizmlarning samaradorligini ta'minlovchi pedagogik shart-sharoitlar asoslanadi. Tadqiqot natijalari oliy ta'lim tizimida talabalarning ma'naviy-axloqiy kamolotini ta'minlashga xizmat qiladi.

Kalit so'zlar: qadriyat, milliy qadriyatlar, umuminsoniy qadriyatlar, aksiologik yondashuv, pedagogik mexanizm, qadriyatlar integratsiyasi, ta'lim jarayoni

Kirish

Globalashuv va ijtimoiy-madaniy transformatsiyalar sharoitida oliy ta'lim tizimi oldida turgan ustuvor vazifalardan biri talabalarda milliy va umuminsoniy qadriyatlar uyg'unligini shakllantirishdir. Zamonaviy ta'lim paradigmasida bilim berish bilan bir qatorda shaxsning ma'naviy-axloqiy rivojlanishini ta'minlash dolzarb masala sifatida namoyon bo'lmoqda. Shu bois, ta'lim jarayonini aksiologik yondashuv asosida tashkil etish, qadriyatlar tizimini shakllantirishning samarali pedagogik mexanizmlarini ishlab chiqishni talab etadi.

Mazkur tadqiqotning maqsadi talabalarda milliy va umuminsoniy qadriyatlar uyg'unligini shakllantirishning pedagogik mexanizmlarini nazariy asoslash va tizimlashtirishdan iborat. Qadriyatlar nazariyasi va aksiologik yondashuv muammolari falsafa va pedagogika fanlarida keng o'rganilgan. Xususan, qadriyatlarning mohiyati, ularning shaxs rivojidagi o'rni hamda ta'lim jarayoniga integratsiyasi masalalari bir qator olimlar tomonidan tadqiq etilgan. Zamonaviy pedagogik tadqiqotlarda shaxsga yo'naltirilgan ta'lim, kompetensiyaviy yondashuv va aksiologik paradigma asosida qadriyatlarni shakllantirish muhim yo'nalish sifatida qaralmoqda.

Shu bilan birga, milliy va umuminsoniy qadriyatlar uyg'unligini ta'minlash masalasi hali ham tizimli pedagogik mexanizmlar nuqtai nazaridan yetarlicha yoritilmagan.

Tadqiqot metodologiyasi

Tadqiqot jarayonida quyidagi metodlardan foydalanildi:

- nazariy tahlil (falsafiy, pedagogik adabiyotlarni o'rganish);
- tizimli yondashuv (qadriyatlar integratsiyasini kompleks tahlil qilish);
- qiyosiy tahlil (milliy va umuminsoniy qadriyatlarni solishtirish);
- umumlashtirish va modellashtirish.

1. Qadriyatlar uyg'unligining pedagogik mohiyati

Milliy va umuminsoniy qadriyatlar uyg'unligi shaxsning ijtimoiylashuvi, madaniy identifikatsiyasi va global tafakkurini shakllantirishda muhim omil hisoblanadi. Ushbu uyg'unlik talabaning nafaqat o'z milliy qadriyatlariga sodiq bo'lishini, balki boshqa madaniyat va qadriyatlarga nisbatan bag'rikenglik bilan munosabatda bo'lishini ta'minlaydi.

Mazmuniy-integrativ mexanizm Mazmuniy-integrativ mexanizm ta'lim jarayonida qadriyatlarni shakllantirishning asosiy yo'nalishlaridan biri bo'lib, u o'quv mazmunini ma'naviy-axloqiy jihatdan boyitish va tizimli ravishda qayta tashkil etishga xizmat qiladi. Ushbu mexanizmning mohiyati shundan iboratki, qadriyatlar alohida mavzu yoki qo'shimcha element sifatida emas, balki barcha o'quv fanlari va ta'lim komponentlariga uzviy singdirilgan holda beriladi. Natijada talaba bilimlarni o'zlashtirish jarayonida qadriyatlarni ham tabiiy ravishda anglab boradi va ularni shaxsiy dunyoqarashining bir qismiga aylantiradi. Mazkur mexanizm doirasida o'quv dasturlarini qadriyatlar asosida boyitish muhim ahamiyat kasb etadi. Bu jarayonda fanlarning mazmuni qayta ko'rib chiqilib, ularga milliy va umuminsoniy qadriyatlarni aks ettiruvchi g'oyalar, tushunchalar va misollar kiritiladi. Masalan, tarix, adabiyot, falsafa, pedagogika kabi fanlarda qadriyatlar bevosita yoritilsa, texnik va tabiiy fanlarda esa ularning ijtimoiy va axloqiy jihatlari bilan bog'liqligi ochib beriladi. Shu tariqa, har bir fan talabaning qadriyatlar haqidagi tasavvurini kengaytirishga xizmat qiladi. Fanlararo integratsiyani

ta'minlash ham mazmuniy-integrativ mexanizmning muhim tarkibiy qismi hisoblanadi. Qadriyatlar ko'p qirrali va murakkab hodisa bo'lgani sababli, ularni turli fanlar kesimida o'rganish talab etiladi. Fanlararo yondashuv orqali talaba bir xil qadriyatning turli ilmiy nuqtai nazardan qanday talqin etilishini ko'radi, bu esa uning tafakkurini chuqurlashtiradi va tizimli fikrlashini rivojlantiradi. Masalan, "adolat" tushunchasi huquqshunoslikda qonuniylik mezoni sifatida, falsafada axloqiy kategoriya sifatida, pedagogikada esa tarbiyaviy prinsip sifatida talqin qilinadi. Shuningdek, milliy va global kontekstni uyg'unlashtirish mazkur mexanizmning samaradorligini ta'minlaydi. Ta'lim jarayonida milliy qadriyatlar an'ana, urf-odat, madaniy meros asosida shakllangan qarashlar bilan bir qatorda, umuminsoniy qadriyatlar inson huquqlari, erkinlik, bag'rikenglik, tinchlik kabi universal tushunchalar ham uyg'un holda berilishi zarur. Bu yondashuv talabalarda bir vaqtning o'zida milliy o'zlikni anglash va global dunyoqarashni rivojlantirish imkonini yaratadi. Natijada ular turli madaniyat va qadriyatlarga hurmat bilan qaraydigan, ochiq fikrli va tolerant shaxs sifatida shakllanadi. Umuman olganda, mazmuniy-integrativ mexanizm ta'lim jarayonining barcha tarkibiy qismlarini qadriyatlar asosida uyg'unlashtirish orqali talabalarda chuqur, barqaror va ongli qadriyatli munosabatlarni shakllantirishga xizmat qiladi.

Motivatsion-aksiologik mexanizm Motivatsion-aksiologik mexanizm talabalarda qadriyatlarga nisbatan ichki ehtiyojni shakllantirishga yo'naltirilgan bo'lib, u shaxsning qadriyatlarni ongli ravishda qabul qilishi va ularga amal qilishini ta'minlaydi. Ushbu mexanizmning mohiyati shundaki, qadriyatlar tashqi talab yoki majburiyat sifatida emas, balki talabaning ichki e'tiqodi, hayotiy pozitsiyasi va shaxsiy maqsadlariga aylanishi lozim. Shu jihatdan, ta'lim jarayonida qadriyatlarning mazmun-mohiyatini chuqur anglatish muhim ahamiyat kasb etadi. Talabaga insonparvarlik, adolat, mas'uliyat, halollik kabi umuminsoniy qadriyatlarning jamiyat taraqqiyotidagi o'rni, shuningdek, milliy qadriyatlarning shaxs kamolotidagi ahamiyati hayotiy misollar, real

vaziyatlar va muammoli savollar orqali yetkaziladi. Natijada talaba qadriyatlarni nazariy tushuncha sifatida emas, balki zarur hayotiy mezon sifatida anglay boshlaydi. Mazkur mexanizm doirasida rag‘batlantirish tizimini joriy etish ham muhim o‘rin tutadi. Talabalarning qadriyatlarga asoslangan ijobiy xatti-harakatlari, ijtimoiy faolligi va mas’uliyatli yondashuvi turli shakllarda e’tirof etilishi lozim. Bu jarayonda nafaqat moddiy, balki ma’naviy rag‘batlantirish vositalari e’tirof, maqtov, jamoa oldida tan olish, sertifikatlar berish kabi usullar samarali hisoblanadi. Rag‘batlantirish orqali talabalarda ijobiy xulq-atvorni takrorlashga nisbatan ichki ehtiyoj yuzaga keladi va qadriyatlarga sodiqlik mustahkamlanadi. Shaxsiy motivatsiyani kuchaytirish esa ushbu mexanizmning eng muhim jihatlaridan biri hisoblanadi. Har bir talabaning individual qiziqishlari, ehtiyojlari va maqsadlarini inobatga olgan holda ta’lim jarayonini tashkil etish orqali uning ichki motivatsiyasi rivojlantiriladi. Talaba o‘z hayotiy maqsadlari bilan qadriyatlar o‘rtasidagi bog‘liqlikni anglab yetganda, ularni ongli ravishda qabul qiladi va ularga amal qilishga intiladi. Bunda interfaol metodlar, muammoli vaziyatlar, shaxsiy tajribaga asoslangan topshiriqlar muhim rol o‘ynaydi. Umuman olganda, motivatsion-aksiologik mexanizm talabaning ichki dunyosiga ta’sir etish orqali qadriyatlarni chuqur va barqaror shakllantirishga xizmat qiladi. Ushbu mexanizm samarali tashkil etilganda, qadriyatlar shaxsning ajralmas qismiga aylanadi va uning xulq-atvori hamda faoliyatida izchil namoyon bo‘ladi. Ijtimoiy-madaniy mexanizm talabalarda milliy va umuminsoniy qadriyatlar uyg‘unligini shakllantirishda muhim o‘rin tutib, ta’lim muhitini ma’naviy, madaniy va ijtimoiy jihatdan boyitishga xizmat qiladi. Mazkur mexanizm orqali qadriyatlar bevosita nazariy bilim sifatida emas, balki kundalik ijtimoiy tajriba, muloqot va madaniy faoliyat jarayonida shakllanadi. Natijada talabalar qadriyatlarni chuqur anglab, ularni o‘z hayotiy faoliyatiga tatbiq etishga o‘rganadi, ma’naviy muhit yaratish ushbu mexanizmning asosiy tarkibiy qismi hisoblanadi. Oliy ta’lim muassasasida sog‘lom ma’naviy-axloqiy muhitni shakllantirish

talabalarning qadriyatli munosabatlarini rivojlantirish uchun zarur shartdir. Bunday muhit o‘zaro hurmat, bag‘rikenglik, adolat va hamkorlik tamoyillariga asoslanadi. O‘qituvchi va talaba o‘rtasidagi samimiy, ishonchga asoslangan munosabatlar, akademik halollik tamoyillariga rioya etish, ijobiy psixologik iqlimni ta‘minlash orqali talabalarda umuminsoniy qadriyatlarga nisbatan ijobiy munosabat shakllanadi. Shu bilan birga, milliy an‘ana va qadriyatlarga hurmat muhitini yaratish orqali talabalarning milliy o‘zligini anglash darajasi oshadi. Tahlillar shuni ko‘rsatadiki, qadriyatlar uyg‘unligini shakllantirish bir yoqlama jarayon emas, balki ko‘p omilli pedagogik tizimni talab etadi. Har bir mexanizm o‘zaro bog‘liq holda ishlaganda samaradorlik oshadi. Ayniqsa, ta‘lim jarayonida faoliyatga yo‘naltirilgan va refleksiv yondashuvlar muhim ahamiyat kasb etadi.

Xulosa Milliy va umuminsoniy qadriyatlar uyg‘unligi talaba shaxsining har tomonlama rivojlanishini ta‘minlovchi muhim omil sifatida namoyon bo‘ladi. Mazkur uyg‘unlik talabaning nafaqat kasbiy kompetensiyalarini, balki uning ma‘naviy-axloqiy fazilatlarini, ijtimoiy faolligini va fuqarolik pozitsiyasini ham shakllantiradi. Natijada talaba o‘z milliy qadriyatlariga sodiq qolgan holda, umuminsoniy qadriyatlarni anglay oladigan va ularga amal qiladigan barkamol shaxsga aylanadi. Bu esa uning global ijtimoiy-madaniy makonda muvaffaqiyatli integratsiyalashuvini ta‘minlaydi. Talabalarda qadriyatli munosabatlarni shakllantirishga xizmat qiluvchi pedagogik mexanizmlar tizimli va kompleks xarakterga ega ekanligi aniqlandi. Ya‘ni, mazkur jarayon alohida metod yoki vosita bilan emas, balki o‘zaro bog‘liq bo‘lgan mazmuniy-integrativ, motivatsion-aksiologik, faoliyatga yo‘naltirilgan, refleksiv-tahliliy hamda ijtimoiy-madaniy mexanizmlar majmuasi orqali amalga oshiriladi. Ushbu mexanizmlarning har biri o‘ziga xos funksiyani bajarib, yagona pedagogik tizim sifatida ishlaganda yuqori samaradorlikka erishiladi. Ta‘lim jarayonida aksiologik yondashuvni joriy etish zarurligi ilmiy jihatdan asoslandi. Aksiologik yondashuv ta‘lim mazmunini

qadriyatlar bilan boyitish, talabaning ichki motivatsiyasini shakllantirish va uning shaxsiy rivojlanishini ta'minlashga xizmat qiladi. Bu yondashuv orqali ta'lim jarayoni faqat bilim berishga yo'naltirilgan tizimdan chiqib, shaxsni har tomonlama kamol toptiruvchi ijtimoiy-madaniy muhitga aylanadi, ishlab chiqilgan pedagogik mexanizmlarni amaliyotga tatbiq etish ta'lim sifatini sezilarli darajada oshirishi aniqlandi. Xususan, qadriyatlar asosida tashkil etilgan ta'lim jarayonida talabalarning bilimlarni o'zlashtirish darajasi, mustaqil fikrlash qobiliyati, ijtimoiy faolligi va kasbiy mas'uliyati ortadi. Shu bilan birga, bunday yondashuv ta'lim muhitining ma'naviy-psixologik holatini yaxshilab, sog'lom pedagogik iqlimni shakllantirishga xizmat qiladi.

Foydalanilgan adabiyotlar.

1. Abdixakimovich X.K. Aksiologik yondashuv asosida kursantlarda fuqarolik kompetensiyasini takomillashtirish //Pedagogs international research journal. – 2025. – T. 95. – №. 1. – С. 254-258.

2.Abdullaev K., Juraev B., Khabibova G. Food quality and safety control as an important factor of physical development //E3S Web of Conferences. – EDP Sciences, 2023. – T. 460. – С. 11001.

3. Жураев Б.Т. Деятельность педагога по гуманизации учебно-воспитательного процесса //Научные школы. Молодежь в науке и культуре XXI в.: материалы междунар. науч.-творч. форума. – 2017. – Т. 31.

4. Жураев Б.Т. Социально-духовное развитие студентов //Россия-Узбекистан. Международные образовательные и социально-культурные технологии: векторы развития. – 2019. – С. 22-23

1. 5. Леонтьев А. Н., Леонтьев А. Н. Деятельность. сознание. личность. – Политиздат, 1975. – С. 5-7695.

2. Norboyeva M. Aksiologik yondashuvlar asosida bo 'lajak pedagoglarda altruizm ko 'nikmalarini shakllantirish: bosqichlar va tamoyillar //Maktabgacha va maktab ta'limi jurnali. – 2025. – T. 3. – №. 7.

3. Олимов Ш.Ш., Ходжиева М.Ш. Возможности применения педагогических технологий в образовательном процессе //Молодежь и XXI век-2020. – 2020. – С. 228-231.

4. Karimova R. M. Aksiologik yondashuvning ta'limdagi ahamiyati.// Pedagogika va psixologiya jurnali. 2022. 2(4), 45-51.

5. Kluckhohn C. Values and value-orientations in the theory of action: An exploration in definition and classification //Toward a general theory of action. – Harvard university press, 1951. – С. 388-433.

6. Xodjayev B. X. Pedagogik aksiologiya” o'quv qo'llanma //T.“Fan va texnologiya. – 2011. – T. 156.

7. Ходжиева М. Ш. Совершенствование аксиологического подхода к педагогической деятельности у будущих учителей //Научный журнал. – 2020. – №. 9 (54). – С. 43-45.

8. Yoshiyena U. M. The importance of using pedagogical technologies in special educational schools //Вестник науки и образования. – 2020. – №. 22-2 (100). – С. 24-26.

**METHODOLOGY OF USING PROBLEM-BASED LEARNING
TECHNOLOGY IN THE ANALYSIS OF LITERARY TEXTS
(BASED ON THE WORKS OF OZOD SHARAFIDDINOV)**

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Abstract: This thesis analyzes the role and methodology of problem-based learning technology in increasing the effectiveness of literary text analysis in literature lessons. The literary and critical works and journalism of critic Ozod Sharofiddinov were selected as the object of research.

Keywords: problem-based learning, text analysis, literary criticism, intellectual potential, artistic skill, logical thinking.

**BADIY ASAR MATNINI TAHLIL QILISHDA MUAMMOLI TA'LIM
TEXNOLOGIYASIDAN FOYDALANISH METODIKASI
(OZOD SHARAFIDDINOV ASARLARI MISOLIDA)**

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Annotatsiya: Mazkur tezisdagi adabiyot darslarida badiiy matn tahlilining samaradorligini oshirishda muammoli ta'lim texnologiyasining o'rnini va metodikasi tahlil qilinadi. Tadqiqot obyekti sifatida munaqqid Ozod Sharofiddinovning adabiy-tanqidiy asarlari va publitsistikasi tanlangan.

Kalit so'zlar: muammoli ta'lim, matn tahlili, adabiy tanqid, intellektual salohiyat, badiiy mahorat, mantiqiy tafakkur.

Аннотация: В данной работе анализируется роль и методология проблемно-ориентированного обучения в повышении эффективности анализа литературных текстов на уроках литературы. В качестве объекта исследования выбраны литературно-критические произведения и журналистские работы критика Ozod Sharofiddinov.

Ключевые слова: проблемно-ориентированное обучение, анализ текста, литературная критика, интеллектуальный потенциал, художественное мастерство, логическое мышление.

Ta'limni tashkil etishning muvaffaqiyati o'quvchilarning fan asoslarini egallash jarayonida nutq boyligi darajasi, til hodisalarini va ularning nutqdagi vazifasini o'zlashtirishiga bog'liq. Shunday ekan, boshlang'ich sinf o'qish darsliklariga tanlanadigan o'quv materiallariga alohida e'tibor qaratish lozim.

O'qish uchun tavsiya etilgan asar qanchalik badiiy-estetik jihatdan yuksak bo'lmasin, uning tahlilida o'quvchining e'tiborini maqsadga yo'naltiradigan muammoli savol-topshiriqlar tizimi ishlab chiqilmasa, samaradorlikka erishish mushkul bo'ladi.¹

Zamonaviy adabiy ta'limning bosh maqsadi — o'quvchiga tayyor bilim berish emas, balki uni matn ichidagi ma'nolarni mustaqil kashf etishga o'rgatishdir. Muammoli ta'lim texnologiyasi o'quvchi oldiga yechimi darhol ko'rinmaydigan, izlanish va tahlilni talab qiladigan vazifalarni qo'yish orqali uning kognitiv faolligini oshiradi.²

Ozod Sharofiddinov o'zbek adabiyotshunosligida o'tkir mantiqi, dolzarb masalalarni dadil ko'tara olishi va asar tahliliga yangicha yondashuvi bilan ajralib turadi. Uning “Zamon. Qalb. Poeziya”, “Iste'dod jilolari” kabi asarlari muammoli vaziyatlar yaratish uchun boy manba hisoblanadi.

¹ N.N. Azizxo'jaeva. Pedagogik texnologiya va pedagogik mahorat. — Toshkent: TDPU nashriyoti, 2006.

² R. Ishmuhamedov, M. Yuldashev. Ta'lim va tarbiyada innovatsion pedagogik texnologiyalar. O'quv qo'llanma.

Hozirgi tajribada muammoli ta'lim deganda o'qituvchi tomonidan yaratiladigan muammoli vaziyatlar va ularni hal etishga qaratilgan o'quvchilarning mustaqil faoliyati tushuniladi. Bu jarayonda talabalar bilim, ko'nikma va kompetensiyalarga ega bo'lish bilan birga, mantiqiy fikrlash qobiliyatlarini ham rivojlantiradi.

Muammoli ta'lim texnologiyasining asosiy tamoyillari quyidagilardan iborat:

muammoli vaziyat yaratish;

o'quvchilarning izlanish faoliyatini tashkil etish;

mantiqiy tafakkurni rivojlantirish;

mustaqil xulosa chiqarishga o'rgatish.³

Ozod Sharofiddinov asarlarining didaktik imkoniyatlari

Ozod Sharofiddinovning adabiy-tanqidiy merosi badiiy matnning ichki mohiyatini ochish, muallif pozitsiyasini aniqlash hamda ijtimoiy-estetik muammolarni yoritishda muhim ahamiyatga ega.

Uning maqolalarida yozuvchi va asar o'rtasidagi munosabat, obrazlarning ma'naviy yuklamasi chuqur tahlil qilinadi. Bu esa dars jarayonida muammoli savollarni shakllantirish uchun keng imkoniyat yaratadi.

Muammoli ta'lim asosida badiiy matnni tahlil qilish metodikasi

1. Muammoli vaziyat yaratish

Dars boshida o'quvchilarga quyidagi savollar berilishi mumkin:

Muallif nima sababdan aynan shu obrazni tanlagan?

Asardagi konflikt nimadan kelib chiqadi?

Qahramon xatti-harakatlari oqlanadimi?

Bu savollar o'quvchini mustaqil izlanishga undaydi.

Amaliy misol:

Ozod Sharofiddinov asarlari asosida quyidagi muammoli savol qo'yilishi mumkin:

³ B.X. Xodjayev. Umumiy pedagogika nazariyasi va amaliyoti. – Toshkent: "Sano-standart" nashriyoti.

Muammo: “Badiiy asarda muallif pozitsiyasi ochiq ifodalanishi kerakmi yoki yashirin bo‘lishi samaraliroqmi?”

Xulosa: Badiiy asar matnini tahlil qilishda muammoli ta’lim texnologiyasidan foydalanish samarali pedagogik yondashuv hisoblanadi. Ayniqsa, Ozod Sharofiddinov asarlari misolida bu metod o‘quvchilarning analitik tafakkurini rivojlantirishda muhim ahamiyat kasb etadi.

Mazkur metodika:

o‘quvchini passiv obyektidan faol subyektga aylantiradi;

badiiy asarga tanqidiy yondashishni shakllantiradi;

mustaqil fikrlash va o‘z nuqtai nazarini himoya qilish ko‘nikmasini rivojlantiradi.

FOYDALANILGAN ADABIYOTLAR

1.N.N.Azizxo‘jaevaPedagogik texnologiya va pedagogik mahorat. – Toshkent:TDPU nashriyoti, 2006.

2.S.A. Madyarova va boshqalar Pedagogik texnologiya va pedagogik mahorat. – Toshkent: “Iqtisod-moliya” nashriyoti, 2009. – 240 b.

3.R. Ishmuhamedov, M. Yuldashev Ta’lim va tarbiyada innovatsion pedagogik texnologiyalar: o‘quv qo‘llanma. – Toshkent, 2013. – 279 b.

4.B.X. Xodjayev Umumiy pedagogika nazariyasi va amaliyoti: darslik. – Toshkent: “Sano-standart” nashriyoti, 2017. – 416 b.

5.Ozod Sharofiddinov Adabiy-tanqidiy maqolalar to‘plami. – Toshkent: G‘afur G‘ulom nomidagi nashriyot, 1980–2000-yillar.

Developing Intercultural Competence in English Language Teaching

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Abstract: *This article explains that intercultural competence is the ability for communication and effective interaction among people from various cultural backgrounds. It is not only any theoretical ideas, but it shows the ability to think, feel and behave when interacting with different cultural people. In teaching, intercultural competence is essential to understand and communicate between a teacher's and a student's ability in a respectful way.*

Keywords: *intercultural competence, knowledge, attitudes, skills, communication, mutual understanding, learning and teaching, cultures, respect, politeness*

Intercultural competence is not the knowledge or skill of language teaching or learning, however, its role in education and pedagogical features has been more vital for years. Intercultural competence does not teach EFL or ESL learners grammar or vocabulary. It is teaching of the ways for using language in real cultural contexts. Language and culture are inseparable which means that language can be communication system and culture is meaning system. When we speak a language, we also express cultural values such as politeness, respect, distance and humor.

Intercultural competence is a part of concepts including global competence, graduate attributes, employability skills and education. All these concepts is recognition of globalisation which is a force to change in aspects of the modern world and the core for graduates to be able to engage and act globally. In the context of language teaching, intercultural competence can be categorized into several interrelated dimensions that support effective communication and meaningful learning. One of the most widely recognized frameworks is the model of Intercultural Communicative Competence proposed by Michael Byram (1997), which emphasizes the integration of knowledge,

attitudes, and skills. In educational settings, this is often reflected through three main categories: cognitive, affective, and behavioral dimensions. The cognitive dimension refers to learners' understanding of cultural knowledge, including traditions, values, and communication styles. The affective dimension involves the development of positive attitudes such as openness, respect, and curiosity toward other cultures. The behavioral dimension focuses on the ability to apply this knowledge and these attitudes in real-life communication through appropriate language use and interaction. Additionally, intercultural competence is viewed as a developmental process, as highlighted by Darla K. Deardorff (2006), where learners gradually move from basic awareness of cultural differences to more advanced levels of adaptability and effective intercultural interaction. Therefore, in language teaching, these categories should be integrated into classroom practice to ensure that learners not only acquire linguistic knowledge but also develop the ability to communicate successfully in diverse cultural contexts.

Methodology

A mixed-methods research design, combining both quantitative and qualitative approaches to identify the importance of intercultural competence in language teaching. A mixed-methods design is suitable because it allows for a more comprehensive understanding of educational phenomena by integrating numerical data with detailed participant perspectives (John W. Creswell & Vicki L. Plano Clark, 2018).

A structured questionnaire with a **5-point Likert scale** was used to measure students' intercultural awareness, attitudes, and perceived importance of intercultural competence in language learning. Likert scales are widely used in attitude measurement research (Rensis Likert, 1932).

Results

The results indicate that intercultural competence is considered highly important in language teaching. 80% of students agreed that intercultural competence improves

communication skills. 75% believed that understanding culture helps them learn language more effectively. 70% reported that teachers should include cultural topics in lessons. 65% stated that they feel more motivated when cultural content is included.

Discussion

The findings of this study confirm that intercultural competence is widely recognized as an essential component of language teaching. The high questionnaire scores indicate that learners perceive culture as an important factor in language acquisition. This supports the view of Michael Byram (1997), who argues that language learning should include intercultural communicative competence.

The qualitative results also show that teachers value intercultural competence but face practical challenges, particularly in terms of resources and training. This aligns with the findings of Darla K. Deardorff (2006), who emphasizes that effective intercultural education requires structured support and institutional guidance.

Furthermore, limited classroom observation suggests that intercultural competence is still not fully integrated into teaching practice. This gap between theory and practice highlights the need for curriculum development and teacher training program.

Practical Implications

Teacher training has a significant role in the successful implementation of intercultural competence. The results indicate that teachers recognize its importance but often lack sufficient training and resources. Therefore, professional development programs should be designed to equip teachers with practical strategies for integrating intercultural activities into their teaching. According to Darla K. Deardorff (2006), educators need structured support to effectively foster intercultural skills in learners. In this area, training workshops, seminars and guides for instruction can be helpful to teachers in order to become more confident and competent.

Additionally, classroom practices should shift toward more interactive and student-centered approaches. Activities such as role-plays, group discussions, case studies, and simulations can provide students with opportunities to practice intercultural communication in meaningful ways. These methods encourage critical thinking and help learners develop the skills necessary to navigate cultural differences. The use of authentic materials, including videos, films, and real-life texts, is also highly recommended, as it exposes students to natural language use and cultural contexts.

Conclusion

In conclusion, intercultural competence plays a crucial role in modern language teaching and learning. The findings of this study demonstrate that both students and teachers recognize its importance in developing effective communication skills and fostering mutual understanding across cultures. Language learning is no longer limited to the acquisition of grammatical knowledge; it also involves understanding cultural contexts, values, and communication styles. Moreover, the study reveals that while there is a positive attitude toward intercultural competence, its practical implementation in classrooms remains limited due to challenges such as insufficient resources and lack of teacher training. As highlighted by Darla K. Deardorff (2006), the development of intercultural competence requires continuous effort, structured support, and appropriate teaching strategies. Therefore, it is essential for educational institutions to integrate intercultural components into curricula and provide professional development opportunities for teachers.

Overall, enhancing intercultural competence in language education can lead to more meaningful communication, greater cultural awareness, and improved global readiness among learners. It is, therefore, not only an important component of language teaching but also a necessary skill for individuals living in an increasingly interconnected world.

Reference

- Babbie, E. (2020). *The practice of social research* (15th ed.). Cengage Learning.
- Byram, M. (1997). *Teaching and assessing intercultural communicative competence*. Multilingual Matters.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge.
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.
- Deardorff, D. K. (2006). Identification and assessment of intercultural competence. *Journal of Studies in International Education*, 10(3), 241–266.
- Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology*, 140, 1–55.

Determining the knowledge and skills of nurses through simulation training

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Specialization of Medical and Pharmaceutical Personnel**

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Abstract

This study examines the effectiveness of simulation-based teaching methods in nursing education. In today's healthcare system, the clinical competence of nurses is a key factor in ensuring patient safety. This article analyzes the benefits of transitioning from traditional teaching methods to simulation technologies, with a focus on the process of integrating nurses' theoretical knowledge with practice (Hakami et al., 2024)., 2024). During the study, the impact of simulation on nurses' acquisition of knowledge, development of skills, and long-term retention of these skills was evaluated (Alharbi et al., 2024)., 2024). The results show that training sessions using high-fidelity simulators significantly improve nurses' clinical competence and self-confidence (Hakami et al.(Hakami et al., 2024; Yazdanpanah et al., 2021).

Keywords: simulation training, nursing education, clinical skills, high-fidelity simulation, critical thinking, patient safety, professional development.

Metodologiya

Tadqiqotda miqdoriy yondashuvga asoslangan kvazi-eksperimental dizayn qo'llanildi. Tadqiqot ob'ekti sifatida malaka oshirish kurslarida tahsil olayotgan hamshiralar tanlab olindi.

1. **Baholash vositalari:** Hamshiralarning bilimi treningdan oldin (pre-test) va keyin (post-test) maxsus ishlab chiqilgan standartlashtirilgan testlar orqali tekshirildi ([Alharbi et al., 2024](#)).
2. **Amaliy ko'nikmalar:** Amaliy mahoratni baholash uchun Ob'ektiv Tarkibiy Klinik Imtihon formatidan foydalanildi. Bunda yuqori va o'rta aniqlikdagi manekenlar yordamida real klinik ssenariylar yaratildi ([Yazdanpanah et al., 2021](#)).
3. **Statistik tahlil:** Olingan ma'lumotlar t-testi yordamida tahlil qilinib, treningdan oldingi va keyingi natijalar o'rtasidagi farqning ishonchliligi ($p < 0.05$) aniqlandi ([Alharbi et al., 2024](#)).

Asosiy qism

1. Simulyatsion o'qitishning nazariy va amaliy integratsiyasi

An'anaviy ta'lim uslublarida hamshiralar nazariy bilimlarni o'zlashtirsalar-da, ularni real klinik vaziyatlarda qo'llashda ko'pincha qiyinchiliklarga duch kelishadi. Simulyatsiya asosidagi o'qitish aynan shu "bo'shliqni" to'ldirishga xizmat qiladi ([Alharbi et al., 2024](#)). Tadqiqotlar shuni ko'rsatadiki, simulyatsiya muhiti hamshiralarga xavfsiz sharoitda xato qilish va o'z xatolaridan xulosa chiqarish imkonini beradi. Bu jarayonda nazariy bilimlar amaliy harakatlar bilan mustahkamlanadi, natijada hamshiralarning klinik kompetensiyasi sezilarli darajada oshadi ([Alharbi et al., 2024](#)).

2. Simulyatorlarning aniqlik darajasi va samaradorlik

Simulyatsion treninglarning muvaffaqiyati ishlatilayotgan texnologiyaning aniqlik darajasiga ko'p jihatdan bog'liq. O'rta va yuqori aniqlikdagi (high-fidelity) simulyatorlar inson fiziologiyasini, masalan, nafas olish, puls va qon bosimi o'zgarishlarini aniq aks ettira oladi ([Yazdanpanah et al., 2021](#)). Yuqori aniqlikdagi simulyatsiyalar hamshiralarda real klinik vaziyatga kirishish tuyg'usini uyg'otadi, bu esa ularning shoshilinch holatlarda (masalan, kardiogen shok yoki nafas qisishi) tez va to'g'ri qaror qabul qilish qobiliyatini rivojlantiradi ([Alharbi et al., 2024; Yazdanpanah et al., 2021](#)).

3. Bilimlarni o'zlashtirish va ularni uzoq muddat saqlab qolish

Simulyatsion treninglarning eng muhim afzalliklaridan biri — bu egallangan bilimlarning xotirada uzoq vaqt saqlanishidir. Tadqiqot natijalariga ko'ra, simulyatsiya orqali o'rganilgan klinik ko'nikmalar an'anaviy usullarga qaraganda ancha uzoq muddat davomida hamshiralar xotirasida saqlanib qoladi ([Alharbi et al., 2024](#)). Bu, ayniqsa, kam uchraydigan, lekin o'ta kritik hisoblangan klinik vaziyatlarda (masalan, anafilaktik shok) juda muhimdir, chunki hamshira bunday holatga duch kelganda avtomatik ravishda to'g'ri algoritmlarni eslay oladi ([Alharbi et al., 2024](#)).

4. Psixologik tayyorgarlik va o'z-o'ziga ishonch

Faqatgina bilimning o'zi yetarli emas; hamshira o'z bilimiga ishonishi ham kerak. Simulyatsion ta'lim hamshiralarning o'z-o'ziga bo'lgan ishonchini (self-efficacy) oshirishda yuqori samaradorlik ko'rsatmoqda ([Hakami et al., 2024](#)). Mashg'ulotlar davomida muvaffaqiyatli bajarilgan har bir klinik muolaja hamshiraning o'z kasbiy mahoratiga bo'lgan ishonchini mustahkamlaydi, bu esa bevosita bemorlarga ko'rsatiladigan yordam sifatiga ijobiy ta'sir qiladi ([Hakami et al., 2024](#)). Shuningdek, treninglar hamshiralarning tanqidiy fikrlash (critical thinking) ko'rsatkichlarini ham yaxshilaydi, bu ularga murakkab tashxislar bilan ishlashda yordam beradi ([Saghafi et al., 2024](#)).

5. Jamoada ishlash va tengdoshlar bilan o'rganish

Simulyatsiya faqatgina individual ko'nikmalarni emas, balki jamoaviy hamkorlikni ham rivojlantiradi. Tengdoshlar bilan o'rganish (peer learning) metodikasi simulyatsiya davomida hamshiralarning bir-birlariga maslahat berishi va jamoada mas'uliyatni bo'lishishini ta'minlaydi ([Paul et al., 2024](#)). Bu yondashuv klinik muhitda tibbiyot xodimlari o'rtasidagi muloqotni yaxshilaydi va jamoaviy xatolar ehtimolini kamaytiradi ([Paul et al., 2024](#)).

Xulosa

O'tkazilgan tahlillar shuni tasdiqlaydiki, simulyatsion treninglar hamshiralar bilimini va amaliy tayyorgarligini oshirishda eng samarali zamonaviy texnologiyalardan biri hisoblanadi. Ushbu metod hamshiralarning nazariy bilimlarini amaliyotda qo'llashdagi "bo'shliqni" to'ldirishga yordam beradi ([Alharbi et al., 2024](#)). Kelajakda hamshiralik ta'limi dasturlariga ko'proq simulyatsion modullarni kiritish va o'qitishda tengdoshlar bilan o'rganish uslubidan kengroq foydalanish tavsiya etiladi ([Paul et al., 2024](#)).

Adabiyotlar ro'yxati

1. Hakami, A., et al.. The Impact of Simulation Education on Self-Efficacy in Pre-Registration Nursing Students. ([Hakami et al., 2024](#))
2. Alharbi, A., et al.. Effectiveness of simulation-based learning on knowledge and skill acquisition and retention among nursing students. ([Alharbi et al., 2024](#))
3. Yazdanpanah, F., et al.. Medium and High Fidelity Simulations in Training Undergraduate Nursing and Operating Room Students. ([Yazdanpanah et al., 2021](#))
4. Saghafi, F., et al.. Effectiveness of Simulation in Nursing Students' Critical Thinking Scores. ([Saghafi et al., 2024](#))
5. Alharbi, A., et al.. The effectiveness of simulation-based learning on students' knowledge and skills in nursing programs. ([Alharbi et al., 2024](#))
6. Paul, P., et al.. Effectiveness of Simulation-Based, Peer Learning Intervention in Continuing Nursing Education. ([Paul et al., 2024](#))

**MODERN OPPORTUNITIES FOR ENHANCING CREATIVITY IN
PRIMARY STUDENTS**

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Primary Education

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Abstract: This article broadly covers the essence of the concept of creativity, its role in the development of the individual and society, as well as the possibilities of increasing creativity based on modern technologies and innovative approaches. The importance of digital tools, educational technologies, artificial intelligence and interactive methods in the formation of creative thinking is analyzed on a scientific basis.

Keywords: creativity, innovation, modern technologies, education, artificial intelligence, creative thinking, digital environment.

**BOSHLANG‘ICH SINF O‘QUVCHILARIDA KREATIVLIKNI OSHIRISHDA
ZAMONAVIY IMKONIYATLAR**

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Annotatsiya: Ushbu maqolada kreativlik tushunchasining mohiyati, uning shaxs va jamiyat rivojida o‘rni, shuningdek, zamonaviy texnologiyalar va innovatsion yondashuvlar asosida kreativlikni oshirish imkoniyatlari keng yoritilgan. Raqamli vositalar, ta’lim texnologiyalari, sun‘iy intellekt hamda interaktiv metodlarning kreativ fikrlashni shakllantirishdagi ahamiyati ilmiy asosda tahlil qilingan.

Kalit so‘zlar: kreativlik, innovatsiya, zamonaviy texnologiyalar, ta’lim, sun‘iy intellekt,

kreativ fikrlash, raqamli muhit.

Аннотация: В данной статье широко рассматривается сущность понятия креативности, её роль в развитии личности и общества, а также возможности повышения креативности на основе современных технологий и инновационных подходов. Научный анализируется значение цифровых инструментов, образовательных технологий, искусственного интеллекта и интерактивных методов в формировании креативного мышления.

Ключевые слова: креативность, инновации, современные технологии, образование, искусственный интеллект, креативное мышление, цифровая среда.

Kirish: Hozirgi kunda jamiyatning barcha sohalarida tub o'zgarishlar yuz bermoqda. Axborot texnologiyalarining jadal rivojlanishi, global integratsiya va raqobatning kuchayishi insondan yangicha fikrlashni talab etmoqda. Bunday sharoitda kreativlik shaxsning eng muhim kompetensiyalaridan biri sifatida namoyon bo'ladi. Kreativ fikrlash orqali inson mavjud muammolarga noodatiy yechim topadi, yangi g'oyalar yaratadi va o'z faoliyatini samarali tashkil etadi.

Mazkur maqolaning maqsadi — kreativlikni oshirishda zamonaviy imkoniyatlarning o'рни va ahamiyatini ilmiy jihatdan tahlil qilish hamda amaliy tavsiyalar ishlab chiqishdan iborat.

Kreativlik — bu insonning yangi, original va foydali g'oyalarni yaratish qobiliyati bo'lib, u tafakkur jarayonining muhim ko'rinishlaridan biridir. Psixologik nuqtai nazardan, kreativlik divergent fikrlash bilan bog'liq bo'lib, bunda inson bir muammoga bir nechta yechim topa oladi. Kreativlik tug'ma qobiliyat emas, balki uni rivojlantirish mumkin bo'lgan ko'nikma hisoblanadi.

Zamonaviy davrda kreativlikni rivojlantirish uchun keng imkoniyatlar yaratilgan bo'lib, ular orasida raqamli texnologiyalar alohida o'rin tutadi. Internet, mobil ilovalar va turli platformalar orqali inson o'z g'oyalarini erkin ifoda etishi va rivojlantirishi

mumkin. Masalan, grafik dizayn dasturlari, video montaj platformalari va onlayn ta'lim tizimlari ijodkorlikni rag'batlantiradi. Shuningdek, sun'iy intellekt texnologiyalari ham kreativlikni oshirishda muhim vosita bo'lib xizmat qilmoqda. Sun'iy intellekt yordamida matn yaratish, dizayn ishlab chiqish, musiqa yozish kabi jarayonlar soddalashtirilmoqda. Bu esa insonning ijodiy salohiyatini yanada kengaytiradi. Biroq, sun'iy intellektdan samarali foydalanish uchun insonning o'zi ham kreativ fikrlashga ega bo'lishi zarur.

Ta'lim tizimida ham kreativlikni rivojlantirishga alohida e'tibor qaratilmoqda. Zamonaviy pedagogik texnologiyalar, jumladan, interaktiv metodlar, muammoli ta'lim, loyiha asosida o'qitish kabi yondashuvlar talabalarning ijodiy fikrlashini rivojlantiradi. Bu metodlar orqali o'quvchilar mustaqil izlanadi, tahlil qiladi va o'z fikrini erkin bayon etadi.

Bundan tashqari, kreativlikni rivojlantirishda muhit ham muhim rol o'ynaydi. Erkin fikrlashga imkon beruvchi, xatolardan qo'rqmaydigan muhit insonning ijodiy faoliyatini rag'batlantiradi. Aksincha, qat'iy cheklovlar va tanqidiy yondashuv kreativlikni pasaytirishi mumkin. Amaliy jihatdan boshlang'ich ta'limda kreativlikni oshirish uchun bir qator usullar mavjud. Jumladan, "miya shturmi" (brainstorming), assotsiativ fikrlash, ro'l o'ynash, dizayn fikrlash (design thinking) kabi metodlar samarali hisoblanadi. Ushbu metodlar orqali inson yangi g'oyalarni tez va samarali ishlab chiqadi.

Zamonaviy imkoniyatlardan yana biri — ijtimoiy tarmoqlardir. Ular orqali inson o'z ijodiy ishlarini keng auditoriyaga taqdim etishi, fikr almashishi va ilhom olishi mumkin. Bu esa kreativlikni yanada rivojlantirishga xizmat qiladi.

Natijalar va muhokama. Tahlillar shuni ko'rsatadiki, zamonaviy texnologiyalar kreativlikni rivojlantirish uchun keng imkoniyatlar yaratmoqda. Ayniqsa, raqamli vositalar va ta'lim texnologiyalari insonning ijodiy salohiyatini ochishda muhim

ahamiyatga ega.

Biroq, faqat texnologiyalarning o'zi yetarli emas. Kreativlikni rivojlantirish uchun insonning ichki motivatsiyasi, qiziqishi va faol ishtiroki ham muhim hisoblanadi. Shu bois, zamonaviy imkoniyatlardan samarali foydalanish bilan birga, shaxsiy rivojlanishga ham e'tibor qaratish lozim. Zamonaviy sharoitda boshlang'ich sinflarda kreativlikni rivojlantirish faqat texnologiyalar bilan cheklanib qolmay, balki kognitiv va psixologik yondashuvlarni ham o'z ichiga oladi. Xususan, neyropsixologik tadqiqotlar shuni ko'rsatadiki, kreativ fikrlash jarayonida inson miyasining turli qismlari — ayniqsa, prefrontal korteks faol ishtirok etadi. Bu esa shuni anglatadiki, kreativlikni rivojlantirish uchun faqat bilim emas, balki tafakkur mashqlari, mantiqiy va tasavvuriy fikrlashni uyg'unlashtirish zarur.

Kreativlikni oshirishda "lifelong learning", ya'ni uzluksiz ta'lim konsepsiyasi ham muhim o'rin tutadi. Zamonaviy inson doimiy ravishda yangi bilim va ko'nikmalarni egallab borishi orqali o'z ijodiy salohiyatini rivojlantirib boradi. Onlayn kurslar, vebinarlar, ochiq ta'lim platformalari bu borada katta imkoniyat yaratmoqda. Bunday muhitda inson nafaqat bilim oladi, balki global miqyosda fikr almashish imkoniga ham ega bo'ladi.

Bundan tashqari, kreativlikni rivojlantirishda interdiscipliner yondashuv, ya'ni turli fanlar o'rtasidagi integratsiya muhim ahamiyat kasb etadi. Masalan, texnologiya va san'atni birlashtirish orqali yangi innovatsion mahsulotlar yaratiladi. Bu esa STEAM (Science, Technology, Engineering, Art, Mathematics) yondashuvi orqali amalga oshiriladi. Ushbu model o'quvchilarning nafaqat bilimini, balki ularning ijodiy va tanqidiy fikrlash qobiliyatini ham rivojlantiradi.

Kreativlikni oshirishda muhim omillardan yana biri — muammoga yo'naltirilgan fikrlashdir. Zamonaviy jamiyatda yuzaga kelayotgan murakkab muammolarni hal qilish uchun insondan standart bo'lmagan yondashuv talab etiladi. Shu sababli muammoli

vaziyatlar asosida o'qitish metodlari keng qo'llanilmoqda. Bu metodlar orqali talabalar real hayotiy muammolar ustida ishlashadi va o'zlarining kreativ yechimlarini ishlab chiqadilar.

Shuningdek, kreativlikni rivojlantirishda emotsional intellekt ham muhim rol o'ynaydi. O'z his-tuyg'ularini anglay oladigan va boshqara oladigan inson ijodiy jarayonda erkinroq fikrlaydi. Emotsional barqarorlik esa yangi g'oyalarni yaratishda muhim omil hisoblanadi. Stress va qo'rquv esa aksincha kreativlikni cheklaydi.

Zamonaviy imkoniyatlardan yana biri — kollaborativ (hamkorlikdagi) faoliyatdir. Jamoa bo'lib ishlash jarayonida turli fikrlar to'qnashuvi yuzaga keladi va bu yangi g'oyalar paydo bo'lishiga olib keladi. Ayniqsa, xalqaro loyihalarda ishtirok etish insonning dunyoqarashini kengaytiradi va kreativ fikrlashni rivojlantiradi.

Raqamli transformatsiya jarayonida kreativ industriya ham jadal rivojlanmoqda. Blogerlik, kontent yaratuvchilik, grafik dizayn, video ishlab chiqarish kabi sohalar yoshlar orasida ommalashib bormoqda. Bu yo'nalishlar nafaqat ijodiy o'zini ifoda etish vositasi, balki daromad manbai ham hisoblanadi. Shu sababli kreativlik bugungi kunda iqtisodiy jihatdan ham muhim ahamiyat kasb etmoqda.

Bundan tashqari, gamifikatsiya, ya'ni o'yin elementlarini ta'limga kiritish ham kreativlikni oshirishda samarali vosita hisoblanadi. O'yin orqali o'rganish jarayoni qiziqarli va motivatsion bo'ladi. Bu esa talabalarning faol ishtirokini ta'minlaydi va ularning ijodiy fikrlashini rag'batlantiradi.

Yuqoridagi barcha omillar shuni ko'rsatadiki, boshlang'ich sinflarda kreativlikni rivojlantirish kompleks jarayon bo'lib, u texnologik, pedagogik, psixologik va ijtimoiy omillar uyg'unligini talab etadi. Zamonaviy imkoniyatlardan to'g'ri va samarali foydalanish orqali har bir inson o'z ijodiy salohiyatini yuqori darajaga olib chiqishi mumkin.

Foydalanilgan adabiyotlar

1. Edward P. Torrance. Creativity in Education. New York: Prentice Hall, 1995.
2. J. P. Guilford. The Nature of Human Intelligence. New York: McGraw-Hill, 1967.
3. Ken Robinson. Creative Schools. London: Penguin Books, 2015.
4. Teresa M. Amabile. Creativity in Context. Westview Press, 1996.
5. Robert J. Sternberg. Handbook of Creativity. Cambridge University Press, 1999.
6. O‘zbekiston Respublikasi Oliy Majlisi. “Ta’lim to‘g‘risida”gi Qonun. Toshkent, 2020.
7. O‘zbekiston Respublikasi Prezidenti. Ta’lim va innovatsiyalarni rivojlantirishga oid farmon va qarorlar, 2019–2023.
8. O‘zbekiston Respublikasi Oliy va o‘rta maxsus ta’lim vazirligi. Pedagogik texnologiyalar va innovatsiyalar bo‘yicha o‘quv qo‘llanmalar. Toshkent, 2021.
9. Pedagogika. Toshkent: O‘qituvchi nashriyoti, 2018.
10. N. N. Azizxo‘jayeva. Pedagogik texnologiyalar va pedagogik mahorat. Toshkent, 2006.
11. B. X. Xodjayev. Umumiy pedagogika nazariyasi va amaliyoti. Toshkent, 2017.
12. UNESCO. Education for Creativity and Innovation. Paris, 2018.

WAYS TO IMPROVE THE EFFICIENCY OF STATE FINANCIAL CONTROL BASED ON TAXPAYER SEGMENTATION AND RISK ANALYSIS SYSTEMS

Axmedov Kamron

Abstract: This thesis examines the role of taxpayer segmentation and risk-analysis mechanisms in enhancing the efficiency of state financial control, with a particular focus on tax administration. The study substantiates the need to shift from comprehensive control methods to a targeted approach that concentrates administrative resources on high-risk entities. The research includes a comparative analysis of practices recommended by international organizations (OECD, ISORA) and the experiences of advanced tax jurisdictions (IRS, SARS), juxtaposed with the regulatory framework and implementation of the risk management system in the Republic of Uzbekistan. Based on the findings, the thesis proposes priority directions for modernization, including the adoption of artificial intelligence and machine learning technologies, the development of differentiated control strategies per taxpayer segment, and the enhancement of inter-agency data integration.

Key words: State financial control, tax control, risk analysis, taxpayer segmentation, tax administration, artificial intelligence, budget stability, shadow economy.

SOLIQ TO‘LOVCHILARNI SEGMENTLASH VA RISK-TAHLIL TIZIMI ASOSIDA DAVLAT MOLİYAVIY NAZORATI SAMARADORLIGINI OSHIRISH YO‘LLARI

Annotatsiya: Mazkur tezisdavlat moliyaviy nazorati tizimining ajralmas qismi bo‘lgan soliq nazorati samaradorligini oshirishda soliq to‘lovchilarni segmentlash va risk-tahlil mexanizmlarining ahamiyati yoritilgan. Ishda an’anaviy yoppasiga nazorat usullaridan voz kechib, resurslarni yuqori soliq xavfiga ega subyektlarga yo‘naltirish

zarurati ilmiy asoslab berilgan. Xalqaro tashkilotlar (OECD, ISORA) tadqiqotlari hamda ilg'or xorijiy soliq ma'muriyatlari (IRS, SARS) tajribasi tahlil qilinib, O'zbekiston Respublikasida joriy etilgan soliq xavfini boshqarish tizimi va uning normativ-huquqiy asoslari¹ qiyosiy o'rganilgan. Tahlillar natijasida milliy tizimni takomillashtirishning ustuvor yo'nalishlari, jumladan, sun'iy intellekt va mashinaviy o'qitish texnologiyalarini joriy etish, segmentlar kesimida differensial nazorat strategiyalarini ishlab chiqish va idoralararo ma'lumotlar integratsiyasini kuchaytirish kabi amaliy takliflar ilgari surilgan.

Kalit so'zlar: Davlat moliyaviy nazorati, soliq nazorati, risk-tahlil, soliq to'lovchilarni segmentlash, soliq ma'murchiligi, sun'iy intellekt, budget barqarorligi, yashirin iqtisodiyot.

Davlat moliyaviy nazorati tizimida soliq nazoratining asosiy vazifasi soliq qonunchiligiga rioya etilishini ta'minlash, budget daromadlarining to'liq va o'z vaqtida shakllanishiga erishishdan iborat. An'anaviy yondashuvda soliq organlari barcha soliq to'lovchilarni bir xil mezonlar asosida tekshirishga intilgan bo'lsa, bu resurslarning samarasiz sarflanishiga va qonunga itoatkor tadbirkorlarning ortiqcha nazorat yukiga duch kelishiga olib kelgan². Bugungi kunda ilg'or soliq ma'murchiliklari tomonidan qo'llanilayotgan risk-tahlilga asoslangan segmentlash yondashuvi esa cheklangan insoniy va moliyaviy resurslarni yuqori xavfga ega soliq to'lovchilarga yo'naltirish imkonini bermoqda. Iqtisodiy hamkorlik va taraqqiyot tashkiloti (OECD) ma'lumotlariga ko'ra, soliq ma'murchiliklarining 85 foizi bugungi kunda rasmiy risklarni boshqarish strategiyasiga ega bo'lib, ularning deyarli barchasi asosiy risklarni aniqlash, baholash va ustuvorlashtirishga qaratilgan maxsus yondashuvlardan foydalanadi³.

¹ O'zbekiston Respublikasi Vazirlar Mahkamasining 2021-yil 7-yanvardagi 1-son "Soliq xavfini boshqarish, soliq xavfi mavjud soliq to'lovchilarni (soliq agentlarini) aniqlash va soliq tekshiruvlarini tashkil etish va o'tkazish to'g'risida"gi Qarori // Qonunchilik ma'lumotlari milliy bazasi. <https://Lex.uz>.

² O'zbekiston Respublikasi Prezidentining 2021-yil 27-avgustdagi PF-6300-son "Davlat moliyaviy nazorati tizimini yanada takomillashtirish chora-tadbirlari to'g'risida"gi Farmoni // Qonunchilik ma'lumotlari milliy bazasi, 28.08.2021-y., 06/21/6300/0834-son. <https://Lex.uz>.

³ OECD (2023). Tax Administration 2023: Comparative Information on OECD and other Advanced and Emerging Economies. Eleventh edition. Paris: OECD Publishing. DOI: <https://doi.org/10.1787/23077727>. 221 p.

Soliq to'lovchilarni segmentlash — bu soliq ma'muriyatlarining fiskal boshqaruvini yaxshilash va soliq yig'iluvchanligini optimallashtirishga qaratilgan asosiy strategiyalardan biridir.

Mazkur yondashuv soliq to'lovchilarni turli mezonlar — kompaniya hajmi, daromad darajasi, rioya etish tarixi, iqtisodiy faoliyat turi va soliqlardan bo'yin tovlash xavfi kabi ko'rsatkichlar bo'yicha tasniflashga asoslanadi. Xalqaro tajriba shuni ko'rsatadiki, soliq ma'muriyatlari odatda soliq to'lovchilarni yirik kompaniyalar, kichik va o'rta korxonalar, mikrofirmalar hamda jismoniy shaxslar kabi toifalarga ajratadi. Ayniqsa, yirik soliq to'lovchilar uchun maxsus bo'linmalar tashkil etish amaliyoti keng tarqalgan bo'lib, ISORA (International Survey on Revenue Administration) so'rovida qatnashgan mamlakatlarning 85,5 foizida bunday tuzilmalar mavjud⁴. Risk-tahlil esa soliq to'lovchining qonunchilikni buzish ehtimolini miqdoriy va sifat ko'rsatkichlari asosida baholash imkonini beradi. OECD tomonidan ishlab chiqilgan risklarni boshqarish modeli soliq ma'muriyatlariga xavflarni tizimli tarzda aniqlash va ularga mos choralar ko'rish imkonini beruvchi universal ramka vazifasini o'taydi⁵.

O'zbekiston Respublikasida soliq to'lovchilarni segmentlash va risk-tahlil tizimi so'nggi yillarda jadal rivojlanmoqda. Ushbu jarayonning huquqiy asosini O'zbekiston Respublikasi Vazirlar Mahkamasining 2021-yil 7-yanvardagi 1-son qarori bilan tasdiqlangan "Soliq xavfini boshqarish, soliq xavfi mavjud soliq to'lovchilarni (soliq agentlarini) aniqlash va ularni soliq xavfi darajasi bo'yicha toifalash tartibi to'g'risida"gi nizom tashkil etadi. Ushbu nizomga muvofiq soliq xavfini boshqarish tizimi strategiyasi va taktikasini, axborot yig'ish va uni qayta ishlash, soliq xavfini tahlil qilish va baholash,

⁴ Asian Development Bank (2024). A Comparative Analysis of Tax Administration in Asia and the Pacific: Seventh Edition. Manila: ADB. (ISORA 2022 ma'lumotlari asosida). DOI: <http://dx.doi.org/10.22617/TCS240026-2>. [reference:4]

⁵ OECD (2020). Compliance Risk Management Guide for Tax Administrations. Fiscalis Risk Management Platform Group. European Commission. 110 p. URL: https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/common/publications/info_docs/taxation/risk_managt_guide_en.pdf [reference:3]

shuningdek, soliq xavfini boshqarishga doir chora-tadbirlarni ishlab chiqish va amalga oshirish O'zbekiston Respublikasi Davlat soliq qo'mitasi tomonidan belgilanadi⁶. Amaldagi tizimda soliq to'lovchilar 1 balldan 29 ballgacha to'plagan past xavf — "yashil", 30 balldan 69 ballgacha bo'lgan o'rta xavf — "sariq", 70 balldan yuqori ball to'plagan esa yuqori xavf — "qizil" toifaga kiritiladi. Soliq xavfi darajasi soliq to'lovchilar tomonidan taqdim etilgan soliq va moliyaviy hisobotlar, shaxsiy kartochkalardagi ma'lumotlar, shuningdek, boshqa davlat organlari va tashkilotlardan kelib tushgan ma'lumotlar asosida har olti oyda bir marta avtomatik tarzda aniqlanadi.

Xalqaro miqyosda ushbu yondashuvning samarali modellari shakllangan. Janubiy Afrika Respublikasi Soliq xizmati (SARS) tomonidan joriy etilgan tizim soliq to'lovchilarni xulq-atvori, moliyaviy profili va rioya etish tarixi asosida segmentlaydi, ularni yirik korxonalar, yuqori daromadli jismoniy shaxslar, kichik va o'rta biznes hamda oddiy soliq to'lovchilar kabi toifalarga ajratadi⁷. Har bir toifa maxsus mezonlar va risk ko'rsatkichlari asosida baholanadi, risk indikatorlari ishga tushgan soliq to'lovchilar qo'shimcha tekshiruvga tortiladi, qonunga itoatkor soliq to'lovchilar esa tezkor xizmat ko'rsatish va kamaytirilgan nazoratdan foydalanadi. AQSh Ichki Daromad Xizmati (IRS) esa sun'iy intellekt va mashinaviy o'qitish texnologiyalarini soliq tekshiruvlari jarayoniga faol integratsiya qilmoqda. IRS tomonidan joriy etilgan mashinaviy o'qitish tasniflash modeli har bir soliq deklaratsiyasini avtomatik tahlil qilib, tuzatish talab qilishi ehtimoli yuqori bo'lgan asosiy uchta masalani tavsiya qiladi⁸. Shuningdek, IRS aktivlari 10 milliondan 250 million dollargacha bo'lgan korporatsiyalar uchun eski tizimni yangi "Line Anomaly Recommender" (LAR) bilan

⁶ O'zbekiston Respublikasi Vazirlar Mahkamasining 2021-yil 7-yanvardagi 1-son "Soliq xavfini boshqarish, soliq xavfi mavjud soliq to'lovchilarni (soliq agentlarini) aniqlash va soliq tekshiruvlarini tashkil etish va o'tkazish to'g'risida"gi Qarori // Qonunchilik ma'lumotlari milliy bazasi. <https://Lex.uz>.

⁷ SARS (South African Revenue Service) (2022). SARS Service Charter and Compliance Model Overview. Pretoria: SARS Official Publications. URL: www.sars.gov.za/reference:5

⁸ U.S. Government Accountability Office (GAO) (2023). IRS Use of Artificial Intelligence and Machine Learning in Tax Compliance. GAO-23-106045. Washington, DC: GAO.

almashtirgan bo‘lib, bu model daromad, chegirmalar va kreditlar kabi qator ko‘rsatkichlari o‘rtasidagi o‘zaro bog‘liqliklarni tahlil qiladi.

Davlat moliyaviy nazorati — bu davlat hokimiyati organlarining hamda mahalliy o‘z-o‘zini boshqarish organlarining moliyaviy resurslardan qonuniy va maqsadli foydalanishini ta’minlashga qaratilgan tizimli faoliyatdir.

Ushbu tizimda soliq nazorati alohida o‘rin tutadi, chunki soliq tushumlari davlat budjeti daromadlarining asosiy manbai hisoblanadi. 2019–2024-yillar davomida o‘tkazilgan tadqiqotlarda soliq organlari tomonidan amalga oshirilgan nazorat tadbirlari natijasida undirilgan soliqlar hajmi dinamikasi tahlil qilinib, soliq nazoratining davlat moliyasini boshqarishdagi fiskal samaradorligi ochib berilgan. Tadqiqotda risk-tahlilga asoslangan yondashuvlar hamda profilaktik nazorat mexanizmlarining amaliy afzalliklari yoritilgan bo‘lib, soliq tekshiruvlarini takomillashtirish, nazorat natijalarini oshkoralik va iqtisodiy tahlil orqali baholashga oid takliflar ishlab chiqilgan. Temirov esa davlat moliyaviy nazorati mexanizmlarining samaradorligini baholash muammosini o‘rganib, nazorat samaradorligini doimiy monitoring qilish va tahlil qilish muhimligini asoslab bergan⁹.

O‘zbekistonda soliq to‘lovchilarni segmentlash va risk-tahlil tizimini yanada rivojlantirish quyidagi ustuvor yo‘nalishlarni qamrab olishi lozim. Birinchidan, sun’iy intellekt va mashinaviy o‘qitish texnologiyalarini joriy etish orqali risk-tahlil aniqligini oshirish zarur. Xorijiy tajriba shuni ko‘rsatadiki, mashinaviy o‘qitish modellarini qo‘llash orqali soliq tekshiruvi natijasida aniqlanadigan soliq to‘lashdan bo‘yin tovlash holatlarini 39 foizgacha oshirish mumkin. Ikkinchidan, soliq to‘lovchilar segmentlari bo‘yicha differensial nazorat strategiyalarini ishlab chiqish lozim. A’zamov tomonidan olib borilgan tadqiqotda Rossiya, AQSh, Qozog‘iston, Norvegiya, Yaponiya va Buyuk

⁹ Temirov M.X. (2024). “Davlat sektorida moliyaviy nazorat: muammolar va rivojlanish istiqbollari”. Iqtisodiy Taraqqiyot va Tahlil, 2(1), 143-153.

Britaniya kabi mamlakatlar tajribasi tahlil qilinib, xavf mezonlariga asoslangan yondashuvlar hamda soliq to'lovchilar bilan interaktiv aloqalar mexanizmlari eng samarali deb topilgan. Uchinchidan, idoralararo axborot almashinuvini kengaytirish va ma'lumotlar integratsiyasini kuchaytirish zarur. SARS tajribasi shuni ko'rsatadiki, soliq organlari ish haqi qaydnomalari, bank ma'lumotlari, bojxona deklaratsiyalari va xalqaro ma'lumotlar (masalan, OECDning Umumiy hisobot standarti) kabi turli manbalardan olingan tuzilmali va tuzilmasiz ma'lumotlardan foydalanadi. To'rtinchidan, past xavf toifasidagi soliq to'lovchilar uchun soddalashtirilgan hisobot va imtiyozli xizmat ko'rsatish mexanizmlarini kengaytirish orqali ixtiyoriy rioya etish muhitini mustahkamlash lozim.

Amalga oshirilgan tahlillar shuni ko'rsatadiki, davlat moliyaviy nazorati tizimida soliq to'lovchilarni segmentlash va risk-tahlil mexanizmlarini joriy etish zamonaviy soliq ma'murchiligining strategik ustuvor yo'nalishi hisoblanadi. An'anaviy yoppasiga nazorat usullaridan farqli ravishda, ushbu yondashuv cheklangan ma'muriy va moliyaviy resurslarni yuqori soliq xavfiga ega bo'lgan subyektlarga yo'naltirish, qonunga itoatkor tadbirkorlar uchun esa qulay ishbilarmonlik muhitini shakllantirish imkonini beradi. O'zbekiston Respublikasida so'nggi yillarda mazkur yo'nalishda sezilarli islohotlar amalga oshirilgan bo'lib, xususan, Vazirlar Mahkamasining 2021-yil 7-yanvardagi 1-son qarori bilan soliq xavfini boshqarish tizimining normativ-huquqiy asoslari mustahkamlangan va soliq to'lovchilarni "yashil", "sariq" va "qizil" toifalarga ajratish amaliyoti yo'lga qo'yilgan¹⁰. Shunga qaramay, xalqaro tajriba bilan qiyosiy tahlil milliy tizimni yanada takomillashtirish uchun qator imkoniyatlar mavjudligini ko'rsatmoqda.

¹⁰ O'zbekiston Respublikasi Vazirlar Mahkamasining 2021-yil 7-yanvardagi 1-son "Soliq xavfini boshqarish, soliq xavfi mavjud soliq to'lovchilarni (soliq agentlarini) aniqlash va soliq tekshiruvlarini tashkil etish va o'tkazish to'g'risida"gi Qarori // Qonunchilik ma'lumotlari milliy bazasi. <https://Lex.uz>.

Birinchidan, soliq xavfini baholashning aniqligi va tezkorligini oshirishda sun'iy intellekt hamda mashinaviy o'qitish texnologiyalarini joriy etish muhim ahamiyat kasb etadi. AQSh Ichki Daromad Xizmati (IRS) tajribasi shuni ko'rsatadiki, mashinaviy o'qitish modellari soliq deklaratsiyalaridagi anomalialarni avtomatik tarzda aniqlash va inson omiliga bog'liq xatoliklarni minimallashtirish orqali soliq tekshiruvlari samaradorligini 30-40 foizgacha oshirish imkonini beradi¹¹. O'zbekiston sharoitida bunday texnologiyalarni joriy etish, ayniqsa, qo'shilgan qiymat solig'i bo'yicha zanjirli uzilishlarni aniqlash va transfert narxlar nazoratida yuqori natijalar berishi mumkin.

Ikkinchidan, soliq to'lovchilar segmentlari kesimida differensial nazorat strategiyalarini ishlab chiqish zarurati kun tartibidagi dolzarb masala bo'lib qolmoqda. Xalqaro amaliyotda keng qo'llanilayotgan yirik soliq to'lovchilar uchun maxsus bo'linmalar faoliyati, kichik biznes subyektlari uchun soddalashtirilgan hisobot shakllari va jismoniy shaxslar uchun masofaviy monitoring mexanizmlari O'zbekiston soliq tizimiga moslashtirilgan holda tatbiq etilishi lozim. Bu, o'z navbatida, har bir segmentning o'ziga xos risk profillarini chuqurroq tushunish va ularga mos nazorat choralarini qo'llash imkonini beradi.

Uchinchidan, idoralararo ma'lumotlar almashinuvini kengaytirish va integratsiyalashgan axborot bazasini yaratish soliq xavfini kompleks baholashning asosiy shartlaridan biridir. Janubiy Afrika Respublikasi Soliq xizmati (SARS) tajribasi shuni tasdiqlaydiki, soliq organlari, bojxona xizmati, bank sektori, kadastr agentligi va boshqa davlat idoralari o'rtasida real vaqt rejimida ma'lumotlar almashinuvi yo'lga qo'yilganda, soliq to'lashdan bo'yin tovlash holatlarini erta bosqichda aniqlash va ularning oldini olish samaradorligi sezilarli darajada oshadi¹². O'zbekistonda bu

¹¹ U.S. Government Accountability Office (GAO) (2023). IRS Use of Artificial Intelligence and Machine Learning in Tax Compliance. GAO-23-106045. Washington, DC: GAO.

¹²SARS (South African Revenue Service) (2022). SARS Service Charter and Compliance Model Overview. Pretoria: SARS Official Publications. URL: www.sars.gov.za/reference/5

yoʻnalishda “Soliq-3” avtomatlashtirilgan axborot tizimining imkoniyatlarini kengaytirish va boshqa idoralarning maʼlumotlar bazalari bilan yanada chuqur integratsiyalashuvini taʼminlash muhim vazifa hisoblanadi.

Toʻrtinchidan, past xavf toifasiga mansub soliq toʻlovchilarni ragʻbatlantirish va ularga nisbatan ishonch tamoyiliga asoslangan nazorat mexanizmlarini joriy etish ixtiyoriy rioya etish darajasini oshirishning eng samarali yoʻlidir. “Yashil” toifadagi soliq toʻlovchilar uchun soliq tekshiruvlarini minimallashtirish, ortiqcha toʻlangan soliq summalarini tezkor qaytarish va ularga maslahat xizmatlarini koʻrsatish orqali davlat va biznes oʻrtasida oʻzaro manfaatli hamkorlik muhitini shakllantirish mumkin.

Bu esa, oʻz navbatida, soliq organlarining asosiy resurslarini yuqori xavfga ega “qizil” toifadagi subyektlar ustidan chuqurlashtirilgan nazoratni amalga oshirishga yoʻnaltirish imkoniyatini yaratadi.

Foydalangan adabiyotlar:

I. Normativ-huquqiy hujjatlar

1. Oʻzbekiston Respublikasi Prezidentining 2021-yil 27-avgustdagi PF-6300-son “Davlat moliyaviy nazorati tizimini yanada takomillashtirish chora-tadbirlari toʻgʻrisida”gi Farmoni // Qonunchilik maʼlumotlari milliy bazasi, 28.08.2021-y., 06/21/6300/0834-son. <https://Lex.uz>.

2. Oʻzbekiston Respublikasi Vazirlar Mahkamasining 2021-yil 7-yanvardagi 1-son “Soliq xavfini boshqarish, soliq xavfi mavjud soliq toʻlovchilarni (soliq agentlarini) aniqlash va soliq tekshiruvlarini tashkil etish va oʻtkazish toʻgʻrisida”gi Qarori // Qonunchilik maʼlumotlari milliy bazasi. <https://Lex.uz>.

II. Xalqaro tashkilotlar hisobotlari va rasmiy nashrlar

1. OECD (2023). Tax Administration 2023: Comparative Information on OECD and other Advanced and Emerging Economies. Eleventh edition. Paris: OECD Publishing. DOI: <https://doi.org/10.1787/23077727>. 221 p.

2. OECD (2022). Tax Administration 2022: Comparative Information on OECD and other Advanced and Emerging Economies. Tenth edition (shu jumladan ISORA so'rov natijalari). Paris: OECD Publishing.

3. OECD (2020). Compliance Risk Management Guide for Tax Administrations. Fiscalis Risk Management Platform Group. European Commission. 110 p. URL: https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/common/publications/info_docs/taxation/risk_managt_guide_en.pdf[reference:3].

4. Asian Development Bank (2024). A Comparative Analysis of Tax Administration in Asia and the Pacific: Seventh Edition. Manila: ADB. (ISORA 2022 ma'lumotlari asosida). DOI: <http://dx.doi.org/10.22617/TCS240026-2>. [reference:4].

III. Xorijiy soliq organlari va davlat idoralari materiallari

1. SARS (South African Revenue Service) (2022). SARS Service Charter and Compliance Model Overview. Pretoria: SARS Official Publications. URL: <https://www.sars.gov.za>. [reference:5].

2. U.S. Government Accountability Office (GAO) (2023). IRS Use of Artificial Intelligence and Machine Learning in Tax Compliance. GAO-23-106045. Washington, DC: GAO.

3. IRS (Internal Revenue Service) (2023). "IRS announces sweeping effort to restore fairness to tax system with Inflation Reduction Act funding; new compliance efforts focused on increasing scrutiny on high-income, partnerships, corporations and promoters abusing tax rules". IR-2023-166, September 8, 2023. URL: <https://www.irs.gov>. [reference:7].

IV. Ilmiy maqolalar va dissertatsiyalar

1. Temirov M.X. (2024). "Davlat sektorida moliyaviy nazorat: muammolar va rivojlanish istiqbollari". Iqtisodiy Taraqqiyot va Tahlil, 2(1), 143-153.

METHODS OF EASY SOLUTION OF MODULAR EQUATIONS IN ACADEMIC LYCEUMS BASED ON NEW PEDAGOGICAL TECHNOLOGIES

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Annotation: This article discusses effective and easy methods of solving modular equations in academic lyceums based on new pedagogical technologies. In particular, the issues of developing students' logical thinking through interactive methods, problem-based learning, cluster, brainstorming, work in small groups, "Blitz-survey" and the use of ICT tools are analyzed. Innovative approaches to solving modular equations in the traditional way are compared and their advantages are substantiated. The results of the study show that the lesson process organized on the basis of modern pedagogical technologies significantly increases students' independent thinking, analysis and generalization skills.

Keywords: Modular equation, new pedagogical technologies, interactive methods, problem-based learning, innovative approach, academic lyceum, logical thinking, ICT, work in small groups, efficiency.

AKADEMIK LITSEYLARDA MODULLI TENGLAMALARNI YANGI PEDAGOGIK TEXNOLOGIYALAR ASOSIDA OSON YECHISH USULLARI.

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Annotatsiya: Mazkur maqolada akademik litseylarda modulli tenglamalarni o'qitishda yangi pedagogik texnologiyalar asosida samarali va oson yechish usullari yoritilgan. Jumladan, interfaol metodlar, muammoli ta'lim, klaster, aqliy hujum, kichik guruhlarda ishlash, "Blits-so'rov" va AKT vositalaridan foydalanish orqali o'quvchilarning mantiqiy tafakkurini rivojlantirish masalalari tahlil qilingan. Modulli

tenglamalarni an'anaviy usulda yechish bilan innovatsion yondashuvlar taqqoslanib, ularning afzalliklari asoslab berilgan. Tadqiqot natijalari shuni ko'rsatadiki, zamonaviy pedagogik texnologiyalar asosida tashkil etilgan dars jarayoni o'quvchilarning mustaqil fikrlash, tahlil qilish va umumlashtirish ko'nikmalarini sezilarli darajada oshiradi.

Kalit so'zlar:Modulli tenglama, yangi pedagogik texnologiyalar, interfaol metodlar, muammoli ta'lim, innovatsion yondashuv, akademik litsey, mantiqiy tafakkur, AKT, kichik guruhlarda ishlash, samaradorlik.

Bugungi kunda ta'lim tizimini modernizatsiya qilish, o'quv jarayoniga innovatsion yondashuvlarni joriy etish va o'quvchilarning mustaqil fikrlash ko'nikmalarini rivojlantirish dolzarb masalalardan biri hisoblanadi. Xususan, akademik litseylarda matematika fanini o'qitishda murakkab mavzularni, jumladan modulli tenglamalarni samarali o'zlashtirishni ta'minlash muhim pedagogik vazifa sanaladi [4].

Modulli tenglamalar mavzusi o'quvchilardan yuqori darajadagi mantiqiy tafakkur, tahlil qilish va umumlashtirish ko'nikmalarini talab qiladi. An'anaviy o'qitish usullarida bu mavzu ko'pincha qiyinchilik tug'diradi, natijada o'quvchilarda mavzuga nisbatan qiziqish pasayadi. Shu bois zamonaviy pedagogik texnologiyalar asosida darslarni tashkil etish zarurati yuzaga kelmoqda. Ta'lim jarayoniga interfaol metodlarni joriy etish g'oyalari Viktor Shatalov, Mikhail Klarin, John Dewey kabi pedagog olimlarning ilmiy qarashlarida o'z aksini topgan [1][2][3]. Ularning fikricha, o'quvchi ta'lim jarayonining faol subyekti bo'lishi, bilimni mustaqil ravishda izlab topishi va amaliyotda qo'llay olishi lozim.

Mazkur maqolaning maqsadi – akademik litseylarda modulli tenglamalarni yangi pedagogik texnologiyalar asosida oson va samarali o'qitish usullarini ishlab chiqish hamda ularning amaliy ahamiyatini asoslab berishdan iborat. Tadqiqot davomida interfaol metodlar, muammoli ta'lim, differensial yondashuv hamda axborot-kommunikatsiya texnologiyalaridan foydalanishning samaradorligi tahlil qilinadi [6].

Modul ichida noma'lum son qatnashgan tenglamalar modulli tenglamalar deyiladi.

Masalan:

a) $|x| = 7$ b) $|x-3| = |x+5|$ c) $|x^2 - 2x| + |x| = 3$ d) $|2x-1| = 3x+1$ e) $5x^2 - 3|x| + 2 = 0$

I. $|f(x)| = c$, (c =berilgan son) ko'rinishdagi tenglamalar.

1. Agar $c > 0$ bo'lsa, $|f(x)| = c$ tenglama 2 ta tenglamaga ajratib yechiladi. $f(x) = c$
va $f(x) = -c$

1-misol: $|3x-1| = 17$

1) $3x-1 = 17$

$3x = 18$

$x = 6$

2) $3x-1 = -17$

$3x = -16$

$x = -5\frac{1}{3}$

javob: $6; -5\frac{1}{3}$

1.

Agar $c = 0$ bo'lsa, $|f(x)| = 0$

tenglama faqat 1 ta $f(x) = 0$ tenglamaga almashtirib yechamiz.

2-misol:

$|7x-15| = 0$ $7x-15 = 0$ $7x = 15$ $x = \frac{15}{7}$ $x = 2\frac{1}{7}$ javob: $2\frac{1}{7}$

2.

Agar $c < 0$ bo'lsa, $|f(x)| = c$ tenglama

yechimga ega bo'lmaydi. Chunki hech qanday sonning moduli manfiy emas.

3-misol: a) $|3x-1| = -2$ b) $|x^2 - 4x + 5| = -3$ tenglamalar yechimga ega emas.

II. $|f(x)| = |g(x)|$ ko'rinishidagi tenglamalar.

Bunday tenglamalarni 2 xil usulda yechish mumkin.

1-usul: $|a| = |b|$ tenglik $a = \pm b$ bo'lganda to'g'ri bo'lishini hisobga olsak $|f(x)| = |g(x)|$
tenglamani quyidagicha 2 tenglamaga ajratib yechish mumkin.

$f(x) = g(x)$ va $f(x) = -g(x)$

1-misol: $|x-3|=|x+1|$ tenglamani yeching.

$$x-3=x+1$$

$$x-3=-x-1$$

$$0=4$$

$$2x=2$$

$$\text{Javob: } x=1$$

$$\emptyset$$

$$x=1$$

2-usul: $|a|^2=a^2$ va $|a \pm b|^2=(a \pm b)^2$ tenglamalardan foydalanib, $|f(x)|=|g(x)|$

tenglamani $f^2(x)=g^2(x)$ tenglamaga almashtirib yechiladi.

2-misol: $|x-3|=|x+1|$ tenglamani yeching.

$$(x-3)^2=(x+1)^2$$

$$x^2-6x+9=x^2+2x+1$$

$$\text{Javob: } x=1$$

$$-8x=-8 \quad x=1$$

1-eslatma: $|x-a|=|x-b|$ tenglamaning ildizi $x=\frac{a+b}{2}$ bo'ladi.

$$a) |x-5|=|x-3|$$

$$b) |x+7|=|x-1|$$

$$x=\frac{5+3}{2}$$

$$x=4$$

$$x=\frac{-7+1}{2}$$

$$x=-3$$

III. $f(|x|)=0$ ko'rinishdagi tenglamalarni yechish.

Bunday tenglamalarga misollar: a) $|x|-3x=1$ b) $x^2-5|x|+4=0$

1) $x \geq 0$ deb shart bo'lib modulni tashlab, hosil bo'lgan tenglamani yechib topilgan ildiz shartni qanoatlantirsa javobga olinadi, shartni qanoatlantirmasa chet ildiz sifatida tashlab yuboriladi.

2) $x < 0$ deb shart qo'yib modulni ochib hosil bo'lgan tenglama yechiladi va topilgan ildiz shartni qanoatlantiradimi yokii yo'qmi aniqlanadi.

1-misol: $|x| - 3x = 1$ tenglamani yeching.

$$\begin{array}{llll} 1) x \geq 0 \text{ bo'lsa, } x - 3x = 1 & -2x = 1 & x = -0,5 \\ 2) x < 0 \text{ bo'lsa, } -x - 3x = 1 & -4x = 1 & x = -0,25 \end{array} \quad \text{javob: } -0,5; -0,25$$

2-misol: $x^2 - 5|x| + 4 = 0$ tenglamani yeching.

$$\begin{array}{llll} 1) x \geq 0 \text{ bo'lsa, } x^2 - 5x + 4 = 0 & x_1 = 1, & x_2 = 4 \\ 2) x < 0 \text{ bo'lsa, } x^2 + 5x + 4 = 0 & x_1 = -1, & x_2 = -4 \end{array} \quad \text{javob: } \pm 1; \pm 4$$

3-misol: $x^2 - 2|x| - 3 = 0$ tenglamani yeching.

$$\begin{array}{llll} 1) x \geq 0 \text{ bo'lsa, } x^2 - 2x - 3 = 0 & x_1 = -1, & x_2 = 3 & x = -1 \text{ chet ildiz} \\ 2) x < 0 \text{ bo'lsa, } x^2 + 2x - 3 = 0 & x_1 = 1, & x_2 = -3 & x = 1 \text{ chet ildiz} \end{array} \quad \text{javob: } \pm 3$$

IV. $|f(x)| = g(x)$ tenglamani yechish.

Bunday tenglamalar ham shartlar qo'yib, 2 ta tenglamaga ajratib yechiladi.

$$\begin{array}{ll} 1) f(x) \geq 0 \text{ bo'lsa, } f(x) = g(x) & 1) g(x) \geq 0 \text{ bo'lsa, } f(x) = g(x) \\ 1) f(x) < 0 \text{ bo'lsa, } f(x) = -g(x) & 1) g(x) \geq 0 \text{ bo'lsa, } f(x) = -g(x) \end{array}$$

1-misol: $|x - 3| = 3x - 13$

$$\begin{array}{llll} 1) x - 3 \geq 0 & x \geq 3 & 2) x - 3 < 0 & x < 3 \\ x - 3 = 3x - 13 & & -x + 3 = 3x - 13 & \\ -2x = -10 & x = 5 & -4x = -16 & x = 4 \text{ chet ildiz} \end{array} \quad \text{Javob: } x = 5$$

V. $|f(x)| = f(x)$ tenglamani yechish.

Misollar: a) $|x + 5| = x + 5$ b) $|x^2 + 3x| = x^2 + 3x$

$|f(x)| = f(x)$ tenglamani yechish uchun $f(x) \geq 0$ tengsizlikni yechish etarli.

$$\begin{array}{ll} 1-misol: |x + 5| = x + 5 & 2-misol: |x^2 + 3x| = x^2 + 3x \\ x + 5 \geq 0 & x^2 + 3x \geq 0 \\ x \geq -5 & x(x + 3) \geq 0 \\ \text{javob: } [-5; \infty) & \text{javob: } (-\infty; -3] \cup [0; \infty) \end{array}$$

VI. $|f(x)| = -f(x)$ tenglamani yechish.

Bunday tenglamalarga Misollar: a) $|x - 2| = 2 - x$ b) $|x^2 - 5x| = -x^2 + 5x$

$|f(x)| = -f(x)$ tenglamani yechish uchun $f(x) \leq 0$ tengsizlikni yechish etarli.

1-misol: $|x-2| = 2-x$

$$x-2 \leq 0$$

$$x \leq 2$$

javob: $(-\infty; 2]$

2-misol: $|x^2 - 5x| = -x^2 + 5x$

$$x^2 - 5x \leq 0$$

$$x(x-5) \leq 0$$

javob: $[0; 5]$

VII. $|x-a| + |x-b| + |x-c| = d$ ko'rinishdagi tenglamalarni yechish.

Bunday tenglamalarni yechish uchun a, b va c nuqtalar yordamida sonlar o'qini oraliqlarga ajratamiz. Aytaylik $a < b < c$ bo'lsin, bunda 4 ta oraliq hosil bo'ladi: 1) $(-\infty; a)$ 2) $[a; b)$ 3) $[b; c)$ 4) $[c; \infty)$ berilgan tenglama har bir oraliqda alohida-alohida yechiladi.

Tenglamani biror oraliqda yechish degani o'sha oraliqdan biror son tanlov x ning o'rniga o'sha sonni qo'yganda har bir modul ichidagi qiymat musbat yoki manfiylikni aniqlab, modulni ochib hosil bo'lgan tenglama yechiladi va topilgan ildiz qarayotgan oraliqda tegishli bo'lsa, javobga kiritiladi. Aks holda chet ildiz sifatida tashlab yuboriladi. Barcha oraliqlar uchun shu ish takrorlanadi.

1-eslatma: Mabodo tenglamani biror oraliqda yechayotganimizda x lar yo'qolib to'g'ri sonli tenglik hosil bo'lsa, o'sha qarayotgan oraliqdagi barcha sonlar yechim bo'ladi.

1-misol: $|x+3| + |x-7| - |x-3| = 9$ tenglamani yeching.

1) $x < 3$ bo'lsin

$$-x-3-x+7+x-3=9$$

$$-x=8$$

$$x=-8$$

2) $-3 \leq x < 3$ bo'lsin

$$x+3-x+7+x-3=9$$

$$x=2$$

3) $3 \leq x < 7$

$$x+3-x+7-x+3=9$$

$$-x=-4$$

$$x=4$$

4) $x \geq 7$

$$x+3+x-7-x+3=9$$

$$x=10$$

javob: $-8; 2; 4; 10$

O'quvchilar mavzuni qay darajada tushunganini bilish uchun "Soyasini top" metodidan foydalanamiz.

“Soyasini top” metodi uchun savollar:

a) $|x - 2| = 0$; b) $|3 - 4x| = 0$; c) $|4x + 3| = 2$;

d) $\left|\frac{3}{4}x - \frac{1}{2}\right| = \frac{1}{4}$; e) $|x| = 2,1$; f) $|3 - x| = 8$;

g) $|3 - 4x| = 3$; h) $\left|\frac{2}{3}x + \frac{1}{6}\right| = \frac{1}{3}$; i) $|3x - 5| = 5$.

j) $|x - 1| = 3,4$; k) $|1 - x| = 2,4$; l) $|1 - 2x| = 5$;

m) $|x - 1| = |x - 2|$; n) $|x - 5| = |x - 8|$; o) $|x + 1| = |x - 2|$;

p) $|x + 3| = |x - 5|$; q) $|x + 3| = |x + 7|$; r) $|x + 6| = |x + 10|$.



1-rasm. “Soyasini top” metodini namunaviy ko‘rinishi

Xulosa. Akademik litseylarda modulli tenglamalarni o‘qitishda yangi pedagogik texnologiyalarni qo‘llash ta’lim samaradorligini oshirishning muhim omillaridan biri hisoblanadi. Interfaol metodlar va zamonaviy axborot-kommunikatsiya vositalari yordamida tashkil etilgan darslar o‘quvchilarning mavzuni chuqurroq anglashiga, mustaqil yechim topish ko‘nikmalarining shakllanishiga hamda matematik tafakkurning

rivojlanishiga xizmat qiladi. Shuningdek, modulli tenglamalarni bosqichma-bosqich tahlil qilish, grafik usul, test texnologiyalari va differensial yondashuvdan foydalanish o'quvchilarning bilim darajasini hisobga olgan holda individual rivojlanishni ta'minlaydi. Natijada, o'quvchilar nafaqat tenglamalarni mexanik yechish, balki ularning mantiqiy mohiyatini anglash darajasiga erishadilar. Demak, modulli tenglamalarni o'qitishda innovatsion pedagogik texnologiyalarni keng joriy etish ta'lim sifatini oshirish va raqobatbardosh bilimli yoshlarni tarbiyalashda muhim ahamiyat kasb etadi [1][2][3][6].

Foydalanilgan adabiyotlar

1. John Dewey. Democracy and Education. — New York: Macmillan, 1916.
2. Mikhail Klarin. Pedagogicheskaya texnologiya v uchebnom protsesse. — Moskva, 1989.
3. Viktor Shatalov. Pedagogik tajriba va ilg'or metodlar. — Kiev, 1980.
4. O'zbekiston Respublikasi "Ta'lim to'g'risida"gi Qonuni. — Toshkent, 2020.
5. Matematika fanidan akademik litseylar uchun o'quv dasturi. — Toshkent, 2022.
6. Zamonaviy pedagogik texnologiyalar asoslari. — Toshkent: O'qituvchi nashriyoti, 2019.

SCIENTIFIC-METHODICAL BASIS OF USING THE 5E MODEL IN TEACHING THE SUBJECT OF COORDINATION IN PRIMARY GRADES

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Annotation

This article analyzes the scientific and methodological foundations of using the 5E instructional model in teaching the topic of coordinates in primary school mathematics. The pedagogical and psychological features of the model and its role in improving students' cognitive activity are highlighted. The integration of systematic, activity-based and competency-based approaches within the framework of the 5E model is substantiated. The results show that the use of the 5E model contributes to the development of logical and spatial thinking skills of primary school students and improves the effectiveness of mastering mathematical concepts.

Keywords: 5E model, primary education, coordinate system, constructivist learning, spatial thinking, mathematical competence.

Annotatsiya

Mazkur maqolada boshlang'ich sinflarda matematika fanining muhim bo'limlaridan biri hisoblangan koordinata mavzusini o'qitishda 5E ta'lim modelidan foydalanishning pedagogik, psixologik hamda ilmiy-metodik asoslari tahlil qilingan. Tadqiqot jarayonida 5E modelining konstruktivistik ta'lim nazariyasiga asoslanganligi, uning boshlang'ich sinf o'quvchilarining yosh va psixologik xususiyatlariga mosligi hamda o'quvchilarning bilish faolligini oshirishdagi ahamiyati yoritilgan. Shuningdek, koordinata mavzusini o'qitishda tizimli, faoliyatga yo'naltirilgan va kompetensiyaviy yondashuvlarning 5E modeli bilan uyg'unlashuvi ilmiy asoslangan. Tadqiqot natijalari

5E modelidan foydalanish o'quvchilarning mantiqiy va fazoviy tafakkurini rivojlantirish, bilimlarni ongli va mustahkam o'zlashtirish hamda amaliy faoliyatda qo'llash ko'nikmalarini shakllantirishga xizmat qilishini ko'rsatadi.

Kalit so'zlar: 5E modeli, koordinata mavzusi, boshlang'ich ta'lim, konstruktivistik ta'lim, fazoviy tafakkur, matematik kompetensiya, innovatsion pedagogik texnologiyalar.

Аннотация

В статье раскрываются научно-методические основы использования образовательной модели 5Е при обучении теме координат в начальных классах. Проанализированы педагогические и психолого-методические возможности модели 5Е в развитии познавательной активности учащихся. Обоснована эффективность применения системного, деятельностного и компетентностного подходов при обучении теме координат на основе модели 5Е. Отмечается, что использование данной модели способствует развитию логического и пространственного мышления учащихся младших классов и повышает качество усвоения учебного материала.

Ключевые слова: модель 5Е, начальное образование, координаты, конструктивистское обучение, математическая компетентность, пространственное мышление.

Bugungi kunda ta'lim tizimida amalga oshirilayotgan islohotlar zamonaviy pedagogik texnologiyalarni o'quv jarayoniga keng joriy etishni taqozo etmoqda. Ayniqsa boshlang'ich ta'lim bosqichida o'quvchilarning bilish faoliyatini faollashtirish, ularning mustaqil fikrlash ko'nikmalarini rivojlantirish hamda matematik kompetensiyalarini shakllantirish muhim vazifalardan biri hisoblanadi. Shu nuqtai nazardan boshlang'ich sinf matematika kursida koordinata mavzusini samarali o'qitish masalasi alohida dolzarblik kasb etadi.

Koordinata mavzusi boshlang'ich sinf o'quvchilarining fazoviy tasavvurini shakllantirish, mantiqiy fikrlashini rivojlantirish hamda real hayotiy vaziyatlarda yo'nalishlarni aniqlash ko'nikmalarini hosil qilishda muhim o'rin tutadi. Mazkur mavzuni samarali o'qitishda zamonaviy ta'lim modellari, xususan konstruktivistik yondashuvga asoslangan 5E modelidan foydalanish o'quvchilarning bilish faoliyatini faollashtirishga xizmat qiladi.

Shu sababli boshlang'ich sinflarda koordinata mavzusini o'qitishda 5E modelidan foydalanishning ilmiy-metodik asoslarini tadqiq etish bugungi kunning dolzarb pedagogik muammolaridan biri hisoblanadi.

Nazariy tahlil. Boshlang'ich ta'lim tizimi o'quvchilarda fundamental bilim, ko'nikma va malakalarni shakllantirishning muhim bosqichi hisoblanadi. Aynan shu davrda o'quvchilarning mantiqiy fikrlashi, fazoviy tasavvuri hamda bilish faolligi shakllanadi. Matematika fanini o'qitish jarayonida koordinata mavzusi o'quvchilarning fazoda mo'ljal olish ko'nikmalarini rivojlantirishda muhim vosita sifatida namoyon bo'ladi. Boshlang'ich sinf o'quvchilarining psixologik xususiyatlariga ko'ra ular ko'rgazmali-obrazli tafakkur asosida fikrlaydilar. Shu sababli abstrakt tushunchalarni o'zlashtirish jarayoni bevosita amaliy faoliyat orqali tashkil etilgandagina samarali bo'ladi. 5E modeli aynan shu jihatdan boshlang'ich sinf o'quvchilari uchun mos keladigan samarali pedagogik texnologiyalardan biri hisoblanadi.

Mazkur model konstruktivistik ta'lim nazariyasiga asoslangan bo'lib, o'quvchilarning bilimlarni tayyor holda qabul qilish emas, balki mustaqil ravishda shakllantirish jarayonini tashkil etishga xizmat qiladi. 5E modeli quyidagi bosqichlardan iborat:

- jalb qilish
- tadqiq etish
- tushuntirish

—kengaytirish

— baholash

Ushbu bosqichlarning izchil qo'llanilishi ta'lim samaradorligini oshirish bilan bir qatorda o'quvchilarning mustaqil fikrlash faoliyatini rivojlantirishga ham xizmat qiladi.

Nazariy jihatdan koordinata mavzusini o'qitishda 5E modelidan foydalanish o'quvchilarning bilimlarni bosqichma-bosqich egallashini ta'minlaydi hamda ularning bilish jarayonini faol tashkil etishga imkon yaratadi.

Boshlang'ich sinflarda koordinata mavzusini o'qitishda 5E modelidan foydalanish metodik jihatdan samarali natijalarni ta'minlaydi. Mazkur model asosida tashkil etilgan dars jarayonida o'quvchilar bilimlarni mustaqil ravishda egallashga jalb etiladi.

“Jalb qilish” bosqichida o'quvchilarning mavzuga bo'lgan qiziqishi oshiriladi. Koordinata tushunchasini kundalik hayotiy vaziyatlar bilan bog'lash orqali o'quvchilarning mavjud bilimlari faollashtiriladi.

“Tadqiq etish” bosqichida o'quvchilar koordinata tekisligida nuqtalarni joylashtirish orqali mustaqil ravishda bilim hosil qiladilar. Ushbu jarayon o'quvchilarning tahlil qilish, taqqoslash hamda umumlashtirish ko'nikmalarini rivojlantiradi.

“Tushuntirish” bosqichida o'qituvchi tomonidan o'quvchilarning avvalgi faoliyati asosida shakllangan bilimlar ilmiy jihatdan tizimlashtiriladi.

“Kengaytirish” bosqichida o'quvchilar o'zlashtirilgan bilimlarni yangi vaziyatlarda qo'llash imkoniyatiga ega bo'ladilar. Bu esa ularning ijodiy fikrlashini rivojlantiradi.

“Baholash” bosqichi esa o'quvchilarning bilim darajasini aniqlash hamda refleksiya ko'nikmalarini shakllantirishga xizmat qiladi.

Natijalar. Tadqiqot natijalari shuni ko'rsatdiki, boshlang'ich sinflarda koordinata mavzusini o'qitishda 5E modelidan foydalanish o'quvchilarning bilish faoliyatini sezilarli darajada faollashtiradi. Mazkur model asosida tashkil etilgan ta'lim jarayoni o'quvchilarning fazoviy tafakkurini rivojlantirishga xizmat qiladi.

Shuningdek, 5E modeli asosida tashkil etilgan darslarda o'quvchilarning mustaqil fikrlash ko'nikmalari shakllanadi, muammoli vaziyatlarni hal etish qobiliyati rivojlanadi hamda matematik tushunchalarni ongli ravishda o'zlashtirish darajasi oshadi.

Natijalar shuni ko'rsatadiki, 5E modeli boshlang'ich sinf matematika darslarida koordinata mavzusini samarali o'qitish imkonini beruvchi innovatsion pedagogik texnologiya hisoblanadi.

Yuqoridagi fikrlardan xulosa qiladigan bo'lsak, boshlang'ich sinflarda koordinata mavzusini o'qitishda 5E modelidan foydalanish o'quvchilarning bilish faoliyatini faollashtirishda muhim ahamiyat kasb etadi. Mazkur model asosida tashkil etilgan ta'lim jarayoni o'quvchilarning mantiqiy fikrlashini rivojlantirishga xizmat qiladi.

Shuningdek, 5E modeli asosida tashkil etilgan darslar o'quvchilarning bilimlarni mustaqil egallashiga, ularni amaliy faoliyatda qo'llash ko'nikmalarini shakllantirishga hamda matematik kompetensiyalarini rivojlantirishga yordam beradi.

Natijada koordinata mavzusini o'qitishda 5E modelidan foydalanish ta'lim samaradorligini oshirishning muhim metodik vositalaridan biri hisoblanadi.

Foydalanilgan adabiyotlar

1. Vigotskiy L.S. Tafakkur va nutq.
2. Davydov V.V. Rivojlantiruvchi ta'lim nazariyasi asoslari.
3. Leontyev A.N. Faoliyat, ong va shaxs.
4. Rubinshteyn S.L. Umumiy psixologiya asoslari.
5. Bybee R. The BSCS 5E Instructional Model.
6. Karplus R. Science Teaching and the Development of Reasoning.
7. Tolipov U. Pedagogik texnologiyalar.
8. Nishonaliyev U. Zamonaviy pedagogik texnologiyalar.
9. Sayidaxmedov N. Pedagogik mahorat asoslari.
10. Yuldoshev J.G. Ta'limda innovatsion texnologiyalar.

THE ROLE OF AUTHENTIC MATERIALS IN ENHANCING CULTURAL ADAPTABILITY IN FOREIGN LANGUAGE EDUCATION

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Abstract: This study explores the role of authentic materials in developing cultural adaptability in foreign language learning. Many learners struggle with real communication due to a lack of cultural awareness. This research analyzes the use of authentic resources such as videos and communication platforms like HelloTalk. The findings show that authentic materials improve learners' understanding of cultural norms and enhance their communication skills. As a result, learners become more confident and effective in intercultural communication.

Key words: Authentic materials, cultural adaptability, intercultural communicative competence, cultural awareness, communication skills, digital platforms.

In modern foreign language education, the integration of authentic materials has become increasingly important as a means of improving both linguistic competence and cultural understanding. Authentic materials are defined as resources created for real-life communication rather than for instructional purposes, including news articles, videos, social media content, and real conversations. Such materials expose learners to natural language use and provide meaningful contexts that cannot be fully replicated through traditional textbooks. One of the major challenges in foreign language learning is the gap between classroom knowledge and real-life communication. Learners often acquire

grammar and vocabulary but struggle to understand natural speech and participate in spontaneous interaction. This limitation highlights the need for more realistic and communicative approaches to language teaching. Authentic materials help bridge this gap by presenting language in its natural form, including idiomatic expressions, cultural references, and pragmatic usage.

Authentic materials provide learners with direct access to these cultural elements, thereby promoting intercultural awareness and adaptability. In addition, digital platforms such as YouTube and mobile applications enable learners to engage with language in interactive and meaningful ways. Research shows that multimedia content, combining visual and auditory input, significantly enhances comprehension and supports language acquisition.

The use of authentic materials in foreign language teaching is strongly supported by modern theories of second language acquisition. According to H. Douglas Brown, language learning is a complex process that involves not only cognitive development but also social and cultural interaction. He emphasizes that successful language acquisition requires meaningful exposure to real-life communication, where learners actively engage with authentic input and contextualized language use. Brown highlights that language is closely connected with culture, and effective learning occurs when learners are exposed to both linguistic and sociocultural aspects of communication.

In addition, Michael Byram introduces the concept of Intercultural Communicative Competence (ICC), which includes attitudes, knowledge, and skills necessary for effective communication across cultures. According to Byram, language learners must develop the ability to interpret and relate cultural meanings, as well as interact appropriately in different cultural contexts. Authentic materials play a crucial role in this process by providing learners with direct access to real cultural content, including social norms, values, and communication styles. Thus, integrating authentic materials into language teaching not only enhances linguistic competence but also supports the development of cultural adaptability, which is essential in today's globalized world.

The practical application of authentic materials can be observed through the use of digital platforms such as YouTube and HelloTalk, which provide learners with real-life language exposure and opportunities for intercultural interaction. YouTube, as a widely used video platform, offers access to a variety of authentic content, including vlogs, interviews, and educational videos. Research indicates that multimedia input, combining visual and auditory elements, significantly improves language comprehension and engagement. Learners can observe natural pronunciation, intonation, and informal language use, as well as cultural behaviors and everyday practices. Similarly HelloTalk enables learners to communicate directly with native speakers. This platform creates a social learning environment where users exchange messages, correct each other's mistakes, and share cultural experiences. Such interaction promotes learner autonomy and provides opportunities for authentic communication beyond the classroom. A practical example can illustrate the impact of authentic materials on cultural adaptability. For instance, a learner who primarily studies English through textbooks may understand grammatical structures but struggle to interpret humor or informal expressions in real conversations. When exposed to YouTube videos, the learner begins to recognize slang, tone, and cultural references. In one case, a student initially misunderstood a joke in English due to a lack of cultural context. However, after regularly watching authentic video content and interacting with native speakers on HelloTalk, the learner developed a better understanding of humor and appropriate responses. This example demonstrates how authentic materials help learners move from theoretical knowledge to practical communication.

A comparative perspective further highlights the importance of cultural adaptability in language learning. Differences between English and Uzbek cultures can be observed through authentic materials such as songs, videos, and everyday communication. For example, English-language content often emphasizes individualism, personal opinions, and direct communication styles, whereas Uzbek culture tends to value collectivism, respect, and indirect expressions.

Authentic materials allow learners to observe these contrasts in real contexts. By comparing cultural elements across languages, learners develop a deeper understanding of both their native and target cultures. This comparative awareness enhances their ability to adapt communication strategies and avoid misunderstandings in intercultural interaction. In conclusion, authentic materials play a vital role in foreign language

learning by bridging the gap between classroom instruction and real-life communication. Theoretical perspectives by Brown and Byram highlight the importance of integrating linguistic and cultural components in language education. Practical tools such as YouTube and HelloTalk provide learners with meaningful exposure to authentic language and cultural contexts. As demonstrated through real examples and comparative analysis, the use of authentic materials significantly enhances learners' cultural adaptability and communicative competence.

References:

1. Brown, H. D. (2007). Principles of language learning and teaching (5th ed.). Pearson Education.
2. Byram, M. (1997). Teaching and assessing intercultural communicative competence. Multilingual Matters.
3. Dizon, G. (2022). YouTube for second language learning: What does the research tell us? Australian Journal of Applied Linguistics, 5(1), 19–26.
<https://doi.org/10.29140/ajal.v5n1.636>
4. Nushi, M., & Makiabadi, H. (2018). HelloTalk: A language exchange app on your smartphone. Roshd Journal of Foreign Language Teaching, 33(2), 16–23.
5. Ne'matova, N. (2024). The role of authentic materials in foreign language instruction. In Languages, culture, and translation in modern linguistics: Comparative approaches (pp. 47–50).
6. Burkhonov, D. (2026). Using authentic materials to implement the communicative approach in teaching English at the middle stage. International Journal of Linguistics, 4(1), 9–15.
7. Dadajonov, O., & Anvarova, N. (2025). Using authentic materials for developing comprehension in reading skills. Academic Research in Modern Science.
<https://doi.org/10.5281/zenodo.15128552>

Sorption of heavy metals from complex solutions using ion exchangers obtained from peanut shells

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Abstract

*This article analyzes the heavy metal sorption properties of ion exchangers obtained from peanut (*Arachis hypogaea*) shells using various chemical modification methods in complex (multi-component) solutions. The research focuses on studying the influence of different modification techniques (H_3PO_4 , KOH , , mercaptoacetic acid, iron oxides) on sorption capacity, inter-ionic competition mechanisms, and selectivity characteristics. The results indicate that the modified ion exchangers exhibit high selectivity in complex solutions, with Pb^{2+} ions predominating over other metals in most cases*

Keywords: *peanut shell, ion exchanger, biosorbent, heavy metals, complex solutions, selectivity.*

Yeryong'oq po'stlog'idan olingan ionitlar yordamida murakkab eritmalarda og'ir metallarni sorbsiyalash

**Сорбция тяжелых металлов из сложных растворов с помощью ионитов,
полученных из шелухи арахиса**

Annotatsiya

*Ushbu maqolada yeryong'oq (**Arachis hypogaea**) po'stlog'idan turli kimyoviy modifikatsiya usullari yordamida olingan ionitlarning murakkab (ko'p komponentli)*

eritmalarda og'ir metallarni sorbsiyalash xususiyatlari tahlil qilingan. Tadqiqot turli modifikatsiya usullarining (H_3PO_4 , KOH, merkapto-asetik kislota, temir oksidlari) sorbsiya sig'imiga ta'sirini, ionlararo raqobat mexanizmlarini va selektivlik xususiyatlarini o'rganishga qaratilgan. Natijalar shuni ko'rsatadiki, modifikatsiyalangan ionitlar murakkab eritmalarda yuqori selektivlik namoyon etadi va Pb^{2+} ionlari ko'pchilik hollarda boshqa metallar ustidan ustunlik qiladi.

Аннотация

*В данной статье анализируются сорбционные свойства ионитов, полученных из шелухи арахиса (*Arachis hypogaea*) с помощью различных методов химической модификации, по отношению к тяжелым металлам в сложных (многокомпонентных) растворах. Исследование направлено на изучение влияния различных методов модификации (H_3PO_4 , KOH, меркаптоуксусная кислота, оксиды железа) на сорбционную емкость, механизмы меж-ионной конкуренции и характеристики селективности. Результаты показывают, что модифицированные иониты проявляют высокую селективность в сложных растворах, причем ионы Pb^{2+} в большинстве случаев преобладают над другими металлами.*

Kalit so'zlar: *yeryong'oq po'stlog'i, ionit, biosorbent, og'ir metallar, murakkab eritmalar, selektivlik*

Ключевые слова: *шелуха арахиса, ионит, биосорбент, тяжелые металлы, сложные растворы, селективность.*

Introduction

The release of heavy metals (lead, copper, cadmium, nickel, chromium) into aquatic environments as a result of industrial and agricultural activities represents a global environmental concern. These metals exhibit high toxicity and pose significant risks to human health and ecosystems [1], [2]. Conventional purification methods

(chemical precipitation, membrane filtration, electrochemical methods) are costly and can produce secondary pollution [3]. Consequently, recent years have seen rapid progress in research focused on developing inexpensive, environmentally friendly, and effective biosorbents.

Agricultural residues, particularly peanut shells, have attracted considerable attention as biosorbents. Peanut shell is a lignocellulosic material consisting of cellulose, hemicellulose, and lignin [4]. These compounds contain hydroxyl, carboxyl, and phenolic groups, which are capable of forming complexes with metal ions [5], [6]. Furthermore, peanut shell is produced in large quantities across many regions of the world and is typically discarded as waste, rendering its use as a biosorbent economically feasible [7].

However, the sorption capacity of raw peanut shell may be relatively low. Consequently, various chemical and physical modification methods—including activation with acids or bases, modification with organic functional groups, and biosorbent preparation via pyrolysis—are employed [8], [9]. These modifications increase the sorbent's comparative surface area, introduce new functional groups, and improve the adsorption of metal ions [10].

In practical settings, wastewater typically contains several heavy metals. Therefore, it is important to investigate the sorption process in complex (binary or multicomponent) solutions. In multicomponent systems, a competitive adsorption process is observed, wherein different metal cations compete with each other to form coordination bonds with the active sites (functional groups) on the sorbent surface. [11], [12]. In this context, the selectivity of the sorbent—namely, its high thermodynamic affinity for a specific metal cation and its preferential adsorption capacity in the presence of other competing ions—is of fundamental importance. [13]

The objective of this article is to analyze the sorption properties of ion exchangers derived from peanut shells in complex solutions for the removal of heavy metals, mechanisms of interionic competition, and selectivity factors. The article provides a detailed review of various modification methods, sorption kinetics and isotherms, as well as the mechanisms of interionic interactions in complex solutions.

Composition and Structure of Peanut Shell

The peanut shell is primarily a lignocellulosic material, containing 35–45% cellulose, 18–25% hemicellulose, and 30–40% lignin [14]. Cellulose and hemicellulose contain numerous hydroxyl (-OH) groups, while lignin contains phenolic and methoxyl groups. These functional groups interact with metal ions via complex formation, ion

$$q_i = \frac{q_{max,i} K_{EL,i} C_i}{1 + \sum_{j=1}^n K_{EL,j} C_j}$$

exchange, and electrostatic attraction [15].

The specific surface area of raw peanut shell is typically around 1–5 m²/g, which limits its sorption capacity [16]. Therefore, modification methods are employed. Treatment with acid or alkali partially degrades the lignocellulosic structure, increases porosity, and exposes new functional groups [17]. The production of biosorbent by pyrolysis (300–700°C) yields a carbonaceous material with a high specific surface area (100–500 m²/g) [18].

Interionic competition in complex solutions

In complex solutions, multiple metal ions compete for the same active sites on the sorbent surface. As a result of competition, the sorption capacity of each metal decreases compared to the mono-component system [24]. The Extended Langmuir Model is used to characterize interionic competition.

q_i (Equilibrium sorption capacity): This is the amount of a specific i -metal (for example, only lead) adsorbed by the Sorbent.

$q_{max,i}$ (**Maximum sorption capacity**): The theoretical maximum amount that can be adsorbed when all active sites of the Sorbent are saturated exclusively with this metal. This indicator represents the 'capacity' of the Sorbent.

$K_{EL,i}$ (Extended Langmuir constant): This parameter is referred to as the affinity coefficient. It indicates the strength of binding between the metal ion and the active sites on the sorbent surface. The higher this parameter, the more strongly the metal adheres to the sorbent.

C_i (**Equilibrium concentration**): After the sorption process is complete, the amount of i -metal ions remaining in the solution.

Selectivity coefficient ($\alpha_{i/j}$)

This parameter determines the ability (selectivity) of the sorbent to preferentially bind one metal over another:

i and j metals: **For example**, i — lead (Pb^{2+}), j — copper (Cu^{2+}).

$\alpha_{i/j} > 1$: The sorbent has a higher affinity for the metal. That is, the peanut shell exhibits greater selectivity for lead over copper.

$\alpha_{i/j} = 1$: The sorbent shows no preference between the two metals and removes both equally.

$\alpha_{i/j} < 1$: The sorbent prefers the other metal (copper).

Chemical modification methods

Various reagents are utilized for the chemical modification of peanut shell. The most widely used methods are as follows:

Modification peanut shells were treated with a activated peanut shell (AQPs) sorbent [1]. This method partially decomposes the lignocellulosic structure, increases the specific surface area, and exposes carboxyl groups. The AQPs sorbent effectively removed Cd^{2+} and Pb^{2+} ions from solution.	with $\alpha_{i/j} = \frac{K_{EL,i}}{K_{EL,j}}$	H_3PO_4: In the study by Santos et al., 1 M H_3PO_4 solution to obtain the

Modification with KOH: Alkaline modification is also considered an effective method. Treatment with KOH partially dissolves lignin and hemicellulose, resulting in the formation of macro- and micropores [27]. Studies indicate that KOH-modified sorbents demonstrate high selectivity toward Pb^{2+} ions.

Modification with ZnCl_2 : Modification with zinc chloride is also applied. This method results in the formation of a porous structure with a high specific surface area [28].

Pyrolysis– is the thermal decomposition of peanut shell at high temperatures (300–700°C) in an oxygen-free environment. As a result, a biosorbent with high carbon content, porous structure, and chemical stability is obtained [29].

In the study by Taşar and colleagues, a biosorbent was obtained from peanut shell and used for the sorption of Pb^{2+} ions [8]. The maximum sorption capacity of the biosorbent reached 56.5 mg/g, and the Langmuir model fit the experimental data well [8].

Modification with iron and manganese oxides

Impregnation with iron (Fe) and manganese (Mn) oxides imparts magnetic properties to the sorbent and enhances selectivity. In the study by Chen and colleagues, peanut shell biochar was modified with FeCl_3 to obtain Fe-modified biosorbent (FeBC) [3]. This sorbent exhibited high selectivity for Pb^{2+} in mixed solutions of Pb^{2+} , Cu^{2+} , and Ni^{2+} [3].

An increase in specific surface area and the appearance of new functional groups significantly enhance the sorption capacity.

Kinetic models

Various kinetic models are employed to describe the rate of the sorption process. The most commonly used models are the pseudo-first order and pseudo-second order models.

Pseudo-first order model (Lagergren model):

$$\ln(q_e - q_t) = \ln q_e - k_1 t$$

where q_e – equilibrium sorption capacity (mg/g), q_t – sorption capacity at time t , k_1 – pseudo-first order rate constant (min^{-1}) [31].

Pseudo-second order model:

$$\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{t}{q_e}$$

where k_2 is the pseudo-second order rate constant ($\text{g}/(\text{mg} \cdot \text{min})$) [32].

Most studies indicate that the pseudo-second order model provides a better fit to experimental data for peanut shell-based sorbents [2], [5], [6], [8]. This demonstrates the predominance of a chemical sorption (chemisorption) mechanism, whereby metal ions form chemical bonds with functional groups on the sorbent surface.

For example, in Xiaoshan's study, the sorption of Pb^{2+} , Cu^{2+} , Cr^{3+} , Cd^{2+} , and Ni^{2+} ions using raw peanut shell was characterized by the pseudo-second order model [2]. In the study by Tashar and colleagues, the pseudo-second order model also provided the best fit for the biosorbent [8].

Isotherm models characterize the relationship between sorption capacity and solution concentration at equilibrium. The most widely used are the Langmuir and Freundlich models.

Langmuir model:

$$q_e = \frac{q_{\max} K_L C_e}{1 + K_L C_e}$$

where $q_{\max}$ – maximum sorption capacity (mg/g), K_L – Langmuir constant (L/mg), and C_e – equilibrium concentration (mg/L) [33].

Freundlich model:

$$q_e = K_F C_e^{1/n}$$

where K_F – Freundlich constant, and n – sorption intensity parameter [34]. The Freundlich model suggests multilayer sorption and the energetic heterogeneity of active sites.

Thermodynamic parameters

The thermodynamic parameters of the sorption process (Gibbs energy ΔG° , enthalpy ΔH° , entropy ΔS°) describe the degree of spontaneity and the thermal effect of

$$\Delta G^\circ = -RT \ln K_d$$

$$\ln K_d = \frac{\Delta S^\circ}{R} - \frac{\Delta H^\circ}{RT}$$

the process:

where K_d is the distribution coefficient, R is the universal gas constant, and T is the absolute temperature [35].

Various results have been reported in the literature. In some studies, the sorption process is exothermic ($\Delta H^\circ < 0$), and the sorption capacity decreases with increasing temperature [6]. In other studies, endothermic ($\Delta H^\circ > 0$) results have been obtained [8]. These differences are associated with the sorbent preparation method, the type of metal, and experimental conditions.

In all cases, $\Delta G^\circ < 0$, indicating that the sorption process is spontaneous [2], [8].

Interionic competition and selectivity in complex solutions

Competition in binary component solutions

When multiple metal ions are simultaneously present in complex solutions, they compete for the active sites on the sorbent surface. As a result of this competition, the sorption capacity of each metal decreases relative to the mono-component system.

In the study by Santos and colleagues, the sorption of Cd^{2+} and Pb^{2+} ions from a binary solution was investigated using H_3PO_4 -activated peanut shell (AQPs) [1]. The extended Langmuir model was applied, and the following parameters were obtained:

- For Pb^{2+} : $q_{\max} = 0.7 \pm 0.1 \text{ mmol/g}$ (144.9 mg/g), $K_{EL} = 40.5 \pm 14.9 \text{ L/mmol}$

- For Cd^{2+} : $q_{\max} = 0.7 \pm 0.3 \text{ mmol/g}$ (78.4 mg/g), $K_{EL} = 5.0 \pm 3.6 \text{ L/mmol}$

Selectivity coefficient:

$$\alpha_{\text{Pb/Cd}} = \frac{K_{EL,\text{Pb}}}{K_{EL,\text{Cd}}} = \frac{40.5}{5.0} = 8.1$$

This result demonstrates that the AQPs sorbent adsorbs Pb^{2+} ions eight times more than Cd^{2+} ions [1]. This can be attributed to the larger ionic radius of Pb^{2+} and its greater propensity to form covalent bonds.

In the study by Gama and colleagues, the sorption of Cd^{2+} and Cu^{2+} ions in mono- and binary-component solutions was investigated using peanut shell biosorbent (BPS) [4]. In binary-component solutions, the sorption capacity of both metals decreased, confirming the effect of interionic competition [4].

Competition in multicomponent solutions

In Xiaoshan's study, the sorption of five different metal ions (Pb^{2+} , Cu^{2+} , Cr^{3+} , Cd^{2+} , Ni^{2+}) from a multicomponent solution using raw peanut shell was investigated [2]. According to the Langmuir model, the maximum sorption capacities are as follows:

- Pb^{2+} : 32.25 mg/g
- Cu^{2+} : 7.09 mg/g
- Cr^{3+} : 3.82 mg/g
- Cd^{2+} : 2.95 mg/g
- Ni^{2+} : 2.22 mg/g

These results indicate that the sorption capacity decreases in the following order: $\text{Pb}^{2+} > \text{Cu}^{2+} > \text{Cr}^{3+} > \text{Cd}^{2+} > \text{Ni}^{2+}$ [2]. This sequence is associated with the chemical properties of the metals.

In the study by Chen and colleagues, the sorption of Pb^{2+} , Cu^{2+} , and Ni^{2+} from complex solutions using Fe-modified biosorbent was investigated [3]. The results indicated that the biosorbent exhibits high selectivity toward Pb^{2+} [3]. This is attributed to the strong complex formation ability of iron oxides with Pb^{2+} .

Factors determining selectivity

In complex solutions, the selectivity of the sorbent depends on several factors:

1. *Chemical properties of the metal ion:*

- *Ionic radius:* A higher ionic radius (Pb^{2+} : 1.19 Å) demonstrates greater selectivity compared to metals with a lower ionic radius (Ni^{2+} : 0.69 Å) [36].

2. *Functional groups on the sorbent surface:*

- Carboxyl (-COOH) and hydroxyl (-OH) groups form complexes with a broad range of metals, but the selectivity is lower [40].

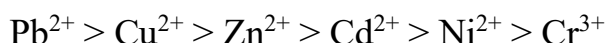
- Iron and manganese oxides exhibit higher selectivity towards Pb^{2+} and Cd^{2+} [3], [30].

3. *Solution conditions:*

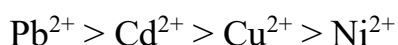
- *pH:* Changes in pH affect the degree of protonation of functional groups and the hydrolysis of metal ions [41]. Typically, a pH of 5–6 is considered optimal.

Based on literature analysis, the general selectivity order for peanut shell-based sorbents is as follows:

Raw and acid/alkali-modified sorbents:



Sorbents modified with iron/manganese oxides:



These experiments depend on the modification method and the nature of the functional groups. However, in all cases, Pb^{2+} demonstrates the highest selectivity, which can be attributed to its chemical properties (large ionic radius) [2], [3], [5], [14].

Comparative analysis of modification methods

The following criteria are important for comparing the efficiency of different modification methods:

1. *Selectivity:* Modification with iron oxides provides high selectivity toward Pb^{2+} [3].

2. *Economic efficiency*: Modification with H_3PO_4 and KOH is relatively inexpensive and straightforward [1].
3. *Regeneration capability*: Biosorbent and modified sorbents can be effectively utilized over multiple cycles [4], [9].
4. *Environmental safety*: Raw peanut shells and biosorbents do not require chemical reagents and are easy to dispose of [8].

In practical applications, it is necessary to balance these factors. For example, for industrial wastewater containing high concentrations of Pb^{2+} , iron-modified sorbents are preferable. In cases where an inexpensive and environmentally friendly solution is required, H_3PO_4 modification or biosorbent use is appropriate.

Conclusion

In this article, the sorption properties of ion exchangers derived from peanut shells in the removal of heavy metals from complex solutions, mechanisms of interionic competition, and factors influencing selectivity were analyzed. The main conclusions are as follows:

1. *Modification methods significantly increase the sorption capacity*. Modification with H_3PO_4 and KOH is economically efficient [1], while modification with iron oxides imparts high selectivity [3].
2. *The sorption process is primarily characterized by pseudo-second-order kinetics and the Langmuir isotherm*. This demonstrates the superiority of the chemical sorption mechanism and indicates monolayer sorption [2], [5], [6], [8].
3. *In complex solutions, interionic competition decreases the sorption capacity*. The extended Langmuir model is an effective tool for characterizing binary and multicomponent solutions [1], [4].

4. *The order of selectivity is primarily as follows: $Pb^{2+} > Cu^{2+} > Zn^{2+} > Cd^{2+} > Ni^{2+}$.* This order is explained by the chemical properties (ionic radius) of the metal ions [2], [3], [5], [14].
5. *The modification method alters selectivity.* Iron oxides provide high selectivity for Pb^{2+} [3], [5].
6. *pH, ionic strength, and the initial concentration ratio significantly influence sorption efficiency. The optimal pH is typically in the range of 5–6 [1], [2], [8].*
7. *Peanut shell-based ion exchangers can be practically applied in industry, agriculture, and drinking water purification.* They are considered inexpensive, environmentally friendly, and effective biosorbents [7], [46].

Further experimental and theoretical studies are required to obtain a deeper understanding of interionic competition and selectivity in complex solutions.

References

- [1] Santos, V. C. G., Tarley, C. R. T., Caetano, J., & Dragunski, D. C. (2022). Preparation of adsorbents from agro-industrial wastes and their application in the removal of Cd^{2+} and Pb^{2+} ions from a binary mixture: evaluation of ionic competition. **Chemical Engineering Research & Design**, 182, 713–724. <https://doi.org/10.1016/j.cherd.2022.05.043>
- [2] Xiaoshan, J. (2010). Study on the kinetics and thermodynamics of Pb^{2+} , Cu^{2+} , Cr^{3+} , Cd^{2+} , Ni^{2+} adsorption onto peanut hull. **Soil and Environmental Sciences**.
- [3] Chen, Y., Wang, F., Duan, L., Yang, H., & Gao, J. Adsorption of Fe-modified peanut shell biochar for Pb(II) in mixed Pb(II), Cu(II), and Ni(II) solutions.
- [4] Gama, B. M. V., Sales, D. C. S., Mahler, C. F., & Nascimento, R. F. (2021). Adsorption and recovery of cadmium and copper ions in mono- and bicomponent systems using peanut shell biochar as a sustainable source: model development.

Chemical Engineering Communications, 209(9), 1247-1262.

<https://doi.org/10.1080/00986445.2021.1903885>

[5] Huang, X., Liu, Y., Liu, S., Tan, X., Ding, Y., Zeng, G., Zhou, Y., Zhang, M., Wang, S., & Zheng, B. (2016). Adsorption Properties of Cu^{2+} , Zn^{2+} and Pb^{2+} by Mercaptoacetic Acid-Modified Peanut Shell. <https://doi.org/10.13386/j.issn1002-0306.2016.17.006>

[6] Oktasari, L., Jumina, J., & Siswanta, D. (2018). Peanut Shell (*Arachis hypogaea* L.) as an Adsorbent for Pb(II) Ions. *ALKIMIA: Journal of Chemical and Applied Sciences*, 2(1), 11–19. <https://doi.org/10.19109/ALKIMIA.V2I1.2258>

[7] Babarinde, A., Ogundipe, K., Sangosanya, K. T., Akintola, B. D., & Hassan, A. O. (2016). Equilibrium sorption of divalent metal ions onto groundnut (*Arachis hypogaea*) shell: kinetics, isotherms, and thermodynamics.

[8] Taşar, Ş., Özer, A., & Kaya, Y. (2019). A thermodynamic and kinetic evaluation of the adsorption of Pb(II) ions using peanut (*Arachis hypogaea*) shell-based biochar from aqueous media. *Polish Journal of Environmental Studies*, 28(3), 1891-1898. <https://doi.org/10.15244/PJOES/103027>

[9] Anastopoulos, I., Bhatnagar, A., Bikiaris, D. N., & Kyzas, G. Z. (2019). Agricultural biomass/waste as adsorbents for toxic metal decontamination of aqueous solutions. *Journal of Molecular Liquids*, 295, 111684. <https://doi.org/10.1016/J.MOLLIQ.2019.111684>

[10] Idowu, A. A., Adeogun, A. I., Olatunde, O. C., & Aliu, B. J. (2019). Agro-waste material as an ecofriendly adsorbent for the removal of Zn(II): isotherm, kinetic, thermodynamic, and optimization studies. *Desalination and Water Treatment*, 148, 214-227. <https://doi.org/10.5004/DWT.2019.23977>

[11] Jianyi, L., Yongfeng, J., Bin, L., Libo, Z., & Yuanyuan, W. (2018). Preparation of high surface area oxidized activated carbon from peanut shell and application for the

removal of organic pollutants and heavy metal ions. **Water, Air, & Soil Pollution**, 229, 1-13. <https://doi.org/10.1007/S11270-018-4021-9>

[12] Zhang, Y., Zhao, M., Cheng, Q., Wang, C., Li, H., Han, X., Fan, Z., Su, G., Pan, D., & Li, Z. (2016). Adsorption technology and mechanism of Cu and CN^- from cyanide wastewater on modified peanut shell. **Synthesis and Reactivity in Inorganic, Metal-Organic, and Nano-Metal Chemistry**, 46(5), 632-639. <https://doi.org/10.1080/15533174.2014.988796>

[13] Babarinde, A., Ogundipe, K., Sangosanya, K. T., Akintola, B. D., & Hassan, A. O. Equilibrium sorption of divalent metal ions onto groundnut (*Arachis hypogaea*) shells: kinetics, isotherms, and thermodynamics. <https://doi.org/10.31221/osf.io/d9x8h>

[14] Shan, R., Shi, Y., Gu, J., Wang, Y., & Yuan, H. (2020). Single and competitive adsorption affinities of heavy metals on peanut shell-derived biochar and its mechanisms in aqueous systems. **Chinese Journal of Chemical Engineering**, 28(5), 1375-1383. <https://doi.org/10.1016/J.CJCHE.2020.02.012>

[15] Li, Y., Xing, B., Ding, Y., Han, X., & Wang, S. (2023). Removal of heavy metal lead and ciprofloxacin from farm wastewater using peanut shell biochar. **Environmental Technology & Innovation**, 31, 103121. <https://doi.org/10.1016/j.eti.2023.103121>

[16] Zaili, J., Xiaoshan, J., & Xin, L. (2010). Study on the kinetics and thermodynamics of $Pb^{(2+)}$, $Cu^{(2+)}$, $Cr^{(3+)}$, $Cd^{(2+)}$, and $Ni^{(2+)}$ adsorption onto peanut hull. <https://doi.org/10.3969/j.issn.1674-5906.2010.12.035>

[17] Li, Y., Xing, B., Wang, X., Wang, S., & Ding, Y. (2023). Study on the adsorption of Cr^{3+} by peanut shell: adsorption kinetics, thermodynamics, and isotherm properties. **Chemistry & Biodiversity**, 20(1), e202201095. <https://doi.org/10.1002/cbdv.202201095>

- [18] Shabani, Z., Rahimi, G., & Khodadadi Darban, A. (2019). Sorption of Cd(II) ions by chitosan-modified peanut shell biochar from aqueous solution. **Advances in Environmental Science and Technology**, 5(4), 253–264. <https://doi.org/10.22104/AET.2020.4332.1220>
- [19] Ingle, S. M., Raut, P. D., Awati, P. S., & Patil, S. S. (2015). Sorption of copper(II) from aqueous solution onto *Arachis hypogaea* husk. **Desalination and Water Treatment**, 56(11), 3095–3105. <https://doi.org/10.1080/19443994.2014.914446>
- [20] Staroń, P., Sorys, P., Chwastowski, J., & Banach, M. (2020). Sorption behavior of *Arachis hypogaea* shells toward Ag⁺ ions and assessment of the antimicrobial properties of the product. **Environmental Science and Pollution Research**, 27, 16996–17007. <https://doi.org/10.1007/S11356-020-08464-2>
- [21] Ouakouak, A., Abdelhamid, M., Thouraya, B., Hamdi, N., & Chahinez, H. O. (2023). Easily separable, floatable, and recyclable magnetic-biochar/alginate beads as super-adsorbents for removing copper ions from aqueous media. **Bioresource Technology**, 380, 129225. <https://doi.org/10.1016/j.biortech.2023.129225>
- [22] Boeykens, S. P., Redondo, N., & Obeso, R. (2018). Agroindustrial waste for lead and chromium biosorption. **Journal of Sustainable Development of Energy, Water and Environment Systems**, 6(1), 108-121. <https://doi.org/10.13044/J.SDEWES.D5.0184>
- [23] Xu, X., Gao, B., Yue, Q., & Zhong, Q. (2014). Removal of cadmium ions from aqueous solution using chemically modified peanut shell.
- [24] Liu, Y., Huang, X., Wang, M., Chi, Q., & Wang, Y. A novel MnO_x-impregnated peanut shell-derived biochar for high adsorption performance of Pb(II) and Cd(II): behavior and mechanism.
- [25] Das, S., Mishra, S., & Ghangrekar, M. M. (2022). Adsorptive removal of Pb(II) ions using *Arachis hypogaea* shells: batch experiments, statistical analysis, and GA

- modeling. **International Journal of Environmental Science and Technology**, 20, 3211-3226. <https://doi.org/10.1007/s13762-021-03842-w>
- [26] Mathew, B. B., Jaishankar, M., Biju, V. G., & Beeregowda, K. N. (2016). Role of bioadsorbents in reducing toxic metals. **Journal of Toxicology**, 2016, 4369604. <https://doi.org/10.1155/2016/4369604>
- [27] Taşar, Ş., Kaya, Y., & Özer, A. Biosorption of lead (II) ions from aqueous solution by peanut shells: equilibrium, thermodynamic, and kinetic studies.
- [28] Zhai, L. Study of the adsorption by zinc chloride–modified peanut shells: adsorption kinetics, thermodynamics, and isothermal properties.
- [29] Taşar, Ş., Özer, A., & Kaya, Y. A thermodynamic and kinetic evaluation of the adsorption of Pb(II) ions using peanut (*Arachis hypogaea*) shell-based biochar from aqueous media.
- [30] Liu, Y., Huang, X., Wang, M., Chi, Q., & Wang, Y. A novel MnOx-impregnated peanut shell-derived biochar for high adsorption performance of Pb(II) and Cd(II): behavior and mechanism.
- [31] Lagergren, S. (1898). On the theory of so-called adsorption of soluble substances. **Kungliga Svenska Vetenskapsakademiens Handlingar**, 24(4), 1-39.
- [32] Ho, Y. S., & McKay, G. (1999). Pseudo-second order model for sorption processes. **Process Biochemistry**, 34(5), 451-465.
- [33] Langmuir, I. (1918). The adsorption of gases on plane surfaces of glass, mica, and platinum. **Journal of the American Chemical Society**, 40(9), 1361-1403.
- [34] Freundlich, H. (1906). On the adsorption in solution. **Journal of Physical Chemistry**, 57, 385-471.
- [35] Atkins, P., & de Paula, J. (2010). **Physical Chemistry** (9th ed.). Oxford University Press.

- [36] Shannon, R. D. (1976). Revised effective ionic radii and systematic studies of interatomic distances in halides and chalcogenides. **Acta Crystallographica Section A**, 32(5), 751-767.
- [37] Pauling, L. (1960). **The Nature of the Chemical Bond** (3rd ed.). Cornell University Press.
- [38] Marcus, Y. (1991). Thermodynamics of solvation of ions. Part 5. Gibbs free energy of hydration at 298.15 K. **Journal of the Chemical Society, Faraday Transactions**, 87(18), 2995-2999.
- [39] Pearson, R. G. (1963). Hard and soft acids and bases. **Journal of the American Chemical Society**, 85(22), 3533-3539.
- [40] Demirbas, A. (2008). Heavy metal adsorption onto agro-based waste materials: A review. **Journal of Hazardous Materials**, 157(2-3), 220-229.
- [41] Volesky, B. (2007). Biosorption and me. **Water Research**, 41(18), 4017-4029.
- [42] Pagnanelli, F., Mainelli, S., Vegliò, F., & Toro, L. (2003). Heavy metal removal by olive pomace: Sorbent characterisation and equilibrium modelling. **Chemical Engineering Science**, 58(20), 4709-4717.
- [43] Aksu, Z., & Gönen, F. (2004). Biosorption of phenol by immobilized activated sludge in a continuous packed bed: Prediction of breakthrough curves. **Process Biochemistry**, 39(5), 599-613.
- [44] Vijayaraghavan, K., & Yun, Y. S. (2008). Bacterial biosorbents and biosorption. **Biotechnology Advances**, 26(3), 266-291.
- [45] Gadd, G. M. (2009). Biosorption: Critical review of scientific rationale, environmental importance, and significance for pollution treatment. **Journal of Chemical Technology & Biotechnology**, 84(1), 13-28.
- [46] Fu, F., & Wang, Q. (2011). Removal of heavy metal ions from wastewaters: A review. **Journal of Environmental Management**, 92(3), 407-418.

- [47] Kurniawan, T. A., Chan, G. Y., Lo, W. H., & Babel, S. (2006). Physico-chemical treatment techniques for wastewater laden with heavy metals. **Chemical Engineering Journal**, 118(1-2), 83-98.
- [48] Hua, M., Zhang, S., Pan, B., Zhang, W., Lv, L., & Zhang, Q. (2012). Heavy metal removal from water/wastewater by nanosized metal oxides: A review. **Journal of Hazardous Materials**, 211-212, 317-331.
- [49] Barakat, M. A. (2011). New trends in removing heavy metals from industrial wastewater. **Arabian Journal of Chemistry**, 4(4), 361-377.
- [50] Gupta, V. K., & Suhas. (2009). Application of low-cost adsorbents for dye removal: A review. **Journal of Environmental Management**, 90(8), 2313-2342.
- [51] Mohan, D., & Pittman Jr, C. U. (2007). Arsenic removal from water/wastewater using adsorbents: A critical review. **Journal of Hazardous Materials**, 142(1-2), 1-53.
- [52] Crini, G. (2006). Non-conventional low-cost adsorbents for dye removal: A review. **Bioresource Technology**, 97(9), 1061-1085.
- [53] Rao, G. P., Lu, C., & Su, F. (2007). Sorption of divalent metal ions from aqueous solution by carbon nanotubes: A review. **Separation and Purification Technology**, 58(1), 224-231.
- [54] Wan Ngah, W. S., Teong, L. C., & Hanafiah, M. A. K. M. (2011). Adsorption of dyes and heavy metal ions by chitosan composites: A review. **Carbohydrate Polymers**, 83(4), 1446-1456.

**OPTIMIZATION OF THE OPERATION REGIME AND ENERGY
EFFICIENCY OF PUMPING STATIONS IN THE DRINKING WATER
SYSTEM OF PARKENT DISTRICT**

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Abstract. This article analyzes the current operating mode of pumping stations in the drinking water supply system of the Parkent district of the Tashkent region and examines issues of increasing their energy efficiency. The main goal of the study is to identify water distribution imbalances across regions, evaluate the technical and energy indicators of pumping units, and develop their optimal operating mode. During the research, key parameters such as water supply duration, pump flow rate, pressure, power, and efficiency were analyzed. The results showed that uneven water distribution over time and the presence of low-efficiency pumping units lead to excessive energy consumption in the system and a decrease in operational efficiency. To eliminate these problems, it was proposed to optimize the operating mode of pumping stations and implement automated control systems based on SCADA. At the conclusion of the article, scientific and practical recommendations were developed aimed at increasing energy efficiency, balancing water distribution, and ensuring the stable operation of the system.

Key words: pumping station, drinking water supply, energy efficiency, SCADA system, water distribution, operating mode optimization, efficiency (η), hydraulic mode, real-time monitoring, automated control.

**PARKENT TUMANI ICHIMLIK SUVI TIZIMIDA NASOS
STANSIYALARINING ISH REJIMINI OPTIMALLASHTIRISH VA
ENERGIYA SAMARADORLIGINI OSHIRISH**

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Annotatsiya. Ushbu maqolada Toshkent viloyati Parkent tumani ichimlik suvi ta'minoti tizimida nasos stansiyalarining amaldagi ish rejimi tahlil qilindi hamda ularning energiya samaradorligini oshirish masalalari o'rganildi. Tadqiqotning asosiy maqsadi - hududlar kesimida suv taqsimotidagi nomutanosibliklarni aniqlash, nasos agregatlarining texnik va energetik ko'rsatkichlarini baholash hamda ularning optimal ishlash rejimini ishlab chiqishdan iborat. Tadqiqot jarayonida suv berish davomiyligi, nasoslarning suv sarfi, bosim, quvvat va foydali ish koeffitsiyenti kabi asosiy parametrlar tahlil qilindi. Natijalar shuni ko'rsatdiki, suv taqsimotining vaqt bo'yicha notekisligi hamda past samaradorlikka ega nasos agregatlarining mavjudligi tizimda ortiqcha energiya sarfiga va ekspluatatsion samaradorlikning pasayishiga olib kelmoqda. Mazkur muammolarni bartaraf etish maqsadida nasos stansiyalarining ish rejimini optimallashtirish hamda SCADA asosida avtomatlashtirilgan boshqaruv tizimlarini joriy etish taklif etildi. Maqola yakunida energiya samaradorligini oshirish, suv taqsimotini muvozanatlashtirish va tizimning barqaror ishlashini ta'minlashga qaratilgan ilmiy-amaliy tavsiyalar ishlab chiqildi.

Kalit so'zlar: nasos stansiyasi, ichimlik suvi ta'minoti, energiya samaradorligi, SCADA tizimi, suv taqsimoti, ish rejimini optimallashtirish, foydali ish koeffitsiyenti (η), gidravlik rejim, real vaqt monitoringi, avtomatlashtirilgan boshqaruv.

Kirish. Hozirgi davrda ichimlik suvi ta'minoti tizimlarining barqaror va samarali ishlashini ta'minlash global miqyosda dolzarb muammolardan biri hisoblanadi. Aholi sonining ortib borishi, urbanizatsiya jarayonlarining jadallashuvi hamda iqlim o'zgarishlari suv resurslariga bo'lgan talabni keskin oshirmoqda. Shu bilan birga, mavjud suv ta'minoti infratuzilmasining eskirishi va energiya jihatidan samarasiz

texnologiyalardan foydalanish tizim samaradorligining pasayishiga olib kelmoqda. Jahon sog'liqni saqlash tashkiloti ma'lumotlariga ko'ra, dunyo bo'yicha millionlab insonlar hali ham xavfsiz va uzluksiz ichimlik suvi bilan to'liq ta'minlanmagan bo'lib, bu holat suv resurslarini boshqarish tizimlarini takomillashtirish zaruratini yanada kuchaytirmoqda [1].

Ichimlik suvi ta'minoti tizimlarida nasos stansiyalari asosiy texnologik bo'g'inlardan biri hisoblanadi. Ular suvni manbadan iste'molchilarga yetkazib berishda uzluksizlikni ta'minlaydi hamda tizimning gidravlik rejimini shakllantiradi. Nasos agregatlarining ish rejimi, texnik holati va boshqaruv usullari tizimning umumiy samaradorligiga bevosita ta'sir ko'rsatadi. Ilmiy tadqiqotlar shuni ko'rsatadiki, nasos stansiyalarining optimal bo'lmagan ish rejimi elektr energiyasi sarfining ortishiga, gidravlik yo'qotishlarning ko'payishiga va uskunalarning tez eskirishiga olib keladi [2]. Shu sababli nasoslarning optimal ish nuqtasini aniqlash va ularni samarali boshqarish suv ta'minoti tizimlarini takomillashtirishning muhim yo'nalishlaridan biri sifatida qaraladi [3]. So'nggi yillarda suv ta'minoti tizimlarida energiya samaradorligini oshirish masalasi alohida e'tibor qaratilayotgan ilmiy yo'nalishlardan biri bo'lib, nasos stansiyalarida energiya sarfi umumiy ekspluatatsion xarajatlarning asosiy qismini tashkil etishi aniqlangan [4]. Tadqiqotlar natijalariga ko'ra, nasos agregatlarining noto'g'ri tanlangan ish rejimi va yuklanish darajasi elektr energiyasi sarfining 20–30 % gacha ortishiga sabab bo'lishi mumkin [5]. Ayniqsa, suv iste'molining vaqt bo'yicha notekis taqsimlanishi nasoslarning maksimal yuklama rejimida ishlashiga olib keladi, bu esa energiya samaradorligini pasaytiruvchi asosiy omillardan biri hisoblanadi [6].

O'zbekiston Respublikasida ham ichimlik suvi ta'minoti tizimini rivojlantirish, aholini sifatli va uzluksiz suv bilan ta'minlash hamda energiya samaradorligini oshirish davlat siyosatining ustuvor yo'nalishlaridan biri hisoblanadi. Xususan, "Ichimlik suvi ta'minoti va oqova suvlarni chiqarib yuborish to'g'risida"gi qonun hamda "O'zbekiston

– 2030” strategiyasida suv ta’minoti infratuzilmasini modernizatsiya qilish, energiya tejamkor texnologiyalarni joriy etish va boshqaruv tizimlarini takomillashtirish vazifalari belgilangan [7]. Bu esa mavjud tizimlarni ilmiy asosda tahlil qilish va ularni optimallashtirish bo‘yicha samarali usullarni ishlab chiqishni talab etadi. Toshkent viloyatining Parkent tumani ichimlik suvi ta’minoti tizimi ham yuqorida qayd etilgan muammolarning amaliy ko‘rinishi sifatida qaraladi. Hududda suv taqsimotining notekisligi, ayrim mahalla fuqarolar yig‘inlarida suv berish vaqtining 24 soatdan 4 soatgacha keskin farqlanishi, shuningdek nasos agregatlarining turli texnik ko‘rsatkichlarga ega ekanligi tizim samaradorligiga salbiy ta’sir ko‘rsatmoqda. Tahlillar shuni ko‘rsatadiki, suv ta’minotining muvozanatlashmaganligi nasos stansiyalariga ortiqcha yuklama tushishiga, elektr energiyasi sarfining ortishiga hamda gidravlik barqarorlikning buzilishiga olib kelmoqda. Natijada tizimning ekspluatatsion xarajatlari ortib, xizmat ko‘rsatish sifati pasaymoqda. Zamonaviy ilmiy yondashuvlarda suv ta’minoti tizimlarini boshqarishda optimallashtirish usullaridan keng foydalanilmoqda. Jumladan, nasos stansiyalarining ish rejimini optimallashtirish, yuklamani vaqt bo‘yicha muvozanatlashtirish, energiya tejamkor uskunalarni qo‘llash hamda avtomatlashtirilgan boshqaruv tizimlari (SCADA) orqali real vaqt rejimida nazoratni tashkil etish tizim samaradorligini sezilarli darajada oshirish imkonini beradi [8]. SCADA tizimlari nasos stansiyalarining ishlash jarayonlarini markazlashgan holda nazorat qilish, suv sarfi, bosim va energiya iste’moli kabi asosiy ko‘rsatkichlarni real vaqt rejimida monitoring qilish hamda ularni samarali boshqarish imkonini beruvchi avtomatlashtirilgan tizim sifatida keng qo‘llanilmoqda [11]. Shu nuqtai nazardan, Parkent tumani ichimlik suvi ta’minoti tizimini chuqur tahlil qilish va nasos stansiyalarining optimal ish rejimini ishlab chiqish muhim ilmiy-amaliy ahamiyat kasb etadi. Mazkur maqolada Toshkent viloyati Parkent tumani ichimlik suvi ta’minoti tizimidagi nasos stansiyalarining amaldagi ish rejimini tahlil qilinadi.

Maqsad va vazifalari. Toshkent viloyati Parkent tumani ichimlik suvi ta'minoti tizimida faoliyat yuritayotgan nasos stansiyalarining amaldagi ish rejimini kompleks tahlil qilish, suv taqsimotidagi nomutanosibliklarni aniqlash hamda nasos agregatlarining optimal ishlash rejimini ishlab chiqish orqali energiya samaradorligini oshirish va tizimning barqaror ishlashini ta'minlashdan iborat.

Maqolaning vazifalari:

1. Parkent tumani ichimlik suvi ta'minoti tizimining amaldagi holatini hamda nasos stansiyalarining ish rejimini kompleks tahlil qilish.
2. Hududlar kesimida suv taqsimotidagi nomutanosibliklarni aniqlash va ularning nasos agregatlarining yuklanish darajasi hamda energiya sarfiga ta'sirini baholash.
3. Nasos agregatlarining asosiy texnik ko'rsatkichlarini (suv sarfi, bosim, quvvat, foydali ish koeffitsiyenti) tahlil qilish orqali ularning energiya samaradorligini aniqlash.
4. Nasos stansiyalarining ish rejimini optimallashtirishning ilmiy asoslangan usullarini ishlab chiqish va suv taqsimotini muvozanatlashtirish imkoniyatlarini baholash.
5. Taklif etilgan optimallashtirish yechimlari asosida energiya sarfini kamaytirish va tizim samaradorligini oshirish bo'yicha ilmiy-amaliy tavsiyalar ishlab chiqish.

Metodologiya. Mazkur tadqiqotda Toshkent viloyati Parkent tumani hududida joylashgan nasos stansiyalari ish rejimi o'rganilib, olingan ma'lumotlar metodologik tahlil yondashuvlari asosida o'rganiladi hamda xulosa va amaliy tavsiyalar ishlab chiqiladi.

Natijalar. Ichimlik suvi ta'minoti tizimining samarali faoliyat yuritishi uzluksiz suv yetkazib berish, barqaror bosimni ta'minlash hamda energiya resurslaridan oqilona foydalanishga bevosita bog'liq hisoblanadi. Suv ta'minoti jarayonida nasos stansiyalarining optimal ish rejimida ishlashi tizimning umumiy samaradorligini

belgilovchi asosiy omillardan biri hisoblanadi. Agar nasos agregatlari texnik va ekspluatatsion talablarga mos holda ishlamasa, bu holat ortiqcha energiya sarfi, gidravlik yo‘qotishlarning ortishi hamda suv taqsimotida nomutanosibliklarning yuzaga kelishiga olib keladi. Shu sababli nasos stansiyalarining ish rejimini ilmiy asosda tahlil qilish va ularning samaradorligini baholash muhim ahamiyat kasb etadi.

Ichimlik suvi ta‘minoti tizimining samaradorligi nafaqat suv sifatiga, balki uni iste‘molchilarga uzluksiz va barqaror tarzda yetkazib berish jarayonining to‘g‘ri tashkil etilishiga ham bevosita bog‘liqdir. Xususan, nasos stansiyalarining ish rejimi, suv taqsimotining muvozanatlashganligi hamda tizimda barqaror bosimni ta‘minlash ichimlik suvi ta‘minoti sifatini belgilovchi asosiy omillardan biri hisoblanadi. Agar nasos agregatlari optimal bo‘lmagan rejimda ishlasa, bu holat suv ta‘minotida uzilishlar, bosimning keskin o‘zgarishi va iste‘molchilarni yetarli darajada suv bilan ta‘minlay olmaslik kabi muammolarni yuzaga keltiradi. Natijada tizimning umumiy samaradorligi pasayib, suv taqsimotida nomutanosibliklar kuchayadi [9]. Shu bilan birga, nasos stansiyalarining noto‘g‘ri boshqarilishi elektr energiyasi sarfining ortishiga va ekspluatatsion xarajatlarning sezilarli darajada ko‘payishiga olib keladi. Ilmiy tadqiqotlar shuni ko‘rsatadiki, nasos agregatlarining optimal ish nuqtasidan chetga chiqib ishlashi energiya yo‘qotishlarining ortishiga sabab bo‘lib, tizimning energetik samaradorligini pasaytiradi. Ayniqsa, suv taqsimotining vaqt bo‘yicha nomutanosibligi nasoslarning yuqori yuklama rejimida ishlashiga olib kelib, energiya sarfini oshiruvchi asosiy omillardan biri sifatida namoyon bo‘ladi [10]. Shu sababli nasos stansiyalarining ish rejimini optimallashtirish va suv taqsimotini muvozanatlashtirish zamonaviy suv ta‘minoti tizimlarida muhim ilmiy-amaliy vazifa hisoblanadi.

Parkent tumani ichimlik suvi ta‘minoti tizimida suv taqsimotining amaldagi holatini baholash maqsadida hududlar kesimida suv berish davomiyligi tahlil qilindi. Tadqiqot jarayonida turli suv inshootlari orqali aholini suv bilan ta‘minlash rejimi o‘rganilib, suv

berish vaqtining sutkalik davomiyligi asosiy ko'rsatkich sifatida qabul qilindi. Olingan ma'lumotlar shuni ko'rsatadiki, hududlarda suv ta'minoti davomiyligi bir xil emas bo'lib, ayrim inshootlarda suv uzluksiz (24 soat) yetkazib berilsa, boshqa hududlarda bu ko'rsatkich sezilarli darajada qisqaradi. Suv taqsimotidagi bunday farqlar tizimning umumiy samaradorligiga va nasos stansiyalarining ish rejimiga bevosita ta'sir ko'rsatadi. Mazkur holatni yanada aniqroq baholash maqsadida suv berish vaqtining hududlar kesimidagi taqsimoti quyidagi jadvalda keltirilgan.

Parkent tumani hududlarida suv berish vaqtining taqsimlanishi.

1-jadval

T /r	Suv inshoot nomi	MFY nomi	Suv berish vaqti (soat)
1	40 - maktab suv inshooti	Istiqbol MFY	24
2	Gulbog suv inshooti 2	Qayilma MFY Bog`bon MFY	24
3	Gulbog` Na'munaviy uylar 1	Istiqbol MFY	24
4	Gulbog` Na'munaviy uylar 2	Istiqbol MFY	24
5	Gulbog` Na'munaviy uylar 3	Istiqbol MFY	24
6	Sumcha Na'munaviy uylar	Nurobod MFY	24
7	2 qavatli uylar suv inshooti	Istiqbol MFY	24

8	Qo`rg`ontepa suv inshooti	Qo`rg`ontepa MFY	24
9	Yoshlik suv inshooti	Yoshlik MFY	24
1 0	Xizmat uylari suv inshooti	Istiqbol MFY	24
1 1	Kichik Sanoat Zonasi suv inshooti	Istiqbol MFY	24
1 2	Oqtepa 3 suv inshooti	Oqtepa MFY	24
1 3	Oqtepa 4 suv inshooti	Oqtepa MFY	24
1 4	Istiqbol Suv inshooti	Istiqbol MFY	24
1 5	Quruqsoy suv inshooti	Quruqsoy MFY	12
1 6	Markaziy suv inshooti	Markaziy MFY Guliston MFY	12
1 7	T.Rizaeu suv inshooti	Davlatobod MFY	12
1 8	Shampan suv inshooti	Shampan MFY	12
1 9	Surxi suv inshooti	Surxi MFY	12
2 0	Oqtepa-2 suv inshooti	Oqtepa MFY	12

2 1	O'chok suv inshooti	O'choq MFY	8
2 2	Cho'qqayma suv inshooti	Cho'qqayma MFY	8
2 3	Navro'z suv inshooti	Navruz MFY	8
2 4	Navbaxor suv inshooti	Yangi Navbaxor MFY	8
2 5	Teman suv inshooti	Teman MFY	8
2 6	Davlatbuva suv inshooti	Novdak MFY	8
2 7	Namdanak suv inshooti	Bozorboshi MFY	8
2 8	Namdanak Na'munaviy uylar	Obod MFY	8
2 9	Quruqsoy 2 suv inshooti	Quruqsoy MFY	8
3 0	Kuygantok suv inshooti	Istiqbol MFY	8
3 1	Boyqozon-2 suv inshooti	Boyqozon MFY	8
3 2	Boyqozon-1 suv inshooti	Yashnobod MFY	8

3	Nevich suv inshooti	Nevich MFY	4
3			

Jadval ma'lumotlari Parkent tumani hududlarida ichimlik suvi ta'minoti davomiyligi keskin farqlanishini ko'rsatadi. Tahlil natijalariga ko'ra, suv berish vaqti 24 soatdan 4 soatgacha o'zgarib, bu holat tizimda suv taqsimoti vaqt bo'yicha muvozanatlashmaganligini bildiradi. Xususan, ayrim hududlarda (Istiqbol, Oqtepa, Yoshlik MFYlarida) suv ta'minoti uzluksiz 24 soat davomida amalga oshirilayotgan bo'lsa, boshqa hududlarda bu ko'rsatkich 12, 8 va hatto 4 soatgacha qisqarishi kuzatiladi. Bunday tafovut suv resurslarining hududlar kesimida teng taqsimlanmaganligini va mavjud infratuzilmaning barcha iste'molchilar ehtiyojini to'liq qondira olmayotganini ko'rsatadi. Ayniqsa, 8 soat va 4 soatlik ta'minot rejimida ishlayotgan hududlarda suv yetkazib berish qisqa vaqt oralig'ida amalga oshirilishi natijasida iste'mol yuklamasi keskin oshadi. Bu esa nasos agregatlarining yuqori yuklama rejimida ishlashiga sabab bo'ladi. Shuningdek, suv berish vaqtining qisqarishi iste'molchilar tomonidan suvni zaxiralashga bo'lgan ehtiyojni oshiradi, bu esa tizimda suv sarfining notekis taqsimlanishiga olib keladi. Natijada suv ta'minoti tizimida gidravlik rejim buzilib, ayrim hududlarda bosimning pasayishi yoki ortishi kabi muammolar yuzaga keladi.

Umuman olganda, jadval tahlili Parkent tumani ichimlik suvi ta'minoti tizimida suv berish vaqtining hududlar kesimida nomutanosib taqsimlanganligini va bu holat nasos stansiyalarining ish rejimiga salbiy ta'sir ko'rsatayotganini ko'rsatadi. Mazkur muammo tizimni optimallashtirish va suv taqsimotini muvozanatlashtirish zarurligini asoslab beradi.

Parkent tumani hududlarida suv berish vaqtining taqsimlanishi.

1-rasm

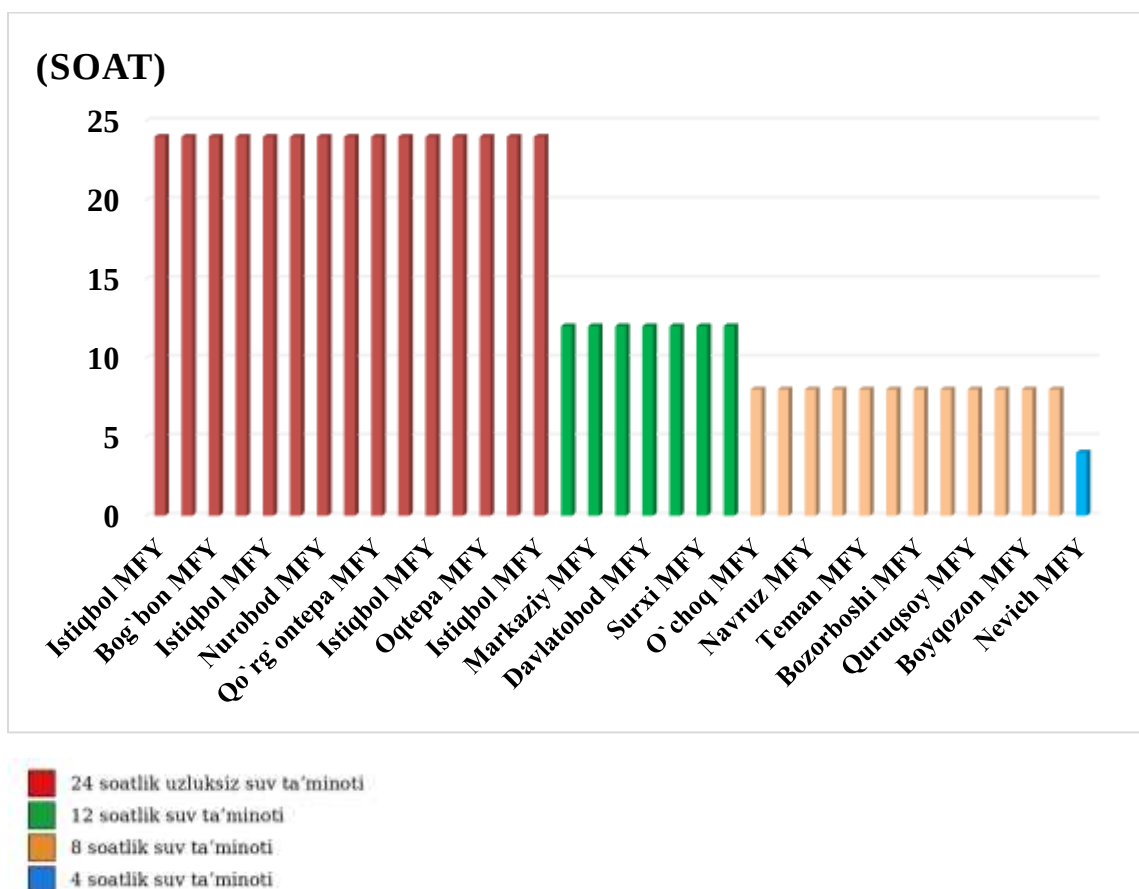


Diagramma ma'lumotlari Parkent tumani hududlarida ichimlik suvi ta'minoti davomiyligining aniq taqsimlanishini vizual tarzda ifodalaydi. Grafikdan ko'rinib turibdiki, suv ta'minoti 24, 12, 8 va 4 soatlik guruhlariga ajralgan bo'lib, ularning hududlar kesimidagi ulushi bir xil emas. Xususan, grafikda 24 soatlik suv ta'minotiga ega hududlar ulushi yuqori ekanligi kuzatiladi, bu esa ayrim markaziy va rivojlangan hududlarda suv ta'minoti tizimi nisbatan barqaror ekanligini ko'rsatadi. Shu bilan birga, 12 va 8 soatlik ta'minot rejimiga ega hududlar soni ham sezilarli bo'lib, bu suv resurslarining hududlar kesimida yetarli darajada muvozanatlashmaganligini bildiradi. Ayniqsa, 4 soatlik suv ta'minoti bilan cheklangan hudud mavjudligi tizimda jiddiy muammolar borligini yaqqol ko'rsatadi. Bunday hududlarda suv iste'moli qisqa vaqt ichida keskin ortib, nasos agregatlariga maksimal yuklama tushishiga sabab bo'ladi. Natijada energiya sarfi oshadi va tizimning samaradorligi pasayadi. Grafik tahlili shuni

ko'rsatadiki, suv taqsimotining vaqt bo'yicha notekisligi nasos stansiyalarining ish rejimiga bevosita ta'sir ko'rsatib, ularning optimal ishlashiga to'sqinlik qiladi. Bu esa o'z navbatida gidravlik barqarorlikning buzilishi, bosimning notekis taqsimlanishi hamda ekspluatatsion xarajatlarning ortishiga olib keladi.

Yuqorida keltirilgan suv taqsimoti tahlillari natijasida Parkent tumani ichimlik suvi ta'minoti tizimida vaqt bo'yicha nomutanosiblik mavjudligi aniqlandi. Mazkur holat nasos stansiyalarining ish rejimiga bevosita ta'sir ko'rsatib, ularning yuklanish darajasi va energiya sarfi ko'rsatkichlarining o'zgarishiga olib keladi. Shu sababli tizimda qo'llanilayotgan nasos agregatlarining texnik ko'rsatkichlarini o'rganish va ularning samaradorligini baholash muhim ahamiyat kasb etadi. Nasoslarning suv sarfi, bosim, quvvat va foydali ish koeffitsiyenti kabi asosiy parametrlarini tahlil qilish orqali ularning amaldagi ish rejimi va energiya samaradorligini aniqlash mumkin. Mazkur maqsadda Parkent tumani ichimlik suvi ta'minoti tizimida foydalanilayotgan nasos agregatlarining texnik ko'rsatkichlari quyidagi jadvalda keltirilgan.

Xulosa. O'tkazilgan kompleks tahlillar natijasida Toshkent viloyati Parkent tumani ichimlik suvi ta'minoti tizimining amaldagi holati baholanib, unda suv taqsimotining vaqt bo'yicha nomutanosibligi hamda nasos agregatlarining turli samaradorlik darajasida ishlashi asosiy muammolar sifatida aniqlandi. Xususan, hududlar kesimida suv berish davomiyligining 24 soatdan 4 soatgacha keskin farqlanishi tizimda yuklama notekis taqsimlanayotganini ko'rsatadi. Bu esa nasos stansiyalarining yuqori yuklama rejimida ishlashiga, elektr energiyasi sarfining ortishiga va tizimning umumiy samaradorligining pasayishiga olib kelmoqda. Nasos agregatlarining texnik ko'rsatkichlari va foydali ish koeffitsiyenti bo'yicha o'tkazilgan tahlillar ularning energiya samaradorligi o'rtasida sezilarli tafovut mavjudligini ko'rsatdi. Ayniqsa, past samaradorlikka ega nasoslarning mavjudligi tizimda ortiqcha energiya yo'qotishlariga sabab bo'layotgani aniqlandi.

Foydalanilgan adabiyotlar.

1. World Health Organization. *Guidelines for Drinking-water Quality*. — 4th ed. — Geneva: WHO Press, 2017. — 631 p.
2. Karassik I.J., Messina J.P., Cooper P., Heald C.C. *Pump Handbook*. — 4th ed. — New York: McGraw-Hill, 2008. — 1900 p.
3. Gülich J.F. *Centrifugal Pumps*. — 2nd ed. — Berlin: Springer, 2010. — 1060 p.
4. U.S. Department of Energy. *Improving Pumping System Performance: A Sourcebook for Industry*. — 2nd ed. — Washington: DOE, 2006. — 122 p.
5. European Commission. *Energy Efficiency in Water Pumping Systems*. — Brussels: European Commission, 2012. — 85 p.
6. Alegre H., Baptista J.M., Cabrera E. Jr. *Performance Indicators for Water Supply Services*. — London: IWA Publishing, 2016. — 300 p.
7. O‘zbekiston Respublikasi Qonuni. *Ichimlik suvi ta’minoti va oqova suvlarni chiqarib yuborish to‘g‘risida*. — O‘RQ-784-son. — Toshkent, 2022.
8. SCADA System Applications in Water Supply Systems // *IEEE Conference Proceedings*. — 2018. — P. 1–6.
9. Alegre H., Baptista J.M., Cabrera E. Jr. *Performance Indicators for Water Supply Services*. — London: IWA Publishing, 2016. — 300 p.
10. U.S. Department of Energy. *Improving Pumping System Performance: A Sourcebook for Industry*. — 2nd ed. — Washington: DOE, 2006. — 122 p.
11. Sinsmarts. What is a SCADA system and how does it work? [Elektron resurs]. — URL: <https://www.sinsmarts.com/uz/blog/what-is-a-scada-system-and-how-does-it-work/>
12. Shakirov B.M., Abduxalilov O.A., O‘rinov I.Sh., Rasuljonov J.J., Abdullazizova Sh.A. Nasos stansiyalarida SCADA tizimlaridan foydalanish // *Theoretical Aspects in the Formation of Pedagogical Sciences*. — 2024. — B. 68–75.

THE MAIN FUNCTIONS AND PRACTICAL IMPORTANCE OF RADIO TELESCOPES

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Abstract

This The article not only provides information about radio telescopes, their constituent parts and the principle of operation, but also gives a brief overview of the role of radio telescopes in our lives and the radio telescopes that have grown not only in Uzbekistan, but also in many other countries.

Keywords. Radio telescope, radio telescope with parabolic antenna, radio interferometer, directivity level of radio telescope, radio astronomy.

Introduction

By the 30s of our century, it became known that many celestial bodies, including gaseous nebulae, radiate in the radio range . Telescopes designed to record radio rays coming from celestial bodies with a wavelength ranging from millimeters to tens of meters are called radio telescopes. The main parts of radio telescopes are the antenna and the receiver , and the antenna is often made in the form of a paraboloid. The radio rays returned from the antenna are collected in the radiator located at the focus of the paraboloid and directed to the receiver using a special wave transmitter . After the signal is amplified in the receiver, it is detected and then recorded in a special device called a radio signal recorder . The receiver amplifier is designed for the wavelength, the object is observed in that monochromatic radio beam . The requirement for the accuracy of the metal mirror of radio telescopes is much lower than that of optical telescopes (due to the fact that radio waves correspond to the longest wavelength sections of the electromagnetic wave scale), the deviation of the antenna from the exact parabolic surface, λ the wavelength operating at for a radio telescope $\lambda/8$ should not be

greater than For example, the mentioned deviation of the antenna of telescopes operating in the 1-meter range is allowed to go up to 12.5 centimeters.

Multiple p antennas are sometimes used to record radio waves in the range of several meters to tens of meters . A special characteristic called a directivity diagram is used to determine the resolving power of radio telescopes . The directivity diagram characterizes the sensitivity of the radio telescope to the position of the point source of radio radiation relative to the antenna . The directivity diagram of a radio telescope with a parabolic antenna is symmetrical about the paraboloid axis. The angular resolution of a radio telescope, i.e., the smallest distance between two objects that the telescope can detect as separate objects, is approximately the angle equal to the half-power width of the central "leaf" of the directivity diagram, and is found as :

$$\delta = \frac{\lambda}{D}$$

in this case , λ is the radio wavelength used by the radio telescope, and D is the diameter of the antenna. Despite the large diameter of the mirror of radio telescopes , they are inferior to optical telescopes in terms of resolving power due to the fact that they operate at long wavelengths . However, radio telescopes can achieve very high resolution when operating as radio interferometers. A simple radio interferometer consists of two radio telescopes A_1 and A_2 placed at a fairly large distance a from each other, called the base , and the signals recorded by the radio telescopes' emitters from a certain object are transmitted to a single receiver through cables.

If a radio interferometer with a certain base is receiving a signal at a wavelength λ from a specific source, then the difference of the path of the rays coming from the object to these two telescopes b is equal to an integer number of wavelengths: $b = a \sin \alpha = n \lambda$

such signals are added to the receiver in the same phase to give a maximum. If not 1

difference:

$$b = (n+1) \frac{\lambda}{2}$$

, the signals arrive in opposite phase, and the resulting recorded signal will be equal to the difference of their amplitudes, i.e. zero. As a result, the directivity diagram of a radio interferometer, unlike that of a single radio telescope, when cut by a plane passing through the base, has the appearance of narrow leaves, and the angle between the maxima or minima of two adjacent leaves is $\Delta \theta$:

$$\Delta \theta = \arcsin \frac{(n+1)\lambda}{a} - \arcsin \frac{n\lambda}{a} = \delta$$

is found through (see figure). Here d - characterizes the resolving power of the radio interferometer, and it is not difficult to understand that when the a - basis is too large, d - is too small, and the resolving power of the radio telescope is very high. For example: when $l = 1$ m, base $a = 1000$ km, the resolving power of the radio interferometer

$$\delta = (1\text{m}/10^6\text{m}) \times 5,73 \times 60 \times 60'' = 0.206''$$

will be equal to Therefore, such an interferometer can separate objects located at a distance of 0.2 arcs from each other in the meter range . Also, such an interferometer makes it possible to determine the angular ratio of the object and the distribution of radio brightness "according to a certain coordinate . In the following years, a method of radio interferometric observation of celestial bodies was developed using antennas and receivers located on different continents. As a result of observation using this method, the resolution of the interferometer

"reached 0.0003. One of the three radio telescopes involved in this observation was located in Australia (65 meters), the second in Russia (22 meters) and the third in the USA.

dozens of highly sensitive radio telescopes are working on different continents of our planet . The diameter of the mirrors is 65 m (Australia), 76 m (England), 100 m (FRG), 600 m (Russia) and 300 m (USA). provides non-stop information from natural radio sources. These telescopes allow us to see the "radio image" of the Universe in fine detail

At low frequencies, antennas are usually dipoles (like those used in radios and televisions), but to increase the light-gathering surface and resolution, dipole arrays are used - where all the dipole elements are connected together.

The most common antenna is the parabolic reflector, which works like a telescope with an optical mirror. At long wavelengths, the reflecting surface is not necessarily continuous, long-wavelength photons cannot see the holes in the reflecting surface, and therefore the antenna is usually made in the form of a metal mesh. For high-frequency operation, the receiving surface must be very smooth, even in the millimeter-submillimeter range, where radio astronomers install their own radiometers and use large optical mirror telescopes. Surface roughness should be less than 1/10 of the observed wavelength to ensure coherent signal amplification.

The main difference between optical and radio telescopes is their signal recording. Radio telescopes are not imaging telescopes (except for synthetic (man-made) telescopes listed below); instead, a speaker-like radiator at the antenna's focus sends a concentrated signal to the receiver. This saves wavelength and phase information.

The Ö-resolving ability of a radio telescope can be derived from the formula written for optical telescopes, that is, it is λ / D , where λ is the observed wavelength, D is the aperture (antenna) diameter. Since the ratio between the wavelengths of optical and radio rays is about 10,000, antennas several kilometers in diameter are required to achieve the resolution of optical telescopes. In the early days of radio astronomy, one of the biggest obstacles to its recognition and development was its extremely low resolution

. For example, the antenna used by Yansky had a fan-shaped signal of approximately 30° of separation in the narrowest direction . Therefore, observations in the radio range cannot be equated with optical observations . There were no opportunities to match radio sources with their optical counterparts .

The largest radio telescope in the world is the Arecibo antenna in Puerto Rico , whose main reflector is fixed and installed in a circular natural valley with a diameter of 305 meters, covered with a metal grid. By the end of the 1970s, its antenna surface and receiver were modernized, as a result of which the antenna was able to operate at wavelengths up to 5 cm. The mirror of the Arecibo telescope is not parabolic, but rather spherical, and the antenna is equipped with a movable transmitter system, which allows observations to be made in an area with a radius of 20° around the zenith.



Parabolic antenna. One of VLA's 27 antennas.

The radio signals coming from these antennas aimed at a space radio source are added and analyzed on a computer, and a radio map of the radio source is created, in which

the radio temperature distribution is checked. Such a radio telescope is called based on the synthesis (additive analysis) of apertures (many antennas). Radio source signals fall on the antennas of such radio telescopes for 12 hours (from the time the radio source rises above the horizon to the time it sinks) at different angles and are recorded. The measurement results collected during half a day are analyzed on a computer and a radio map of the radio source is created. In such maps, the internal structure of the radio source was studied in high resolution.

Radio astronomy is one of the new directions of astronomy . It spans the frequency range from a few megahertz (MHz - 100 m) to about 300 MHz (1 mm), thus extending the observable electromagnetic spectrum by several orders of magnitude. The lower-frequency limit of the radio range is determined by the opacity of the ionosphere, and the higher-frequency limit is determined by the strong absorption bands of oxygen and water in the lower layers of the atmosphere. But none of these limitations are absolute, and under favorable conditions radio astronomers can work through holes in the ionosphere in the submillimeter region or during sunspot minima.

The largest fully manned radio telescope is the Green Bank Telescope, built in late 2000 in Virginia, USA. It is slightly asymmetric and has a diameter of 100-110 meters. The Green Bank Telescope was preceded by the Effelsberg Telescope in Germany for about 20 years. Its antenna was parabolic and had a diameter of 100 meters. The inner 80-meter dish is made of flat, continuous aluminum panels , while the outer part of the disc has a metal grid structure. Using only the inner part of the telescope, it was possible to observe the wavelength range up to 4 mm. The oldest and perhaps most famous large radio telescope is the 76-meter antenna at Jodrell Bank in Britain, which was completed in the late 1950s.

The RT-70 radio telescope project on the Suffa Plateau of Uzbekistan was started in the mid-80s. At that time, he appeared as an absolute leader in the world. I would like

to note that the object is well preserved, it can be continued to be built. If our scientists have such a tool, many things will change. In addition, it joins the family of such devices, significantly complementing it. World science is interested in this.

References

1. Sattorov I. Astrophysics. Textbook for students of higher educational institutions. Ministry of Higher and Secondary Special Education of the Republic of Uzbekistan . — T.: "Educational Publishing House", "Economics- Finance". 2009.
2. Mamadazimov Mamadmusa «Umumiy astronomiya». «Yangi asr avlodi», 2008-yil.
3. M.Kuchkorov, M.Erkinova, “The role of didactic materials in the process of teaching physics”, “Galaxy international interdisciplinary research journal (GIIRJ)” – 2023.
4. I.Eshboltayev, M.Erkinova, “Application of differential equations to physical examples in the study of harmonic vibrations”, “International Journal of Education” – 2024.
5. I.Eshboltayev, M.Erkinova, “Application of differential equations to physical examples in the study of damped vibrations”, “International Journal of Education” – 2024.
6. I.Eshboltayev, M.Erkinova, “Application of differential equations to physical examples in the study of forced vibrations without taking into account the resistance of the medium”, “International Journal of Education” – 2024.

VOLTAGE STABILIZERS AND THEIR TYPES

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Abstract: This article analyzes the structure and operating principles of various voltage stabilizers. Their main advantages and disadvantages are presented. Furthermore, the fields of their application are provided depending on quality indicators.

Keywords: voltage deviation, voltage fluctuations, voltage stabilizer, electrical networks.

Annotatsiya: Ushbu maqolada turli kuchlanish stabilizatorlarning tuzilishi va ishlash tamoyillari tahlil qilingan. Ularning asosiy afzalliklari hamda kamchiliklari keltirilgan. Shuningdek, ularning sifat ko'rsatgichlariga bog'liq holda qo'llanilish sohalari keltirilgan.

Kalit so'zlar: kuchlanish og'ishi, kuchlanish tebranishlari, kuchlanish stabilizatori, elektr tarmoqlari

Tarmoq kuchlanishlari bilan bog'liq bo'lgan muammolar, ya'ni kuchlanishning keskin tushib ketishi, keskin oshib ketishi, signal shaklining buzilishi maishiy va turli jihozlarning ishlashiga salbiy ta'sir qiladi. Xozirgi kunda tarmoqdagi o'zgarishlarning salbiy ta'sirlarini kamaytiruvchi yoki to'liq bartaraf qiladigan texnik vositalarga talab kattadir. Shunday texnik vositalardan biri kuchlanish stabilizatori hisoblanadi. Uning asosiy vazifasi tarmoqdan kelayotgan kuchlanishning qiymati og'ganda yuklamani ta'minlab turgan chiqish kuchlanishini kerakli qiymatda ushlab turishdan iborat bo'ladi.

Kuchlanish stabilizatorni ishlab chiqaruvchilar turli ko‘rinishdagi stabilizatorlarni foydalanuvchilarga taqdim qilishgan. Ularning turlari oddiy sohalarda qo‘llaniladigandan boshlab, alohida tibbiyot, aloqa va energiya sohalarida qo‘llaniladigan maxsus turlarini qamrab oladi. Xozirgi kunda kuchlanish stabilizatorlarning releli, elektron hamda inverterli turlarini uchratishimiz mumkin. Mazkur stabilizatorlar o‘zining ishlash tamoyiliga bog‘liq holda elektr ta‘minot sifati bilan bog‘liq muammolarni hal qiladi.

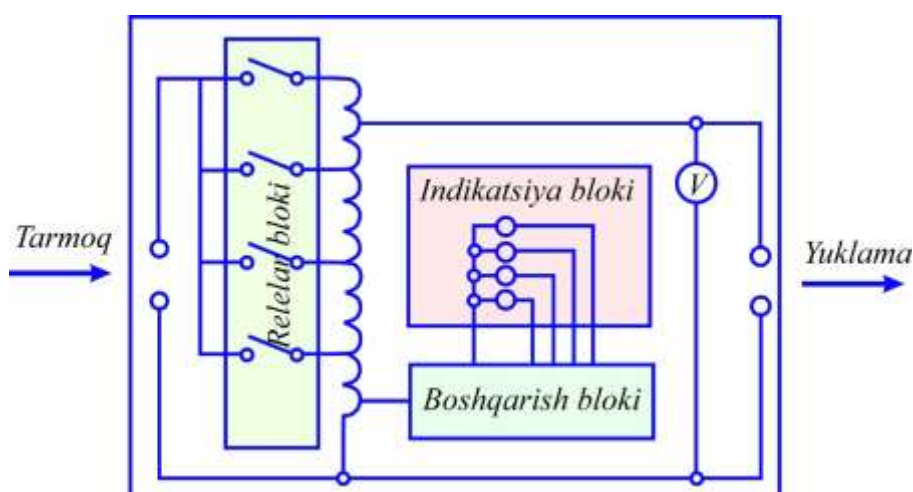
Releyli turdagi stabilizatorlarda tarmoq kuchlanishini to‘g‘rilashda transformatorli texnologiya qo‘llanilgan. Uning tarkibida avtotransformator, katta quvvatli rele bo‘g‘ini va boshqarish tizimi bo‘ladi.

Bu turdagi stabilizatorlarda barqarorlashtirish jarayoni transformator orqali bajariladi. Stabilizatorning boshqarish tizimi tarmoqdan kelayotgan kirish signallarining qiymatini uzluksiz tarzda tahlil qiladi va kuchlanishning qiymati oshib ketishi yoki kamayishi yuz berganda katta quvvatli rele kirish kuchlanishi nominal qiymatga yaqin bo‘lishi uchun transformator cho‘lg‘a-mining kerakli bo‘lagiga uzib ulaydi.

Kuchlanishni rostlanishi pog‘onali amalga oshirilganligi uchun tarmoq parametrlarini o‘zgarishiga javob ushlanish bilan yuz beradi. Tezkorlikni yetarli darajada bo‘lmaganligi sababli kuchlanishni birdan oshib ketishi yoki tushib ketishidan himoyani to‘laqonli ta‘minlay olmaydi. Elektr tarmoqda tez-tez bo‘lib turadigan kuchlanish sakrashlari katta quvvatli relening ishlash sifatini pasaytiradi va uning yemirilishini tezlashtiradi [1].

Rele turdagi stabilizatorlarning chiqish signalining aniqligi rostlash pog‘onasining soniga va uning tezliga bog‘liq bo‘ladi [2]. Chiqish signalining xatoligi nominal qiymatning 10% ga borishi mumkin. Bu esa elektr sezgin qurilmalarning elektr ta‘minoti uchun to‘g‘ri kelmaydi. Signallarni to‘g‘rilashning diskretligi tufayli elektr ta‘minotda mikrouzilishlar va chiqish signalining shaklini buzilishi yuz beradi.

Signallarni to'g'rilash vaqtida transformator cho'lg'amlarining bo'laliga uzib ulashda katta quvvatli rele bo'g'ini ichidan tovush chiqadi. Shuning uchun ular ko'proq bo'sh xonalarga qo'yiladi. Bu turdagi stabilizatorlar asosan elektr ta'minot sifatiga talab yo'q bo'lgan yuklamalarni himoya qilishda ishlatilishi mumkin.



1-rasm. Rele turidagi stabilizator tuzilishi

Elektron stabilizatorning farqi qiladigan tomoni, ularda rele o'rniga yarimo'tkazgichli kalitlardan foydalaniladi [3]. Elektron stabilizator quyidagilardan tashkil topgan bo'ladi: kirish va chiqish kuchlanishining o'lchagichi; o'lchagichdan kelayotgan ma'lumotlarni tahlil qiladigan va kerak bo'lganda kuchlanish o'zgartirish jarayonini ishga tushuradigan boshqarish mikrosxemasi; kuchlanishni rostlash uchun cho'lg'amlarni uzib-ulash imkoniyatiga ega bo'lgan transformator; cho'lg'amlarni uzib-ulashini boshqaradigan elektron kalitlar bloki. Elektron kalit sifatida tiristorlar yoki simistorlar ishlatiladi hamda boshqarish signallari orqali ulanishi amalga oshiriladi [4].

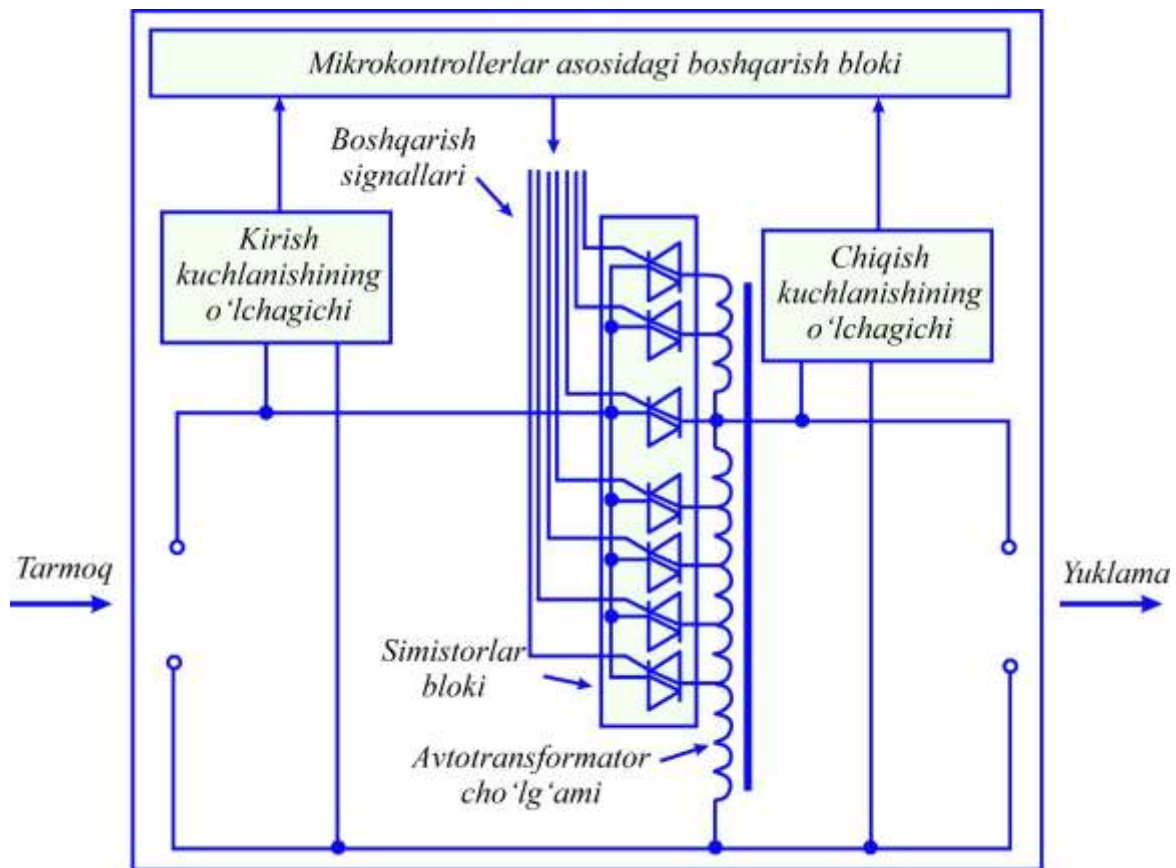
Elektron kalitlar katta quvvatli rele bilan solishtirganda kichik o'lchamga ega bo'ladi. Shuning uchun qurilma o'lcham bo'yicha kichik bo'ladi. Mazkur stabilizatorning sxemasida harakatlanuvchi elementlar bo'lmaydi. Shuning uchun ular ishonchli va shovqinsiz bo'ladi. Rele sxemasiga kabi elektron turdagi stabilizatorlarda ham

kuchlanishni to'g'rilash pog'onali bo'ladi. Kuchlanishni rostlash oxistaroq bo'lsada, elektr sezgir yuklamada xalaqitlarni yuzaga keltiradi.

Transformator cho'lg'amlar soni ko'pligi va ularni uzib-ulanish tezligi kattaligi (o'rtacha 10 ms ni tashkil qiladi) keskin sakrashlarni bartaraf qilish va kirish signalini yuqori aniqlikda to'g'rilashga imkon beradi. Mazkur turdagi stabilizatorlarda kirish kuchlanishining o'rtacha oralig'i $130\div 270$ V ni, chiqish signalining hatoligi 5% ni tashkil qiladi. Biroq tarmoq kuchlanishini sezilarli darajada kamayganda uni bartaraf qilishni uddasidan chiqolmaydi. Kirish signalining barqarorlashtirish aniqligi volt sifatiga sezgir bo'lgan iste'molchilar uchun yetarli bo'lmaydi. Bu turdagi stabilizatorlar quyidagi jihozlar bilan ishlatishga tavsiya qilinmaydi:

- Tarkibida elektr motor bo'lgan qurilmalarda – chiqish kuchlanishi noto'g'ri shaklga ega bo'lishi motorni ishdan chiqishiga olib kelishi mumkin;
- Audio va video qurilmalarda – pog'onali uzib-ulashda yuzaga keladigan xalaqitlar surat va tovush sifatida salbiy ta'sir qiladi;
- Kompyuter – kuchlanishni pog'onali rostlash beradigan aniqlik yetarli bo'lmaydi.

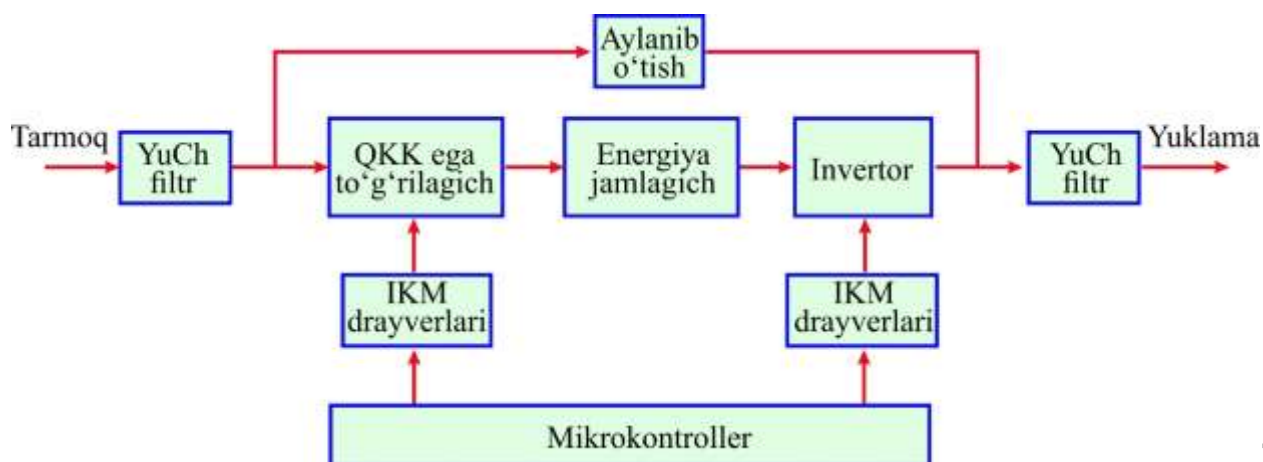
Elektron turdagi stabilizatorning asosiy kamchiligi chiqish kuchlanishining shakli nosinusoidal bo'lishi hisoblanadi. Kuchlanishning shakli katta quvvatli kalitlar, simistor yoki tiristorlar tomonidan hosil bo'ladi. Stabilizatorlarning ayrim modellari katta bo'lmagan yuklanish qobiliyatiga ega bo'ladi. Mazkur ko'rsatgich 40% ni tashkil qilishi mumkin. Katta darajadagi yuklanishlar katta quvvatli kalitlarni ishdan qiqishiga olib kelishi mumkin.



2-rasm. Elektron stabilizatorning tuzilishi

Xozirgi kunda yangi va butunlay boshqa ishlash tamoyiliga asoslangan invertorli stabilizatorlar ishlab chiqarilmoqda. Ular o'zidan avvalgi stabilizator turlarini qo'llanishdan siqib chiqarmoqda. Stabilizatorlarning boshqa turlaridan farqli ravishda, ularning tarkibida avtotransformatorlar va ular bilan moslashtirilgan uzib-ulovchi elementlar mavjud bo'lmaydi. Ularning o'rniga yarimo'tkazgichli asboblari asosida elektron sxema ishlab chiqilgan bo'lib, uning asosiy elementlari to'g'rilagich, invertor, energiya jamlash vazifasini bajaradigan oraliq kondensator va boshqaruvchi mikrokontroller bo'ladi.

Mazkur stabilizatorning ishlashi on-line turidagi uzluksiz ta'minot manbasida qo'llanilgan energiyani ikki marta o'zgartirish tamoyiliga asoslanadi [5].



3-

rasm. Invertorli stabilizatorning tuzilishi

To'g'rilagich energiyani dastlabki o'zgartirishni amalga oshiradi. U kirishdagi o'zgaruvchan kuchlanishni oraliq o'zgarmas kuchlanishga o'tkaziladi va kondensatorga yuboriladi. Kondensatorda elektr zaryad jamlanadi. Buning hisobiga kuchlanishning uzluksiz barqaroligi ta'minlanadi. Invertorda energiyani ikkinchi marta o'zgartirilishi amalga oshiriladi. Mazkur o'zgartirish natijasida chiqishda kerakli texnik parametrga ega bo'lgan o'zgaruvchan kuchlanish olinadi. Bu turdagi stabilizatorida nafaqat kuchlanish qiymatining barqarorligi ta'minlanadi, balki chiqishda sinusoidal shakldagi kuchlanish olinishiga erishiladi.

1-jadvalda turli turdagi stabilizatorlarning o'zaro solishtirilishi keltirilgan bo'lib, ularning asosiy afzalliklari hamda kamchiliklari ko'rsatilgan.

Turi	Ishlash tamoyili	Afzalliklari	Kamchiliklari	Qo'llanilishi
Rele	Transformator cho'lg'amlarini uzib-ulaydigan reli bilan	Arzonligi, konstruksiyaning soddaligi, kirish kuchlanishining	Uzib-ulanishdagi shovqin, releni yemirilishi, pog'onali rostlash,	Maishiy qurilmalar

	pog'onali rostlash	oralig'i keng bo'lishi	aniqlikni cheklanganligi	
Elektron	Yarimo'tkazgic hli kalitlardan foydalangan holda kontaktsiz rostlash	Shovqinsiz, yuqori aniqlik, xizmat ko'rsatish vaqtining kattaligi, tezkor javob	Narxning yuqoriligi, ta'mirlashning murakkabligi, yuklanishlarga sezgir	Sezgir texnika
Invertorl i	Kuchlanishni ikki marta o'zgartirish	Mukammal barqarorlik, kirish kuchlanishining keng oralig'i, xalaqitlardan himoya	Narxning juda yuqoriligi, murakkab konstruksiya, sifatli xizmat ko'rsatishni talab qiladi	Tibbiyot qurilmalari, serverlar

Xulosa

Tarmoq kuchlanishning o'rnatilgan qiymatlardan kamayishi yoki oshib ketishi turli elektron qurilmalarning barqaror ishlashiga salbiy ta'sir ko'rsatadi. Muammoni bartaraf qilishning yechimlaridan biri kuchlanish stabilizatoridan foydalanish hisoblanadi. Turli ishlash tamoyiliga va qo'llash sohalariga ega bo'lgan kuchlanish stabilizatorlari mavjud bo'lib, tuzilishga bog'liq holda texnika parametrlari bir-biridan farq qiladi. Invertorli stabilizatorlardan foydalanishning o'ziga xos tomoni, ular nafaqat kuchlanishnnig o'rnatilgan qiymatini, balki uning shakli sinusoidal bo'lishini

ta'minlaydi. Sezgirligi yuqori bo'lgan tibbiyot qurilmalarning elektr ta'minotida inverterli stabilizatorlar foydalanish samarali hisoblanadi.

Foydalanilgan adabiyotlar

1. Batarseh I. Power Electronic Circuits. – Wiley, 2004.
2. Rashid M.H. Power Electronics: Circuits, Devices, and Applications. – 4th ed., Pearson, 2014.
3. Mohan N., Undeland T., Robbins W. Power Electronics: Converters, Applications and Design. – 3rd ed., Wiley, 2003.
4. Bose B.K. Modern Power Electronics and AC Drives. – Prentice Hall, 2002.
5. Maksimović D., Erickson R. Digital Control of High-Frequency Switched-Mode Power Converters. – IEEE Press, 2005.

**Unification of Terms and the Formation of a Domain Thesaurus:
Theoretical and Practical Approaches**

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Abstract

This article analyzes the theoretical and practical foundations of term unification, the improvement of the Uzbek terminological system, and the development of domain-specific thesauri. It examines issues such as synonymy, polysemy, and translation inaccuracies. The role of a thesaurus in standardizing scientific language and organizing terminology is substantiated. The results show that thesaurus development is an important direction in modern linguistics.

Keywords:

terminology, thesaurus, unification, synonymy, monosemanticity, lexicography, scientific language, standardization

**TERMINLAR UNIFIKATSIYASI VA SOHA TEZAVRUSINING
SHAKLLANISHI: NAZARIY VA AMALIY YONDASHUVLAR**

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Annotatsiya. Mazkur maqolada o'zbek tilida terminologik tizimni takomillashtirish, terminlar unifikatsiyasi hamda soha tezaurusini yaratishning nazariy va amaliy asoslari yoritiladi. Terminologiyada sinonimiya, ko'p ma'nolilik (polisemantiklik) va tarjima noaniqliklari bilan bog'liq muammolar tahlil qilinadi. Shuningdek, tezaurusning ilmiy tilni standartlashtirish, terminlar tizimini tartibga solish hamda ularning o'zaro semantik aloqalarini aniqlashdagi o'rni asoslab beriladi. Tadqiqot natijalari tezaurus yaratish zamonaviy tilshunoslikning muhim yo'nalishlaridan biri ekanini ko'rsatadi.

Kalit so'zlar: terminologiya, tezaurus, unifikatsiya, sinonimiya, bir ma'nolilik, leksikografiya, ilmiy til, standartlashtirish

Аннотация

В статье рассматриваются теоретические и практические основы унификации терминов, совершенствования терминологической системы узбекского языка и создания отраслевого тезауруса. Анализируются проблемы синонимии, полисемии и неточностей перевода. Обосновывается роль тезауруса в стандартизации научного языка и систематизации терминологии. Результаты исследования показывают, что разработка тезауруса является важным направлением современной лингвистики.

Ключевые слова: терминология, тезаурус, унификация, синонимия, моносемантичность, лексикография, научный язык, стандартизация

Kirish

Globallashuv va raqamli texnologiyalar jadal rivojlanayotgan hozirgi davrda milliy tillarning ilmiy salohiyatini oshirish dolzarb vazifalardan biridir. O'zbek tilining davlat tili sifatidagi maqomini mustahkamlash, uning ilmiy va kasbiy kommunikatsiyadagi imkoniyatlarini kengaytirish terminologik tizimning mukammalligiga bevosita bog'liq.

Terminologiya har qanday ilmiy sohaning asosiy tarkibiy qismi bo'lib, u orqali tushunchalar aniq va ixcham ifodalanadi. Terminlar tizimi izchil va yagona bo'lmagan

hollarda ilmiy muloqotda tushunmovchiliklar yuzaga keladi. Shu sababli terminlarni unifikatsiya qilish, ya'ni ularni yagona shakl va ma'noda qo'llash masalasi muhim ahamiyat kasb etadi.

Hozirgi kunda o'zbek tilida turli sohalarga oid terminologik lug'atlar mavjud bo'lsa-da, ko'p hollarda bir tushuncha uchun bir nechta termin variantlari qo'llanadi. Bu esa terminlar tizimining barqarorligiga salbiy ta'sir ko'rsatadi. Mazkur muammoni hal etishda soha tezaurusini yaratish samarali vosita hisoblanadi.

Metodlar

Tadqiqot jarayonida quyidagi ilmiy metodlardan foydalanildi:

1. Tahliliy metod – ilmiy maqolalar, terminologik lug'atlar va normativ hujjatlar tahlil qilindi.
2. Qiyosiy metod – turli manbalarda uchraydigan termin variantlari o'zaro solishtirildi.
3. Leksik-semantik tahlil – terminlarning ma'no doirasi, aniqligi va qo'llanish xususiyatlari o'rganildi.
4. Sistemaviy yondashuv – terminologiya yagona tizim sifatida tahlil qilindi va uning ichki aloqalari aniqlashtirildi.
5. Deskriptiv metod – mavjud holat tavsiflanib, asosiy muammolar belgilab olindi.

Natijalar

Terminologiyada sinonimiya muammosi

Terminologik tizimda sinonimiya nomaqbul hodisa hisoblanadi, chunki:

- termin bir ma'noli bo'lishi kerak;
- sinonim variantlar ilmiy aniqlikni pasaytiradi;
- turli shakllar tushunmovchiliklarni keltirib chiqaradi.

Masalan, bir tushuncha uchun bir nechta variant qo'llanadi:

- “ish yurituvchi” / “ish boshqaruvchi”;

- “gaz niqobi” / “gazli niqob”.

Bunday holatlar terminlar tizimining barqarorligini buzadi.

Tarjima bilan bog‘liq muammolar

Xorijiy tillardan kirib kelgan terminlar ba’zan noto‘g‘ri yoki noaniq tarjima qilinadi:

- противогаз → gaz niqobi
- супруги → er-xotin;
- kidnapping → odam o‘g‘irlash.

Noto‘g‘ri tarjima terminning asl mazmunini buzadi va noto‘g‘ri tushunchalarga olib keladi.

Tezaurusning afzalliklari

Soha tezaurusi quyidagi imkoniyatlarni ta’minlaydi:

- terminlarni tizimlashtirish;
- sinonimiyani kamaytirish;
- tushunchalar o‘rtasidagi semantik aloqalarni aniqlash;
- ilmiy tilni standartlashtirish.

Muhokama

Tezaurus oddiy lug‘atdan farqli ravishda, nafaqat so‘zlarning ma’nosini, balki ularning o‘zaro semantik bog‘liqligini ham ko‘rsatadigan murakkab tizimdir. U ilmiy tafakkurning strukturaviy modelini aks ettiradi.

Tezaurusning asosiy funksiyalari:

- terminlarni tartibga solish;
- bilimlarni tizimlashtirish;
- ilmiy muloqotni optimallashtirish;
- axborot izlash jarayonini yengillashtirish.

Xalqaro tajriba

Rivojlangan mamlakatlarda, xususan, Yevropa davlatlari va AQShda soha tezauruslari:

- sun'iy intellekt tizimlarida,
- elektron kutubxonalarda,
- ilmiy ma'lumotlar bazalarida keng qo'llaniladi.

Bu tajriba o'zbek tilida ham zamonaviy tezauruslar yaratish zarurligini ko'rsatadi.

Amaliy tavsiyalar

- har bir soha bo'yicha alohida tezauruslar yaratish;
- terminlarni standartlashtirish bo'yicha ilmiy komissiyalar faoliyatini

kuchaytirish;

- tarjima jarayonini ilmiy asosda nazorat qilish;
- raqamli tezaurus platformalarini ishlab chiqish.

Xulosa

Terminlar unifikatsiyasi va soha tezaurusini yaratish ilmiy tilni rivojlantirishning muhim omillaridan biridir. Tadqiqot natijalari quyidagilarni ko'rsatadi:

- terminlar tizimida izchillik yetarli darajada emas;
- sinonimiya va tarjima xatolari mavjud;
- tezaurus ushbu muammolarni bartaraf etishda samarali vosita hisoblanadi.

Shu sababli, o'zbek tilining barcha ilmiy sohalari uchun tizimli va zamonaviy tezauruslar yaratish dolzarb vazifa hisoblanadi. Bu ilmiy muloqotni takomillashtirish bilan birga, tilning xalqaro nufuzini oshirishga ham xizmat qiladi.

Foydalanilgan adabiyotlar:

1. Reformatskiy A.A. *Terminologiya masalalari*. — Moskva, 1986.
2. Vinogradov V.V. *Tilshunoslik asoslari*. — Moskva, 1972.
3. *O'zbek tilining izohli lug'ati*. — Toshkent, 2006.
4. Sager J.C. *A Practical Course in Terminology Processing*. — Amsterdam, 1990.

THE ROLE AND PROBLEMS OF TRANSLATION IN THE INTERNATIONAL BANKING SYSTEM

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Abstract

This article examines the theoretical and practical significance of translation in the international banking system. It argues that the effectiveness of interbank communication in the context of global financial integration directly depends on the quality of translation. The study explores the complexity of financial terminology, linguistic and cultural differences, as well as the capabilities and limitations of automated translation tools. Scientific and practical recommendations for addressing these challenges are proposed.

Keywords: international banking system, financial translation, terminology, discourse, linguistics, standardization, artificial intelligence.

XALQARO BANK TIZIMIDA TARJIMANING O‘RNI VA MUAMMOLARI

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Annotatsiya

Mazkur maqolada xalqaro bank tizimida tarjimaning nazariy va amaliy ahamiyati tahlil qilinadi. Global moliyaviy integratsiya sharoitida banklararo kommunikatsiya samaradorligi bevosita tarjima sifati bilan bog‘liqligi asoslab beriladi. Tadqiqotda moliyaviy terminologiyaning murakkabligi, lingvistik va madaniy tafovutlar, shuningdek, avtomatlashtirilgan tarjima vositalarining imkoniyat va cheklovlari ko‘rib chiqiladi. Muammolarni bartaraf etish bo‘yicha ilmiy-amaliy takliflar ilgari suriladi.

Kalit so‘zlar: xalqaro bank tizimi, moliyaviy tarjima, terminologiya, diskurs, lingvistika, standartlashuv, sun‘iy intellekt.

Аннотация

В данной статье анализируется теоретическое и практическое значение перевода в международной банковской системе. Обосновывается, что эффективность межбанковской коммуникации в условиях глобальной финансовой интеграции напрямую зависит от качества перевода. Рассматриваются сложность финансовой терминологии, лингвистические и культурные различия, а также возможности и ограничения автоматизированных систем перевода. Предлагаются научно-практические рекомендации по решению выявленных проблем.

Ключевые слова: международная банковская система, финансовый перевод, терминология, дискурс, лингвистика, стандартизация, искусственный интеллект.

Kirish

Zamonaviy global iqtisodiyot sharoitida xalqaro bank tizimi davlatlar o‘rtasidagi moliyaviy integratsiyaning asosiy mexanizmlaridan biri sifatida faoliyat yuritadi. Xalqaro kreditlash, investitsiya loyihalari, valyuta operatsiyalari va transchegaraviy to‘lovlar doimiy ravishda turli til muhitida amalga oshiriladi. Shu sababli, ko‘p tilli kommunikatsiya jarayonida tarjima instituti muhim o‘rin egallaydi.

Tarjima nafaqat axborotni uzatish vositasi, balki iqtisodiy xavfsizlikni ta'minlovchi omil sifatida ham qaraladi. Xususan, bank tizimida yuzaga keladigan terminologik noaniqliklar yoki noto'g'ri talqinlar millionlab dollar miqdoridagi yo'qotishlarga sabab bo'lishi mumkin. Shu bois tarjima jarayonining ilmiy asoslarini o'rganish va amaliy jihatdan takomillashtirish dolzarb masalalardan biri hisoblanadi.

Tarjima nazariyasida ekvivalentlik (equivalence), adekvatlik (adequacy) va funksional moslik tushunchalari markaziy o'rinni egallaydi. Moliyaviy tarjimada ushbu tushunchalar alohida ahamiyat kasb etadi, chunki bu sohada semantik aniqlik ustuvor hisoblanadi.

Moliyaviy diskursning o'ziga xos xususiyati shundaki, unda terminlar qat'iy normativ ma'noga ega bo'ladi. Masalan, "liquidity", "assets", "equity" kabi terminlar nafaqat lug'aviy, balki iqtisodiy kontekstda ham aniqlik bilan ifodalanishi lozim. Shu nuqtai nazardan, tarjimonning vazifasi oddiy til o'girish emas, balki mazmunni funksional jihatdan to'g'ri yetkazishdan iborat.

Bundan tashqari, zamonaviy tarjima nazariyasida diskursiv yondashuv ham muhim hisoblanadi. Ya'ni matn alohida gaplar yig'indisi emas, balki muayyan kommunikativ vazifani bajaruvchi yaxlit tizim sifatida qaraladi. Xalqaro bank matnlarida bu tizim huquqiy, iqtisodiy va institutsional omillar bilan chambarchas bog'liq.

Xalqaro bank tizimida tarjimaning funksional roli:

1. Shartnomaviy-huquqiy hujjatlar tarjimasi

Xalqaro bank faoliyatida kredit shartnomalari, kafolat bitimlari, sug'urta hujjatlari va investitsiya kelishuvlari asosiy o'rin tutadi. Ushbu hujjatlar ko'pincha bir nechta tillarda tuziladi va ularning har biri huquqiy kuchga ega bo'ladi.

Tarjima jarayonida biror terminning noto'g'ri talqini shartnoma majburiyatlarining noto'g'ri tushunilishiga olib kelishi mumkin. Masalan, ingliz tilidagi "shall" va "may"

yordamchi fe'llari huquqiy majburiyat darajasini ifodalashda keskin farq qiladi. Ularning noto'g'ri tarjimasi huquqiy nizolarni keltirib chiqarishi ehtimoldan xoli emas.

2. Xalqaro moliyaviy kommunikatsiya

Banklararo yozishmalar, rasmiy bayonotlar va muzokaralar tarjima orqali amalga oshiriladi. Ushbu jarayonda tarjima nafaqat til vositasi, balki diplomatik va strategik kommunikatsiya vositasi sifatida xizmat qiladi.

Xususan, xalqaro moliyaviy tashkilotlar bilan olib boriladigan muzokarlarda tarjimaning aniqligi muhim ahamiyatga ega. Noto'g'ri tarjima investorlar ishonchining pasayishiga yoki noto'g'ri qarorlar qabul qilinishiga olib kelishi mumkin.

3. Raqamli bank tizimlarida tarjima

So'nggi yillarda fintech va raqamli bank xizmatlarining rivojlanishi tarjimaga yangi talablarni qo'ymoqda. Mobil ilovalar, onlayn platformalar va avtomatlashtirilgan to'lov tizimlari ko'p tilli interfeysga ega bo'lishi zarur.

Foydalanuvchi interfeysida tarjimaning sifati mijoz tajribasiga bevosita ta'sir qiladi. Masalan, noto'g'ri tarjima qilingan menyular yoki tushunarsiz terminlar foydalanuvchilarning xizmatdan foydalanishiga to'sqinlik qiladi va bank imijiga salbiy ta'sir ko'rsatadi.

4. Xalqaro standartlar va hisobot tizimi

Xalqaro moliyaviy hisobot standartlari (IFRS) asosida tayyorlanadigan hujjatlar ko'plab tillarga tarjima qilinadi. Ushbu jarayonda terminologik izchillikni saqlash muhim ahamiyatga ega.

Standartlarning noto'g'ri tarjimasi moliyaviy hisobotlarning noto'g'ri talqin qilinishiga olib keladi, bu esa investorlar va nazorat organlari uchun noto'g'ri xulosalar chiqarilishiga sabab bo'lishi mumkin.

Tarjimadagi asosiy muammolar

1. Terminologik muammolar

Moliyaviy terminologiya yuqori darajada ixtisoslashgan bo'lib, ko'pincha to'g'ridan-to'g'ri ekvivalentga ega emas. Bunday hollarda tarjimon adaptatsiya yoki izohli tarjima usullaridan foydalanishga majbur bo'ladi.

2. Lingvokulturologik tafovutlar

Turli mamlakatlarning bank tizimlari o'rtasidagi farqlar tarjima jarayonida qiyinchilik tug'diradi. Masalan, ayrim moliyaviy instrumentlar bir davlatda mavjud bo'lsa, boshqasida umuman qo'llanilmasligi mumkin.

3. Sintaktik va stilistik murakkablik

Moliyaviy matnlar ko'pincha murakkab gap tuzilishiga ega bo'lib, ularni boshqa tilga o'girishda mazmunni yo'qotmaslik muhim.

4. Texnologik muammolar

Sun'iy intellekt asosidagi tarjima tizimlari (Google Translate, DeepL va boshqalar) umumiy matnlar uchun samarali bo'lsa-da, tor ixtisoslashgan moliyaviy matnlarda xatoliklarga yo'l qo'yadi. Bu esa inson tarjimonining rolini hali ham dolzarb qilib qolmoqda.

Yechimlar va rivojlanish istiqbollari

1. Ta'lim tizimini takomillashtirish

Moliyaviy tarjima bo'yicha maxsus o'quv dasturlarini joriy etish zarur.

2. Terminologik bazalar yaratish

Yagona elektron lug'atlar va korpuslar tarjima sifatini oshirishga xizmat qiladi.

3. Texnologiyalarni integratsiya qilish

Sun'iy intellekt va inson tarjimasi uyg'unligi eng samarali model hisoblanadi.

4. Xalqaro hamkorlik

Banklar va ilmiy markazlar o'rtasida tajriba almashish muhim ahamiyatga ega.

Xulosa

Xalqaro bank tizimida tarjima iqtisodiy integratsiyaning muhim komponenti hisoblanadi. Tadqiqot natijalari shuni ko'rsatadiki, tarjima sifati moliyaviy barqarorlik, huquqiy aniqlik va kommunikatsiya samaradorligiga bevosita ta'sir ko'rsatadi.

Kelajakda ushbu sohada sun'iy intellekt texnologiyalarining roli oshishi kutilmoqda, biroq inson omili hal qiluvchi ahamiyatga ega bo'lib qoladi. Shu bois, kompleks yondashuv — ya'ni ilmiy tadqiqotlar, amaliy tajriba va texnologik innovatsiyalar uyg'unligi muhimdir.

Adabiyotlar ro'yhati:

1. Nida, E.A., & Taber, C.R. (1964). The Theory and Practice of Translation. Leiden: Brill. — 220 p.
2. Komissarov, V.N. (1990). Teoriya perevoda (lingvisticheskie aspekty). Moskva: Visshaya shkola. — 253 s.
3. Reiss, K., & Vermeer, H.J. (1984). Grundlegung einer allgemeinen Translationstheorie. Tübingen: Niemeyer. — 278 p.
4. Forbes, M. (2010). Financial Translation Explained. London: Bloomsbury Academic. — 312 p.
5. Chesterman, A. (2016). Memes of Translation: The Spread of Ideas in Translation Theory. Amsterdam: John Benjamins. — 248 p.
6. Kockaert, H.J., & Steurs, F. (2014). Handbook of Terminology. Amsterdam: John Benjamins Publishing. — 385 p.
7. Baker, M. (2011). In Other Words: A Coursebook on Translation. 2nd ed. London: Routledge. — 320 p.

ANALYSIS OF DYNAMIC FLOW SECURITY MANAGEMENT ALGORITHMS IN SOFTWARE-DEFINED NETWORKING (SDN) ENVIRONMENTS

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Abstract. While Software-Defined Networking (SDN) offers flexibility by decoupling control and data planes, architectural centralization increases vulnerability to Distributed Denial of Service (DDoS) attacks targeting the core controller. This study evaluates a Shannon entropy-based dynamic filtering model for real-time anomaly isolation within OpenFlow-based SDNs. Simulations utilizing Mininet and the Ryu controller demonstrated that the system identifies anomalous flows in under 12 milliseconds. The algorithmic intervention reduced controller CPU utilization from 98% to 42%, preserving legitimate throughput at 91.5%. Transitioning to dynamic reactionary algorithms represents a fundamental strategic solution for ensuring centralized network continuity.

Keywords: SDN, OpenFlow, dynamic routing, cybersecurity, flow table, Shannon entropy, DDoS.

Annotatsiya. Dasturiy ta'minot bilan boshqariladigan tarmoqlar (SDN) boshqaruv va ma'lumotlar tekisligini ajratish orqali moslashuvchanlikni ta'minlasa-da, markaziy kontrollerga qaratilgan DDoS xurujlarga nisbatan zaiflikni oshiradi. Mazkur tadqiqot OpenFlow protokoli asosida oqimlar xavfsizligini dinamik boshqarish uchun Shennon entropiyasiga tayanuvchi modelni baholaydi. Mininet va Ryu kontrolleri yordamida o'tkazilgan simulyatsiyalar tizim anomal oqimlarni 12 millisekunddan kam vaqtda aniqlashini isbotladi. Algoritmik aralashuv kontrollerning CPU yuklamasini 98% dan 42% gacha tushirdi va tranzaksiyalar o'tkazuvchanligini 91.5% darajasida saqlab qoldi.

Oqimlarni dinamik boshqarishga o'tish markazlashgan infratuzilmalarning operatsion uzluksizligini kafolatlovchi strategik yechimdir.

Kalit so'zlar: SDN, OpenFlow, dinamik marshrutlash, kiberxavfsizlik, oqimlar jadvali, Shennon entropiyasi, DDoS.

Kirish. Dasturiy ta'minot bilan boshqariladigan tarmoqlar (SDN) boshqaruv (control plane) va ma'lumotlarni yo'naltirish (data plane) qatlamlarini ajratish orqali tarmoq resurslarini optimallashtirish imkonini beradi. Arxitekturaviy markazlashuv tizimning asosiy zaif nuqtasini ham yuzaga keltirib, kontroller kiberjinoyatchilarning nishoniga aylanadi. Xakerlar IP manzillarni soxtalashtirish (spoofing) orqali tarmoqqa minglab noma'lum paketlarni yuborishadi, natijada kommutator har bir yangi paket uchun kontrollerga "Packet-In" so'rovini jo'natishga majbur bo'ladi. Bu holat kontrollerning resurslarini yeb bitiradi va TCAM xotirasini soxta qoidalar bilan to'ldirib tashlaydi. Tadqiqot maqsadi SDN muhitida kontroller resurslarini zoriqtirmaydigan, matematik yengil va real vaqtda o'z-o'zini moslashtiruvchi dinamik algoritmik arxitekturani ishlab chiqish va sinovdan o'tkazishdir.

Materiallar va metodlar. Kvazi-eksperimental simulyatsiya izolyatsiya qilingan Mininet (v 2.3.0) virtual tarmoq laboratoriyasida, Python tilidagi ochiq kodli Ryu kontrolleri hamda OpenFlow 1.3 protokoli yordamida amalga oshirildi. Oqimlarni tahlil qilish uchun kontroller yadrosiga Shennon entropiyasi algoritmi integratsiya qilindi. Algoritm tarmoqdagi Destinatsiya IP manzillari (DIP) va Portlari (DP) bo'yicha ehtimollik taqsimotini hisoblaydi. DDoS hujum yuz berganda, oqimlar taqsimotidagi xilma-xillik keskin kamayib, entropiya qiymati tushib ketadi.

Kuzatish oynasi (1 soniya) davomida H qiymati dinamik ostonaviy me'yordan (Threshold) pastga tushsa, anomaliya rejimi faollashadi. Kontroller zudlik bilan hujumchi IP manzillar uchun eng yuqori ustuvorlikdagi "Drop" qoidasini yaratib, to'g'ridan-to'g'ri chetki kommutatorga (TCAM xotirasini tejovchi timeout parametrlari

bilan) o'rnatadi.

Natijalar. Oddiy yuklama rejimida Ryu kontrollerining CPU sarfi 12-15% ni tashkil qilib, oqimlarni yo'naltirish tezligi 980 Mbps gacha yetdi. Himoya algoritmlari o'chirilgan holatda tarmoqqa 50k pps SYN Flood hujumi yuborilganda, kontrollerning CPU sarfi 98% gacha keskin ko'tarildi, qonuniy foydalanuvchilarning paketlarini yo'naltirish 64% ga qisqardi, kechikish esa 2 ms dan 415 ms gacha sakradi.

Shannon entropiyasi algoritmi faollashtirilgach, tizim entropiya indeksining keskin qulashini 12 millisekund o'tib qayd etdi va himoya mexanizmini ishga tushirdi. Algoritmik aralashuv natijasida:

- Kontrollerga kelayotgan zararli so'rovlar 87% ga bloklandi.
- Kontroller CPU yuklamasi xavfsiz 42% gacha pasayib, barqarorlashdi.
- Qonuniy tranzaksiyalarning o'tkazish qobiliyati 91.5% saqlab qolindi.
- TCAM xotirasi dinamik tozalash evaziga faqatgina 35% to'ldi.

Algoritmik tahlilning o'zi tarmoq kechikishiga o'rtacha 1.6 ms qo'shimcha vaqt qo'shgan bo'lsa-da, bu kontroller falajlanishining oldini olish evaziga keladigan ulkan operatsion foyda bilan to'liq qoplanadi.

Muhokama. Eksperimental natijalar SDN arxitekturasida statik tarmoq ekranlari yirik DDoS hujumlari va flesh-kraud holatlarini farqlay olmasligini tasdiqlaydi. Entropiyaga asoslangan dinamik yondashuv paketlar soniga emas, xulq-atvori va taqsimot naqshlariga tayanadi. Bu algoritmnı nol-kun (zero-day) hujumlariga nisbatan o'ta samarali qiladi. Biroq, kam intensivlikdagi yashirin xurujlarni (Slowloris) aniqlash uchun tizimni Tasodifiy O'rmon (Random Forest) kabi Mashinali O'qitish tasniflagichlari bilan integratsiya qilish zarur.

Ilmiy yangilik va amaliy ahamiyati. Tadqiqotning ilmiy yangiligi anomal oqimlarni izolyatsiya qilish uchun ostonaviy qiymati o'z-o'zini moslashtiruvchi modifikatsiyalangan entropiya algoritmik ramkasini taklif etishidadir. Bu mexanizm

dasturiy kontroller yadrosiga og'ir analitik yuklama bermasdan ishlaydi. Amaliy jihatdan, ushbu arxitektura yirik telekommunikatsiya tarmoqlari va ma'lumotlarni qayta ishlash markazlarida qimmatbaho apparat tizimlarisiz kuchli kiber-mudofaani ta'minlash uchun aniq texnologik yo'riqnoma bo'lib xizmat qiladi.

Xulosa. Arxitekturaviy markazlashuv tizimli kiberxavfsizlik choralari qayta ko'rib chiqishni talab qiladi. Shennon entropiyasiga asoslangan oqimlarni dinamik boshqarish algoritmi zararli trafikni real vaqtda izolyatsiya qilishni avtomatlashtiradi, TCAM xotirasi to'lib qolishining oldini oladi va CPU resurslarini iqtisod qiladi. Zamonaviy korporativ tarmoqlarni modernizatsiya qilishda dinamik filtrlash algoritmlarini SDN kontrollerlariga majburiy integratsiya qilish barqarorlikni ta'minlovchi strategik imperativdir.

Foydalanilgan adabiyotlar

1. McKeown N, et al. OpenFlow: Enabling innovation in campus networks. *ACM SIGCOMM*. 2008;38(2):69-74.
2. Kreutz D, et al. Software-Defined Networking: A comprehensive survey. *Proceedings of the IEEE*. 2015;103(1):14-76.
3. Ahmad I, et al. Security in Software Defined Networks: A survey. *IEEE Communications Surveys & Tutorials*. 2015;17(4):2317-2346.
4. Bawany NZ, et al. DDoS attack detection and mitigation using SDN. *Arabian Journal for Science and Engineering*. 2017;42(2):425-441.
5. Wang R, et al. An entropy-based distributed DDoS detection mechanism in SDN. *IEEE Trustcom*. 2015;1:310-317.
6. Yan Q, et al. SDN and DDoS attacks in cloud computing environments. *IEEE Communications Surveys & Tutorials*. 2016;18(1):602-622.
7. Mousavi SM, St-Hilaire M. Early detection of DDoS attacks against SDN controllers. *ICNC*. 2015;1:77-81.
8. Cui N, et al. Intrusion detection system based on dynamic flow feature extraction in SDN. *Journal of Network and Computer Applications*. 2020;151:102500.

CLINICAL AND EPIDEMIOLOGICAL CHARACTERISTICS OF ODONTOGENIC PURULENT-INFLAMMATORY DISEASES IN CHILDREN

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Abstract. Odontogenic purulent-inflammatory diseases in children remain highly relevant due to their prevalence and risk of complications. This study analyzed 239 patients aged 3–17 years, considering age, gender, and premorbid background. The highest incidence was observed in adolescents (12–17 years), with a predominance of males. Premorbid conditions, particularly chronic tonsillitis, anemia, and ethmoiditis, were common and often combined. Submandibular and infraorbital phlegmons were the most frequent clinical forms. The findings emphasize the importance of early diagnosis and individualized treatment approaches in pediatric patients.

Keywords. Odontogenic infection, purulent-inflammatory diseases, children, phlegmon, premorbid background, comorbidity, maxillofacial region

Relevance. Odontogenic purulent-inflammatory diseases in children remain a significant problem in modern pediatric dentistry and maxillofacial surgery due to their high prevalence, rapid progression, and risk of severe complications. The course of these diseases is influenced by age-related anatomical and physiological characteristics, as well as by the presence of premorbid conditions. However, the clinical structure, distribution patterns, and the role of comorbid background in the development of odontogenic infections in children are still insufficiently studied.

Aim. To analyze the clinical and demographic characteristics of odontogenic purulent-inflammatory diseases in children, considering age, gender, and premorbid background.

Materials and methods. The study included 239 children aged 3 to 17 years diagnosed with odontogenic purulent-inflammatory diseases who were treated in the maxillofacial surgery department between 2021 and 2025. Additionally, 39 patients without premorbid pathology were included as a comparison group.

Patients were divided into three groups:

Group I (n=105) — patients with odontogenic infection complicated by phlegmon on a premorbid background, treated with a comprehensive approach including bacteriophage therapy and sea buckthorn oil;

Group II (n=95) — patients with premorbid background receiving conventional treatment;

Group III (n=39) — patients without premorbid pathology receiving standard therapy.

Clinical, demographic, and statistical analyses were performed.

Results. Odontogenic purulent-inflammatory diseases were most frequently observed in children aged 12–17 years (42.3%), followed by 7–11 years (34.7%) and 3–6 years (23.0%). A slight predominance of male patients was noted in the main (57.1%) and control (55.7%) groups, while females predominated in the comparison group (53.8%).

The analysis of comorbid conditions showed a high prevalence of premorbid pathology, with the most common conditions being chronic tonsillitis (15.5%), anemia (15.5%), and ethmoiditis (11.0%). In total, comorbidities exceeded 100%, indicating the presence of multiple concurrent conditions in many patients.

Among clinical forms, submandibular phlegmon (30.5%) and infraorbital phlegmon (24.3%) were the most common, together accounting for more than half of all cases.

Conclusion. Odontogenic purulent-inflammatory diseases in children are characterized by a predominance in older age groups, a high frequency of premorbid conditions, and a leading role of submandibular and infraorbital phlegmons. These findings emphasize the importance of early diagnosis and individualized treatment strategies considering systemic factors.

References

1. Bahl R., Sandhu S., Singh K., Sahai N., Gupta M. Odontogenic infections: microbiology and management // Contemporary Clinical Dentistry. – 2014.
2. Kaban L.B., Dodson T.B. Management of odontogenic infections in children // Oral and Maxillofacial Surgery Clinics of North America. – 2016.
3. Bagheri S.C., Jo C. Clinical Review of Oral and Maxillofacial Surgery. – Elsevier, 2014.
4. World Health Organization (WHO). Oral health status and dental infections in children // Geneva, 2021.

**ENHANCING ENERGY EFFICIENCY IN MULTI-APARTMENT
RESIDENTIAL COMPLEXES THROUGH INTELLIGENT BUILDING
MANAGEMENT SYSTEMS OPERATED BY SERVICE MANAGEMENT
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Abstract. This article examines the issues of improving the energy efficiency of management service company (MSC) buildings within multi-apartment residential complexes through the implementation of intelligent management systems. The study analyzes modern smart technologies, including automated control systems, sensor-based monitoring tools, and digital control of engineering communications. In addition, the principles of integrating energy-efficient solutions into the functional and architectural planning of MSC buildings are considered.

Based on the analysis of international experience, the effectiveness of intelligent management systems is evaluated, and the prospects for their application in the context of Uzbekistan are substantiated. As a result, architectural and technological proposals aimed at rational use of energy resources, reduction of operational costs, and optimization of management processes in MSC buildings are developed.

Keywords: *multi-apartment residential complex, MSC building, intelligent management systems, energy efficiency, automation, sensor monitoring, engineering systems, digital management, architectural planning, functional zoning, operational efficiency, sustainable development*

**KO'P XONADONLI TURAR JOYLAR MAJMUALARIDA BOSHQARUV
SERVIS KOMLANIYASI BINOLARINING AQLLI BOSHQARUV
TIZIMLARI ORQALI ENERGIYA SAMARADORLIGINI OSHIRISH**

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ANNOTATSIYA. Mazkur maqolada ko'p xonadonli turar joy majmualarida boshqaruv servis kompaniyasi (BSK) binolarida aqlli boshqaruv tizimlarini joriy etish orqali energiya samaradorligini oshirish masalalari tadqiq etilgan. Tadqiqot doirasida zamonaviy aqlli texnologiyalar, jumladan, avtomatlashtirilgan boshqaruv tizimlari, sensorli monitoring vositalari hamda muhandislik kommunikatsiyalarini raqamli nazorat qilish imkoniyatlari tahlil qilinadi. Shuningdek, BSK binolarining funksional va arxitekturaviy tashkil etilishida energiya tejoychi yechimlarni integratsiya qilish tamoyillari ko'rib chiqilgan.

Maqolada xorijiy tajriba asosida aqlli boshqaruv tizimlarining samaradorligi baholanib, ularni O'zbekiston sharoitida qo'llash istiqbollari asoslab berilgan. Natijada BSK binolarida energiya resurslaridan oqilona foydalanish, ekspluatatsiya xarajatlarini kamaytirish hamda boshqaruv jarayonlarini optimallashtirishga xizmat qiluvchi arxitekturaviy va texnologik takliflar ishlab chiqilgan.

Kalit so'zlar: ko'p xonadonli turar joy majmuasi, BSK binosi, aqlli boshqaruv tizimlari, energiya samaradorligi, avtomatlashtirish, sensorli monitoring, muhandislik tizimlari, raqamli boshqaruv, arxitekturaviy rejalashtirish, funksional zonalash, ekspluatatsiya samaradorligi, barqaror rivojlanish

АННОТАЦИЯ. В данной статье рассматриваются вопросы повышения энергоэффективности зданий управляющих сервисных компаний (БСК) в составе многоквартирных жилых комплексов на основе внедрения интеллектуальных

систем управления. В рамках исследования проанализированы современные интеллектуальные технологии, в том числе автоматизированные системы управления, средства сенсорного мониторинга, а также возможности цифрового контроля инженерных коммуникаций. Кроме того, рассмотрены принципы интеграции энергосберегающих решений в функционально-планировочную и архитектурную организацию зданий БСК.

В статье на основе анализа зарубежного опыта дана оценка эффективности интеллектуальных систем управления и обоснованы перспективы их применения в условиях Узбекистана. В результате разработаны архитектурные и технологические предложения, направленные на рациональное использование энергетических ресурсов, снижение эксплуатационных затрат и оптимизацию процессов управления в зданиях БСК.

***Ключевые слова:** многоквартирный жилой комплекс, здание БСК, интеллектуальные системы управления, энергоэффективность, автоматизация, сенсорный мониторинг, инженерные системы, цифровое управление, архитектурное планирование, функциональное зонирование, эксплуатационная эффективность, устойчивое развитие.*

KIRISH. Zamonaviy urbanizatsiya jarayonlari natijasida ko‘p xonadonli turar joy majmualari soni keskin ortib bormoqda. Shu bilan birga, ushbu majmualarda energiya resurslaridan foydalanish hajmi ham yildan-yilga oshib, bu esa energiya samaradorligi masalasini dolzarb muammolardan biriga aylantirmoqda. Xususan, turar joy binolarida elektr energiyasi, issiqlik va suv resurslaridan nooqilona foydalanish holatlari ekspluatatsiya xarajatlarining ortishiga hamda ekologik yuklamaning kuchayishiga olib kelmoqda. Xalqaro tadqiqotlar shuni ko‘rsatadiki, bino va inshootlar global energiya iste’molining qariyb 30–40 foizini tashkil etadi. Bu ko‘rsatkich ayniqsa zich qurilgan turar joy majmualarida yanada yuqori bo‘lishi mumkin. Shu sababli energiya

samaradorligini ta'minlash nafaqat iqtisodiy, balki ekologik barqarorlik nuqtai nazaridan ham muhim ahamiyat kasb etadi.

An'anaviy boshqaruv tizimlariga ega turar joy majmualarida energiya iste'moli ko'pincha nazoratsiz yoki past darajada boshqariladi. Natijada yoritish, isitish, ventilyatsiya va suv ta'minoti tizimlarida ortiqcha energiya sarfi kuzatiladi. Bunday sharoitda zamonaviy aqlli boshqaruv texnologiyalarini joriy etish orqali energiya resurslaridan samarali foydalanishni ta'minlash zarurati yuzaga keladi.

Aqlli boshqaruv tizimlari (Building Management System – BMS, IoT asosidagi yechimlar va sensorli monitoring tizimlari) yordamida binolarning muhandislik tizimlarini real vaqt rejimida nazorat qilish va boshqarish imkoniyati yaratiladi. Bu esa energiya iste'molini optimallashtirish, nosozliklarni erta aniqlash hamda ekspluatatsiya xarajatlarini kamaytirishga xizmat qiladi.

Shu nuqtai nazardan, ko'p xonadonli turar joy majmualarida boshqaruv servis kompaniyalari (BSK) binolarining roli alohida ahamiyat kasb etadi. Mazkur binolar butun majmuaning muhandislik tizimlarini boshqaruvchi markaz sifatida faoliyat yuritib, energiya samaradorligini ta'minlashda muhim bo'g'in hisoblanadi. Biroq amaliyotda BSK binolarini loyihalashda aqlli texnologiyalarni integratsiya qilish masalalari yetarli darajada o'rganilmagan.

Yuqoridagilarni inobatga olgan holda, zamonaviy turar joy majmualarida energiya muammolarini hal etish hamda BSK binolarida aqlli boshqaruv tizimlarini joriy etish orqali energiya samaradorligini oshirish masalalarini ilmiy jihatdan tadqiq etish dolzarb vazifa hisoblanadi.

Zamonaviy ko'p xonadonli turar joy majmualarining samarali faoliyat yuritishi ko'p jihatdan ularni boshqarish tizimlarining to'g'ri tashkil etilganligiga bog'liq. Shu nuqtai nazardan, boshqaruv servis kompaniyalari (BSK) binolari mazkur majmualarning muhandislik va ekspluatatsion jarayonlarini muvofiqlashtiruvchi markaz sifatida muhim

ahamiyat kasb etadi. BSK binolari orqali turar joy majmuasining energiya ta'minoti, suv tizimlari, issiqlik va ventilyatsiya jarayonlari, shuningdek, texnik xizmat ko'rsatish va monitoring ishlari yagona tizim asosida boshqariladi.

Amaliyot shuni ko'rsatadiki, an'anaviy boshqaruv yondashuvlari asosida faoliyat yurituvchi turar joy majmualarida muhandislik tizimlarini markazlashgan holda boshqarish darajasi past bo'lib, bu energiya resurslaridan samarasiz foydalanishga olib keladi. Ayniqsa, real vaqt rejimida nazoratning yetishmasligi energiya yo'qotishlari va ortiqcha ekspluatatsiya xarajatlarini keltirib chiqaradi. Shu sababli BSK binolarini nafaqat ma'muriy, balki yuqori texnologik boshqaruv markazi sifatida shakllantirish zarurati yuzaga kelmoqda.

So'nggi yillarda raqamli texnologiyalar va aqlli boshqaruv tizimlarining jadal rivojlanishi bino va inshootlarni boshqarish sohasida yangi imkoniyatlarni yaratdi. Xususan, Building Management System (BMS), Internet of Things (IoT) asosidagi qurilmalar hamda sensorli monitoring tizimlari yordamida muhandislik kommunikatsiyalarini avtomatlashtirilgan tarzda boshqarish, energiya iste'molini optimallashtirish va nosozliklarni oldindan aniqlash imkoniyati kengaymoqda. Bunday texnologiyalarni joriy etish orqali binolarda energiya sarfini sezilarli darajada kamaytirish mumkinligi xalqaro tajribada o'z tasdig'ini topgan.

Aqlli texnologiyalarning dolzarbligi, avvalo, energiya resurslarining cheklanganligi va ekologik muammolarning ortib borayotganligi bilan izohlanadi. Jahon miqyosida binolar umumiy energiya iste'molining katta qismini tashkil etishi sababli, aynan shu sohada energiya samaradorligini oshirish ustuvor yo'nalishlardan biri sifatida qaralmoqda. Shu jihatdan, BSK binolarida aqlli boshqaruv tizimlarini integratsiya qilish nafaqat alohida binoning, balki butun turar joy majmuasining samaradorligini oshirishga xizmat qiladi. Shunday qilib, ko'p xonadonli turar joy majmualarida BSK binolarini zamonaviy aqlli texnologiyalar asosida boshqaruv markazi sifatida

shakllantirish, energiya resurslaridan oqilona foydalanish va ekspluatatsiya jarayonlarini optimallashtirishda muhim omil hisoblanadi. Mazkur yo‘nalishda ilmiy asoslangan arxitekturaviy va texnologik yondashuvlarni ishlab chiqish bugungi kunda dolzarb vazifalardan biridir.

BSK binosi, uning mazmuni va vazifalari. Ko‘p xonadonli turar joy majmualarida boshqaruv servis kompaniyasi (BSK) binosi muhandislik tizimlarini markazlashtirilgan holda boshqarish va ekspluatatsiya jarayonlarini muvofiqlashtirishga xizmat qiluvchi asosiy infratuzilma elementi hisoblanadi. BSK binosi odatda turar joy majmuasining barcha texnik va xizmat ko‘rsatish jarayonlarini boshqaruvchi “operatsion markaz” vazifasini bajaradi.

BSK binosining asosiy funksiyalari quyidagilardan iborat:

- muhandislik tizimlarini (elektr, suv, issiqlik, ventilyatsiya) doimiy monitoring qilish;
- texnik nosozliklarni aniqlash va tezkor bartaraf etish;
- resurslardan (energiya, suv, issiqlik) oqilona foydalanishni ta’minlash;
- ekspluatatsiya jarayonlarini optimallashtirish va xizmat ko‘rsatish sifatini oshirish;
- binolar xavfsizligi va barqaror ishlashini nazorat qilish.

Xalqaro tajribada BSK binolari “facility management center” sifatida qaralib, ular zamonaviy aqlli texnologiyalar bilan integratsiyalashgan holda ishlaydi. Bu esa ularni oddiy ma’muriy bino emas, balki yuqori texnologik boshqaruv tuguniga aylantiradi.

Aqlli boshqaruv tizimlari (IoT, BMS, avtomatika). Aqlli boshqaruv tizimlari zamonaviy binolarni raqamli texnologiyalar asosida boshqarish va nazorat qilish imkonini beruvchi kompleks tizimlar hisoblanadi. Ushbu tizimlar binoning barcha muhandislik va ekspluatatsion jarayonlarini avtomatlashtirilgan va markazlashgan platforma orqali boshqaradi.

Building Management System (BMS) — bino ichidagi elektr ta'minoti, isitish, sovutish, ventilyatsiya va yoritish tizimlarini yagona boshqaruv markazi orqali nazorat qilishga mo'ljallangan intellektual tizimdir. BMS yordamida energiya sarfi real vaqt rejimida kuzatilib, optimallashtiriladi.

Internet of Things (IoT) texnologiyasi esa turli sensorlar va qurilmalarni internet tarmog'i orqali bir-biriga bog'lab, ma'lumotlarni uzluksiz almashish imkonini yaratadi. Bu texnologiya binodagi harorat, namlik, energiya sarfi va boshqa ko'rsatkichlarni doimiy monitoring qilishga xizmat qiladi.

Avtomatlashtirish tizimlari esa inson aralashuvisiz muhandislik jarayonlarini boshqaradi. Masalan, yoritish tizimlari harakat sensorlari orqali avtomatik yoqilib-o'chishi, isitish tizimi esa tashqi haroratga qarab o'zini moslashtirishi mumkin.

Mazkur tizimlarning integratsiyasi natijasida binolarda energiya samaradorligi sezilarli darajada oshadi va ekspluatatsiya xarajatlari kamayadi.

Energiya samaradorlik tushunchasi. Energiya samaradorlik — bu bino yoki tizimning minimal energiya sarfi orqali maksimal funksional natijaga erishish qobiliyatidir. Boshqacha qilib aytganda, energiya samaradorlik resurslardan oqilona foydalanish orqali yo'qotishlarni kamaytirish va tizim ishlash unumdorligini oshirishni anglatadi. Bino va inshootlar sektori global energiya iste'molining katta qismini tashkil etadi. Xalqaro Energetika Agentligi (IEA) ma'lumotlariga ko'ra, binolar umumiy energiya iste'molining 30–40% ini tashkil etadi. Shu sababli energiya samaradorligini oshirish global miqyosda muhim strategik yo'nalishlardan biri hisoblanadi.

Turar joy majmualarida energiya samaradorlik asosan quyidagi yo'nalishlarda ta'minlanadi:

- issiqlik yo'qotishlarini kamaytirish;
- yoritish tizimlarini optimallashtirish;
- avtomatik boshqaruv tizimlarini joriy etish;

- qayta tiklanuvchi energiya manbalaridan foydalanish.

Aqlli boshqaruv tizimlari esa energiya samaradorlikni ta'minlashda asosiy vosita sifatida xizmat qiladi, chunki ular real vaqt rejimida monitoring va tahlil qilish imkonini beradi.

Xorijiy tajriba. Germaniya misolida aqlli bino boshqaruvi

Yevropa davlatlari orasida Germaniya bino va inshootlarda energiya samaradorligini oshirish hamda aqlli boshqaruv tizimlarini joriy etish bo'yicha yetakchi tajribaga ega mamlakatlardan biri hisoblanadi. Germaniyada "Energiewende" siyosati doirasida qurilish sektorida energiya tejamkor texnologiyalarni keng joriy etish ustuvor yo'nalish sifatida belgilangan.

Ayniqsa, "smart building" konsepsiyasi Germaniya shaharlarida keng qo'llanilib, binolarda Building Management System (BMS), IoT sensorlari va avtomatlashtirilgan boshqaruv platformalari integratsiyalashgan. Masalan, Berlin va Myunxen shaharlaridagi zamonaviy turar joy majmualarida isitish, sovutish va yoritish tizimlari tashqi muhit sharoitiga qarab avtomatik boshqariladi, bu esa energiya sarfini 20–35% gacha kamaytirish imkonini bergan.

Germaniya tajribasining muhim jihati shundaki, aqlli tizimlar faqat texnik yechim sifatida emas, balki arxitekturaviy loyihalash bosqichidan boshlab integratsiya qilinadi. Bu yondashuv BSK (facility management) markazlari orqali butun bino kompleksini samarali boshqarish imkonini yaratadi.

Oddiy bino va aqlli tizimli bino taqqoslanishi. Oddiy (an'anaviy) binolar va aqlli boshqaruv tizimlariga ega binolar o'rtasida sezilarli farqlar mavjud. An'anaviy binolarda muhandislik tizimlari ko'pincha alohida-alohida ishlaydi va markazlashgan monitoring tizimi mavjud emas. Natijada energiya sarfi nazoratsiz bo'lib, resurslar yo'qotilishi kuzatiladi. Aksincha, aqlli binolarda barcha muhandislik tizimlari yagona raqamli platforma orqali boshqariladi. Bu esa real vaqt rejimida monitoring, avtomatik

boshqaruv va optimallashtirish imkonini beradi. Natijada ekspluatatsiya xarajatlari kamayadi va energiya samaradorligi sezilarli darajada oshadi.

Quyidagi asosiy farqlarni ko'rsatish mumkin:

- An'anaviy bino: qo'lda boshqaruv, fragmentar tizimlar
- Aqlli bino: avtomatlashtirilgan, markazlashgan boshqaruv
- An'anaviy bino: yuqori energiya yo'qotishlari
- Aqlli bino: optimallashtirilgan energiya sarfi

Shu sababli zamonaviy qurilish amaliyotida aqlli tizimli binolar ustuvor yo'nalish sifatida qaralmoqda.

Energiyani tejovchi asosiy tizimlar:

1. Yoritish tizimlari (sensorli boshqaruv). Aqlli binolarda yoritish tizimlari harakat, yorug'lik darajasi va vaqt sensorlari orqali boshqariladi. Bu texnologiya orqali faqat zarur bo'lgan hududlarda yoritish yoqiladi, natijada elektr energiyasi sarfi sezilarli kamayadi. Xalqaro tadqiqotlarga ko'ra, sensorli yoritish tizimlari 20–60% gacha energiya tejamkorlikni ta'minlashi mumkin.

2. Isitish va sovutish tizimlari (avtomatik boshqaruv). HVAC (Heating, Ventilation and Air Conditioning) tizimlari aqlli binolarda tashqi harorat, ichki mikroiqlim va foydalanuvchi ehtiyojlariga qarab avtomatik boshqariladi. BMS tizimi orqali isitish va sovutish jarayonlari optimallashtirilib, ortiqcha energiya sarfi oldi olinadi. Bu esa ayniqsa katta turar joy majmualarida sezilarli iqtisodiy samara beradi.

3. Suv tizimlari monitoringi. Aqlli suv boshqaruv tizimlari oqim sensorlari va bosim monitoringi orqali suv sarfini real vaqt rejimida kuzatib boradi. Bu texnologiya suv yo'qotishlarini aniqlash, nosozliklarni erta bartaraf etish va umumiy iste'molni optimallashtirish imkonini beradi. Shu bilan birga, suv resurslaridan oqilona foydalanish ekologik barqarorlikni ta'minlashga xizmat qiladi.

BSK binosida texnik xonalar joylashuvi. Boshqaruv servis kompaniyasi (BSK)

binosining samarali ishlashi ko‘p jihatdan uning ichki funksional-rejaviy tashkil etilishiga bog‘liq. Texnik xonalar, odatda, muhandislik tizimlariga yaqin va xizmat ko‘rsatish jarayoniga qulay bo‘lgan zonalarda joylashtiriladi. Bunga elektr taqsimlash shchitlari, suv nasoslari, ventilyatsiya qurilmalari va avariya boshqaruv punktlari kiradi.

Texnik xonalarni to‘g‘ri joylashtirish ekspluatatsiya qulayligini oshiradi hamda muhandislik tarmoqlarida yo‘qotishlarni kamaytiradi. Xalqaro amaliyotda texnik zonalar odatda binoning pastki qavatlar yoki alohida bloklarda markazlashtirilgan holda loyihalanadi.

Server va boshqaruv markazi zonasi. BSK binosining eng muhim elementi bu — server va boshqaruv markazi hisoblanadi. Ushbu zona barcha aqlli tizimlardan kelayotgan ma’lumotlarni yig‘ish, qayta ishlash va tahlil qilish funksiyasini bajaradi. Building Management System (BMS) aynan shu markaz orqali ishlaydi.

Server xonasi iqlim nazorati, uzluksiz elektr ta’minoti (UPS) va xavfsizlik tizimlari bilan jihozlanadi. Bu esa tizimning uzluksiz ishlashini ta’minlaydi. Zamonaviy “smart building” konsepsiyasida aynan ushbu markaz binoning “raqamli miyasi” sifatida qaraladi.

Muhandislik tizimlari integratsiyasi. BSK binosida barcha muhandislik tizimlarining integratsiyalashuvi muhim ahamiyatga ega. Elektr, suv, isitish, sovutish va xavfsizlik tizimlari yagona raqamli platforma orqali boshqariladi. Bu jarayon Building Management System (BMS) va IoT texnologiyalari yordamida amalga oshiriladi.

Integratsiya natijasida tizimlar o‘zaro ma’lumot almashadi va avtomatik qaror qabul qilish imkoniyati yuzaga keladi. Bu esa energiya sarfini optimallashtirish va nosozliklarni tez aniqlashga yordam beradi.

Funksional zonalash tamoyillari. BSK binosini loyihalashda funksional zonalash muhim arxitekturaviy yondashuv hisoblanadi. Bino odatda quyidagi zonalarga bo‘linadi:

- boshqaruv va ofis zonasi;
- texnik xizmat ko'rsatish zonasi;
- server va IT infratuzilma zonasi;
- yordamchi va saqlash zonalari.

Bunday zonalash binoning ekspluatatsion samaradorligini oshiradi, xizmat ko'rsatish jarayonlarini tezlashtiradi hamda xavfsizlik darajasini kuchaytiradi. Funktsional ajratish ayniqsa aqlli boshqaruv tizimlari bilan birgalikda ishlaganda yuqori natija beradi.

Taklif va natijalar. Ko'p xonadonli turar joy majmualarida boshqaruv servis kompaniyasi (BSK) binolarida aqlli boshqaruv tizimlarini joriy etish bugungi kunda energiya samaradorligini oshirishning eng muhim yo'nalishlaridan biri hisoblanadi. O'zbekiston sharoitida iqlimning keskin kontinental xususiyati, yoz mavsumida yuqori harorat va qish mavsumida issiqlik yuklamasining ortishi binolarda energiya sarfini sezilarli darajada oshiradi. Shu sababli, aqlli boshqaruv texnologiyalarini integratsiya qilish amaliy jihatdan katta ahamiyatga ega.

Tadqiqotlar shuni ko'rsatadiki, aqlli bino boshqaruv tizimlari (BMS, IoT va avtomatlashtirish yechimlari) joriy etilganda umumiy energiya sarfini o'rtacha **10–30% gacha kamaytirish mumkin**. Xususan, yoritish tizimlarida sensorli boshqaruv orqali 20–60% gacha elektr energiyasi tejaliishi, HVAC tizimlarida esa 20–35% gacha samaradorlikka erishish mumkinligi qayd etilgan. Suv tizimlarida esa aqlli monitoring orqali o'rtacha 10% atrofida resurs tejaliishi kuzatiladi. O'zbekiston uchun eng maqbul yondashuv — bosqichma-bosqich integratsiya modelini qo'llashdir. Bunda avvalo BSK binolari markaziy boshqaruv tuguni sifatida raqamlashtiriladi, keyinchalik esa turar joy majmuasining barcha muhandislik tizimlari IoT sensorlari orqali ulanadi. Mahalliy elektr energiyasi narxlari va ekspluatatsiya xarajatlarini hisobga olganda, bunday tizimlar o'zini oqlash muddati 3–5 yilni tashkil etishi mumkin.

Tahlillar asosida O‘zbekiston sharoitida aqlli BSK tizimlari joriy etilganda quyidagi natijalar kutiladi:

- Elektr energiyasi sarfi: **15–30% kamayish**
- Isitish va sovutish tizimlari: **20–35% tejalish**
- Yoritish tizimlari: **25–50% tejalish**
- Suv resurslari: **5–10% tejalish**

Bu ko‘rsatkichlar xalqaro tajribada ham tasdiqlangan bo‘lib, smart building texnologiyalari umumiy bino energiya sarfini sezilarli darajada optimallashtiradi.

Iqtisodiy samaradorlik. Iqtisodiy nuqtai nazardan, aqlli boshqaruv tizimlarini joriy etish boshlang‘ich investitsiya talab qilsa-da, ekspluatatsiya xarajatlarining kamayishi hisobiga o‘rta muddatda sezilarli foyda beradi. Xalqaro tadqiqotlarga ko‘ra, aqlli binolar 3–7 yil ichida investitsiya xarajatlarini qoplash imkoniyatiga ega bo‘lib, keyingi davrda sof iqtisodiy foyda keltiradi.

O‘zbekiston sharoitida esa energiya narxlarining oshib borishi fonida bu muddat yanada qisqarishi mumkin. Bundan tashqari, texnik xizmat ko‘rsatish xarajatlarining kamayishi va tizim nosozliklarining erta aniqlanishi ham qo‘shimcha iqtisodiy samaradorlikni ta’minlaydi.

Taklif: arxitekturaviy integratsiya modeli. Mazkur tadqiqot natijalariga asoslanib quyidagi konseptual model taklif etiladi:

“BSK binolarida aqlli boshqaruv tizimlarini arxitekturaviy rejalashtirish orqali integratsiya qilish modeli”

Ushbu modelga ko‘ra:

- BSK binosi markaziy “aqlli boshqaruv yadro markazi” sifatida loyihalanadi;
- server va BMS xonasi alohida xavfsiz zonada joylashtiriladi;
- barcha muhandislik tizimlari yagona raqamli platformaga ulanadi;
- funksional zonalash orqali texnik va boshqaruv jarayonlari ajratiladi.

Bu yondashuv nafaqat energiya samaradorligini oshiradi, balki butun turar joy majmuasining ekspluatatsion barqarorligini ham ta'minlaydi.

Foydalanilgan adabiyotlar:

1. International Energy Agency (IEA). *Energy Efficiency 2023 Report*. <https://www.iea.org/reports/energy-efficiency-2023>
2. United Nations Environment Programme (UNEP). *2022 Global Status Report for Buildings and Construction*. <https://www.unep.org/resources/report/2022-global-status-report-buildings-and-construction>
3. U.S. Department of Energy. *Building Energy Management Systems (BEMS)*. <https://www.energy.gov>
4. European Commission. *Energy Performance of Buildings Directive (EPBD)*. <https://energy.ec.europa.eu>
5. World Green Building Council. *The Business Case for Green Buildings*. <https://www.worldgbc.org>
6. U.S. Department of Energy. *Building Energy Management Systems (BEMS)*. <https://www.energy.gov/eere/buildings/building-energy-management-systems>
7. International Energy Agency (IEA). *Digitalisation and Energy*. <https://www.iea.org/reports/digitalisation-and-energy>
8. United Nations Environment Programme (UNEP). *2022 Global Status Report for Buildings and Construction*. <https://www.unep.org/resources/report/2022-global-status-report-buildings-and-construction>
9. International Facility Management Association (IFMA). *Facility Management Principles and Practices*. <https://www.ifma.org>
10. U.S. Department of Energy. *Building Energy Management Systems (BEMS)*. <https://www.energy.gov/eere/buildings/building-energy-management-systems>
11. International Telecommunication Union (ITU). *Internet of Things (IoT) and Smart Sustainable Cities*. <https://www.itu.int>
12. International Energy Agency (IEA). *Energy Efficiency 2023*. <https://www.iea.org/reports/energy-efficiency-2023>
13. European Commission. *Energy Performance of Buildings Directive (EPBD)*. <https://energy.ec.europa.eu>
14. German Federal Ministry for Economic Affairs and Climate Action (BMWK). *Energy Transition in Germany (Energiewende)*. <https://www.bmwk.de>

15. Fraunhofer Institute for Building Physics. *Smart Buildings and Energy Efficiency in Germany*. <https://www.ibp.fraunhofer.de>
16. International Energy Agency (IEA). *Digitalisation and Energy*. <https://www.iea.org/reports/digitalisation-and-energy>
17. U.S. Department of Energy. *Lighting Controls and Energy Savings*. <https://www.energy.gov>
18. European Commission. *Energy Performance of Buildings Directive (EPBD)*. <https://energy.ec.europa.eu>
19. International Facility Management Association (IFMA). *Facility Management Best Practices*. <https://www.ifma.org>
20. U.S. Department of Energy. *Building Energy Management Systems (BEMS)*. <https://www.energy.gov>
21. International Energy Agency (IEA). *Digitalisation and Energy Systems*. <https://www.iea.org>
22. European Commission. *Energy Performance of Buildings Directive (EPBD)*. <https://energy.ec.europa.eu>
23. International Energy Agency (IEA). *Energy Efficiency 2023 Report*. <https://www.iea.org/reports/energy-efficiency-2023>
24. ABB Group. *Smarter Buildings, Lower Consumption*. <https://www.abb.com>
25. Transforma Insights. *Smart Buildings and Energy Reduction Potential*. <https://transformainsights.com>
26. European Commission. *Energy Performance of Buildings Directive (EPBD)*. <https://energy.ec.europa.eu>
27. U.S. Department of Energy. *Building Energy Management Systems (BEMS)*. <https://www.energy.gov>
28. World Green Building Council. *The Business Case for Green Buildings*. <https://www.worldgbc.org>

Artificial Intelligence in Academic English Training

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Annotation. The thesis analyzes integration of artificial intelligence into methodology for building academic English competence in teacher education. It aims to substantiate a didactic model that unites formative assessment, adaptive practice, and feedback literacy. Methods include conceptual analysis, design based research logic, and outcome aligned evaluation criteria. Novelty is a staged AI supported methodology centered on transparency, academic integrity, and measurable improvements in academic speaking and writing performance.

Keywords. artificial intelligence, English language teaching, academic literacy, assessment, adaptive tutoring, learning analytics, integrity

AI challenges traditional assessment because it can produce fluent text that masks insufficient competence. A methodological response is not to prohibit technology categorically but to redesign assessments so that competence is demonstrated through processes and performances that are difficult to outsource. The thesis proposes a balanced assessment architecture including in class writing with planning notes, oral defenses of written arguments, and portfolio assessment with documented drafting history. AI may be permitted for specified stages, such as language polishing, provided that students submit the pre and post revision versions and a short rationale. This approach supports integrity by making the role of AI visible and by evaluating the learner's contribution. It also reflects contemporary guidance on AI in education that emphasizes transparency, human responsibility, and clear rules for acceptable use. Methodologically, integrity is treated as teachable competence: students learn citation conventions, paraphrasing strategies, and methods for checking factual accuracy,

thereby connecting language learning with research culture.

AI based methodology does not diminish the teacher's importance; rather, it shifts the teacher's role toward designer, diagnostician, and ethical moderator. Instructors interpret analytics to identify patterns such as persistent cohesion problems, limited stance marking, or overreliance on template phrases. However, the methodology avoids equating analytics with learning, because measurable events may not represent deep competence. Therefore, analytics are used as prompts for pedagogical decisions, such as targeted mini lessons, peer review grouping, and additional modeling of academic genres. The approach resonates with established methodological principles in language teaching that stress systematic progression, communicative orientation, and reflective practice. In this model, AI supports differentiation, but the teacher ensures that differentiation remains aligned with curriculum outcomes and professional standards for teacher education.

Scientific novelty of the thesis is expressed in three interrelated contributions. First, it offers a staged AI supported methodology for academic English that is explicitly aligned with formative assessment logic and feedback literacy, treating AI feedback as pedagogical material rather than as authoritative correction. Second, it proposes constraint based task design that preserves cognitive responsibility of the learner while still using AI for scaffolding, thereby addressing the central risk of substitution. Third, it operationalizes academic integrity within language methodology by embedding transparency requirements, revision documentation, and oral justification tasks into assessment, which makes ethical practice measurable and teachable.

The expected outcomes of implementing this methodology in teacher education include improved coherence and argumentation in academic writing, more accurate and context appropriate language use, stronger ability to read and synthesize scholarly sources, and more developed metacognitive skills related to revising and evaluating feedback. Importantly, the methodology is intended to produce not only better student texts but also better future teachers: graduates learn how to integrate AI responsibly into classroom practice, how to teach learners to question automated suggestions, and how

to maintain academic standards in digitally saturated environments. Limitations of the approach include dependence on access to reliable digital infrastructure and the need for teacher professional development to interpret AI outputs critically and to design constraints effectively. These limitations reinforce the methodological conclusion that AI integration is not a one time adoption but a continuous process of pedagogical calibration.

The thesis substantiates that artificial intelligence can strengthen academic English development in teacher education when it is embedded in an outcomes aligned methodology that prioritizes formative assessment, feedback literacy, and transparent integrity rules. The proposed staged model demonstrates how diagnostic profiling, constrained adaptive practice, reflective feedback use, and process oriented assessment together create conditions for meaningful competence growth. AI becomes most educationally valuable not when it writes instead of students, but when it expands opportunities for guided practice, makes learning processes visible, and supports teachers' evidence informed instructional decisions.

References

1. UNESCO. Guidance for generative AI in education and research. Paris: UNESCO, 2023. 64 p.
2. Passov E. I. Kommunikativnyy metod obucheniya inostrannomu govoreniyu. Moscow: Prosveshchenie, 1991. 223 p.
3. Hattie J., Timperley H. The power of feedback. Review of Educational Research. Washington, DC: American Educational Research Association, 2007. Vol. 77, No. 1. P. 81–112.
4. Nation I. S. P. Learning vocabulary in another language. Cambridge: Cambridge University Press, 2001. 477 p.
5. Jalolov J. J. Chet til o'qitish metodikasi. Toshkent: O'qituvchi, 2012. 432 b.
6. Safarov Sh. S. Zamonaviy lingvodidaktika: nazariya va amaliyot. Toshkent: Fan va texnologiya, 2019. 256 b.

The Practical Significance of Developing Students' Intellectual and Creative Abilities through English Language Teaching

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Abstract. This article describes the goals and objectives of experimental work on improving the intellectual and creative abilities of students based on the English language.

Keywords: Theoretical, intellectual, creative, systematic, integrative, research, decomposition, relevance, consistency, connection, correlation.

Ingliz tili fani asosida o'quvchilardagi intellektual va ijodiy qobiliyatni shakllantirishning amaliy ahamiyati

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Annotatsiya. Ushbu maqolada o'quvchilarning ingliz tili fani asosida intellektual va ijodiy qobiliyatni takomillashtirish yuzasidan olib borilgan tajriba-sinov ishlarining maqsad va vazifalari yoritib berilgan.

Kalit so'zlar: Nazariy, intellektual, ijodiy, tizimlilik, integrativ, tadqiqot, dekompozitsiya, aloqadorlik, izchillik, bog'liqlik, o'zaro mutanosiblik.

Аннотация. В данной статье описываются цели и задачи экспериментальной работы по совершенствованию интеллектуальных и творческих способностей учащихся на основе английского языка.

Ключевые слова: Теоретический, интеллектуальный, творческий, системный, интегративный, исследование, декомпозиция, релевантность, согласованность, связь, корреляция.

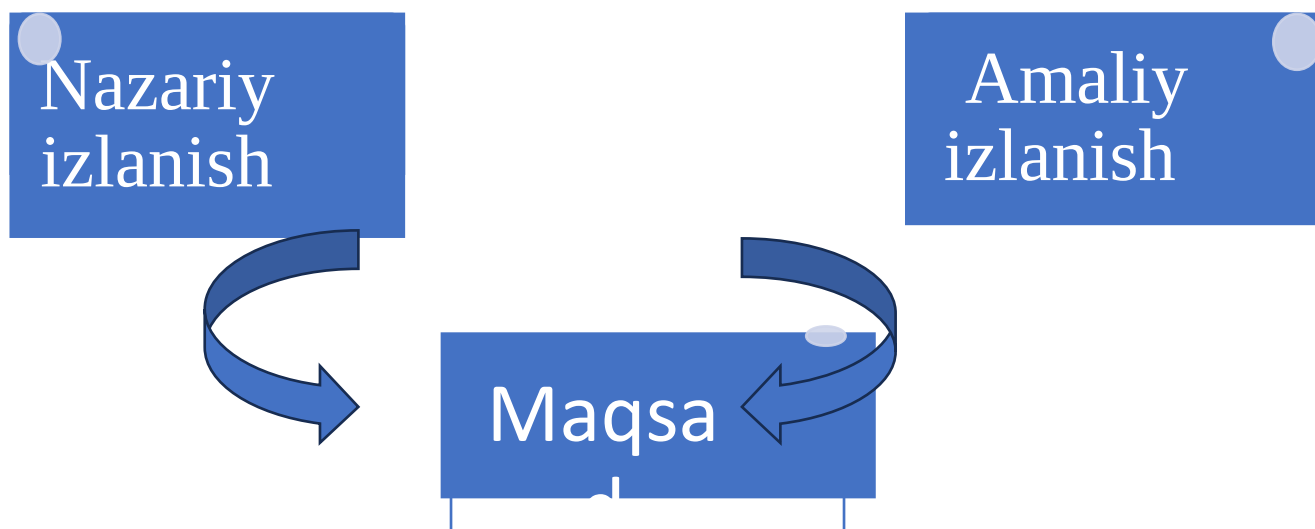
Pedagogika fan tarmog'iga oid tadqiqotlar, shartli ravishda ikki qismdan iborat bo'ladi:

- Nazariy qism va ilgari surilgan ilmiy gipotezaning to'g'riligini tasdiqlash uchun o'tkazilgan tajriba-sinov ishlari. Nazariy qismda tanlangan muammoning umumiy asoslari, yetakchi tamoyillari, tayanch tushunchalari, yaxlit jarayonning dialektik va dinamik xususiyatlari, yechimni topishda asosiy ishtirokchi sifatida namoyon bo'ladigan ijtimoiy subyektlar, ularning jarayondagi o'rni va roli, bosqichlar rivojiga ta'siri, asosiy maqsadi, unga erishish yo'lida hal qilinishi zarur bo'lgan vazifalar mohiyati, kutiladigan natija, natijaga erishishni kafolatlovchi shartlar va omillar, metod va yo'llar, erishilgan natijaning samaradorlik ko'rsatkichlar yoritiladi.

- Amaliy tajriba esa tadqiqotda ilgari surilgan ilmiy farazning to'g'riligini tajriba-sinovdan o'tkazish jarayoni, muammo nazariy bayonining amaliyotda, pedagogik tajribadagi in'ikosi hisoblanib, unda ishning nazariy qismida ilgari surilgan ustuvor g'oyalarni amaliyotga tatbiq etish yo'llari, sinov uchun tavsiya etilgan dastur hamda yetakchi tamoyillarning bayoni, tajribada foydalaniladigan metodika mazmuni, ko'p bosqichli sinov ishlarining umumiy va xususiy maqsadi, ularga erishish borasida bajarilgan amaliy-pedagogik vazifalar, kutiladigan natija, sinov ishlarining turli bosqichlarida qo'lga kiritilgan natijalar, ularning umumlashmasi, o'zaro qiyosiy tahlili, shuningdek, farq ko'rsatkichlari, asoslovchi va ta'kidlovchi tajriba natijalarining matematik-statistik tahlili masalalari yoritiladi.

Nazariy qism va amaliy tajriba o‘zaro bir-biri bilan g‘oyaviy jihatdan adekvat¹ munosabatda bo‘lishi lozim. Ilmiy tadqiqot sifati va samaradorligini ta‘minlashda bu ikki qismning o‘zaro bog‘liqligi, muvofiqligi, aloqadorligi va izchilligining ta‘minlanishiga e‘tibor qaratish zarur. Mazkur talabning to‘laqonli ta‘minlanishi tadqiqotning pedagogik va amaliy-metodik jihatdan to‘g‘ri tashkil qilinishini ta‘minlaydi.

Tadqiqot ishida nazariy qism va amaliy tajribaning o‘zaro munosabati, komponentlarining o‘zaro bog‘liqligi quyidagicha ta‘minlanishi talab etiladi (3.1rasm).



¹ **Adekvat** (lotincha *adaequatus* — tenglashgan, mos, aynan bir, o‘xshash) — bilish nazariyasida narsa va hodisalarning xossalari va aloqalarini ularning ob‘yektiv mazmuniga to‘g‘ri keladigan, aniq va mos qilib olish. Inson [ong](#) ob‘yektiv borliqni ijtimoiy amaliyot asosida adekvat aks ettira boradi (qarang [Haqiqat](#))^[1]. Asosan Adekvatlik ma‘nosini boshqalarning fikrini ham inobatga olish, o‘zini har doim haq bilmaslik iboralari ham bildiradi.



3.1-rasm. Tadqiqotning nazariy qismi va amaliy tajribasning o‘zaro munosabati.

Umuman olganda, tadqiqotning nazariy qismi tadqiqot uchun asos qilib olingan muammo va uni tahlil qilishga qaratilgan ilmiy faoliyat mazmunini belgilaydi.

Pedagogik tajriba-sinov ishlaria esa mazkur ilmiy farazning to‘g‘ri ekanligi amaliyotda tajribadan o‘tkaziladi va natijalar matematik-statistik jihatdan tahlil qilinadi.

Pedagogik tajriba-sinov ishlarining samaradorligi quyidagi shartlarga bevosita bog‘liq:

- 1) ishtirokchilarning tajriba-sinov jarayonida qo‘llaniladigan innovatsiyalarga tayyorgarligi;
- 2) ishtirokchilarning motivatsiyasini oshirish;
- 3) ilmiy-nazariy va uslubiy ta‘minotning mavjudligi;
- 4) axborot-kommunikatsiya texnologiyalari;
- 5) innovatsiyalarning mazmun-mohiyatining anglanishi;
- 6) ijodiy, tizimli va innovatsion yondashuvning mavjudligi.

Rus tadqiqotchisi E.V.Litvinenko pedagogik tajriba-sinov ishlarini boshqarish samaradorligi tadqiq qilishda quyidagi yondashuv tamoyillarini taklif etadi (3.2-rasm)

№	Tamoyillar	Tamoyillar mazmuni
1	Tizimlilik	Boshqaruv sifatini tizimli yondashuv asosida ko‘rib chiqish
2	Integrativlik	Sifat tushunchasini ifodalashda turli xil fanlar bo‘yicha bilimlarni qo‘llash va fanlararo o‘zaro bog‘liqlikni hisobga olish
3	Dekompozitsiya	Boshqaruv samaradorligi va sifatini faqat uni tashkil etuvchi qismlarga ajratgan holda ko‘rib chiqish mumkin, bu turli xil asoslarga ko‘ra boshqaruv sifatining iyerarxik strukturasi shakllantirishni nazarda tutadi
4	Interfaollik	Sifatni baholash va tahlil qilishda baholashning evristik metodlaridan foydalanish, tahliliy baholash metodlarini qo‘llashni nazarda tutadi
5	Ko‘po‘lchamlilik	Sifat va samaradorlikni tashkil etuvchilarning turli xil xususiyatlari va murakkab strukturasi baholashning har xil ko‘rsatkichlari va mezonlaridan foydalanishni nazarda tutadi

²Литвиненко Э.В. Подходы к определению качество управления образовательным учреждением с позиции квалиметрии // Управление качеством образования. Сб. матер. Науч. Сесси ФПК и ППРО МПГУ. –М.: МПГУ, 2001. -145 с.

3.2-rasm. Pedagogik tajriba-sinov ishlarini boshqarish samaradorligi tadqiq qilish tamoyillari

Tadqiqot ishimizning pedagogik tajriba-sinov ishlarini tashkil qilish va boshqarishda sifat va samaradorlikka erishish nuqtai nazaridan mazkur tamoyillarga tayandik. Tadqiqotning ilmiy farazidan ko‘zlangan samaradorlikni biz shartli ravishda quyida turlarga ajratdik:

1) maqsadli samaradorlik: tajriba guruhining salohiyati, imkoniyatlari va mavjud imkoniyatlarning belgilangan maqsadlarga mos kelishi. Pedagogik tajriba-sinov ishlarini boshqarish faoliyatining maqsadli samaradorligini baholashda tajriba guruhlari o‘qituvchisi belgilangan maqsadlarga muvaffaqiyatli erishish natijalariga mos keluvchi omillar, sabablar, vositalar va usullarni baholaydi;

2) ijtimoiy-psixologik samaradorlik: tajriba guruhidagi ma’naviy-psixologik muhit tavsifi, o‘quvchilarning nutqiy ko‘nikmalarni rivojlantirishga bo‘lgan ehtiyojining qondirilishi, ta’lim va tarbiya jarayoni qatnashchilarining ushbu jarayondan qoniqish hosil qilishini nazarda tutadi;

3) ta’minot samaradorligi: dars mashg‘ulotida fan bo‘yicha asosiy va yordamchi ta’lim vositalari bilan erishilayotgan natijalarning qiyosiy baholanish tavsifini ifodalaydi. Mazkur samaradorlikda moddiy ta’minot sifatida o‘qitishning texnik, asosiy va yordamchi vositalari, nomoddiy ta’minot sifatida esa o‘qituvchi va o‘quvchilarning sifat va miqdoriy tarkibi nazarda tutilgan;

4) texnologik samaradorlik: pedagogik tajriba-sinov ishlari boshqaruvidagi asosiy funksiyalarning o‘qituvchi tomonidan amalga oshirilish, pedagogik tajriba-sinov ishlari boshqaruv strukturasi sinf o‘quvchilari nutqiy savodxonligini rivojlantirishning maqsad va vazifalari bilan mos kelish darajasini ifodalaydi.

Adabiyotlar ro'yxati

1. Bekmuratova U. B. “Ingliz tilini o’qitishda innovatsion texnologiyalardan foydalanish” mavzusida referat. Toshkent — 2012 yil
2. Отабоева, М. Р. Chet tilini o’qitishda zamonaviy innovatsion texnologiyalaridan foydalanish va uning samaradorligi / М. Р. Отабоева. — Текст: непосредственный, электронный // Молодой ученый. — 2017.
3. Литвиненко Э.В. Подходы к определению качество управления образовательным учреждением с позиции квалиметрии // Управление качеством образования. Сб. матер. Науч. Сесси ФПК и ППРО МПГУ. –М.: МПГУ, 2001. -145 с.
- 4.N.Q. Xatamova, M.N.mirzayeva. “Ingliz tili darslarida qo’llaniladigan interfaol usullar” (uslubiy qo’llanma), Navoiy, 2006

DEVELOPMENT OF LIBRARY MARKETING IN THE CONTEXT OF DIGITAL TRANSFORMATION

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Abstract. This article analyzes the role and significance of marketing activities in the field of library science from a scientific and analytical perspective. It examines the transformation of library activities in the modern information society, user-oriented services, digital marketing, and management based on statistical analysis. The study also identifies existing problems in library marketing and proposes scientifically grounded solutions.

Keywords: library marketing, information services, digital marketing, user needs, library services, marketing strategy, information technologies, statistical analysis.

RAQAMLI TRANSFORMATSIYA SHAROITIDA KUTUBXONA MARKETINGINING RIVOJLANISHI

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Annotatsiya. Mazkur maqolada kutubxonachilik sohasida marketing faoliyatining o'rni va ahamiyati ilmiy-tahliliy jihatdan yoritilgan. Zamonaviy axborot jamiyatida kutubxonalar faoliyatining transformatsiyasi, foydalanuvchi ehtiyojlariga yo'naltirilgan xizmatlar, raqamli marketing va statistik tahlil asosida boshqaruv masalalari tahlil qilingan. Shuningdek, kutubxona marketingida mavjud muammolar aniqlanib, ularni bartaraf etish bo'yicha ilmiy asoslangan takliflar ishlab chiqilgan.

Kalit so'zlar: kutubxona marketingi, axborot xizmati, raqamli marketing, foydalanuvchi ehtiyoji, kutubxona xizmatlari, marketing strategiyasi, axborot texnologiyalari, statistik tahlil.

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Аннотация. В данной статье научно-аналитически освещаются роль и значение маркетинговой деятельности в сфере библиотечного дела. Рассматриваются вопросы трансформации деятельности библиотек в условиях современного информационного общества, ориентированные на потребности пользователей услуги, цифровой маркетинг и управление на основе статистического анализа. Также выявлены существующие проблемы библиотечного маркетинга и предложены научно обоснованные пути их решения.

Ключевые слова: библиотечный маркетинг, информационные услуги, цифровой маркетинг, потребности пользователей, библиотечные услуги, маркетинговая стратегия, информационные технологии, статистический анализ.

Kirish

Bugun globallashtirilgan jamiyatda axborotga bo'lgan ehtiyoj keskin ortib bormoqda. Ayniqsa, bu ta'lim sohasida sezilarli yutuqlarga, shuning barobarida kamchiliklarni ham yuzaga keltirmoqda.

Xo'sh, bugungi raqamli muhit axborot resurs markazlariga qay darajada ta'sir o'tkazayapti yoki kutubxonalarda axborotlashish muhiti qanday?

Raqamli texnologiyalar kutubxonalar faoliyatini yangi bosqichga olib chiqmoqda deb bimalol ayta olamiz. An'anaviy kutubxona modeli, ya'ni faqat axborotni saqlash va taqdim etish bilan cheklanadigan tizim o'rnini foydalanuvchi ehtiyojlariga moslashgan, interaktiv va innovatsion xizmatlar tizimi egallamoqda. Shu jihatdan, kutubxonachilik sohasida marketing faoliyatini joriy etish va rivojlantirish muhim ilmiy-amaliy ahamiyat kasb etadi. Marketing kutubxona xizmatlarini tashkil etishda strategik vosita sifatida namoyon bo'lib, u orqali foydalanuvchilar ehtiyojlari aniqlanadi, xizmatlar moslashtiriladi va samarali targ'ibot amalga oshiriladi.¹

¹ "O'zbekiston Respublikasi Prezidentining 2017-yil 13-sentabrdagi PQ-3271-son qarori "Axborot-kutubxona faoliyatini yanada takomillashtirish to'g'risida".

Kutubxona marketingi o'z mohiyatiga ko'ra ijtimoiy yo'naltirilgan faoliyat hisoblanadi. U tijorat marketingidan farqli ravishda foyda olishni emas, balki axborotga bo'lgan ehtiyojni qondirishni asosiy maqsad qilib qo'yadi. Shu bilan birga, marketingning asosiy tamoyillari — ehtiyojni aniqlash, xizmatlarni moslashtirish va auditoriya bilan samarali kommunikatsiya o'rnatish — kutubxona faoliyatida ham to'liq amal qiladi. Statistik ma'lumotlar shuni ko'rsatadiki, kutubxonalar keng foydalanuvchi auditoriyasiga ega bo'lib, ularning katta qismini yoshlar tashkil etadi. Bu esa marketing strategiyalarini aynan yoshlar ehtiyojlari va qiziqishlariga yo'naltirish zaruratini yuzaga keltiradi.²

Foydalanuvchi auditoriyasini o'rganish kutubxona marketingining asosiy bosqichlaridan biri hisoblanadi. Bunda foydalanuvchilarning kutubxonaga tashrif chastotasi, o'qilayotgan adabiyotlar turi, axborot olish usullari va xizmatlardan foydalanish darajasi tahlil qilinadi. Tadqiqotlar shuni ko'rsatadiki, ko'pchilik foydalanuvchilar kutubxonaga an'anaviy xizmatlar — kitob olish va qaytarish maqsadida murojaat qiladi. Bu holat zamonaviy xizmatlar, xususan, elektron resurslar va onlayn xizmatlarning yetarli darajada rivojlanmaganligini yoki foydalanuvchilar orasida yetarlicha targ'ib qilinmaganligini ko'rsatadi. Shu bois marketing faoliyati faqat targ'ibot bilan cheklanib qolmasdan, foydalanuvchi ehtiyojlarini chuqur o'rganishga ham yo'naltirilishi lozim.

Asosiy qism. Raqamli texnologiyalarning rivojlanishi kutubxona marketingiga yangi imkoniyatlar yaratmoqda. Ijtimoiy tarmoqlar, elektron kataloglar, mobil ilovalar va virtual xizmatlar orqali foydalanuvchilar bilan samarali aloqa o'rnatish mumkin. Raqamli marketing vositalari orqali yangi kitoblar, tadbirlar va xizmatlar haqida tezkor axborot yetkazish, foydalanuvchilarni jalb etish va ularning faolligini oshirish mumkin.

² Kotler, F. Marketing asoslari. – Toshkent: Sharq, 2010.

Shu bilan birga, raqamli marketing foydalanuvchi xulq-atvorini kuzatish va tahlil qilish imkonini berib, xizmatlarni yanada takomillashtirishga xizmat qiladi. Ammo amaliyot shuni ko'rsatadiki, ko'plab kutubxonalarda raqamli marketing imkoniyatlaridan to'liq foydalanilmayapti, bu esa xizmatlar samaradorligiga salbiy ta'sir ko'rsatmoqda.

Kutubxona marketingida statistik tahlil muhim o'rin tutadi. Ma'lumotlarga asoslangan yondashuv orqali foydalanuvchilarning qiziqishlari, ehtiyojlari va xulq-atvori aniqlanadi. Ushbu tahlillar asosida kutubxona fondini shakllantirish, xizmatlarni optimallashtirish va yangi loyihalarni ishlab chiqish mumkin.³

Bu esa zamonaviy kutubxonachilikda "data-driven" boshqaruv konsepsiyasining shakllanishiga olib kelmoqda.

Shu bilan birga, kutubxona marketingini rivojlantirish jarayonida bir qator muammolar mavjud. Jumladan, marketing faoliyatining yetarli darajada rivojlanmaganligi, malakali mutaxassislar yetishmasligi, raqamli infratuzilmaning cheklanganligi va foydalanuvchilarni segmentatsiya qilish tizimining sustligi kuzatiladi. Bundan tashqari, ayrim hollarda marketing strategiyalari ilmiy asosda emas, balki an'anaviy yondashuvlar asosida olib borilmoqda. Bu esa marketing faoliyatining samaradorligini pasaytiradi.

Mazkur muammolarni bartaraf etish uchun kutubxonalarda marketing faoliyatini ilmiy asosda tashkil etish zarur. Avvalo, foydalanuvchilarni demografik va ijtimoiy xususiyatlariga ko'ra segmentatsiya qilish, ularning ehtiyojlariga mos xizmatlar ishlab chiqish lozim. Raqamli marketing vositalaridan keng foydalanish, ijtimoiy tarmoqlarda faol targ'ibot olib borish va foydalanuvchilar bilan interaktiv aloqani yo'lga qo'yish muhim ahamiyat kasb etadi. Shuningdek, kutubxonachilarning marketing bo'yicha

³ O'zbekiston Respublikasi Davlat statistika qo'mitasi. Kutubxonalar faoliyati bo'yicha rasmiy statistik ma'lumotlar.

bilim va ko'nikmalarini oshirish, statistik ma'lumotlarga asoslangan boshqaruv tizimini joriy etish ham zarur choralar qatoriga kiradi.⁴

Xulosa

Kutubxonada marketing faoliyati zamonaviy sharoitda xizmatlar sifatini oshirish, foydalanuvchilar sonini ko'paytirish va axborot resurslaridan samarali foydalanishni ta'minlashning muhim omili hisoblanadi. Marketingni innovatsion texnologiyalar va tahliliy yondashuvlar asosida rivojlantirish kutubxonalarni zamonaviy axborot markazlariga aylantirishga xizmat qiladi.

Savdo-sotiq markazlarida, bozor muhitida marketingni rivojlantirish katta foyda olishga sabab bo'ladi, ta'lim sohasida, xususan kutubxonachilikda esa marketing yoshlar kamoloti, barkamollik uchun xizmat qiladi.

Foydalanilgan adabiyotlar:

1.O'zbekiston Respublikasi Prezidentining 2017-yil 13-sentabrdagi PQ-3271-son qarori "Axborot-kutubxona faoliyatini yanada takomillashtirish to'g'risida".

2.O'zbekiston Respublikasi Vazirlar Mahkamasining 2019-yil 5-iyuldagi 553-son qarori "Axborot-kutubxona muassasalari faoliyatini rivojlantirish chora-tadbirlari to'g'risida".

3.O'zbekiston Respublikasi Davlat statistika qo'mitasi. Kutubxonalar faoliyati bo'yicha rasmiy statistik ma'lumotlar.

4.Kutubxonachilik asoslari: o'quv qo'llanma. Toshkent, 2020.

5.Ilmiy maqolalar to'plami: "Axborot-kutubxona faoliyatida innovatsion texnologiyalar". Toshkent, 2022.

⁴ Kutubxonachilik asoslari: o'quv qo'llanma. – Toshkent, 2020.

OIL AND GAS ECONOMY IN UZBEKISTAN: TRANSITION TO SUSTAINABLE USE OF HYDROCARBON RESOURCES

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Abstract

Uzbekistan, one of the largest economies in Central Asia, is a transition economy significantly dependent on the oil and gas sector. This article analyzes the current state of Uzbekistan's oil and gas economy, its political-institutional environment, and strategic opportunities for sustainable development. The study is based on a mixed-methodological approach, including quantitative data analysis (2019–2024), policy document review, and stakeholder consultations. The results show that the sector contributes approximately 20% of state budget revenues; however, excessive dependence on hydrocarbon exports, aging capital assets, and low energy efficiency remain major challenges. The article proposes a multifaceted strategic framework aimed at economic diversification, transition to renewable energy sources, acceleration of privatization, and the use of digital transformation tools.

Keywords: oil and gas economy; Uzbekistan; sustainable development; energy policy; hydrocarbon resources; economic diversification; Central Asia

NEFT VA GAZ IQTISODIYOTI O'ZBEKISTONDA: GIDROKARBON RESURSLARIDAN BARQAROR FOYDALANISHGA O'TISH

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Annotatsiya. O'zbekiston Markaziy Osiyoning eng yirik iqtisodiyotlaridan biri bo'lib, neft va gaz sektoriga sezilarli darajada bog'liq bo'lgan o'tish davri iqtisodiyotidir. Ushbu maqola O'zbekistonning neft-gaz iqtisodiyoti holatini, siyosiy-institutsional muhitini va barqaror rivojlanish yo'nalishidagi strategik imkoniyatlarini

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tahlil qiladi. Tadqiqot aralash metodologik yondashuvga — miqdoriy ko‘rsatkichlar tahlili (2019–2024), siyosat hujjatlarini ko‘rib chiqish va manfaatdor tomonlar bilan maslahat o‘tkazish — asoslanadi. Natijalar shuni ko‘rsatadiki, sektor davlat byudjeti daromadlarining taxminan 20 foizini ta‘minlaydi, biroq gidrokarbon eksportiga haddan tashqari bog‘liqlik, ustav kapitalining eskirishi va past energiya samaradorligi jiddiy muammolar bo‘lib qolmoqda. Maqolada sektor iqtisodiyotini xilma-xillashtirish, qayta tiklanadigan energiya manbalariga o‘tish, xususiylashtirishni jadallashtirish va raqamli transformatsiya vositalaridan foydalanishga yo‘naltirilgan ko‘p qirrali strategik doira taklif etiladi.

Kalit so‘zlar: neft va gaz iqtisodiyoti; O‘zbekiston; barqaror rivojlanish; energetika siyosati; gidrokarbon resurslari; iqtisodiy xilma-xillashtirish; Markaziy Osiyo

JEL Tasnifi: Q32, Q41, Q48, O13, P28

1. Kirish

Neft va gaz resurslari ko‘plab rivojlanayotgan davlatlar uchun iqtisodiy o‘rishning asosiy harakatlantiruvchi kuchi bo‘lib xizmat qiladi. Biroq gidrokarbon eksportiga ortiqcha tayanish ko‘pincha “neft la’nati” deb ataladigan iqtisodiy qulaylik paradoksi, sifatli institutlarning shakllanmasligi va iqtisodiy xilma-xillikning pasayishiga olib keladi. Xalqaro Valyuta Jamg‘armasi ma’lumotlariga ko‘ra, gidrokarbon eksportiga bog‘liq davlatlar jahon bozorlaridagi narx tebranishlariga nisbatan sezilarli darajada zaif hisoblanadi [1].

O‘zbekiston ushbu muammo kontekstida alohida o‘rin tutadi. Tabiiy gaz qazib olish hajmi jihatidan jahonda o‘n birinchi o‘rinda turuvchi mamlakat bo‘lgan O‘zbekistonda neft-gaz sektori YaIMning taxminan 12 foizini va eksport tushumlarining 20 foizini tashkil etadi. Shu bilan birga, 2016-yildan boshlab Prezident Shavkat Mirziyoyev boshchiligida amalga oshirilayotgan keng ko‘lamli iqtisodiy islohot neft-gaz sektorini

modernizatsiya qilish va iqtisodiyotni xilma-xillashtirish yoʻlidagi muhim imkoniyatlar eshigini ochdi [2].

Xom neft va tabiiy gaz narxlarining global pasayishi (2014–2016 va 2020-yillardagi tushkunlik davrlarida) energetika sektori daromadlariga bogʻliq byudjetlarga ogʻir zarba yetkazdi. Oʻzbekiston ham bu tendentsiyadan mustasno emas: 2020-yilda neft-gaz eksporti daromadlari 2019-yilga nisbatan 23 foizga kamaydi [3]. Bunday sharoitda gidrokarbon sektorining barqarorligi va uning milliy iqtisodiyot rivojiga hissasi masalasi iqtisodiy siyosat muhokamalarining markaziga chiqdi.

Ushbu maqola uchta asosiy hissa qoʻshadi. Birinchidan, 2019–2024-yillar davrida Oʻzbekistonning neft-gaz sektoriga oid siyosat, institutsional aktyor va miqdoriy koʻrsatkichlarning keng qamrovli empirik tasviri taqdim etiladi. Ikkinchidan, Oʻzbekistonning neft-gaz iqtisodiyoti Markaziy Osiyo va musbat oʻtish tajribasiga ega post-sovet davlatlari kontekstida koʻrib chiqiladi. Uchinchidan, Oʻzbekistonning oʻziga xos institutsional sharoitlarini hisobga olgan holda sektor rivojlanishini tezlashtirish uchun strategik doira ishlab chiqiladi.

2. Adabiyotlar Sharhi: Neft-Gaz Iqtisodiyotining Nazariy Asoslari

Resurs iqtisodiyoti nazariyasi neft va gaz boyliklarining milliy rivojlanishga taʼsirini tushuntirishga qaratilgan bir nechta raqobatdosh nazariy yondashuvlarni oʻz ichiga oladi. “Resurs laʼnati” gipotezasi, dastlab Auty [4] tomonidan ishlab chiqilgan va Sachs va Warner [5] tomonidan empirik jihatdan kengaytirilgan, gidrokarbon boyliklari koʻp boʻlgan davlatlarning past iqtisodiy oʻsish koʻrsatkichlarini namoyish etishini taʼkidlaydi. Ushbu nazariy doira yillar davomida muhim toriqilgan: zamonaviy tadqiqotlar resurslarning oʻzini emas, balki institutlar sifatini yetakchi oʻzgaruvchi sifatida ajratib koʻrsatadi [6].

Hollandiya kasalligi nazariyasi gidrokarbon eksportiga bogʻliq valyuta kursi qadrlashini va qayta ishlab chiqarish sektorining raqobatbardoshligining pasayishini

tushuntirib beradi. Corden va Neary [7] tomonidan tavsiflab berilgan ushbu hodisa resurslarga boy ko'plab Markaziy Osiyo davlatlarida, jumladan O'zbekistonda qayd etilgan bo'lib, milliy valyuta kursi tebranishlari va sanoat sektorlari eksport raqobatbardoshligiga bevosita ta'sir ko'rsatganligi kuzatilgan.

Barqaror rivojlanish nuqtai nazaridan, neft-gaz resurslarini boshqarishning zamonaviy konsepsiyalari uchta o'zaro bog'liq yo'nalishni ta'kidlaydi: gidrokarbon daromadlarini kelajak avlodlar manfaatini ko'zlab boshqarish uchun fiskal qoidalar va jamg'arma fondlari; ekologik me'yorlar va past uglerodli texnologiyalarga o'tishni qo'llab-quvvatlovchi tartibga solish amaliyoti; va iqtisodiy xilma-xillikni ta'minlash uchun neft-gaz daromadlaridan foydalanish strategiyalari [8]. Van der Ploeg va Venables [9] rivojlanayotgan iqtisodiyotlardagi resurslarga boy davlatlar uchun optimal tejash va sarmoya kiritish nisbatlarini hisoblash modelini ishlab chiqqan, bu esa O'zbekiston holatiga bevosita tatbiq etish imkoniyatini beradi.

3. Metodologiya

Ushbu tadqiqot miqdoriy ikkilamchi ma'lumotlar tahlilini sifatli siyosat hujjatlarini ko'rib chiqish va manfaatdor tomonlar bilan maslahat o'tkazish bilan birlashtirgan aralash metodologik dizaynga asoslanadi. Metodologik yondashuv uch ketma-ket bosqich atrofida tuzilgan.

3.1 Ma'lumot To'plash

Miqdoriy ma'lumotlar 2019–2024-yillarni qamrab oluvchi rasmiy milliy va xalqaro statistik manbalardan olindi. Asosiy ma'lumot manbalari quyidagilardan iborat: O'zbekiston Respublikasi Statistika qo'mitasi (yillik statistik to'plamlar, 2019–2024) [3]; O'zbekiston Respublikasi Energetika vazirligi [10]; O'zbekiston Respublikasi Iqtisodiyot va moliya vazirligi [11]. Qo'shimcha xalqaro ma'lumotlar Jahon banki, XVJ, EBRD, ADB, BP Statistical Review of World Energy va Xalqaro energetika agentligidan (IEA) olindi.

Sifatli ma'lumotlar 2024-yilning sentyabr—dekabr oylari orasida o'tkazilgan tuzilgan manfaatdor tomonlar maslahatlari orqali to'plandi. Toshkent, Buxoro va Qashqadaryo viloyatlaridagi milliy vazirliklar, neft-gaz kompaniyalari, xalqaro moliyaviy institutlar hamda akademik ekspertlardan iborat jami 21 tashkilot ishtirok etdi. Maslahatlar erkin javob berish imkonini ta'minlaydigan yarim tuzilgan intervyu formatida o'tkazildi.

3.2 Tahliliy Doira

Miqdoriy tahlil O'zbekistonda neft-gaz sektorining ahvolini baholashga mo'ljallangan beshta asosiy ko'rsatkich bo'yicha 2030-yilga mo'ljallangan maqsadlarga nisbatan tendentsiya va bo'shliqni baholash uchun tavsifiy statistika va tendentsiya tahlilidan foydalanadi: qazib olish hajmi, eksport daromadlari, energiya intensivligi, xorijiy to'g'ridan-to'g'ri investitsiyalar ulushi va neft-gaz byudjet ulushi. Barcha qiyosiy ko'rsatkichlar Eurostat moddiy oqim hisobi metodologiyasiga muvofiq hisoblangan [12].

Siyosat tahlili qonunchilik, iqtisodiy va axborot neft-gaz instrumentlarini tasniflash va baholash uchun moslashtirilgan OECD siyosat instrumentlari tipologiyasini qo'llaydi [13]. Siyosatni amalga oshirishning samaradorligi belgilangan maqsadlarga nisbatan baholanadi va birlamchi manfaatdor tomonlar ma'lumotlari bilan taqqoslash orqali tekshiriladi.

Tarmoq tahlili uchta ustuvor soha — quyi oqim qayta ishlash, gaz ta'minot infratuzilmasi va qayta tiklanadigan energiyaga o'tish — bo'yicha olib boriladi. Tarmoqlar tanlovini asoslash uchun YaIMdagi ulushi (taxminan 28 foiz), ish bilan band bo'lish (taxminan 15 foiz) va hujjatlashtirilgan o'tish salohiyati mezonlari qo'llanildi.

3.3 Tahlil Vositalari

7-bo'limda keltirilgan SWOT tahlili manfaatdor tomonlar maslahatlari va miqdoriy hamda siyosat tahlillari natijalarini birlashtirgan iterativ ekspert so'rovnomasi asosida

tuzildi. Natijalar ikki bosqichli ekspert tekshiruvi orqali tasdiqlandi: ichki izchillik tekshiruvi va Markaziy Osiyo energetika iqtisodiyoti mutaxassislari bo'lgan uch akademik tomonidan tashqi ekspert ko'rib chiqish.

8-bo'limda taklif etilgan strategik doira ko'p ustunli mantiq modeli yondashuvi yordamida ishlab chiqildi. Xalqaro eng yaxshi amaliyot taqqoslashuvchi mezon sifatida Qozog'iston, Ozarbayjon va Turkmanistondagi neft-gaz sektori o'tish tajribalari, shuningdek Norvegiya va Buyuk Britaniyaning qiyosiy rivojlangan bozor tajribalari asosida amalga oshirildi.

4. Natijalar

4.1 O'zbekistonning Neft-Gaz Sektori: Iqtisodiy Kontekst

4.1.1 Makroiqtisodiy Ko'rinish

O'zbekiston 2023-yilda YaIMi taxminan 90,9 milliard AQSh dollarini tashkil etib, Qozog'iston va Turkmaniston bilan birga Markaziy Osiyoning uchta yirik iqtisodiyotidan biri sifatida o'z o'rnini mustahkamladi [2]. Neft-gaz sektori mamlakatning energetika mustaqilligida muhim rol o'ynaydi: 2023-yilda tabiiy gaz qazib olish hajmi taxminan 50,7 mlrd kubometrni tashkil etdi. Biroq 36,1 millionlik aholisi yil sayin 1,5 foizga o'sib borayotgan mamlakat uchun ichki iste'mol ham doimiy ravishda ortib bormoqda.

Mustaqillik davrida tashkil etilgan "O'zbekiston neft va gaz" davlat kompaniyasi neft-gaz operatsiyalarini boshqarishning asosiy platformasi hisoblanadi. Ammo kompaniyaning boshqaruv tuzilmasidagi murakkablik va moliyaviy shaffoflikning yetarli darajada ta'minlanmaganligi xorijiy sarmoyadorlarni sektorda ishtirok etishiga to'siq bo'lib kelgan [14]. Shu sababli 2019–2024-yillar davomida amalga oshirilgan boshqaruv islohot tadbirlari ayniqsa muhim ahamiyat kasb etadi.

4.1.2 Resurs Zahiralar va Qazib Olish

O‘zbekistonning tasdiqlangan tabiiy gaz zahiralari taxminan 1,1 trillion kubometrni tashkil etadi va mamlakat so‘nggi yillarda ularni kengaytirishga qaratilgan geofizik razvedka ishlarini jadallashtirib kelmoqda [15]. Neft zahiralari nisbatan cheklangan: taxminan 594 million barrel bo‘lib, ular asosan Farg‘ona vodiysi va Ustyurt platosida joylashgan. Qazib olish hajmi 2010-yillardan beri barqaror kamayib, importga bog‘liqlik asta-sekin kuchayib bormoqda.

Shu bilan birga, Qashqadaryo va Surxondaryo viloyatlarida yangi gaz konlari qidiruvi faollashganligi va zamonaviy qazib olish texnologiyalarini tatbiq etish bo‘yicha bir qator xalqaro kompaniyalar bilan shartnomalar imzolanganligi sektor salohiyatini oshirishga xizmat qilmoqda. Lukoil, CNPC va Total Energies singari yirik xalqaro kompaniyalar O‘zbekistondagi qidirish va qazib olish loyihalarida allaqachon ishtirok etmoqda [14].

4.2 Siyosiy va Huquqiy Muhit

O‘zbekistonning neft-gaz sektori 2019-yildan buyon sezilarli islohot yo‘lini bosib o‘tdi. Quyidagi jadval asosiy siyosat vositalari va ularning hozirgi holati to‘g‘risida ma’lumot beradi.

**2-jadval. O‘zbekistonda Neft-Gaz Sektoriga Oid Siyosat va Huquqiy Doira
(2019–2024)**

Siyosat / Tashabbuslar	Yil	Asosiy Maqsad	Holati
"O‘zbekneftgaz" islohot dasturi	2019	Boshqaruv va moliyaviy shaffoflikni takomillashtirish	Faol

Gaz tarmog'ini erkinlashtirish siyosati	2020	Bozor mexanizmlarini joriy etish va raqobatni rivojlantirish	Faol
Uglevodorod qonunchiligi islohoti	2021	XTI uchun qulay shartnomaviy muhitni ta'minlash	Faol
Energiya samaradorligi milliy dasturi	2022	2030-yilga qadar energiya intensivligini 30% kamaytirish	Jarayonda
Neft-gaz sektorini raqamlashtirish dasturi	2023	Raqamli monitoring va SCADA tizimlarini joriy etish	Pilot bosqich
Energetika Yo'l Xaritasi 2030	2024	Kompleks energetika o'tish rejasi	Qabul qilingan

Manba: O'zbekiston Respublikasi Energetika vazirligi [10]; muallif to'plami.

2024-yilda qabul qilingan Energetika Yo'l Xaritasi 2030 neft-gaz sektori bilan yangi energetika manbalarini integratsiya qilishni ko'zda tutuvchi eng keng qamrovli hujjat hisoblanadi. U neft-gaz, energiya samaradorligi, qayta tiklanadigan energiya va import diversifikatsiyasi bo'yicha tarmoqqa xos maqsadlarni belgilaydi hamda birinchi marta yillik hisobot majburiyatlari bilan rasmiy monitoring va baholash tizimini joriy etadi.

4.3 Asosiy Neft-Gaz Ko'rsatkichlari va Taraqqiyot Baholash

1-jadval 2019–2023-yillar davomida O'zbekiston neft-gaz sektorining asosiy ko'rsatkichlarini kuzatuvchi miqdoriy ma'lumotlarni va Milliy Yo'l Xaritasida belgilangan 2030-yil maqsadlariga havola qiluvchi ma'lumotlarni taqdim etadi.

1-jadval. O‘zbekiston Neft-Gaz Sektori Asosiy Ko‘rsatkichlari (2019–2023)

Ko‘rsatkich	2019	2021	2023	Maqsad 2030
Tabiiy gaz qazib olish (mlrd m ³)	56.3	53.1	50.7	55.0
Neft-gaz eksporti daromadi (mln USD)	3 240	2 810	3 490	4 200
Energiya intensivligi (MJ/USD YaIM)	8.4	7.8	7.1	5.9
Neft-gazning byudjet ulushi (%)	22.1	19.8	18.4	14.0
XTI neft-gaz sektoriga (mln USD)	610	780	1 120	2 500

Manba: O‘zbekiston Respublikasi Statistika qo‘mitasi [3]; Energetika vazirligi [10]; muallif hisob-kitoblari.

Ma’lumotlar energiya intensivligining doimiy pasayishini (2019–2023-yillar orasida 0.7 birlik punktga kamayish) va xorijiy to‘g‘ridan-to‘g‘ri investitsiyalarning o‘rishini ko‘rsatmoqda. Byudjetdagi neft-gaz ulushining 22,1 foizdan 18,4 foizga kamayishi iqtisodiyotning asta-sekin xilma-xillashayotganini bildiradi. Biroq 2030-yilga maqsadlarda ko‘zda tutilgan parametrlarga erishish uchun o‘zgarish suratlari yetarli emas, ayniqsa XTI jalb qilish va energiya intensivligini kamaytirish yo‘nalishida sezilarli tezlashuv zarur.

4.4 Tarmoqli Tahlil: Neft-Gaz Sektoridagi Asosiy Yo‘nalishlar

4.4.1 Quyi Oqim Qayta Ishlash

O'zbekistondagi neftni qayta ishlash sanoati asosan Farg'ona va Oltiariq neftni qayta ishlash zavodlari atrofida jamlangan bo'lib, ularning umumiy quvvati yiliga 10 million tonnadan oshiq neftni qayta ishlashga imkon beradi. Biroq zavodlarning aksariyati sovet davridagi uskunalar bilan jihozlangan va ular samaradorligi past, mahsulot sifati esa xalqaro standartlarga to'liq javob bermaydi [14]. Zamonaviy kreking va ekstremal texnologiyalarni joriy etish orqali qayta ishlash chuqurligini oshirish va qo'shilgan qiymat yaratish imkoniyatlari katta.

4.4.2 Gaz Ta'minot Infratuzilmasi

O'zbekiston keng tarmoqli gaz quvurlari tizimiga ega: umumiy uzunligi 13 000 km dan oshiq magistral va tarqatuvchi quvurlar mamlakatning barcha mintaqalarini qamrab oladi. Ammo infratuzilmaning eskirganlik darajasi va texnik yo'qotishlar darajasining yuqiligi hal qilinadigan muammo bo'lib qolmoqda — ma'lumotlarga ko'ra, tarqatish jarayonidagi yo'qotishlar yiliga 2–3 mlrd kubometrni tashkil etadi [15]. Quvurlarni ta'mirlash va modernizatsiya qilish dasturlari amalga oshirilmoqda, lekin investitsiya sur'atlari talab darajasidan past.

4.4.3 Qayta Tiklanadigan Energiyaga O'tish

Neft-gaz sektorini qayta tiklanadigan energiya bilan uyg'unlashtirish O'zbekiston energetika siyosatining ustuvor yo'nalishlaridan biriga aylandi. 2030-yilga qadar qayta tiklanadigan energiya ulushini 25 foizga yetkazish maqsadi ko'ylangan bo'lib, bu neft-gazga nisbatan tayanishni kamaytirish va eksport ulushini oshirish imkonini beradi [10]. 2023-yilda ishga tushirilgan Nukus va Samarqand viloyatlaridagi quyosh energiyasi loyihalari (jami 1 GVt quvvat) bu yo'nalishdagi dastlabki va istiqbolli qadamlar sifatida baholanmoqda.

5. Muhokama

5.1 SWOT Tahlili

1-rasm 2024-yilning sentyabr-dekabr oylarida muallif tomonidan o'tkazilgan birlamchi ma'lumot to'plash va manfaatdor tomonlar maslahatlari asosida O'zbekistonning neft-gaz o'tish salohiyatini shakllantiruvchi tuzilmaviy omillarni sintez qiluvchi keng qamrovli SWOT tahlilini taqdim etadi.

1-rasm. SWOT Tahlili: O'zbekistonda Neft-Gaz Sektori O'tishi

KUCHLI TOMONLAR	ZAIF TOMONLAR
Katta tabiiy gaz zahiralari (1,1 trln m ³) Hukumatning islohot istiqloлга mos yo'nalishi Keng ko'lamli quvur infratuzilmasi Xalqaro kompaniyalar bilan shartnomalar mavjud	Eskirgan sanoat uskunalari (sovet merosi) Moliyaviy shaffoflikning yetarli emasligi Yuqori energiya intensivligi Past qayta ishlash chuqurligi
IMKONİYATLAR	TAHDIDLAR
O'sib borayotgan xalqaro yashil moliya oqimlari ADB, EBRD va Jahon banki qo'llab-quvvatlashi Raqamli transformatsiya resurslari monitoringini yaxshilash Qayta tiklanadigan energiya bilan integratsiya imkoniyati	Global neft narxlari tebranishlari Iqlim o'zgarishining tazyiqi va uglevodorodga talab pasayishi Texnik kadrlar oqimi (brain drain) Sekin institutional islohot sur'atlari

Manba: Manfaaddor tomonlar maslahatlari va siyosat ko'rib chiqish asosida muallif tahlili (2024).

5.2 Neft-Gaz O'tishini Tezlashtirish Strategik Doirasi

Yuqorida keltirilgan tahlilga asoslanib, ushbu bo‘lim O‘zbekistondagi neft-gaz sektori rivojini tezlashtirish uchun besh o‘zaro bog‘liq aralashuv domeniga asoslangan ko‘p qirrali strategik doirani taklif etadi.

5.2.1 Tartibga Solishni Mustahkamlash va Rag‘batlantirishni Isloh Qilish

Huquqiy va tartibga solish muhiti barcha yirik iqtisodiy tarmoqlarda neft-gaz tamoyillarini mustahkamlash uchun yanada rivojlantirilishi kerak. Ustuvor chora-tadbirlar quyidagilarni o‘z ichiga oladi: xorijiy investorlar uchun yer osti boyliklaridan foydalanish shartnomasini imzolash jarayonini soddalashtirish; sektordagi davlat subsidiyalarini bosqichma-bosqich kamaytirish va bozor narxlariga o‘tishni jadallashtirish; ekologik hisobot standartlarini xalqaro me‘yorlar bilan uyg‘unlashtirish va katta korxonalar uchun iqlim xatarlarini oshkor qilishni majburiy qilish.

5.2.2 Qayta Ishlash Quvvatlarini Modernizatsiya Qilish

Neftni qayta ishlash zavodlarini modernizatsiya qilish yoqilg‘i importini kamaytirish va qo‘shilgan qiymatni oshirish uchun asosiy vosita hisoblanadi. Xususan, Farg‘ona zavodi uchun rejalashtirilgan EUR 1,2 mlrd hajmdagi isloh loyihasi 2030-yilga qadar qayta ishlash chuqurligini 65 foizdan 92 foizga oshirishi mo‘ljallangan [16]. Ushbu tendentsiyani qo‘llab-quvvatlash uchun quyi oqim infratuzilmasiga xorijiy to‘g‘ridan-to‘g‘ri investitsiyalarni jalb qilish va davlat-xususiy sheriklik mexanizmlarini faollashtirish zarur.

5.2.3 Energiya Samaradorligini Oshirish

O‘zbekistonning energiya intensivligi OECD o‘rtacha ko‘rsatkichidan deyarli uch barobar yuqori. Sanoat jarayonlarida energiya samaradorligini oshirish, quvurlar infratuzilmasidagi yo‘qotishlarni kamaytirish va uylar hamda tijorat binolarida izolyatsiya standartlarini takomillashtirish orqali 2030-yilgacha energiya intensivligini 30 foizga kamaytirish maqsadi real ko‘rinmoqda. Bunda ADB va EBRD ning energiya

samaradorligi kreditlari muhim moliyaviy vosita bo'lib xizmat qilishi mumkin [16], [17].

5.2.4 Raqamli Monitoring va Boshqaruv

IoT sensori, sun'iy intellekt asosidagi gidrodinamik modellash va bulut platformalariga asoslangan raqamli texnologiyalar qazib olish samaradorligini oshirish va atrof-muhitga ta'sirni kamaytirish imkonini beradi. "O'zbekneftgaz" kompaniyasi uchun milliy raqamli monitoring platformasi to'g'risidagi qaror maqbuliy ishlash tartiblarini optimallashtirish va texnik yo'qotishlarni kamaytirishda yo'l ko'rsatuvchi rol o'ynashi mumkin.

5.2.5 Xalqaro Moliyalashtirish va Bilim Uzatish

O'zbekiston ko'p tomonlama rivojlanish banklari — ADB [16], EBRD [17] va Jahon banki — bilan samarali hamkorlikni yo'lga qo'ygan bo'lib, ular yashil energetika loyihalari uchun imtiyozli moliyalashtirish va texnik yordam ko'rsatadi. Ushbu hamkorliklarni neft-gaz sektoridagi maxsus modernizatsiya moliyalashtirish ob'ektlari, yashil obligatsiya chiqarish doiralari va aralash moliya vositalari orqali chuqurlashtirish 2030-yilgi energetika maqsadlariga erishish uchun zarur bo'lgan taxminan 5,2 mlrd AQSh dollari hajmdagi investitsiyalarni jalb qilishning asosi bo'ladi [17].

6. Xulosa

Ushbu maqola O'zbekistondagi neft-gaz iqtisodiyotining hozirgi holati va kelajak istiqbollarini ko'rib chiqdi hamda mamlakatning neft-gaz sektori o'tishi uchun muhim poydevor yaratganini, ayni paytda zudlik bilan hal etilishi zarur bo'lgan muhim tuzilmaviy va institutsional muammolar mavjudligini ko'rsatdi.

Dalillar to'rtta asosiy xulosani qo'llab-quvvatlaydi. Birinchidan, O'zbekistonning neft-gaz sektori huquqiy arxitekturasini 2019-yildan buyon sezilarli darajada mustahkamladi va Energetika Yo'l Xaritasi 2030 izchil strategik yo'nalish belgilab berdi. Ikkinchidan, miqdoriy ko'rsatkichlar energiya intensivligi, XTI jalb qilish va

sektordagi byudjet ulushining kamayishi bo'yicha ijobiy dinamikasi ko'rsatmoqda, biroq 2030-yilgi maqsadlarga erishish uchun o'zgarish sur'atini sezilarli tezlashtirish talab etiladi. Uchinchidan, tuzilmaviy to'siqlar — eskirgan sanoat uskunalari, past moliyaviy shaffoflik va zaif qayta ishlash chuqurligi — tartibga solish, fiskal va institutsional domenlar bo'yicha maqsadli aralashuvni taqozo etadi. To'rtinchidan, O'zbekistonning geografik o'rni, katta gaz zahiralar va xalqaro savdo hamda moliya tarmoqlari bilan o'sib borayotgan integratsiyasi neft-gaz sektoriga investitsiya va bilim uzatish uchun qulay tashqi muhitni ta'minlamoqda.

Siyosat ishlabchiqaruvchilari uchun ustuvor vazifa qonunchilik majburiyatlarini har toifadagi korxona uchun zamonaviy texnologiyalarga o'tishni tijorat jihatidan maqbul qiluvchi izchil tartibga solish va fiskal rag'batlantirishga aylantirish hisoblanadi. Rivojlanish moliyasi institutlari uchun imkoniyat rivojlanayotgan iqtisodiyotlardagi neft-gaz investitsiyalarining xatarlar profiliga moslashtirilgan aralash moliya vositalarini birgalikda ishlab chiqishda yotadi. Xususiyl sektor uchun neft-gaz sektorini modernizatsiya qilish kirish xarajatlarini kamaytirish, eksport ulushini oshirish va resurslari narx tomonidan keladigan xatarlarga nisbatan barqarorlikni mustahkamlash uchun strategik imkoniyatni ifodalaydi.

Kelajak tadqiqotlar O'zbekistonning asosiy sanoat tarmoqlari bo'yicha neft-gaz sektori o'tishi xarajatlari va manfaatlari to'g'risidagi firma darajasidagi empirik tahlilga, eko-sanoat parklari faoliyati ko'rsatkichlarini qiyosiy baholashga va qayta tiklanadigan energiyaga o'tishdan qishloq aholisi uchun farovonlik ko'rsatkichlarining yaxshilanishini baholashga e'tibor qaratishi kerak.

Adabiyotlar

[1] Xalqaro Valyuta Jamg'armasi (XVJ), World Economic Outlook: Navigating Global Divergences, Vashington, D.K.: XVJ, 2023. [Online]. Mavjud: <https://www.imf.org/en/Publications/WEO>

- [2] Jahon banki, Uzbekistan Economic Update, Spring 2024, Vashington, D.K.: World Bank Group, 2024. [Online]. Mavjud: <https://www.worldbank.org/en/country/uzbekistan/publication/uzbekistan-economic-update>
- [3] O‘zbekiston Respublikasi Statistika qo‘mitasi, O‘zbekiston Statistika to‘plami 2024, Toshkent, 2024. [Online]. Mavjud: <https://stat.uz/en/>
- [4] R. M. Auty, Sustaining Development in Mineral Economies: The Resource Curse Thesis, London: Routledge, 1993.
- [5] J. D. Sachs va A. M. Warner, “Natural resource abundance and economic growth,” NBER Working Paper, no. 5398, 1995. doi: 10.3386/w5398.
- [6] T. L. Karl, The Paradox of Plenty: Oil Booms and Petro-States, Berkeley: University of California Press, 1997.
- [7] W. M. Corden va J. P. Neary, “Booming sector and de-industrialisation in a small open economy,” Economic Journal, vol. 92, no. 368, pp. 825–848, 1982. doi: 10.2307/2232670.
- [8] M. Humphreys, J. D. Sachs va J. E. Stiglitz (tahr.), Escaping the Resource Curse, New York: Columbia University Press, 2007.
- [9] F. van der Ploeg va A. J. Venables, “Harnessing windfall revenues: optimal policies for resource-rich developing economies,” Economic Journal, vol. 121, no. 551, pp. 1–30, 2011. doi: 10.1111/j.1468-0297.2010.02411.x.
- [10] O‘zbekiston Respublikasi Energetika vazirligi, O‘zbekiston Energetika Statistikasi 2024, Toshkent, 2024. [Online]. Mavjud: <https://minenergy.uz>
- [11] O‘zbekiston Respublikasi Iqtisodiyot va moliya vazirligi, Makroiqtisodiy tahlil va prognoz 2024, Toshkent, 2024. [Online]. Mavjud: <https://mf.uz>

- [12] Eurostat, Material Flow Accounts and Resource Productivity Statistics, Lyuksemburg: Eurostat, 2023. [Online]. Mavjud: https://ec.europa.eu/eurostat/statistics-explained/index.php/Material_flow_statistics
- [13] IQTT (OECD), Extended Producer Responsibility: Updated Guidance for Efficient Waste Management, Parij: OECD nashriyoti, 2016. doi: 10.1787/9789264256385-en.
- [14] Xalqaro energetika agentligi (IEA), Uzbekistan Energy Policy Review, Parij: IEA, 2022. [Online]. Mavjud: <https://www.iea.org/reports/uzbekistan-energy-policy-review-2022>
- [15] BP, Statistical Review of World Energy 2023, London: BP p.l.c., 2023. [Online]. Mavjud: <https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html>
- [16] Osiyo Taraqqiyot Banki (ADB), Uzbekistan Country Partnership Strategy 2024–2028, Manila: ADB, 2023. [Online]. Mavjud: <https://www.adb.org/countries/uzbekistan/main>
- [17] EBRD (Yevropa Tiklanish va Taraqqiyot Banki), Uzbekistan Green Economy Financing Facility, London: EBRD, 2023. [Online]. Mavjud: <https://www.ebrd.com/uzbekistan.html>
- [18] K. Mukhitdinova va G. Tarakhtieva, “Ensuring sustainable future: the interconnectedness of food safety and environmental health,” E3S Web of Conferences, vol. 497, p. 03037, 2024. doi: 10.1051/e3sconf/202449703037.
- [19] K. A. Mukhitdinova va L. A. Vildanova, “Transport improvement of the method of assessing the attractiveness of investment in automotive enterprises,” Journal of Critical Reviews, vol. 7, no. 5, 2020. doi: 10.31838/jcr.07.05.

*Age-related physiological prerequisites for the formation of learning
motivation*

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Abstract: This article examines the age-related physiological prerequisites for the formation of learning motivation in children and adolescents. It analyzes the development of the nervous system, cognitive processes, and emotional-volitional sphere at different stages of ontogenesis. Special attention is given to the influence of biological factors on the development of interest in learning and the stability of motivation. The conclusion emphasizes the importance of considering age-related physiological characteristics in the educational process

Keywords: learning motivation, age-related characteristics, physiological development, nervous system, cognitive processes, emotional-volitional sphere, ontogenesis, adolescence, education, cognitive activity.

*«Возрастные физиологические предпосылки формирования учебной
мотивации.»*

Аннотация: В статье рассматриваются возрастные физиологические предпосылки формирования учебной мотивации у детей и подростков. Анализируются особенности развития нервной системы, когнитивных процессов и эмоционально-волевой сферы на разных этапах онтогенеза. Особое внимание уделяется влиянию биологических факторов на формирование интереса к обучению и устойчивости мотивации. Делается вывод о необходимости учета

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возрастных физиологических особенностей при организации образовательного процесса.

Ключевые слова: учебная мотивация, возрастные особенности, физиологическое развитие, нервная система, когнитивные процессы, эмоционально-волевая сфера, онтогенез, подростковый возраст, обучение, познавательная активность.

Annotatsiya: Ushbu maqolada bolalar va o'smirlarda o'quv motivatsiyasining shakllanishiga ta'sir etuvchi yoshga oid fiziologik omillar ko'rib chiqiladi. Ontogenezning turli bosqichlarida asab tizimi, kognitiv jarayonlar va emotsional-irodaviy sohaning rivojlanishi tahlil qilinadi. Ta'limga bo'lgan qiziqish va motivatsiyaning barqarorligiga biologik omillarning ta'siriga alohida e'tibor qaratiladi. Xulosa sifatida ta'lim jarayonida yoshga xos fiziologik xususiyatlarni hisobga olish zarurligi ta'kidlanadi.

Kalit so'zlar : o'quv motivatsiyasi, yosh xususiyatlari, fiziologik rivojlanish, asab tizimi, kognitiv jarayonlar, emotsional-irodaviy soha, ontogenez, o'smirlik davri, ta'lim, bilish faolligi.

Введение

Учебная мотивация является ключевым фактором успешного освоения знаний. Она формируется под влиянием множества факторов, среди которых важное место занимают возрастные физиологические особенности развития организма. Понимание этих предпосылок позволяет педагогам и психологам более эффективно организовать образовательный процесс.

- Роль нервной системы в формировании мотивации: развитие центральной нервной системы определяет способность ребенка к обучению. В младшем школьном возрасте происходит активное созревание коры головного мозга, особенно лобных долей, отвечающих за произвольное поведение и контроль

внимания. На ранних этапах обучения мотивация носит преимущественно эмоциональный характер. Дети реагируют на яркость, новизну и игровую форму подачи материала. По мере взросления усиливается роль произвольной регуляции и осознанных целей.

- **Возрастные особенности когнитивных процессов:** когнитивные процессы (внимание, память, мышление) напрямую связаны с физиологическим развитием мозга. Младший школьный возраст — преобладает наглядно-образное мышление, высокая роль непроизвольного внимания. Подростковый возраст — развивается абстрактное мышление, способность к анализу и обобщению. Эти изменения способствуют переходу от внешней мотивации (оценки, поощрения) к внутренней (интерес к знаниям).

- **Эмоционально-волевая сфера:** формирование мотивации невозможно без развития эмоций и воли. В детском возрасте эмоции играют ведущую роль: положительные переживания усиливают интерес к учебе. У подростков усиливается влияние самооценки и социальной среды. Желание самоутверждения может как повышать, так и снижать учебную мотивацию.

- **К физиологическим предпосылкам относятся:** уровень работоспособности нервной системы, особенности темперамента, гормональные изменения (особенно в подростковом возрасте). Например, в период полового созревания наблюдается нестабильность эмоционального состояния, что может снижать устойчивость учебной мотивации.

- **Учет возрастных физиологических особенностей позволяет:** выбирать адекватные методы обучения регулировать нагрузку поддерживать интерес к учебе. Например, младшим школьникам эффективнее давать материал в игровой форме, а подросткам — через обсуждение и самостоятельный поиск решений.

Проблема формирования учебной мотивации с учетом возрастных физиологических особенностей широко рассматривалась в трудах отечественных и зарубежных исследователей.

Лев Выготский подчеркивал, что развитие мотивации напрямую связано с социальной средой и уровнем развития высших психических функций. Он ввёл понятие «зона ближайшего развития», показывая, что интерес к обучению усиливается, когда задания соответствуют возможностям ребенка, но немного их опережают.

Алексей Леонтьев рассматривал мотивацию через призму деятельности. По его мнению, учебная мотивация формируется в процессе активной деятельности, где важную роль играет личностный смысл учебных задач.

Лидия Божович уделяла особое внимание внутренним мотивам. Она считала, что с возрастом у ребенка происходит переход от внешних стимулов (оценки, похвала) к внутренним (интерес к знаниям, саморазвитие).

Даниил Эльконин связывал развитие мотивации с ведущей деятельностью на каждом возрастном этапе. Например, в младшем школьном возрасте ведущей становится учебная деятельность, что способствует формированию устойчивого интереса к обучению.

Абрахам Маслоу рассматривал мотивацию через иерархию потребностей. Согласно его теории, учебная мотивация формируется только при удовлетворении базовых физиологических и психологических потребностей.

Жан Пиаже связывал мотивацию с этапами когнитивного развития. Он отмечал, что способность к обучению и интерес к знаниям зависят от уровня развития мышления ребенка.

Современные исследователи подчеркивают, что физиологические факторы (развитие мозга, гормональные изменения, особенности нервной системы) тесно

взаимодействуют с социальными условиями, определяя уровень и устойчивость учебной мотивации.

В ходе анализа возрастных физиологических предпосылок формирования учебной мотивации были получены следующие результаты:

Во-первых, установлено, что уровень развития центральной нервной системы напрямую влияет на способность к обучению и устойчивость мотивации. В младшем школьном возрасте мотивация носит преимущественно эмоциональный характер и зависит от внешних стимулов, тогда как с возрастом возрастает роль произвольной регуляции и осознанных целей.

Во-вторых, выявлена тесная связь между развитием когнитивных процессов и учебной мотивацией. Развитие внимания, памяти и мышления способствует переходу от внешней мотивации к внутренней, основанной на познавательном интересе.

В-третьих, доказано, что эмоционально-волевая сфера оказывает значительное влияние на формирование мотивации. Положительные эмоции усиливают интерес к обучению, тогда как нестабильность эмоционального состояния (особенно в подростковом возрасте) может снижать мотивацию.

В-четвертых, определено влияние биологических факторов, таких как темперамент, уровень работоспособности и гормональные изменения. Эти факторы могут как способствовать, так и затруднять формирование устойчивой учебной мотивации.

Наконец, подтверждено, что учет возрастных физиологических особенностей при организации учебного процесса способствует повышению эффективности обучения, развитию познавательной активности и формированию устойчивого интереса к знаниям.

Заключение

Возрастные физиологические особенности играют важную роль в формировании учебной мотивации. Развитие нервной системы, когнитивных процессов и эмоционально-волевой сферы определяет характер и устойчивость мотивации на разных этапах обучения. Эффективное обучение возможно только при учете этих факторов.

Список литературы

1. Выготский Л.С. Психология развития человека. — М.: Смысл, 2005.
2. Леонтьев А.Н. Деятельность. Сознание. Личность. — М.: Политиздат, 1975.
3. Божович Л.И. Личность и её формирование в детском возрасте. — М.: Просвещение, 2008.
4. Эльконин Д.Б. Психология развития. — М.: Академия, 2001.
5. Рубинштейн С.Л. Основы общей психологии. — СПб.: Питер, 2002.
6. Немов Р.С. Психология. В 3 т. — М.: Владос, 2003.
7. Давыдов В.В. Теория развивающего обучения. — М.: Интор, 1996.
8. Маркова А.К. Формирование мотивации учения. — М.: Просвещение, 1990.
9. Ильин Е.П. Мотивация и мотивы. — СПб.: Питер, 2011.
10. Хекхаузен Х. Мотивация и деятельность. — СПб.: Питер, 2003.
11. Maslow A.H. Motivation and Personality. — New York: Harper & Row, 1954.
12. Piaget J. The Psychology of Intelligence. — London: Routledge, 1950.

Deep Procedural Analysis of the Judicial Manager's Role in Simplified Insolvency Proceedings: Legal Doctrines and Judicial Practice

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Abstract:

This research paper delves into the complex procedural mechanics of simplified insolvency within the economic judicial system of Uzbekistan. It identifies the “procedural compression” phenomenon, where the Judicial Manager is required to bypass the traditional observation and rehabilitation phases to achieve rapid liquidation. The article provides a doctrinal analysis of the Judicial Manager's status as a “procedural trustee”, examining the legal tension between administrative efficiency and the constitutional protection of property rights. By analyzing the “Missing Debtor” and “Asset-less Estate” doctrines, the author proposes a new conceptual framework for the Judicial Manager's liability and remuneration. The study advocates for the integration of summary judgment principles into insolvency litigation to prevent the abuse of simplified tracks by unscrupulous debtors.

Keywords:

Simplified Insolvency, Procedural Compression, Judicial Manager, Missing Debtor, Forensic Liquidation, Economic Court, Summary Judgment, Fiduciary Duty.

The procedural architecture of simplified insolvency in the Republic of Uzbekistan represents a departure from the traditional staircase model of bankruptcy, characterized by a deliberate compression of legal timelines and stages. In this context, the Judicial Manager's role is redefined by a functional urgency that necessitates a shift from a neutral administrator to an active forensic investigator. Within the Economic Procedural Code, simplified proceedings are often triggered by the objective impossibility of the debtor's physical presence or the evident lack of operational assets. This procedural

shortcut, while essential for clearing the market of non-viable entities, places a heightened evidentiary burden on the Judicial Manager. The manager must navigate the fine line between the expedited closure of the case and the legal requirement to conduct a thorough investigation into the causes of the debtor's insolvency, particularly to identify signs of intentional bankruptcy or asset stripping.

A profound procedural specific of these cases is the “presumption of insolvency” which often governs simplified tracks. In standard proceedings, the Judicial Manager conducts a long-term analysis to determine whether the debtor can be saved; in simplified tracks, however, the law presumes a state of terminal financial distress. This shift fundamentally alters the Judicial Manager’s fiduciary duties. Under the “Forensic Liquidation” doctrine, the manager's primary duty is not to the debtor’s continuity, but to the integrity of the credit market. The manager must utilize extraordinary procedural tools, such as seeking court-ordered disclosure from third-party custodians of data (e.g., telecommunication providers and digital asset exchanges), which are often overlooked in traditional liquidation. The legal complexity arises when the Judicial Manager encounters a shell company—a debtor with no physical office or employees—where the procedural challenge is not just managing assets, but reconstructing a fragmented financial history to identify voidable transactions.

Furthermore, the Asset-less Estate (No-Asset Case) remains one of the most contentious areas of simplified insolvency. When a Judicial Manager is appointed to a case where the debtor has zero liquid assets, a procedural paradox emerges: the manager is legally mandated to perform exhaustive investigative duties, yet there is no estate to fund these activities. In developed jurisdictions like Germany or the United States, this is resolved through a public interest funding mechanism or a flat-fee state guarantee. The author argues that for Uzbekistan’s economic courts to maintain the quality of justice in simplified tracks, the procedural status of the Judicial Manager must be

bolstered by a “priority administrative claim” status. This would ensure that the manager’s costs are prioritized even in the most resource-depleted estates, thereby preventing the “procedural apathy” that occurs when practitioners are forced to work without compensation.

Another deep-seated issue is the Judicial Manager's authority to move for “Summary Judgment” within the insolvency process. In cases where the debtor is clearly a missing person or the insolvency is indisputable, the Judicial Manager should have the procedural right to request the Economic Court to bypass certain formal hearings that only serve to prolong the inevitable. This procedural economy must, however, be balanced against the rights of creditors who may not have been properly notified due to the debtor’s absence. The author proposes a Digital Notification Doctrine, where the Judicial Manager’s publication of notice on a centralized electronic platform constitutes legal service, thereby allowing the simplified proceeding to move forward with full judicial legitimacy.

In conclusion, the Judicial Manager’s participation in simplified insolvency is a high-stakes legal balancing act. It requires a professional who can act with the speed of an administrator and the precision of a judge. As Uzbekistan modernizes its Economic Procedural Code, it is essential to codify the specific powers of the manager in missing debtor scenarios and to provide a robust financial framework for no-asset cases. By deepening the procedural independence and investigative authority of the Judicial Manager, the state can ensure that simplified insolvency remains an efficient tool for economic cleansing rather than a legal loophole for fraudulent evasion. The transformation of this institute is a vital component of the broader effort to harmonize Uzbekistan’s commercial laws with global standards of transparency and judicial efficiency.

References:

1. UNCITRAL. (2021). *Legislative Guide on Insolvency Law, Part Five: Insolvency law for micro- and small-sized enterprises*. United Nations.
2. World Bank Group. (2014). *Report on the Treatment of the Insolvency of Natural Persons*. World Bank.
3. German Insolvency Code (Insolvenzordnung - InsO). *Section 304 et seq. (Simplified Insolvency Proceedings)*.
4. Madaus, S. (2020). *The Role of the Insolvency Practitioner in Simplified Procedures for MSEs*. European Insolvency and Restructuring Journal.
5. United States Bankruptcy Code. *11 U.S.C. § 1181–1195 (Subchapter V of Chapter 11)*.
6. McCormack, G. (2017). *Statutory Priorities and Administrative Expenses in Corporate Insolvency*. Journal of Corporate Law Studies.
7. International Association of Insolvency Regulators (IAIR). (2018). *Regulatory Challenges of No-Asset Cases*.
8. European Commission. (2022). *Proposal for a Directive harmonising certain aspects of insolvency law. COM(2022) 702 final*.

SYNTHESIS OF AMIDE DERIVATIVES BASED ON GLYCYRETHIC ACID BY EDCI/HOBT ACTIVATION WITH 3- AMINOPROPYL IMIDAZOL

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ABSTRACT: in this work, new amide derivatives were synthesized with 3-aminopropyl imidazole (3-API) by activating the carboxyl group of glycyrrhizic acid (GLC) in the presence of EDCI (1-ethyl-3-(3-dimethylaminopropyl) carbodiimide hydrochloride) and HOBT (1-hydroxybenzotriazole). The reaction was carried out in an inert gas medium, and the synthesis was carried out with a high chemical total (95%). [1] The resulting compound was confirmed using IR and mass spectrometry. The formation of the amide bond was determined by the absorption bands 1642 (C=O) and 3354 cm⁻¹ (N-H). The results show that the EDCI/HOBT system is an effective reagent combination for amide synthesis based on natural triterpenoids.

KEY WORDS: glycyrrhizic acid, 3-aminopropylimidazole, EDCI, HOBT, triterpenoids, imidazole derivatives.

ANNOTATSIYA: ushbu ishda glitsirret kislota (GLK) karboksil guruhi EDCI (1-etil-3-(3-dimetilaminopropil)karbodiimid gidrokslorid) va HOBT (1-hidroksibenzotriazol) ishtirokida faollashtirilib, 3-aminopropil imidazol (3-API) bilan yangi amid hosilalari sintez qilindi. Reaksiya inert gaz muhitida olib borilib, yuqori kimyoviy umum bilan sintez amalga oshirildi (95%). [1] Hosil bo'lgan birikma IQ va mass-spektrometriya yordamida tasdiqlandi. Amid bog' hosil bo'lishi 1642 (C=O) va 3354 cm⁻¹ (N-H) qabul qilingan. Natijalar shuni ko'rsatadiki, EDCI/HOBT tizimi tabiiy triterpenoidlar asosida amid sintezi uchun samarali reagent kombinatsiyasidir.

3354 cm^{-1} (N-H) yutilish chiziqlari orqali aniqlangan. Natijalar EDCI/HOBt tizimining tabiiy triterpenoidlar asosida amid sintezi uchun samarali reagentlar kombinatsiyasi ekanligini ko'rsatadi.

KALIT SO'ZLAR: glitsirret kislota, 3-aminopropilimidazol, EDCI, HOBt, triterpenoidlar, imidazol hosilalari.

KIRISH: glitsirret kislota (GK) shirinmiya (*Glycyrrhiza glabra*) o'simligidan ajratib olinadigan pentatsiklik triterpenoid bo'lib, u farmakologik jihatdan juda keng spektrli biofaollikka ega. [2] U yallig'lanishga qarshi, antiviral, gepatoprotektiv va antitumor xususiyatlari bilan ajralib turadi. Shu sababli, glitsirret kislotasining hosilalarini sintez qilish, ularning farmakologik faolligini o'rganish hamda yangi dori vositalarini yaratish dolzarb vazifalardan hisoblanadi. 3-aminopropil imidazol (3-API) tarkibida imidazol halqasi mavjud bo'lib, bu fragment biologik tizimlarda (masalan, histidin qoldig'i, ferment faol markazlari) muhim rol o'ynaydi. Imidazol halqasi proton almashinuvi, metall ionlari bilan koordinatsiya va vodorod bog'lari hosil qilish xususiyatiga ega bo'lib, biofaollikni sezilarli darajada oshiradi. [3]

Shu sababli GK va 3-API ni birlashtirish orqali yangi farmakofor tizim yaratish katta ilmiy ahamiyatga ega.

ASOSIY QISM: amid bog' hosil qilish uchun karboksil kislotalarni to'g'ridan-to'g'ri aminlar bilan kondensatsiyalash o'rniga EDCI/HOBt faollashtiruvchilar ishlatildi.

Reaksiya quyidagi bosqichlarda boradi:

1-bosqich: Karboksil guruhning faollashtirish (EDCI reaksiyasi) Glitsirret kislota karboksil guruhi EDCI bilan reaksiyaga kirishib, yuqori reaktiv O-asillangan birikmasini hosil qiladi. Bu bosqichda karboksil kislotaning OH guruhi karbodiimid markazi bilan kondensatsiyalanadi. [4]

2-bosqich: HOBt ishtirokida aktiv efir bog' hosil bo'lishi Hosil bo'lgan O-asillangan oraliq mahsulot beqaror bo'lib, HOBt bilan reaksiyaga kirishadi. Natijada nisbatan barqaror benzotriazol (OBt-ester) hosil bo'ladi. Bu bosqich yon reaksiyalar (N-acylurea hosil bo'lishi)ni sezilarli darajada kamaytiradi. [5]

3-bosqich: Nukleofil hujum va amid bog' hosil bo'lishi 3-aminopropil imidazol tarkibidagi erkin amin guruhi nukleofil sifatida karbonil uglerod atomiga hujum qiladi. Bu jarayon natijasida tetraedrik oraliq kompleks hosil bo'ladi va keyinchalik HOBt ajralib chiqib, barqaror amid bog' ($-\text{CONH}-$) shakllanadi.

NATIJALAR VA MUHOKAMA: sintez qilingan Glk-3API an=mid hosilasi yuqori unum bilan (95%) olindi. IQ spektroskopik tahlil natijalari amid bog' hosil bo'lganini tasdiqladi:

1. 3354 cm^{-1} N-H valent tebranishi (amid)
2. 1642 cm^{-1} C=O (amid karbonil guruhi)
3. $2920\text{--}2850\text{ cm}^{-1}$ C-H alifatik tebranishlar

EDCI/HOBt tizimi klassik SOCl_2 yoki asilxlorid usullariga nisbatan yuqori selektivlik berishi bilan ajralib turadi. [6]

XULOSA: glitsirret kislota va 3-aminopropil imidazol asosida yangi amid hosilasi EDCI/HOBt yordamida muvaffaqiyatli sintez qilindi. Reaksiya mexanizmi karboksil guruhning O-asillangan va OBt-ester orqali faollashuvi hamda nukleofil amin hujumi orqali amalga oshishi bilan amalga oshirildi. Olingan natijalar ushbu birikmalarni biologik faol moddalarning istiqbolli sinfi sifatida ko'rib chiqish mumkinligini ko'rsatadi.

FOYDALANILGAN ADABIYOTLAR

1. Carpino L.A. et al. The use of HOBt in peptide coupling reactions. J. Org. Chem.
2. Bodanszky M. Peptide Chemistry: A Practical Textbook. Springer.
3. Albericio F. EDCI/HOBt mediated amide bond formation. Chem. Rev.
4. Khan A. et al. Glycyrrhetic acid derivatives in medicinal chemistry. Bioorg. Med. Chem.
5. Smith M.B. March's Advanced Organic Chemistry. Wiley.
6. Houben-Weyl. Methods of Organic Chemistry: Amide Bond Formation.

SYNTHESIS AND QUANTUM-CHEMICAL ANALYSIS OF A COMPLEX COMPOUND OF Cu(II) ION WITH INDOLE-3-ACETIC ACID AND ACETAMIDE

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Abstract. This article presents the results of the synthesis and quantum-chemical analysis of a new mixed-ligand coordination compound based on the divalent copper (II) ion with indole-3-acetic acid (IAA) and acetamide (AA) ligands. The aim of the study is to determine the conditions for the formation of the complex compound and to investigate its composition, structure, and electronic properties using modern physicochemical methods. Elemental analysis of the synthesized complex confirmed its stoichiometric composition, while IR spectroscopy revealed the coordination modes of the ligands to the metal ion. In particular, it was established that indole-3-acetic acid participates in coordination through the carboxylate group, whereas acetamide coordinates via the carbonyl oxygen atom. In the theoretical part of the study, the geometric structure of the complex was optimized using Density Functional Theory (DFT), and its stability was evaluated. Quantum-chemical calculations were performed to determine the Mulliken charge distribution of atoms in the molecule, the energies of

the HOMO and LUMO orbitals, and the energy gap (ΔE). The obtained results indicate the high stability and reactivity of the complex compound.

Furthermore, these parameters are of significant importance for predicting the plant growth-stimulating properties of the complex. The results of this study can be applied in the fields of coordination chemistry, bioinorganic chemistry, and the development of new agricultural stimulants.

Keywords: Copper(II) complex, indole-3-acetic acid, acetamide, coordination compounds, synthesis, IR spectroscopy, DFT calculations, HOMO-LUMO, biological activity.

Annotatsiya. Ushbu maqolada ikki valentli mis (II) ioniga asosida indol-3-sirka kislotasi (IAA) va atsetamid (AA) ligandlari bilan yangi aralash ligandli koordinatsion birikmaning sintezi hamda kvant-kimyoviy tahlili natijalari keltirilgan. Tadqiqotning maqsadi kompleks birikmaning hosil bo'lish sharoitlarini aniqlash va uning tarkibi, tuzilishi hamda elektron xossalarini zamonaviy fizik-kimyoviy usullar yordamida o'rganishdan iborat. Sintez qilingan kompleksning elementar tahlili uning stexiometrik tarkibini tasdiqladi, IK-spektroskopiya esa ligandlarning metall ioniga koordinatsiyalanish usullarini aniqlash imkonini berdi. Xususan, indol-3-sirka kislotasi karboksilat guruhi orqali, atsetamid esa karbonil kislorod atomi orqali koordinatsiyalanishi aniqlangan. Tadqiqotning nazariy qismida kompleksning geometrik tuzilishi zichlik funksionali nazariyasi (DFT) yordamida optimallashtirildi va uning barqarorligi baholandi. Kvant-kimyoviy hisoblashlar orqali molekuladagi atomlarning Mulliken zaryad taqsimoti, HOMO va LUMO orbitalari energiyalari hamda energiya farqi (ΔE) aniqlangan. Olingan natijalar kompleks birikmaning yuqori barqarorligi va reaktivligini ko'rsatadi. Shuningdek, ushbu parametrlar kompleksning o'simlik o'sishini rag'batlantiruvchi xossalarini bashorat qilishda muhim ahamiyatga

ega. Tadqiqot natijalari koordinatsion kimyo, bioanorganik kimyo hamda qishloq xo‘jaligi stimulyatorlarini yaratish sohalarida qo‘llanilishi mumkin.

Kalit so‘zlar: mis(II) kompleksi, indol-3-sirka kislotasi, atsetamid, koordinatsion birikmalar, sintez, IK-spektroskopiya, DFT hisoblashlar, HOMO–LUMO, biologik faollik.

Аннотация. В данной статье представлены результаты синтеза и квантово-химического анализа нового смешанно-лигандного координационного соединения на основе иона меди(II) с лигандами индол-3-уксусной кислоты (IAA) и ацетамида (AA). Целью исследования является определение условий образования комплексного соединения, а также изучение его состава, структуры и электронных свойств с использованием современных физико-химических методов. Элементный анализ синтезированного комплекса подтвердил его стехиометрический состав, а ИК-спектроскопия позволила установить способы координации лигандов к иону металла. В частности, установлено, что индол-3-уксусная кислота координируется через карбоксилатную группу, тогда как ацетамид — через карбонильный атом кислорода. В теоретической части исследования геометрическая структура комплекса была оптимизирована с использованием теории функционала плотности (DFT), а его стабильность была оценена. Квантово-химические расчёты позволили определить распределение зарядов Малликена, энергии граничных орбиталей HOMO и LUMO, а также энергетический разрыв (ΔE). Полученные результаты свидетельствуют о высокой стабильности и реакционной способности комплексного соединения. Кроме того, данные параметры имеют важное значение для прогнозирования свойств комплекса как стимулятора роста растений. Результаты исследования могут быть использованы в координационной химии, биоанорганической химии, а также при разработке новых сельскохозяйственных стимуляторов.

Ключевые слова: комплекс меди(II), индол-3-уксусная кислота, ацетамид, координационные соединения, синтез, ИК-спектроскопия, расчёты DFT, HOMO–LUMO, биологическая активность.

Research methodology. The mixed-ligand coordination compound of cuprum(II) chloride with indole-3-acetic acid and acetamide was synthesized using the following procedure. First, 0.01 mol (1.75 g) of indole-3-acetic acid (IAA) was dissolved in 50 mL of ethanol. To ensure deprotonation of the ligand's carboxyl group, 0.01 mol of potassium hydroxide (KOH) was added to the resulting solution. In a separate beaker, 0.005 mol (0.855 g) of cuprum(II) chloride dihydrate ($\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$) was completely dissolved in 20 mL of distilled water. The metal salt solution was then added dropwise to the indole-3-acetic acid solution under constant stirring and mixed on a magnetic stirrer for 25–30 minutes. Afterwards, in order to form the mixed-ligand complex, a solution of 0.01 mol (0.59 g) of acetamide (AA) was added dropwise (5–10 mL) to the reaction mixture, followed by further stirring for 25–30 minutes. The reaction mixture was then continuously stirred at 50–55 °C for 1–1.5 hours using a magnetic stirrer [12]. At the end of the reaction, a clear, colorless solution was obtained. The resulting solution was purified by filtration, washed several times with a mixture of distilled water and ethanol, and dried in a vacuum desiccator (over P_2O_5) until constant mass was achieved [13,14].

As a result of the synthesis process, a clear colorless crystalline powder was obtained. The overall yield of the synthesis reaction was 82%, which confirms the high efficiency of the selected synthetic method. Based on the compositional analysis of the complex compound, it can be represented by the formula $[\text{Cu}(\text{IAA})_2(\text{AA})_2] \cdot 2\text{H}_2\text{O}$ [15]. The reaction equation can be expressed as follows.

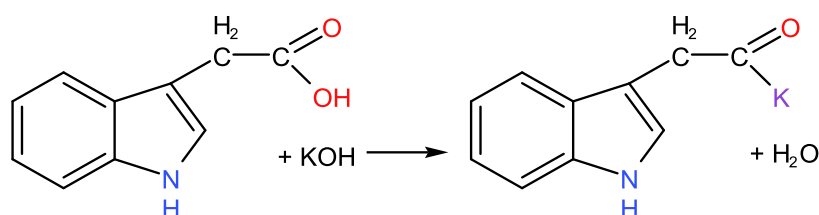


Figure 1. The reaction for obtaining the potassium salt of indole-3-acetic acid

In solution, the selected ligands lose their protons and are converted into IAA^- and AA^- anions. The Zn^{2+} ion possesses vacant coordination orbitals and forms coordination bonds with the IAA^- and AA^- ligands through the oxygen atoms of the carboxylate groups. $\text{M} = \text{Cu}$.

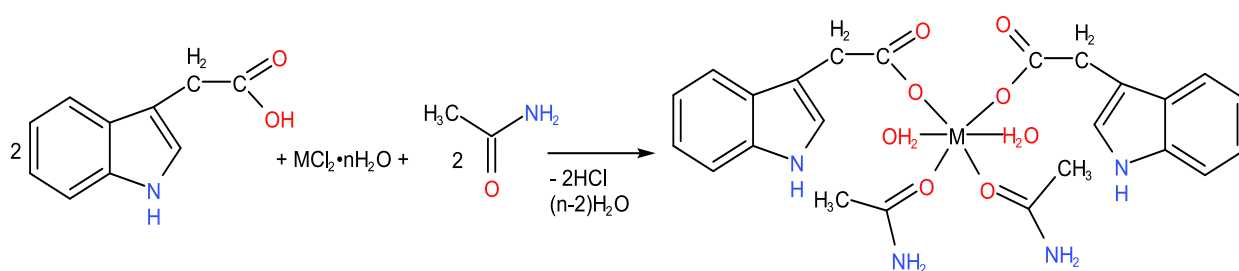


Figure 2. The reaction equation for the formation of the complex compound $[\text{Cu}(\text{IAA})_2(\text{AA})_2] \cdot 2\text{H}_2\text{O}$

As a result, a coordination compound with six coordination and octahedral geometry is formed. During crystallization, the resulting complex incorporates two water molecules, which are considered water of crystallization: $[\text{Cu}(\text{IAA})_2(\text{AA})_2] \cdot 2\text{H}_2\text{O}$.

Analysis and results. In this study, the electronic structure, geometric parameters, and stability of the synthesized complex $[\text{Cu}(\text{IAA})_2(\text{AA})_2] \cdot 2\text{H}_2\text{O}$ were investigated using quantum chemical calculations. All computations were carried out using the Gaussian program package. The geometry optimization and subsequent analyses were performed within the framework of Density Functional Theory (DFT) employing the range-separated hybrid functional CAM-B3LYP, which is known for its improved description of long-range electron interactions and charge-transfer systems. The initial molecular structure of the complex was constructed based on experimental coordination assumptions, where $\text{Cu}(\text{II})$ is coordinated by two indole-3-acetate (IAA^-) and two acetate (AA^-) ligands through oxygen donor atoms. Full geometry optimization was performed without any symmetry constraints, and the nature of the stationary points was confirmed by vibrational frequency analysis, ensuring the absence of imaginary frequencies.

The optimized structure reveals that the Cu(II) center adopts a distorted octahedral coordination environment, where the ligand molecules form stable coordination bonds via carboxylate oxygen atoms. The presence of crystallization water molecules plays an important role in stabilizing the supramolecular structure through hydrogen bonding interactions. Furthermore, frontier molecular orbital (FMO) analysis was carried out to evaluate the electronic properties of the complex. The energies and spatial distributions of HOMO and LUMO orbitals provide insight into the chemical reactivity, kinetic stability, and possible charge-transfer pathways within the complex [16]. The HOMO–LUMO energy gap indicates the relative stability of the system and its potential reactivity. Additionally, charge distribution analysis and electron density mapping were used to better understand the coordination behavior and electron delocalization within the complex system. These results provide a theoretical basis for interpreting the stability and physicochemical properties of the synthesized cuprum complex.

Similar to above complex, Cu(II) complex was optimized at the same level of theory and shown in Figure 3. The converged unrestricted wave function yielded a spin expectation value of $\langle S^2 \rangle = 0.7516$ before annihilation and 0.7500 after, confirming negligible spin contamination and a clean doublet ground state consistent with a d^9 Cu(II) center bearing one unpaired electron. Natural bond orbital (NBO) analysis was carried out on the converged density to obtain atomic charges, natural electron configurations quantifying the strength of ligand-to-metal electron donation.

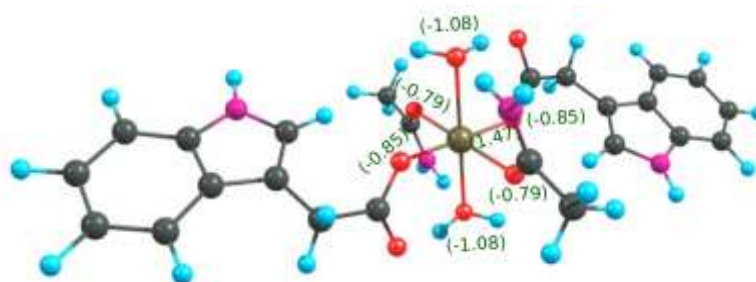


Figure 3. Optimized geometry of the Cu(II) complex (CAM-B3LYP/LANL2DZ) with NBO partial charges (green, in parentheses). Cu (gold), O (red), N (magenta), C (dark gray), H (cyan).

The NBO charge on copper was determined to be +1.47 e, substantially below the formal oxidation state of +2, similar results were observed by JV Burda et,al[1]. This reduction of 0.53 e from the ionic limit directly reflects the greater covalent character of the Cu–O bonds arising from the more diffuse, partially filled d-shell of Cu(II). The natural electron configuration of copper is [core] 4s(0.26) 3d(9.24) 5p(0.02), confirming that the formal d⁹ count is preserved in the NBO picture with the d-manifold holding 9.24 electrons in total. The six coordinating oxygen atoms fall into three chemically distinct groups, each with a characteristic NBO charge reflecting both their intrinsic donor ability and the extent of charge transferred to Cu(II). The indole-2-carboxylic acid oxygens that coordinate directly to copper carry charges of –0.853 e each, the most negative values among the directly bonded donor set. The non-coordinating partner oxygens of each carboxylate group bear significantly less negative charges of –0.743 e, confirming asymmetric bonding within the carboxylate unit in which one oxygen engages the metal while the other retains greater electron density. The acetamide carbonyl oxygens, which chelate copper through amide resonance-modulated lone pairs, carry charges of –0.792 and –0.791 e respectively. The terminal aqua oxygens bear the highest negative charges in the coordination sphere (–1.086 e each), which as in the Zn complex arises from O–H bond polarity rather than strong donation to the metal.

Moreover, the individual 3d orbital occupancies extracted from the NAO analysis provide a detailed picture of the d⁹ electron hole distribution. The five d-orbitals are unequally populated, with $d_{x^2-y^2}$ (occupancy 1.591) and d_{xy} (occupancy 1.701) carrying the largest electron deficiencies. The d_{xz} (1.991), d_{yz} (1.997), and d_z^2 (1.961) orbitals remain nearly fully occupied. This pattern of preferential depopulation of $d_{x^2-y^2}$ and d_{xy}

is the hallmark of a Jahn-Teller active Cu(II) center in an elongated octahedral or square-based coordination environment, where the equatorial ligand field splits the eg manifold and destabilizes the orbital pointing directly toward the strongest equatorial donors. The SOMO is thus predominantly $d_{x^2-y^2}$ in character with a secondary d_{xy} contribution, consistent with the complex's pseudo-square-planar equatorial plane defined by the four strongly donating indole-2-carboxylic acid and acetamide oxygens.

The frontier molecular orbital analysis HOMO-LUMO gap is 5.53 eV as shown in Figure 4. The partially filled d-shell of Cu(II) introduces a low-lying metal-centered acceptor state that pulls the LUMO energy down into the gap, compressing E_g considerably. This directly reflects the open-shell d^9 electronic structure of the Cu center. The LUMO is metal-centered, concentrated at the Cu–O coordination core and displaying orbital lobes with clear Cu d-character interacting with the surrounding donor oxygen atoms. This confirms that the lowest-energy electronic excitation is a ligand-to-metal charge transfer (LMCT) process, in which electron density flows from the oxygen lone pairs and ligand π -system into the vacant d-based acceptor orbital on Cu[2]. This LMCT character is characteristic of open-shell Cu(II) and is consistent with the partial radical character already identified on the coordinating carboxylate oxygens through spin density analysis. The HOMO is ligand-centered, delocalized as a π -type bonding orbital across both indole aromatic ring systems on the two ligands simultaneously. The symmetrical HOMO topology across both ligands confirms equivalent electronic environments on the two indole fragments and suggests that photoexcitation can be used to probe the ligand π -framework through LMCT transitions. The chemical hardness $\eta = E_g/2 = 2.77$ eV classifies this complex as moderately hard. Research on the Mixed Ligand Cu(II) and Zn(II) Complexes by Mamaru Bitew Alem et, al.[3] shows similar character.

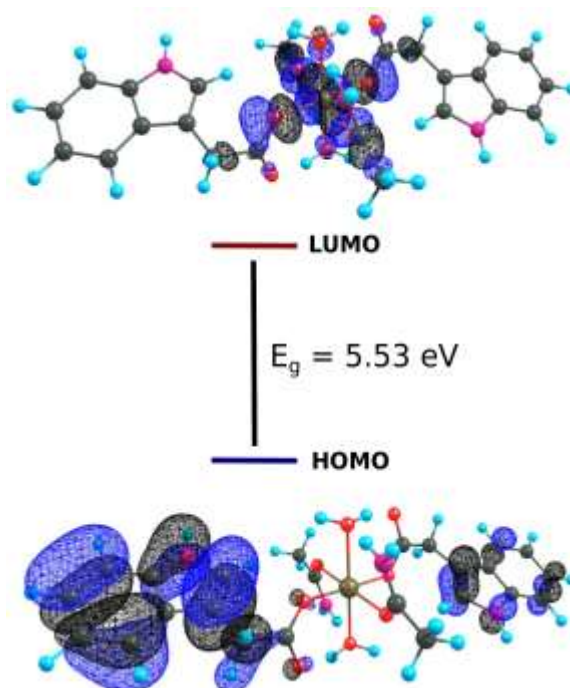


Figure 4. Frontier molecular orbitals of the Cu(II) complex (CAM-B3LYP/LANL2DZ, isovalue = 0.02 a.u.). Top: LUMO, localized on the Cu–O coordination core with significant metal d-character. Bottom: HOMO, delocalized across both indole ligand π -systems. $E_g = 5.53$ eV. Blue surface: positive phase; black mesh: negative phase.

The ESP surface (Figure 5.) shows a deep red nucleophilic zone at the Cu–O coordination core, broader and more intense than in the Ni(II) or Zn(II) analogues, consistent with the higher covalency (0.53 e charge transfer). Blue regions are localized symmetrically at the acetamide N–H protons on both ligands, marking them as the primary hydrogen-bond donor sites. The aromatic ring faces display near-neutral green/cyan π -electron density.

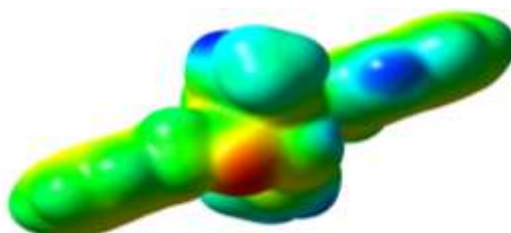


Figure 5. Electrostatic potential (ESP) surface of the Cu(II) complex mapped on the 0.001 a.u. electron density isosurface (CAM-B3LYP/LANL2DZ). Red: most electron-rich (negative potential, Cu–O coordination core); blue: most electron-poor (positive, amide N–H protons); green/cyan: near-neutral aromatic π -faces; yellow: mildly electrophilic C–H periphery. The two elongated indole-containing arms extend horizontally.

REFERENCES:

1. Piu P., Leoni V., Zoroddu M.A., Manca G., Deiana S., Gessa C. Coordination of metal ions by indolic acids. Complexes of indole-3-carboxylic, indole-3-acetic, indole-3- β -acrylic, indole-N-acetic and indole-N-methyl-2-carboxylic acids with some divalent metal ions // *Transition Metal Chemistry*. – 1992. – Vol. 17. – № 4. – Pp. 283–286.
2. Micera G., Erre L.S., Panzanelli A., Piu P., Cariatì F. Coordination of metal ions by indolic acids. Complexes of indole-2-carboxylic, -3-acetic, -3-propanoic and -3-butanolic acids with some divalent metal ions // *Journal of Coordination Chemistry*. – 1984. – Vol. 13. – № 3. – Pp. 231–239.
3. Ibragimova M.R., Alimov U.K., Azizov T.A. Study of Mixed Amide Coordination Compounds of Copper (II) Nicotinate // *Chemical Science International Journal*. – 2022. – Vol. 31. – № 4. – Pp. 12–20.
4. Omirzak N., Yerkasov R.S. Quantum chemical study of structural properties for copper halide complexes with protonated acetamides // *Bulletin of the L.N. Gumilyov Eurasian National University. Chemistry. Geography. Ecology Series*. – 2022. – № 1 (138). – Pp. 7–17.
5. Khaleel A.M.N. Synthesis and Characterization of Trihydro mono and Dihydrobis(indole-3-acetic acid) Borate Ligands and Some of Their Metal Complexes // *Iraqi Journal of Science*. – 2015. – Vol. 56. – № 4A. – Pp. 2762–2772.
6. Strinna Erre, L. Coordination of metal ions by indolic acids. Copper(II) complexes

of indole-3-carboxylic, -5-carboxylic, -N-acetic, and N-methylindole-2-carboxylic acids / L. Strinna Erre, G. Micera, P. Piu, A. Pusino, F. Cariati // *Journal of Coordination Chemistry*. – 1986. – Vol. 13. – Iss. 3. – Pp. 231–239.

7. Nnabuike, G. G. Copper(II) and Nickel(II) complexes of the non-steroidal anti-inflammatory drug indomethacin containing aromatic chelating N,N-donor ligand: Synthesis and structural studies / G. G. Nnabuike, S. Salunke-Gawali, A. S. Patil, R. J. Butcher, M. Lawal, M. O. Bamigboye, J. A. Obaleye // *Journal of Molecular Structure*. – 2021. – Vol. 1224. – Art. 129069.

8. İnci, D. Cu(II) complex with auxin (3-indoleacetic acid) and an aromatic planar ligand: synthesis, crystal structure, biomolecular interactions and radical scavenging activity / D. İnci, R. Aydın, Y. Zorlu // *European Biophysics Journal*. – 2021. – Vol. 50. – Pp. 771–785. – DOI: 10.1007/s00249-021-01525-5.

9. Chkirate, K. Novel Co(II) and Cu(II) coordination complexes constructed from pyrazole-acetamide: Effect of hydrogen bonding on the self assembly process and antioxidant activity / K. Chkirate, S. Fettach, K. Karrouchi, N. K. Sebbar, E. M. Essassi, J. T. Mague, S. Radi, M. E. A. Faouzi, N. N. Adarsh, Y. Garcia // *Journal of Inorganic Biochemistry*. – 2019. – Vol. 191. – Pp. 21–28.

10. Ma, Q. Auxin signaling: a big question to be addressed by small molecules / Q. Ma, P. Grones, S. Robert // *Journal of Experimental Botany*. – 2018. – Vol. 69. – No. 2. – Pp. 313–328. – DOI: 10.1093/jxb/erx375.

11. El-Sayed D.S., Sinha L., Soayed A.A. Experimental and theoretical quantum chemical studies of 2-(2-acetamidophenyl)-2-oxo-N-(pyridin-2-ylmethyl)acetamide and its copper(II) complex: molecular docking simulation with IGF-1R // *BMC Chemistry*. – 2024. – Vol. 18. – Article 112. – DOI: 10.1186/s13065-024-01217-z.

12. Niu H.-Y., Zheng Y.-R., Ding Y.-F., Wei Y.-X., Zhang J., Guo S.-L., Qiao Z.-H., Cheng H., Dong W.-K., Ding Y.-J. The unexpected salamo-type copper(II) complex:

Synthesis, structure, theoretical calculations and fluorescence properties // *Journal of Molecular Structure*. – 2023. – Vol. 1293. – Article 136250. – DOI: 10.1016/j.molstruc.2023.136250.

13. Smajlagić A., Srabović M., Huremović M., Ademović Z., Pehlić E. Synthesis and characterization of metal complexes of Mg(II) and Cu(II) ions with N-(4-hydroxyphenyl) acetamide // *Journal of Scientific Research and Reports*. – 2025. – Vol. 31, No. 1. – P. 322–330. – DOI: 10.9734/jsrr/2025/v31i12773.

14. Ж.У. Туракулов, Т.А. Азизов. Синтез и исследование координационных соединений ацетата кальция с ацетамидом. // Научный журнал. *Universum: Химия и биология*. №9 (51). Москва, 2018. С.18-24.

15. Харитонов Ю.А., Цивадзе А.Ю., Смирнов А.Н. Анализ нормальных колебаний координированного ацета мида // *Коорд. химия*. – 1975. – Т.1. – № 2. – С. 214-219.

16. Gaussian 16, Revision C.02, M. J. Frisch, G. W. Trucks, H. B. Schlegel, G. E. Scuseria, M. A. Robb, J. R. Cheeseman, G. Scalmani, V. Barone, G. A. Petersson, H. Nakatsuji, X. Li, M. Caricato, A. V. Marenich, J. Bloino, B. G. Janesko, R. Gomperts, B. Mennucci, H. P. Hratchian, J. V. Ortiz, A. F. Izmaylov, J. L. Sonnenberg, D. Williams-Young, F. Ding, F. Lipparini, F. Egidi, J. Goings, B. Peng, A. Petrone, T. Henderson, D. Ranasinghe, V. G. Zakrzewski, J. Gao, N. Rega, G. Zheng, W. Liang, M. Hada, M. Ehara, K. Toyota, R. Fukuda, J. Hasegawa, M. Ishida, T. Nakajima, Y. Honda, O. Kitao, H. Nakai, T. Vreven, K. Throssell, J. A. Montgomery, Jr., J. E. Peralta, F. Ogliaro, M. J. Bearpark, J. J. Heyd, E. N. Brothers, K. N. Kudin, V. N. Staroverov, T. A. Keith, R. Kobayashi, J. Normand, K. Raghavachari, A. P. Rendell, J. C. Burant, S. S. Iyengar, J. Tomasi, M. Cossi, J. M. Millam, M. Klene, C. Adamo, R. Cammi, J. W. Ochterski, R. L. Martin, K. Morokuma, O. Farkas, J. B. Foresman, and D. J. Fox, Gaussian, Inc., Wallingford CT, 2016.

SYNTHESIS, STRUCTURE AND ELECTRONIC PROPERTIES OF A NEW $[Zn(IAA)_2(AA)_2] \cdot 2H_2O$ COORDINATION COMPLEX: A COMBINED EXPERIMENTAL AND COMPUTATIONAL STUDY

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Abstract. The article describes the synthesis of a new mixed-ligand coordination compound of zinc(II) ion with indole-3-acetic acid (heteroauxin) and acetamide. The composition and structure of the obtained complex compound were investigated using elemental analysis and IR spectroscopy. Analysis of the IR spectra allowed determining the coordination modes of the ligands to the metal ion. In the second part of the study, the electronic structure and thermodynamic characteristics of the complex were analyzed using quantum-chemical calculations (DFT method). The results show a high correlation between theoretical and experimental data, providing a basis for the potential biological activity of the synthesized complex.

Keywords: zinc(II), indole-3-acetic acid, acetamide, coordination compound, synthesis, IR spectroscopy, quantum-chemical analysis, DFT, HOMO-LUMO.

Annotatsiya. Maqolada rux(II) ioni bilan indol-3-sirka kislotasi (geteroauksin) va atsetamid asosidagi yangi aralash ligandli koordinatsion birikmaning sintezi

tavsiflangan. Olingan kompleks birikmaning tarkibi va tuzilishi element tahlili hamda IQ-spektroskopiya usullari yordamida tadqiq etildi. IQ-spektrlar tahlili ligandlarning metal ioniga koordinatsiyalanish usullarini aniqlash imkonini berdi. Tadqiqotning ikkinchi qismida kompleksning elektron tuzilishi va termodinamik xarakteristikalar kvant-kimyoviy hisoblashlar (DFT usuli) yordamida tahlil qilindi. Natijalar nazariy va tajribaviy ma'lumotlar o'rtasida yuqori korrelyatsiya mavjudligini ko'rsatdi, bu esa sintez qilingan kompleksning potentsial biologik faolligi uchun asos bo'lib xizmat qiladi.

Kalit so'zlar: rux(II), indol-3-sirka kislotasi, atsetamid, koordinatsion birikma, sintez, IQ-spektroskopiya, kvant-kimyoviy tahlil, DFT, HOMO-LUMO.

Аннотация. В статье описан синтез нового смешаннолигандного координационного соединения иона цинка(II) с индол-3-уксусной кислотой (гетероауксином) и ацетамидом. Состав и структура полученного комплексного соединения были исследованы с помощью элементного анализа и ИК-спектроскопии. Анализ ИК-спектров позволил определить способы координации лигандов к иону металла. Во второй части исследования с помощью квантово-химических расчетов (метод DFT) были проанализированы электронное строение и термодинамические характеристики комплекса. Результаты демонстрируют высокую корреляцию между теоретическими и экспериментальными данными, что дает основание для прогнозирования потенциальной биологической активности синтезированного комплекса.

Ключевые слова: цинк(II), индол-3-уксусная кислота, ацетамид, координационное соединение, синтез, ИК-спектроскопия, квантово-химический анализ, DFT, ВЗМО-НСМО.

The mixed-ligand coordination compound of zinc(II) chloride with indole-3-acetic acid and acetamide was synthesized using the following procedure. First, 0.01

mol (1.75 g) of indole-3-acetic acid (IAA) was dissolved in 50 mL of ethanol. To ensure deprotonation of the ligand's carboxyl group, 0.01 mol of potassium hydroxide (KOH) was added to the resulting solution. In a separate beaker, 0.005 mol (0.85 g) of zinc(II) chloride dihydrate ($\text{ZnCl}_2 \cdot 2\text{H}_2\text{O}$) was completely dissolved in 20 mL of distilled water. The metal salt solution was then added dropwise to the indole-3-acetic acid solution under constant stirring and mixed on a magnetic stirrer for 25–30 minutes. Afterwards, in order to form the mixed-ligand complex, a solution of 0.01 mol (0.59 g) of acetamide (AA) was added dropwise (5–10 mL) to the reaction mixture, followed by further stirring for 25–30 minutes. The reaction mixture was then continuously stirred at 50–55 °C for 1–1.5 hours using a magnetic stirrer [1]. At the end of the reaction, a clear, colorless solution was obtained. The resulting solution was purified by filtration, washed several times with a mixture of distilled water and ethanol, and dried in a vacuum desiccator (over P_2O_5) until constant mass was achieved [2].

As a result of the synthesis process, a clear colorless crystalline powder was obtained. The overall yield of the synthesis reaction was 82%, which confirms the high efficiency of the selected synthetic method. Based on the compositional analysis of the complex compound, it can be represented by the formula $[\text{Zn}(\text{IAA})_2(\text{AA})_2] \cdot 2\text{H}_2\text{O}$ [3]. The reaction equation can be expressed as follows.

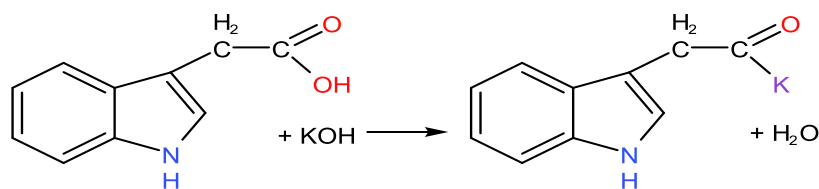


Figure 1. The reaction for obtaining the potassium salt of indole-3-acetic acid

In solution, the selected ligands lose their protons and are converted into IAA^- and AA^- anions. The Zn^{2+} ion possesses vacant coordination orbitals and forms coordination bonds with the IAA^- and AA^- ligands through the oxygen atoms of the carboxylate groups.

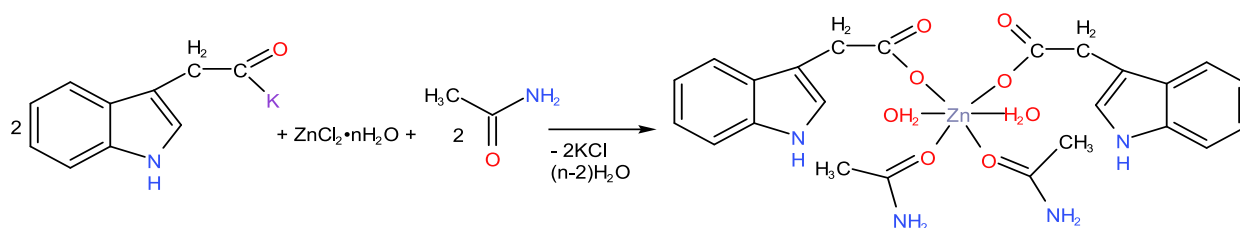


Figure 2. The reaction equation for the formation of the complex compound $[Zn(IAA)_2(AA)_2] \cdot 2H_2O$

As a result, a coordination compound with six coordination and octahedral geometry is formed. During crystallization, the resulting complex incorporates two water molecules, which are considered water of crystallization: $[Zn(IAA)_2(AA)_2] \cdot 2H_2O$.

ANALYSIS AND RESULTS.

Electronic structure analysis of Zn(II) complex.

Zinc(II) coordination complexes occupy a prominent position in bioinorganic chemistry, materials science, and medicinal chemistry owing to the unique electronic properties of the d^{10} metal center, which confers high thermodynamic stability, Lewis acidity, and favorable luminescence behavior [4]. Unlike transition metals with partially filled d-orbitals, Zn(II) exhibits no d–d transitions, directing all photophysical activity toward ligand-based or ligand-to-metal charge-transfer (LMCT) processes [5]. Indole and its derivatives are biologically privileged scaffolds that appear as constituents of the essential amino acid tryptophan and a broad spectrum of natural products and pharmaceuticals [6]. Their aromatic nitrogen and electron-rich π -system make them excellent candidates for chelation of transition metals, offering both σ -donor N-coordination and π -stacking stabilization [7]. The incorporation of carboxylate and amide functionalities alongside the indole moiety creates multidentate ligand platforms capable of saturating the coordination sphere of Zn(II) while imparting solubility and hydrogen-bonding capacity relevant to aqueous biological environments. Density functional theory (DFT) has become the standard computational methodology for

characterizing the structure, bonding, and reactivity of metal complexes [8]. The range-separated CAM-B3LYP functional is particularly well-suited to zinc coordination compounds, accurately describing charge-transfer excitations and long-range electron correlation effects that are poorly treated by conventional hybrid functionals [9]. The LANL2DZ effective core potential (ECP) basis set provides a computationally efficient treatment of the zinc core electrons while maintaining accuracy for valence-shell properties [10].

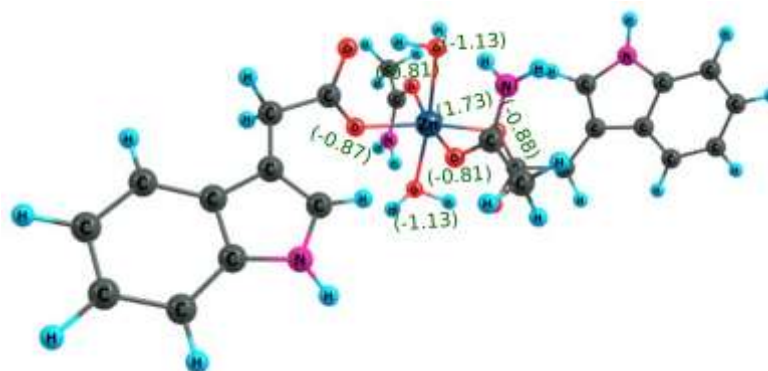


Figure 3. Optimized geometry of the Zn(II) complex at the CAM-B3LYP/LANL2DZ level with NBO partial charges (in parentheses, green text) shown for key donor atoms. Color code: Zn (dark blue), O (red), N (magenta), C (dark gray), H (cyan).

The optimized structure (Figure 3) reveals that the Zn(II) center is hexacoordinate with a strictly oxygen-donor O_6 coordination sphere, adopting a distorted octahedral geometry. The six donor oxygens originate from three chemically distinct sources: two carboxylate oxygens from *indole-2-carboxylic acid* (Zn–O: 2.05 and 2.07 Å), two acetamide carbonyl oxygens from the acetamide-indole ligand (Zn–O: 2.12 and 2.13 Å), and two terminal aqua oxygens (Zn–O: 2.15 and 2.13 Å).

Table 1.

Zn–O Bond lengths and NBO charges

Donor Type	Bond 1 (Å)	Bond 2 (Å)	NBO Charge 1 (e)	NBO Charge 2 (e)
Carboxylate O (indole-2-carboxylic acid)	2.05	2.07	−0.87	−0.88
Acetamide O	2.12	2.13	−0.81	−0.81
Terminal O (aqua)	2.15	2.13	−1.13	−1.13
Zn center (NBO)	—	—	+1.73	(formal: +2.0)

The NBO charge on zinc (+1.73 e) is reduced by 0.27 e relative to the formal +2 oxidation state, reflecting net ligand-to-metal charge transfer distributed across all six Zn–O bonds. This reduction confirms that the Zn–O bonds are predominantly ionic with a meaningful covalent component, consistent with Zn(II) acting as a borderline hard Lewis acid with a strong preference for oxygen donors over nitrogen. The carboxylate oxygens of indole-2-carboxylic acid form the shortest bonds in the complex (2.05 and 2.07 Å) and carry moderate negative charges (−0.87 and −0.88 e), identifying them as the strongest σ -donors in the coordination sphere. Their moderate charge magnitudes, rather than extreme values, reflect a balance between inherent oxygen electronegativity, partial charge transfer to Zn, and delocalization across the O–C–O resonance system of the carboxylate. The near-identical values for both oxygens ($\Delta q = 0.01$ e, $\Delta d = 0.02$ Å) confirm near-symmetric bidentate chelation of indole-2-carboxylic acid. The acetamide carbonyl oxygens exhibit intermediate bond lengths (2.12 and 2.13 Å) and the lowest negative charges among the three oxygen types (−0.81 e each). This is a direct consequence of amide resonance: the nitrogen lone pair adjacent to the C=O group donates electron density into the $\pi^*(\text{C}=\text{O})$ orbital ($n_n \rightarrow \pi^*$ interaction), reducing the electron density available on the carbonyl oxygen for metal donation. Both acetamide oxygens are fully equivalent, confirming symmetric coordination geometry. The terminal aqua oxygens present an apparently paradoxical combination of the highest negative charge (−1.13 e) yet the longest Zn–O bonds (2.13–2.15 Å). This is resolved by recognizing that water oxygen retains high negative charge because of the polarization of its two O–H bonds (each H bears $\sim +0.5$ e in NBO), not because of strong donation to zinc.

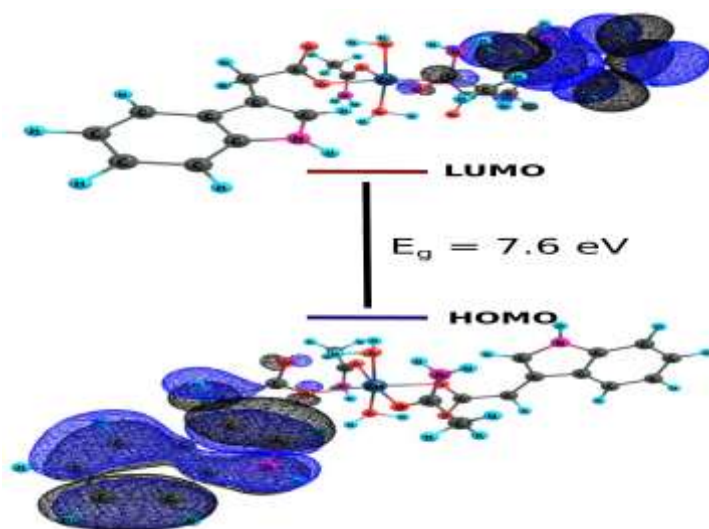


Figure 4. HOMO (bottom) and LUMO (top) of the Zn(II) complex (CAM-B3LYP/LANL2DZ, isovalue = 0.02 a.u.). Blue: positive phase; black mesh: negative phase. $E_g = 7.6$ eV. Both orbitals are exclusively ligand-centered.

Water is in fact the weakest donor of the three groups, forming the longest and most labile Zn–O bonds. These aqua ligands are therefore the primary sites for ligand exchange in solution and represent the most accessible substitution positions for incoming biological or pharmacological ligands.

CONCLUSION. The present study reports a quantum chemical investigation of the zinc(II) complex $[\text{Zn}(\text{IAA})_2(\text{AA})_2] \cdot 2\text{H}_2\text{O}$ using Density Functional Theory calculations performed with the Gaussian program package. Geometry optimizations and electronic structure analyses were carried out at the CAM-B3LYP/LANL2DZ level of theory, confirming a stable optimized structure without imaginary frequencies. The results show that Zn(II) forms a six-coordinate distorted octahedral geometry with oxygen donor atoms. NBO analysis indicates predominantly ionic Zn–O interactions with partial covalent character due to ligand-to-metal charge transfer. Frontier molecular orbital analysis reveals a ligand-centered electronic structure with a large HOMO–LUMO gap (7.6 eV), indicating high kinetic stability and low reactivity. Electrostatic potential mapping further identifies oxygen atoms as the main reactive sites in the complex. Overall, the obtained theoretical results provide a consistent description of the structural stability and electronic properties of the synthesized zinc(II) complex, supporting its potential relevance in coordination and bioinorganic chemistry.

REFERENCES:

1. Мукимова Г.Ж. Синтез и исследование координационных соединений сукцинатов некоторых 3d-металлов с амидами: Автореф. дис ... канд. хим. наук. – Ташкент, 1999. – С. 35-38.
2. Sharipova L.A., Azizov T.A., Ibragimova M.R. Acetamide and nicotinic acid of monotype ligand coordination compounds of zinc nitrate // *Universum: chemistry and biology*, - Moskva, 2021. №5 (83).- P. 45-49.
3. Ж.У. Туракулов, Т.А. Азизов. Синтез и исследование координационных соединений ацетата кальция с ацетамидом. //Научный журнал. *Universum: Химия и биология*. №9 (51). Москва, 2018. С.18-24.
4. Lippard, S. J., & Berg, J. M. (1994). *Principles of bioinorganic chemistry*. University Science Books.
5. Constable, E. C. *Metals and Ligand Reactivity*; VCH: Weinheim, 1996.
6. Kaur, K., Jain, M., Reddy, R. P., & Jain, R. (2010). Quinolines and structurally related heterocycles as antimalarials. *European journal of medicinal chemistry*, 45(8), 3245-3264.
7. Reedijk, J. (2013). Coordination chemistry beyond Werner: interplay between hydrogen bonding and coordination. *Chemical Society Reviews*, 42(4), 1776-1783.
8. Cramer, C. J. *Essentials of Computational Chemistry: Theories and Models*, 2nd ed.; Wiley: Chichester, 2004.
9. Yanai, T., Tew, D. P., & Handy, N. C. (2004). A new hybrid exchange–correlation functional using the Coulomb-attenuating method (CAM-B3LYP). *Chemical physics letters*, 393(1-3), 51-57.
10. Hay, P. J., & Wadt, W. R. (1985). Ab initio effective core potentials for molecular calculations. Potentials for the transition metal atoms Sc to Hg. *The Journal of chemical physics*, 82(1), 270-283.

Analysis of the change process of the Chimkurgan reservoir basin over the years in Global Watersheds

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Abstract. This study analyzes the state and dynamics of water resources in the Chimqo'rg'on Reservoir based on the Global Watersheds platform. Within the scope of the research, the catchment characteristics of the reservoir, the formation of water flow, changes in hydrological regimes, and the impact of climate factors are comprehensively examined. In addition, the spatial and temporal distribution of water resources is assessed using Geographic Information Systems (GIS) and remote sensing data.

During the study, data from the Global Watersheds database are used to analyze inflow volumes to the reservoir, precipitation amounts, evaporation processes, and water discharge indicators. Based on the obtained results, scientifically grounded conclusions are developed regarding the rational use of water resources, improving management efficiency, and preventing water scarcity.

The findings of the research contribute to the sustainable management of water resources, the preservation of ecological balance, and a deeper understanding of hydrological processes using the Chimqo'rg'on Reservoir as a case study.

Keywords:. Chimqo'rg'on Reservoir, Global Watersheds, water resources, hydrological analysis, catchment area, GIS, remote sensing, precipitation, water flow, evaporation, water balance, sustainable management

**Global Watershedsda Chimqo'rg'on suv ombori havzasining yillar
davomida o'zgarish jarayonining tahlili**

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Annotatsiya. Ushbu tadqiqotda Global Watersheds platformasi asosida Chimqo'rg'on suv ombori suv resurslarining holati va dinamikasi tahlil qilinadi. Tadqiqot doirasida suv omborining havza xususiyatlari, suv oqimi shakllanishi, gidrologik rejim o'zgarishlari hamda iqlim omillarining ta'siri kompleks ravishda o'rganiladi. Shuningdek, geoaxborot tizimlari (GIS) va masofadan zondlash ma'lumotlari asosida suv resurslarining makon va vaqt bo'yicha taqsimlanishi baholanadi.

Ish jarayonida Global Watersheds ma'lumotlar bazasidan foydalanib, suv omboriga kelib tushayotgan suv hajmi, yog'ingarchilik miqdori, bug'lanish jarayonlari hamda suv sarfi ko'rsatkichlari tahlil qilinadi. Olingan natijalar asosida suv resurslaridan oqilona foydalanish, ularni boshqarish samaradorligini oshirish va suv tanqisligini oldini olish bo'yicha ilmiy asoslangan xulosalar ishlab chiqiladi.

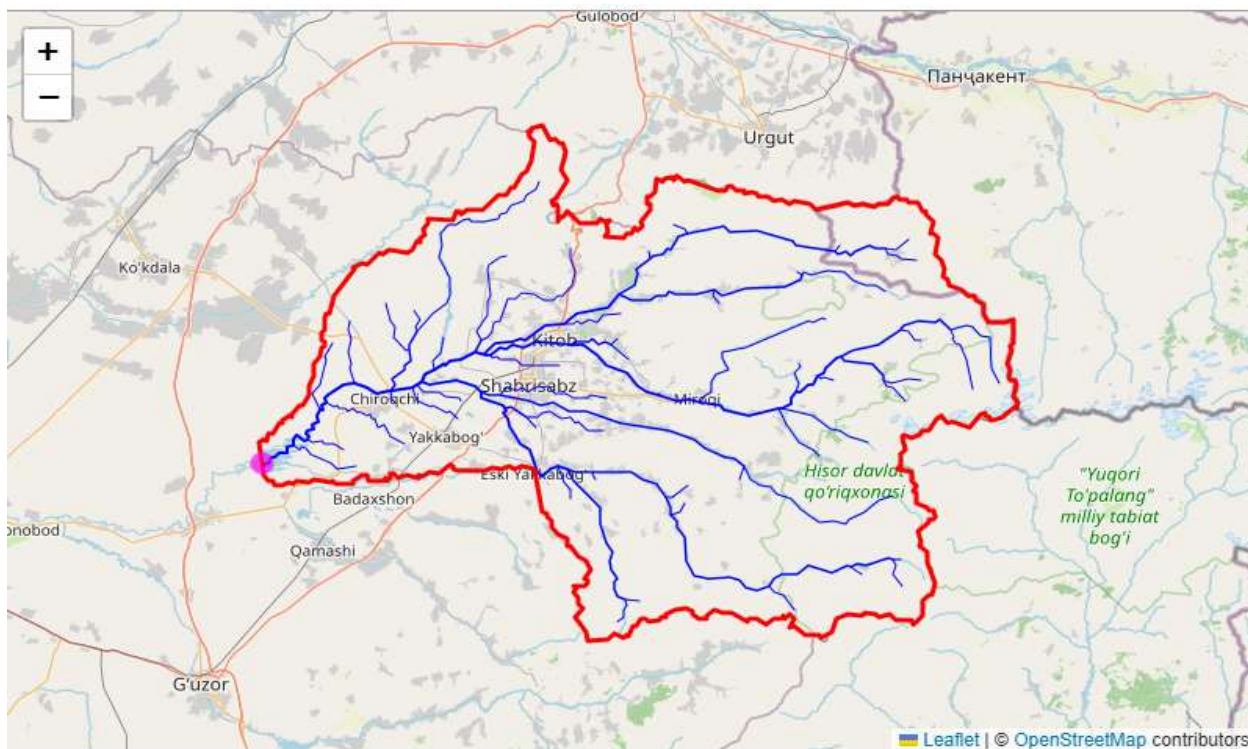
Tadqiqot natijalari Chimqo'rg'on suv ombori misolida suv resurslarini barqaror boshqarish, ekologik muvozanatni saqlash va gidrologik jarayonlarni chuqurroq anglashga xizmat qiladi.

Kalit so'zlar: Chimqo'rg'on suv ombori, Global Watersheds, suv resurslari, gidrologik tahlil, suv havzasi, GIS, masofadan zondlash, yog'ingarchilik, suv oqimi, bug'lanish, suv balansi, barqaror boshqaruv

So'nggi yillarda suv resurslarining barqaror boshqaruvi va ularning holatini zamonaviy texnologiyalar asosida tahlil qilish dolzarb ilmiy-amaliy muammolardan biri bo'lib qolmoqda. Global iqlim o'zgarishi, antropogen bosimning ortishi hamda suv iste'molining ko'payishi suv omborlari va ularning havzalari holatiga sezilarli ta'sir ko'rsatmoqda. Shu nuqtai nazardan, suv resurslarini monitoring qilish va ularni baholashda geoaxborot tizimlari (GIS), masofadan zondlash texnologiyalari hamda global ma'lumot platformalaridan foydalanish muhim ahamiyat kasb etadi. Chimqo'rg'on suv ombori O'zbekistonning muhim gidrotexnik inshootlaridan biri

bo'lib, u sug'orish tizimlari va suv ta'minotida muhim rol o'ynaydi. Ushbu suv omborining suv resurslari holati, uning to'ldirilishi va sarflanish jarayonlari havza gidrologik sharoitlari hamda iqlim omillari bilan chambarchas bog'liqdir. Shu sababli suv ombori resurslarini tizimli ravishda o'rganish va tahlil qilish muhim ilmiy vazifalardan biri hisoblanadi. Global Watersheds platformasi suv havzalari bo'yicha keng qamrovli ma'lumotlar bazasini taqdim etib, suv oqimi, yog'ingarchilik, bug'lanish va suv balansi kabi ko'rsatkichlarni tahlil qilish imkonini beradi. Ushbu imkoniyatlar Chimqo'rg'on suv ombori misolida suv resurslarining makon va vaqt bo'yicha o'zgarishlarini chuqur o'rganishga xizmat qiladi.

Mazkur tadqiqotning maqsadi Global Watersheds ma'lumotlari asosida Chimqo'rg'on suv ombori suv resurslarining holati va dinamikasini tahlil qilish, asosiy gidrologik jarayonlarni baholash hamda suv resurslaridan oqilona foydalanish bo'yicha ilmiy asoslangan xulosalar ishlab chiqishdan iborat.



1.rasm. Suv ombori havzasining suv yig'ish maydoni

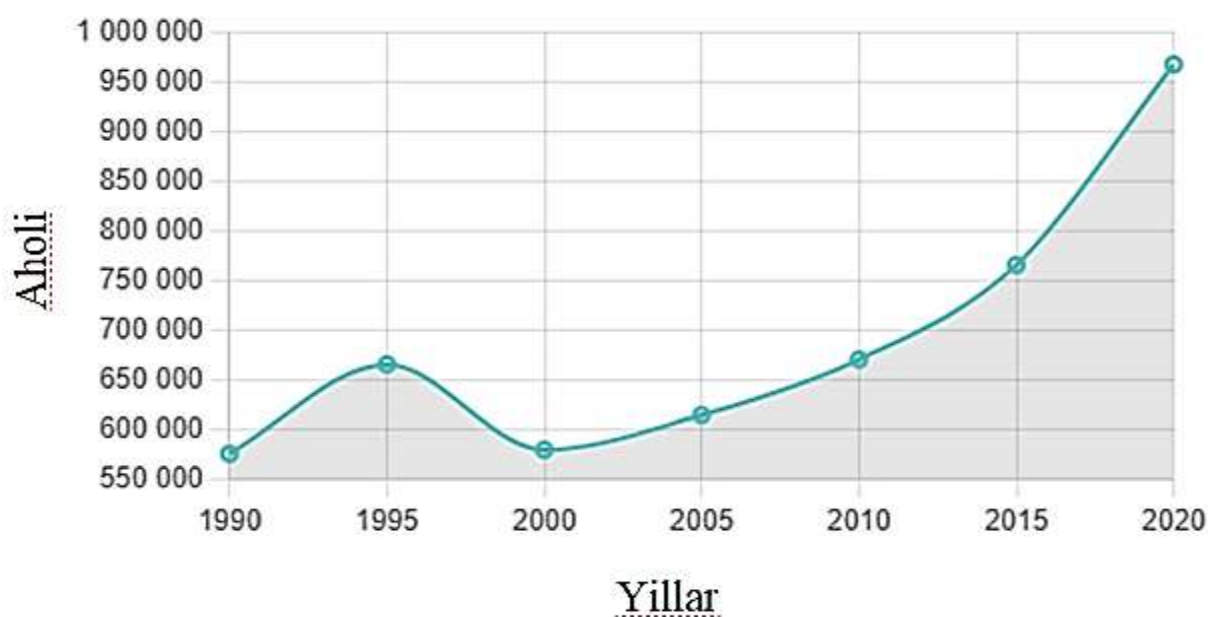
Suv havzasi ikki mamlakatda joylashgan bo'lib, quyida 1-jadvalda ko'rsatilgan.

1-jadval. Suv havzasidagi mamlakatlar.

Mamlakat	maydoni (km ²)	Suv havzasining foizi
Uzbekiston	5.240	95%
Tojikiston	271	5%

Siyosiy chegaralar haqidagi ma'lumotlar Natural Earth, <https://www.naturalearthdata.com> saytidan olingan.

Suv havzasi aholisi 2020-yilda taxminan 967 000 kishini tashkil etgan. 2-rasmda 1990-yildan 2020-yilgacha aholi soni qanday o'zgarganligi ko'rsatilgan. Aholi soni o'rtacha 1,7% ga o'sgan. (2-rasm)

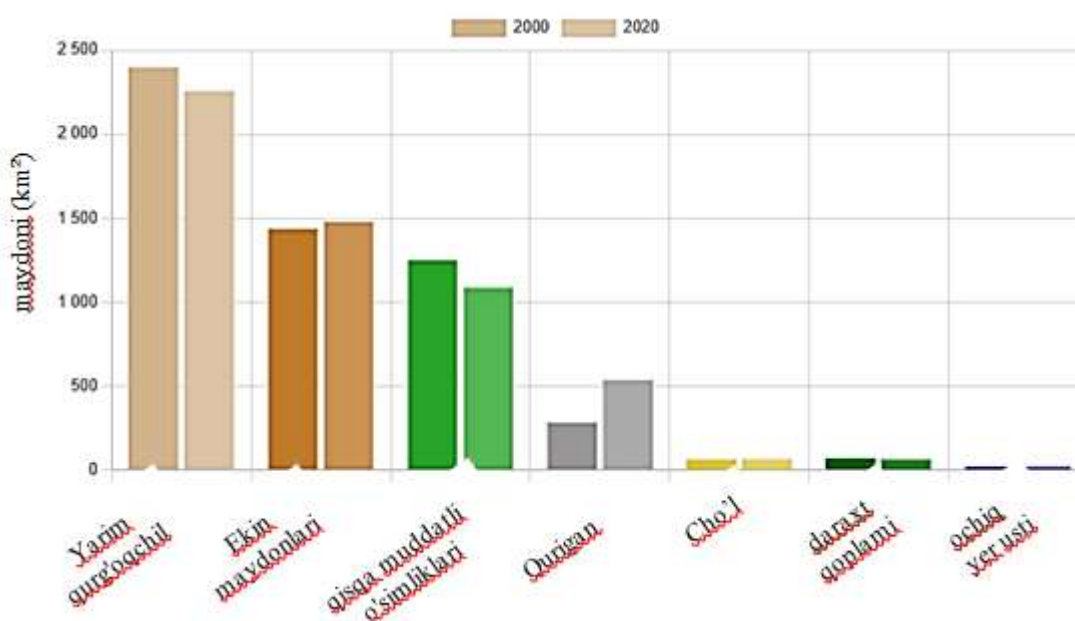


2-rasm. 1990-yildan 2020-yilgacha suv havzasi aholisining taxminiy soni.

Aholi soni haqidagi ma'lumotlar Pekin Normal Universiteti tadqiqotchilari tomonidan yaratilgan GlobPop, Global Gridded Population Estimates (Liu 2024) ma'lumotlaridan olingan.

Hudud aholisining o'sishi shuningdek sanoat va qishloq xo'jaligidan bo'ladigan ifloslanishning ko'payishi suv sifatiga salbiy ta'sir qilmoqda. Bundan tashqari, aholining o'sishi yerlardan foydalanish va yer qoplamining o'zgarishi suv havzalariga katta ta'sir ko'rsatadi.

Suv havzasidagi eng keng tarqalgan yerlar turi yarim qurg'oqchil bo'lib, 2020-yilda 2260 km² maydonni egallagan. Yer resurslari va uning qanday o'zgarganligi haqida batafsil ma'lumot quyidagi 2-jadval va 3-rasmda keltirilgan. Chiziqlar juftligi 2000 va 2020-yillardagi har bir yer resurslari uchun ma'lum maydonni ifodalaydi.



3-rasm. Suv havzasidagi yer qoplami.

2-jadval. Suv havzasidagi yer qoplami.

Yer resurslari	Maydon o'zgarishi, 2000 yilda km ²	Maydon o'zgarishi, 2020 yilda km ²	o'zgarish %
Yarim qurg'oqchil	2.400	2.260	-5%

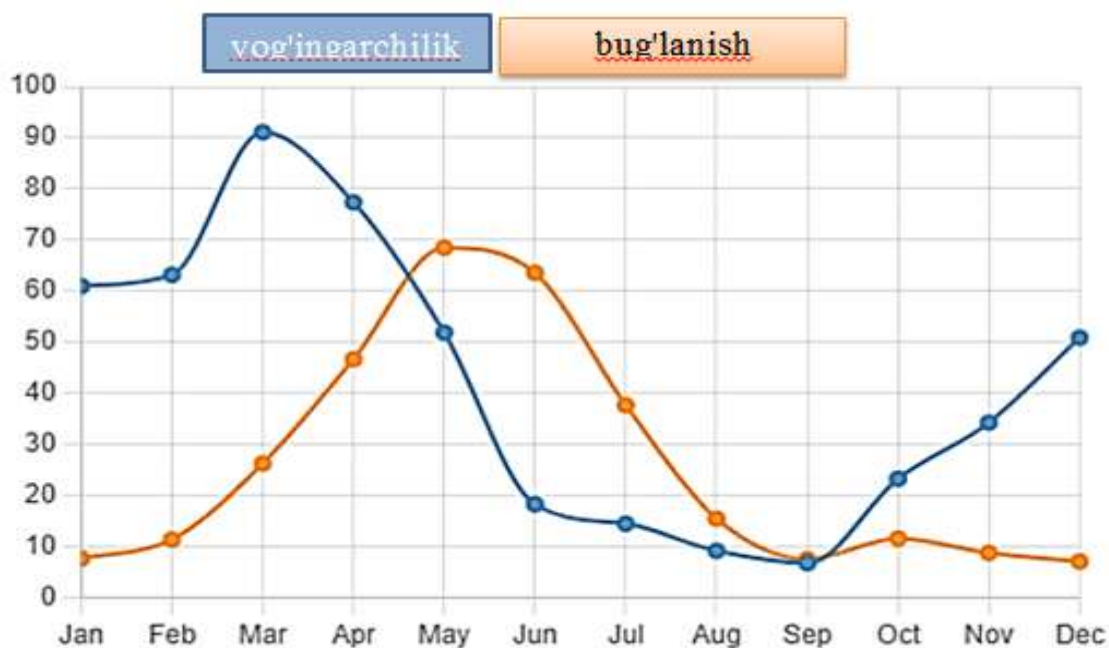
Ekin maydonlari	1.440	1.480	2%
Qisqa muddatli o'simliklari	1.250	1.090	-12%
Qurigan	288	540	87%
Cho'l	68	69	1%
Daraxt qoplami	70	68	-3%
Ochiq yer usti suvlari	24	26	8%

Merilend universiteti tadqiqotchilari tomonidan yaratilgan ushbu ma'lumotlar to'plami 2000-2020 yillar uchub olingan. Tasniflash Landsat va suniy yo'ldosh o'rganish vositalaridan olingan sun'iy yo'ldosh tasvirlariga asoslangan.

Yer resurslarining o'zgarishi suv havzasi gidrologiyasi va suv sifati o'zgarishiga katta ta'sir ko'rsatadi. Urbanizatsiya va rivojlanish suv o'tkazmaydigan qoplamni oshirishi mumkin, bu esa yerga singib ketish o'rni ko'proq suvning oqib ketishiga olib keladi. Bu yer osti suvlarining qayta tiklanishini va daryolar oqimini yoki qurg'oqchil davrlarda sodir bo'ladigan oqimni kamaytiradi. O'rmonlarning kesilishi va qishloq xo'jaligining rivojlanishi ko'pincha tuproq eroziyasi va cho'kindilarning ko'payishiga olib keladi. Yerlardan foydalanishni noto'g'ri tashkil qilish suvning ifloslanishi bilan bog'liq muammolarni keltirib chiqaradi. Masalan, qishloq xo'jaligi o'g'itlardan pestitsidlar va ozuqa moddalarining (azot va fosfor) ko'payishiga olib kelishi mumkin.

Suv havzasi bo'ylab o'rtacha yillik yog'ingarchilik miqdori yiliga 502 mm. ni tashkil qiladi. (Yog'ingarchilik tarkibiga qor va yomg'ir kabi barcha turdagi suv kiradi.) Ushbu suvning bir qismi suv havzasi yuzasidan bug'lanish va transpiratsiya yoki

o'simliklardan suv yo'qotilishi orqali chiqib ketadi. Havzadagi yillik bug'lanish miqdori yiliga 313 mm.ga teng. Havzaning oylik o'rtacha yog'ingarchilik va bug'lanish miqdori 4-rasmda ko'rsatilgan.

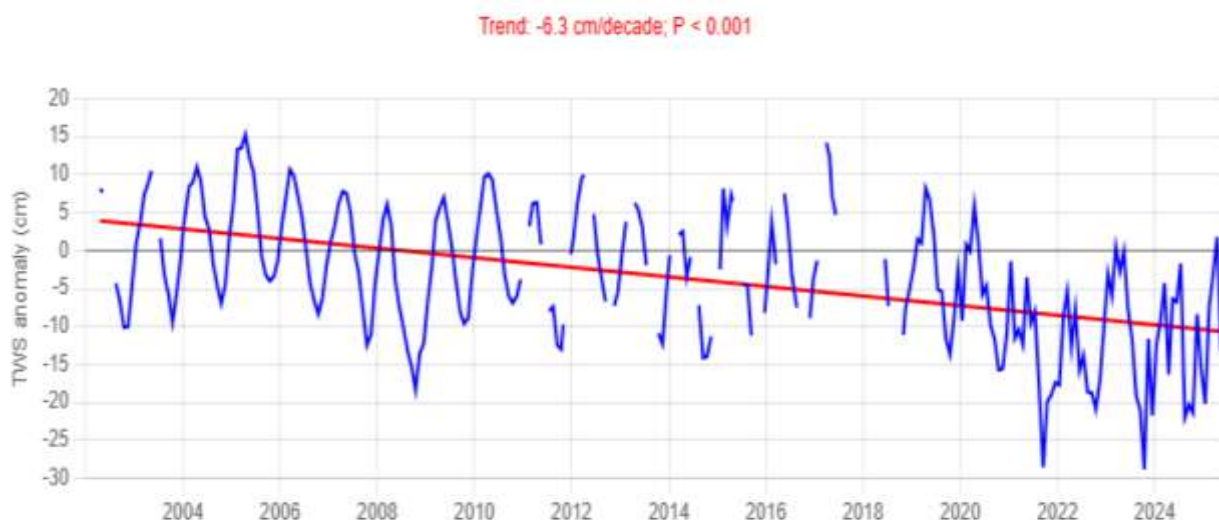


4-rasm. Suv havzasidagi oylik o'rtacha yog'ingarchilik va bug'lanish.

Yog'ingarchilik ma'lumotlari Sharqiy Angliya universiteti tadqiqotchilari tomonidan yaratilgan global tarmoqlangan ma'lumotlar to'plami bo'lgan WorldClimdan olingan (Harris va boshqalar, 2020). Ushbu ma'lumotlar to'plami 1901–2018 yillar oralig'idagi stansiya kuzatuvlarining katta to'plamiga asoslangan CRU-TS ma'lumotlar to'plamini (Fick va Hijmans 2017) kamaytirish va tuzatishga asoslangan.

Bug'lanishni yog'ingarchilikdan ham baholash qiyinroq. Bu yerda biz modellashtirish va masofadan zondlash ma'lumotlarini birlashtirgan GLEAM v3.6B ma'lumotlar to'plamidan foydalanamiz (Martens va boshqalar, 2017; Miralles va boshqalar, 2011).

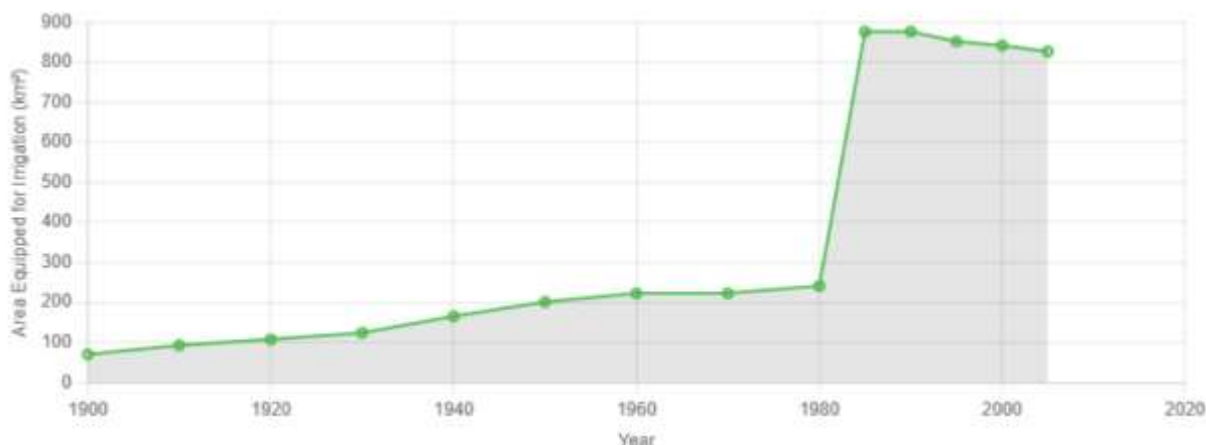
GRACE sun'iy yo'ldoshlari Yerning turli joylarida suv miqdorining o'zgarishi haqida ma'lumot beradi. 4-rasmda suv havzasi ustidagi o'rtacha yer usti suvlarini saqlash anomaliyasi ko'rsatilgan.



5-rasm. 2002 yildan 2025 yilgacha bo'lgan GRACE quruqlikdagi suvni saqlash anomaliyasi.

GRACE sun'iy yo'ldoshlari yerning tortishish maydonini juda aniq va oylik vaqt shkalasida suv massasining o'zgarishini o'lchaydi. Bu o'lchovlar bizga mintaqada qancha suv borligini emas, balki suv miqdorining boshlang'ich chiziqqa nisbatan qanday o'zgarganligini ko'rsatadi. O'lchov daryolar, ko'llar va suv omborlaridagi suv, tuproq namligi, yer osti suvlari, muzliklar, qor va muz kabi barcha turdagi suvlarni o'z ichiga oladi. So'ngi kuzatuvlarda suv havzasidagi suvning umumiy miqdori har o'n yilda -6,3 sm tezlikda pastga qarab ketayotgani aniqlangan. ($P < 0,01$). Bu P-qiymati kuzatilgan tendentsiya statistik jihatdan ahamiyatli ekanligini ko'rsatadi; bu tendentsiya tasodif tufayli bo'lishi ehtimoldan yiroq.

Quyida 1900-yildan 2005-yilgacha sug'oriladigan maydonlarning rivojlanishi ko'rsatilgan. Ushbu hisob-kitoblar xalqaro tadqiqotchilar jamoasi tomonidan nashr etilgan global ma'lumotlar to'plamiga asoslangan (Siebert va boshqalar, 2015).



6-rasm. 1900-yildan 2005-yilgacha suv havzasida sug'orish maydonining o'zgarishi

Sug'orish maydonini suv bilan ta'minlashda havzada manba ma'lumotlar to'plamidagi eng uzun uzluksiz oqim liniyasi, MERIT-Basins orqali daryoning asosiy oqimi inobatga olinadi.

Xulosa

Ushbu tadqiqot Global Watersheds platformasi ma'lumotlari asosida Chimqo'rg'on suv ombori havzasining yillar davomida o'zgarish jarayonlari tahliliga bag'ishlandi. O'rganishlar natijasida suv havzasining gidrologik rejimi vaqt o'tishi bilan iqlim omillari, yog'ingarchilik miqdorining o'zgarishi hamda antropogen ta'sirlar natijasida sezilarli dinamikaga ega ekanligini ko'rsatadi.

Tahlillarda esa, suv oqimi shakllanishi va uning hajmi yillar kesimida barqaror bo'lmagan tendensiyaga ega bo'lib, ayrim davrlarda kamayish yoki ortish holatlari kuzatilgan. Bu esa bevosita bug'lanish jarayonlari, suv sarfi hamda havza hududidagi iqlim o'zgarishlari bilan bog'liqdir. Shuhuningdek, GIS va masofadan zondlash ma'lumotlari asosida olib borilgan baholashlar suv havzasining o'zgarishlarini yanada aniqroq tahlil qilish imkonini berdi.

Olingan natijalar Chimqo'rg'on suv ombori havzasida suv resurslarining barqarorligi doimiy monitoring va kompleks boshqaruvni talab qilishini ko'rsatadi. Shu bilan birga, suv resurslaridan samarali foydalanish, suv yo'qotishlarini kamaytirish va iqlim o'zgarishlariga moslashish bo'yicha ilmiy asoslangan chora-tadbirlarni ishlab chiqish zarurligini ko'rsatadi.

Umuman olganda, tadqiqot natijalari suv havzalarining uzoq muddatli o'zgarishlarini tahlil qilishda Global Watersheds platformasining muhim ilmiy-amaliy ahamiyatga ega ekanligini tasdiqlaydi.

Foydalanilgan adabiyotlar.

1. Global Watersheds Platform. (2024). Hydrological Data and Watershed Analysis System. Available at: <https://www.globalwatersheds.org>
2. Lehner, B., Grill, G. (2013). Global river hydrography and watershed datasets for hydrological modeling. *Hydrology and Earth System Sciences*, 17, 2869–2881.
3. United States Geological Survey (USGS). (2023). Remote Sensing and Hydrological Data Resources. <https://www.usgs.gov>
4. FAO. (2022). Water Resources Management and Sustainable Use. Food and Agriculture Organization of the United Nations.
5. World Bank. (2021). Managing Water Resources for Sustainable Development. Washington, DC.
6. Arnold, J.G., et al. (1998). Large area hydrologic modeling and assessment. *Journal of the American Water Resources Association*, 34(1), 73–89.
7. Tashkent Institute of Irrigation and Agricultural Mechanization Engineers – National Research University. (2025). Hydrology and Water Resources Research Materials.
8. IPCC. (2021). Climate Change 2021: The Physical Science Basis. Intergovernmental Panel on Climate Change Report.



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**THE FORMATION OF A GREEN INVESTMENT ENVIRONMENT
AND THE IMPORTANCE OF ITS MANAGEMENT**

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Abstract

This article analyzes the formation of a green investment environment, its key factors, and the importance of effective management mechanisms. It highlights the significant role of green investments in ensuring environmental sustainability in the modern economy, rational use of natural resources, and addressing climate change-related challenges. The study examines the role of public policy, financial instruments, innovative technologies, and international experience in the development of a green investment environment. It also substantiates the opportunities to enhance economic efficiency, ensure environmental safety, and achieve social well-being through effective management of these investments. The article develops practical proposals and recommendations for improving the green investment environment in the context of Uzbekistan.

Key words: green investment, investment environment, environmental sustainability, green economy, innovative technologies, financial instruments, public policy, efficient resource use, climate change, sustainable development.

Introduction. Today, as the world economy continues to develop at a rapid pace, environmental problems—particularly climate change, the depletion of natural resources, and environmental pollution—are becoming some of the most pressing global issues. In order to address these challenges and ensure sustainable economic growth, there is a growing need to shift from traditional development models to environmentally responsible and resource-efficient approaches. In this regard, the concept of a green economy and the system of green investments that support it are of particular importance.

The formation of a green investment environment means creating favorable conditions for financing environmentally safe, energy-efficient, and innovative projects. The development of such an environment makes it possible not only to ensure economic growth but also to protect the environment, use natural resources efficiently, and preserve a healthy ecological system for future generations. At the same time, green investments contribute to accelerating modernization processes across various sectors of the economy.

The relevance of this topic lies in the fact that modern states face the task of ensuring a balance between economic development and environmental sustainability. In particular, for developing countries, including Uzbekistan, the formation and effective management of a green investment environment is one of the key directions of economic reforms. In this regard, improving public policy, developing financial mechanisms, and studying international experience are of great importance.

Therefore, this work provides a comprehensive analysis of the formation of a green investment environment, the factors influencing it, as well as the economic and environmental significance of its effective management.

Research methods. In this article, theoretical approaches related to the green investment environment were generalized using the methods of analysis and synthesis.

Foreign and national experiences were studied using the comparative method. Investment indicators were evaluated based on statistical analysis. In addition, a systems approach was used to analyze the interrelationship of the structural elements of the green investment environment.

Main part. In the context of today's globalization, ensuring environmental sustainability alongside economic growth is becoming increasingly important. Factors such as climate change, the limited nature of natural resources, and the growing level of environmental pollution are forcing states and business entities to seek new approaches. From this perspective, the formation of a green investment environment and its effective management are considered one of the key directions of modern economic policy. Green investments not only ensure economic growth but also play an important role in addressing environmental problems, improving public health, and supporting sustainable development.

A green investment environment refers to a set of conditions created for investments aimed at environmentally friendly technologies, renewable energy sources, improving energy efficiency, reducing waste, and ensuring the rational use of natural resources. The formation of such an environment requires the implementation of legal, institutional, and economic mechanisms by the state. In particular, investors can be attracted to environmental projects through financial instruments such as tax incentives, subsidies, grants, "green" loans, and bonds.

One of the main factors in the formation of a green investment environment is public policy and strategic planning. Laws, environmental standards, and development programs adopted by the government create clear directions and guarantees for investors. For example, state programs for the development of renewable energy sources increase the inflow of green investments into the energy sector. At the same time, the

strengthening of environmental regulations encourages enterprises to introduce resource-saving technologies.

Financial institutions also play a significant role in the formation of a green investment environment. Banks, investment funds, and international financial organizations support environmental initiatives by financing green projects. In particular, the “green bonds” market has developed rapidly in recent years and has become an important instrument for financing large-scale infrastructure and energy projects. Through this, investors not only receive financial returns but also contribute to positive environmental impact.

The role of innovation and scientific research in forming a green investment environment is also invaluable. By developing new technologies and implementing them in practice, it is possible to increase the environmental efficiency of production processes. For example, energy-saving equipment, waste recycling technologies, and “smart” management systems ensure the sustainability of enterprises’ activities. Therefore, supporting scientific research and developing innovative infrastructure is an important task of the state.

The issue of managing the green investment environment also deserves special attention. If the management system is not effective, it becomes difficult to use available resources efficiently and achieve expected results. Therefore, it is necessary to introduce monitoring and evaluation systems in managing green investments. Through these systems, the environmental and economic efficiency of implemented projects is continuously analyzed. As a result, shortcomings are identified, and measures are taken to eliminate them.

Transparency and accountability principles play an important role in managing green investments. The availability of open and reliable information for investors positively influences their decision-making process. At the same time, transparent

management is also essential to prevent corruption and ensure efficient use of resources. In this regard, the introduction of digital technologies, the creation of databases, and the improvement of reporting systems are of great importance.

Public-private partnership plays a particularly important role in the management of the green investment environment. Favorable conditions and support mechanisms created by the state encourage active participation of private investors. In turn, the private sector introduces innovative ideas and effective management experience. Through this cooperation, the opportunities for implementing large-scale environmental projects are expanded.

The importance of the green investment environment is reflected not only in environmental aspects but also in economic and social dimensions. First, such investments create new jobs and increase economic activity. Second, by improving energy efficiency, production costs are reduced. Third, environmental improvement has a positive impact on public health. As a result, sustainable development is ensured in the long term.

In Uzbekistan, extensive work is also being carried out to form and develop a green investment environment. The development of renewable energy sources, efficient use of water resources, and improvement of waste recycling systems are among the priority areas. At the same time, studying international experience and adapting it to national conditions is of great importance.

In recent years, the Republic of Uzbekistan has been implementing large-scale reforms aimed at sustainable development, environmental security, and the transition to a green economy. In this process, improving the green investment environment is considered one of the key strategic directions. This contributes to ensuring economic growth while simultaneously protecting the environment and efficiently using natural resources.

The first important direction is strengthening the legal and institutional framework. It is necessary to improve legislation that encourages green investments, introduce environmental standards, and create clear and stable rules for investors. This increases investor confidence and strengthens the flow of capital into green projects.

The second direction is the development of financial mechanisms. By expanding financial instruments such as green loans, green bonds, and subsidies, opportunities for financing environmental projects are increased. In addition, strengthening cooperation with international financial institutions is also of great importance.

The third direction is the development of renewable energy sources. By attracting investments in solar, wind, and other environmentally friendly energy types, it is possible to improve energy efficiency and reduce carbon emissions.

The fourth direction is the introduction of innovations and digital technologies. Through green technologies, smart management systems, and digital monitoring platforms, it is possible to increase the efficiency of investment projects and ensure transparency.

The fifth direction is expanding private sector participation and developing public-private partnerships. This reduces the financial burden in implementing large-scale environmental projects and increases efficiency.

In addition, increasing the ecological culture of the population and improving the system of personnel training are also of great importance. Because a sustainable green economy cannot develop without the human factor.

Conclusion and recommendations:

In conclusion, the formation of a green investment environment and its effective management are an integral part of the modern economy. This process serves not only to address environmental problems but also to ensure economic growth. Therefore, active cooperation among the state, business, and all segments of society in this direction

is necessary. Only in this way can sustainable development and a healthy environment for future generations be ensured.

The formation and effective management of a green investment environment is an important factor in ensuring sustainable economic development. It contributes to strengthening environmental safety, efficient use of resources, and increasing economic efficiency. Therefore, the introduction of a comprehensive approach and effective management mechanisms in this area is of great importance.

In general, improving the green investment environment in Uzbekistan requires a comprehensive approach. Through the combination of legal, financial, technological, and institutional reforms, it is possible to form a sustainable and environmentally safe economic system in the country.

References:

1. Abdurakhmanov Q.X. (2022). Investment Economics. Tashkent: “Economy and Innovative Technologies” Publishing House.
2. Gulomov S.S. (2019). Investment Management in Market Economy Conditions. Tashkent: “Fan va Texnologiya”.
3. K.M. Shodmonkulov. PhD dissertation on the topic: “Directions for Effective Management of Small Industrial Zones (on the example of Kashkadarya region)”. Tashkent, 2022.
4. Stat.uz

DIRECTIONS FOR IMPROVING THE EFFECTIVE MANAGEMENT OF THE DEVELOPMENT OF SMALL INDUSTRIAL ZONES

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Abstract. This article analyzes the directions for improving the effective management of the development of small industrial zones. The study highlights the economic importance of small industrial zones, their role in regional development, and existing management challenges. It also substantiates key directions for their development, including strengthening the legal and institutional framework, modernizing infrastructure, improving the investment climate, introducing digital management systems, and expanding public-private partnerships. The results of the study contribute to increasing the efficiency of small industrial zones and ensuring regional economic growth.

Keywords: small industrial zones, management system, regional development, investment climate, infrastructure, public-private partnership, digital management, economic efficiency, innovations, industrial policy

Introduction. Today, small industrial zones (SIZs) play an important role in diversifying Uzbekistan's economy, increasing industrial potential in regions, and creating new jobs. Small industrial zones provide convenient production areas for small and medium-sized business entities and help solve their infrastructural problems. At the same time, these zones are considered one of the main mechanisms that accelerate regional economic development.

The relevance of the topic lies in the fact that ineffective management of small industrial zones may hinder the full realization of their economic potential. Therefore, improving the management system of small industrial zones, attracting investments, and increasing production efficiency are considered among the most pressing issues.

Small industrial zones are an important institution in modern economics that accelerates regional industrial development. They provide ready-made production

infrastructure for small and medium-sized business entities, significantly facilitating the process of starting and expanding entrepreneurial activities.

Research methods. This study analyzes the factors influencing the investment potential of small industrial zones in the Kashkadarya region and explores opportunities for improving their efficiency. The research is based on the analysis of academic literature, statistical data, and practical case studies.

Main part. Small industrial zones perform several important functions in the economy. First, they create a favorable infrastructure for the development of small businesses and private entrepreneurship. Second, they ensure the concentration of industrial production in regions and help reduce economic disparities. Third, they increase employment by creating new job opportunities.

Improving the effective management of small industrial zones plays an important role in accelerating regional economic development and increasing industrial potential. The main objective in this direction is to make full and efficient use of the existing opportunities of SIZs, enhance investment attractiveness, and modernize production processes.

From a regional development perspective, small industrial zones (SIZs) form centers of economic activity and help reduce economic disparities between central and peripheral areas. This, in turn, has a positive impact on the country's sustainable economic development.

In addition, SIZs contribute to the development of innovative activities, the reduction of production costs, and the increase of export potential. This further strengthens their role in the national economy.

Practical experience shows that there are several problems in the management of small industrial zones. These include:

- insufficient development of infrastructure;
- difficulties in attracting investments;

- a high level of centralization in the management system;
- limited powers of regional governing bodies;
- weak monitoring and control systems.

These problems hinder the full capacity operation of SIZs and reduce their economic efficiency.

For the development of small industrial zones and the improvement of the management system, the following key directions can be identified.

The first direction is improving the legal and institutional framework. It is necessary to simplify legislation regulating the activities of small industrial zones, bring management powers closer to regional levels, and create favorable conditions for investors.

The second direction is infrastructure development. Providing full access to electricity, gas, water, road, and logistics systems increases the attractiveness of small industrial zones.

The third direction is improving investment attraction mechanisms. Local and foreign investors can be attracted through tax incentives, subsidies, and state guarantees.

The fourth direction is introducing digital management systems. Electronic monitoring of SIZ activities, expanding the “single window” system, and implementing digital platforms improve management efficiency.

The fifth direction is supporting innovative activities. It is necessary to strengthen integration with technoparks, business incubators, and research centers.

The experience of developed countries shows that the public-private partnership (PPP) model is the most effective in managing small industrial zones. In the experience of China, South Korea, and Turkey, SIZs serve as one of the main drivers of economic growth. Adapting this experience to the conditions of Uzbekistan is of great importance.

In recent years, Uzbekistan has been implementing large-scale reforms in the development of small industrial zones. New SIZs are being established in regions, the

infrastructure of existing zones is being improved, and favorable conditions are being created for entrepreneurs.

In the future, integrating SIZs with cluster systems, expanding export-oriented production, and introducing innovative technologies will be important tasks.

Conclusion and recommendations:

Improving the effective management of small industrial zones is crucial for accelerating regional economic development, attracting investments, and ensuring employment. SIZs create conditions for the stable operation of small and medium-sized businesses by improving production infrastructure.

The analysis shows that improving the legal framework, infrastructure, investment climate, digital management, and public-private partnership mechanisms are the most important directions in developing these zones. The combination of these factors increases the efficiency of SIZs.

In general, managing small industrial zones based on a comprehensive approach serves to strengthen the country's industrial potential and ensure sustainable economic growth.

LIST OF REFERENCES:

1. Normurodov, Z. (2020). Investment Environment and Its Impact on Economic Growth. – Samarkand: SamISI Publishing House.
2. K.M. Shodmonqulov, “Directions for Effective Management of Small Industrial Zones (Based on the Example of Kashkadarya Region)” – Author’s Abstract. Tashkent, 2023.
3. Official website of the Ministry of Investments, Industry, and Trade of the Republic of Uzbekistan – www.invest.gov.uz
4. Official reports and economic indicators of the Kashkadarya Regional Administration (2022–2024).

**INTERPRETATION OF THE MOST FAVOURED NATION (MFN)
CLAUSE IN MODERN ARBITRATION: CONFLICTS OF
INTERPRETATION AND METHODOLOGICAL ISSUES**

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ABSTRACT

This thesis analyzes methodological challenges concerning the interpretation of the Most Favored Nation (MFN) clause in international investment arbitration. The research examines the scope of MFN application to substantive and procedural rights, specifically focusing on its impact on dispute settlement procedures. Based on the *Maffezini* and *Plama* precedents, the study explores the nature of interpretational conflicts and the methodological role of the Vienna Convention and the *ejusdem generis* principle. Finally, practical recommendations are provided regarding the Bilateral Investment Treaties (BITs) and the 2019 Investment Law of the Republic of Uzbekistan.

Keywords: *MFN clause, investment arbitration, interpretation conflict, ejusdem generis, procedural rights, substantive rights, ICSID, BIT, Vienna Convention, Investment legislation of Uzbekistan.*

**MOST FAVOURED NATION (MFN) BANDINING ZAMONAVIY
ARBITRAJDA TALQINI: INTERPRETATSIYA ZIDDIYATLARI VA
METODOLOGIK MUAMMOLAR**

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ANNOTATSIYA

Ushbu tezisdagi eng ko'p qulaylik yaratish rejimi bandi (Most Favoured Nation - MFN clause) xalqaro investitsiya arbitrajida talqin qilinishi bilan bog'liq metodologik muammolar — xususan, moddiy (substantive) va protsessual (procedural) huquqlarga nisbatan qo'llanish chegaralari — tahlil etiladi. XVIII – XIX asrlar klassik savdo huquqidagi funksiyadan zamonaviy ikki tomonlama investitsiya shartnomalari (Bilateral Investment Treaty — BIT) amaliyotigacha bo'lgan interpretatsiya evolyutsiyasi kuzatiladi; Maffezini va Plama pretsedentlari zaminida yotgan talqin ziddiyatlarining tabiati va *ejusdem generis* prinsipining metodologik roli o'rganiladi. O'zbekiston Respublikasining amaldagi BITlari va 2019-yilgi investitsiya qonuni kontekstida amaliy tavsiyalar beriladi.

Kalit so'zlar: *MFN bandi, investitsiya arbitraji, interpretatsiya ziddiyati, ejusdem generis, protsessual huquq, moddiy huquq, ICSID, BIT, Vena konvensiyasi, O'zbekiston investitsion qonunchiligi.*

АННОТАЦИЯ

В данной работе анализируются методологические проблемы толкования оговорки о режиме наибольшего благоприятствования (РНБ/MFN) в международном инвестиционном арбитраже. Исследуются границы применения оговорки MFN в отношении материальных и процессуальных прав, в частности, её влияние на механизмы разрешения споров. На основе прецедентов Маффезини (Maffezini) и Плама (Plama) раскрывается природа конфликтов толкования, а также роль Венской конвенции и принципа *ejusdem generis*. В заключении представлены практические рекомендации по совершенствованию двусторонних инвестиционных договоров (ДИД) и закона об инвестициях 2019 года Республики Узбекистан.

Ключевые слова: Оговорка MFN, инвестиционный арбитраж, конфликт толкования, *ejusdem generis*, процессуальные права, материальные права, МЦУИС

(ICSID), ДИД (BIT), Венская конвенция, Инвестиционное законодательство Узбекистана.

Xalqaro investitsiya huquqida eng ko'p qulaylik rejimi bandi (Most Favoured Nation - MFN clause) dastlab ikki tomonlama savdo munosabatlarida diskriminatsiyani bartaraf etish vositasi sifatida shakllangan¹. Biroq, uning BITlar tizimiga ko'chirilishi bilan birga, talqin doirasi ham keskin kengaydi: endi tribunallar MFN bandini nafaqat moddiy huquqlar (substantive rights), balki protsessual mexanizmlarga — xususan, nizolarni hal etish tartiblari va arbitraj shartlariga (dispute settlement clauses) — nisbatan ham tatbiq etish mumkinmi, degan savolga javob berishi zarur bo'ldi².

Ana shu masalada xalqaro arbitraj tribunallari mutlaqo zid pretsedentlar shakllantirdi. 2000-yildan beri ICSID (International Centre for Settlement of Investment Disputes) va boshqa arbitraj institutlari doirasida chiqarilgan qarorlar bir-biriga tubdan qarama-qarshi metodologik yondashuvlarni aks ettiradi³. Natijada investorlar ham, davlatlar ham MFN bandining qo'llanish doirasini oldindan aniq belgilashda qiyinchilikka duch kelmoqda. Bu holat shartnomaviy munosabatlarda huquqiy barqarorlik (legal certainty) va bashorat qilish imkoniyati (predictability) tamoyillarini jiddiy ravishda zaiflashtirmoqda.

O'zbekiston Respublikasi uchun ushbu masalaning dolzarbligi ayniqsa yuqori: mamlakat 50 dan ortiq davlat bilan BIT imzolagan, 2019-yilda yangi investitsiya qonunini qabul qilgan va xalqaro kapital jalb qilish siyosatini kuchaytirib, faol arbitraj

¹ General Agreement on Tariffs and Trade (GATT), Art. I:1 (1947), 55 UNTS 194. MFN tamoyili WTO doirasida ham I moddada saqlanib qolgan.

² UNCTAD. (2015). Most-Favoured-Nation Treatment. UNCTAD Series on Issues in International Investment Agreements II. UN Doc. UNCTAD/DIAE/IA/2010/1. P. 22–28.

³ Dolzer, R., & Schreuer, C. (2012). Principles of International Investment Law (2nd ed.). Oxford: OUP. P. 207.

muhitiga kirib kelmoqda⁴. Mazkur siyosiy kontekstda MFN bandining talqin muammolari huquqiy va moliyaviy xavf-xatarlarni oshirishi mumkin⁵.

Tadqiqotning maqsadi — zamonaviy xalqaro investitsiya arbitrajida MFN bandining talqini bilan bog'liq interpretatsiya ziddiyatlarini tizimli tahlil qilish, ushbu ziddiyatlarning metodologik ildizlarini aniqlash va O'zbekiston Respublikasining investitsiya shartnomalariga nisbatan asosli huquqiy tavsiyalar ishlab chiqishdir.

Tadqiqot doirasida uchta asosiy ilmiy savol ko'rib chiqiladi:

(1) MFN bandining klassik va zamonaviy funksiyalari o'rtasidagi metodologik farq nimalarda ifodalanadi va bu farq qanday talqin ziddiyatlarini keltirib chiqaradi;

(2) Vena konvensiyasining (1969) 31-33-moddalari⁶ asosida shakllantirilgan talqin metodologiyasi MFN bandiga protsessual masalalar bo'yicha qo'llanishi mumkinmi;

(3) ejusdem generis prinsipi ushbu talqin ziddiyatini bartaraf etish uchun yetarlicha samarali metodologik vosita hisoblanadimi.

MFN bandining talqin evolyutsiyasi va interpretatsiya muammosining kelib chiqishi

An'anaviy savdo huquqida MFN bandi (GATT I moddasi) faqat tarif, bojxona tartibi va tovar muomalasiga nisbatan qo'llanardi. Uning protsessual mexanizmlarga — nizolarni hal etish tartiblariga — tatbiq etilishi hech qachon ko'zda tutilmagan. Biroq BITlar tizimida MFN bandi ko'pincha "barcha sohalarda" yoki "investitsiya bilan bog'liq barcha masalalarda" qo'llanishini nazarda tutuvchi keng iboralar bilan yozilgan. Aynan mana shu tahrir noaniqlik (ambiguity) va interpretatsiya ziddiyatining asosiy manbai

⁴ O'zbekiston Respublikasining "Investitsiyalar va investitsiya faoliyati to'g'risida"gi Qonuni, 25.12.2019, O'RQ-598-son, 7-modda: "Chet el investorlari va ularning investitsiyalariga nisbatan eng qulay millat rejimi va milliy muomala rejimi qo'llaniladi."

⁵ O'zbekiston–Germaniya ikki tomonlama investitsiya shartnomasi (2000), 3(1)–3(2)-moddalar. Xuddi shunday tuzilma O'zbekiston–Fransiya BITi va O'zbekiston–Janubiy Koreya BITida ham mavjud.

⁶ Vienna Convention on the Law of Treaties, Art. 31(1). Shuningdek qarang: Art. 32 (supplementary means of interpretation).

bo'ldi⁷. MFN bandining nazarda tutilayotgan keng tahriri protsessual imtiyozlarni ham qamrab oladi, deb talqin qilish uchun imkon ochib beradi.

Shartnomalarni talqin qilish metodologiyasi nuqtai nazaridan Vena konvensiyasining 31(1)-moddasi bandni uning oddiy ma'nosida (ordinary meaning), kontekstida, shartnomaning maqsadi va predmetiga (object and purpose) ko'ra talqin qilishni talab etadi. Biroq arbitraj tribunallari ushbu metodologiyani MFN bandiga nisbatan turlicha qo'lladi — bu esa talqin birligining (uniformity of interpretation) yo'qolishiga olib keldi.

Asosiy talqin ziddiyati: Maffezini va Plama yondashuvlari

2000-yilda Maffezini v. Spain (ICSID Case No. ARB/97/7) ishida tribunal MFN bandini arbitraj shartlariga nisbatan qo'llash mumkin deb topdi. Hispanyia–Argentina BITiga tayanib, investor Hispanyia–Chili BITidagi kengroq arbitraj shartlarini import qildi va mahalliy sudlarda 18 oy kutish majburiyatidan ozod etildi. Tribunal "arbitrajga kirish huquqi moddiy himoyaning ajralmas qismidir" (access to arbitration is an integral part of substantive protection) degan konsepsiyani ilgari surdi. Bu qaror keyinchalik Siemens v. Argentina (2004) va Gas Natural v. Argentina (2005) ishlari uchun asos bo'ldi⁸.

Biroq Plama v. Bulgaria (ICSID Case No. ARB/03/24, 2005) ishida tribunal Maffezini doktrinasini uch asosiy dalil bilan rad etdi.

⁷ Schill, S. W. (2009). The Multilateralization of International Investment Law. Cambridge: CUP. P. 122–148.

⁸ Siemens A.G. v. The Argentine Republic. ICSID Case No. ARB/02/8. Decision on Jurisdiction, 3 August 2004, §§ 100–109; Gas Natural SDG, S.A. v. The Argentine Republic. ICSID Case No. ARB/03/10. Decision on Jurisdiction, 17 June 2005, §§ 24–31.

Birinchidan, Vena konvensiyasining 31-moddasi talabiga ko'ra, MFN bandi uning aniq matniy konteksti, maqsadi va predmetiga ko'ra talqin qilinishi zarur: "barcha sohalarda" iborasi protsessual mexanizmlarni qamrab olmaydi⁹.

Ikkinchidan, davlatlar BIT tuzishda arbitraj shartlarini ongli ravishda muzokaralar orqali kelishib oladi; MFN bandi orqali ushbu kelishuv bir tomonlama o'zgartirilishi davlatning shartnomaviy irodasi (treaty intent) va suverenitetiga zarar etkazadi. Uchinchidan, bunday talqin arbitraj shartini asosiy shartnomada kelishilgan va ko'zlangan maqsadiga zid tarzda butunlay yo'qqa chiqaradi. Telenor v. Hungary (ICSID, 2006) va Salini v. Jordan (ICSID, 2004) ishlari ham Plama standartini tasdiqladi¹⁰.

Ejusdem generis prinsipi va zamonaviy tendensiyalar

2010-yillardan boshlab zamonaviy arbitraj tribunallari va huquqiy doktrinada ejusdem generis ("bir xil turdagi") prinsipi MFN interpretatsiya muammosini hal etishda asosiy metodologik vosita sifatida tobora keng qabul qilinmoqda. Ushbu prinsip bo'yicha MFN bandining qo'llanish doirasi asosiy shartnomada ko'zda tutilgan huquqlar sinfi (category of rights) bilan chegaralanishi lozim. Agar shartnoma moddiy himoya mexanizmlarini tartibga solish uchun tuzilgan bo'lsa, MFN bandi yordamida protsessual imtiyozlarni import qilish ejusdem generis prinsipiga zid bo'ladi.

Garanti Koza v. Turkmenistan (ICSID Case No. ARB/11/20, 2013) ishida appellatsiya qo'mitasi protsessual huquqlarga nisbatan MFN bandini qo'llash uchun "aniq va oydin matniy asos" (clear and unambiguous textual basis) talab qilinishini ta'kidlaydi. Zamonaviy davlat amaliyotida ham bu tendensiya yanada kuchaymoqda. EU–Canada CETA shartnomasi (2016) ning 8.7(4)-moddasi, Hindiston model BITi (2015)

⁹ Plama v. Bulgaria, ibid., § 209: "An MFN provision in a basic treaty does not incorporate by reference dispute settlement provisions in whole or in part set forth in another treaty, unless the MFN provision in the basic treaty leaves no doubt that the contracting parties intended to incorporate them".

¹⁰ Telenor Mobile Communications A.S. v. The Republic of Hungary. ICSID Case No. ARB/04/15. Award, 13 September 2006, § 92; Salini Costruttori S.p.A. v. The Hashemite Kingdom of Jordan. ICSID Case No. ARB/02/13. Decision on Jurisdiction, 29 November 2004, § 119.

ning 4-moddasi va ASEAN investitsiya doirasidagi so'nggi kelishuvlar MFN bandining protsessual mexanizmlarga qo'llanmasligini to'g'ridan-to'g'ri belgilaydi. UNCTAD ning 2023-yilgi yangilangan investitsiya islohot paketi ham shu yo'lni tavsiya etib, MFN bandining mazmunini aniq chegaralashni taklif qiladi.

O'zbekiston Respublikasining ko'pgina amaldagi BITlarida MFN bandi "investitsiya va investitsiya faoliyatining barcha sohalarida" yoki "investorlarning muomalasiga nisbatan barcha masalalarda" qo'llanishi nazarda tutilgan. Masalan, O'zbekiston–Germaniya BITi (2000) ning 3(1)–3(2)-moddalari, O'zbekiston–Fransiya BITi va O'zbekiston–Janubiy Koreya BITlari shu formatda tuzilgan. Mazkur tahrir Maffezini doktrinasiga tayanib protsessual huquqlarni import qilish uchun argument sifatida qo'llanishi mumkin.

2019-yil 25-dekabrda "Investitsiyalar va investitsiya faoliyati to'g'risida"gi yangi qonunning (O'RQ-598) 7-moddasi¹¹ MFN kafolatini milliy muomala printsipli bilan birga mustahkamlagan. Biroq qonunda MFN bandining protsessual masalalar, jumladan, investitsiya nizolarini hal etish mexanizmlari uchun qo'llanish doirasi aniq belgilanmagan. Bu huquqiy bo'shliq (legal gap) arbitraj amaliyotida O'zbekiston davlatiga qarshi kutilmagan talablar uchun asos bo'lishi mumkin.

MFN bandining protsessual masalalarga qo'llanishi masalasida xalqaro arbitraj tribunallari o'rtasidagi ziddiyat shartnoma matnining noaniqligidan emas, balki talqin metodologiyasidagi fundamental farqdan kelib chiqadi. Maffezini yondashuvi teleologik (maqsadga yo'naltirilgan) talqinni asosga olsa, Plama standarti Vena konvensiyasining 31-moddasiga asoslangan matniy-kontekstual talqinni ustun qo'yadi. Ikkinchi yondashuv metodologik jihatdan yanada asosli va prognoz qilish imkoniyati (predictability) nuqtai nazaridan ustunroqdir.

¹¹ O'zbekiston Respublikasining "Investitsiyalar va investitsiya faoliyati to'g'risida"gi Qonuni. 25.12.2019, O'RQ-598-son. 7-modda

Ejusdem generis prinsipi zamonaviy arbitraj amaliyotida MFN bandining qo'llanish doirasini belgilashda eng ishonchli metodologik vosita sifatida mustahkamlanmoqda. Ushbu prinsip shartnomaning asosiy predmetidan tashqaridagi huquqlarni MFN orqali import qilishga chek qo'yib, davlat va investor manfaatlarini muvozanatlashtirishga xizmat qiladi.

Amaldagi va kelajakda tuzilajak BITlarda MFN bandiga quyidagi mazmundagi aniq cheklash iborasini kiritish zarur: "Ushbu modda asosida berilgan muomala faqat ushbu shartnomada belgilangan moddiy investitsiya huquqlari va kafolatlarga nisbatan tatbiq etiladi. Ushbu modda investitsiya nizolarini hal etish tartib-qoidalariga (dispute resolution procedures), shu jumladan arbitraj shartlariga, qo'llanilmaydi." Bu yondashuv CETA (2016), Hindiston model BIT (2015) va UNCTAD (2023) tavsiyalari bilan to'liq muvofiqlashadi.

O'zbekiston Respublikasining "Investitsiyalar va investitsiya faoliyati to'g'risida"gi qonuniga 7-moddaga qo'shimcha sifatida "MFN kafolati investitsiya nizolarini hal etish mexanizmlariga tatbiq etilmaydi" degan normani kiritish maqsadga muvofiqdir. Bu qo'shimcha qonun va BITlar o'rtasida izchillikni ta'minlaydi, shuningdek, potentsial arbitraj talablaridan davlatni himoya qiladi.

O'zbekiston Adliya vazirligi va investitsiya idoralari amaldagi barcha BITlarni MFN bandining protsessual qo'llanish xavfi nuqtai nazaridan qayta ko'rib chiqib, UNCTAD texnik yordam dasturlari doirasida ular uchun model BIT tahriri ishlab chiqishi tavsiya etiladi.

Foydalanilgan manbalar (References)

I. Xalqaro shartnomalar va normativ hujjatlar

1. Vienna Convention on the Law of Treaties, 23 May 1969. 1155 UNTS 331. Art. 31–33.

2. General Agreement on Tariffs and Trade (GATT). Art. I:1 (1947). 55 UNTS 194.
3. Energy Charter Treaty (1994). 2080 UNTS 100.
4. CETA — Comprehensive Economic and Trade Agreement between Canada and the EU (2016). Art. 8.7(4).
5. India Model Bilateral Investment Treaty (2015). Art. 4 (MFN — exclusion of procedural matters).
6. ASEAN Comprehensive Investment Agreement (2009). Art. 6.
7. O'zbekiston Respublikasining "Investitsiyalar va investitsiya faoliyati to'g'risida"gi Qonuni. 25.12.2019, O'RQ-598-son. 7-modda.
8. O'zbekiston–Germaniya ikki tomonlama investitsiya shartnomasi (2000). 3(1)–3(2)-moddalar.
9. O'zbekiston–Fransiya ikki tomonlama investitsiya shartnomasi.

II. ICSID va boshqa arbitraj qarorlari

10. Emilio Agustín Maffezini v. The Kingdom of Spain. ICSID Case No. ARB/97/7. Decision on Jurisdiction, 25 January 2000. 5 ICSID Reports 396.
11. Plama Consortium Limited v. Republic of Bulgaria. ICSID Case No. ARB/03/24. Decision on Jurisdiction, 8 February 2005. 13 ICSID Reports 272.
12. Siemens A.G. v. The Argentine Republic. ICSID Case No. ARB/02/8. Decision on Jurisdiction, 3 August 2004.
13. Salini Costruttori S.p.A. v. The Hashemite Kingdom of Jordan. ICSID Case No. ARB/02/13. Decision on Jurisdiction, 29 November 2004.
14. Telenor Mobile Communications A.S. v. The Republic of Hungary. ICSID Case No. ARB/04/15. Award, 13 September 2006.
15. RosInvestCo UK Ltd. v. The Russian Federation. SCC Case No. V 079/2005. Award on Jurisdiction, October 2007.

16. Garanti Koza LLP v. Turkmenistan. ICSID Case No. ARB/11/20. Decision on Objection to Jurisdiction, 3 July 2013.

III. Xalqaro tashkilotlar hujjatlari

17. UNCTAD. (2015). Most-Favoured-Nation Treatment. UNCTAD Series on Issues in International Investment Agreements II. UN Doc. UNCTAD/DIAE/IA/2010/1.

18. UNCTAD. (2023). Investment Policy Framework for Sustainable Development (3rd ed.). Geneva: UNCTAD.

19. International Law Commission (ILC). (1978). Draft Articles on Most-Favoured-Nation Clauses with Commentaries. Yearbook of the ILC, Vol. II, Pt. 2, pp. 16–73.

IV. Ilmiy adabiyotlar

20. Dolzer, R., & Schreuer, C. (2012). Principles of International Investment Law (2nd ed.). Oxford: OUP. Ch. 6.

21. Schill, S. W. (2009). The Multilateralization of International Investment Law. Cambridge: CUP.

22. Batifort, S., & Heath, J. B. (2017). The New Debate on the Interpretation of MFN Clauses in Investment Treaties: Putting the Brakes on Multilateralization. American Journal of International Law, 111(4), 873–913.

23. McLachlan, C., Shore, L., & Weiniger, M. (2017). International Investment Arbitration: Substantive Principles (2nd ed.). Oxford: OUP. §§ 7.01–7.90.

24. Vandevelde, K. J. (2010). Bilateral Investment Treaties: History, Policy, and Interpretation. Oxford: OUP. Ch. 8.

Evaluating the Application of Ultrasound and Magnetic Resonance Imaging in Soft Tissue Injuries of the Knee Joint: A Comparative Diagnostic Analysis

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ABSTRACT

Traumatic and degenerative knee lesions require highly accurate diagnostic modalities to formulate optimal management strategies. This prospective study evaluates the diagnostic efficacy of high-frequency ultrasonography (US) versus magnetic resonance imaging (MRI) in detecting intra-articular and extra-articular knee pathologies. Analyzing a cohort of 132 adult patients with acute or subacute knee trauma, the research quantifies both modalities against arthroscopic reference standards. Empirical data indicate ultrasonography exhibits high sensitivity (91.4%) for superficial pathologies (collateral ligament tears, joint effusions) but lacks diagnostic depth for cruciate ligaments and complex meniscal tears. Conversely, MRI demonstrated a diagnostic accuracy of 96.8% for medial meniscus lesions and 98.1% for anterior cruciate ligament ruptures. The dynamics of the observed outcomes advocate for a sequential diagnostic algorithm: utilizing ultrasound as an initial triage tool for superficial injuries, reserving MRI for deep intra-articular derangements. This integrated protocol optimizes resource allocation in regional medical centers without compromising diagnostic integrity.

KEYWORDS: Medical radiology, knee joint trauma, ultrasonography, magnetic resonance imaging, meniscal tear, diagnostic accuracy, musculoskeletal imaging.

INTRODUCTION

The structural integrity of the knee joint relies on a complex biomechanical network of ligaments, menisci, and capsular structures. Disruptions from trauma or degenerative alterations precipitate significant functional impairment. Clinical examination frequently yields ambiguous results due to hemarthrosis and muscle guarding, necessitating advanced radiological interventions.

Epidemiological indicators reveal internal knee derangements account for up to 50% of orthopedic referrals requiring advanced imaging. A persistent scientific gap surrounds the optimization of imaging algorithms in resource-constrained settings. High-field MRI provides unparalleled soft-tissue contrast but is limited by high capital costs and contraindications. Concurrently, high-resolution ultrasonography offers real-time dynamic assessment and high spatial resolution for superficial structures. Conducted at the Andijan State Medical Institute, this study systematically evaluates the diagnostic utility of both modalities. Investigating specific diagnostic blind spots allows for the development of an evidence-based, stratified protocol suitable for regional traumatology departments.

MATERIALS AND METHODS

A prospective diagnostic accuracy design enrolled 132 patients (78 males, 54 females; mean age 34.2 ± 8.6 years) presenting with acute or subacute knee trauma between January 2023 and March 2024. Patients with severe intra-articular fractures or extensive osteoarthritis were systematically excluded.

Ultrasonographic examinations utilized a premium high-frequency linear array transducer (7–14 MHz), incorporating dynamic stress testing to evaluate ligamentous laxity across all quadrants. Subsequent MRI evaluations were conducted using a 1.5

Tesla scanner. The protocol included sagittal, coronal, and axial planes utilizing T1-weighted, T2-weighted, and Proton Density (PD) fat-suppressed sequences (slice thickness 3.0 mm). Arthroscopy served as the absolute reference standard.

Mathematical-statistical analysis was executed using SPSS Statistics 26.0. The McNemar test evaluated differences between modalities, with statistical significance defined at $p < 0.05$ and a 95% Confidence Interval (CI).

RESULTS

Arthroscopic intervention confirmed 84 medial meniscus (MM) tears, 42 lateral meniscus (LM) tears, 56 anterior cruciate ligament (ACL) ruptures, and 34 medial collateral ligament (MCL) sprains within the cohort.

For evaluating the MCL, ultrasonography demonstrated high diagnostic correlation with MRI, achieving a sensitivity of 91.2% (95% CI 84.5-95.6) and a specificity of 94.0%. Real-time valgus stress testing provided dynamic functional data unattainable via static MRI.

However, ultrasonographic efficacy diminished precipitously for intra-articular structures. US sensitivity for ACL ruptures dropped to 48.2%, primarily detecting indirect signs like joint effusion. In stark contrast, MRI displayed formidable diagnostic accuracy for ACL lesions, with a sensitivity of 98.2% and specificity of 97.5% ($p < 0.001$ compared to US).

Meniscal evaluations presented a mixed profile. MRI remained the gold standard, identifying MM tears with 96.4% sensitivity. Ultrasonographic detection was strictly limited to peripheral vascularized zones (sensitivity 64.5%), entirely failing to resolve central substance and radial tears masked by acoustic shadowing.

DISCUSSION

The empirical clinical data reveals that diagnostic disparities between US and MRI are rooted in physical principles. High-frequency acoustic waves suffer from rapid

attenuation and total internal reflection upon encountering cortical bone, obscuring the intercondylar notch. Furthermore, anisotropic artifacts frequently complicate sonographic evaluation of collateral ligaments, requiring profound operator expertise.

Pathophysiological tissue changes manifest distinctly across modalities. MRI relies on differences in proton density, allowing fat-suppressed sequences to vividly highlight intrameniscal fluid accumulation prior to physical tearing.

Integrating the current findings suggests entirely bypassing ultrasound is economically inefficient. A substantial subset of knee pain originates from extra-articular pathologies (Baker's cysts, superficial tendinopathy). In these scenarios, US is actively superior due to its capacity for immediate dynamic functional evaluation.

SCIENTIFIC NOVELTY AND PRACTICAL SIGNIFICANCE

Within the specific clinical demographic of the Fergana Valley, this study quantifies the precise diagnostic overlaps and blind spots between US and MRI, translating qualitative observations into validated metrics.

Implementing these findings allows for a highly efficient, two-tiered radiological triage algorithm. Patients with localized superficial pain should be primarily routed to high-resolution ultrasonography. Only upon negative ultrasound findings coupled with persistent mechanical symptoms should patients advance to MRI. This stratified approach decreases unnecessary MRI utilization by up to 28%, significantly reducing healthcare expenditures.

CONCLUSION

Optimizing the diagnostic pathway for knee joint soft tissue injuries requires a synergistic application of both modalities. Clinical evidence confirms MRI as the apex diagnostic tool for intra-articular derangements like meniscal and cruciate ligament ruptures. Nevertheless, high-frequency ultrasonography remains a highly sensitive instrument for evaluating the extra-articular ligamentous complex. Adopting a

sequential imaging algorithm based on anatomical probability maximizes diagnostic yield and provides a scientifically sound framework for the economical deployment of radiological resources.

REFERENCES

1. O'Connor PJ, Grainger AJ, Morgan SR, Smith KL. Ultrasound assessment of the knee soft tissues: clinical parameters. *Skeletal Radiology*. 2021;50(3):455-465.
2. Lee SH, Yun SJ. The role of dynamic ultrasound in the evaluation of collateral ligaments of the knee. *Journal of Clinical Ultrasound*. 2020;48(8):471-479.
3. Peetrons P. Ultrasound of cartilage and joint space: current concepts. *European Radiology*. 2022;32(1):54-61.
4. Roemer FW, Crema MD, Trattnig S. Advances in imaging of osteoarthritis and cartilage. *Radiology*. 2021;260(2):332-354.
5. Bianchi S, Martinoli C. *Ultrasound of the Musculoskeletal System*. Berlin: Springer; 2020.
6. Smith TO, Drew BT, Toms AP. Accuracy of MRI and computed tomography for the detection of chondral lesions. *European Journal of Orthopaedic Surgery & Traumatology*. 2022;32(7):1083-1094.
7. Karimov AB. Diagnostic challenges of intra-articular knee injuries in emergency departments. *Central Asian Journal of Medicine*. 2023;5(2):44-51.
8. Petchprapa CN, Rosenberg ZS, Sconfienza LM. Value and pitfalls of ultrasound in the evaluation of the menisci and cruciate ligaments. *Radiographics*. 2021;31(4):1143-1160.
9. Vahlensieck M, Reiser M. *MRI of the Musculoskeletal System*. Stuttgart: Thieme; 2022.

COMPULSORY MOTOR INSURANCE IN UZBEKISTAN AS A TOOL OF HOUSEHOLD FINANCIAL RESILIENCE AND REGULATED COMPENSATION

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Abstract

This thesis examines compulsory motor third-party liability insurance in Uzbekistan as a mechanism of household financial resilience, regulated compensation, and public trust in the insurance market. Unlike approaches that evaluate this insurance line mainly through premium growth or market share, this study interprets compulsory motor insurance as an institutional bridge between road-traffic risk, household financial protection, and formal claims settlement. The relevance of the topic is increasing because household motorization has grown considerably: in 2025, Uzbekistan had 61 passenger cars per 100 households, compared with 49 in 2020 and 21 in 2010 [3]. In parallel, the official insurance market data show that in 2025 motor third-party liability insurance generated UZS 406.165 billion in premiums, UZS 245.224 billion in claims payments, 6,221,221 active contracts, and 6,141,455 newly concluded contracts [2, pp. 6–7]. These figures indicate that compulsory motor insurance is not only a legal obligation for vehicle owners, but also a mass financial instrument through which accident-related losses can be transferred from individuals to a regulated insurance system. The thesis concludes that the future development of compulsory motor insurance in Uzbekistan should be assessed not only by contract volume, but also by claims transparency, adequacy of coverage, digital administration, and public confidence in the compensation process.

Keywords: compulsory motor insurance, motor third-party liability, household resilience, regulated compensation, claims governance, financial protection, Uzbekistan.

Introduction. The expansion of private vehicle ownership changes the structure of everyday financial risks in society. A car is not only a mobility asset; it is also a source of potential civil liability. When a road accident occurs, the financial consequences may affect several parties at once: the driver, the vehicle owner, the injured person, the family of the victim, and in some cases the broader public system. In this context, compulsory motor third-party liability insurance performs a stabilizing function because it transfers accident-related civil liability from an individual household to a regulated risk-pooling mechanism. In Uzbekistan, the legal basis of this mechanism is the Law “On Compulsory Insurance of Civil Liability of Vehicle Owners.” The law defines the purpose of compulsory motor insurance as regulation of relations in the field of compulsory insurance of vehicle owners’ civil liability. It also defines the victim, the insured event, compensation payments, the insurer, the policyholder, the insurance amount, and the obligation of vehicle owners to insure their civil liability [1]. In particular, the law states that vehicle owners must insure their civil liability for damage caused to the life, health, or property of other persons when using motor vehicles [1].

The topic is especially important because Uzbekistan’s level of household motorization has been increasing. According to the National Statistics Committee, the average number of passenger cars per 100 households reached 61 in 2025; the same indicator was 49 in 2020, 42 in 2015, and 21 in 2010 [3]. This means that motor-vehicle ownership has become more widespread, and road-related liability risk has also become more socially significant.

The purpose of this thesis is to analyze compulsory motor insurance in Uzbekistan not simply as a mandatory policy, but as a mechanism of financial resilience and regulated compensation. The main research question is: **how does compulsory motor insurance transform individual road-traffic liability into a formal financial protection mechanism in Uzbekistan?**

Main Body

1. Institutional meaning of compulsory motor insurance

Compulsory motor insurance differs from many voluntary insurance products because its central beneficiary is not always the policyholder. The vehicle owner purchases the policy, but the actual protection is often directed toward the injured third party. This makes the product socially important. It prevents road-traffic damage from being handled only through personal negotiations, informal settlements, or court disputes, and instead channels compensation through a legally regulated system.

The institutional value of compulsory motor insurance lies in three functions. First, it creates a predictable source of compensation for victims. Second, it disciplines vehicle owners by transforming civil liability into a measurable financial obligation. Third, it supports the insurance market by bringing a large number of households into formal contact with insurance services.

This is particularly relevant for countries where insurance culture is still developing. When a person buys compulsory motor insurance, this may be the first practical experience with an insurance contract, a premium, a policy, and a claim. Therefore, the quality of this experience directly affects public trust in the broader insurance market. If claims are handled fairly and transparently, compulsory motor insurance can become a gateway to wider insurance participation. If claims are delayed or unclear, it can weaken public confidence in insurance as a whole.

2. Statistical evidence of scale and compensation

Official data confirm that compulsory motor insurance is a mass product in Uzbekistan. In 2025, total insurance premiums in the country reached UZS 13,463.491 billion, while total insurance claims payments amounted to UZS 2,985.534 billion. Within this market, compulsory insurance generated UZS 959.082 billion in premiums and UZS 405.304 billion in claims payments [2, p. 6].

Within the compulsory insurance segment, motor third-party liability insurance played the most important role. In 2025, this line produced UZS 406.165 billion in premiums and UZS 245.224 billion in claims payments [2, p. 6]. Based on these official figures, motor third-party liability insurance accounted for about **42.3% of compulsory insurance premiums** and about **60.5% of compulsory insurance claims payments**. This means that the line is not only large in terms of premiums; it is even more significant in terms of actual compensation.

The contract data also demonstrate the mass character of the product. In 2025, compulsory motor insurance had 6,221,221 active contracts and 6,141,455 newly concluded contracts [2, p. 7]. These figures represented almost the entire compulsory insurance contract base, because motor third-party liability insurance accounted for about **98.7% of active compulsory contracts** and **98.5% of newly concluded compulsory contracts** in 2025.

Table 1. Main indicators of compulsory motor insurance in Uzbekistan, 2025

Indicator	Official figure	Analytical meaning
Motor third-party liability premiums	UZS 406.165 billion	Mass premium inflow into the insurance system
Motor third-party liability claims payments	UZS 245.224 billion	Direct compensation channel for accident-related losses
Active contracts	6,221,221	Broad household and vehicle-owner participation
Newly concluded contracts	6,141,455	High annual renewal and market turnover

Share in compulsory insurance premiums	42.3%	Core premium-generating line in compulsory insurance
Share in compulsory insurance claims	60.5%	Main claims-bearing line in compulsory insurance

Source: Compiled by the author based on NAPP 2025 year-end insurance market data [2, pp. 6–7].

These figures show that compulsory motor insurance has two different forms of importance. Its first importance is quantitative: it covers millions of contracts. Its second importance is functional: it is one of the main tools through which accident-related financial losses are compensated. For this reason, the product should be evaluated not only as a source of premiums for insurers, but also as a social compensation mechanism.

3. Household financial resilience and accident-related risk

Household financial resilience means the ability of a family to absorb financial shocks without falling into deeper economic stress. A road accident may create exactly such a shock. Repair costs, medical expenses, loss of working time, and possible legal disputes can become a serious financial burden, especially for middle- and low-income households.

Compulsory motor insurance helps reduce this burden by replacing unpredictable personal liability with pre-arranged insurance coverage. This does not eliminate the accident itself, but it changes the way the financial consequences are handled. Instead of relying only on the personal resources of the responsible driver, the injured person receives a formal channel for compensation.

This function is especially important in a motorizing society. When the number of vehicles per household increases, exposure to road-related liability becomes more widespread. Uzbekistan's rise from 21 passenger cars per 100 households in 2010 to 61

in 2025 indicates that motorization is no longer a narrow urban phenomenon; it is becoming part of ordinary household life [3]. Therefore, compulsory motor insurance should be seen as a household-risk management instrument, not only as a traffic-related legal requirement.

4. Digital administration and trust in claims settlement

The effectiveness of compulsory motor insurance depends not only on the existence of policies but also on the quality of administration. A policy has real value only when it can be verified, when the claim procedure is clear, and when the injured party can reasonably expect compensation. For this reason, digitalization has become a central reform direction in Uzbekistan's insurance market.

Presidential Resolution No. PQ-108 of 1 March 2024 established that from 1 September 2024 insurance and reinsurance contracts for all types of insurance must be registered through the Unified Automated Information System, and insurance policies must be issued through this system [4]. The same legal framework states that failure to issue policies through the Unified Automated Information System may serve as a basis for declaring them invalid and may be considered a serious violation of licensing requirements [4].

For compulsory motor insurance, this reform is important for several reasons. First, it reduces the possibility of fake or unverifiable policies. Second, it helps create a unified database of insurance contracts. Third, it can improve monitoring of claims and payments. Fourth, it opens the way for better integration between insurance data, vehicle registration systems, and other public digital services.

However, digitalization should not be treated as a complete solution by itself. A digital policy can still be ineffective if the claims process is slow, policy wording is unclear, or compensation is not paid in a predictable manner. Therefore, digital reform must be accompanied by claims governance, transparent service standards, consumer

communication, and systematic publication of settlement indicators.

5. Adequacy of coverage and the new insurance amount

A key question in compulsory motor insurance is whether the insurance amount is sufficient to cover real losses. If the coverage limit is too low, the product may formally exist but fail to provide meaningful protection. This issue has become especially important in Uzbekistan because the legal framework has recently been updated.

The Cabinet of Ministers Resolution No. 458 of 23 July 2025 amended the earlier rules by replacing the phrase “insurance amount — UZS 40 million” with “insurance sum — UZS 80 million,” with the relevant clause entering into force from 1 January 2026 [5]. This change doubles the formal coverage limit and represents an important step toward improving the adequacy of compensation.

The increase in the insurance amount may have several consequences. For victims, it can improve the probability that actual damage will be compensated within the insurance framework. For insurers, it may require more careful underwriting, reserving, and pricing. For regulators, it creates the need to monitor whether higher limits lead to better compensation outcomes or only to higher premiums. Therefore, the reform should be evaluated not only by the amount of coverage, but also by the quality and speed of claims settlement after the new limit is implemented.

6. Macroeconomic context and insurance penetration

Although compulsory motor insurance is highly important inside the compulsory insurance segment, Uzbekistan’s overall insurance market remains relatively shallow in macroeconomic terms. The country’s total insurance premiums were UZS 13.463 trillion in 2025, while GDP at current prices reached UZS 1,849.7 trillion in the same year [2; 6]. Based on these figures, total insurance premiums amounted to approximately **0.73% of GDP**.

For comparison, OECD data show that average insurance penetration among

OECD countries was **6.2%** in 2024 [7]. This comparison does not mean that Uzbekistan should mechanically copy OECD insurance structures. However, it does show that the Uzbek insurance market has substantial room for deepening.

Compulsory motor insurance can support this deepening process because it is already familiar to millions of vehicle owners. If this product becomes more transparent, claims-oriented, and digitally convenient, it can strengthen public understanding of insurance and encourage demand for other forms of voluntary protection. In this sense, compulsory motor insurance may serve as a practical entry point for broader insurance culture.

Conclusion. Compulsory motor insurance in Uzbekistan should not be interpreted merely as a mandatory legal requirement. It is a financial institution that transforms road-traffic liability into a regulated system of compensation. Its economic and social importance comes from the fact that it operates at the household level, the market level, and the institutional level at the same time.

At the household level, it protects families from sudden accident-related liabilities. At the market level, it creates stable premium inflows and a large contract base for insurers. At the institutional level, it supports formal claims settlement, digital registration, and public trust in insurance.

The 2025 data confirm the scale of the product: UZS 406.165 billion in premiums, UZS 245.224 billion in claims payments, more than 6.2 million active contracts, and more than 6.1 million newly concluded contracts [2, pp. 6–7]. These indicators show that compulsory motor insurance is the practical core of Uzbekistan's compulsory insurance system.

The next stage of development should focus on five priorities. First, claims settlement should become more transparent and measurable. Second, digital policy registration must be linked with real service quality. Third, the new UZS 80 million

insurance sum should be monitored in terms of actual compensation adequacy. Fourth, public communication should explain not only the obligation to buy insurance, but also the rights of victims and policyholders. Fifth, risk-based pricing and stronger data systems should gradually improve fairness and financial stability.

In conclusion, compulsory motor insurance is one of the most practical instruments for building trust in Uzbekistan's insurance market. Its future success will depend less on the formal number of policies and more on whether citizens perceive it as a fair, accessible, and reliable mechanism of financial protection.

References

[1] Republic of Uzbekistan. (2008). *Law on Compulsory Insurance of Civil Liability of Vehicle Owners* (Law No. O'RQ-155). Lex.uz.

[2] National Agency for Prospective Projects of the Republic of Uzbekistan. (2026). *General indicators of the insurance market of the Republic of Uzbekistan based on 2025 year-end results*. NAPP.

[3] National Statistics Committee of the Republic of Uzbekistan. (2026). *How many cars are there per 100 households in Uzbekistan?* Stat.uz.

[4] President of the Republic of Uzbekistan. (2024). *On comprehensive measures for the further development of the insurance services market* (Resolution No. PQ-108). Lex.uz.

[5] Cabinet of Ministers of the Republic of Uzbekistan. (2025). *On measures for the implementation of Presidential Resolution No. PQ-108 of March 1, 2024, "On comprehensive measures for the further development of the insurance services market"* (Resolution No. 458). Lex.uz.

[6] National Statistics Committee of the Republic of Uzbekistan. (2026). *Uzbekistan's gross domestic product increased by 7.7% in 2025*. Stat.uz.

[7] OECD. (2025). *Global Insurance Market Trends 2025*. OECD Publishing.

Administrative Courts System in the Republic of Uzbekistan: Stages of Formation, Legal Mechanisms, and the Essence of Reforms

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Introduction. In modern jurisprudence, the system of administrative justice is recognized as one of the most important institutions ensuring balance in relations between public authorities and citizens. In a society based on the principles of the rule of law, effective judicial control over the activities of state authorities is essential. It is precisely the system of administrative courts that creates the institutional and procedural mechanisms for exercising such control.

Keywords: administrative courts, administrative justice, judicial control, public-law disputes, rule of law, judicial reforms.

O'zbekiston Respublikasida ma'muriy sudlar tizimi: shakllanish bosqichlari, huquqiy mexanizmlar va islohotlar mazmuni

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Kirish:

Zamonaviy huquqshunoslikda ma'muriy adliya tizimi davlat hokimiyati organlari va fuqarolar o'rtasidagi munosabatlarda muvozanatni ta'minlovchi eng muhim institutlardan biri sifatida e'tirof etiladi. Huquqiy davlat tamoyillariga asoslangan jamiyatda davlat hokimiyati faoliyati ustidan samarali sud nazorati mavjud bo'lishi shart. Aynan ma'muriy sudlar tizimi ushbu nazoratni amalga oshirishning institutsional va protsessual mexanizmini yaratadi.

Kalit so'zlar:

Ma'muriy sudlar, ma'muriy adliya, sud nazorati, ommaviy-huquqiy nizolar, qonun ustuvorligi, sud-huquq islohotlari.

Asosiy qism:

Ma'muriy sudlar orqali davlat organlari tomonidan qabul qilinadigan normativ-huquqiy hujjatlar, individual qarorlar, shuningdek mansabdor shaxslarning harakatlari yoki harakatsizligi ustidan sud tartibida nazorat o'rnatiladi. Bu esa fuqarolarning buzilgan huquqlarini tiklash, davlat organlarining javobgarligini oshirish va boshqaruv tizimida qonun ustuvorligini ta'minlashga xizmat qiladi. O'zbekiston Respublikasida ma'muriy sudlarning mustaqil tizim sifatida shakllanishi keng ko'lamli sud-huquq islohotlarining mantiqiy davomi bo'lib, u davlat boshqaruvi faoliyatining ochiqqligi va shaffofligini oshirish, inson huquqlarini himoya qilishning samarali mexanizmlarini yaratish hamda fuqarolik jamiyatini rivojlantirishga qaratilgan. Mazkur maqolada ma'muriy sudlar tizimining shakllanish evolyutsiyasi, normativ-huquqiy asoslari, institutsional tuzilmasi, vakolatlari, protsessual xususiyatlari hamda zamonaviy islohotlar doirasida amalga oshirilayotgan o'zgarishlar ilmiy-nazariy va amaliy jihatdan kompleks tahlil qilinadi. Ma'muriy sudlar tizimining shakllanishining tarixiy va huquqiy asoslari O'zbekiston mustaqilligining dastlabki yillarida ma'muriy-huquqiy nizolarni ko'rib chiqish umumyurisdiksiya sudlari tomonidan amalga oshirilgan. Bu tizim o'z vaqtida muayyan darajada samarali bo'lgan bo'lsa-da, ommaviy-huquqiy

munosabatlarning murakkabligi, davlat organlari vakolatlarining kengayishi va fuqarolar huquqlarining kengroq himoyaga muhtojligi sababli ixtisoslashgan sud tizimini yaratish zarurati yuzaga keldi. Xalqaro tajribada, xususan Germaniya, Fransiya va boshqa Yevropa davlatlarida ma'muriy sudlar alohida mustaqil tizim sifatida shakllangan bo'lib, ular davlat organlari ustidan sud nazoratini amalga oshirishda muhim rol o'ynaydi. Ushbu tajriba O'zbekiston uchun ham muhim metodologik asos bo'lib xizmat qildi. 2017-yildan boshlab mamlakatda yangi bosqichdagi sud-huquq islohotlari boshlandi. Ushbu islohotlar doirasida ma'muriy sudlarni tashkil etish konsepsiyasi ishlab chiqildi va amaliyotga joriy etildi. Natijada ma'muriy sudlar mustaqil sud tizimi sifatida shakllandi.

2018-yil 1-apreldan kuchga kirgan "Ma'muriy sud ishlarini yuritish to'g'risida"gi kodeks ma'muriy sudlovning asosiy protsessual normalarini belgilab berdi. Ushbu kodeks orqali sud muhokamasining asosiy prinsiplari — qonuniylik, oshkoralik, taraflarning tengligi, sudning mustaqilligi, adolat va xolislik mustahkamlandi. Shuningdek, mazkur normativ-huquqiy baza davlat organlari faoliyati ustidan sud nazoratini amalga oshirishda yagona va izchil yondashuvni ta'minladi hamda sud amaliyotini standartlashtirishga xizmat qildi. Ma'muriy sudlar tizimining institutsional tuzilishi va instansiyalari O'zbekiston Respublikasida ma'muriy sudlar tizimi ko'p pog'onali va ierarxik tuzilishga ega bo'lib, bu sud qarorlarining qonuniyligi va asoslilikini bosqichma-bosqich tekshirish imkonini beradi. Birinchi instansiya sifatida tumanlararo ma'muriy sudlar faoliyat yuritadi. Ushbu sudlar fuqarolar va yuridik shaxslarning davlat organlari bilan yuzaga kelgan nizolarini bevosita ko'rib chiqadi. Mazkur bosqichda ishning faktik holatlari aniqlanadi, dalillar o'rganiladi va asosiy sud qarori qabul qilinadi. Ikkinchi bosqich — apellyatsiya instansiyasi bo'lib, bunda birinchi instansiya sudlari qarorlarining qonuniyligi va asoslilik qayta ko'rib chiqiladi. Apellyatsiya instansiyasi sud xatolarini aniqlash va tuzatishda muhim ahamiyatga ega.

Kassatsiya instansiyasi esa sud qarorlarini huquqiy jihatdan tekshirishga qaratilgan bo‘lib, unda protsessual va moddiy huquq normalarining to‘g‘ri qo‘llanilishi baholanadi. Eng yuqori instansiya sifatida Oliy sudning ma‘muriy ishlar bo‘yicha sudlov hay‘ati faoliyat yuritadi. Ushbu organ sud amaliyotining yagona va izchil qo‘llanilishini ta‘minlaydi, sud qarorlarini nazorat tartibida ko‘rib chiqadi hamda sud amaliyotini umumlashtiradi. Ma‘muriy sudlarning vakolatlari va yurisdiksiyasi ma‘muriy sudlar ommaviy-huquqiy munosabatlardan kelib chiqadigan nizolarni ko‘rib chiqadi. Ushbu munosabatlarda taraflar teng huquqli emasligi — ya‘ni davlat organi ustun vakolatlarga ega ekanligi — asosiy xususiyat hisoblanadi.

Ma‘muriy sudlarning asosiy vakolatlari quyidagilardan iborat:

Davlat organlari va mansabdor shaxslar qarorlarini haqiqiy emas deb topish;

Noqonuniy harakat yoki harakatsizlikni e‘tirof etish;

Ma‘muriy hujjatlarni bekor qilish yoki o‘zgartirish;

Fuqarolarning buzilgan huquqlarini tiklash;

Saylov jarayonlariga oid nizolarni ko‘rib chiqish;

Davlat xizmatlari ko‘rsatish bilan bog‘liq nizolarni hal etish;

Notarial va FHDYO organlari faoliyati bilan bog‘liq masalalarni ko‘rib chiqish. So‘nggi yillarda ushbu vakolatlar kengaytirilib, fuqarolarning sud orqali himoya qilish imkoniyatlari sezilarli darajada oshirildi. Ayniqsa, davlat xizmatlari sifati ustidan sud nazoratining kuchayishi davlat boshqaruvi samaradorligini oshirishga ijobiy ta‘sir ko‘rsatmoqda. Protsessual xususiyatlar: inkvizitsion tamoyil va isbotlash majburiyati ma‘muriy sud ishlarini yuritish fuqarolik va iqtisodiy sudlovdan o‘ziga xos jihatlari bilan farqlanadi. Eng muhim xususiyatlardan biri — inkvizitsion tamoyilning ustuvorligidir. Unga ko‘ra, sud faqat taraflar taqdim etgan dalillar bilan cheklanib qolmay, balki ishning haqiqiy holatlarini aniqlash maqsadida mustaqil ravishda dalillarni to‘plash va tekshirish huquqiga ega. Bu esa adolatli qaror qabul qilish

ehtimolini oshiradi. Yana bir muhim jihat — isbotlash majburiyatining davlat organiga yuklatilishidir. Ya'ni, nizoli qarorni qabul qilgan organ o'z qarorining qonuniyligini asoslab berishi shart. Ushbu yondashuv "fuqaroni himoya qilish" tamoyiliga asoslanadi va amalda inson huquqlarining ustuvorligini ta'minlaydi. Zamonaviy islohotlar: raqamlashtirish va yangi yondashuvlar O'zbekistonda sud tizimini modernizatsiya qilish jarayonida ma'muriy sudlar faoliyatini takomillashtirishga alohida e'tibor qaratilmoqda. "Yagona darcha" tamoyili joriy etilishi natijasida fuqarolarning sudga murojaat qilish jarayoni sezilarli darajada soddalashtirildi. Noto'g'ri sudga yuborilgan arizalarni qaytarish amaliyoti bekor qilinib, ular avtomatik tarzda tegishli sudga yo'naltirilmoqda. Eksterritoriallik tamoyili esa fuqarolarga hududiy cheklovlersiz sudga murojaat qilish imkonini berdi. Bu, ayniqsa, chekka hududlarda yashovchi aholi uchun muhim qulaylik yaratdi.

Raqamlashtirish jarayonlari doirasida elektron sud tizimlari keng joriy etildi.
Jumladan:

Elektron ariza topshirish tizimi;

Onlayn sud majlislari (videokonferensiya);

Sud qarorlarini elektron shaklda olish;

sud ishlarini masofadan kuzatish imkoniyati. Mazkur innovatsiyalar sud tizimining ochiqqligi, shaffofligi va tezkorligini oshirishga xizmat qilmoqda.

Xulosa:

O'zbekiston Respublikasida ma'muriy sudlar tizimining shakllanishi va rivojlanishi huquqiy davlat barpo etish yo'lidagi muhim institutsional yutuqlardan biridir. Ushbu tizim orqali davlat organlari faoliyati ustidan samarali sud nazorati o'rnatilib, fuqarolarning huquq va erkinliklari kafolatli himoya qilinmoqda. Ma'muriy sudlar davlat boshqaruvida qonun ustuvorligini ta'minlash, davlat organlarining javobgarligini oshirish hamda fuqarolarning davlatga bo'lgan ishonchini

mustahkamlashda muhim rol o'ynamoqda. Kelgusida ma'muriy sudlar tizimini yanada takomillashtirish, xalqaro standartlarga uyg'unlashtirish, sud amaliyotini bir xillashtirish va raqamli texnologiyalarni keng joriy etish orqali uning samaradorligini yanada oshirish mumkin. Natijada ushbu tizim nafaqat huquqlarni himoya qilish vositasi, balki mamlakatning investitsiyaviy jozibadorligini oshiruvchi, demokratik institutlarni mustahkamlovchi va xalqaro huquqiy maydondagi nufuzini yuksaltiruvchi muhim omil sifatida rivojlanishda davom etadi.

Foydalanilgan adabiyotlar:

1. O'zbekiston Respublikasi Konstitutsiyasi. – Toshkent, 2023.
2. Ma'muriy sud ishlarini yuritish to'g'risida kodeks. – Toshkent, 2018.
3. Sudlar to'g'risida Qonun. – Toshkent, 2021.
4. O'zbekiston Respublikasi Prezidentining PF-4966-son Farmoni "Sud-huquq tizimini tubdan takomillashtirish chora-tadbirlari to'g'risida".
5. O'zbekiston Respublikasi Prezidentining PF-6003-son Farmoni "Sudlar faoliyatini yanada takomillashtirish va odil sudlov samaradorligini oshirish chora-tadbirlari to'g'risida".
6. O'zbekiston Respublikasi Oliy sudi rasmiy veb-sayti materiallari.
7. O'zbekiston Respublikasi Adliya vazirligi nashrlari va rasmiy ma'lumotlari.
8. Ma'muriy huquq / mualliflar jamoasi. – Toshkent: TDYU nashriyoti, 2020.
9. Ma'muriy sudlov asoslari. – Toshkent, 2019.
10. Birlashgan Millatlar Tashkiloti hujjatlari (inson huquqlari va odil sudlov standartlari bo'yicha).
11. Yevropa Kengashi tavsiyalari (ma'muriy adliya tizimi bo'yicha).
12. Jahon banki hisobotlari (sud tizimi va boshqaruv samaradorligi bo'yicha).

**Appeal and Cassation Institutions in the Administrative Judiciary
System of the Republic of Uzbekistan: Analysis of Theory and Practice**

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Introduction

Judicial and legal reforms implemented in the Republic of Uzbekistan represent one of the key directions aimed at ensuring the rule of law within the system of state authority, protecting the rights and freedoms of citizens, and improving the effectiveness of justice. As a result of these reforms, the independence of the judiciary has been further strengthened, and effective legal mechanisms have been developed to ensure a fair balance in legal relations between individuals, legal entities, and state bodies.

In this context, the institutions of appeal and cassation in the administrative judiciary system play a crucial role in reviewing court decisions, correcting judicial errors, and ensuring legality and fairness in the administration of justice. Their theoretical foundations and practical application are essential for enhancing judicial control and guaranteeing effective legal protection in public-law disputes.

Keywords: administrative judiciary system, appellate instance, cassation instance, judicial control, court decisions, legality, justice, judicial reforms, public-law relations, legal protection, judicial authority, procedural law.

**O'zbekiston Respublikasi Ma'muriy Sudlov Tizimida Apellyatsiya va Kassatsiya
Institutlari. Nazariya va Amaliyot Tahlili**

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Kalit so'zlar:

ma'muriy sudlov tizimi, apellyatsiya instansiyasi, kassatsiya instansiyasi, sud nazorati, sud qarorlari, qonuniylik, adolat, sud islohotlari, ommaviy-huquqiy munosabatlar, huquqiy himoya, sud hokimiyati, protsessual huquq.

Kirish:

O'zbekiston Respublikasida amalga oshirilayotgan sud-huquq islohotlari davlat hokimiyati tizimida qonun ustuvorligini ta'minlash, fuqarolarning huquq va erkinliklarini ishonchli himoya qilish hamda odil sudlov samaradorligini oshirishga qaratilgan muhim yo'nalishlardan biri hisoblanadi. Ushbu islohotlar natijasida sud hokimiyatining mustaqilligi yanada mustahkamlanib, fuqarolar va yuridik shaxslarning davlat organlari bilan bo'ladigan huquqiy munosabatlarida adolatli muvozanatni ta'minlashga xizmat qiluvchi samarali huquqiy mexanizmlar shakllantirildi.

Asosiy qism:

O'zbekiston Respublikasi ma'muriy sudlov tizimida apellyatsiya va kassatsiya instansiyalari sud qarorlarining qonuniyligi, asoslanganligi hamda adolatliligini ta'minlashga qaratilgan eng muhim protsessual-huquqiy kafolatlar tizimi sifatida namoyon bo'ladi. Ushbu institutlar sud hokimiyatining mustaqilligini amalda ta'minlash, davlat organlari va mansabdor shaxslar faoliyati ustidan samarali sud nazoratini o'rnatish hamda fuqarolar va yuridik shaxslarning buzilgan huquq va qonuniy manfaatlarini tiklashning asosiy mexanizmlaridan biri hisoblanadi. O'zbekiston Respublikasida amalga oshirilgan sud-huquq islohotlari natijasida ma'muriy sudlar tizimi bosqichma-bosqich shakllanib, ommaviy-huquqiy munosabatlardan kelib chiqadigan nizolarni ko'rib chiqishga ixtisoslashgan mustaqil sud tarmog'i sifatida rivojlandi. Bu esa davlat boshqaruvi organlarining harakatlari ustidan samarali huquqiy

nazoratni ta'minlashga va fuqarolarning davlat bilan bo'ladigan munosabatlarida tenglikni mustahkamlashga xizmat qilmoqda.

Ma'muriy sudlov tizimining huquqiy mohiyati shundan iboratki, u davlat organlari va mansabdor shaxslarning qarorlari, harakatlari yoki harakatsizligi har doim sud nazoratiga bo'ysunishini kafolatlaydi. Bu holat huquqiy davlat prinsipining muhim tarkibiy qismi bo'lib, hech bir davlat organi qonundan ustun emasligi g'oyasini amalda ta'minlaydi. Shu jihatdan apellyatsiya va kassatsiya instansiyalari sud qarorlarining sifatini oshirish, sud xatolarini kamaytirish va sud amaliyotida bir xillikni ta'minlashga xizmat qiluvchi ikki bosqichli huquqiy tekshiruv mexanizmini tashkil etadi.

Apellyatsiya instansiyasi ma'muriy sud ishlarini yuritishda birinchi instansiya sudining qonuniy kuchga kirmagan qarorlarini qayta ko'rib chiqish bosqichi bo'lib, sud tizimida muhim oraliq nazorat funksiyasini bajaradi. Ushbu bosqich taraflarga sud qarorining qonuniyligi va asoslanganligini yuqori sud darajasida qayta tekshirtirish imkonini beradi, bu esa odil sudlovning muhim kafolatlaridan biri hisoblanadi. Apellyatsiya instansiyasining mavjudligi sud qarorlarining sifatini oshirish bilan birga, sud tizimiga bo'lgan ishonchni ham mustahkamlaydi.

Apellyatsiya tartibida ish ko'rish jarayonida sud nafaqat huquq normalarining to'g'ri qo'llanilganligini, balki ishning barcha faktik holatlarini ham to'liq qayta tahlil qiladi. Bu bosqichning o'ziga xos jihati shundaki, u birinchi instansiya sudining xatolarini to'liq tuzatish imkonini beradi. Taraflar apellyatsiya jarayonida qo'shimcha dalillar taqdim etishi mumkin bo'lib, sud ularni ishning haqiqiy holatini aniqlash uchun muhim deb topsa, qabul qiladi va baholaydi. Shu orqali ish bo'yicha yanada to'liq va xolis huquqiy xulosa chiqariladi.

Apellyatsiya instansiyasi sud qaroriga nisbatan quyidagi vakolatlarga ega: birinchi instansiya sudining qarorini o'zgarishsiz qoldirish, uni o'zgartirish, to'liq yoki qisman bekor qilish va yangi qaror qabul qilish, shuningdek zarur hollarda ishni qayta ko'rib

chiqish uchun quyi sudga yuborish. Ushbu vakolatlar sud tizimining ichki muvozanatini ta'minlab, adolatli qarorlar qabul qilinishiga xizmat qiladi. Apellyatsiya instansiyasi shu tariqa sud tizimida "ikkinchi nazorat filtri" vazifasini bajaradi.

Kassatsiya instansiyasi esa sud tizimining yanada yuqori bosqichi bo'lib, qonuniy kuchga kirgan sud qarorlarini huquqiy jihatdan qayta tekshirishni amalga oshiradi. Kassatsiya bosqichining asosiy maqsadi sud qarorlarida moddiy va protsessual huquq normalarining to'g'ri qo'llanilganligini aniqlash, sud amaliyotida yagona yondashuvni shakllantirish hamda jiddiy huquqiy xatolarni bartaraf etishdan iboratdir. Ushbu bosqichda ishning faktik holatlari qayta ko'rib chiqilmaydi, balki faqat huquqiy tahlil amalga oshiriladi.

Kassatsiya instansiyasi sud tizimida yakuniy huquqiy nazorat organi sifatida muhim o'rin egallaydi. U sud qarorlarining qonuniyligini ta'minlash bilan birga, sud amaliyotida bir xillikni yaratadi va turli hududlardagi sudlar tomonidan qonunlarni turlicha talqin etilishining oldini oladi. Bu esa huquqiy tizimning barqarorligi va ishonchliligini oshiradi.

Kassatsiya shikoyati sud qarori qonuniy kuchga kirgan kundan boshlab bir yil ichida berilishi mumkin bo'lib, bu muddat sud qarorlarining barqarorligini ta'minlashga xizmat qiladi. Kassatsiya instansiyasi O'zbekiston Respublikasi Oliy sudining Ma'muriy ishlar bo'yicha sudlov hay'ati tomonidan ko'rib chiqiladi. Ushbu organ mamlakat sud tizimida eng yuqori darajadagi huquqiy nazorat funksiyasini bajaradi va uning qarorlari amaliyot uchun muhim huquqiy yo'nalishlarni belgilab beradi.

Kassatsiya instansiyasi sud qarorlarini o'zgarishsiz qoldirishi, ularni bekor qilib ishni qayta ko'rishga yuborishi yoki qonun buzilishi jiddiy bo'lgan hollarda yangi qaror qabul qilishi mumkin. Ayrim hollarda sud qarorlari to'liq bekor qilinib, ish bo'yicha yangi huquqiy baho beriladi. Bu esa sud tizimida adolatni yakuniy ta'minlash mexanizmi sifatida xizmat qiladi.

Xalqaro huquqiy tajribada ham apellyatsiya va kassatsiya institutlari odil sudlovni ta'minlashning asosiy vositalaridan biri sifatida qaraladi. Ko'plab davlatlarda uch bosqichli sud tizimi mavjud bo'lib, O'zbekiston ham ushbu ilg'or tajribaga mos ravishda o'z sud tizimini takomillashtirib bormoqda. Bu esa milliy huquqiy tizimning xalqaro standartlarga moslashuvini ta'minlaydi.

Ma'muriy sud ishlarida shikoyat qilish huquqi fuqarolarning eng muhim konstitutsiyaviy kafolatlaridan biri hisoblanadi. Ushbu huquq orqali har bir shaxs davlat organlarining qarorlaridan norozi bo'lgan taqdirda sud himoyasiga murojaat qilish imkoniga ega bo'ladi. Bu esa fuqarolarning huquqiy himoyasini kuchaytirish bilan birga, davlat organlari faoliyatida mas'uliyat va qonuniylikni oshiradi.

Shu bilan birga, apellyatsiya va kassatsiya institutlari sud jarayonlarining shaffofligini ta'minlaydi, sud qarorlarining asoslanganligini oshiradi hamda jamiyatda adolatga bo'lgan ishonchni mustahkamlaydi. Ular sud tizimining ichki o'zini-o'zi nazorat qilish mexanizmi sifatida ham muhim ahamiyatga ega bo'lib, sud hokimiyatining mustaqilligini yanada mustahkamlaydi.

Xulosa:

Xulosa qilib aytganda, O'zbekiston ma'muriy sudlov tizimida apellyatsiya va kassatsiya O'zbekiston Respublikasida amalga oshirilayotgan sud-huquq islohotlari davlat hokimiyati tizimida qonun ustuvorligini ta'minlash, fuqarolarning huquq va erkinliklarini ishonchli himoya qilish hamda odil sudlov samaradorligini oshirishga qaratilgan muhim yo'nalishlardan biri hisoblanadi. Ushbu islohotlar natijasida sud hokimiyatining mustaqilligi yanada mustahkamlanib, fuqarolar va yuridik shaxslarning davlat organlari bilan bo'ladigan huquqiy munosabatlarida adolatli muvozanatni ta'minlashga xizmat qiluvchi samarali huquqiy mexanizmlar shakllantirildi. instansiyalari sud adolatini ta'minlashning asosiy tayanch ustunlari hisoblanadi. Apellyatsiya bosqichi sud xatolarini aniqlash va tuzatishga xizmat qilsa,

kassatsiya bosqichi sud qarorlarining yakuniy huquqiy nazoratini amalga oshiradi. Ushbu ikki bosqichning uyg'un faoliyati fuqarolarning huquq va manfaatlarini samarali himoya qilish, davlat organlari faoliyatida qonun ustuvorligini ta'minlash hamda jamiyatda adolat va huquqiy tartibotni mustahkamlashga xizmat qiladi.

Foydalanilgan adabiyotlar:

1. O'zbekiston Respublikasi Konstitutsiyasi. – Toshkent, 2023.
2. Ma'muriy sud ishlarini yuritish to'g'risida kodeks. – Toshkent, 2018.
3. Sudlar to'g'risida Qonun. – Toshkent, 2021.
4. O'zbekiston Respublikasi Prezidentining PF-4966-son Farmoni "Sud-huquq tizimini tubdan takomillashtirish chora-tadbirlari to'g'risida".
5. O'zbekiston Respublikasi Prezidentining PF-6003-son Farmoni "Sudlar faoliyatini yanada takomillashtirish va odil sudlov samaradorligini oshirish chora-tadbirlari to'g'risida".
6. O'zbekiston Respublikasi Oliy sudi rasmiy veb-sayti materiallari.
7. O'zbekiston Respublikasi Adliya vazirligi nashrlari va rasmiy ma'lumotlari.
8. Ma'muriy huquq / mualliflar jamoasi. – Toshkent: TDYU nashriyoti, 2020.
9. Ma'muriy sudlov asoslari. – Toshkent, 2019.
10. Birlashgan Millatlar Tashkiloti hujjatlari (inson huquqlari va odil sudlov standartlari bo'yicha).
11. Yevropa Kengashi tavsiyalari (ma'muriy adliya tizimi bo'yicha).
12. Jahon banki hisobotlari (sud tizimi va boshqaruv samaradorligi bo'yicha).

**THE SHARP INCREASE IN DEMAND FOR LEARNING ENGLISH AND
OBTAINING INTERNATIONAL CERTIFICATES AMONG 8TH–9TH GRADE
STUDENTS TODAY: A SOCIO-PEDAGOGICAL ANALYSIS AND PROSPECTS**

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Abstract: This article analyzes the sharp increase in demand for learning English and obtaining international certificates such as Cambridge English, IELTS, and TOEFL among 8th–9th grade students in the Republic of Uzbekistan as one of the most relevant trends in the modern education system. Globalization, economic integration, digital transformation, and national education reforms — particularly the Presidential Decree of 2012 and the implementation of CEFR standards — serve as the main driving forces behind this process. The article highlights both the positive aspects of this growing demand (cognitive development of students, global competitiveness, and cultural openness) and its negative consequences (academic pressure, psychological burden, and urban-rural disparities). The study provides an in-depth analysis of the issue based on pedagogical, psychological, and economic approaches and puts forward recommendations for improving education policy, strengthening individual approaches, and introducing inclusive mechanisms. The findings indicate that English language proficiency and international certificates have now become not merely a school subject but a strategic tool for the life strategies of the younger generation and the development of the country’s human capital. The article is intended for publication in high-ranking international Scopus-indexed journals and is based on empirical observations and a critical analysis of scientific literature.

Keywords: English language teaching, 8th–9th grade students, international certificates, CEFR standards, education reforms, globalization, academic pressure, adolescent psychology, digital education, Uzbekistan education system.

The sharp increase in demand for learning English and obtaining international certificates among 8th–9th grade students today stands as one of the most significant trends in the modern education system. This phenomenon is shaped not only in developing countries like Uzbekistan but also on a global scale by factors such as globalization, economic integration, and digital transformation. The rising demand plays a crucial role in students' personal development, future career opportunities, and the overall competitiveness of society, while simultaneously creating complex socio-pedagogical challenges related to adolescents' psychological well-being, academic workload, and family expectations. In Uzbekistan, recent educational reforms, particularly the strategic decisions to introduce foreign language teaching from early grades and implement international standards, have made English an integral part of students' lives. As a result, 8th–9th graders are now actively engaged not only in school lessons but also in supplementary courses, online platforms, and certificate preparation programs. In the context of globalization, English has become the primary medium of international relations, trade, technology, and scientific cooperation. Consequently, students' aspiration to master the language from a young age and obtain certificates such as Cambridge English, IELTS, or TOEFL is now considered an essential requirement for success in the digital and innovative sectors of the economy. This trend is clearly reflected in Uzbekistan's post-independence education policy. The Presidential Decree of 2012 on further improvement of foreign language teaching, along with subsequent measures to implement CEFR standards in general secondary schools, has significantly increased demand for English language skills. What was once primarily important at the higher education level has now become a decisive factor in 8th–9th grades the middle

of adolescence as international certificates provide advantages in university admissions, access to overseas study opportunities, international grants, and competitive job markets. Recent statistical observations show that the number of high-level English certificates in Uzbekistan, particularly IELTS results at B2 level and above, has increased fivefold. This growth reflects the younger generation's heightened interest in languages, although disparities between urban and rural students persist. The increase is driven not only by state policy but also by family and social pressures. Parents, linking their children's future success to English proficiency, enroll them in additional classes and preparation courses, which in turn intensifies daily schedules and academic burdens.

Under the profound influence of globalization, English is no longer viewed merely as a communication tool but as a vital form of economic and social capital. In international markets, competitiveness in tourism, IT, and service sectors requires advanced language skills. In light of Uzbekistan's accession to the World Trade Organization, the growth of foreign investment, and the transition to a digital economy, 8th–9th grade students perceive English learning as the foundation of their future careers, leading to intensive certificate preparation. The expansion of online platforms and mobile applications has enabled students to work independently toward certification beyond school hours. However, this process also exacerbates digital inequality, as access to the internet and technological resources remains limited in rural areas.

Research confirms that individuals with advanced English proficiency enjoy significantly higher salaries and employment rates, further stimulating demand for certificates among both parents and students. Nevertheless, students' motivation often stems more from external pressures such as university admission requirements or family expectations than from intrinsic interest. From a psychological perspective, the rising demand among 8th–9th graders is closely linked to the specific characteristics of adolescence, a period marked by identity formation, self-evaluation, and intensified

social competition. High academic pressure can lead to depression, anxiety, and sleep disorders, as certificate preparation consumes time that would otherwise be spent on rest and social activities. At the same time, successful students gain increased self-confidence, enhanced cognitive abilities, and exposure to international cultures, producing positive psychological outcomes.

Uzbekistan's efforts to improve the quality and effectiveness of English language teaching including teacher professional development programs and the introduction of modern methodologies have further strengthened students' interest in the language. However, individual approaches and psychological support mechanisms remain underdeveloped. Economically and socially, international certificates represent not only an educational achievement but also a strategic investment for students, opening pathways to foreign universities, international projects, and high-income professions. The growth of Uzbekistan's tourism and service sectors, along with demand in IT and innovative startups, has made English proficiency a mandatory requirement, motivating 8th–9th graders to begin serious preparation at an early age. This surge in demand has also introduced new challenges to the education system: excessive student workload, insufficient teacher qualifications in some areas, and outdated textbooks that fail to meet contemporary needs. Scientific analyses indicate that the effectiveness of English language learning depends not only on the number of instructional hours but also on interactive methods, project-based activities, and approaches grounded in real-life situations. Uzbekistan's educational reforms are developing precisely in this direction. International cooperation programs for teacher training and the integration of digital resources are expected to substantially improve students' language skills, although long-term monitoring of these changes is required. In the future, demand for English and international certificates is expected to grow even further, as artificial intelligence and global competition elevate language skills to a core component of human capital.

Uzbekistan's education policy, taking this trend into account, focuses on curriculum modernization, the introduction of inclusive approaches, and the creation of equal opportunities for rural students, thereby ensuring not only language development but also the holistic growth of 8th–9th graders. Simultaneously, protecting students' psychological health, optimizing academic pressure, and strengthening school-family cooperation remain critical tasks, as excessive demand may lead to negative consequences.

The positive aspects of this growth include the development of students' cognitive abilities, increased cultural openness, and the formation of global citizenship skills. Through English, students gain direct access to international scientific literature, technological innovations, and cultural exchange. However, negative aspects should not be overlooked: for some students, the pursuit of certificates can result in diminished self-esteem, chronic stress, and even disengagement from learning, highlighting the urgent need to strengthen psychological support centers within the education system. Uzbekistan's education strategy seeks to harmonize English language teaching with national interests while considering students' individual needs. This approach will ultimately elevate the quality of the country's human resources. Consequently, the increased demand for English and certificates among 8th–9th grade students is not merely a mirror of contemporary education but a key social process that defines the future development trajectory of both the younger generation and the nation's position in the global arena. This phenomenon strengthens the connection between students' personal growth and the country's global standing.

A thorough analysis reveals that English language learning has evolved from a mere school subject into a central element of students' life strategies, necessitating fundamental changes in pedagogical approaches. Interactive and project-based teaching methods, the integration of digital technologies, and the cultivation of intrinsic

motivation can maximize the positive effects of this demand. Uzbekistan's experience demonstrates that the synergy of state policy and international cooperation can elevate language education to a new qualitative level. In this process, careful consideration of the age-specific emotional and cognitive needs of 8th–9th grade adolescents is of paramount importance.

Future research should explore this trend more deeply to develop effective strategies. Ultimately, English will remain not only a tool but also the key to a successful future for students. The observed growth in demand reflects the dynamic development of Uzbekistan's education system and the readiness of the younger generation to compete globally. It serves as a solid foundation for further improving education policy and ensuring the comprehensive development of students.

Reference

1. Madraximova S. The Role of the English Language in Uzbekistan's Education System and Issues of Improving Teachers' Qualifications // Scientific Bulletin. – 2025. – № 1. – P. 78–89.
2. Muminova D.A. Technologies for Developing Students' Phraseological Competence in English Lessons (on the example of grades 5–9) // Scientific Research. – 2024. – № 3. – P. 235–238.
3. Ministry of Higher and Secondary Specialized Education of the Republic of Uzbekistan. Document No. 3515 on Improving the Teaching of Foreign Languages and General Education Subjects (2024) // Lex.uz.
4. British Council Uzbekistan. "English Impact Report – Uzbekistan". – Tashkent, 2023.
5. Khotamov J.S. Recommendations on Obtaining National or International Certificates for English Language Proficiency // Cybernetics and Linguistics. – 2022. – № 2. – P. 112–125.

**The effectiveness of protecting citizens' rights and freedoms by
administrative courts in the Republic of Uzbekistan**

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Annotation: This article analyzes the effectiveness of administrative courts in protecting the rights and freedoms of citizens in the Republic of Uzbekistan from both theoretical and practical perspectives. It examines the role of administrative courts in resolving disputes between state bodies and citizens, ongoing judicial reforms, digitalization processes, and judicial practice. Additionally, a comparative analysis with foreign countries is conducted, and scientifically grounded proposals are put forward to further improve the administrative court system.

Keywords: administrative courts, administrative proceedings, right to access court, rule of law, human rights, legal protection, judicial review, judicial efficiency, public law disputes, judicial reforms, digital court system, fair trial, supremacy of law

**O'zbekiston Respublikasida ma'muriy sudlar tomonidan fuqarolarning
huquq va erkinliklarini himoya qilish samaradorligi**

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Annotatsiya : Ushbu maqolada O'zbekiston Respublikasida ma'muriy sudlar tomonidan fuqarolarning huquq va erkinliklarini himoya qilish samaradorligi ilmiy-nazariy va amaliy jihatdan tahlil qilinadi. Ma'muriy sudlarning davlat organlari va fuqarolar o'rtasidagi nizolarni hal etishdagi o'rni, sud tizimidagi islohotlar, raqamlashtirish jarayonlari hamda sud amaliyoti asosida ularning samaradorligi yoritiladi. Shuningdek, xorijiy davlatlar tajribasi bilan qiyosiy tahlil o'tkazilib,

ma'muriy sud tizimini yanada takomillashtirish bo'yicha ilmiy asoslangan takliflar ilgari suriladi.

Kalit so'zlar :ma'muriy sudlar, ma'muriy sud ish yuritish, sudga murojaat qilish huquqi, huquqiy davlat, inson huquqlari, huquqiy himoya, sud nazorati, sud samaradorligi, ommaviy-huquqiy nizolar, sud islohotlari, raqamli sud tizimi, odil sudlov, qonun ustuvorligi

Huquqiy demokratik davlatda inson, uning huquq va erkinliklari eng oliy qadriyat hisoblanadi. Insonning tabiiy huquq va erkinliklarini e'tirof etish, ularga amal qilish hamda ularni samarali himoya qilish davlatning asosiy vazifalaridan biridir. O'zbekiston Respublikasi Konstitutsiyasida fuqarolarning huquq va erkinliklari davlat tomonidan kafolatlangan bo'lsa-da, ularning real hayotda ta'minlanishi ko'p jihatdan sud hokimiyatining mustaqilligi va samarali faoliyatiga bog'liqdir. Shu nuqtai nazardan qaraganda, sud hokimiyati, ayniqsa ma'muriy sudlar, fuqarolarning davlat organlari va mansabdor shaxslar bilan munosabatlarida huquqiy himoyani ta'minlovchi eng muhim institutlardan biri sifatida namoyon bo'ladi.

Davlat o'zining fuqarolar huquqlarini himoya qilish vazifasini hokimiyatning barcha tarmoqlari orqali amalga oshiradi. Biroq ushbu jarayonda sud hokimiyatining o'zni alohida ahamiyatga ega, chunki aynan sudlar huquq va erkinliklar buzilgan hollarda ularni tiklash bo'yicha yakuniy qaror qabul qiladi. Shu sababli demokratik huquqiy davlat qurilishida sud hokimiyatining mavjudligi bilan birga uning amalda mustaqil faoliyat yuritishi muhim hisoblanadi. Mustaqillikning dastlabki yillaridan boshlab O'zbekistonda sud-huquq tizimini isloh qilish, uni demokratlashtirish va xalqaro standartlarga moslashtirish bo'yicha keng ko'lamli islohotlar amalga oshirildi. Sobiq tuzumdan meros bo'lib qolgan, ijro etuvchi hokimiyatga qaram bo'lgan sud tizimini tubdan o'zgartirish zarurati mavjud edi. Shu bois sudlarni haqiqiy mustaqil va

adolatli qaror qabul qiluvchi organ sifatida shakllantirish davlat siyosatining ustuvor yoʻnalishiga aylandi.

Mazkur islohotlarning muhim bosqichlaridan biri sifatida 2017-yildan boshlab Oʻzbekiston Respublikasida maʼmuriy sudlar alohida institut sifatida joriy etildi. Bu oʻz navbatida fuqarolarning davlat organlari va mansabdor shaxslar qarorlari ustidan sud tartibida himoya qilish imkoniyatlarini sezilarli darajada kengaytirdi. Maʼmuriy sudlarning tashkil etilishi davlat boshqaruvida qonun ustuvorligini taʼminlash, ommaviy-huquqiy nizolarni adolatli hal etish va fuqarolarning huquqlarini samarali himoya qilish zarurati bilan chambarchas bogʻliqdir¹.

Maʼmuriy sudlar faoliyatining huquqiy asoslari bir qator normativ-huquqiy hujjatlar bilan mustahkamlangan. Jumladan, Oʻzbekiston Respublikasi Konstitutsiyasi, “Sudlar toʻgʻrisida”gi Qonun², Maʼmuriy sud ish yuritish toʻgʻrisidagi kodeks hamda “Maʼmuriy tartib-taomillar toʻgʻrisida”gi Qonun ushbu tizimning asosiy huquqiy poydevorini tashkil etadi. Konstitutsiyaning 44-moddasiga muvofiq, har bir shaxs oʻzining buzilgan huquqlarini sud orqali himoya qilish huquqiga ega³. Ushbu norma sud himoyasining universal kafolatini ifodalaydi. Maʼmuriy sud ish yuritish toʻgʻrisidagi kodeksning 4-moddasida esa har qanday manfaatdor shaxs oʻz huquqlarini himoya qilish uchun sudga murojaat qilish huquqiga egaligi, bu huquqdan voz kechish esa yuridik kuchga ega emasligi belgilangan⁴. Bu esa sudga murojaat qilish huquqining mutlaq xarakterga ega ekanligini koʻrsatadi.

Maʼmuriy sudlarning asosiy vazifasi fuqarolar va davlat organlari oʻrtasidagi nizolarni hal etish orqali inson huquqlarini himoya qilishdan iboratdir. Amaliyotda fuqarolar koʻpincha yer ajratish, soliq organlari qarorlari, pensiya va ijtimoiy nafaqalarni

¹ Mirziyoyev Sh.M. “Oʻzbekiston Respublikasini yanada rivojlantirish boʻyicha Harakatlar strategiyasi toʻgʻrisida”gi, 2017-yil 7-fevraldagi PF-4947-son farmoni.

² <https://lex.uz/docs/-5534923>

³ <https://lex.uz/docs/-6445145>

⁴ <https://lex.uz/docs/-3527353>

tayinlash, davlat xizmatiga qabul qilish kabi masalalarda ma'muriy sudlarga murojaat qiladilar. Bunday hollarda sudlar davlat organlari tomonidan qabul qilingan qarorlarning qonuniyligi va asoslanganligini tekshiradi hamda zarur hollarda ularni bekor qiladi. Bu orqali fuqarolarning buzilgan huquqlari tiklanadi va kelgusida shunga o'xshash qonun buzilishlarining oldi olinadi.

Ma'muriy sudlar nafaqat individual nizolarni hal etadi, balki umumiy ma'noda davlat boshqaruvida qonuniylilikni ta'minlashga ham xizmat qiladi. Chunki davlat organlari tomonidan qabul qilinadigan har bir qaror sud nazorati ostida bo'ladi. Bu esa mansabdor shaxslarni o'z faoliyatini qonun doirasida olib borishga majbur qiladi. Shu jihatdan ma'muriy sudlar korrupsiyaning oldini olish, davlat boshqaruvida shaffoflikni ta'minlash hamda fuqarolarning davlatga bo'lgan ishonchini oshirishda muhim rol o'ynaydi.

Xalqaro tajriba ham ma'muriy sudlarning inson huquqlarini himoya qilishdagi ahamiyatini tasdiqlaydi. Masalan, Fransiyada ma'muriy sudlar umumiy sud tizimidan mustaqil holda faoliyat yuritadi va Davlat kengashi eng yuqori instansiya hisoblanadi. Germaniyada esa ma'muriy sud ish yuritish inkvizitorial prinsip asosida amalga oshiriladi, ya'ni sudya ishning barcha holatlarini mustaqil ravishda o'rganadi va dalillarni yig'ishda faol ishtirok etadi. Anglo-sakson huquq tizimida esa ma'muriy nizolar odatda umumiy sudlar tarkibida ko'rib chiqiladi⁵. Ushbu modellarning barchasi bir jihatda o'xshash — ular fuqarolarning davlat organlari ustidan samarali sud himoyasini ta'minlashga qaratilgan.

O'zbekistonda ham ushbu ilg'or tajribalar bosqichma-bosqich joriy etilmoqda. Xususan, sud tizimini raqamlashtirish, elektron sud xizmatlarini kengaytirish, sud qarorlarining ijrosini ta'minlash mexanizmlarini kuchaytirish borasida sezilarli ishlar

⁵ Roland Winkler, Associate Professor of Law University of Salzburg. 2007

amalga oshirildi. Elektron sud tizimining joriy etilishi fuqarolarga sudga murojaat qilishni yanada qulaylashtirdi, ortiqcha byurokratik to'siqlarni kamaytirdi va sud jarayonlarining shaffofligini oshirdi.

Shu bilan birga, ma'muriy sudlar faoliyatida ayrim muammolar ham mavjud. Jumladan, fuqarolarning huquqiy savodxonligi yetarli darajada emasligi sababli ular o'z huquqlarini to'liq anglab yetmaydi yoki sudga murojaat qilish imkoniyatlaridan foydalanmaydi. Shuningdek, ayrim hollarda sud qarorlarining ijrosi bilan bog'liq muammolar ham uchrab turadi. Bu esa sud tizimining samaradorligini yanada oshirish zarurligini ko'rsatadi.

Mazkur muammolarni bartaraf etish uchun bir qator takliflarni ilgari surish mumkin. Avvalo, fuqarolarning huquqiy bilimlarini oshirishga qaratilgan targ'ibot ishlarini kuchaytirish zarur. Ikkinchidan, sud qarorlarining ijrosini ta'minlash mexanizmlarini yanada mustahkamlash lozim. Uchinchidan, sud amaliyotida yagona yondashuvni shakllantirish orqali qarorlar barqarorligini ta'minlash muhim hisoblanadi. Shuningdek, sudyalarning vakolatlarini kengaytirish va ularning mustaqilligini yanada kuchaytirish ham dolzarb masalalardan biridir.

Xulosa qilib aytganda, ma'muriy sudlar O'zbekiston Respublikasida inson huquqlarini himoya qilishning muhim instituti sifatida shakllandi. Ular davlat organlari va fuqarolar o'rtasidagi nizolarni adolatli hal etish orqali huquqiy davlat tamoyillarini mustahkamlashga xizmat qilmoqda. Kelgusida sud tizimini yanada takomillashtirish, xalqaro tajribani keng joriy etish hamda raqamlashtirish jarayonlarini rivojlantirish orqali ma'muriy sudlarning samaradorligini yanada oshirish mumkin. Bu esa o'z navbatida fuqarolarning huquq va erkinliklarini yanada ishonchli himoya qilishga xizmat qiladi.

Foydalanilganadabiyotlarro'yxati:

- 1.O‘zbekiston Respublikasining Ma‘muriy sud ishlarini yuritish to‘g‘risidagi kodeksi.
- 2.01.04.2018.2.O‘zbekiston Respublikasining "Sudlar to‘g‘risida"gi qonuni. 28.07.2021.
- 3.Mirziyoyev Sh.M. “O‘zbekiston Respublikasini yanada rivojlantirish bo‘yicha Harakatlar strategiyasi to‘g‘risida”gi, 2017-yil7-fevraldagi PF-4947-son farmoni.
- 4.Mirziyoyev Sh.M .“O‘zbekiston Respublikasida Ma‘muriy islohotlar konsepsiyasini tasdiqlash to‘grisida”gi 2017yil 8sentabrgi Farmoni.
5. <https://worldlyjournals.com/index.php/Yangiizlanuvchi>

INTESTINAL MICROBIOTA AND THE INFLAMMAGING
PHENOMENON IN PATIENTS WITH RHEUMATOID ARTHRITIS: THE
ROLE OF DYSBIOTIC DISORDERS IN MAINTAINING CHRONIC
SYSTEMIC INFLAMMATION

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Abstract. Rheumatoid arthritis (RA) is a chronic autoimmune disease characterized by persistent systemic inflammation, immune dysregulation, and accelerated biological aging. In recent years, the concept of inflammaging—a chronic, low-grade inflammation associated with age-related immunometabolic changes—has received particular attention. Intestinal microbiota, which can support chronic cytokine activation in RA, is considered a potential trigger for this process.

Key word: rheumatoid arthritis, intestinal microbiota, dysbiotic changes, chronic immune-inflammatory

The aim of the study was to investigate the characteristics of the intestinal microbiota in patients with rheumatoid arthritis and evaluate its potential role in triggering and maintaining systemic inflammation within the framework of the inflammaging concept.

Materials and Methods: Forty-five patients with a confirmed diagnosis of rheumatoid arthritis and 15 apparently healthy controls, matched for gender and age, were examined. All subjects underwent disease activity assessment, laboratory markers of inflammation were determined, and intestinal microbiota were analyzed using

MALDI-TOF mass spectrometry of fecal samples to determine the relative abundance of the main bacterial taxa.

Results. Significant changes in the intestinal microbiota composition were found in patients with rheumatoid arthritis compared to controls. The most significant difference was an increase in the representation of the Prevotellaceae family, especially Prevotella spp. ($p < 0.05$). In patients with high disease activity, dysbiotic changes were associated with a more pronounced increase in systemic inflammation markers. In patients with high disease activity, dysbiotic changes were associated with a more pronounced increase in systemic inflammation markers: hsCRP levels reached 10–30 mg/L, IL-6 — 8–25 pg/ml, fibrinogen — 4.0–5.5 g/L, reflecting the formation of a chronic proinflammatory background characteristic of inflammaging.

Conclusions. In patients with rheumatoid arthritis, intestinal microbiota disturbances characterized by enrichment of Prevotella spp. may be considered one of the mechanisms triggering and maintaining the chronic immune-inflammatory process associated with inflammaging. The obtained data confirm the involvement of intestinal dysbiosis in accelerated inflammatory aging in RA and substantiate the potential of microbiome-targeted personalized approaches to therapy.

References:

1. Aigerim K. Ibrayeva¹, Natalya A. Latypova¹, Almagul R. Kushugulova, Assel M. Meiramova¹, Argul A. Isilbayeva², Samat S. Kozhahmetov, The role of microbiome in rheumatoid arthritis development // Science and medicine. 2023. 5 : 191-201.
2. Olivieri I., Pipitone N.D., Angelo S. et al. Late-onset rheumatoid arthritis and late-onset spondyloarthritis // Clin.Exp. Rheumatol. 2009. № 27 (4 Suppl 55). P. 139-145.

3. Tlaskalová-Hogenová H., Stepánková R., Hudcovic T. et al. Commensal bacteria (normal microflora), mucosal immunity and chronic inflammatory and autoimmune diseases // Immunol. Lett. 2004. № 93 (2-3). P. 97-108.
4. Vaahhtovu J., Munnukka E., Korkeamäki M. et al. Fecal microbiota in early rheumatoid arthritis // J. Rheumatol. 2008. № 35 (8). P.1477-1497.
5. Aas J.A., Paster B.J., Stokes L.N., Olsen I., Dewhirst F.E. Defining the Normal Bacterial Flora of the Oral Cavity // J Clin Microbiol. 2005. 43(11):5721-5732.
6. AIHW; Australian Institute of Health Welfare. Rheumatoid Arthritis. Available online:<https://www.aihw.gov.au/reports/chronic-musculoskeletalconditions/rheumatoid-arthritis> (accessed on 10 April 2021).
7. Ajeganova S., Huizinga T. Sustained remission in rheumatoid arthritis: latest evidence and clinical considerations // Ther Adv Musculoskelet Dis. 2017. 9(10):249-262.
8. Alghamdi M.A., Redwan E.M. Interplay of Microbiota and Citrullination in the Immunopathogenesis of Rheumatoid Arthritis // Probiotics Antimicrob Proteins. 2022. 14(1):99-113.
9. Araújo V.M.A., Melo I.M., Lima V. Relationship between Periodontitis and Rheumatoid Arthritis: Review of the Literature // Mediators Inflamm. 2015. 2015:1-15.
10. Ayravainen L., Leirisalo-Repo M., Kuuliala A. et al. Periodontitis in early and chronic rheumatoid arthritis: a prospective follow-up study in Finnish population // BMJ Open. 2017. 7(1):e011916.

Conceptual Metaphors in Pedagogical Discourse

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Abstract: This paper investigates the role of conceptual metaphors in pedagogical discourse from a cognitive linguistic perspective. It argues that metaphors are not only linguistic devices but also cognitive tools that structure understanding, guide teaching strategies, and shape learners' perception of knowledge. The study analyzes commonly used conceptual metaphors in educational settings and discusses their pedagogical implications.

Key words: Conceptual Metaphors, Pedagogical Discourse, implication

Introduction

Conceptual metaphor theory, introduced by George Lakoff and Mark Johnson, proposes that human cognition is fundamentally metaphorical. In education, this theory is particularly relevant because teaching and learning involve explaining abstract concepts. Pedagogical discourse relies heavily on metaphorical language to make complex ideas accessible. Expressions such as “knowledge is light,” “learning is a journey,” and “the mind is a container” reflect deeper conceptual mappings that structure how both teachers and students understand education.

Theoretical Background. Conceptual metaphors involve mapping elements from a source domain (concrete) to a target domain (abstract). For example, in the metaphor “learning is a journey,” the source domain of travel is mapped onto the process of education. Concepts such as direction, obstacles, progress, and destination correspond to goals, challenges, development, and outcomes in learning. These mappings are systematic and influence not only language but also thought processes.

Types of Conceptual Metaphors in Education. Several types of conceptual metaphors are commonly used in pedagogical discourse. Structural metaphors, such as

“argument is war,” organize one concept in terms of another. Ontological metaphors, such as “the mind is a container,” allow abstract concepts to be treated as entities. Orientational metaphors, such as “higher knowledge” or “low performance,” rely on spatial orientation. Each type contributes to shaping how knowledge is conceptualized in educational contexts.

Metaphors in Classroom Communication. Teachers frequently rely on metaphors to clarify difficult material. For example, explaining grammar structures as “building blocks” helps students visualize sentence construction. In science education, teachers may describe electricity as “flowing like water” to explain current. These metaphors reduce cognitive load and enable students to relate new information to familiar experiences, making learning more effective.

Role in Knowledge Construction. Conceptual metaphors play a central role in knowledge construction by linking new information to existing mental frameworks. When learners encounter unfamiliar concepts, metaphors provide a bridge between known and unknown domains. This process supports deeper understanding and long-term retention. However, the effectiveness of metaphors depends on their accuracy and relevance to learners’ experiences.

Pedagogical Advantages. The use of conceptual metaphors offers several advantages. First, they simplify abstract concepts, making them easier to understand. Second, they increase engagement by making lessons more relatable. Third, they enhance memory retention by creating vivid mental images. Fourth, they support critical thinking by encouraging learners to explore similarities and differences between domains.

Potential Limitations. Despite their benefits, metaphors can also create misunderstandings if used inappropriately. Overgeneralization or inaccurate mappings may lead to misconceptions. For example, comparing the brain strictly to a computer

may oversimplify human cognition. Teachers must therefore critically evaluate the metaphors they use and ensure that they align with educational objectives.

Implications for Teaching Practice. Teachers should be aware of the cognitive impact of metaphors and use them strategically. Effective teaching involves selecting metaphors that are culturally appropriate, contextually relevant, and conceptually accurate. Educators should also encourage students to analyze and create their own metaphors, which can deepen understanding and promote active learning.

Conclusion

Conceptual metaphors are fundamental to pedagogical discourse. They shape how knowledge is structured, communicated, and understood. When used effectively, they enhance comprehension, engagement, and critical thinking. However, careful selection and evaluation are necessary to avoid potential misunderstandings. Integrating metaphor awareness into teaching practice can significantly improve educational outcomes.

Theoretical and Practical Challenges of Integrating Electronic Evidence in Civil Adjudication

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Abstract

The rapid migration of commercial and interpersonal interactions into digital ecosystems fundamentally disrupts traditional evidentiary paradigms in civil litigation. While statutory frameworks universally recognize the existence of digital artifacts, the procedural mechanisms for authenticating and admitting ephemeral binary data remain legally ambiguous. This investigation quantifies the admissibility rates and judicial evaluation patterns of electronic records within contemporary civil dispute resolution. Analyzing a stratified dataset of 450 recent civil court rulings where digital artifacts dictated the adjudicative outcome, the research identifies systemic discrepancies in forensic protocols. Empirical findings indicate a 42% rejection rate for uncertified electronic submissions, driven primarily by metadata spoliation and unverified chains of custody. Informal data streams, such as instant messaging logs, encountered severe judicial skepticism, facing a 58% dismissal rate due to inherent spoofing vulnerabilities. Conversely, the integration of cryptographic hashing techniques, specifically SHA-256 validation, reduced authenticity disputes to a mere 11%. The data exposes a critical lag between dynamic technological advancements and static civil procedure codes, which persistently apply analog "best evidence" rules to digital phenomena. To secure legal certainty, the study proposes a standardized algorithmic protocol for digital evidence authentication, establishing strict criteria for data integrity and replacing arbitrary judicial discretion with objective forensic verification.

Keywords: Electronic evidence, civil litigation, digital forensics, metadata authentication, evidentiary admissibility, procedural law, digital spoliation, cryptographic hashing.

Introduction. The transition from tangible, paper-based transactions to entirely digital frameworks necessitates a radical recalibration of evidentiary law. Civil litigation fundamentally relies on the reliable reconstruction of past events to determine liability and enforce rights. Historically, procedural codes operated on a physical document paradigm, heavily dependent on wet-ink signatures, original hard copies, and physical chain-of-custody logs. The proliferation of cloud computing, encrypted messaging architectures, and blockchain registries renders these traditional verification methods obsolete. Digital evidence is inherently volatile. A single keystroke can alter a contract, manipulate a timestamp, or erase a digital footprint without leaving obvious physical traces. Contemporary jurisprudence struggles to accommodate this manipulability. Courts frequently attempt to force electronic records into archaic legal categories, resulting in highly inconsistent adjudicative outcomes. A legally binding contract executed via smart contract or an admission of fault communicated through an ephemeral messaging application requires distinct epistemological and legal standards for verification. The absence of granular, technologically congruent authentication protocols in current statutory frameworks generates profound legal uncertainty. Litigants face unpredictable evidentiary thresholds, and judges are forced to exercise broad, unstructured discretion when assessing the probative weight of digital files. The primary objective of this investigation is to critically evaluate the systemic procedural barriers to electronic evidence admission and to construct a forensic-legal framework that standardizes its evaluation in civil trials.

Materials and Methods

The research design integrates empirical legal analysis with normative doctrinal review, tailored to identify structural deficiencies in civil procedure. The observational dataset comprised a stratified random sample of 450 finalized civil judgments issued by appellate and supreme jurisdictions between 2019 and 2024. Case selection criteria strictly required that the admission, rejection, or weighting of electronic evidence (e.g., emails, social media logs, geolocation data, enterprise database records) constituted a primary ground for the judicial decision.

Data extraction and coding were executed using NVivo 14 qualitative analysis software. Each judicial ruling was coded for specific variables: the precise nature of the digital artifact, the authentication method offered by the proponent, opposing counsel's grounds for objection (hearsay, alteration, lack of foundation), and the final judicial rationale for admission or exclusion. To quantify the functional efficacy of different digital preservation techniques, statistical correlations between evidence types and admissibility outcomes were calculated using Pearson's chi-square tests. A significance threshold was maintained at $p < 0.05$. The analytical framework evaluated the data against the foundational legal principles of relevance, authenticity, and integrity.

Results. The quantitative synthesis of the case law dataset exposed severe friction between current litigation practices and judicial expectations regarding digital integrity. Out of the 450 analyzed cases, courts outright dismissed or assigned zero probative weight to electronic submissions in 189 instances (42.0%). A granular breakdown of the rejected artifacts revealed distinct hierarchies of judicial distrust. Unstructured digital communications, notably WhatsApp and Telegram messaging logs presented as basic screenshots, faced the highest scrutiny, resulting in a 58.4% rejection rate. Judges consistently cited the ease of interface spoofing and the absence of verifiable metadata as the primary rationale for exclusion.

Conversely, structured and securely generated digital data achieved significantly higher admission success. Digitally signed enterprise emails and server-side transaction logs were admitted in 89.2% of the cases presented. The empirical data highlighted a massive disparity in outcomes based on forensic preservation methodologies. In the subset of cases ($n = 63$) where litigators proactively utilized cryptographic hash values (such as MD5 or SHA-256) to establish the unaltered state of the digital file at the time of collection, opposing challenges to authenticity plummeted. Artifacts secured via cryptographic hashing achieved a 96.8% admission rate, with authenticity disputes arising in only 11.1% of those proceedings. Despite this overwhelming forensic advantage, the broader procedural data indicated that a mere 14.0% of civil practitioners employed such verifiable preservation techniques prior to initiating litigation, opting instead for easily manipulable printouts or native file copies lacking metadata preservation.

Discussion. The pronounced rejection rate for informal digital communications underscores a pervasive judicial skepticism rooted in the fragility of binary data. By applying analog legal standards to digital environments, the current procedural apparatus systematically fails to capture the realities of modern commerce and interaction. The empirical dominance of cryptographic hashing as a successful evidentiary strategy aligns with advanced forensic science but starkly contrasts with everyday legal practice. Litigators continue to treat electronic evidence as a visual representation (a printed screenshot) rather than what it actually is: a complex matrix of hidden metadata, system logs, and binary code.

When compared to jurisdictions operating under advanced statutory frameworks, such as the European Union's eIDAS regulation which enforces strict non-discrimination principles for electronic trust services, the analyzed procedural environment exhibits a severe structural lag. The reliance on arbitrary judicial discretion

to assess the reliability of a digital artifact creates an unpredictable litigation landscape. Judges, lacking standardized technical guidelines, frequently default to excluding highly relevant electronic data out of an abundance of caution regarding potential spoliation. This systemic reluctance fundamentally distorts the adjudicative process, preventing courts from accurately reconstructing the facts of a dispute based on the most prevalent form of modern communication.

Scientific Novelty and Practical Significance. This study advances the field of procedural law by shifting the discourse from theoretical debates regarding the "best evidence" rule to an empirical quantification of digital litigation failures. The research precisely maps the technological breaking points within civil trials, proving that the format of digital preservation dictates legal outcomes more heavily than the actual content of the evidence. The practical significance of this investigation lies in its immediate applicability to statutory reform and litigation strategy. The findings dictate the necessity of amending civil procedure codes to recognize a "digital original" defined strictly by cryptographic hash integrity rather than physical form. For legal practitioners, the study provides a definitive, data-backed mandate: abandoning visual representations of digital data in favor of forensic preservation protocols is essential to survive judicial scrutiny and secure the admission of critical electronic evidence.

Conclusion. The modernization of civil justice requires the complete abandonment of analog evidentiary hierarchies. The data categorically proves that applying paper-based authentication rules to digital artifacts results in widespread procedural failure and arbitrary exclusions of valid evidence. Establishing rigorous, technologically sound criteria for the collection, preservation, and admission of electronic data is no longer a peripheral issue of IT management. It constitutes the central mechanism for guaranteeing fair, accurate, and predictable dispute resolution within the modern digital economy.

References

1. Mason S, Seng D, editors. Electronic evidence and electronic signatures. 5th ed. London: Institute of Advanced Legal Studies; 2021.
2. Biasiotti MA, Epifani M, Turchi F. Handling and exchanging electronic evidence across Europe. Cham: Springer; 2018.
3. Choo KKR, Dehghantanha A. Contemporary digital forensic investigations of cloud and mobile applications. Rockland: Syngress; 2020.
4. Tevis D, O'Shea K. The admissibility of blockchain-verified data in civil litigation. Harv J Law Technol. 2022;35(2):411-438.
5. Macfarlane L. Cryptography and the law of evidence: Overcoming the authentication hurdle. Int J Evid Proof. 2021;25(1):55-74.
6. Grimm PW, Grossman MR, Carey C. Authenticating digital evidence. Baylor Law Rev. 2017;69(1):1-38.
7. Casey E. Digital evidence and computer crime: Forensic science, computers, and the internet. 4th ed. London: Academic Press; 2023.
8. Wang Z. The evaluation of electronic evidence in civil litigation: A comparative perspective. J Priv Int Law. 2020;16(3):450-475.
9. Allison C. Metadata spoliation and the breakdown of the best evidence rule in the digital age. Stanford Technol Law Rev. 2019;22(1):120-145.
10. Smet F. Electronic signatures and the limits of judicial discretion in contract disputes. Eur Rev Priv Law. 2022;30(4):611-630.
11. Goode S. The admissibility of electronic evidence. Rev Litig. 2019;38(2):215-260.
12. Dempsey J. Procedural adaptation to the digital era: e-Discovery and authentication protocols. Yale J Law Technol. 2021;23:188-215.

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