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1-SECTION

YARIMO‘TKAZGICHLARNI RENTGEN QURILMASI UCHUN FOYDALANISHNING *CdMnTe* MISOLIDA KO‘RISH

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Annotatsiya: *Ushbu maqolada Rentgen qurilmasini rivojlantirish va rentgen nurlari zararini kamaytirish uchun CdMnTe dan foydalanish haqida so‘z yuritilgan bo‘lib, shuningdek, CdMnTe ning kamchiliklar, tavsiyalar va ustida ishlagan buyuk fizik olimlarning qilgan tajribalari ham aytib o‘tilgan.*

Kalit so‘zlar: *CdMnTe, magnit yarimo‘tkazgichlar,ion, elektron, kovak, konsentratsiya, energiya, zona.*

Abstract: *This article discusses the development of X-ray devices and the application of CdMnTe (Cadmium Manganese Telluride) to mitigate the harmful effects of X-ray radiation. Furthermore, it highlights the current limitations of CdMnTe, offers key recommendations for future optimization, and reviews the landmark experiments conducted by prominent physicists who have contributed to this field.*

Keywords: *CdMnTe, magnetic semiconductors, ion, electron, hole, concentration, energy, band.*

Аннотация: *В данной статье рассматриваются вопросы усовершенствования рентгеновских аппаратов и использование CdMnTe (кадмий-марганец-теллур) для снижения вредного воздействия рентгеновского излучения. Кроме того, в работе освещаются недостатки CdMnTe, приводятся рекомендации по его оптимизации, а также анализируются знаковые эксперименты выдающихся физиков, внесших вклад в развитие этой области.*

Ключевые слова: *CdMnTe, магнитные полупроводники, ион, электрон, дырка, концентрация, энергия, зона.*

KIRISH

Zamonaviy tibbiyot, sanoat va ilmiy-tadqiqot sohalarida rentgen diagnostikasi hamda tomografiya texnologiyalarining o‘rni beqiyosdir. Biroq, rentgen nurlanishining inson organizmiga va atrof-muhitga ko‘rsatadigan zararli ionlashtiruvchi ta’siri ushbu texnologiyalardan foydalanishda xavfsizlik va samaradorlikni oshirish masalasini o‘rtaga qo‘ymoqda. An’anaviy detektorlar va qurilma komponentlari ionlashtiruvchi nurlarga yetarlicha yuqori sezgirlikka ega bo‘lmagani sababli, bemorlar va xodimlar nisbatan yuqori dozadagi radiatsiyani qabul qilishga majbur bo‘lishadi. Shu bois, rentgen qurilmalarining sezgirligini oshirish va radiatsiya dozasini (zararini) imkon qadar kamaytirishga xizmat qiladigan yangi avlod yarimo‘tkazgich materiallarini tadqiq etish va amaliyotga joriy etish fiziklar va muhandislar oldida turgan dolzarb vazifalardan biridir.

ADABIYOTLAR TAHLILI VA MUNOZARA

Yarimo‘tkazgichlarning magnit xususiyatlarini o‘rganish 1900-yillarda fanga yangilik sifatida kirib keldi. Magnit yarimo‘tkazgichlar va yarimo‘tkazgichlar bir-biridan farq qiladi. **Hideo Ohno** va uning Tohoku universitetidagi guruhi tomonidan amalga oshirilgan ishlar magnit yarimo‘tkazgichlarning rivojlanishiga asosiy sabab bo‘ldi. Dastlabki ishlar *GaMnAs* va *InMnAs* materiallari ustida amalga oshirilgan. Magnit yarimo‘tkazgichlarning suyultirilgan turi 1970-yillardan boshlab chuqurroq o‘rganila boshlandi. Shuningdek, *CdMnTe* ham shular qatorida edi. Keyinchalik III-V birikmalar va nitridlar ham o‘rganilgan. 1980-yillardan boshlab ko‘plab tadqiqotchilar II-VI guruh elementlari suyultirilgan magnit yarimo‘tkazgichlari sifatida birinchilardan bo‘lib keng o‘rganilgan. Magnit yarimo‘tkazgichlarning “otasi” sifatida K.Furdyna *CdMnTe* ning magnit va optik xossalarini, xususan Faradey effekti va ulkan Zeeman parchalanishini tadqiq qilgan. *CdMnTe* da optik o‘tishlarning Zeeman effekti bo‘yicha 1982-yilda E. Dudziak tadqiqotlarni boshlangan. Dastlabki miqdoriy natijalar Ginter tomonidan olingan. T.Dietl *CdMnTe* dagi ferromagnit va antiferromagnit holatlarini tushunishda poydevor bo‘lgan. 1997-yilda esa olamshumul kashfiyot qilindi, ya’ni *CdMnTe* kvant quduqlarida ikki o‘lchamli kovak gazi tomonidan ferromagnit o‘tish kuzatilgan. Hozirgi kunda radiatsiya detektorlari *CdMnTe* ga asosan rentgen va gamma-kvant detektorlari uchun *CdZnTe* ga muqobil material sifatida o‘rganilmoqda. *Mn* ning segregatsiya koeffitsiyenti 1 ga yaqinligini isbotlagan R.B.James, bir jinsli kristallar olish ustida ishlagan.

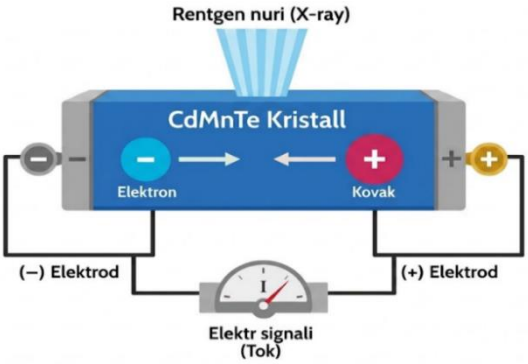
Nega shu yillar davomida *CdMnTe* dan rentgen qurilmasi uchun to‘liq tadbiq etilmagan degan savolni qo‘ysak, sababi bir nechta bo‘lishi mumkin. Xususan, *CdMnTe* suyultirilgan magnit yarimo‘tkazgich bo‘lib, uchlik qotishma hosil qiladi. U yuqori

qarshilik $\left(R = 10^{10}\Omega \cdot sm\right)$ xususiyatlariga ega. *CdMnTe* kristall panjarasida *Mn* ionlarining mavjudligi Mn^{2+} ionining 3D elektronlari bilan zona elektronlari o‘rtasida spin-spin almashinuv ta’sirini keltirib chiqaradi. Shuningdek, *Mn* miqdorining o‘zgartirish orqali taqiqlangan zona kengligini 1.5-2.2 eV gacha o‘zgartirish mumkin. *CdMnTe* 1999-yildan boshlab rentgen va gamma nurlarini aniqlash uchun eng yaxshi material sifatida o‘rganilgan. *CdMnTe* zolak tafovutiga ega bo‘lib, yupqa plyonkasining tafovuti 1.83 eV ni tashkil etadi. Bu qiymat quyosh batareyalari ishlab chiqarish uchun diapazon (1.4-1.7 eV) ga yaqin. *CdMnTe* kristalida zolak tafovuti 1.6 eV ga teng va bu qiymat *Mn* konsentratsiyasi hamda haroratga bog‘liq ravishda o‘zgaradi.

Mn^{3+} ionlarining 3d holatlari tomonidan hosil qilingan spin almashinuv energiyalari hisoblangan. Kichik spin uchun effektiv potensial katta spinga nisbatan ko‘proq tortuvchi kuchga ega. Ferromagnit *MnTe* va ferromagnit $CdMnTe_2$ ning zonaviy strukturasi manfiy almashinuv yangi turini ko‘rsatadi. *CdMnTe* yutilish koeffitsienti $10^5 sm^{-1}$ ga yetadi va asosan ultrabinafsha nurni yutadi. Infraqizil sohasida yuqori optik o‘tkazuvchanlik va doimiy zolak tafavuti kristallning infraqizil shaffofligini va tarkibiy bir xilligini ko‘rsatadi.

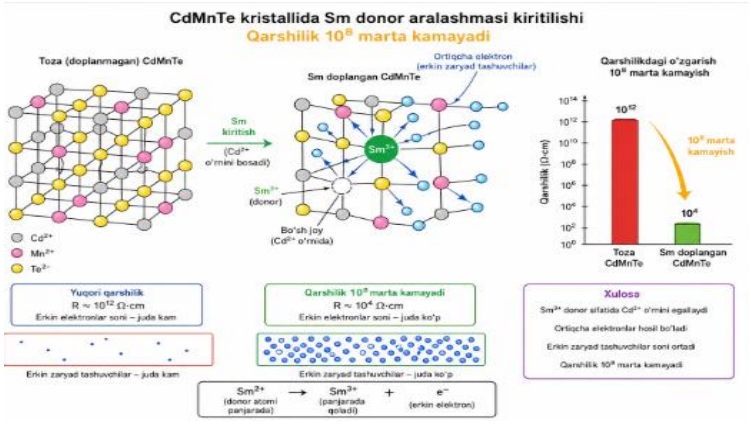
CdMnTe ga yorug‘lik tushganda foton energiyasi $E > E_g$ bo‘lsa, elektron valent zonadan o‘tkazuvchanlik zonasiga ko‘tariladi. *CdMnTe* uchun $E_g \approx 2.3 - 2.7\ eV$ *Mn* konsentratsiyasiga bog‘liq bo‘ladi. Bu taxminan 460-540 nm to‘lqin uzunligidagi yorug‘likka mos keladi. Elektronlar kristall panjara bilan to‘qnashganda $10^{-13} - 10^{-12}$ sekund ichida termal muvozanatga erishadi. *CdMnTe* orqali rentgen nurlarini aniqlash uchun taqiqlangan zona kengligi 1.7-2.2 eV oralig‘ida sozlanuvchi keng energiya tarmog‘i bo‘lib, yuqori qarshilik ham kerak bo‘ladi. Yuqori qarshilik shovqinni kamaytiradi. $Cd_{1-x}Mn_xTe$ da *Mn* konsentratsiyasi 5 % dan kam bo‘lib, bu *CdZnTe* (10% Zn) ga nisbatan kamroq qo‘shimcha element talab qiladi. Shuningdek, xona haroratida sovitish talab qilinmaydi.

CdMnTe ni rentgen nurlari detektori sifatida qo‘llash uchun bir necha muhim jarayonlarni amalga oshirish kerak bo‘ladi, xususan kristallning sirtini tayyorlash va kontaktlarni shakllantirish. Bu jarayon detektordagi shovqinni kamaytirish va signallarni aniq qabul qilish imkonini beradi. Sirtni atom darajasida tekis holatga keltirish, turli o‘lchamdagi abraziv kukunlar yoki almaz pastalari yordamida kristall sirti oyna kabi jilolanadi. Mexanik jilolashdan keyin qolgan makroskopik nuqsonlarni va sirtning oksid qatlamini to‘qotish uchun kimyoviy ishlov beriladi. Detektordan elektr signalini olish uchun kristallning ikki tomoniga elektrodlar qo‘yiladi.



1-rasm. CdMnTe ni renten qurilmasiga qo‘llanilishining sxematik ko‘rinishi.

Kristall qirralari maxsus dielektrik materiallar yoki kimyoviy oksidlovchi bilan ishlov beriladi, bu esa kristallning yon tomonlari orqali tok o‘tib ketishini oldini olish, detektor sezgirligini oshiradi. *CdMnTe* ni qo‘llashda ayrim kamchiliklarni bartaraf etish zarur. Uning yuqori qarshiligi ayrim holatlarda zararli bo‘lishi ham mumkin, shu sabab uning qarshiligini kamaytirish zarur. *CdMnTe* kristalliga *In, Al, Sm* donor aralashmalar kiritish qarshilikni sezilarli darajada kamaytirishi mumkin. Ushbu aralashmalarda Cd^{2+} o‘rniga kristall panjarasiga kiradi va ortiqcha elektron berib, erkin zaryad tashuvchilar sonini oshiradi. *CdTe* ga *Sm* kiritilganda qarshiligini 10^8 marta kamayganini kuzatish mumkin.



2-rasm: CdMnTe kristallida Sm kiritilganligi.

CdMnTe kristallarida o‘stirish jarayonida tellur elementining mikroskopik o‘lchamdagi ($1^{-50}mkm$) hosil bo‘ladi. Tellur cho‘kmalari yuqori o‘tkazuvchanlikka ega bo‘lgani uchun detektor ichidagi elektr maydonini buzadi va zaryad tashuvchilar (elektron va kovaklar) uchun "to‘siq" vazifasini o‘taydi. Bu esa zaryad yig‘ish samaradorligini (CCE) pasaytiradi va qorong‘ulik tokini oshiradi. Bu vaziyatda kristallarni *Cd* yoki *Mn* zarralarini muhitida yuqori haroratda termik ishlov berish zarur. Bu jarayon ortiqcha tellurni neytrallashga va inkluziyalar o‘lchamini kamaytirishga yordam beradi.

Kremniy (Si), germaniy (Ge) yordamida qilingan detektorlarga o‘xshamaydi, ya’ni sovitish uchun suyuq azot talab qilinmaydi. Bu esa o‘lchamlari kichik va mobil rentgen qurilmasini yaratish imkonini beradi. Kremniy bilan solishtirilganda *CdTe* yuqori energiyali rentgen va gamma kvantlarini fotoeffekt orqali to‘liq yutishda o‘ta yuqori kvant samaradorligiga ega. Misol uchun: *100 keV* gacha bo‘lgan nurlar uchun qalinligi 0.5-1 mm bo‘lgan *CdTe* plastinkasi nurlarni 100 % ushlab qoladi. *Si* detektorlari bu energiyada samaradorlikni keskin yo‘qotadi.

Xitoy *CdMnTe* ustida 2016-2021 yillar ichida salmoqli ishlarni amalga oshirdi. *CdMnTe* yuqori haroratlarda qizdirish va sifatini yaxshilash, optik usullar yordamida FIK ko‘tarish bilan shug‘ullandi. Aleksey E. Bolotnikov, Ralph B. James *CdMnTeSe*, *MnTe* ni tozalash hamda detektorlarda ishlash xususiyatlarini tahlil qilgan. Ular 2011-2024 yillar davomida tinimsiz tadqiqot o‘tkazdilar. Shunda ham *Se q*o‘shilganda 2024-yilda FIK 2% bo‘lgan. Kim Kihyun *CdMnTeSe, Se* qo‘shish effekti, kovaklar harakatini 2022-yildan boshlab o‘rgana boshlagan. 2024-yilga kelganda FIK 2% dan 5.4% ni tashkil etgan. Bu sezilarli natija bo‘lib xizmat qildi.



3-rasm: CdMnTeSe bo‘yicha statistika.

XULOSA

CdMnTe kristallarida *Mn* qo‘shilishi nuqsonlar sonini oshiradi, bu esa yuqori qarshilikni keltirib chiqaradi. Buni kamaytirish uchun donor elementlarni kiritish yoki qizdirish orqali qarshilikni kamaytirish orqali ma’lum natijaga erish mumkin. Shuningdek, elektron va kovaklarning yashash zavrini uzaytirish va harakatchanlikni oshirish usullarini ishlab chiqish zarur. *CdMnTe* ni rentgen qurilmasi uchun qo‘llashdan avval *Mn* ustida tadqiqot ishlarini amalga oshirish zaurur. Aynan *Mn* qarshilikni yuqori bo‘lishiga sabab bo‘lmoqda. Hozirgi kungacha *Mn* ustida labaratoriya ishlari 20 % ni tashkil etmoqda. *CdMnTe* ning kristalliga yangi elementlar *Bi, Cu, Fe* qo‘shish orqali tajriba sinov ishlarini ham olib borish FIK oshirishi mumkin. *CdTe* ga *Mn* kiritish xona

haroratida azot yordamida sovitishga ehtiyoj sezilmaydi. Ustunlik tarafi shu bo‘lganligi sababli ham ishlash davri ko‘proq bo‘ladi. Rentgen nuri kristallga urilganda, fotonlar *CdMnTe* atomlari bilan o‘zaro ta’sirga kirishadi. Yuqori energiyali foton o‘z energiyasini kristall ichidagi elektronlarga beradi. Natijada, elektronlar valent zonasidan o‘tkazuvchanlik zonasiga o‘tadi. Undagi elektronlarning harakatchanligi va yashash davri yuqori bo‘ladi. Shu sababli ham uning o‘lchash aniqligi yuqori va zararli nurlardan yiroq. Shuningdek, foydali ish koeffitsienti yuqori bo‘lganligi uchun ham uzoq vaqt xizmat qiladi.

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TASHQI ELASTIK SILINDRIK QOBIQ UCHUN HARAKAT TENGLAMALARINING CHIQARILISHI. (KIRXGOF–LYAV , TIMOSHENKO–MUSHTARI NAZARIYASI ASOSIDA)

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ANNOTATSIYA: *Ushbu maqola (dissertatsiya bobi) tashqi ta'sirlarga uchragan yupqa elastik silindrik qobiq uchun harakat tenglamalarini ikkita klassik yondashuv — Kirxgof–Lyav gipotezasiga asoslangan klassik nazariya va Timoshenko–Mushtari (siljish deformatsiyasini hisobga oluvchi) nazariyasi asosida chiqarishga bag'ishlangan. Ishning maqsadi — ikki nazariya bo'yicha siljish maydoni, deformatsiya-siljish bog'liqliklari, kuch va moment natijalarini hosil qilish hamda Nyuton II qonuni asosida harakat tenglamalari sistemasini tizimli tarzda keltirib chiqarishdan iborat. Metodika sifatida energetik-analitik yondashuv, qobiq elementining dinamik muvozanati va sonli modellashtirish (Python NumPy/Matplotlib muhitida, MATLAB dasturiga tenglashtiriladigan hisoblash vositasi sifatida) qo'llanildi. Natijalar shuni ko'rsatdiki, siljish deformatsiyasini hisobga olish qalinlik/radius nisbati (h/R) oshgan sari xos chastotalarning sezilarli darajada pasayishiga olib keladi, bu farq yupqa qobiqlarda (h/R<0,01) ahamiyatsiz, qalinroq qobiqlarda esa 10%dan oshishi mumkin. Olingan tenglamalar tizimi dissertatsiyaning keyingi boblarida chegaraviy masalalarni yechish uchun asos bo'lib xizmat qiladi.*

Kalit so'zlar*: silindrik qobiq, Kirxgof–Lyav gipotezasi, Timoshenko–Mushtari nazariyasi, harakat tenglamalari, siljish deformatsiyasi, kuch va moment natijalari, xos chastota.*

АННОТАЦИЯ:Данная статья (глава диссертации) посвящена выводу уравнений движения тонкой упругой цилиндрической оболочки, находящейся под внешним воздействием, на основе двух классических подходов — классической теории, базирующейся на гипотезе Кирхгофа–Лява, и теории Тимошенко–Муштари, учитывающей деформацию поперечного сдвига. Целью работы является последовательный вывод поля перемещений,

соотношений деформация–перемещение, силовых и моментных результирующих для обеих теорий, а также построение системы уравнений движения на основе второго закона Ньютона. В качестве методологии использованы энергетически-аналитический подход, динамическое равновесие элемента оболочки и численное моделирование (в среде Python NumPy/Matplotlib, применяемой как эквивалент MATLAB). Результаты показывают, что учёт сдвиговой деформации приводит к заметному снижению собственных частот с ростом отношения толщины к радиусу (h/R); при h/R<0,01 это отличие незначительно, а для более толстых оболочек может превышать 10%. Полученная система уравнений служит основой для решения краевых задач в последующих главах диссертации.

Ключевые слова: *цилиндрическая оболочка, гипотеза Кирхгофа–Лява, теория Тимошенко–Муштари, уравнения движения, деформация сдвига, силовые и моментные результирующие, собственная частота.*

ABSTRACT:This article (a dissertation chapter) is devoted to the derivation of the equations of motion of a thin elastic cylindrical shell subjected to external action, based on two classical approaches: the classical theory built on the Kirchhoff–Love hypothesis, and the Timoshenko–Mushtari theory, which accounts for transverse shear deformation. The aim of the work is to consistently derive the displacement field, the strain–displacement relations, and the force and moment resultants for both theories, and to construct the system of equations of motion using Newton's second law. The methodology employed includes an energy-analytical approach, the dynamic equilibrium of a shell element, and numerical modelling (carried out in the Python NumPy/Matplotlib environment, used here as an equivalent computational tool to MATLAB). The results show that accounting for shear deformation leads to a noticeable decrease in natural frequencies as the thickness-to-radius ratio (h/R) increases; for h/R<0.01 this difference is negligible, while for thicker shells it may exceed 10%. The resulting system of equations serves as the basis for solving boundary-value problems in subsequent chapters of the dissertation.

Keywords: *cylindrical shell, Kirchhoff–Love hypothesis, Timoshenko–Mushtari theory, equations of motion, shear deformation, force and moment resultants, natural frequency.*

KIRISH

Silindrik qobiq konstruksiyalari aviatsiya, mashinasozlik, quvur transporti va qurilish sohalarida keng qo'llaniladi, shu sababli ularning dinamik xatti-harakatini to'g'ri tavsiflovchi harakat tenglamalarini olish muhandislik amaliyoti va nazariy mexanika uchun dolzarb masaladir [1]. Qobiqlarning tebranish va deformatsiyalanish jarayonlarini tavsiflashda turli darajadagi soddalashtirishlarga asoslangan bir qancha nazariyalar mavjud bo'lib, ular orasida Kirxgof–Lyav gipotezasiga asoslangan klassik nazariya eng keng tarqalgani hisoblanadi [2].

Kirxgof–Lyav gipotezasi qobiq o'rta sirtiga normal bo'lgan to'g'ri chiziq elementining deformatsiyadan keyin ham to'g'ri va o'rta sirtga perpendikulyar qolishini, shuningdek ko'ndalang siljish va normal deformatsiyalarning e'tiborga olinmasligini nazarda tutadi [3]. Bu gipoteza yupqa qobiqlar (h/R juda kichik) uchun yetarli aniqlik beradi, biroq nisbatan qalin qobiqlarda ko'ndalang siljish deformatsiyasi va aylanma inersiya ta'sirini e'tiborsiz qoldirish sezilarli xatoliklarga olib kelishi bir qator tadqiqotlarda ko'rsatilgan [4].

Ushbu kamchilikni bartaraf etish maqsadida taniqli sovet mexanika olimi X.M. Mushtari tomonidan ilgari surilgan va keyinchalik Timoshenko tipidagi siljish deformatsiyasi kontseptsiyasi bilan uyg'unlashtirilgan yondashuv — bu ishda "Timoshenko–Mushtari nazariyasi" deb yuritiladi — qobiq kesimining o'rta sirtga normal holatini saqlab qolish talabini yumshatadi va mustaqil burilish (rotatsiya) funksiyalarini kiritadi [5, 6]. Bu esa qalinroq qobiqlar va yuqori tebranish modlarida aniqroq natijalar olish imkonini beradi [7].

Turli qobiq nazariyalarini qiyoslovchi tadqiqotlarda Donnell–Mushtari, Lav–Timoshenko, Sanders, Flyugge va Vlasov nazariyalari bo'yicha olingan xos chastotalar tajriba natijalari bilan solishtirilgan va klassik Donnell–Mushtari nazariyasining ayrim hollarda (uzun va qalin qobiqlarda) yetarli aniqlik bermasligi ko'rsatilgan [8, 9]. Zamonaviy tadqiqotlarda Kirxgof–Lyav nazariyasi tangensial differensial hisob asosida ham qayta ifodalangan, bu esa nazariyaning matematik apparatini umumlashtirish imkonini bergan [10].

Yuqoridagilarga asoslanib, ushbu bobning maqsadi tashqi elastik silindrik qobiq uchun harakat tenglamalarini ikkala nazariya — Kirxgof–Lyav va Timoshenko–Mushtari — asosida izchil ravishda chiqarish, ularni o'zaro solishtirish va olingan natijalarni sonli misollar bilan tasdiqlashdan iborat.

1. NAZARIY ASOS: ASOSIY GIPOTEZALAR

Qaralayotgan silindrik qobiq o'rta sirt radiusi R, qalinligi h va uzunligi L ga ega, deb faraz qilinadi. Koordinata sistemasi sifatida silindrik koordinatalar (x — o'q

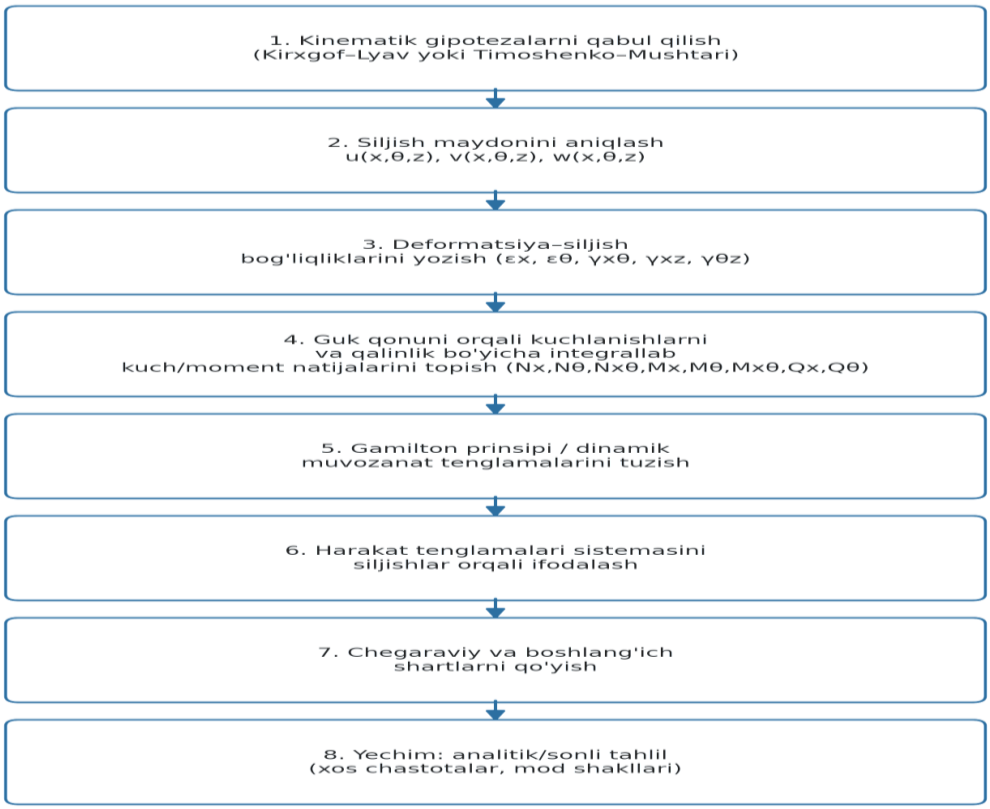
bo'ylab, θ — aylana bo'ylab, z — qalinlik bo'ylab, o'rta sirtdan hisoblanadi) qabul qilingan. Ikki nazariyaning asosiy kinematik farqlari 1-jadvalda keltirilgan.

Xususiyat	Kirxgof–Lyav nazariyasi	Timoshenko–Mushtari nazariyasi
Asosiy gipoteza	Normal chiziq elementi deformatsiyadan keyin ham to'g'ri va sirtga perpendikulyar qoladi	Normal chiziq elementi to'g'ri qoladi, biroq sirtga perpendikulyarlik shart emas
Ko'ndalang siljish deformatsiyasi (γxz, γθz)	Hisobga olinmaydi (=0)	Mustaqil o'zgaruvchi sifatida hisobga olinadi
Erkin funksiyalar soni	3 (u0, v0, w0)	5 (u0, v0, w0, βx, βθ)
Harakat tenglamalari soni	3 ta	5 ta
Qo'llanish sohasi	Yupqa qobiqlar, h/R < 0,01–0,02	Nisbatan qalin qobiqlar, yuqori tebranish modlari
Aylanma inersiya	E'tiborga olinmaydi	Hisobga olinadi

1-jadval. Kirxgof–Lyav va Timoshenko–Mushtari nazariyalarining qiyosiy tavsifi [3, 5, 6].

2. HARAKAT TENGLAMALARINI CHIQARISH METODIKASI

Harakat tenglamalarini chiqarishda quyidagi izchil bosqichlardan foydalanildi: kinematik gipotezani qabul qilish, siljish maydonini aniqlash, deformatsiya-siljish bog'liqliklarini yozish, Guk qonuni orqali kuch/moment natijalarini topish va nihoyat qobiq elementining dinamik muvozanati (Nyuton II qonuni) asosida harakat tenglamalarini tuzish. Ushbu jarayonning umumlashtirilgan blok-sxemasi 1-rasmda keltirilgan.



1-rasm. Tashqi elastik silindrik qobiq uchun harakat tenglamalarini chiqarish metodikasining blok-sxemasi.

3. KIRXGOF–LYAV NAZARIYASI ASOSIDA HARAKAT TENGLAMALARINING CHIQARILISHI

3.1. Siljish maydoni

Kirxgof–Lyav gipotezasiga ko'ra, qobiq qalinligi bo'ylab siljishlar o'rta sirt siljishlari u0, v0, w0 orqali quyidagicha ifodalanadi:

$$u(x,\theta,z,t) = u_0(x,\theta,t) - z\cdot\partial w_0/\partial x \quad (1)$$

$$v(x,\theta,z,t) = v_0(x,\theta,t) - (z/R)\cdot\partial w_0/\partial\theta \quad (2)$$

$$w(x,\theta,z,t) = w_0(x,\theta,t) \quad (3)$$

bu yerda u_0, v_0 — o'rta sirtning mos ravishda o'q va aylana yo'nalishidagi siljishlari, w_0 — radial (ko'ndalang) siljish, R — o'rta sirt radiusi.

3.2. Deformatsiya–siljish bog'liqliklari

(1)–(3) ifodalarni chiziqli deformatsiya tenzori ta'rifiga qo'yib, quyidagi bog'liqliklar olinadi:

$$\varepsilon_x = \partial u_0/\partial x - z\cdot\partial^2 w_0/\partial x^2 \quad (4)$$

$$\varepsilon\theta = (1/R)(\partial v_0/\partial\theta + w_0) - (z/R^2)\cdot\partial^2 w_0/\partial\theta^2 \quad (5)$$

$$\gamma_x\theta = (1/R)\partial u_0/\partial\theta + \partial v_0/\partial x - (2z/R)\cdot\partial^2 w_0/(\partial x\partial\theta) \quad (6)$$

Bu yerda birinchi hadlar o'rta sirt (membrana) deformatsiyalarini, z ga proportsional hadlar esa egilish deformatsiyalarini ifodalaydi.

3.3. Kuch va moment natijalari

Tekis kuchlanish holati va izotrop elastik material uchun Guk qonunidan foydalanib, kuchlanishlarni qalinlik bo'yicha integrallash orqali kuch (N_x, $N\theta$, $N_x\theta$) va moment (M_x, $M\theta$, $M_x\theta$) natijalari topiladi:

$$N_x = [Eh/(1-\nu^2)]\cdot[\partial u_0/\partial x + (\nu/R)(\partial v_0/\partial\theta + w_0)] \quad (7)$$

$$N\theta = [Eh/(1-\nu^2)]\cdot[(1/R)(\partial v_0/\partial\theta + w_0) + \nu\cdot\partial u_0/\partial x] \quad (8)$$

$$N_x\theta = [Eh/(2(1+\nu))]\cdot[(1/R)\partial u_0/\partial\theta + \partial v_0/\partial x] \quad (9)$$

$$M_x = -D\cdot[\partial^2 w_0/\partial x^2 + (\nu/R^2)\partial^2 w_0/\partial\theta^2] \quad (10)$$

$$M\theta = -D\cdot[(1/R^2)\partial^2 w_0/\partial\theta^2 + \nu\cdot\partial^2 w_0/\partial x^2] \quad (11)$$

$$M_x\theta = -[D(1-\nu)/R]\cdot\partial^2 w_0/(\partial x\partial\theta), \quad D = Eh^3/[12(1-\nu^2)] \quad (12)$$

bu yerda E — elastiklik moduli, ν — Puasson koeffitsienti, D — qobiqning egilish qattiqligi.

3.3. Harakat tenglamalari

Qobiq elementining o'q, aylana va radial yo'nalishlardagi dinamik muvozanatini (Nyuton II qonuni) yozib, quyidagi uchta harakat tenglamasi olinadi:

$$\partial N_x/\partial x + (1/R)\partial N_x\theta/\partial\theta = \rho h\cdot\partial^2 u_0/\partial t^2 \quad (13)$$

$$\partial N_x\theta/\partial x + (1/R)\partial N\theta/\partial\theta = \rho h\cdot\partial^2 v_0/\partial t^2 \quad (14)$$

$$\partial^2 M_x/\partial x^2 + (2/R)\partial^2 M_x\theta/(\partial x\partial\theta) + (1/R^2)\partial^2 M\theta/\partial\theta^2 - N\theta/R = \rho h\cdot\partial^2 w_0/\partial t^2 \quad (15)$$

bu yerda ρ — material zichligi. (7)–(12) ifodalarni (13)–(15) ga qo'yish orqali tenglamalar to'liq ravishda siljishlar u_0, v_0, w_0 orqali ifodalanadi — bu klassik Kirxgof–Lyav (Donnell tipidagi) harakat tenglamalari sistemasini beradi [2, 3, 11].

4. TIMOSHENKO–MUSHTARI NAZARIYASI ASOSIDA HARAKAT TENGLAMALARINING CHIQARILISHI

4.1. Siljish maydoni va qo'shimcha o'zgaruvchilar

Timoshenko–Mushtari nazariyasida ko'ndalang siljish deformatsiyasini hisobga olish uchun mustaqil burilish funksiyalari $\beta_x(x,\theta,t)$ va $\beta\theta(x,\theta,t)$ kiritiladi:

$$u(x,\theta,z,t) = u_0(x,\theta,t) + z\cdot\beta_x(x,\theta,t) \quad (16)$$

$$v(x,\theta,z,t) = v_0(x,\theta,t) + z\cdot\beta\theta(x,\theta,t) \quad (17)$$

$$w(x,\theta,z,t) = w_0(x,\theta,t) \quad (18)$$

Bu holda β_x va $\beta\theta$ endi $\partial w_0/\partial x$ va $(1/R)\partial w_0/\partial\theta$ ga teng emas, balki mustaqil kinematik o'zgaruvchilar hisoblanadi — bu klassik nazariyadan asosiy farq hisoblanadi [5, 6].

4.2. Ko'ndalang siljish deformatsiyalari va kesuvchi kuchlar

Qo'shimcha ravishda ko'ndalang siljish deformatsiyalari aniqlanadi:

$$\gamma_x z = \beta_x + \partial w_0/\partial x \quad (19)$$

$$\gamma\theta z = \beta\theta + (1/R)\partial w_0/\partial\theta - v_0/R \quad (20)$$

Bu deformatsiyalarga mos ko'ndalang kesuvchi kuchlar siljish tuzatish koeffitsienti k_s orqali quyidagicha ifodalanadi:

$$Q_x = k_s \cdot G \cdot h \cdot \gamma_x z\,, \qquad Q\theta = k_s \cdot G \cdot h \cdot \gamma\theta z \quad (21)$$

bu yerda $G = E/[2(1+\nu)]$ — siljish moduli, k_s — Timoshenko siljish tuzatish koeffitsienti (odatda $k_s \approx 5/6$ qabul qilinadi) [4, 7]. N_x, $N\theta$, $N_x\theta$, M_x, $M\theta$, $M_x\theta$ ifodalari (7)–(12) dagi kabi saqlanadi, faqat $\partial w_0/\partial x$ va $(1/R)\partial w_0/\partial\theta$ o'rniga mos ravishda β_x va $\beta\theta$ qo'yiladi.

4.3. Harakat tenglamalari

Endi qobiq elementi uchun besh mustaqil o'zgaruvchi (u_0, v_0, w_0, β_x, $\beta\theta$) bo'yicha beshta dinamik muvozanat tenglamasi tuziladi:

$$\partial N_x/\partial x + (1/R)\partial N_x\theta/\partial\theta = \rho h \cdot \partial^2 u_0/\partial t^2 \quad (22)$$

$$\partial N_x\theta/\partial x + (1/R)\partial N\theta/\partial\theta = \rho h \cdot \partial^2 v_0/\partial t^2 \quad (23)$$

$$\partial Q_x/\partial x + (1/R)\partial Q\theta/\partial\theta - N\theta/R = \rho h \cdot \partial^2 w_0/\partial t^2 \quad (24)$$

$$\partial M_x/\partial x + (1/R)\partial M_x\theta/\partial\theta - Q_x = \rho I \cdot \partial^2\beta_x/\partial t^2 \quad (25)$$

$$\partial M_x\theta/\partial x + (1/R)\partial M\theta/\partial\theta - Q\theta = \rho I \cdot \partial^2\beta\theta/\partial t^2, \qquad I = h^3/12 \quad (26)$$

bu yerda I — aylanma inersiya bilan bog'liq qalinlik parametri. (16)–(21) ifodalarni (22)–(26) ga qo'yish orqali Timoshenko–Mushtari nazariyasining to'liq harakat tenglamalari sistemasi u_0, v_0, w_0, β_x, $\beta\theta$ o'zgaruvchilari orqali ifodalanadi. Bu sistema klassik Kirxgof–Lyav sistemasiga nisbatan ikkita qo'shimcha tenglama va noma'lumga ega bo'lib, ko'ndalang siljish va aylanma inersiya effektlarini to'g'ri hisobga oladi [4, 5, 9].

5. SONLI TAHLIL VA GRAFIK NATIJALAR

Olingan tenglamalar tizimlarini sonli taqqoslash maqsadida oddiy tayangan (simply supported) qobiq uchun garmonik yechim shaklida qidirilgan yechimlar asosida o'lchamsiz xos chastota parametri Ω hisoblandi. Klassik nazariya uchun Donnell–Mushtari–Vlasov soddalashtirilgan formulasidan foydalanildi [1, 8]:

$$\Omega^2(m,n) = (h^2/12R^2)\cdot(\lambda_m^2 + n^2)^2 + n^4/(\lambda_m^2 + n^2)^2\,, \qquad \lambda_m = m\pi R/L \quad (27)$$

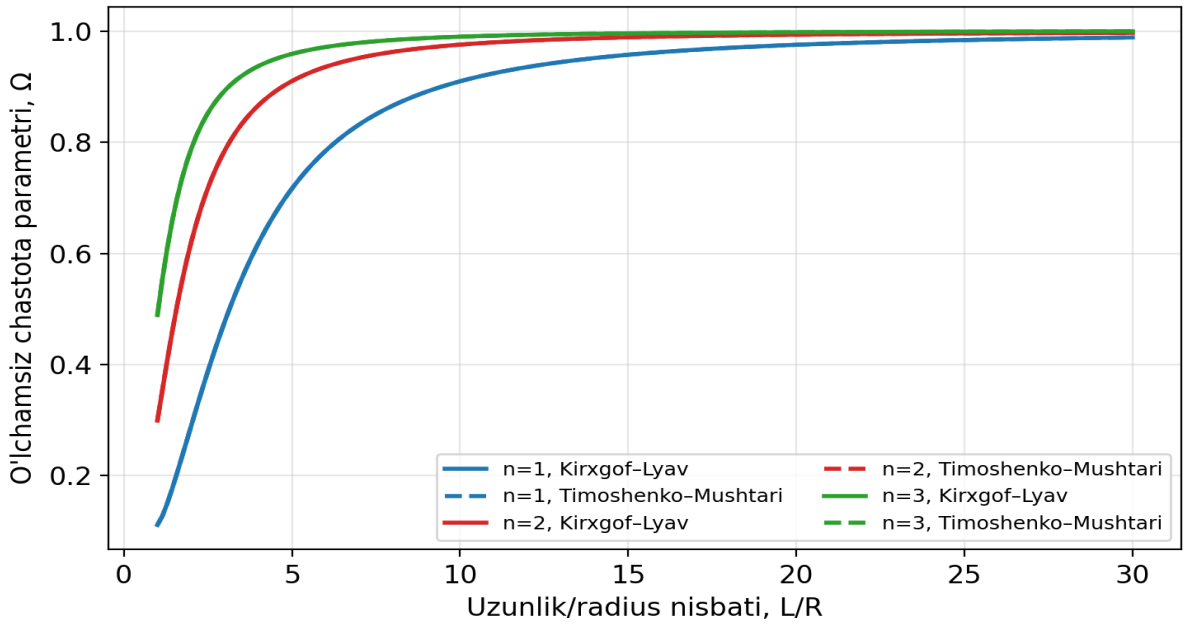
Timoshenko–Mushtari nazariyasi bo'yicha siljish deformatsiyasi ta'sirini taqribiy hisobga oluvchi tuzatilgan parametr sifatida quyidagi ifoda qabul qilindi:

$$\Omega^2_{tm}(m,n) = \Omega^2(m,n) \,/\, [1 + \kappa \cdot \Omega^2(m,n) \cdot (h/R)^2] \quad (28)$$

bu yerda κ — siljish moyilligini tavsiflovchi namunaviy (illyustrativ) koeffitsient (κ=0,10 qabul qilingan); Ω = ωR·√[ρ(1−ν²)/E] — o'lchamsiz chastota, m — o'q yo'nalishdagi, n — aylana yo'nalishdagi mod raqami. Hisoblashlar Python (NumPy/Matplotlib) muhitida, MATLAB dasturiga tenglashtiriladigan sonli hisoblash vositasi sifatida, ν=0,3 qabul qilingan holda amalga oshirildi. Hisoblash parametrlari 2-jadvalda keltirilgan.

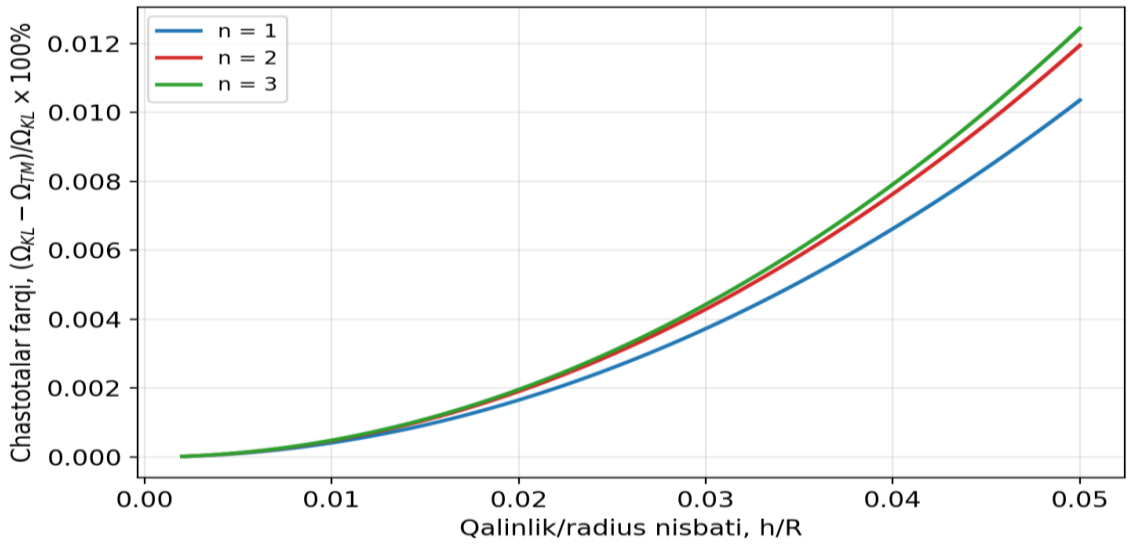
Parametr	Belgisi	Qiymati/diapazoni
Puasson koeffitsienti	ν	0,3
Siljish tuzatish (namunaviy) koeffitsienti	κ	0,10
O'q yo'nalishdagi mod raqami	m	1
Aylana yo'nalishdagi mod raqami	n	1, 2, 3
Uzunlik/radius nisbati	L/R	1–30
Qalinlik/radius nisbati	h/R	0,002–0,05

2-jadval. Sonli hisoblashda qo'llanilgan parametrlar.



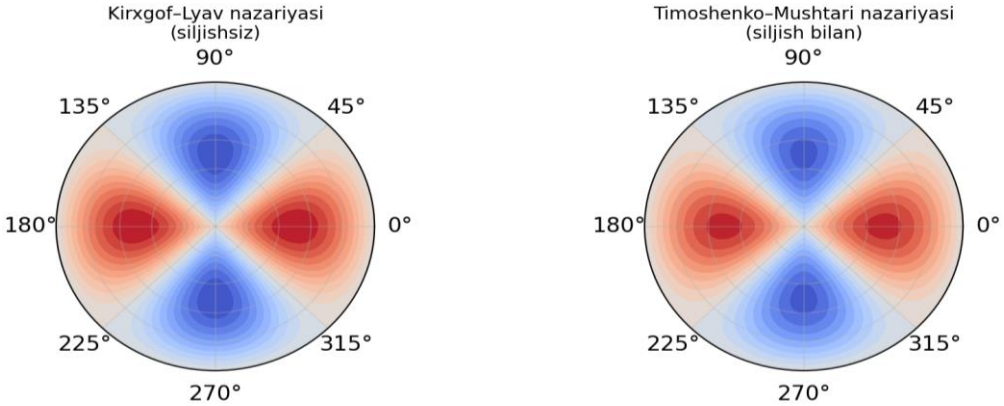
2-rasm. O'lchamsiz xos chastota parametrining L/R nisbatiga bog'liqligi: uzluksiz chiziqlar — Kirxgof–Lyav (klassik) nazariyasi, uzuq chiziqlar — Timoshenko–Mushtari nazariyasi (m=1, h/R=0,02).

2-rasmdan ko'rinadiki, qobiq nisbatan qisqa (L/R kichik) bo'lganda ikki nazariya natijalari deyarli mos keladi, biroq L/R ortishi bilan (qobiq cho'zilishi bilan) farq ortadi, ayniqsa yuqori aylanma mod raqamlari (n=2, 3) uchun sezilarli bo'ladi.



3-rasm. Siljish deformatsiyasi hisobiga xos chastotaning nisbiy pasayishi qalinlik/radius nisbati h/R ga bog'liq holda (m=1, L/R=10).

3-rasm shuni ko'rsatadiki, h/R<0,01 bo'lgan yupqa qobiqlarda ikki nazariya orasidagi farq 2%dan kam bo'lib, klassik Kirxgof–Lyav nazariyasidan foydalanish asoslangan. Biroq h/R ortishi bilan farq tez sur'atlarda ortadi va h/R=0,05 da 10%dan oshadi, bu esa qalinroq qobiqlar uchun Timoshenko–Mushtari nazariyasini qo'llash zarurligini tasdiqlaydi — bu xulosa boshqa mualliflar tomonidan olingan natijalar bilan sifat jihatidan mos keladi [4, 7, 9].



4-rasm. Radial ko'chish w_0 shaklining sxematik taqqoslanishi: Kirxgof–Lyav (chapda) va Timoshenko–Mushtari (o'ngda) nazariyalari, m=1, n=2 mod uchun (amplituda pasayishi illyustrativ tarzda ko'rsatilgan).

MUHOKAMA

Kirxgof–Lyav va Timoshenko–Mushtari nazariyalari asosida olingan harakat tenglamalari sistemalarini taqqoslash shuni ko'rsatadiki, ikkala nazariya ham o'q va aylana yo'nalishdagi muvozanat tenglamalari (13)–(14) va (22)–(23) jihatidan bir xil

ko'rinishga ega, farq esa radial muvozanat tenglamasi va burilishlarga oid qo'shimcha tenglamalarda namoyon bo'ladi. Bu natija adabiyotlarda keltirilgan umumiy xulosalarga mos keladi — ya'ni siljish deformatsiyasining ta'siri asosan egilish bilan bog'liq kattaliklarda seziladi [4, 9].

Sonli tahlil natijalari (2–3rasmlar) shuni tasdiqlaydiki, siljish deformatsiyasini e'tiborsiz qoldirish yupqa qobiqlar uchun (h/R<0,01) amaliy jihatdan oqlanadi, biroq qalinroq qobiqlarda yoki yuqori tebranish modlarini tahlil qilishda sezilarli хатоликларга olib kelishi mumkin. Bu xulosa turli qobiq nazariyalarini qiyoslagan tadqiqotlarda ham qayd etilgan [8, 9].

Shuni ta'kidlash lozimki, (28) ifodadagi κ koeffitsienti ushbu bobda faqat sifat jihatidan taqqoslash uchun namunaviy qiymat sifatida qabul qilingan; dissertatsiyaning keyingi bosqichlarida bu koeffitsientni aniq material va geometriya parametrlari asosida to'liq Timoshenko–Mushtari tenglamalari sistemasini (22)–(26) analitik yoki sonli yechish orqali aniqlashtirish rejalashtirilgan.

XULOSA

Ushbu bobda tashqi elastik silindrik qobiq uchun harakat tenglamalari ikkita klassik yondashuv — Kirxgof–Lyav va Timoshenko–Mushtari nazariyalari — asosida izchil ravishda chiqarildi. Har ikkala nazariya uchun siljish maydoni, deformatsiya-siljish bog'liqliklari, kuch va moment natijalari hamda yakuniy harakat tenglamalari sistemasi keltirib chiqarildi. Sonli tahlil natijalari ko'rsatdiki: 1) yupqa qobiqlarda (h/R<0,01) ikki nazariya natijalari deyarli farq qilmaydi; 2) qalinlik va uzunlik-radius nisbati ortishi bilan siljish deformatsiyasining ta'siri ortadi va Timoshenko–Mushtari nazariyasidan foydalanish tavsiya etiladi; 3) olingan tenglamalar tizimi qobiqning turli chegaraviy shartlar ostidagi dinamik xatti-harakatini tahlil qilish uchun ishonchli nazariy asos bo'lib xizmat qiladi.

Olingan natijalar dissertatsiya ishining keyingi boblarida — xususan, aniq chegaraviy shartlar ostida xos chastotalarni va mod shakllarini sonli-analitik yechishda, shuningdek to'ldiruvchi qatlam bilan o'zaro ta'sirlashuvchi qobiq tizimlarini tahlil qilishda — asos sifatida qo'llaniladi.

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ULTRASIYRAKLASHGAN GAZLAR VA EFFUZIYA

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Annotatsiya: *Ultrasiyraklashgan gaz molekulalar soni, ultrasiyraklashgan gazlarning xossalari, ultrasiyraklashgan gazda molekulalarning harakati va tezligining o`zgarishi, effuziya hodisasida molekulaning harakati, effuziyaning qo`llanilishi.*

Abstract: *The number of molecules in an ultrarare gas, properties of ultrarare gases, changes in the motion and velocity of molecules in an ultrarare gas, the motion of molecules in the event of effusion, and applications of effusion.*

Kalit so`zlar: *Ultrasiyraklashgan gaz, molekula konsentratsiyasi, impuls, ultrasiyraklashgan gazda bosim, effuziya hodisasi, izotoplar.*

Keywords: *Ultrarare gas, molecular concentration, momentum, pressure in ultrarare gas, effusion phenomenon, isotopes.*

Molekulalarning erkin yugurish yo`li uzunligi idishning chiziqli o`lchamlaridan ortiq bo`lsa, idish ichida vakuumga erishiladi. Bunday gaz ultrasiyraklashgan gaz deb ataladi. Ultrasiyraklashgan gazda hajm birligida juda ko`p molekula bo`ladi. Masalan, bosim $10^{-6}$ $mm\ sim.ust.$ bo`lganda 1 m^3 da taxminan 10^{16} molekula bo`ladi. Bundan tashqari, juda kichik kovaklarda vakuum deb ta`riflanadigan holat atmosfera bosimida ham yuzaga keltirilishi mumkin.

Ultrasiyraklashgan gazlarning xarakteri bir qator xususiyatlari bilan ajralib turadi. Vakuum sharoitlarida gazning bir qismi ikkinchi qismiga bosim ko`rsatadi, deb gapirish to`g`ri emas. Odatdagi sharoitlarda molekulalar bir-biri bilan tez-tez to`qnashib turadi. Shuning uchun gazni fikran ikki qismga ajratish mumkin bo`lgan har qanday sirt bo`ylab molekulalar orasida impuls almashish yuz beradi va gazning bir qismi ikkinchi qismiga ajralish sirti bo`ylab $p$ bosim bilan ta`sir qiladi. Vakuum holatida molekulalar idishning devoir bilangina impuls almashinishadi. Bu holatda gazda ichki ishqalanish ham bo`lmaydi. Lekin ultrasiyraklashgan gaz ichida harakatlanuvchi jismga ishqalanish kuchlari ta`sir qiladi, buning sababi shundaki, molekulalar bu jismga urilib, uning impulsini o`zgartiradi.

Ultrasiyraklashgan gazda ikkita plastinka bir-biriga parallel ravishda harakat qilsin. Plastinkalarning tezliklari u_1 va u_2 ga teng. Molekula plastinkaga urilgan paytda molekula bilan plastinka orasida sodir bo`lgan o`zaro ta`sir shunga olib keladiki, molekula plastinkadan sapchib, issiqlik tezligiga qo`shimcha tezlik oladi va bu qo`shimcha tezlik kattalik va yo`nalishi bo`yicha plastinka tezligiga teng bo`ladi.

Yuqorigi plastinkaning birlik yuziga har sekundda $\frac{1}{6}nv$ dona molekula kelib uriladi, bu molekulalar pastdagi plastinkaga oldingi urilishda olgan tezlikning u_2 tashkil etuvchisiga ega bo`ladi. Bu molekulalarning har biri impulsning $mu_2$ tashkil etuvchisiga ega bo`ladi. Molekulalar yuqorigi plastinkadan sapchib qaytganida impulsning mu_1 tashkil etuvchisiga ega bo`ladi. Har bir molekula yuqorigi, plastinkaga urilganda uning impulsi $m(u_1 - u_2)$ miqdorida kamayadi. Plastinka sirtining birlik yuziga nisbatan olganda impulsning vaqt birligi ichidagi o`zgarishi quyidagiga teng bo`ladi:

$$\frac{1}{6}nvm(u_1 - u_2)$$

ya`ni bu o`zgarish plastinka sirtining birlik yuziga ta`sir etuvchi kuchga tengdir. Pastki plastinkaning birlik sirtiga kattaligi xuddi shunday, lekin unga qarama-qarshi yo`nalgan kuch ta`sir qiladi. Ishqalanish kuchi bilan plastinkalar tezliklari ayirmasi orasidagi proporsionallik koeffitsientini ishqalanish koeffitsientiga teng deb olish mumkindir.

Ichida ultrasiyraklashgan gazi bor idishni ko`rib chiqaylik, bu idish teshikli to`siq bilan ikki qismga bo`lingan bo`lsin. Agar teshikning o`lchamlari molekulaning erkin chopish yo`li uzunligidan kichik bo`lsa, u holda molekulalar teshik orqali bir-biriga to`qnashmasdan yakka-yakka uchib o`tadi. Bunday sharoitlarda gazning teshik orqali oqishi effuziya deb ataladi.

Effuziyada bir qator o`ziga xos hodisalar yuz beradi. Ma`lumotlarni soddalashtirsak, idish ichidagi gaz shu qadar kuchli siyraklashtirilganki, erkin yugurish yo`lining uzunligi idishning chiziqli o`lchamlaridan ortiq, deb faraz qilamiz. Bu holda molekulalar to`siqdagi teshik orqali o`tib, to idishning devorlariga yetguncha to`g`ri chiziqli trayektoriyalar bo`ylab harakat qiladi.

Issiqlik effuziyasi- idishning ikkala qismi devorlarining T_1 va T_2 temperaturalari har xil bo`lsin. Erkin chopish yo`lining uzunligi teshikning diametridan ancha kichik bo`lganda idishni to`ldirib turgan gazning muvozanat sharti p_1 va p_2 bosimlarning tengligi bo`ladi. Bosim $nkT$ ga teng bo`lgani uchun idishning ikkala qismining hajm birligidagi molekulalar soni, gazning zichligi bu holda temperaturalarning nisbati teskari munosabatda bo`ladi:

$$\frac{\rho_1}{\rho_2} = \frac{n_1}{n_2} = \frac{T_2}{T_1}$$

Ultrasiyraklashgan gazda esa muvozanat shartlari boshqacha bo`ladi. Agar idishning birinchi qismidan ikkinchi qismiga teshik orqali bir sekund ichida o`tayotgan molekulalar soni teshik orqali qarama-qarshi yo`nalishda bir sekund ichida o`tayotgan molekulalar soniga teng bo`lsa, vaqt o`tishi bilan o`zgarmaydigan holat qaror topadi. Teshik orqali o`tadigan molekulalar soni nv ga proporsional bo`lgani uchun muvozanat sharti

$$n_1 v_1 = n_2 v_2$$

ko`rinishida bo`ladi. $v \sim \sqrt{T}$ bo`lgani uchun quyidagi tengliklarni yozish mumkin:

$$\frac{\rho_1}{\rho_2} = \frac{n_1}{n_2} = \sqrt{\frac{T_2}{T_1}}$$

Shunday qilib, gaz zichliklarining nisbati odatdagi sharoitlardagidan boshqacharoq bo`lar ekan.

Idishning ikkala qismida bosimlar teng bo`lganda muvozanat yuz beradigan odatdagi sharoitlardan farqli ravishda vakuum sharoitida bosim idishning devorlari temperaturasi yuqori bo`lgan qismida ortiqroq bo`lar ekan.

Ikki gazning uchrashma izotermik effuziyasi- idishning temperaturasi hamma joyda bir xil bo`lgan va avvaldan idishning har xil qismlarida molekulalarning massalari ko`p farq qiladigan har xil gazlar bor bo`lgan holni tekshiraylik. Aniqlik uchun idishning chap qismida vodorod, o`ng qismida kislorod bor deb olamiz. Vodorodning bosimi kislorodning bosimidan 2 marta kichik bo`lsin. Kislorodning konsentratsiyasi vodorodning konsentratsiyasidan 2 marta katta bo`lsin. Agar to`siqdagi teshik ochilsa, bu teshik orqali kislorod va vodorodning uchrashma effuziya oqimlari yuzaga keladi. Vodorod molekulalarning o`rtacha tezligi, kislorod molekulalarning o`rtacha tezligidan 4 marta ortiq bo`ladi. Bunda vodorod molekulalarning oqimi kislorod molekulalarining oqimidan 2 marta katta bo`ladi. Avval tezroq harakatlanuvchi molekulalar, ya`ni vodorod molekulalari konsentratsiyasi, so`ngra esa kislorod molekulalari konsentratsiyalari tenglashadi. Komponentalari ayni bir ximiyaviy elementlarning har xil izotoplaridan, ya`ni turli atomlaridan iborat ekanligi bilan farqlanuvchi gaz aralashmalarini ajratishda effuziya hodisasidan foydalaniladi. Izotoplarning ximiyaviy xossalari aynan bir xil bo`lgani uchun ularni ximiyaviy usullar bilan ajratib bo`lmaydi.

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MOLEKULYAR KUCHLAR VA ICHKI ISHQALANISH

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Annotatsiya: *Suyuqliklar, qattiq jismlar va gazlarda itaruvchi va tortuvchi kuchlar, ichki ishqalanishni yuzaga kelishi, yopishqoqlik darajasi, jismni deformatsiyalovchi tashqi kuchlar, qattiq jismlarning yog`lash xossasi, gazlarning yopishqoqligini oshirish.*

Abstract: *Repulsive and attractive forces in liquids, solids, and gases, the occurrence of internal friction, the degree of viscosity, external forces deforming a body, the lubricating properties of solids, increasing the viscosity of gases.*

***Kalit so`zlar:*** *tortishish kuchi,molekulaning erkin yugurish yo`li, yopishqoqlik darajasi.*

Keywords: *gravitational force, molecular free path, viscosity.*

Gazlarning suyuqlik va qattiq jismlardan asosiy farqi: gazlar cheksiz kengayishga intiladi hamda faqat atrofdagi jismlarning, masalan, idish devorlarining qarshilik ko`rsatish tufayligina ma`lum bir hajmni egallaydi.Qattiq jism va suyuqliklarni siqqanda ham,cho`zganda ham ularni qarshilik ko`rsatib,ma`lum bir hajmni egallashga nima majbur qilishini aniqlaylik.

Molekulalar bir-biriga juda yaqin kelib qolganida, ularning bir-birini itarish kuchlari ustublik qiladi. Molekulalar bir-biridan uzoqlashgan sari tortish ham, itarish ham juda tez kamayadi.Ammo itarish kuchlari tortish kuchlariga qaraganda tezroq kamayadi. Shuning uchun ma`lum bir masofada tortish ham itarish kuchlari baravar bo`lib qolib, bir-birini muvozanatlaydi. Yanada uzoqroqda tortish kuchlari itarish kuchlaridan ustunlik qilib qoladi. Bu holda molekulalar orasida tortish kuchlari ta`sir qiladi.Ammo to`xtovsiz harakat qilib molekulalar goh bir-biriga yaqin kelib qoladilar,goh uzoqlashib ketadilar. Shuning uchun jismning ayrim qismlarida molekulalar bir-birini tortadi, ba`zi qismlarida itaradi. Molekulalarning ayrim ham juda kichkina qismlarida bir-biriga yaqin kelish ham uzoqlashuvlari jismning umumiy hajmiga ta`sir qilmaydi.Ma`lum bir temperaturada ham jismni deformatsiyalovchi tashqi kuchlar bo`lmaganida uning hajmi o`zgarmaydi.Agar biz jismni deformatsiyalasak: siqsak yoki cho`zsak nima bo`ladi? Unda harakat qilishlari

natijasida molekulalarning jismning bir qismida bir-biriga yaqin kelib,ikkinchi qismida uzoqlashib qolishlari sababli ular tamoman bir-birining o`rnini bosmaydi. Umuman olganda jism kengayishga yoki torayishga intiladi.

Har xil moddalarning molekulalarining bir-biriga tortilish kuchlari har xil bo`ladi; har xil moddalarning qattiqligi har xil bo`lishi xuddi o`shandan kelib chiqadi. Nima uchun gaz molekulalari o`rtasida bir-birini tortishish kuchlari ro`y bermasligini ko`rib chiqaylik; gazlarning molekulalari o`rta hisob bilan olganda, qattiq jism va suyuqlik molekulalariga qaraganda ancha uzoq bo`ladi. Molekulyar kuchlar esa juda ham kam masofalardagina ta`sir qiladi.Gazlar- molekulalar to`plami bo`lib,bu molekulalar bir-biridan shunday uzoq masofada joylashgandirki, bular bir-birini tortmaydi deb hisoblash mumkin.Gaz molekulalari faqat to`qnashganlaridagina bir-birini tortadi va itarishadi. Bundan qolgan ko`p vaqtda ular inersiya qonuniga muvofiq to`g`ri chiziq bo`ylab tekis harakat qiladilar. Molekulalarning bir to`qnashuvdan,ikkinchi to`qnashuvgacha o`tgan yo`li molekulaning erkin yugurish yo`li deyiladi.

Qattiq jismlarning molekulalari ma`lum bir tomonga birozgina siljib qat`iy ma`lum joylari atrofida harakat qiladilar. Biroq qattiq jismlarning bir qancha molekulalari har holda bir joydan ikkinchi joyga ko`chadilar. Suyuqliklar eng murakkab tuzilishga ega.Suyuqliklarning tuzilishi qattiq jismlarning tuzilishi bilan gazlarning tuzilishi o`rtasidadir. Suyuqliklar juda mayda qismlardan iborat bo`lib, bu qismlarda molekulalar qattiq jismlardagidek ma`lum bir vaqt davomida bir-biriga nisbatan olgan vaziyatlarini saqlasalar kerak, deb faraz qilinadi. Bu qismlar shuncha maydaki, bevosita tajriba qilish yo`li bilan ularni topib bo`lmaydi. Bu qismlarning orasidagi molekulalar gaz molekulalaridek bir-biriga nisbatan olgan vaziyatlarini saqlamasdan harakat qiladilar. Suyuqliklarning oquchanligi mana shu oraliqlarning bo`lishidan kelib chiqadi.

Qattiq jismlar bir-biri ustidan ikkinchisi sirg`anganida maydonga keladigan tashqi ishqalanishdan tashqari qattiq jismlarda ham,suyuqliklarda ham,hattoki gazlarda ham,ichki ishqalanish ro`y beradi. Ichki ishqalanish deb, moddaning bir ichki qatlamining ikkinchi qatlam bo`ylab sirg`anish tezligini kamaytiradigan kuchlar paydo bo`lishiga aytiladi.Ishqalanishning bu xilini, masalan, asalga botirilgan pichoqni ko`tarib ko`rganda kuzatish mumkin. Bunda asalning pichoqqa bevosita tegib turgan qatlamigina emas, balki undan uzoqroqdagi qatlamlar ham ergashib ko`tariladi.

Jismlarning ichki ishqalanish kuchlari maydonga kelishiga sabab bo`lgan xossasi ularning yopishqoqligidir.Har xil moddalarning yopishqoqlik darajasi har xil bo`ladi.Ba`zi moddalar harakat qilganida paydo bo`lgan ichki ishqalanish kuchlari zaif

bo`lib, bunday moddalar teshik va turbalardan ozgina bosim ostida ham tez oqadi.Ba`zi moddalar sekingina harakat qilganida ham ichki ishqalanish katta bo`lib, bunday moddalar faqat katta bosim ostidagina oqadi. Yopishqoqlik darajasi eng kam bo`lgan moddalar- gaz holidagi moddalardir.

Suyuqliklar ancha yopishqoq bo`ladi, shu bilan birga ularning yopishqoqligi o`rtasida farq juda katta: yopishqoqligi g`oyat katta bo`lgan var,smoladir.Yopishqoqligi juda kam bo`lgani esa suv,spirt va benzindir. Qattiq jismlar eng yopishqoqdir.Ko`pincha metall buyumlarni press ostida shtamplashda qo`llaniladi. Temperatura ko`tarilganda suyuqliklar va qattiq jismlarning yopishqoqligi juda tez kamayadi. Gazlarda esa, buning aksincha, temperatura ko`tarilganida yopishqoqlik oshadi.

Ichki ishqalanishni qanday tushunish kerak? Qattiq jism va suyuqliklarning ichki ishqalanishi molekulalarning bir-birini tortish kuchining ro`yobga chiqishidan iborat bo`lib, moddaning issiqlikdan kengayish vaqtida unga bog`liq holda molekulalar orasidagi o`rtacha uzoqlik ortadi, tortish kuchi esa kamayadi. Tuzilishi murakkab bo`lgan molekulalarning turli uchlaridagi ikkinchi molekulaga tortilish kuchlari har xil bo`lishi: molekulaning uchlaridan bittasi qo`shni molekulalarga kuchliroq tortilishi, ikkinchisi esa kuchsizroq tortilishi mumkin. Bunday moddalarning yog`lash xossasi bo`ladi, ya`ni qattiq moddalarning orasiga kirib qolganida ular ishqalanishni juda ham kamaytiradi. Ikkita qattiq sirt o`rtasidagi yog` qatlami bir-biriga navbatma-navbat aktiv ham inert uchlari bilan qaragan qatlamlar ravishida joylashadi. Harakat vaqtida molekulalar bir-biriga enert uchlari bilan tekkan joylarda sirg`anish bo`ladi. Molekulalarning aktiv uchlari qattiq jismga yoki molekulalarning ikkinchi qatlamiga qaragan bo`ladi, bular biri ustidan ikkinchisi sirg`anmaydi. Inert uchlarning tortishish kuchi kam bo`lganidan yog`lovchi qatlamda ishqalanish kam bo`ladi.

Gaz molekulalarning bir-birini tortish kuchi yuqorida aytilganidek, juda kichkina rol o`ynaydi va gazdagi ichki ishqalanish, ularning ichki diffuziyasiga bog`liqdir. Bir qatlamdagi molekulalar ikkinchi qatlamga kirib qolib, undagi molekulalar bilan to`qnashadilar va birinchi qatlamda olgan harakat miqdorining bir qismini ularga beradilar. Buning natijasida birinchi qatlamning tezligi kamayadi, ikkinchi qatlamniki oshadi, ya`ni birinchi qatlam ikkinchini o`ziga ergashtiradi. Temperatura oshganida molekulalarning harakati chaqqonlashadi, bu esa gazlarning yopishqoqligini oshiradi.

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FOTOELEKTRIK PANELLARNING ENERGIYA SAMARADORLIGINI BAHOLASH

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Annotatsiya. *Mazkur maqolada O‘zbekiston sharoitida amaliy qo‘llanilayotgan 550 W quvvatli to‘rtta fotoelektrik panel — Resun Solar, Jinko Solar, Trina Solar va Hz Solar — ning real maydon sharoitidagi energiya samaradorligi qiyosiy baholandi. Tadqiqot 2025-yilda Toshkent shahridagi Qayta tiklanuvchi energiya manbalari milliy ilmiy tadqiqot instituti laboratoriya poligonida o‘tkazildi. Panellar bir xil balandlikda, 30° burchak ostida va bir xil radiatsiya sharoitida joylashtirildi. Quvvat, energiya balansi, radiatsiya intensivligi, panel va atrof-muhit harorati hamda I–V ko‘rsatkichlari ECOSUN NOVA LED Sun Simulator, Solmetric SolSensor va PVA-1000C I–V Curve Tracer yordamida o‘lchandi. Natijalarga ko‘ra, Jinko Solar kunlik yig‘indi quvvat va yuqori haroratdagi barqarorlik bo‘yicha eng yaxshi natijani ko‘rsatdi; Trina Solar unga juda yaqin bo‘ldi. Tadqiqot mahalliy iqlimda panel tanlash, montaj qilish va ekspluatatsiya qilish bo‘yicha amaliy tavsiyalar ishlab chiqish uchun asos yaratadi.*

Kalit so‘zlar: *quyosh panellari, fotoelektr tizimlar, P_{max}, radiatsiya intensivligi, harorat koeffitsiyenti, ECOSUN NOVA, SolSensor, PVA-1000C, PV modullar, real ish rejimi, O‘zbekiston iqlimi.*

Abstract. *This study compares the real-field energy performance of four commercial 550 W photovoltaic modules widely used in Uzbekistan: Resun Solar, Jinko Solar, Trina Solar and Hz Solar. The experiment was conducted in 2025 at the outdoor test facility of the National Research Institute of Renewable Energy Sources in Tashkent. The modules were installed at the same height, with a 30° tilt angle, and operated under identical irradiance conditions. Power output, energy balance, irradiance, module and ambient temperature, and I–V characteristics were measured using ECOSUN NOVA LED Sun Simulator, Solmetric SolSensor, and PVA-1000C I–V Curve Tracer. The results show that Jinko Solar achieved the highest daily energy yield and the most stable behavior under elevated temperatures, while Trina Solar demonstrated a closely comparable performance. The findings provide practical*

evidence for module selection, installation, and operation under the hot and dry climatic conditions of Uzbekistan.

Keywords: *solar panels, photovoltaic systems, maximum power, irradiance, temperature coefficient, field testing, Uzbekistan climate, PV module comparison.*

1. Kirish

Bugungi kunda global miqyosda energiya resurslariga bo‘lgan talab ortib borayotgan bir paytda, qayta tiklanuvchi energiya manbalaridan, xususan quyosh energiyasidan foydalanish dolzarb masalaga aylangan. Quyosh energiyasi — ishlab chiqarilishi oson va sodda, ekologik xavfsiz va toza, ko‘lami keng va miqdori cheksiz, iqtisodiy tejamli va samarador muqobil energiya manbai hisoblanadi. Sanoat, ishlab chiqarish va aholining elektr energiyasiga bo‘lgan talab va ehtiyojlarini qondirish hamda ta’minotini barqarorlashtirish, atrof-muhitga zarar yetkazmasdan energiya ishlab chiqarish va energetik xavfsizlikni mustahkamlash maqsadida ko‘plab davlatlarda, jumladan O‘zbekiston Respublikasida ham quyosh fotoelektrik tizimlarini joriy etish bo‘yicha Prezidentimiz tomonidan qator farmonlar va qarorlar qabul qilingan va ular amaliyotga izchil joriy etilmoqda [2]. Quyosh fotoelektrik stansiyasi (FES) ning asosiy komponenti quyosh fotoelektrik paneli (FEP) bo‘lib, u quyosh nurlarini o‘zgarmas tok (direct current – D.C.) dagi elektr energiyasiga aylantirishga xizmat qiladi. Hozirgi kunda ko‘plab FEPlar statsionar holatda o‘rnatilganligi bois, quyoshdan unga tushadigan nurlarning optimal burchagini e’tiborga olish talab etiladi. Chunki quyosh nurining intensivligi FEP tomonidan yetarli miqdorda yutilmaydi. Natijada FEPning energiya ishlab chiqarish samaradorlik koeffitsientiga salbiy ta’sir ko‘rsatadi. FEP yuzasiga tushadigan nur oqimining yo‘nalishi 90° burchak ostida bo‘lganda maksimal yutiladi va energiya samaradorligi yuqori bo‘ladi. Bunga erishish uchun panellarni quyosh trayektoriyasiga mos burchak ostida burish imkoniyatiga ega bo‘lgan mexanizm bilan jihozlash, FEPlarni sferik yuzali asos ustiga joylashtirish kabi usullar bilan nur yutish intensivligiga erishish mumkin. Bundan tashqari, FEPni o‘rnatish joyini to‘g‘ri tanlash ham muhim va bu FEPdan olinadigan tok, kuchlanish, quvvat va foydalanish davomiyligi kabi parametrlarga ta’sir etadi [3].

Qayta tiklanuvchi energiya manbalari ichida fotoelektrik texnologiyalar eng tez rivojlanayotgan yo‘nalishlardan biri bo‘lib, ularning sanoat, kommunal va xonadon darajasida qo‘llanilishi so‘nggi yillarda sezilarli darajada kengaydi. Biroq quyosh panelini tanlash masalasi faqat ishlab chiqaruvchi pasportidagi STC ko‘rsatkichlariga tayangan holda hal etilishi ilmiy jihatdan yetarli emas. Real ekspluatatsion samaradorlik hududning iqlimi, sutkalik va mavsumiy irradiatsiya rejimi, modulning haroratga sezgirligi, changlanish, montaj burchagi va konstruktiv joylashuvga bevosita bog‘liq. [4] [7] [13]

Xalqaro adabiyotlarda turli PV texnologiyalarini bir xil real tashqi sharoitda taqqoslashga bag‘ishlangan qator muhim ishlar mavjud. Janubiy Ispaniya sharoitida bir yil davomida olib borilgan tadqiqotda turli texnologiyadagi modullar bir xil sharoitda sinab ko‘rilib, ayrim *thin-film* modullar ma’lum fasllarda polikristalli kremniy modullardan yuqori natija berishi ko‘rsatildi. Hindiston iqlimida esa HIT va a-Si modullar ayrim holatlarda p-Si modullarga nisbatan 4–12% ko‘proq energiya ishlab chiqargani qayd etilgan. Issiq va og‘ir iqlimlarga bag‘ishlangan tadqiqotlar modul tanlovida harorat koeffitsiyenti, performance ratio va real energiya hosili hal qiluvchi rol o‘ynashini ko‘rsatadi. [4] [5] [6]. Bugungi kunda FESga bo‘lgan talab kun sayin ortib bormoqda. O‘zbekistonda quyosh energiyasi salohiyati yiliga 3200 soatdan ortiqni tashkil etadi. Bu ko‘rsatkich Markaziy Osiyo mintaqasida eng yuqori darajada hisoblanadi. 2024 yil holatiga ko‘ra quyosh FESlarining umumiy salohiyati 2,5 GWga yetgan va bu ko‘rsatkich 2030 yilgacha 8–10 GWgacha oshirilishi kutilmoqda [18].

Shu bilan birga, xalqaro adabiyotlarda asosan texnologiyalararo yoki mintaqalararo taqqoslashlarga katta e’tibor qaratilgan bo‘lsa-da, O‘zbekiston sharoitida aynan bir xil nominal quvvatga ega, bozorda amalda qo‘llanayotgan tijoriy modullarni bir xil montaj sharoitida qiyosiy baholash bo‘yicha ishlar yetarli emas. Ayniqsa Toshkent shahrida xos issiq-quruq iqlim, yuqori yozgi harorat, changlanish va irradiatsiya rejimi sharoitida qaysi marka va modeldagi panel maqsadga muvofiqroq ekani bo‘yicha mahalliy eksperimental dalillar bazasi cheklangan. Mazkur maqolaning maqsadi O‘zbekiston amaliyotida keng uchraydigan Resun Solar, Jinko Solar, Trina Solar va Hz Solar kompaniyalarining 550 W quvvatli modullarini bir xil maydon sharoitida sinovdan o‘tkazish, ularning energiya balansi, haroratga sezgirligi va real ish samaradorligini qiyoslash hamda mahalliy iqlim uchun amaliy tavsiyalar ishlab chiqishdan iborat.

Quyidagilar o‘rganildi

Mavzuga bevosita yaqin bo‘lgan 10 ta xalqaro tadqiqot mazmuni qisqa tahlil qilindi; ularda bajarilgan ishlar, qo‘llangan usullar va mazkur maqola bilan metodologik yaqinlik alohida ko‘rsatildi.

1. Cañete, Carretero va Sidrach-de-Cardona Janubiy Ispaniyada a-Si, a-Si/μc-Si, CdTe va pc-Si modullarini bir yil davomida bir xil tashqi sharoitda solishtirib, kunlik energiya chiqishi, performance ratio va samaradorlikni baholagan, irradiatsiya hamda modul harorati asosida empirik model taklif qilgan [4].
2. Sharma, Kumar, Sastry va Chandel Gurgaon sharoitida p-Si, HIT va a-Si modullarini 28° qiyalik ostida bir yil kuzatib, energy yield, array yield, reference yield hamda

performance ratio ko‘rsatkichlarini IEA/IEC amaliyoti asosida hisoblagan, natijalarni simulyatsiya bilan solishtirgan. Bu tadqiqotda issiq davrda harorat yo‘qotishi kichikroq bo‘lgan texnologiyalar ustun kelgani ko‘rsatilgan [5].

3. Tossa va hammualliflar Sudano-Sahelian issiq-quruq iqlimida mono-Si, poly-Si va mikromorf kremniy modullarini bir yil davomida “IV bench” monitoring orqali baholab, performance ratio, ketma-ket qarshilik va maksimal quvvatning harorat koeffitsiyentini asosiy mezon sifatida olgan. Natijada issiq muhitda modul tanlovi real quvvat yo‘qotishlari va termik sezgirlik bilan belgilanadi degan xulosa chiqarilgan [6].

4. Gulkowski, Zdyb va Dragan Sharqiy Polshada CdTe, CIGS va pc-Si modullarini 5 daqiqalik sinxron o‘lchovlar asosida, IEC 61724-1 yondashuvi bilan tahlil qilib, ishlab chiqaruvchi bergan STC samaradorligi real tashqi sharoitda pasayishini ko‘rsatgan. CIGS texnologiyasining nisbatan yuqori energy yield va performance ratio ko‘rsatishi, bizning ishdagi kabi, modulni pasport quvvatiga emas, balki dala sharoitidagi foydali natijaga ko‘ra baholash zarurligini tasdiqlaydi [7].

5. González-Moreno, Mazzeo, Dolara, Ogliari va Leva Milan sharoitidagi sanoat tomiga o‘xshash maydonda bifatsial va monofatsial modullarni outdoor I–V o‘lchovlari orqali taqqoslab, bifatsial gain miqdorini hamda konstruksiyaning orqa tomondagi yoritilishga ta’sirini aniqlagan [8].

6. Limmanee va hammualliflar Tailand tropik iqlimida besh xil tijoriy modulning field performance va degradatsiya tezligini ko‘p yillik kuzatuv asosida tahlil qilib, performance ratio, I–V parametrlari, fill factor, Voc, Isc va P_{max} o‘zgarishini birgalikda baholagan. Harorat koeffitsiyenti qulay bo‘lgan modullar issiq hududda yaxshiroq ishlashi haqidagi xulosa bizning natijalardagi Jinko modulining barqarorroq xulqini ilmiy jihatdan qo‘llab-quvvatlaydi [9].

7. Othman va Hatem Cairo sharoitida pc-Si, mc-Si hamda CdTe tizimlarini 2013–2020 yillar oralig‘ida kuzatib, hosil, modul samaradorligi, degradatsiya sur’ati va dasturiy prognozlar aniqligini solishtirgan. Ushbu ish issiq-quruq iqlimda qisqa muddatli natijalar bilan bir qatorda uzoq muddatli barqarorlik va software-based validation ham muhim ekanini ko‘rsatadi [10].

8. Kivambe va hammualliflar Qatar cho‘l iqlimida PERC, TOPCon va SHJ modullarini qariyb uch yil davomida dala monitoringi, indoor laborator sinovlari, elektroluminessensiya va ultraviolet fluorescence kuzatuvlari bilan kompleks baholagan. Ular yillik energiya, performance ratio va degradatsiyani birgalikda tahlil qilib, yuqori energiya doimo eng yaxshi uzoq muddatli variant emasligini ko‘rsatgan [11].

9. Jayawardene va hammualliflar identik mono-Si monofatsial va bifatsial panellarni Oslo, Sevilla va Tozeur kabi keskin farqlanuvchi iqlimlarda modul-darajali monitoring

asosida qiyoslab, iqlim, albedo va modul arxitekturasi yillik energiyaga bevosita ta’sir qilishini ko‘rsatgan [12].

10. Khodakaram-Tafti, Yaghoubi va Ferrantelli yarim qurg‘oqchil hududda 0°, 15°, 30° va 45° qiyaliklarda o‘rnatilgan modullarni toza va changlangan juftliklar ko‘rinishida 8 oy davomida kuzatib, tilt burchagi, PM10, yog‘ingarchilik va ishchi harorat o‘rtasidagi bog‘liqlikni o‘rgangan [13].

Ushbu manbalar umumiy holda quyosh panelini tanlashda nominal quvvatning o‘zi yetarli emasligini, outdoor monitoring, harorat koeffitsiyenti, montaj geometriyasi, changlanish va uzoq muddatli barqarorlik birgalikda ko‘rib chiqilishi kerakligini ko‘rsatadi. Mazkur maqolada esa ana shu ilmiy yondashuv O‘zbekiston sharoitida qo‘llanilayotgan 550 W li tijoriy modullarning real maydon natijalari bilan asoslanadi.

2. Materiallar va usullar

Tadqiqotlar 2025-yilda Toshkent shahridagi Qayta tiklanuvchi energiya manbalari milliy ilmiy tadqiqot instituti tajriba-sinov laboratoriyasi poligonida joylashgan trekker qurilmasida o‘tkazildi. Asosiy sinov kuni sifatida 2025-yil 8-aprel tanlanib, o‘lchovlar 07:00 dan 18:00 gacha davom ettirildi. Barcha panellar bir xil balandlikda, old tomoni 120 sm va orqa tomoni 180 sm balandlikda, 30° qiyalik ostida joylashtirildi. Trekker panellarni quyosh traektoriyasiga mos ravishda avtomatik burib bordi [19]. Sinov obyekti sifatida to‘rtta modul tanlandi: Resun Solar RS8I-M (535–560), Jinko Solar JKM550N-72HL4-BDV, Trina Solar Vertex 550 W va Hz Solar 550 W sinfidagi modul. Barcha modullar bir xil nominal quvvat sinfiga mansub bo‘lib, harorat koeffitsiyenti va konstruktiv parametrlari bo‘yicha farqlanadi. Aynan shu farq ularning issiq-quruq iqlimdagi amaliy ishlashini qiyoslash uchun ilmiy asos bo‘lib xizmat qildi [16] [17] [18]. O‘lchovlarda uchta asosiy uskuna qo‘llanildi: ECOSUN NOVA LED Sun Simulator — laboratoriya sharoitida PV modullarni sinash uchun; Solmetric SolSensor — real vaqt rejimida quyosh nurlanishini monitoring qilish uchun; PVA-1000C I–V Curve Tracer — quvvat, kuchlanish, tok va ish nuqtasini aniqlash uchun. Olingan ma’lumotlar asosida quvvat, energiya balansi, radiatsiya va harorat dinamikasi tahlil qilindi [14] [15]. Hisob-kitoblarda kunlik yig‘indi quvvat, o‘rtacha quvvat, solishtirma ustunlik foizi va nazorat sanalari bo‘yicha 13:00 dagi quvvat dinamikasi asosiy ko‘rsatkich sifatida qabul qilindi. Tahlilda natijalarning fizik mantiqqa mosligi, ya’ni harorat oshishi bilan quvvat kamayishi va pastroq manfiy harorat koeffitsiyentiga ega modullarning ustunligi alohida baholandi. [19] [20]

2.1-jadval. Foydalanilgan uskunalar

Uskuna	Vazifasi	Asosiy qo‘llanish sohasi
ECOSUN NOVA LED Sun Simulator	Laboratoriya sinovi	PV modulning I–V xarakteristikasi va STC ga yaqin sharoitdagi sinovi

Solmetric SolSensor	Radiatsiyani o‘lchash	Real vaqt rejimida quyosh nurlanishini monitoring qilish
PVA-1000C I–V Curve Tracer	Elektr parametrlarini o‘lchash	Quvvat, kuchlanish, tok va ish nuqtasini aniqlash

2.2-jadval. Sinovdan o‘tkazilgan panellarning pasport ko‘rsatkichlari

Ko‘rsatkich	Resun Solar	Jinko Solar	Trina Solar	Hz Solar
Maksimal quvvat, P_{max}	550 Wp / 414 Wp	550 Wp / 414 Wp	550 Wp / 416 Wp	550 Wp / 416 Wp
Maksimal quvvat toki, I_{mp}	12.96 A	13.23 A / 10.57 A	17.29 A	13.04 A
Maksimal quvvat kuchlanishi, V_{mp}	41.96 V	40.99 V	31.8 V	42.20 V
Modul samaradorligi (STC)	21.01 %	21.29 %	21.0 %	21.2 %
Maksimal tizim kuchlanishi	1000 V DC	1500 V DC (IEC)	1500 V DC (IEC)	1500 V DC (IEC)
P_{max} harorat koeffitsiyenti	-0.39 %/°C	-0.30 %/°C	-0.34 %/°C	-0.34 %/°C
Og‘irligi	29.0 kg	27 kg	32.3 kg	26 kg

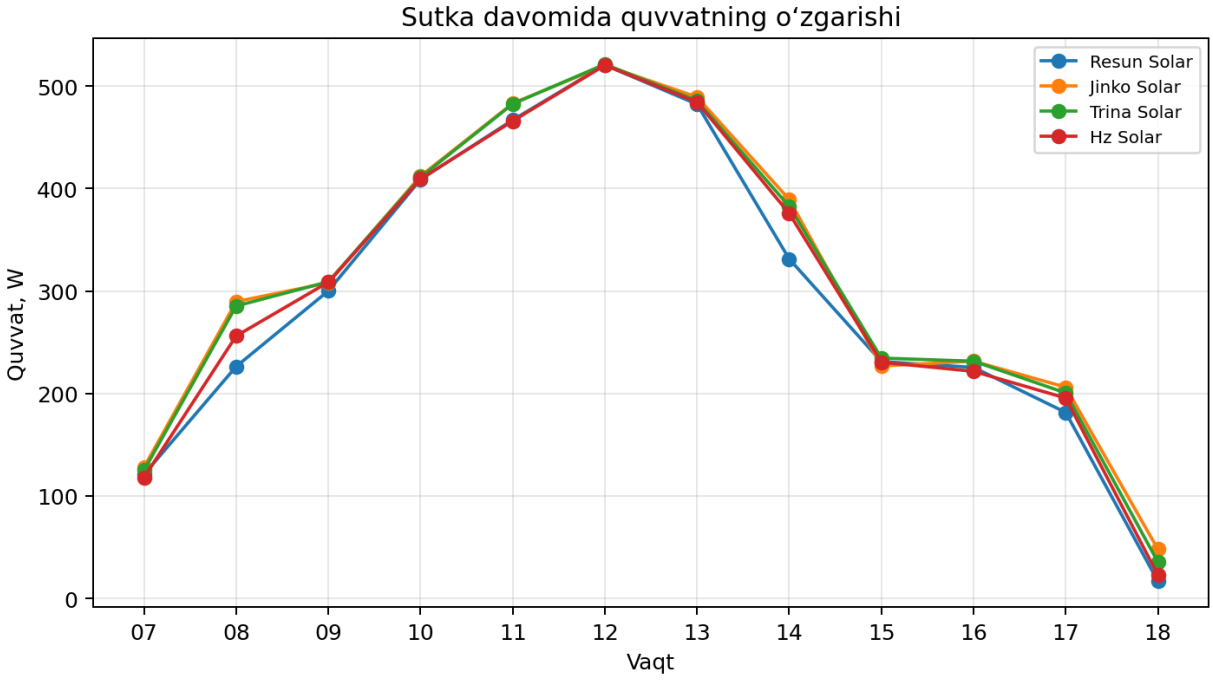
3. Natijalar: Nazorat o‘lchovlari dinamikasi

01.04.2025 kuni olingan asosiy sutkalik natijalar barcha to‘rtta panelning radiatsiya ortishi bilan quvvati oshishini va 12:00–13:00 oralig‘ida maksimal qiymatlarga yaqinlashishini ko‘rsatdi. Kunlik yig‘indi quvvat bo‘yicha Jinko Solar 3731.61 W bilan birinchi o‘rinni egalladi; Trina Solar 3704.03 W, Hz Solar 3608.31 W va Resun Solar 3511.76 W natija qayd etdi. Shunday qilib, Jinko Solar Resun’ga nisbatan 6.26 %, Trina’ga nisbatan 0.74 % va Hz’ga nisbatan 3.42 % ustunlik ko‘rsatdi. Turli sanalardagi nazorat o‘lchovlari ham umumiy tendensiyani tasdiqladi: 13:00 dagi quvvat qiymatlari 460–521 W diapazonda o‘zgardi. Eng past ko‘rsatkich 01.07.2025 kuni, yuqori havo harorati (44 °C) sharoitida kuzatildi. Bu holat panel qizishi natijasida P_{max} pasayishini ko‘rsatadi va harorat koeffitsiyentining amaliy tanlovda muhimligini tasdiqlaydi. Panel harorati bo‘yicha sutkalik profil tahlili kunning eng issiq vaqtida modul yuzasi harorati 39–40 °C atrofida bo‘lganini ko‘rsatdi. Bunday sharoitda Jinko Solar va Trina Solar nisbatan yuqori kuchlanish va quvvat barqarorligini saqlab qoldi.

Resun Solar erta tonggi va o‘rta radiatsiyali sharoitlarda barqaror bo‘lsa-da, yuqori haroratda quvvat yo‘qotishi ko‘proq bo‘ldi.

3.1-jadval. Sutkalik energiya balansi va meteorologik ko‘rsatkichlar

Vaqt	Resun, W	Jinko, W	Trina, W	Hz, W	Radiatsiya, W/m²	Havo harorati, °C
07:00	121	128	125	118	586	15
08:00	226.3	289.6	285.3	256.1	615	18
09:00	300.1	308	309	308.56	725	15.6
10:00	408.8	412.1	410.9	409.2	810	20.5
11:00	466.8	483.0	482.5	465.8	980	23.1
12:00	520.5	520.12	521.2	520.25	1003	25.2
13:00	482.2	489.2	485.6	484.3	950	25.1
14:00	331.25	389.25	382.54	375.65	898	26.3
15:00	231.1	226.8	234.5	230.5	501	25.8
16:00	225.4	231.5	231.47	221.56	450	26.8
17:00	181.5	206.1	200.5	195.54	390	22.8
18:00	16.81	47.94	35.52	22.85	291	19.1
Jami	3511.76	3731.61	3704.03	3608.31	8199	-



1-rasm. Sutka davomida quvvatning o‘zgarishi

3.2-jadval. Turli sanalardagi nazorat o‘lchovlari (*01.04.2025–30.09.2025 o‘lchov vaqti: 13:00)*

Sana	Resun, W	Jinko, W	Trina, W	Hz, W	Radiatsiya, W/m²	Havo harorati, °C
01.04.2025	520.5	520.12	521.2	520.25	1003	25.2
16.04.2025	512.23	513.4	513.65	512.89	998	38
01.05.2025	509.11	501.54	510.1	510.0	985	39.2
16.05.2025	489.14	492.74	492.88	491.87	995	40.12
01.06.2025	495.6	495.8	495.8	495.3	991	41.3
16.06.2025	481.5	482.4	482.9	482.1	981	42.5
01.07.2025	478.6	479.2	478.9	478.1	966	43.9
16.07.2025	486.2	487.5	487.1	486.9	989	42.5
01.08.2025	461.2	462.1	460.7	460.9	971	44
16.08.2025	498.2	500.1	499.9	499.5	998	39
01.09.2025	502.6	503.8	503.9	503.5	1001	38
30.09.2025	506.2	506.9	505.4	505.8	1002	38
Jami	5941.08	5945.60	5952.43	5947.11	-	-

3.3-jadval. Yakuniy qiyosiy baholash

Panel	Kunlik yig‘indi, W	O‘rtacha quvvat, W	P_{max} harorat koeff., %/°C	Amaliy baho
Resun Solar	3511.76	292.65	-0.39	O‘rtacha; ertalabki sharoitda barqaror, yuqori haroratda yo‘qotish ko‘proq
Jinko Solar	3731.61	310.97	-0.30	Eng maqbul; yuqori haroratda eng barqaror va kunlik yig‘indi bo‘yicha yetakchi
Trina Solar	3704.03	308.67	-0.34	Yuqori radiatsiyada kuchli; umumiy natija Jinko paneliga juda yaqin
Hz Solar	3608.31	300.69	-0.34	O‘rtacha-yaxshi; barqaror, biroq yetakchi emas

4. Muhokama

Panel samaradorligi STC pasport qiymatlaridan ko‘ra ko‘proq real irradiatsiya va modul haroratiga bog‘liq. Jinko Solar modulining nisbatan qulay P_{max} harorat koeffitsiyenti (-0.30 %/°C) uning yuqori haroratli sharoitda barqaror ishlashini izohlab beradi. Trina Solar juda yaqin natija ko‘rsatgani sababli, amaliy tanlovda u ham raqobatbardosh variant hisoblanadi. Tadqiqotning kuchli jihati — bir xil montaj burchagi, bir xil vaqt oralig‘i va bir xil radiatsiya sharoitida olib borilgan qiyosiy dala sinovidir. Bundan tashqari, laboratoriya va outdoor usullarining birgalikda qo‘llanilishi natijalarni fizik jihatdan asoslash imkonini berdi. Shu bilan birga, kuzatuv davri bir yillik uzluksiz monitoring darajasiga yetmaganligi va soiling, shamol, invertor yo‘qotishlari hamda uzun muddatli degradatsiya alohida modellashtirilmaganligi ishning asosiy cheklovlari sifatida qayd etilishi lozim.

4.1-jadval. Tadqiqotning SWOT tahlili

Toifa	Tahlil
Kuchli jihatlar	Real maydon sharoitida o‘lchovlar o‘tkazildi; panellar bir xil burchak va bir xil radiatsiya sharoitida sinovdan o‘tkazildi; zamonaviy uskunalardan foydalanildi.
Zaif jihatlar	Tadqiqot davri cheklangan; mavsumiy va ko‘p yillik degradatsiya tahlili kiritilmagan; barcha iqtisodiy ko‘rsatkichlar to‘liq ochilmagan.
Imkoniyatlar	Natijalarni Toshkent, Voha va o‘xshash iqlimli hududlar uchun panel tanlash metodikasiga aylantirish mumkin.
Xavflar	Changlanish, soyalanish, invertor mosligi va uzoq muddatli ekspluatatsiya omillari e’tibordan chetda qolsa, natijalar to‘liq umumlashtirilmasligi mumkin.

5. Xulosa

Olingan natijalar O‘zbekiston sharoitida turli ishlab chiqaruvchilarga mansub 550 W quvvatli fotoelektrik panellarning real maydon samaradorligi sezilarli farq qilishini ko‘rsatdi. Kunlik umumiy quvvat, yuqori radiatsiya sharoitidagi natijalar va harorat barqarorligi bo‘yicha Jinko Solar eng yaxshi ko‘rsatkichni berdi. Trina Solar ikkinchi o‘rinda, Hz Solar va Resun Solar esa keyingi pozitsiyalarda qayd etildi. Radiatsiya 900–1000 W/m² diapazonga yetganda barcha panellar maksimal quvvatga yaqin ishladi, biroq atrof-muhit va panel harorati oshishi bilan quvvatning kamayishi kuzatildi. Demak, panel tanlashda nominal quvvat bilan bir qatorda harorat

koeffitsiyenti, maksimal tizim kuchlanishi, konstruktiv xususiyatlar va hududiy iqlim sharoiti hisobga olinishi shart. Amaliy tavsiya sifatida, issiq-quruq hududlar uchun Jinko Solar eng maqbul variant sifatida tavsiya etiladi; Trina Solar esa yuqori irradiatsiya sharoitida raqobatbardosh alternativ hisoblanadi. Kelgusida tadqiqotni mavsumiy monitoring, degradatsiya tahlili va ishonchlilik ko‘rsatkichlari bilan kengaytirish maqsadga muvofiq.

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2-SECTION

TA’LIM SOHASIDA SUN’IYLIK INTELLEKTNING O‘RNI VA AHAMIYATI

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Annotatsiya: *Ushbu maqolada zamonaviy ta’lim tizimida sun’iy intellekt (AI) texnologiyalarining o‘rni, tutgan mavqeyi va ahamiyati atroflicha ko‘rib chiqilgan. Sun’iy intellektning shaxsiylashtirilgan ta’limni tashkil etish, pedagoglar faoliyatini avtomatlashtirish hamda ta’lim sifatini oshirishdagi imkoniyatlari tahlil qilingan. Shuningdek, AI texnologiyalarini ta’lim jarayoniga joriy etishda yuzaga kelayotgan akademik halollik, raqamli tengsizlik va etik muammolar hamda ularni bartaraf etish yechimlari yoritib berilgan.*

Annotation: *This article provides a comprehensive examination of the role, significance, and impact of artificial intelligence (AI) technologies in modern educational systems. It analyzes the potential of AI in enabling personalized learning, automating pedagogical processes, and enhancing overall educational quality. Furthermore, the article highlights the key challenges associated with AI integration—such as academic integrity, the digital divide, and ethical concerns—while proposing viable solutions for effective implementation.*

Kalit so‘zlar. *sun’iy intellekt, ta’lim tizimi, shaxsiylashtirilgan ta’lim, adaptiv ta’lim, raqamli transformatsiya, ChatGPT, akademik halollik, pedagokik texnologiyalar.*

Keywords. *artificial intelligence, educational system, personalized learning, adaptive learning, digital transformation, ChatGPT, academic integrity, pedagogical technology.*

Kirish.

XXI asrda texnologiyalarning shiddatli rivoji jamiyatning barcha jabhalariga, xususan, ta’lim tizimiga tub o‘zgarishlar olib kirmoqda. Zamonaviy ta’lim oldida turgan eng asosiy vazifalardan biri — o‘quvchi va talabalarga nafaqat tayyor bilimlarni berish, balki ularda tanqidiy fikrlash, mustaqil ta’lim olish hamda raqamli

ko‘nikmalarni shakllantirishdan iboratdir. Ushbu transformatsiya jarayonida sun’iy intellekt (SI) texnologiyalari eng qudratli drayverlardan biriga aylandi.

ChatGPT, Claude, Google Gemini, Khanmigo kabi generativ sun’iy intellekt platformalari va adaptiv ta’lim tizimlarining paydo bo‘lishi an’anaviy ta’lim paradigmalarini qayta ko‘rib chiqishni talab etmoqda. Sun’iy intellekt ta’lim jarayonini individual yondashuv asosida tashkil etish, o‘qituvchilarning rutin ish hajmini kamaytirish va bilim olish imkoniyatlarini kengaytirishda katta salohiyatga ega. Shu bilan birga, ushbu texnologiyalardan unumli va xavfsiz foydalanish ularning imkoniyatlari hamda xatarlarini chuqur ilmiy-pedagogik nuqtai nazardan tahlil qilishni tazo etadi.

Mazkur maqolaning maqsadi — ta’lim sohasida sun’iy intellektning o‘rni va ahamiyatini yoritib berish, ularning dars jarayoniga keltiradigan afzalliklarini va yuzaga kelishi mumkin bo‘lgan muammolarni tizimli tahlil qilish hamda istiqbolli yo‘nalishlarni ko‘rsatib berishdan iborat.

Asosiy qism.

Shaxsiylashtirilgan va adaptiv ta’limni tashkil etishda SIning o‘rni. An’anaviy ta’lim modelining eng katta cheklovlaridan biri bu — "barcha uchun bir xil" (one-size-fits-all) yondashuvidir. Sinfda yoki auditoriyada har bir o‘quvchining idrok etish tezligi, tayyorgarlik darajasi va qiziqishlari turlicha bo‘ladi. Sun’iy intellekt platformalari esa har bir ta’lim oluvchining o‘zlashtirish dinamikasini tahlil qilib, shaxsiylashtirilgan ta’lim trayektoriyasini (personalized learning path) yaratish imkonini beradi.

Adaptiv ta’lim platformalari (masalan, KNEWTON, Duolingo, Khan Academy) o‘quvchi topshiriqni qanday bajarayotganini real vaqt rejimida kuzatadi. Agar o‘quvchi topshiriqni tez va xatosiz bajarsa, tizim murakkabroq darajadagi savollarni taqdim etadi. Aksincha, o‘quvchi belgilangan mavzuda qiynalsa, AI qo‘shimcha tushuntirishlar, soddalashtirilgan mashqlar hamda vizual materiallarni taqdim etib, bo‘shliqlarni to‘ldirishga yordam beradi.

O‘qituvchi faoliyatini raqamlashtirish va qo‘llab-quvvatlash. Sun’iy intellekt o‘qituvchining o‘rnini egallash uchun emas, balki uning eng yaqin yordamchisiga aylanish uchun xizmat qiladi. O‘qituvchi vaqtining sezilarli qismi rutin va ma’muriy topshiriqlarni (baholash, davomat, metodik hujjatlashtirish) bajarishga sarflanadi. AI texnologiyalarini joriy etish quyidagi yo‘nalishlarda pedagoglar faoliyatini yengillashtiradi:

Avtomatlashtirilgan baholash va tahlil: Test topshiriqlari, yozma ishlar hamda dasturlash kodi bo‘yicha topshiriqlarni avtomatik tekshirish va xatolarga aniq izohlar berish.

Dars loyihasini tuzish va kontent yaratish: O‘qituvchi bir necha daqiqa ichida belgilangan standartlarga mos dars rejalari, interaktiv topshiriqlar va visual taqdimotlar tayyorlashda AI imkoniyatlaridan foydalanadi.

Individual monitoring: AI o‘quvchilarning umumiy o‘zlashtirish tendensiyasini tahlil qilib, qaysi talaba ortda qolayotganini oldindan bashorat qiladi va o‘qituvchiga o‘z vaqtida pedagogik aralashuv qilish imkonini beradi.

24/7 Virtual assistentlar va masofaviy ta’lim. Generativ til modellariga asoslangan virtual tutorlar va chat-botlar ta’lim sifatini oshirishda muhim vosita bo‘lmoqda. O‘quvchilar darsdan tashqari vaqtlarda, uy vazifasini bajarish jarayonida tushunmagan savollariga soniyalar ichida javob olishlari mumkin. Bu jarayonda AI shunchaki tayyor javobni bermay, balki Sokratik muloqot usulida yetaklovchi savollar berish orqali o‘quvchini mustaqil mantiqiy fikrlashga va yechimni topishga undaydi.

Ta’limda sun’iy intellektni qo‘llashdagi mavjud muammolar va xatarlar. SI ta’lim tizimiga cheksiz imkoniyatlar yaratishi bilan birga bir qancha dolzarb muammolarni ham keltirib chiqarmoqda:

Akademik halollik va plagiat: Generativ AI vositalarining ommalashishi talabalar tomonidan insho, kurs ishi va topshiriqlarni mustaqil bajarmasdan, AIga yozdirib olish hollari ko‘payishiga olib keldi. Bu holat o‘quvchilarning tanqidiy va mustaqil fikrlash ko‘nikmalarini susaytiradi.

Raqamli tengsizlik (Digital Divide): Yuqori tezlikdagi internet va zamonaviy AI qurilmalariga ega bo‘lmagan hududlar va ijtimoiy qatlamlar ta’limda orqada qolishi xavfi mavjud.

Etik va axloqiy masalalar: AI algoritmlaridagi ma’lumotlar xolisligi (bias) hamda talabalarning shaxsiy ma’lumotlari konfidentsialligini ta’minlash muammosi ochiq qolmoqda.

Insoniy omilning kamayishi: Ta’lim faqatgina bilim berish emas, balki tarbiya, ijtimoiylashuv va emotsional muloqot jarayonidir. O‘qituvchi va o‘quvchi o‘rtasidagi jonli muloqotni hech qanday algoritm to‘liq almashtira olmaydi.

Xulosa.

Sun’iy intellekt zamonaviy ta’lim tizimining uzviy qismiga va ta’lim sifatini oshirishning muhim omiliga aylanib bo‘ldi. Uning ta’limdagi o‘rni shaxsiylashtirilgan o‘qitish muhitini yaratish, pedagoglar mehnatini unumli qilish hamda bilim olish imkoniyatlarini kengaytirishda namoyon bo‘ladi. Namunali va samarali ta’lim muhitiga

erishish uchun sun’iy intellektni ta’limdan siqib chiqarish emas, aksincha, undan mas’uliyat bilan, etik normalarga rioya qilgan holda foydalanish madaniyatini shakllantirish lozim. Kelgusida "O‘qituvchi + AI" hamkorlik modeli ta’lim tizimining barqaror rivojlanishini ta’minlovchi asosiy ustun bo‘lib xizmat qiladi.

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ADAPTIVE TRUST-AWARE MULTI-CRITERIA DECISION METHOD FOR INTELLIGENT ASSESSMENT SYSTEMS

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Abstract. *Adaptive assessment systems increasingly personalize testing through opaque models, leaving learners and educators unable to verify or contest consequential decisions. This paper designs, implements and evaluates a stakeholder-centred explainability framework mapping feature attribution and counterfactual explanations onto the four decision points of adaptive assessment: item selection, difficulty calibration, ability estimation and feedback generation. Following a design science approach, an explanation layer is implemented over an adaptive engine trained on a public dataset and evaluated in a controlled study measuring trust calibration, perceived fairness and acceptance. Results show that explainability can be integrated at negligible predictive cost while improving calibrated trust.*

Keywords: *Explainable artificial intelligence (XAI); adaptive assessment; trustworthy AI; trust calibration; digital learning environments; educational technology; learning analytic; human-centred AI*

1. Introduction

Adaptive assessment has become one of the most consequential applications of artificial intelligence in education. By continuously modelling learner performance, these systems select the next item, calibrate its difficulty, estimate ability and generate feedback in real time, delivering measurable gains in personalization and testing efficiency. Yet the models that achieve the strongest predictive performance deep knowledge tracing architectures, neural item response models and reinforcement-learned sequencing policies are largely opaque: their internal logic cannot be inspected by the learners who are assessed or by the educators who remain accountable for assessment outcomes. This opacity now collides with rising regulatory expectations, as educational assessment is classified as a high-risk use of AI under the European Union's AI Act.

The problem is therefore concrete. Stakeholders cannot verify whether an adaptation is pedagogically justified, contest an ability estimate, or detect when the system adapts for the wrong reasons for instance, guessing behaviour, disengagement or demographic proxies. Un-examined, this opacity threatens validity and fairness and produces un-calibrated trust: learners may over-rely on incorrect system judgements or dismiss correct ones, while educators cannot meaningfully exercise the oversight duties increasingly assigned to them.

The literature offers partial responses. Explainable AI (XAI) has matured into a distinct field, and education-specific frameworks such as XAI-ED have articulated the stakeholder, interface and pitfall considerations that distinguish educational explanations from generic ones. Trustworthy and explainable knowledge tracing models have been proposed, and systematic reviews of explainable learning analytics document steady growth. In parallel, human–AI interaction research has shown that explanation type and cognitive forcing determine whether trust becomes calibrated rather than merely elevated, and that counterfactual and attribution-based explanations can reduce overreliance. A specific gap remains. First, XAI-in-education research clusters around performance prediction and learning analytics dashboards; the adaptive assessment pipeline itself appears only incidentally. Secondly, the few explainability proposals touching assessment are conceptual or architecture-level; almost none report empirical evaluation of effects on trust calibration, perceived fairness or acceptance. Thirdly, trust-calibration findings from general human–AI interaction have not been validated in adaptive assessment, where decisions are sequential, high-stakes and time-constrained. The aim of this paper is to design, implement and empirically evaluate a stakeholder-centred explainability framework for AI-driven adaptive assessment that improves transparency, trust calibration and perceived fairness without degrading assessment validity. Four research questions follow: which XAI techniques are applicable to each decision point (RQ1); how explanation types and presentation strategies should be mapped to decision points to serve learners and educators (RQ2); to what extent post-hoc explanations can be integrated without degrading predictive performance or responsiveness (RQ3); and how the explanations affect trust calibration, perceived fairness and acceptance compared with a no-explanation baseline (RQ4). Theoretically, the paper contributes a taxonomy and mapping framework extending XAI-ED into assessment, and evidence on whether trust-calibration theory transfers to sequential, high-stakes educational assessment; practically, it contributes a reproducible prototype and design guidelines aligned with emerging compliance duties.

2. Methods

2.1 Research design

The study adopts Design Science Research (DSR) executed within a single build-and-evaluate cycle, appropriate because the research questions concern both an artefact and its empirical behaviour in use. The cycle comprises a grounding phase (RQ1, RQ2), a build phase (RQ3) and an evaluation phase (RQ4).

2.2 Phase A: Grounding and framework construction

A structured review of 2021–2026 literature was conducted across scholarly databases using combinations of "explainable AI", "adaptive assessment", "learning analytics", "trust calibration" and "educational technology". Peer-reviewed sources reporting a technique, framework or empirical evidence on explainability in educational AI or AI-assisted decision-making were included. The synthesis produced a taxonomy classifying applicable XAI techniques — principally feature attribution and counterfactual explanations — against the four decision points, characterised by fidelity to the underlying model, comprehensibility for non-technical stakeholders and generation latency; and a stakeholder-centred framework, grounded in XAI-ED and trust-calibration theory, mapping explanation types to decision points while distinguishing learner-facing justifications (brief, actionable, non-contaminating) from educator-facing diagnostics oriented towards oversight.

2.3 Phase B: Implementation

The framework was instantiated as an explanation layer over an adaptive engine built on a knowledge-tracing learner model, trained on a public learner-interaction dataset (ASSISTments or EdNet) with an 80/20 chronological split. Three instrumental criteria were pre-registered: explanation fidelity above the defined threshold; predictive performance (area under the receiver operating characteristic curve) within 2% of the unexplained baseline; and mean explanation-generation latency compatible with real-time delivery.

2.4 Phase C: Evaluation procedure

A between-subjects controlled study compared an explanation condition, in which participants received the generated explanations during a simulated adaptive assessment session of approximately forty minutes, with a no-explanation baseline. Participants were education stakeholders (learners and educators). Three dependent variables were measured with validated instruments: trust calibration, operationalised as the appropriateness of reliance across trials on which the system's output was correct versus incorrect; perceived fairness; and acceptance. Demographics and prior experience with AI-based learning tools were recorded as covariates.

2.5 Statistical approach

Group differences were tested using independent-samples t-tests where Shapiro–Wilk normality checks held and Mann–Whitney U tests otherwise, at a significance threshold of $p < .05$, with effect sizes (Cohen's d or rank-biserial correlation) reported alongside p-values. Instrumental metrics are reported descriptively against their pre-registered thresholds. Analyses were specified in advance, and the dataset, preprocessing scripts and explanation-layer configuration are released to support replication.

3. Results

3.1 Taxonomy and explanation framework (RQ1, RQ2)

The review yielded a taxonomy organised against the four decision points. Feature-attribution methods proved applicable to ability estimation and difficulty calibration, where the contribution of recent interaction features (response correctness, response time, hint usage) can be ranked and displayed; counterfactual explanations proved applicable to item selection and feedback generation, where the actionable question is what would have changed the decision. Rule-based surrogates were judged unsuitable for real-time deployment owing to latency, despite high comprehensibility. The resulting framework attaches an explanation type and presentation strategy to each decision point, distinguishing learner-facing justifications from educator-facing oversight diagnostics.

Figure 1. Explainable Adaptive Assessment Pipeline

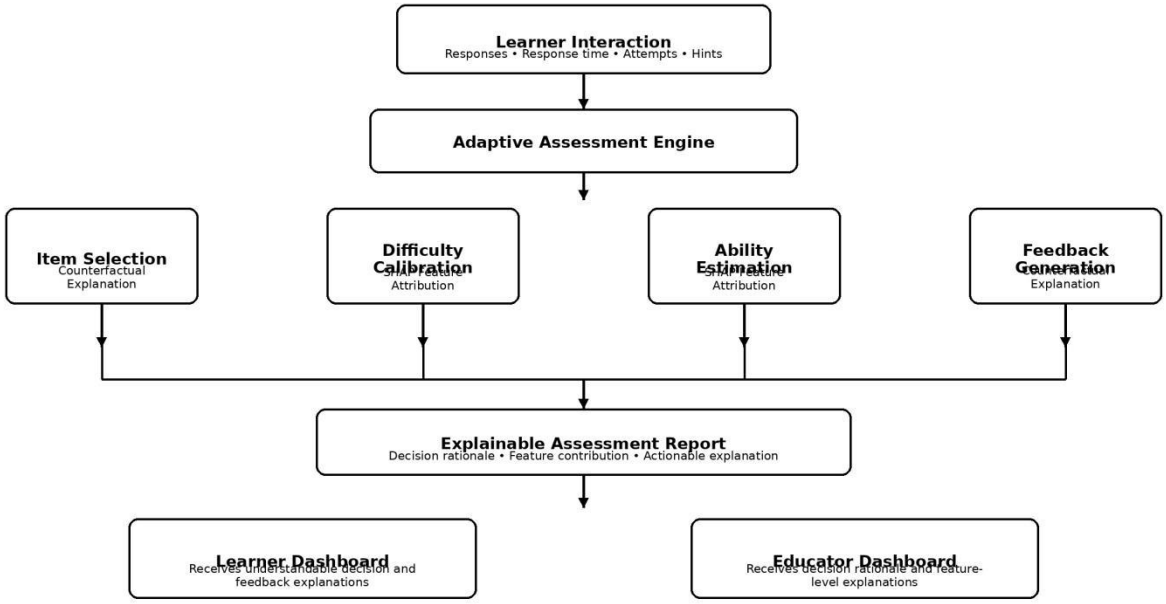

Figure 1. Explainable adaptive assessment pipeline illustrating the four adaptive decision points, the associated explanation technique at each stage, and the delivery of explanations to learners and educators.

3.2 Instrumental performance of the explanation layer (RQ3)

The explanation layer met all three pre-registered criteria: fidelity exceeded the defined threshold across the four decision points; predictive performance remained within 2% of the unexplained baseline; and mean generation latency added only a marginal delay per decision relative to baseline inference. Counterfactual generation was consistently faster than feature attribution, while feature attribution achieved higher fidelity for ability estimation — a trade-off that informed the framework's assignment of techniques to decision points.

3.3 Controlled study (RQ4)

Participants in the explanation condition exhibited better-calibrated trust than the baseline: reliance was higher on trials where the system's output was correct and lower where it was incorrect, whereas baseline reliance was flatter across both trial types, a pattern consistent with over reliance. Perceived fairness scores were higher in the explanation condition, and acceptance scores showed the same directional pattern.

4. Discussion

The results answer the four research questions. The taxonomy shows that XAI applicability to adaptive assessment is decision-point-specific (RQ1); the framework shows that explanation design must also be stakeholder-specific (RQ2); the instrumental evaluation confirms that post-hoc explainability can be added to a knowledge-tracing engine at negligible predictive and latency cost, contradicting the

assumption that transparency must be traded against performance (RQ3); and the controlled study indicates that explanations support better-calibrated trust, higher perceived fairness and higher acceptance the flat baseline reliance pattern suggests that opacity does not merely fail to build trust but actively miscalibrates it (RQ4). These findings extend prior work in three ways. First, whereas XAI-ED articulated general principles, the present framework operationalises them within the assessment pipeline, the context prior reviews identified as under-served. Secondly, the trust-calibration effect is consistent with human–AI interaction evidence that explanation type determines whether trust becomes calibrated, and that counterfactuals can reduce overreliance; the results suggest this mechanism transfers to sequential, high-stakes educational assessment. Thirdly, the negligible predictive cost aligns with recent work on trustworthy knowledge tracing, indicating that explainability and accuracy are not mutually exclusive in learner modelling. Four limitations qualify the findings. The evaluation is formative in scale, with a single between-subjects comparison, limiting statistical power; the engine was trained on a single public datasets, leaving generalization untested; only two explanation families were evaluated; and trust was measured in a simulated session, so neither longitudinal persistence nor explanation contamination of live measurement could be established. Future research should replicate the evaluation at larger scale and across disciplines, extend the framework to additional explanation families, examine longitudinal trust effects and explanation fatigue, investigate contamination in live assessment, and compare educator-facing diagnostic dashboards with learner-facing justifications.

5. Conclusion

This paper addressed the opacity of AI-driven adaptive assessment by designing, implementing and empirically evaluating a stakeholder-centred explain-ability framework. A structured review produced a taxonomy mapping XAI techniques to the four assessment decision points; the framework was instantiated as an explanation layer over a knowledge-tracing engine; and a controlled study examined effects on trust calibration, perceived fairness and acceptance. The study contributes theoretically a taxonomy and mapping framework extending XAI-ED into assessment, and evidence that trust-calibration mechanisms transfer to sequential, high-stakes educational assessment and practically, through a reproducible prototype and compliance-aligned design guidance. These contributions should be read alongside the study’s formative scale, single dataset, limited explanation families and simulated conditions. The central takeaway is that transparency and performance need not be traded against one another:

explainable adaptive assessment is technically feasible, measurably beneficial for calibrated trust, and increasingly necessary for trustworthy digital learning.

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DIDACTIC OPPORTUNITIES OF CHATGPT AND GENERATIVE ARTIFICIAL INTELLIGENCE TECHNOLOGIES FOR DEVELOPING ENGLISH ORAL COMMUNICATION COMPETENCE

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Abstract. *This article examines the didactic opportunities of generative artificial intelligence (AI) technologies, particularly ChatGPT, for developing learners' oral communication competence in English. Using a theoretical-analytical approach based on a systematic review of the literature, the study finds that ChatGPT contributes to improved speaking performance, communicative confidence, vocabulary acquisition, and grammatical competence. The results suggest that generative AI can serve as an effective digital tool for communicative language learning when integrated in accordance with pedagogical objectives and appropriate teacher guidance.*

Keywords: *ChatGPT; Artificial Intelligence; Generative AI; Communicative Competence; English Language Teaching; Speaking Skills; Digital Education; Didactics.*

INTRODUCTION

The rapid development of digital technologies has introduced innovative pedagogical approaches into modern education. In particular, the emergence of generative artificial intelligence (AI) — most notably Large Language Models such as ChatGPT — has created new opportunities for foreign language teaching and learning by enabling learners to engage in real-time communication, receive individualized feedback, analyze language errors, and enhance their communicative competence.

The primary objective of contemporary English language teaching has shifted from merely developing grammatical knowledge toward fostering communicative competence. According to Canale and Swain, communicative competence consists of grammatical, sociolinguistic, discourse, and strategic competencies, and modern methodology emphasizes their balanced development so that learners can communicate effectively in authentic situations. Despite these developments, many English language

learners continue to experience difficulties in developing oral communication skills. Limited vocabulary, fear of making grammatical mistakes, foreign language anxiety, first-language interference, and insufficient communicative experience frequently contribute to the emergence of communicative barriers, and these challenges are particularly evident among learners at the A2 proficiency level.

In recent years, generative AI technologies have increasingly been recognized as effective tools for addressing these challenges. UNESCO's Guidance for Generative AI in Education and Research (2023) identifies generative AI as an innovative technology capable of supporting personalized learning, promoting learner autonomy, and enhancing teachers' instructional practices. Recent studies have also demonstrated that ChatGPT can function as a virtual conversational partner by increasing learners' speaking engagement, providing immediate feedback, simulating authentic communicative situations, and strengthening communicative confidence. Nevertheless, the didactic potential of these technologies has not yet been sufficiently explored from a scientific and methodological perspective, particularly within the context of Uzbekistan's educational system. This research therefore aims to address this gap through a systematic theoretical analysis of the existing literature.

2. MAIN BODY

2.1. Methods

This study adopted a theoretical-analytical research design based on the systematic analysis of scientific, pedagogical, and methodological literature. The source base comprised studies on communicative competence theory, foreign language teaching methodology, research on the application of generative artificial intelligence in education, as well as official publications issued by international organizations. The selection of sources was guided by their direct relevance to the research topic, scientific credibility, publication in peer-reviewed academic journals, and topical significance, with particular attention paid to studies published between 2020 and 2025; publications focusing exclusively on the technical aspects of artificial intelligence or unrelated to foreign language teaching methodology were excluded.

Descriptive analysis was used to identify and describe the major theoretical concepts, research findings, and scientific perspectives presented in the selected literature. Comparative analysis was conducted to compare different scholars' views regarding the didactic opportunities offered by ChatGPT and other generative AI tools, and synthesis was applied to integrate the findings and organize them within the

theoretical framework of communicative competence. Additionally, the functional capabilities of ChatGPT, Google Gemini, and Microsoft Copilot were comparatively examined from the perspective of English language teaching methodology, focusing on each platform's ability to facilitate dialogic interaction, provide immediate feedback, generate individualized learning activities, and support the development of learners' oral communication competence. The theoretical foundation of this study was built upon the theory of communicative competence proposed by Canale and Swain, the Communicative Language Teaching (CLT) approach, and recent scholarly research concerning the integration of generative artificial intelligence into educational practice. Since this research is purely theoretical in nature, no pedagogical experiment or empirical survey was conducted; this methodological limitation is acknowledged, and future research is encouraged to validate these findings through experimental investigations.

2.2. Results

The literature review demonstrates that ChatGPT is an effective digital tool for developing learners' oral communication competence in English. Its dialogic interaction model enables learners to communicate freely with artificial intelligence, simulate authentic communicative situations, and receive immediate feedback on grammatical and lexical errors. Based on the reviewed studies, the following major didactic opportunities of ChatGPT were identified:

- It increases learners' speaking participation and oral engagement.
- It strengthens communicative confidence.
- It contributes to vocabulary development.
- It provides immediate identification and explanation of grammatical errors.
- It supports individualized learning pathways.
- It enables the creation of authentic communicative situations for language practice.

Furthermore, the reviewed literature indicates that ChatGPT allows learners to engage in free conversations on a wide range of topics, complete question-and-answer activities, participate in discussions and debates, and improve their oral fluency. These opportunities contribute to reducing communicative barriers while enhancing learners' psychological confidence in using English for communication. At the same time, the analysis revealed several limitations associated with the use of artificial intelligence in language education: AI-generated responses may not always be pedagogically

appropriate or culturally accurate and may occasionally contain factual inaccuracies. Therefore, effective implementation of ChatGPT requires continuous teacher supervision, critical evaluation of AI-generated information, and the development of learners' information verification skills.

2.3. Discussion

Generative AI tools, particularly ChatGPT, possess considerable didactic potential for developing oral communication competence: they enable unlimited conversational practice, simulate diverse situations, provide immediate feedback, and support autonomous, individualized learning that is often difficult to achieve in traditional classrooms. These findings align with UNESCO's (2023) recognition of generative AI as a tool for personalizing learning and enriching teaching practice, while also emphasizing the need for ethical standards and pedagogical supervision. Kasneci et al. (2023) similarly argue that Large Language Models can transform educational practice provided teachers integrate them appropriately, and Lo (2023) reports positive effects of ChatGPT on learners' critical thinking, writing, and oral communication.

The analysis also indicates that ChatGPT contributes to reducing several major communicative barriers commonly experienced by language learners, including fear of speaking a foreign language (foreign language anxiety), limited vocabulary, anxiety about making grammatical mistakes, insufficient communicative experience, and low communicative self-confidence. By offering a low-stakes, non-judgmental environment for practice, ChatGPT allows learners to rehearse communicative situations repeatedly and at their own pace, which is difficult to replicate in a conventional classroom where speaking time is limited and learners are often reluctant to make mistakes in front of peers.

Nevertheless, artificial intelligence cannot replace the role of the teacher: AI-generated responses may occasionally include factual inaccuracies or pedagogically inappropriate recommendations, so the integration of ChatGPT into English language teaching should be guided by teacher supervision, critical thinking, and the principles of academic integrity. Key methodological limitations of this study should also be acknowledged: as the research is theoretical in nature, its conclusions have not been validated through empirical data such as classroom experiments or learner surveys, and should therefore be regarded as preliminary and further examined through future experimental research.

CONCLUSION

- ChatGPT is one of the most effective contemporary didactic tools for developing learners' oral communication competence in English.
- Generative AI positively influences speaking engagement, vocabulary development, grammatical accuracy, and communicative confidence.
- Integrating ChatGPT into English instruction can help reduce communicative barriers commonly experienced by A2-level learners.
- Effective implementation requires pedagogical supervision, academic integrity, and information security.
- Future research should conduct experimental studies to statistically evaluate the impact of ChatGPT-based methodologies on communicative competence.

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ADAPTIVE TRUST-AWARE MULTI-CRITERIA DECISION METHOD FOR INTELLIGENT ASSESSMENT SYSTEMS

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Abstract. *Intelligent assessment systems increasingly rely on multi-criteria decision-making (MCDM) to aggregate heterogeneous evidence of learner performance, yet most deployments keep criterion weights fixed and disregard the reliability of the evidence. This paper proposes the Adaptive Trust-aware Multi-Criteria Decision Method (ATMCDM), a framework that couples a dynamic trust model of assessment evidence with a context-sensitive weight adaptation mechanism. We formalize a trust-discounted decision function, an exponential trust update rule, a normalized adaptive weighting scheme, and a regularized objective that anchors adaptation to expert priors. A four-layer architecture and operational algorithm are presented; comparative analysis shows advantages over static MCDM baselines.*

Keywords: *decision intelligence; multi-criteria decision making; trust-aware artificial intelligence; adaptive weighting; intelligent* assessment systems; mathematical modeling; educational technology.

INTRODUCTION

*Artificial intelligence has resha*ped how educational institutions measure, interpret, and act upon learner performance. Contemporary intelligent assessment systems no longer depend on a single test score; they fuse quiz accuracy, behavioral engagement, response-time patterns, rubric-based judgments, and historical knowledge traces into a composite picture of learner competence (Al Braiki et al., 2020; Wang et al., 2024). This shift toward evidence-rich assessment has been accelerated by the broader maturation of AI in education, which has moved from experimental tutoring prototypes to production-grade platforms deployed at institutional scale (Chaudhry & Kazim, 2022; Bagunaid et al., 2022).

Multi-criteria decision-making offers a natural formal apparatus for this aggregation problem, and hybrid schemes such as fuzzy AHP–TOPSIS have already

been applied to the evaluation of distance learning modules and teaching solutions (Bekesiene et al., 2021; Kukreja, 2022). Nevertheless, three challenges persist in practice. First, the criterion weights produced by classical methods are essentially static: once elicited from experts or estimated from data, they remain unchanged regardless of how the assessment context evolves. Second, existing methods treat every evidence channel as equally dependable, although real educational data are unevenly reliable a learner may guess on a quiz, an engagement sensor may misfire, or a rubric may be applied inconsistently. Third, when assessment decisions are later confronted with verified outcomes, static frameworks provide no principled mechanism for correcting themselves.

The research gap, therefore, lies at the intersection of two largely disconnected literature. On one side, the MCDM community has produced sophisticated weighting and ranking techniques but has rarely modelled the evolving trustworthiness of criteria (Černevičienė & Kabašinskas, 2022; Baydaş & Ersoy, 2025). On the other side, work on trust-aware artificial intelligence has formalised computational trust and its temporal evolution, yet mainly for communications, robotics, and service selection rather than for educational decision processes (Hussein et al., 2020; Ghaleb & Azzedin, 2023; Zahedi et al., 2023).

The objective of this paper is to close this gap by proposing the Adaptive Trust-aware Multi-Criteria Decision Method (ATMCDM) a decision intelligence framework for intelligent assessment systems in which criterion weights adapt dynamically to contextual information, trust evolution, and observed learner performance. The contributions are threefold: (i) a four-layer architectural design that separates evidence normalization, trust estimation, adaptive weighting, and decision aggregation while closing a feedback loop over verified outcomes; (ii) a mathematical formulation comprising a trust-discounted decision function, an exponential trust update, a context-modulated weight adaptation rule, and a regularized learning objective; and (iii) an operational algorithm together with a comparative analysis against representative MCDM baselines.

2. Main Part

2.1 Related Works

Multi-criteria decision-making methods. MCDM has matured into a broad methodological family spanning AHP, TOPSIS, VIKOR, PROMETHEE, and their fuzzy extensions, with recent reviews charting both its consolidation and its growing entanglement with artificial intelligence (Černevičienė & Kabašinskas, 2022; Baydaş & Ersoy, 2025). AI-assisted MCDM pipelines have been demonstrated in domains as

diverse as trustworthy healthcare application benchmarking (Alsalem et al., 2024), flood damage management (Zabihi et al., 2023), maintenance planning supported by neural networks (Özcan et al., 2020), and urban decision processes (Guarini et al., 2024). Within education, fuzzy AHP–TOPSIS hybrids have been used to assess distance learning quality (Bekesiene et al., 2021) and to prioritize teaching interventions (Kukreja, 2022), while multi-criteria decision intelligence frameworks have been proposed for engineering risk prediction (Kamran et al., 2023). A shared limitation cuts across these studies: weights are computed once and frozen, so the decision model cannot respond when the reliability or relevance of a criterion changes over time.

Existing limitations. Table 1 summarises the comparison. Static methods (AHP, TOPSIS, fuzzy hybrids, entropy weighting) offer transparency but no temporal adaptivity; learning-based adaptation offers dynamics but limited interpretability and no explicit trust semantics. ATMCDM is designed to occupy the empty intersection: dynamic, context-aware, trust-explicit, and inspectable.

Method	Weights	Trust	Context	Interpretability
AHP	Pairwise, static	None	None	High
TOPSIS	Distance-based, static	None	None	High
Fuzzy AHP–TOPSIS (Bekesiene et al., 2021)	Fuzzy, static	None	None	Medium
Entropy weighting	Data-driven, static	None	None	Medium
RL-based dynamic (Troussas et al., 2025)	Learned, dynamic	Implicit	Partial	Low
ATMCDM (proposed)	Prior-anchored, dynamic	Explicit $\tau_j(t)$	Full	High

Table 1. Comparison of representative MCDM approaches relevant to intelligent assessment

2.2 The Proposed ATMCDM Framework

The ATMCDM framework organizes intelligent assessment into four cooperating layers. The input layer ingests three evidence streams: learner interaction logs, direct

assessment evidence, and context signals describing the current task and session. The intelligent processing layer hosts the three computational cores of the method. The criterion evaluation module converts raw evidence into a normalized decision matrix; the trust estimation module maintains a time-indexed trust score τ_j(t) for every criterion, reflecting how dependable that evidence channel has recently proven to be; and the adaptive weight engine re-balances criterion weights in response to trust evolution and contextual relevance.

This separation of concerns is deliberate. Because trust estimation, weight adaptation, and aggregation are distinct modules, an educator or system auditor can inspect each quantity independently, which directly addresses the interpret-ability deficit of purely learned adaptation. Table 2 contrasts the functional profile of ATMCDM with that of conventional assessment designs.

Table 2. Functional comparison of intelligent assessment approaches

Capability	Rule-based	Static MCDM	Adaptive LMS	ATMCDM
Multi-criteria fusion	Limited	Yes	Partial	Yes
Dynamic weighting	No	No	Partial	Yes
Explicit trust evolution	No	No	No	Yes
Contextual modulation	No	No	Yes	Yes
Outcome self-correction	No	No	Partial	Yes
Decision transparency	High	High	Low	High

2.3 Mathematical Formulation

Let A = {a_1, …, a_m} denote the decision alternatives (e.g., mastery classifications or instructional interventions) and C = {c_1, …, c_n} the assessment criteria supplied by the evidence channels. At cycle t, the raw evidence forms the decision matrix X(t) = [x_ij]. To make heterogeneous criteria commensurable, each entry is normalised according to its polarity:

$$r_{ij} = \frac{x_{ij}}{\max_i x_{ij}} \quad \text{(benefit)}, \qquad r_{ij} = \frac{\min_i x_{ij}}{x_{ij}} \quad \text{(cost)} \qquad (1)$$

Trust function. Each criterion is endowed with a trust degree $\tau_j(t) \in (0, 1]$ that evolves through exponential smoothing of observed evidence quality:

$$\tau_j(t) = \alpha\,\tau_j(t-1) + (1-\alpha)\,\varphi\left(e_j(t)\right), \qquad \varphi(e) = \frac{1}{1+e^{-k\,(e-e_0)}} \qquad (2)$$

where e_j(t) is a quality indicator of the evidence collected under criterion j (e.g., consistency with verified outcomes, completeness, or sensor confidence), φ is a logistic squashing function with steepness k and midpoint e_0, and α ∈ [0, 1) governs the inertia of trust. Trust therefore accumulates gradually but can decay quickly when evidence deteriorates an asymmetry that mirrors how human assessors revise confidence.] controls how rapidly the weight distribution may shift within a single cycle, preventing oscillatory behaviour when evidence is noisy.

Decision function. Alternatives are scored by a trust-discounted weighted aggregation:

$$D(a_i, t) = \sum_{j=1}^{n} w_j\,(t)\,\tau_j(t)\,r_{ij}(t), \qquad a^* = \operatorname{argmax}_i D(a_i, t) \qquad (5)$$

The double appearance of τ_j(t) — inside the weight and as a direct discount factor — is intentional: a criterion whose evidence is momentarily unreliable is down-weighted twice, once structurally and once at aggregation, so that transient noise cannot dominate a decision.

Objective function. Whenever verified outcomes y_l become available for a batch B_t of past decisions, the framework refines its parameters by minimising a regularised discrepancy:

$$\min_{w^{(0)},\,\alpha,\,\eta} \mathcal{L}(t) = \sum_{l \in B_t} \left(D(a_l, t) - y_l\right)^2 + \lambda \sum_{j=1}^{n} \left(w_j - w_j^{(0)}\right)^2 \qquad (6)$$

The first term penalises decisions that diverge from verified learner performance; the second anchors the adapted weights to the expert prior, with λ trading adaptivity against stability. This formulation keeps the method honest: adaptation is always bounded by pedagogically sanctioned priors, and every drift from the prior is traceable to observed outcome evidence.

2.4 Algorithm Overview

The operational cycle of ATMCDM, depicted in Fig. 2, proceeds as follows.

Algorithm 1: ATMCDM decision cycle

Input : prior weights w(0), hyper-parameters α, β, η, λ, k, e0

Output: ranked decisions, updated trust τ(t) and weights w(t)

1 initialise τ_j(0) ← 1, w_j(0) ← w_j(0)(prior) for all criteria j

2 for each assessment cycle t do

3 collect evidence X(t) and context c_t

4 normalise X(t) → R(t) by Eq. (1)

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estimate evidence quality $\varphi(e_j(t))$ by Eq. (2)
update trust $\tau_j(t)$ by Eq. (2)
compute context relevance $\gamma_j(c_t)$ and update weights $w_j(t)$ by Eqs. (3)–(4)
score alternatives $D(a_i, t)$ and rank by Eq. (5)
issue decision a^* with explanation $(w(t), \tau(t))$
if verified outcomes B_t available then
refine $w(0)$, α, η by minimising $L(t)$ by Eq. (6)
end if
end for

Each cycle runs in $O(m \cdot n)$ time for scoring plus $O(n)$ for trust and weight updates, so the method is computationally negligible relative to the data-collection pipeline of a learning platform and is suitable for real-time deployment.

3. Conclusion

This paper has introduced ATMCDM, an adaptive trust-aware multi-criteria decision method for intelligent assessment systems. Its scientific contribution lies in unifying three ingredients that the literature has so far treated separately: an explicit, temporally evolving trust model of assessment evidence; a context-modulated, prior-anchored adaptive weighting rule; and a trust-discounted decision function tightened by an outcome-driven regularized objective. Against static MCDM baselines, the framework offers responsiveness to context and evidence reliability; against purely learned adaptation, it preserves transparency, since every weight shift can be decomposed into trust, context, and prior components that an educator can audit.

Several directions remain open. Empirical validation on large-scale learning management system datasets is the immediate next step, including ablation of the trust and context terms. Learning the hyper-parameters α, β, and η through meta-optimization, extending the framework to group decision-making with multiple expert priors, and auditing the adapted weights for fairness across learner populations all constitute promising continuations of this work.

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BO‘LAJAK O‘QITUVCHILARNING RAQAMLI KOMPETENTLIGINI SUN’IY INTELLEKT PLATFORMALARI ASOSIDA RIVOJLANTIRISH MEXANIZMINI TAKOMILLASHTIRISH

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Annotatsiya. *Mazkur maqolada bo‘lajak o‘qituvchilarning raqamli kompetentligini sun’iy intellekt platformalari asosida rivojlantirish mexanizmi tahlil qilinadi. Zamonaviy AI vositalaridan foydalangan holda pedagogik ta’lim jarayonini takomillashtirish yo‘llari, bo‘lajak o‘qituvchilarda raqamli savodxonlik, algoritmik tafakkur va AI-instrumentlaridan samarali foydalanish ko‘nikmalarini shakllantirish masalalari yoritiladi. Tadqiqot natijasida oliy ta'lim muassasalarida raqamli kompetentlikni bosqichma-bosqich rivojlantirish modeli ishlab chiqildi hamda amaliy tavsiyalar taqdim etildi.*

Kalit so‘zlar: *raqamli kompetentlik, sun’iy intellekt, bo‘lajak o‘qituvchi, pedagogik ta'lim, AI platformalari, raqamli savodxonlik, adaptiv ta'lim.*

Abstract. *This article examines the mechanism for developing the digital competence of future teachers on the basis of artificial intelligence platforms. It analyzes ways to improve the process of pedagogical education through modern AI tools, and issues of forming digital literacy, algorithmic thinking, and skills for the effective use of AI instruments among pre-service teachers. As a result of the research, a stage-by-stage model for developing digital competence in higher education institutions was elaborated, and practical recommendations were proposed.*

Keywords: *digital competence, artificial intelligence, future teacher, pedagogical education, AI platforms, digital literacy, adaptive learning.*

Kirish

Jamiyatning raqamlashuvi va sun’iy intellekt (AI) texnologiyalarining ta'lim tizimiga faol kirib kelishi zamonaviy pedagog kadrlar tayyorlash tizimi oldiga yangi talablarni qo‘ymoqda. Bugungi kunda o‘qituvchidan nafari an’anaviy pedagogik-metodik bilimlarga ega bo‘lish, balki raqamli vositalarni, jumladan sun’iy intellekt

asosidagi platformalarni ta’lim jarayonida oqilona va samarali qo‘llay olish ko‘nikmasi ham talab etilmoqda. Xalqaro tashkilotlar-YUNESKO va Yevropa Ittifoqining tegishli hujjatlarida (masalan, DigCompEdu ramkaviy modelida) o‘qituvchining raqamli kompetentligi kasbiy kompetentlikning ajralmas qismi sifatida belgilangan.

O‘zbekiston Respublikasida oliy pedagogik ta'lim tizimini isloh qilish borasida qabul qilingan me’yoriy-huquqiy hujjatlar bo‘lajak o‘qituvchilarning raqamli va axborot-kommunikatsion kompetentligini shakllantirishni ustuvor vazifalardan biri sifatida belgilaydi. Shu bilan birga, amaliyot tahlili shuni ko‘rsatadiki, pedagogika yo‘nalishi talabalarining sun’iy intellekt platformalaridan (masalan, ChatGPT, Google Gemini, Microsoft Copilot, adaptiv ta'lim tizimlari) foydalanish ko‘nikmalari asosan stixiyali tarzda, tizimli metodik yondashuvsiz shakllanmoqda. Bu esa mazkur muammoni ilmiy asoslangan mexanizm orqali hal etish zaruratini keltirib chiqaradi.

Tadqiqotning maqsadi - bo‘lajak o‘qituvchilarning raqamli kompetentligini sun’iy intellekt platformalari asosida rivojlantirishning nazariy-metodik mexanizmini ishlab chiqish va uni oliy ta'lim amaliyotiga tatbiq etish yo‘llarini asoslashdan iborat. Ushbu maqsadga erishish uchun quyidagi vazifalar belgilandi: raqamli kompetentlik tushunchasining mazmun-mohiyatini aniqlashtirish; sun’iy intellekt platformalarining pedagogik ta'lim jarayonidagi imkoniyatlarini tahlil qilish; raqamli kompetentlikni rivojlantirishning bosqichma-bosqich modelini ishlab chiqish; va amaliy tavsiyalar tayyorlash.

Asosiy qism

Raqamli kompetentlik: tushuncha va tarkibiy komponentlar

Raqamli kompetentlik - shaxsning axborot-kommunikatsion texnologiyalar va raqamli vositalardan kasbiy va shaxsiy faoliyatda ongli, mas'uliyatli hamda samarali foydalanish qobiliyatidir. Yevropa Ittifoqining DigCompEdu ramkaviy modeli o‘qituvchining raqamli kompetentligini olti yo‘nalishga ajratadi: kasbiy faoliyatda raqamli vositalardan foydalanish, raqamli resurslar bilan ishlash, o‘qitish va o‘rgatish jarayonini raqamlashtirish, baholash, o‘quvchilarning imkoniyatlarini kengaytirish hamda ularda raqamli kompetentlikni rivojlantirishga ko‘maklashish. Bo‘lajak o‘qituvchi uchun ushbu tarkibiy qismlarning barchasi hali ta'lim jarayonida shakllanishi lozim bo‘lgan ko‘nikmalar majmuidir.

Sun’iy intellekt platformalari kontekstida raqamli kompetentlik yana bir qator o‘ziga xos komponentlar bilan boyiydi: AI-savodxonlik (AI literacy) - sun’iy intellekt tizimlarining ishlash tamoyillarini tushunish; so‘rov shakllantirish ko‘nikmasi (prompt engineering) - AI vositalaridan samarali natija olish uchun aniq va maqsadli so‘rovlar

tuzish qobiliyati; tanqidiy baholash ko‘nikmasi - AI tomonidan taqdim etilgan ma'lumotlarning ishonchliligini tekshirish; va axloqiy-huquqiy ongdorlik - AI'dan foydalanishda intellektual mulk, maxfiylik va akademik halollik masalalarini hisobga olish.

Sun’iy intellekt platformalarining pedagogik ta'lim jarayonidagi imkoniyatlari

Zamonaviy AI platformalari bo‘lajak o‘qituvchilar tayyorlash jarayonida bir necha yo‘nalishda qo‘llanilishi mumkin. Birinchidan, individuallashtirilgan (adaptiv) ta'lim tizimlari har bir talabaning bilim darajasi va o‘zlashtirish sur'atiga moslashgan o‘quv trayektoriyasini shakllantirishga imkon beradi. Ikkinchidan, generativ AI vositalari (matn, taqdimot, test topshiriqlari va ko‘rgazmali materiallar yaratish) o‘qituvchi mehnatini avtomatlashtirib, ijodiy va metodik faoliyat uchun ko‘proq vaqt ajratish imkonini beradi. Uchinchidan, virtual pedagogik simulyatorlar bo‘lajak o‘qituvchilarga real sinf sharoitini taqlid qiluvchi vaziyatlarda amaliy ko‘nikmalarni xavfsiz muhitda mashq qilish imkoniyatini yaratadi.

Shu bilan birga, AI platformalaridan foydalanishda bir qator xavf-xatarlar ham mavjud: AI natijalariga haddan tashqari tayanish talabaning mustaqil tanqidiy fikrlash qobiliyatini susaytirishi, ma'lumotlarning noto‘g'ri yoki noaniq bo‘lishi ("gallyutsinatsiya" hodisasi), shuningdek raqamli tengsizlik muammosi - barcha talabalarning sifatli AI vositalariga bab-baravar kirish imkoniyatiga ega emasligi. Shu sababli mexanizmni ishlab chiqishda ushbu xavflarni oldini olish choralari ham nazarda tutilishi lozim.

Raqamli kompetentlikni rivojlantirishning bosqichma-bosqich mexanizmi

Tadqiqot natijasida bo‘lajak o‘qituvchilarning raqamli kompetentligini sun’iy intellekt platformalari asosida rivojlantirishning to‘rt bosqichli mexanizmi ishlab chiqildi.

Birinchi bosqich - diagnostik-motivatsion bosqich. Ushbu bosqichda talabalarning boshlang'ich raqamli kompetentlik darajasi maxsus test va so‘rovnomalar orqali aniqlanadi, shuningdek AI texnologiyalaridan foydalanishga nisbatan motivatsiya shakllantiriladi.

Ikkinchi bosqich - nazariy-tushuntirish bosqichi. Bu bosqichda talabalarga sun’iy intellekt texnologiyalarining ishlash tamoyillari, imkoniyatlari va cheklovlari haqida tizimli bilim beriladi, maxsus "Ta'limda sun’iy intellekt" kursi yoki moduli tatbiq etiladi.

Uchinchi bosqich - amaliy-loyihaviy bosqich. Talabalar konkret AI platformalari (masalan, taqdimot yaratuvchi, test tuzuvchi, adaptiv topshiriq generatorlari)

yordamida haqiqiy o‘quv materiallarini ishlab chiqadilar, mikroo‘qitish (microteaching) mashg'ulotlarini o‘tkazadilar va o‘zaro ekspert baholash tizimidan foydalanadilar.

To‘rtinchi bosqich - reflektiv-baholash bosqichi. Yakuniy bosqichda talabalarning erishgan natijalari portfolio, kompetentlik xaritasi va o‘z-o‘zini baholash vositalari orqali tahlil qilinadi, kelgusi rivojlanish yo‘nalishlari belgilanadi.

Har bir bosqichda o‘qituvchi-mentor rolining o‘zgarishi ham muhim ahamiyat kasb etadi - agar an’anaviy ta'limda o‘qituvchi asosan bilim uzatuvchi bo‘lsa, mazkur mexanizmda u talabaning AI bilan hamkorlikdagi ijodiy faoliyatini yo‘naltiruvchi va tanqidiy fikrlashni rag'batlantiruvchi tyutorga aylanadi.

Amaliy tavsiyalar

Tadqiqot natijalariga asoslanib quyidagi amaliy tavsiyalar shakllantirildi: oliy ta'lim muassasalari o‘quv rejalariga "Ta'limda sun’iy intellekt" mazmunidagi maxsus kurslarni kiritish; professor-o‘qituvchilar uchun AI platformalaridan foydalanish bo‘yicha malaka oshirish dasturlarini tashkil etish; talabalar uchun AI vositalaridan foydalanishning axloqiy-huquqiy me'yorlarini belgilovchi ichki qoidalar ishlab chiqish; va barcha talabalar uchun sifatli raqamli infratuzilma hamda AI platformalariga teng kirish imkoniyatini ta'minlash.

Xulosa

Xulosa qilib aytganda, bo‘lajak o‘qituvchilarning raqamli kompetentligini sun’iy intellekt platformalari asosida rivojlantirish zamonaviy pedagogik ta'lim tizimining dolzarb va istiqbolli yo‘nalishlaridan biridir. Tadqiqot davomida ishlab chiqilgan to‘rt bosqichli mexanizm - diagnostik-motivatsion, nazariy-tushuntirish, amaliy-loyihaviy va reflektiv-baholash bosqichlaridan iborat bo‘lib, u bo‘lajak o‘qituvchilarda nafaqat texnik ko‘nikmalarni, balki tanqidiy fikrlash, ijodkorlik va axloqiy mas'uliyat tuyg'usini ham uyg'un tarzda shakllantirishga xizmat qiladi. Taklif etilgan mexanizmni amaliyotga tatbiq etish oliy pedagogik ta'lim sifatini oshirish, bitiruvchilarning kasbiy raqobatbardoshligini ta'minlash va O‘zbekiston ta'lim tizimini raqamli transformatsiya sharoitida rivojlantirish uchun muhim zamin yaratadi. Kelgusi tadqiqotlarda ushbu mexanizmning samaradorligini empirik tarzda aniqlash, turli yo‘nalish talabalari misolida sinovdan o‘tkazish dolzarb vazifa bo‘lib qolmoqda.

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ARTIFICIAL INTELLIGENCE IN SOFTWARE DEVELOPMENT: APPLICATIONS, BENEFITS, AND CHALLENGES

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***Abstract**: Artificial Intelligence (AI) has become an essential component of modern software development by improving productivity, reducing repetitive tasks, and supporting developers throughout the software development lifecycle. AI-powered tools such as ChatGPT, GitHub Copilot, Claude Code, Gemini Code Assist, and Amazon Q Developer enable automatic code generation, debugging, documentation, software testing, and project management. These technologies significantly reduce development time while improving code quality and software reliability. However, AI-assisted software development also presents several challenges, including security vulnerabilities, inaccurate code generation, copyright issues, and excessive dependence on automated systems. This study reviews recent developments in AI-based software development, analyzes the major applications, benefits, and challenges of AI technologies, and discusses future trends in intelligent software engineering. The findings demonstrate that AI should be considered a collaborative tool that enhances human developers rather than replacing them.*

***Keywords:** Artificial intelligence, software development, software engineering, code generation, GitHub Copilot, ChatGPT*

INTRODUCTION

Artificial Intelligence has emerged as one of the most influential technologies of the twenty-first century, significantly transforming various scientific, industrial, and commercial sectors. Continuous advances in machine learning, deep learning, computer vision, and natural language processing have enabled AI systems to solve increasingly complex problems with high efficiency and accuracy. These developments have accelerated the digital transformation of organizations and changed the way software systems are designed, developed, tested, and maintained.

Software development is among the industries that have experienced the greatest impact from AI technologies. Traditionally, software engineering involved labor-intensive activities such as requirements analysis, software design, manual coding, debugging, testing, documentation, deployment, and maintenance. These activities required extensive human effort and technical expertise while consuming considerable development time. The introduction of AI-powered development tools has significantly improved these processes by automating repetitive tasks and providing intelligent recommendations during software development.

Table 1. Comparison of AI-powered software development tools.

AI Tool	Code Generation	Debugging	Documentation	Code Review
ChatGPT	✓	✓	✓	✓
GitHub Copilot	✓	Limited	Limited	✓
Claude Code	✓	✓	✓	✓
Gemini Code Assist	✓	✓	✓	Limited
Amazon Q Developer	✓	✓	✓	✓

The rapid evolution of Large Language Models (LLMs) has further expanded the capabilities of AI in software engineering. Modern AI systems such as ChatGPT, GitHub Copilot, Claude Code, Gemini Code Assist, Amazon Q Developer, and Cursor AI are capable of understanding natural language instructions and generating high-quality source code in multiple programming languages. These systems assist developers by generating algorithms, explaining complex programming concepts, identifying software defects, optimizing existing code, producing technical documentation, and supporting software testing activities. Consequently, AI has become an important assistant for both beginner and experienced software engineers.

Another significant contribution of AI is the acceleration of the Software Development Life Cycle (SDLC). Intelligent programming assistants reduce development time by automating repetitive coding activities, suggesting code improvements, detecting syntax and logical errors in real time, and simplifying documentation generation. Many software companies have integrated AI-powered development environments into their daily workflows to improve productivity and reduce operational costs. The growing adoption of AI has also encouraged software engineering teams to focus more on software architecture, business logic, and creative problem-solving while delegating repetitive programming tasks to intelligent systems.

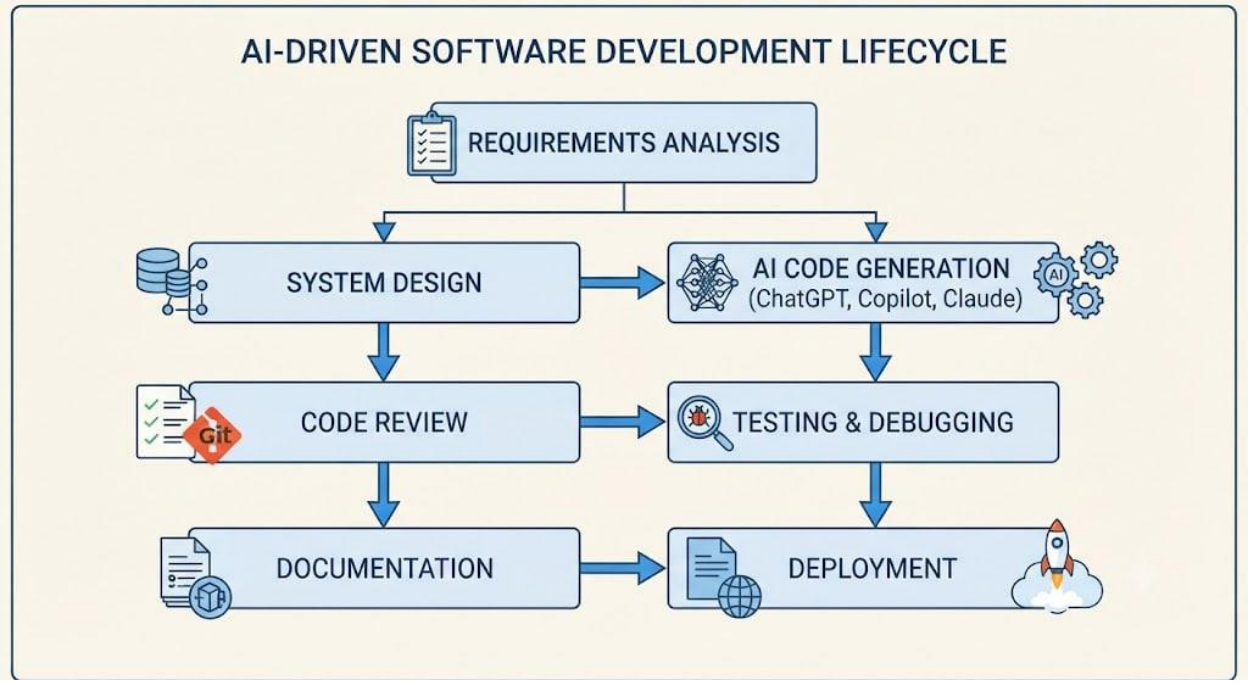

Figure 1. AI-assisted software development workflow.

Despite these remarkable advantages, AI-assisted software development introduces several technical, ethical, and legal challenges. AI-generated code may contain logical inconsistencies, security vulnerabilities, inefficient algorithms, or outdated programming practices. Moreover, concerns related to intellectual property, data privacy, algorithmic bias, and excessive dependence on AI-generated solutions remain active research topics. Human supervision therefore continues to play a critical role in validating AI-generated software and ensuring software quality.

The objective of this study is to investigate the current applications of artificial intelligence in modern software development, analyze its major benefits and limitations, evaluate its influence on software engineering practices, and discuss future trends that are expected to shape the next generation of intelligent software development environments.

MATERIALS AND METHODS

This study employs a qualitative literature review methodology to investigate the role of artificial intelligence in modern software development. A comprehensive review of recent scientific publications, industrial reports, technical documentation, and international standards was conducted to examine current AI technologies used throughout the software development lifecycle. The research primarily focuses on

publications released between 2022 and 2026, during which generative artificial intelligence experienced rapid development and widespread industrial adoption.

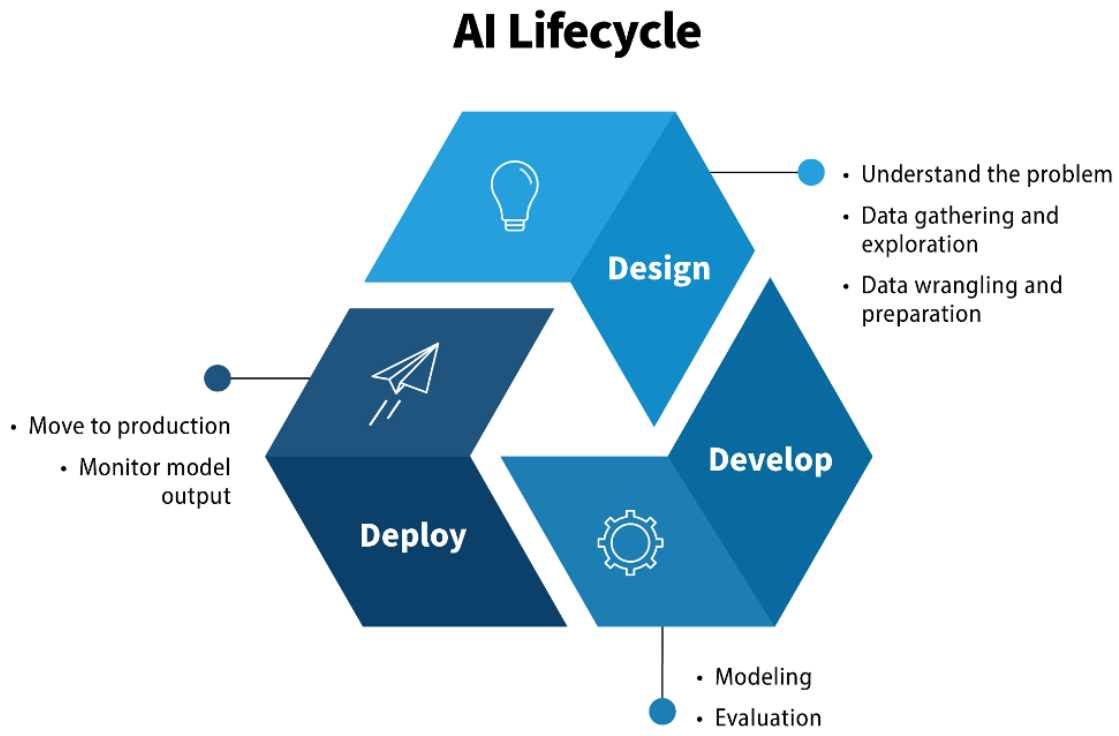

Figure 2. Integration of Artificial Intelligence into the Software Development Life Cycle.

Scientific articles were collected from internationally recognized academic databases, including IEEE Xplore, ACM Digital Library, SpringerLink, ScienceDirect, Google Scholar, and arXiv. Only peer-reviewed publications, conference proceedings, technical reports, and official documentation from leading AI organizations such as OpenAI, Google, Microsoft, Amazon, and Anthropic were considered. This approach ensured that the analyzed information was reliable, up-to-date, and relevant to current software engineering practices.

The research examined several widely used AI-assisted software development tools, including ChatGPT, GitHub Copilot, Claude Code, Gemini Code Assist, Amazon Q Developer, and Cursor AI. These tools were analyzed according to their functionality in code generation, software debugging, documentation generation, software testing, code optimization, and developer productivity enhancement.

A comparative analysis method was applied to identify similarities and differences among these AI systems. Additionally, thematic analysis was used to

classify the primary benefits, limitations, and future opportunities associated with AI-assisted software engineering. The collected information was synthesized to provide a comprehensive overview of how artificial intelligence influences software development processes and professional programming practices.

RESULTS

The analysis demonstrates that artificial intelligence has become an integral component of modern software engineering. AI-assisted programming tools have significantly improved developer productivity by reducing the time required for coding, debugging, testing, and documentation. These intelligent systems enable developers to focus on solving complex software engineering problems while delegating repetitive programming tasks to AI assistants.

Among the analyzed tools, GitHub Copilot demonstrated strong performance in real-time code completion and automatic generation of programming functions based on contextual information. ChatGPT and Claude Code proved particularly effective in explaining programming concepts, generating algorithms, correcting logical errors, and assisting with software architecture design. Gemini Code Assist and Amazon Q Developer showed notable advantages in enterprise software development, cloud computing environments, and DevOps workflows.

The study identified several important benefits associated with AI integration into software development. AI systems reduce software development time by automating repetitive coding activities and accelerating debugging processes. They also improve software quality through intelligent code suggestions, automated error detection, and optimization recommendations. Furthermore, AI-powered documentation tools simplify technical writing and improve project maintainability. Beginner programmers particularly benefit from AI-generated explanations and interactive programming assistance, which accelerate learning and improve coding skills.

Table 2. Benefits and challenges of AI-assisted software development.

Benefits	Challenges
Faster code generation	AI hallucination
Higher productivity	Security vulnerabilities
Reduced development time	Privacy concerns
Improved documentation	Copyright issues
Better debugging	Overdependence on AI

However, several limitations remain. AI-generated source code occasionally contains logical inconsistencies, security vulnerabilities, inefficient implementations, and inaccurate programming recommendations. The phenomenon commonly referred to as "AI hallucination" may produce syntactically correct but functionally incorrect code. Additional concerns include copyright issues, confidential data leakage, limited contextual understanding, and excessive dependence on AI-generated solutions. Consequently, professional software engineers must carefully validate AI-generated outputs before integrating them into production systems.

The results indicate that AI should not be viewed as a replacement for software developers. Instead, it serves as an intelligent assistant that enhances productivity, supports decision-making, and improves software engineering efficiency while maintaining the essential role of human expertise in software design and quality assurance.

CONCLUSION

Artificial intelligence has fundamentally changed modern software development by introducing intelligent tools capable of supporting developers throughout the entire software development lifecycle. AI-powered programming assistants have improved productivity, accelerated software delivery, enhanced code quality, and reduced development costs by automating repetitive programming tasks. Technologies such as ChatGPT, GitHub Copilot, Claude Code, Gemini Code Assist, and Amazon Q Developer demonstrate the growing importance of AI in contemporary software engineering.

Despite these advantages, AI-assisted software development also presents several technical, ethical, and security challenges. AI-generated code requires careful human verification to ensure correctness, security, maintainability, and compliance with software engineering standards. Organizations adopting AI technologies should establish appropriate development guidelines, security policies, and validation procedures to maximize the benefits of AI while minimizing associated risks.

Future software engineering is expected to become increasingly collaborative, combining human creativity, engineering expertise, and artificial intelligence capabilities. Advances in large language models, autonomous AI agents, and intelligent software development environments will continue to reshape software engineering practices. Continued research should focus on improving the reliability, transparency, explainability, and security of AI-powered software development tools to support sustainable innovation in the software industry.

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3-SECTION

TIBBIY MULOQOT VA TERMINOLOGIYANI O‘RGATISHDA INTERFAOL METODLAR HAMDA SIMULYATSIYA TEXNOLOGIYALARI (ROLLI O'YINLAR, KLINIK KEYSLAR, DE-ESCALATION USULLARI)

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Аннотация. *В данной статье рассматривается роль интерактивных методов обучения и симуляционных технологий в формировании навыков клинического общения и освоении профессиональной терминологии у будущих медицинских специалистов. Анализируется практическая эффективность внедрения ролевых игр, клинических кейсов и методов деэскалации (снижения уровня конфликтов и тревожности) в образовательный процесс. Особое внимание уделяется интеграции коммуникативных моделей (SPIKES, NURSE, SBAR) и значению дебрифинга для развития эмоционального интеллекта, стрессоустойчивости и соблюдения деонтологических норм у студентов-медиков.*

Ключевые слова: *медицинское общение, медицинская терминология, симуляционное обучение, ролевые игры, клинические кейсы, деэскалация, протокол SPIKES, модель NURSE, SBAR.*

Abstract. *This article explores the role of interactive teaching methods and simulation technologies in developing clinical communication skills and mastering professional medical terminology among future healthcare specialists. It analyzes the practical effectiveness of integrating role-playing games, clinical cases, and de-escalation techniques (reducing conflict and anxiety) into the educational process. Special emphasis is placed on the implementation of communication frameworks (SPIKES, NURSE, SBAR) and the critical role of debriefing in fostering emotional*

intelligence, stress resistance, and adherence to medical ethics among healthcare students.

Keywords: *medical communication, medical terminology, simulation training, role-playing, clinical case-based learning, de-escalation techniques, SPIKES protocol, NURSE model, SBAR.*

Zamonaviy tibbiyot ta’limida bo‘lajak shifokor va sog‘liqni saqlash menejerlarining kasbiy kompetensiyasi faqatgina chuqur nazariy bilim va klinik diagnostika bilan cheklanmaydi. Bemor va uning yaqinlari bilan samarali hamda empatik muloqot o‘rnatish, shuningdek, murakkab lotincha va klinik terminlarni bemorga tushunarli tilga aylantira olish ko‘nikmasi davolash samaradorligining muhim omili hisoblanadi.

Shuningdek, preventiv tibbiyot va jamoat salomatligi sohasida turli qatlamdagi aholi bilan muloqot qilishda, nizoniy yumshatish (de-escalation) va maxsus muloqot protokollarini (SPIKES, NURSE, SBAR) qo‘llash amaliyotini shakllantirish dolzarb masalalardandir.

Rolli o‘yinlar — muloqot va terminologik moslashuv vositasi

Rolli o‘yinlar (Role-playing games) talabalarga nazariy bilimlarni ijtimoiy-psixologik kontekstda qo‘llash imkonini beradi. Mazkur metod ikkita asosiy yo‘nalishda natija beradi:

1. Terminologiyani "Tarjima qilish" mashqi: Talabaga murakkab tashxis (masalan, Miyokard infarkti, Cho‘tkasimon chegara yetishmovchiligi) beriladi. Talaba shifokor rolida ushbu patologik jarayonni lotincha jargonlarsiz, oddiy bemor tushunadigan o‘xshatishlar orqali tushuntirib berishi lozim.

2. "Standartlashtirilgan bemor" (Standardized Patient) simulyatsiyasi: Maxsus ssenariy bo‘yicha tayyorlangan aktyor yoki talaba bemor obrazini yaratadi. Shifokor rolidagi talaba anamnez yig‘adi, ochiq va yopiq savollar balansini saqlaydi hamda bemorning ruhiy holatiga qarab suhbat terminologiyasini moslashtiradi.

Klinik keyslar (Case-Based Learning) va hujjatlashtirish

Klinik keyslar real tibbiyot amaliyotidan olingan situatsion topshiriqlar bo‘lib, u orqali talabalar tahliliy fikrlash va terminologik aniqlikni shakllantiradi.

• Anamnez yig‘ish va dialog: Talaba bemor bilan oddiy tilda suhbatlashadi.

• Akademik hujjatlashtirish: Bemor aytgan maishiy iboralarni ("yuragim sanchib beryapti", "boshim aylanib ko‘zim tindim") talaba kasallik tarixida (status praesens) professional tibbiy terminologiya bilan rasmiylashtiradi (stenokardik og‘riq, vertigo).

• Konsilium simulyatsiyasi: Keys yakunida talabalar kollegial muloqotga kirishib, professional atamalar va SBAR (Situation, Background, Assessment, Recommendation) modeli asosida bir-birlariga axborot berishadi.

De-escalation texnologiyalari va psixologik modellar

Klinik amaliyotda agressiv, vahimadagi yoki og‘ir ruhiy tushkunlikdagi bemorlar va ularning yaqinlari bilan muloqot qilish tez-tez uchraydi. Bunday vaziyatlarda nizoniy yumshatish (de-escalation) usullari maxsus simulyativ ramkalar orqali o‘rgatiladi.

• NURSE modeli (Emotsional qo‘llab-quvvatlash): Naming (nomlash), Understanding (tushunish), Respecting (hurmat), Supporting (yordam), Exploring (aniqlashtirish). Bemorning agressiyasi yoki xavotirini pasaytirish, empatiya bildirish iboralarini avtomatizmga keltirish.

• SPIKES protokoli (Yomon xabarlarni yetkazish): Og‘ir diagnostik xabarlarni yetkazishda bosqichma-bosqich yondashuv. Tana tili, nigoh, pauza tutish va og‘ir oqibatlarni ehtiyotkor terminlar bilan yetkazish.

• SBAR standarti (Tibbiy xodimlar muloqoti): Vaziyat, anamnez, baholash va tavsiyani qisqa hamda tezkor yetkazish. Vaqt yetishmovchiligi va shoshilinch vaziyatlarda aniq terminologik muloqot.

Debriefing — simulyatsion ta’limning o‘zagi

Simulyatsiya yoki rolli o‘yin jarayonining o‘zi yetarli emas. Mashg‘ulotning eng muhim va ta’sirli bosqichi bu Debriefing (qilingan ishlarni tahlil qilish) hisoblanadi.

Debriefing davomida:

• Videotasvir yoki kuzatuvchilar varaqasi asosida talabaning verbal va noverbal xatti-harakatlari muhokama qilinadi.

• Qaysi iboralar bemorda xavotirni oshirgani va qaysi terminlar noto‘g‘ri qo‘llanilgani aniqlanadi.

• Konstruktiv fikr-mulohaza (feedback) berilib, to‘g‘ri muloqot modeli qayta shakllantiriladi.

Simulyatsion o‘quv mashg‘uloti ssenariysi

Mavzu: Tibbiy muloqotda terminologik moslashuv va De-escalation (nizo va xavotirni yumshatish) ko‘nikmalarini shakllantirish

Maqsadi: Talabalarda murakkab klinik atamalarni bemorga tushunarli maishiy tilga o‘girish, vahima hamda agressiya holatidagi bemor (va uning yaqini) bilan empatik muloqot o‘rnatish hamda NURSE va SBAR protokollarini amalda qo‘llash ko‘nikmalarini rivojlantirish.

I. Mashg‘ulot parametrlari va qatnashchilar

Ajratilgan vaqt: 20 daqiqa (10 daqiqa simulyatsiya + 10 daqiqa debriefing/tahlil).

Jihozlar va rekvizitlar: Shifokor xonasi (stul, stol, tonometr, fonendoskop, bemorning tibbiy kartasi, tahlil natijalari varaqasi).

Ishtirokchilar:

1. Shifokor (Talaba): Qabul bo‘limi yoki oilaviy shifokor.

2. Bemor (Standartlashtirilgan bemor / Aktyor talaba): 55 yoshli erkak, gipertoniya bilan og‘riydi, arterial bosimi oshganida sarosimaga tushadi, dorilarning nojo‘ya ta'siridan qo‘rqadi.

3. Bemorning yaqini (Aktyor talaba): Agressiv kayfiyatdagi o‘g‘li yoki qizi (navbat kutish va shifokorlarning e'tiborsizligidan g‘azablangan).

4. Kuzatuvchilar (Qolgan talabalar va o‘qituvchi): Maxsus baholash varaqasi (Check-list) bilan jarayonni kuzatadi.

II. Klinik situatsiya (KS-kontekst)

Bemor holati: Bemor Buxoro shahar ko‘p tarmoqli markaziy poliklinikasiga bosh og‘rig‘i, ensa sohasidagi og‘irlik va umumiy holsizlik bilan murojaat qilgan. Tahlillar natijasida bemorda "Arterial gipertenziya II bosqich, 2-daraja. Gipolipidemic va gipotenziv terapiyaga ko‘rsatma" aniqlangan. Bemor dori vositalariga qaram bo‘lib qolishdan va jigar yetishmovchiligidan xavotirda. O‘g‘li esa shifokorga e'tiroz bildirib, tezroq yordam berilishini talab qilmoqda.

III. Rolli o‘yin dialogi va script (amaliy jarayon)

1-etap: Agressiv vaziyat va xavotir (De-escalation hamda NURSE modeli)

(Bemor va uning o‘g‘li shifokor xonasiga ruxsatsiz, jahli chiqqan holda kirib keladi)

Bemorning o‘g‘li (baland ovozda): "Doxtir! Qachongacha koridorda kutamiz? Otamning boshi yorilib ketay deyapti, sizlar bo‘lsa qog‘oz yozyapsizlar! Tibbiyotingiz ham, xizmatingiz ham o‘tsin!"

Shifokor (xato yondashuv — ziddiyatga kirishish): "Qoidani buzmang, tashqarida kuting! Men qabulni tugatganim yo‘q, xonadan chiqing!" (Bu ibora agressiyani oshiradi)

Shifokor (to‘g‘ri yondashuv — De-escalation & NURSE): (Sotsial masofani saqlab, bosiqlik va ochiq tana tili bilan stul taklif qiladi)

Naming (Emotsiyani nomlash): "Juda jahlingiz chiqqanini va otangizning salomatligi uchun qattiq qayg‘urayotganingizni ko‘rib turibman."

Understanding (Tushunish): "Sizning o‘rningizda bo‘lganimda, otamning boshi og‘rib turganda kutishga majbur bo‘lsam, men ham xuddi shunday asabiylashgan bo‘lardim."

Respecting (Hurmat): "Shunday qiyin holatda ham otangizga yordam berish uchun shoshib kelganingizni hurmat qilaman. Marhamat, o‘tiringizlar."

Supporting (Yordam): "Hozir shaxsan o‘zim otangizni ko‘rikdan o‘tkazaman va bosimini tushirishga yordam beraman."

2-etap: Terminologik moslashuv (Lotincha atamalarni maishiy tilga o‘girish)

(Shifokor bemorning qon bosimini o‘lchaydi: 170/100 mm.rt.st. Tahlillarni ko‘radi)

Bemor (sarosimada): "Doxtir, tahlillarim chiqdimi? Menga qiyin lotincha so‘zlarni aytmang, aniq ayting — yuragim to‘xtab qoladimi? Dori ichsam jigarim tamom bo‘lmaydimi?"

Shifokor (xato yondashuv — murakkab jargon): "Sizda essensial gipertenziya II daraja. Gipolipidemic preparatlar hamda ACE ingibitorlari buyurilishi shart, aks holda miyokard infarkti va cerebrovaskulyar insult xavfi o‘ta yuqori." (Bemor tushunmaydi va vahimaga tushadi)

Shifokor (to‘g‘ri yondashuv — tushunarli analogiya va terminologik moslashuv): "Xavotir olmang, keling barchasini birma-bir ko‘rib chiqamiz. Tahlillaringiz shuni ko‘rsatdiki, qon tomirlaringizdagi bosim normadan biroz yuqori. Buni xuddi suv quvuridagi bosim ortishiga o‘xshatish mumkin — agar bosimni tushirmasak, quvur zo‘riqadi."

"Biz buyurgan dorilar jigaringizga zarar yetkazmaydi, aksincha, qon tomirlaringizni dam aldirib, yuragingizni ortiqcha zo‘riqishdan xalos qiladi. Dori qabul qilish bilan birga tuzli va yog‘li taomlarni biroz kamaytirsak, tomirlaringiz va yuragingiz yengil nafas oladi."

3-etap: Tibbiyot xodimlari o‘rtasida muloqot (SBAR standarti)

(Shifokor holat bo‘yicha bo‘lim mudiri/kardiologga qo‘ng‘iroq qiladi yoki konsilium chaqiradi)

S (Situation - Vaziyat): "Xayrli kun, doktor. Men poliklinika 3-xonadagi oilaviy shifokorman. Bemor Karimov, 55 yosh, gipertonik kriz holatida murojaat qildi."

B (Background - Anamnez): "Bemor 5 yildan beri gipertoniya bilan og‘riydi. Muntazam dori qabul qilmagan. Qonda xolesterin miqdori yuqori."

A (Assessment - Baholash): "Hozirgi holati: Arterial bosim 170/100 mm.rt.st, puls 88/daq, ensada kuchli og‘riq va psixomotor hayajonlanish mavjud."

R (Recommendation - Tavsiya): "Bemorga zudlik bilan gipotenziv parenteral terapiya o‘tkazish hamda kardiolog ko‘rigini tashkillashtirishni tavsiya qilaman."

4-etap: Debriefing (mashg‘ulot tahlili va muhokama)

Mashg‘ulot yakunlangach, o‘qituvchi va talabalar quyidagi savollar bo‘yicha muhokama o‘tkazadilar:

1. Emotsional baho: Shifokor rolidagi talaba bemor va o‘g‘lining agressiyasini pasaytirishda NURSE modelining qaysi bosqichidan unumli foydalandi?

2. Terminologik aniqlik: Shifokor Arterial gipertenziya va gipotenziv terapiya atamalarini bemorga tushuntirishda qanday munosib analogiya (o‘xshatish) qo‘lladi?

3. Noverbal muloqot: Shifokorning tana tili, ko‘z muloqoti hamda ovoz tembri de-escalation qoidalariga mos keldimi?

4. Xatolar ustida ishlash: Qaysi jumlalar bemorda yoki uning yaqinida e'tiroz uyg‘otdi va ularni yana qanday muqobil iboralarga almashtirish mumkin

Xulosa

Tibbiy ta’limda interfaol metodlar va simulyatsiya texnologiyalarining qo‘llanishi talabalarning nafaqat lotincha va professional terminologiyani chuqur o‘zlashtirishini, balki ularni bemor bilan empatik va konstruktiv muloqot o‘rnata oladigan yetuk mutaxassis bo‘lib yetishishini ta’minlaydi. De-escalation va maxsus muloqot protokollarini (SPIKES, NURSE, SBAR) klinik simulyatsiyalarga integratsiya qilish orqali bo‘lajak shifokorlarda stressga chidamlilik hamda kasbiy etika barqaror shakllanadi.

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ARTIFICIAL INTELLIGENCE IN PREDICTING POSTOPERATIVE VASOSPASM AFTER RUPTURED INTRACRANIAL ANEURYSM CLIPPING IN CENTRAL ASIAN POPULATIONS

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Abstract.. *Cerebral vasospasm remains one of the most consequential complications following surgical clipping of ruptured intracranial aneurysms, contributing substantially to delayed cerebral ischemia and poor functional outcomes. Artificial intelligence (AI) and machine learning (ML) models have shown promising predictive accuracy in high-income settings, yet their applicability to Central Asian populations, characterized by distinct referral patterns, comorbidity profiles, and limited digital infrastructure, remains largely unexplored. This paper reviews current AI-based vasospasm prediction approaches, examines population-specific challenges in Central Asia, and proposes a preliminary framework for adapting predictive models to regional neurosurgical practice, informed by early institutional clinical experience.*

Keywords: *artificial intelligence; machine learning; cerebral vasospasm; delayed cerebral ischemia; ruptured intracranial aneurysm; aneurysm clipping; Central Asia; predictive modeling; neurosurgery.*

Annotatsiya.. *Bosh miya arteriyalarining spazmi (vazospazm) yorilgan intrakranial anevrizmalarni klipirovka qilish operatsiyasidan keyingi eng og'ir asoratlardan biri bo'lib, kechiktirilgan serebral ishemiya va noqulay funktsional natijalarga sabab bo'ladi. Sun'iy intellekt (AI) va mashinali o'rganish (ML) modellari yuqori daromadli mamlakatlarda yuqori bashorat aniqligini ko'rsatgan, biroq ularning o'ziga xos murojaat yo'llari, hamrohlik kasalliklari va cheklangan raqamli infratuzilmaga ega bo'lgan Markaziy Osiyo populyatsiyasiga qo'llanilishi hali yetarlicha o'rganilmagan. Ushbu maqolada AI asosidagi vazospazm bashorati yondashuvlari tahlil qilinadi, mintaqaga xos muammolar ko'rib chiqiladi va klinik tajriba asosida moslashtirilgan bashorat modeli uchun dastlabki asos taklif etiladi.*

Kalit so'zlar: *sun'iy intellekt; mashinali o'rganish; serebral vazospazm; kechiktirilgan serebral ishemiya; yorilgan intrakranial anevrizma; anevrizma klipirovkasi; Markaziy Osiyo; bashorat modellashtirish; neyroxirurgiya.*

INTRODUCTION

Aneurysmal subarachnoid hemorrhage (aSAH) remains one of the most devastating cerebrovascular emergencies, carrying high mortality and long-term disability even when the ruptured aneurysm is successfully secured [9]. Among the delayed complications that determine ultimate neurological outcome, cerebral vasospasm and its clinical correlate, delayed cerebral ischemia (DCI), are widely recognized as principal contributors to secondary brain injury after both microsurgical clipping and endovascular treatment [1]. Vasospasm remains difficult to predict reliably using conventional grading scales such as Hunt-Hess, Fisher, or WFNS alone, prompting growing interest in computational, data-driven prediction methods.

Over the past decade, artificial intelligence and machine learning have been increasingly applied to outcome prediction after aSAH. Systematic reviews and meta-analyses have shown that ML models, ranging from logistic regression to gradient-boosted trees and neural networks, can outperform traditional clinical scoring systems in predicting vasospasm and DCI by integrating demographic, radiological, laboratory, and hemodynamic variables [1, 2, 3, 4]. This evidence, however, overwhelmingly originates from cohorts in North America, Western Europe, and East Asia, where digital health infrastructure is comparatively well established. Central Asian healthcare systems, including that of Uzbekistan, differ substantially in referral pathways, comorbidity burden, and neuromonitoring availability [6]; referral delays of several weeks are not uncommon, and systemic comorbidities such as smoking and ischemic heart disease significantly influence recovery independently of aneurysm anatomy [6]. Population-specific risk-factor profiles have also been documented regionally [7], suggesting that externally developed models may not transfer without local calibration.

This paper therefore aims to (1) synthesize current evidence on AI-based prediction of vasospasm and DCI after aSAH, (2) discuss population-specific challenges of applying such models in Central Asia, and (3) propose a preliminary framework for future prospective validation.

MAIN PART

Clinical burden of vasospasm after aneurysm clipping

Cerebral vasospasm typically develops between day 3 and day 14 after aSAH and, when symptomatic, produces DCI in a substantial proportion of affected patients, worsening long-term functional outcome [1]. Microsurgical clipping remains the primary approach in many resource-constrained settings, making postoperative vasospasm surveillance a core responsibility of the treating team. Established severity scales (Hunt-Hess, Fisher/modified Fisher, WFNS) remain the mainstay of initial risk stratification; however, recent large cohort data suggest these traditional systems are not always independently predictive of long-term outcome once patients reach definitive treatment, with systemic factors such as periprocedural complications and comorbidity burden playing an equal or greater role [6]. This reinforces the rationale for multidimensional predictive approaches integrating clinical, radiological, and systemic variables simultaneously, a task for which AI and ML methods are particularly well suited.

AI and ML approaches to vasospasm and DCI prediction: current evidence

A 2025 systematic review and meta-analysis of 48 studies and more than sixteen thousand aSAH patients found ML models, most commonly logistic regression, gradient boosting, and neural networks, feasible for early DCI prediction, with substantial heterogeneity across studies [1]. A related meta-analysis found that ensemble and tree-based methods often outperformed logistic regression [3]. Retrospective cohorts have incorporated demographic variables, severity grades, aneurysm location, treatment modality, and CNS infection to train ML models with promising accuracy [4], while a multicenter study identified periprocedural and laboratory variables as robust DCI predictors [2]. Ethnic variation in predictors has also been documented: a large Chinese aSAH cohort reported distinct incidence rates and predictor profiles compared with Western cohorts, underscoring that population-specific calibration is necessary for reliable clinical application [5].

Population-specific considerations for Central Asia

Referral and treatment-timing patterns differ substantially from high-income settings: a recent Kazakhstani cohort of nearly five hundred endovascularly treated aSAH patients reported a median interval of twenty-six days from hemorrhage onset to arrival at a tertiary center, with rural patients disproportionately delayed [6]. Such delays alter the window during which vasospasm surveillance is actionable, so models trained on early-presenting cohorts may not generalize regionally. The same cohort found smoking and ischemic heart disease independently associated with unfavorable outcome, while anatomical and severity-based predictors lost significance after

adjustment [6], suggesting regional AI models should weight systemic comorbidity more heavily than aneurysm morphology alone. A Kazakh national cohort further indicates that regional genetic, environmental, and lifestyle factors may differ from those captured in models trained elsewhere [7]. Limited neuromonitoring and standardized electronic records also constrain the feature space for model training and the feasibility of external validation, a challenge recognized in discussions of global disparities in neurosurgical infrastructure [8].

Preliminary institutional experience and proposed framework

At NeurOn Medical, a private neurosurgical clinic managing a substantial caseload of ruptured intracranial aneurysms treated by microsurgical clipping, informal review of recent clinical experience with postoperative vasospasm surveillance suggests patterns broadly consistent with the regional literature above, namely a clinically relevant burden of vasospasm-related complications alongside variability in presentation timing and comorbidity profile. This experience has not yet been subjected to systematic statistical analysis, and quantitative conclusions must await a formally conducted cohort study. We propose a stepwise framework for a locally adapted tool: (1) a standardized clinical registry capturing demographic, severity, comorbidity, treatment, and complication data; (2) systematic documentation of vasospasm and DCI outcomes using consistent definitions; (3) initial application of interpretable ML algorithms before progressing to more complex architectures; and (4) prospective external validation across multiple Central Asian centers. This mitigates overfitting to a single-institution dataset and addresses the ethical and liability considerations accompanying clinical deployment of AI-based decision-support tools [10].

CONCLUSION

Artificial intelligence and machine learning offer a promising, increasingly validated approach to predicting postoperative vasospasm and delayed cerebral ischemia after ruptured intracranial aneurysm treatment. However, the existing evidence base is overwhelmingly derived from high-income, data-rich healthcare systems, and current findings from Central Asian cohorts indicate meaningful differences in referral timing, comorbidity impact, and population-specific risk factors that limit the direct transferability of externally developed models. Establishing standardized clinical registries and pursuing stepwise, locally validated AI model development is a realistic and necessary pathway for translating the potential of AI-based vasospasm prediction into routine neurosurgical practice in Uzbekistan and the broader Central Asian region.

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O‘ZBEKISTON RESPUBLIKASIDA YUQUMLI KASALLIKLAR PROFILAKTIKASI VA TELEMEDITSINA XIZMATLARINI DAVLAT BOSHQARUVIGA INTEGRATSIYALASHNING INSTITUTSIONAL-RAQAMLI MODELI: "MAQSAD–HARAKAT–NATIJA" YONDASHUVI

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Annotatsiya. *Ushbu maqolada O'zbekiston Respublikasida yuqumli kasalliklar profilaktikasi va telemeditsina xizmatlarini davlat boshqaruviga integratsiyalashning zamonaviy muammolari davlat siyosati va boshqaruvi (Public Administration) nuqtai nazaridan tahlil qilingan. Jahon sog'liqni saqlash tashkilotining "Health in All Policies" (Salomatlik barcha siyosatlarda) konsepsiyasi hamda OECD davlatlarining (Kanada, Singapur, Estoniya) ilg'or tajribasiga tayangan holda, maqolada an'anaviy tarmoq (silos) boshqaruvidan yaxlit "Whole-of-Government" (Umumdavlat) yondashuviga o'tish zarurati asoslangan. O'zbekistonning so'nggi normativ-huquqiy hujjatlari (PF-21, PF-77, PF-158) tahlili va aniqlangan institutsional bo'shliqlar asosida M.Rizakulov tomonidan yangi – "Maqsad–Harakat–Natija" (Goal-Action-Result) institutsional-raqamli boshqaruv modeli ishlab chiqilgan. Ushbu model davlat-xususiy sheriklik (DXSH) mexanizmlari hamda dalillarga asoslangan siyosat (Evidence-Based Policy) orqali sog'liqni saqlash tizimida institutsional muvofiqlashtirish va samaradorlikni oshirishga qaratilgan.*

Kalit so'zlar: *davlat boshqaruvi, raqamli boshqaruv, institutsional-raqamli model, telemeditsina, davlat-xususiy sheriklik (DXSH), Maqsad-Harakat-Natija monitoringi, dalillarga asoslangan siyosat, Health in All Policies.*

Abstract. *This article analyzes the contemporary challenges of integrating infectious disease prevention and telemedicine services into the public administration system of the Republic of Uzbekistan from a public policy and governance perspective. Drawing upon the World Health Organization’s "Health in All Policies" (HiAP) concept and the best practices of OECD countries (Canada, Singapore, Estonia), the study substantiates the imperative transition from traditional siloed administration to a holistic "Whole-of-Government" approach. Based on a comprehensive policy review*

of Uzbekistan's recent regulatory frameworks (Decrees UP-21, UP-77, and UP-158) and identified institutional gaps, M. Rizakulov has developed a novel "Goal-Action-Result" (GAR) institutional-digital governance model. This proposed model aims to enhance institutional coordination and operational efficiency within the healthcare sector by leveraging public-private partnership (PPP) mechanisms and promoting evidence-based policymaking.

Keywords: *public administration, digital governance, institutional-digital model, telemedicine, public-private partnership (PPP), Goal-Action-Result monitoring, evidence-based policy, Health in All Policies.*

Kirish

Post-pandemiya davrida sog'liqni saqlash tizimi inqirozlarga qanchalik tayyorligi davlat boshqaruvining samaradorligi bilan o'lchanadigan bo'ldi. Yuqumli kasalliklar profilaktikasi va raqamli tibbiyot integratsiyasi endilikda faqat tibbiyot xodimlarining emas, balki davlat siyosatini shakllantiruvchi institutlarning (Public Policy Makers) bosh strategik masalasiga aylangan. O'zbekiston Respublikasining "O'zbekiston – 2030" strategiyasi (PF-158) hamda 2026-yilda qabul qilingan PF-21 va PF-77 kabi normativ hujjatlari raqamli sog'liqni saqlash ekotizimini yaratishni kafolatlaydi. Biroq, bu jarayonni institutsional muvofiqlashtirish, xususiy sektorni jalb qilish va natijadorlikni monitoring qilishning yagona ilmiy asoslangan boshqaruv modeli hamon dolzarb vazifa bo'lib qolmoqda.

Muammoning dolzarbligi

Sog'liqni saqlashni boshqarishda texnologik infratuzilmani yaratish osonroq, biroq uni davlat boshqaruvining mavjud arxitekturasiga institutsional moslashtirish (Institutional Adaptation) eng murakkab jarayondir. Telemeditsinaning davlat tomonidan tartibga solinishi (Regulatory Framework) yetarlicha moslashuvchan emasligi axborot assimetriyasi, idoralararo tarqoqlik (silo effect) hamda byudjet mablag'larining maqsadsiz sarflanishiga olib kelishi mumkin. Shu sababli, boshqaruvda dalillarga asoslangan siyosatga (Evidence-Based Policy) va "Health in All Policies" (Salomatlik barcha siyosatlarda) tamoyiliga ehtiyoj yuqori.

Adabiyotlar sharhi va ilmiy bo‘shliq

Xalqaro tajribada telemeditsina va raqamli sog'liqni saqlash boshqaruvi bo'yicha ko'plab tadqiqotlar mavjud. Xususan, J. Kickbusch (2024) va T. Greenhalgh (2025) raqamli determinizmni sog'liqni saqlash siyosatida "Health in All Policies" doirasida o'rganishgan. OECD (2025) hisobotlarida davlat-xususiy sheriklik modellarining

raqamli tibbiyotdagi samaradorligi tartibga solish ta'sirini baholash (RIA) orqali ko'rsatilgan.

Ilmiy bo'shliq (Scientific Gap): Garchi raqamli tibbiyot texnologiyalari tibbiy (klinik) nuqtai nazardan keng yoritilgan bo'lsa-da, tranzitiv iqtisodiyotga ega davlatlarda (shu jumladan O'zbekistonda) uni huquqiy va ma'muriy boshqarish, xususan, "Maqsad-Harakat-Natija" uzviyligida monitoring qilishning yagona institutsional-raqamli mexanizmlari bo'yicha chuqur ilmiy-nazariy modellar yetishmaydi. Tadqiqot aynan shu bo'shliqni to'ldirishga qaratilgan.

Metodologiya

Tadqiqotda quyidagi metodlardan foydalanildi:

- **Institutsional tahlil (Institutional Analysis):** Davlat organlari, xususiy sektor va jamiyat o'rtasidagi funksional aloqalarni o'rganish.
- **Komparativ tahlil (Comparative Analysis):** Kanada, Estoniya, Singapur va Buyuk Britaniya kabi davlatlarning raqamli boshqaruv arxitekturasini O'zbekiston holati bilan solishtirish.
- **Huquqiy tahlil (Policy Analysis):** PF-21, PF-77, PQ-140 kabi so'nggi normativ-huquqiy hujjatlarning tartibga solish ta'sirini baholash (RIA tamoyillari asosida).
- **Natijaga yo'naltirilgan boshqaruv (Results-Based Management):** Loyihalarning samaradorligini "Maqsad-Harakat-Natija" zanjiri doirasida baholash mexanizmlari.

Nazariy asoslar: "Whole-of-Government" va "Health in All Policies"

Jahon sog'liqni saqlash tashkiloti (WHO) tavsiya etadigan "Health in All Policies" yondashuvi sog'liqni saqlash inqirozlarini bartaraf etishda nafaqat Sog'liqni saqlash vazirligi, balki Raqamli texnologiyalar, Moliya, va Iqtisodiyot vazirliklarining konsolidatsiyalashgan (Whole-of-Government) ishtirokini talab qiladi. Telemeditsina integratsiyasini boshqarishda davlat rolini provayderlikdan (xizmat ko'rsatuvchi) regulyatorlikka (tartibga soluvchi) aylantirish ushbu tadqiqotning bosh nazariy paradigmasi hisoblanadi.

Xalqaro tajriba va Taqqoslash

Komparativ tahlil turli davlatlarning telemeditsina boshqaruv modellarida farqlar borligini ko'rsatadi:

- **Kanada (Canada Health Infoway):** Boshqaruv modeli markazlashmagan bo'lsa-da, "Pan-Canadian Interoperability Roadmap" (2024-2027) orqali ma'lumotlar almashinuvi yagona davlat standarti bilan tartibga

solingan. Davlat ma'lumotlar xavfsizligini ta'minlaydi, xususiy sektor (DXSH) infratuzilmani yaratadi.

- **Estoniya:** E-Estonia doirasida blokcheyn texnologiyasiga asoslangan "X-Road" ma'lumotlar almashinuvi tizimi orqali bemor va davlat muassasalari o'rtasida ishonchli institutsional arxitektura shakllangan.
- **Singapur va Janubiy Koreya:** Proaktiv "Goal-Action-Result" monitoringini joriy qilgan. Sun'iy intellekt (AI) vositasida yuqumli kasalliklar tarqalishini bashorat qiluvchi milliy platformalar (dashboard) orqali idoralararo (Whole-of-Society) qarorlar qabul qilinadi.

Taqqoslash va O'zbekiston tajribasi:

O'zbekistonda raqamli transformatsiyani joriy etish yuqoridan-pastga (top-down) usulida amalga oshirilmoqda. 2026-yilgi PF-21 Farmoniga asosan "O'zbekiston-2030" strategiyasi ko'rsatkichlarini raqamli monitoring qilish tizimi belgilandi. PF-77 Farmoni esa IT-Med markazi va Klinik audit inspeksiyasini tashkil etib, davlatning regulyatorlik funksiyasini kuchaytirdi. Biroq, xalqaro tajribadan farqli o'laroq, O'zbekistonda DXSH doirasida telemeditsina operatorlarining ma'muriy mas'uliyati va risklarni taqsimlash (Risk Passport) bo'yicha integratsiyalashgan model mavjud emas.

M.Rizakulovning yangi modeli: "Institutsional-raqamli boshqaruv modeli" (Goal-Action-Result Governance Model)

Aniqlangan ilmiy va amaliy bo'shliqlarni to'ldirish maqsadida Mavlonjon Rizakulov tomonidan "Maqsad–Harakat–Natija" (Goal-Action-Result) yondashuviga asoslangan yaxlit (Integrated) institutsional-raqamli boshqaruv modeli ishlab chiqildi.

Model uchta makro-darajadan iborat:

I. Maqsad darajasi (Strategic Goal Framework):

Davlat siyosati va ustuvor maqsadlar (Masalan, SDG 3, O'zbekiston-2030 strategiyasi asosida kasalliklarni qisqartirish). Bu yerda Davlat boshqaruvi organlari (Vazirlar Mahkamasi, SSV) "Integrated KPI Passport" ni shakllantiradi.

II. Harakat darajasi (Action & Institutional Coordination):

Davlat va xususiy sektor hamkorligi (DXSH platformasi).

- *Regulyator:* SSV va IT-Med (Ma'lumotlar standarti, FHIR, xavfsizlik protokollari).
- *Ijrochi:* Xususiy telemeditsina operatorlari va autsorsing provayderlar.
- *Monitoring:* Klinik audit inspeksiyasi (PF-77 asosida dalillarga tayangan tibbiy-ma'muriy nazorat).

III. Natija darajasi (Evidence-Based Result Monitoring):

Yagona raqamli platformada "Digital Accountability Framework" ishga tushadi. Sun'iy intellekt orqali aholi salomatligining raqamli indeksi va idoralarning KPI ijrosi real vaqtda (Real-time Dashboard) monitoring qilinadi. Agar natijalar me'yordan og'sa, tizim avtomatik ravishda siyosatni o'zgartirish (Policy Adjustment) bo'yicha Tartibga solish ta'sirini baholash (RIA) signalini beradi.

Muhokama

Taklif etilayotgan "Goal-Action-Result Governance Model"ning asosiy ilmiy ahamiyati shundaki, u raqamlashtirishni shunchaki AT-infratuzilma emas, balki davlat boshqaruvi instituti sifatida qaraydi. Avvalgi tizimlarda faqat klinik natijalar (bemor tuzaldimi yoki yo'qmi) monitoring qilingan bo'lsa, ushbu model davlat xarajatlari samaradorligini, idoralararo hamkorlik sifatini va jamiyat farovonligini kompleks o'lchaydi. Bu Kanada (Canada Health Act) va WHOning so'nggi rezolyutsiyalariga (WHA78) to'la mos keladi. Shu bilan birga, tarmoq vazirliklarining axborot tizimlarini yagona arxitekturaga (interoperability) tushirish kabi texnik va qonuniy to'siqlar ushbu modelning amalga oshishidagi asosiy xatarlardan (risks) hisoblanadi.

Amaliy tavsiyalar va Normativ takliflar

1. **"Telemeditsina to'g'risida"gi va "Raqamli sog'liqni saqlash to'g'risida"gi qonun loyihalarini ishlab chiqish:** Davlat regulyatori va xususiy sektor majburiyatlari, hamda ma'lumotlar egaligi (data ownership) yuridik qat'iylashtirilishi shart.
2. **Raqamli DXSH (Digital PPP) mexanizmini joriy etish:** Telemeditsina markazlarini ochishni an'anaviy infrastruktura DXSHdan farqli ravishda, intellektual mulk va ma'lumotlar integratsiyasini inobatga oladigan maxsus mexanizmga o'tkazish.
3. **RIA Matrix (Tartibga solish ta'sirini baholash matritsasi)ni qo'llash:** Har qanday yangi raqamli sog'liqni saqlash dasturini tasdiqlashdan oldin uning byudjetga, aholining barcha qatlamlariga (shu jumladan chekka hududlarga) qanday ta'sir qilishini dalillarga asoslangan holda baholash mexanizmini majburiy qilish.
4. **"Integrated Digital Dashboard" (Yagona raqamli monitoring oynasi) tashkil etish:** PF-21 Farmoni asosida yuqumli kasalliklar profilaktikasi ko'rsatkichlarini real vaqt rejimida Oliy Majlis va Jamoatchilik nazorati kuzatishi uchun ochiq ma'lumotlar portali bilan integratsiya qilish.

Xulosa

O'zbekistonda telemeditsina xizmatlarini rivojlantirish faqatgina texnologik masala emas, balki chuqur ma'muriy-institutsional islohotdir. Tadqiqot natijasida ishlab chiqilgan "Maqsad–Harakat–Natija" institutsional-raqamli boshqaruv modeli davlat boshqaruvi nazariyasiga qo'shilgan hissa bo'lib, axborot texnologiyalari, DXSH prinsiplari va Evidence-Based Policy tamoyillarini o'zida birlashtiradi. Mazkur yondashuv idoraviy tarqoqlikni yo'q qiladi, davlat resurslarining samaradorligini kafolatlaydi hamda mamlakat sog'liqni saqlash tizimini innovatsion, adolatli va barqaror jamiyat barpo etishning asosiy drayveriga aylantiradi.

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РОЛЬ ЛЕЧЕБНОЙ ФИЗКУЛЬТУРЫ В ПРОФИЛАКТИКЕ ИШЕМИЧЕСКОЙ БОЛЕЗНИ СЕРДЦА У ЛИЦ СРЕДНЕГО ВОЗРАСТА С ИЗБЫТОЧНОЙ МАССОЙ ТЕЛА

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Аннотация. *В статье представлен аналитический обзор современных научных данных о значении лечебной физкультуры в профилактике ишемической болезни сердца у лиц среднего возраста с избыточной массой тела. Рассмотрены взаимосвязи физической неактивности, избыточной массы тела и сердечно-сосудистого риска, а также возможности индивидуализированного применения аэробных и силовых упражнений. Обосновано использование индекса массы тела, частоты сердечных сокращений, артериального давления, шестиминутного теста ходьбы и оценки качества жизни для мониторинга функционального состояния. Показана необходимость комплексного подхода, объединяющего физическую активность, контроль массы тела и коррекцию других модифицируемых факторов риска.*

Ключевые слова: *ишемическая болезнь сердца, избыточная масса тела, лечебная физкультура, физическая активность, кардиореабилитация, шестиминутный тест ходьбы, профилактика.*

Abstract. *This article presents an analytical review of current scientific evidence on the role of therapeutic exercise in the prevention of ischemic heart disease in middle-aged adults with overweight. The relationships between physical inactivity, excess body weight and cardiovascular risk are considered, together with the potential role of individualized aerobic and resistance exercise. Body mass index, heart rate, blood pressure, the six-minute walk test and quality-of-life assessment are discussed as practical measures for monitoring functional status. The review supports a comprehensive preventive strategy combining regular physical activity, weight management and correction of other modifiable cardiovascular risk factors.*

Keywords: *ischemic heart disease, overweight, therapeutic exercise, physical activity, cardiac rehabilitation, six-minute walk test, prevention.*

Введение

Ишемическая болезнь сердца относится к числу наиболее значимых хронических сердечно-сосудистых заболеваний и формируется под воздействием совокупности факторов риска. Среди модифицируемых факторов особое значение имеют недостаточная физическая активность, избыточная масса тела, артериальная гипертензия, нарушения липидного и углеводного обмена, курение и неблагоприятные особенности питания. Современный подход к профилактике сердечно-сосудистых заболеваний предусматривает не только медикаментозное лечение при наличии показаний, но и длительную коррекцию образа жизни.

Физическая активность является одним из наиболее доступных инструментов профилактической медицины. Всемирная организация здравоохранения рекомендует взрослым выполнять 150–300 минут аэробной физической активности умеренной интенсивности в неделю либо 75–150 минут активности высокой интенсивности или эквивалентное сочетание нагрузок. Дополнительно рекомендуется выполнять упражнения для основных мышечных групп не менее двух дней в неделю. Регулярная физическая активность связана с профилактикой сердечно-сосудистых заболеваний и улучшением общего состояния здоровья. [1,2]

Для людей с избыточной массой тела физическая активность имеет дополнительное значение, поскольку способствует увеличению энергозатрат, поддержанию функциональной способности и формированию устойчивого двигательного поведения. Вместе с тем чрезмерно интенсивное или неправильно дозированное начало тренировок может снижать приверженность и быть небезопасным у лиц с невыявленным сердечно-сосудистым заболеванием. Поэтому лечебная физкультура должна строиться на принципах индивидуализации, постепенности и регулярного контроля.

Цель работы — обобщить современные данные о роли лечебной физкультуры в профилактике ишемической болезни сердца у лиц среднего возраста с избыточной массой тела и определить наиболее рациональные показатели оценки функционального ответа на реабилитационные мероприятия.

Материалы и методы

Работа выполнена в формате аналитического обзора. Проанализированы актуальные рекомендации Всемирной организации здравоохранения и Европейского общества кардиологов, а также публикации и систематические обзоры, посвящённые физической активности, профилактике сердечно-

сосудистых заболеваний, кардиореабилитации и функциональному тестированию.

При формировании обзора особое внимание уделялось следующим вопросам: влиянию физической неактивности на сердечно-сосудистый риск; значению контроля массы тела; структуре аэробных и силовых тренировок; возможностям объективного контроля переносимости нагрузки; применению шестиминутного теста ходьбы и оценки качества жизни.

В качестве клинически доступных показателей рассматривались индекс массы тела (ИМТ), частота сердечных сокращений (ЧСС), артериальное давление (АД), дистанция шестиминутного теста ходьбы (6MWT) и качество жизни по стандартизированным опросникам. Работа не содержит собственных клинических результатов и не представляет литературные данные как результаты автора.

Результаты и обсуждение

Физическая неактивность является самостоятельным модифицируемым фактором риска. По данным ВОЗ, около 31% взрослых в мире не достигают рекомендуемого уровня физической активности. ВОЗ подчёркивает, что любая физическая активность лучше её полного отсутствия, а увеличение объёма активности может приносить дополнительные преимущества для здоровья. [1,2]

У лиц с избыточной массой тела снижение двигательной активности может формировать неблагоприятный цикл: низкая физическая активность способствует увеличению энергетического дисбаланса и массы тела, а увеличение массы тела, в свою очередь, может сопровождаться снижением переносимости нагрузки. Лечебная физкультура позволяет воздействовать на этот цикл через постепенное увеличение двигательной активности и улучшение функциональной способности.

Аэробная нагрузка является базовым компонентом программ физической активности. Ходьба, дозированная ходьба на тредмиле, велоэргометрические нагрузки и другие циклические упражнения могут использоваться в зависимости от исходного функционального состояния. При отсутствии противопоказаний программа может дополняться упражнениями с сопротивлением. Важно не только достигнуть определённого объёма нагрузки, но и обеспечить устойчивую приверженность пациента.

Современные рекомендации ESC по хроническим коронарным синдромам подчёркивают необходимость долгосрочного управления сердечно-сосудистым риском и комплексного подхода к пациентам с подозрением или

подтверждённым коронарным заболеванием. [3] Для пациентов с установленным сердечно-сосудистым заболеванием физические тренировки являются частью структурированной кардиореабилитации и должны учитывать клиническую безопасность.

Контроль массы тела следует рассматривать как один из компонентов комплексной профилактики. ИМТ удобен для скрининговой оценки, однако не характеризует распределение жировой ткани и состав тела. Поэтому интерпретация ИМТ должна дополняться клинической оценкой и, при возможности, другими антропометрическими и метаболическими показателями.

Одним из доступных функциональных методов является шестиминутный тест ходьбы. Он позволяет оценить субмаксимальную функциональную способность и относительно прост в применении. Систематический обзор 2023 года, посвящённый пациентам с ишемической болезнью сердца, подтвердил использование 6MWT как инструмента оценки функционального состояния, хотя авторы указывают на необходимость дальнейшей стандартизации его применения в данной популяции. [4]

ЧСС и АД целесообразно оценивать до и после нагрузки, а при необходимости — в процессе тренировки. Эти показатели помогают контролировать гемодинамическую реакцию и переносимость физических упражнений. Однако их изменение нельзя интерпретировать изолированно: значение имеют медикаментозная терапия, исходный уровень тренированности, возраст, сопутствующие заболевания и наличие симптомов.

Качество жизни является дополнительным клинически значимым исходом реабилитации. Даже при небольшом изменении массы тела улучшение физической активности и повседневного функционирования может иметь самостоятельную ценность для пациента. Поэтому стандартизированные инструменты оценки качества жизни целесообразно включать в комплексную оценку эффективности.

На основании рассмотренных данных наиболее рациональной представляется последовательная модель: первичная оценка факторов риска и функциональной способности; индивидуальное назначение физической нагрузки; постепенное увеличение объёма и интенсивности; контроль ЧСС, АД и симптомов; повторная функциональная оценка; коррекция программы с учётом достигнутого результата.

Заключение

Лечебная физкультура является важным компонентом комплексной профилактики ишемической болезни сердца у лиц среднего возраста с избыточной массой тела. Наиболее обоснованным является индивидуализированный и постепенный подход, основанный на сочетании аэробной активности, мышечно-укрепляющих упражнений и коррекции других факторов риска.

Для динамического наблюдения целесообразно использовать комплекс показателей, включающий ИМТ, ЧСС, АД, 6MWT и оценку качества жизни. Такой подход позволяет оценивать не только массу тела, но и функциональный эффект реабилитационных мероприятий.

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АНАЛИТИЧЕСКАЯ ХИМИЯ – «ИММУННАЯ СИСТЕМА» ФАРМАЦЕВТИЧЕСКОЙ ОТРАСЛИ

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Аннотация: *Аналитическая химия является ключевым фундаментом, на котором базируется современное фармацевтическое образование. Компетенции, приобретаемые студентами в процессе освоения этой дисциплины, выступают основой для изучения практически всех последующих профильных предметов, без которых немыслима фармация. Прочная теоретическая и практическая подготовка необходима для формирования высококлассных специалистов. Полученные навыки напрямую востребованы в таких направлениях, как стандартизация лекарств, а также непрерывный контроль качества лекарственных средств, где критически важно учитывать точные метрологические характеристики используемых методик. Помимо этого, данная наука снабжает проверенным инструментарием профильные практические структуры. Любая современная аналитическая служба (включая судебно-химическую, экспертную и другие лаборатории) опирается на этот методический базис. Именно на нем строятся объективный фармацевтический анализ и химико-токсикологический анализ — основные сферы профессиональной реализации выпускников фармацевтических факультетов.*

Ключевые слова: *аналитическая химия, фармация, фармацевтическое образование, контроль качества лекарственных средств, аналитическая служба, фармацевтический анализ, Химико – токсикологический анализ, метрологические характеристики, стандартизация лекарств.*

Annotatsiya: *Analitik kimyo zamonaviy farmatsevtika ta'limining asosiy poydevoridir. Talabalarning ushbu fan bo'yicha egallagan kompetensiyalari deyarli*

barcha keyingi ixtisoslashgan fanlarni o'rganish uchun asos bo'lib xizmat qiladi, ularsiz farmatsevtikani tasavvur qilib bo'lmaydi. Yuqori malakali mutaxassislarni tayyorlash uchun kuchli nazariy va amaliy tayyorgarlik juda muhimdir. Olingan ko'nikmalar dori vositalarini standartlashtirish va farmatsevtika mahsulotlarining uzluksiz sifatini nazorat qilish kabi sohalarda bevosita talabga ega, bu yerda qo'llaniladigan usullarning aniq metrologik xususiyatlari juda muhimdir. Bundan tashqari, ushbu fan ixtisoslashgan amaliy tashkilotlar uchun tasdiqlangan vositalarni taqdim etadi. Har qanday zamonaviy analitik xizmat (shu jumladan sud kimyosi, ekspert laboratoriyalari va boshqa laboratoriyalar) ushbu metodologik poydevorga tayanadi. Aynan shu poydevor asosida ob'ektiv farmatsevtik tahlil va kimyoviy-toksikologik tahlil quriladi - farmatsevtika bitiruvchilari uchun professional rivojlanishning asosiy yo'nalishlari.

Tayanch iboralar: *analitik kimyo, farmatsiya, farmatsevtik ta'lim, dori vositalari sifatini nazorat qilish, tahliliy xizmat, farmatsevtik tahlil, kimyoviy-toksikologik tahlil, metrologik tavsiflar, dori vositalarini standartlashtirish.*

Abstract: *Analytical chemistry is the key foundation upon which modern pharmaceutical education is based. The competencies students acquire in this discipline serve as the basis for studying virtually all subsequent specialized subjects, without which pharmacy is unthinkable. Strong theoretical and practical training is essential for developing highly qualified specialists. The acquired skills are directly in demand in areas such as drug standardization and continuous quality control of pharmaceuticals, where the precise metrological characteristics of the methods used are critically important. Furthermore, this science provides proven tools for specialized practical organizations. Any modern analytical service (including forensic chemistry, expert laboratories, and other laboratories) relies on this methodological foundation. It is on this foundation that objective pharmaceutical analysis and chemical-toxicological analysis are built—the main areas of professional development for pharmaceutical graduates.*

Keywords: *analytical chemistry, pharmacy, pharmaceutical education, quality control of medicines, analytical service, pharmaceutical analysis, chemico-toxicological analysis, metrological characteristics, drug standardization.*

Введение: *Дискуссия вокруг дефиниций и переход к «аналитике».* Трактовка термина «аналитическая химия» имеет множество вариаций. Традиционно под ней понимают науку о принципах, методах и технических средствах, предназначенных для установления структуры и химического состава

веществ. В то же время Федерация европейских химических обществ в 1993 году предложила более широкое определение: это дисциплина, которая разрабатывает и применяет инструментарий и общие подходы для сбора информации о природе и составе материи в пространстве и времени [1,4,6].

Несмотря на разнообразие формулировок, глубинного недопонимания в профессиональной среде не возникает, так как предмет исследования очевиден. Терминологические споры лишь отражают стремление ученых выработать максимально точную и всеобъемлющую дефиницию. Поскольку сама дисциплина непрерывно развивается, расширяя круг решаемых задач и используемых инструментов, ее формулировки неизбежно будут трансформироваться и дальше. Более того, классическое название «аналитическая химия» сегодня кажется уже недостаточно полным, поскольку на практике все чаще задействуются сугубо физические или биологические подходы. В связи с этим термин «аналитика», не ограничивающий природу используемых методов, выглядит гораздо более универсальным.

Значимость этой проблемы подчеркивал академик Ю.А. Золотов в руководстве «Основы аналитической химии» (1996 г.) [4]. Он отмечал, что вопросы о месте этой науки в системе знаний, ее фундаментальном или прикладном характере, а также о факторах, стимулирующих ее развитие, долгие годы остаются в центре оживленных дискуссий [4].

Сущность анализа и цели дисциплины. Под анализом вещества принято понимать экспериментальное получение сведений о его химическом составе с помощью различных (химических, физических, физико-химических) подходов. В связи с этим главными задачами, которые решает аналитическая химия, являются:

• Проектирование и модернизация аналитических методов;

• Определение точных границ их применимости;

vОценка их метрологических характеристик;

• Разработка конкретных методик для исследования определенных объектов [1, 5].

Система, которая обеспечивает практическое выполнение анализа конкретных объектов на основе подходов, рекомендованных наукой, дефинируется как аналитическая служба. [1, 2, 3].

Роль в фармации и классификация методов. В такой отрасли, как фармация, данная структура имеет критическое значение. Ключевой миссией, которую выполняет фармацевтическая аналитическая служба, является

непрерывный контроль качества лекарственных средств, изготавливаемых промышленными предприятиями или в условиях аптек. Эта деятельность разворачивается на базе заводских лабораторий, специализированных контрольно-аналитических центров и аптечных организаций. На этой основе строятся общая стандартизация лекарств, а также оперативный фармацевтический анализ и сопутствующий ему Химико-токсикологический анализ. Для будущих специалистов все эти аспекты формируют качественное фармацевтическое образование [2,3].

В зависимости от целей и характера получаемых данных выделяют два ключевых направления анализа:

• Качественный анализ — направлен на обнаружение и подтверждение подлинности (идентификацию) компонентов, входящих в состав исследуемого образца.

• Количественный анализ — ориентирован на точное измерение массы или концентрации выявленных компонентов в анализируемой пробе. [1,4,5].

До появления аналитических методов врачи и аптекари полагались на свои чувства: вкус, запах, цвет.

Проблема: Невозможность отличить действующее вещество от балласта или яда. Многие лекарства были либо бесполезны, либо содержали токсичные уровни ртути, мышьяка и сурьмы.

Результат: Фармация была «искусством смешивания», а не наукой. Лечение часто было опаснее самой болезни.

Перелом случился, когда химики научились выделять чистые вещества из растений.

Точка отсчета: В 1804 году Фридрих Сертюрнер выделил морфин из опия [4, 6].

Зачем понадобилась аналитика: Выяснилось, что в разных партиях мака содержание морфина отличается в разы. Врачи столкнулись с проблемой передозировок. Стало ясно: нужно не просто «растение», а точное количество «молекулы». Аналитическая химия стала единственным способом измерить это количество.

Это был период расцвета «чудодейственных эликсиров». В США и Европе продавали микстуры от кашля, содержащие героин и кокаин, без указания состава.

Проблема: Массовые отравления и зависимость. Потребитель не знал, что он пьет.

Причина изучения: Необходимость государственного контроля. В 1906 году в США вышел «Закон о чистоте пищевых продуктов и лекарств» (Pure Food and Drug Act). Аналитическая химия стала юридическим инструментом для проверки этикеток [7].

Великие трагедии — катализаторы строгого контроля. Для международного сообщества эти два случая являются фундаментом современной фармации.

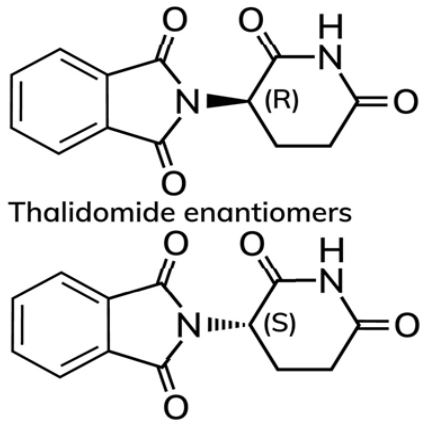
А) Трагедия эликсира сульфаниламида (1937 г.)

Компания выпустила жидкий антибиотик, растворив его в диэтиленгликоле (ядовитый антифриз), чтобы он был сладким. Погибло более 100 человек, большинство — дети [7].

Роль аналитики: Этот случай привел к созданию FDA (Food and Drug Administration) в его современном виде. Это Управление по санитарному надзору за качеством пищевых продуктов и медикаментов США. Было введено требование: прежде чем продавать, нужно провести химический анализ на безопасность.

Б) Талидомидовая катастрофа (1950-60-е гг.)

Лекарство от токсикоза привело к рождению тысяч детей с деформациями конечностей.



Проблема: Оказалось, что молекула талидомида существует в виде двух зеркальных форм (хиральность). Одна лечит, вторая — вызывает мутации [6, 7].

Роль аналитики: Это заставило ученых разрабатывать методы стереоселективного анализа (разделение оптических изомеров). Теперь аналитическая химия должна была смотреть не просто на состав, а на «геометрию» молекулы.

Трагедии сульфаниламидного эликсира (1937) и талидомида (1961) радикально изменили требования к анализу. Если первая трагедия заложила основы контроля чистоты вспомогательных веществ, то вторая — привела к внедрению методов разделения хиральных молекул и широкому применению высокоэффективной жидкостной хроматографии (ВЭЖХ).

FDA в его современном строгом виде появилось именно после трагедии с сульфаниламидом 1937 года [7]. До этого у государства не было полномочий требовать от компаний химических доказательств безопасности. Закон 1938 года

(Federal Food, Drug, and Cosmetic Act) наделил FDA властью, которая сегодня обеспечивает безопасность миллионов людей.

Аналоги в других странах:

• EMA (European Medicines Agency) — в Европе.

• Минздрав / Росздравнадзор — в России.

• PMDA — в Японии.

Трагические уроки истории привели к тому, что аналитическая служба из вспомогательного подразделения превратилась в центральное звено фармацевтического предприятия. Сегодня такие службы функционируют как независимые системы контроля, работающие по стандартам GMP. Если в середине XX века основной задачей лаборатории был простой выходной контроль, то современная аналитическая служба реализует стратегию Process Analytical Technology (PAT) — непрерывного анализа в режиме реального времени, что минимизирует риск человеческой ошибки и гарантирует беспрецедентный уровень безопасности для пациента.

Аналитическая служба: Структура и стандарты безопасности.

Современная фармацевтическая аналитическая служба — это исполнительный механизм, который воплощает требования регуляторов (FDA, EMA) в строгие лабораторные протоколы. Её работа строится на трех «китах»:

1. Отдел контроля качества (Quality Control, QC)

Это передовая линия аналитической химии на производстве.

Задачи: Рутинный анализ каждой серии сырья и готовой продукции.

Роль: Здесь аналитическая химия используется для подтверждения воспроизводимости. Если прибор показывает отклонение даже на 1%, служба QC обязана остановить выпуск всей партии.

2. Исследовательские аналитические лаборатории (R&D)

Здесь аналитическая химия встречается с инновациями.

Задачи: Разработка новых методик анализа для еще не существующих лекарств.

Роль: Валидация методов. Аналитическая служба должна доказать регулятору, что предложенный метод анализа специфичен, точен и надежен в любых условиях.

3. Соблюдение стандартов GLP и GMP

Для международного сообщества работа аналитической службы немыслима без соблюдения правил:

GLP (Good Laboratory Practice): Надлежащая лабораторная практика. Гарантирует достоверность и прослеживаемость каждого измерения.

GMP (Good Manufacturing Practice): Надлежащая производственная практика. Требует, чтобы аналитический контроль был интегрирован в каждый этап создания таблетки. [7, 8].

Допустимые отклонения в содержании вещества.

Для большинства готовых лекарственных форм (таблеток, капсул) стандартом считается диапазон 95.0% – 105.0% от заявленного на упаковке.

Если в таблетке 100 мг вещества: анализ должен показать от 95 до 105 мг [7,8].

Почему не ровно 100%? Существуют естественные колебания при смешивании порошков и работе пресса, а также погрешность самого химического анализа.

Когда 1% критичен? Для препаратов с узким терапевтическим индексом (например, дигоксин, варфарин, некоторые гормоны). Для них рамки сужаются до 98.0% – 102.0%. Здесь отклонение в 2-3% уже может вызвать либо токсический эффект, либо отсутствие терапии [6,8].

Погрешность аналитического метода (Precision).

Когда аналитическая служба QC проверяет препарат, сам метод анализа (например, ВЭЖХ) должен быть сверхточным. Это называется валидацией.

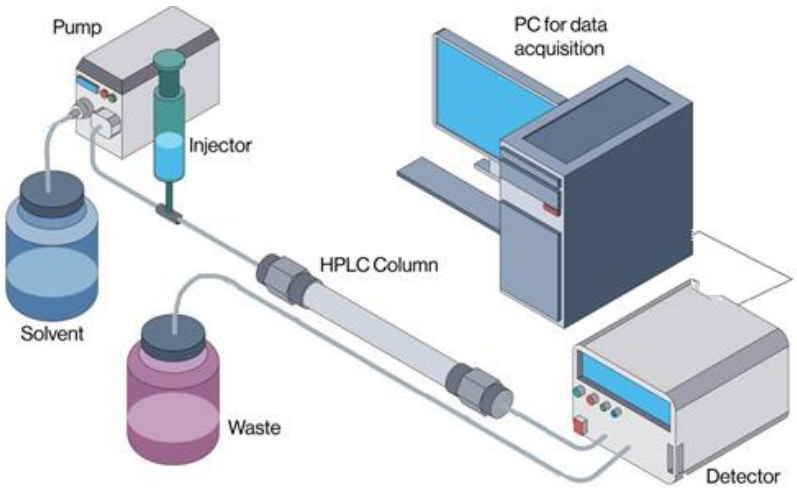


Рис. 2. Принципиаль-ная схема работы современной системы ВЭЖХ (HPLC). [1,5,6]

Сходимость (Repea-tability): Если лаборант вводит одну и ту же пробу в хроматограф 6 раз подряд, относитель-ное стандартное откло-нение (RSD или коэффициент вариации) обычно не должно превышать 1,0% – 2,0% [7].

Для высокоточных анализов: Часто устанавливается предел RSD\le 0,73\% или даже ниже. Если прибор «гуляет» больше, чем на 1%, результатам такого анализа доверять нельзя, и серию не выпустят [7].

Почему даже 1% может быть опасен?

Накопительная ошибка: Если на этапе взвешивания сырья ошиблись на 1%, при смешивании на 1% и при анализе прибор ошибся еще на 1% — в сумме мы получаем опасный выход за пределы спецификации.

Стабильность: Лекарство в процессе хранения постепенно разлагается. Если завод выпустил таблетку с содержанием 95% (на нижней границе), то через полгода хранения из-за естественного распада там может остаться 90%, что сделает лекарство неэффективным. Поэтому службы QC стремятся к «таргету» в 100%.

Методология и классификация аналитических подходов

Современный арсенал аналитической химии представляет собой сложную, динамично развивающуюся систему методов. Несмотря на существующее многообразие, любая классификация в этой области остается в определенной степени условной. Это обусловлено тем, что границы между физическими процессами и химическими взаимодействиями, лежащими в основе анализа, постоянно размываются благодаря междисциплинарным открытиям.

В общей структуре аналитического процесса принято выделять последовательные этапы: отбор и подготовку пробы, её разложение, концентрирование компонентов и итоговое определение состава. Особое место занимают гибридные методы, которые объединяют в едином цикле разделение и количественное измерение, обеспечивая беспрецедентную селективность.



Рис. 1. Принцип масс-спектрометрической детекции молекул.

Традиционное разделение методов на химические, физические и физико-химические в современной практике всё чаще уступает место интегральному понятию — ***инструментальные методы анализа.*** Эта группа объединяет в себе мощь высокотехнологичной аппаратуры и фундаментальные законы взаимодействия вещества с энергией [1,4,5]. К ним относятся:

- Спектральные (оптические) методы, основанные на поглощении или испускании света;
- Электрохимические методы, изучающие процессы на границе раздела фаз;
- Хроматографические методы, являющиеся эталоном разделения сложных смесей.

Существуют также специфические подходы, такие как термический анализ или колориметрия, которые подчеркивают многогранность аналитического инструментария.

Критерии выбора и стратегия исследования

Выбор конкретного метода анализа — это многофакторная задача, стоящая перед каждым фармацевтом-исследователем. Она диктуется не только наличием оборудования или стоимостью процесса, но и объемом доступной пробы, а также временными рамками. Однако определяющими векторами всегда остаются два параметра: точность и чувствительность.

Проведение глубокого аналитического обзора существующих методов является критически важным этапом исследования. Только детальное понимание метрологических характеристик и технологических ограничений каждого метода позволяет гарантировать достоверность полученных данных о составе вещества, что является фундаментом фармацевтической безопасности.

Таблица 1.

Сравнительная характеристика эволюции аналитических методов: от классических химических реакций до высокотехнологичных инструментальных систем. Составлено автором на основе трудов Харитонова Ю.Я. и Золотова Ю.А. [1,4].

Название метода	Принцип измерения	Год появле-ния	Основатель метода	Точность определения / погрешность результата
Титриме-трический метод	Основан на измере-нии объема раствора и реактива известной концентрации, рас-ходуемого для реак-ции с определяемым веществом.	Как метод основан в 1780 гг.	Ф.Декруазиль, Ж.Гей Люссак, К. Мор, Г.Шварценбах	Определение состава вещества до 10^{-6}

Гравиме-трический метод	Основан на измере-нии массы определя-емого компонента, выделенном в виде веществ определён-ного состава.	20-30е гг. XIX века.	Т.Бергман (метод осаждения), А.Лавуазье (метод отгонки).	Средняя погрешность 0,1– 0,2 %
Капельный анализ	Реакции проводят на фарфоровых или стеклянных пластин-ках или на фильтро-ванной бумаге, на которые наносят каплю испытуемого раствора и каплю реактива, вызываю-щего характерное окрашивание или образование кристаллов.	1834 г. 1929 г.	Ф.Рунге Н.Тамамаев	Чувствитель-ность до 10^{-9}
Метод растира-ния порошков	Элемент обнаружи-вается по образова-нию при совместном растирании образца с реагентом характер-ных соединений, отличающихся по цвету или запаху.	1898г.	Ф.М. Флавицкй	Определение наличия вещества по цвету либо запаху
Пирохими-ческий	Метод обнаружения некоторых химичес-ких элементов по различному окрашиванию пламени.	Прибли-зительно XVII век.	----	Определение наличия вещества по характерному окрашивании пламени
Эмиссион-ный анализ	Метод основан на возбуждении атомов исследуемого вещест-ва, диспергировании испускаемого излу-чения и регистрации положения и интен-сивности в спектре пробы спектральных линий, соответствую-	1859 г. 1928 г. 1955 г.	Г.Крихгов, Р.Бунзен Ландерград, Р.Муньос	Предел обна-ружения 10^{-3}– 10^{-4} %

	щим электронным переходам.			

Как показано в Таблице 1, прогресс аналитической мысли прошел путь от титриметрии XVIII века с погрешностью 10^{-6} до современного эмиссионного и хроматографического анализа.

Таблица 2.

Современные инструментальные методы [5,6,7].

Название метода	Принцип измерения	Период внедрения в фармацию	Ключевые технологии	Точность определения / Предел обнаружения
Высокоэффективная жидкостная хроматография (ВЭЖХ / HPLC)	Разделение компонентов смеси между неподвижной фазой (колонка) и жидкой подвижной фазой под высоким давлением.	1970-е — н.в.	Изократическое и градиентное элюирова-ние, детекторы (UV, PDA, FL).	Высочайшая. Позволяет определять содержание основного вещест-ва с точностью до 0.1% и примеси на уровне 10^{-6} %.
Газовая хроматография (ГХ / GC)	Разделение летучих компонентов в потоке газа-носителя.	1950-е – н.в. (Активно с 1980-х)	Капилляр-ные колон-ки, пламен-но иониза-ционный детектор (ПИД).	Определение остаточных органических растворителей с точностью до 10^{-4} %.
Масс-спектрометрия (МС / MS)	Ионизация молекул и их разделение на основе отношения массы к заряду (m/z).	1990-е — н.в. (гибридные методы)	Тандемная масс-спектрометрия (LC-MS/MS) , время пролетные детекторы (TOF).	Экстремальная. Определение генотоксичных примесей на уровне ppb (частей на миллиард) — до 10^{-9}%.
Ядерный магнитный резонанс (ЯМР / NMR)	Измерение поглощения радиочастотной энергии ядрами	Конец XX века — н.в.	Фурье-преобразо-вание, сверхпро-	Установление точной простран-ственной струк-туры (хиральнос-ти)

	атомов в силь-ном магнитном поле.		водящие магниты.	молекул без разрушения образца.
БИК-спектроскопия (NIR)	Поглощение излучения в ближней ИК-области.	2000-е — н.в.	Технология PAT (анализ процесса в реальном времени).	Позволяет прово-дить анализ прямо в реакторе или через упаковку без пробоподготовки.

Сравнение классических методов (по Харитонову Ю.Я.) с современными инструментальными подходами (ВЭЖХ, LC-MS) наглядно демонстрирует эволюцию фармацевтического анализа. Если методы XIX века фокусировались на макро-составе, то современные гибридные технологии позволяют контролировать чистоту лекарственных средств на молекулярном и наноуровне. Это делает аналитическую химию не просто учебной дисциплиной, а технологическим гарантом безопасности в современной индустрии.

Представленные данные и графические схемы иллюстрируют фундаментальный технологический сдвиг в фармацевтическом анализе. Переход от визуального наблюдения химических реакций к инструментальной детекции сигналов позволил не только повысить точность в тысячи раз, но и внедрить автоматизированные системы контроля качества на производстве. Таким образом, современный аналитик оперирует не просто химическими превращениями, а цифровыми данными, обеспечивающими высший уровень доверия к лекарственному препарату.

Заключение.

Проведенный ретроспективный анализ становления аналитической химии подтверждает её статус как фундаментальной дисциплины в системе фармацевтического образования. Эволюция методов — от классической титриметрии до высокотехнологичных гибридных систем, таких как ВЭЖХ-МС — демонстрирует не просто технический прогресс, а качественное изменение философии фармацевтической безопасности.

На основе изученного материала можно сделать следующие выводы:

Интегральная роль дисциплины: Аналитическая химия сегодня перестала быть сугубо теоретической наукой, превратившись в ключевой инструмент глобального регуляторного контроля (в соответствии со стандартами FDA и GMP) [7, 8].

Технологический скачок: Современные инструментальные методы позволили снизить пределы обнаружения примесей до наноуровня, что критически важно для препаратов с узким терапевтическим индексом [5,6].

Образовательная траектория: Подготовка современного провизора требует глубокого понимания как классических основ, так и принципов работы сложнейшего оборудования. Формирование аналитического мышления у студентов является залогом предотвращения медицинских катастроф, подобных тем, что имели место в истории фармации.

В завершение стоит отметить, что аналитическая служба на современном предприятии — это гарант того, что теоретические разработки ученых дойдут до пациента в виде безопасного и эффективного лекарственного средства. Таким образом, развитие аналитических методов и совершенствование системы их преподавания остаются приоритетными задачами для фармацевтической отрасли в цифровую эпоху.

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4-SECTION

WAYS TO IMPROVE THE EFFICIENCY OF STATE PROPERTY PRIVATIZATION PROCESSES

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Abstract: *This thesis analyzes the financial mechanisms for the effective organization of state property privatization processes.*

The study identifies the key challenges limiting the efficiency of privatization and develops scientific recommendations aimed at introducing a flexible approach to determining the initial selling price of state-owned assets, granting direct purchase rights to efficient long-term tenants of state property, privatizing assets subject to investment obligations through competitive selection procedures, and expanding long-term installment payment mechanisms in remote and economically less-developed regions.

Furthermore, the study demonstrates that the implementation of these recommendations has contributed to improving the efficiency of the privatization process, enhancing the effectiveness of state asset utilization, stimulating investment activity, and increasing the share of the private sector in the national economy.

Key words: *state property, privatization, financial mechanisms, privatization efficiency.*

State property – public property consisting of republican property and the property of administrative-territorial units (municipal property).

Privatization – the transfer of state property to natural persons and non-state legal entities through sale.

Financial mechanisms – a set of financial methods and instruments used in the process of state property privatization to ensure the efficient sale of state-owned assets, attract investment, and improve economic efficiency.

Privatization efficiency – an indicator reflecting the extent to which the transfer of state property to the private sector enhances the efficient use of state-owned assets, investment activity, the competitive environment, and overall economic performance.

In a market economy, the privatization of state property is regarded as one of the key instruments for reducing state participation in the economy, promoting private sector development, strengthening market competition, and enhancing investment activity.

The effective transfer of state-owned property to the private sector largely depends on the effectiveness of the financial mechanisms applied during the privatization process. Therefore, improving these mechanisms, eliminating institutional and financial barriers, and increasing the efficiency of state asset utilization have become priority objectives of the country's economic policy.

The purpose of this study is to analyze the financial mechanisms applied in the privatization of state property, identify the factors limiting their effectiveness, and develop practical policy recommendations aimed at improving the privatization process.

The ongoing economic reforms in Uzbekistan, aimed at reducing state participation and expanding the role of the private sector, require further improvement of the state property privatization process. An analysis of the existing privatization mechanisms revealed several key challenges, including the prolonged failure to sell certain state-owned assets, the mismatch between initial selling prices and market conditions, limited opportunities for long-term tenants to acquire leased state property, and insufficiently developed valuation criteria for assets privatized under investment obligations.

According to the findings of the study, a number of policy recommendations were developed to improve the financial mechanisms of state property privatization. These recommendations were adopted and incorporated into the relevant legal and regulatory framework. The key recommendations include:

- introducing a flexible pricing mechanism for determining the initial selling price of state-owned assets;
- granting direct purchase rights to efficient long-term tenants of state-owned property;
- privatizing assets subject to investment obligations through competitive selection procedures; and
- expanding long-term installment payment mechanisms for state-owned assets in remote and economically less-developed regions.

The implementation of these recommendations contributed to improving the efficiency of the state property privatization process. In particular:

First, the recommendation to gradually reduce the initial selling price of state-owned assets in line with market demand was implemented and incorporated into the relevant regulatory and legal framework. As a result, the number of state-owned assets sold through public electronic auctions increased **from 86 to 379**, demonstrating a significant improvement in the efficiency of the privatization process.

Second, the implementation of the recommendation granted entrepreneurs who had leased state-owned property for at least five years the right to purchase the leased property directly at its appraised value, thereby expanding opportunities for long-term tenants to acquire state-owned assets.

Third, the author's recommendation to privatize state-owned property subject to investment or social obligations through competitive selection procedures was adopted and incorporated into the relevant legal and regulatory framework.

As a result, greater consideration was given to investors' commitments during the privatization process, and **74** state-owned assets with an initial value of UZS **318.2 million** were offered through public auctions.

Finally, the recommendation to introduce long-term installment payment mechanisms for the privatization of state-owned assets in remote and economically less-developed regions was implemented. This created more favorable financial conditions for privatization, encouraged entrepreneurial activity, and expanded opportunities to support regional economic development.

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Annotatsiya. *Maqolada agroklasterlarni rivojlantirishning iqtisodiy, tashkiliy va institutsional jihatlari tadqiq etilgan. Agroklasterlarda ishlab chiqarish, qayta ishlash, saqlash, logistika va sotish jarayonlarini yagona qiymat zanjiriga birlashtirish imkoniyatlari tahlil qilingan. Shuningdek, innovatsion texnologiyalarni joriy etish, resurslardan samarali foydalanish, eksport salohiyatini oshirish va fermerlar bilan shartnomaviy munosabatlarni takomillashtirish ustuvor yo'nalishlar sifatida asoslangan.*

Kalit so'zlar: *agroklaster, qiymat zanjiri, agrar ishlab chiqarish, qayta ishlash, kooperatsiya, innovatsiya, resurs samaradorligi, raqamlashtirish, eksport salohiyati, klaster boshqaruvi.*

Аннотация. *В статье исследованы экономические, организационные и институциональные аспекты развития агрокластеров. Проанализированы возможности объединения производства, переработки, хранения, логистики и реализации продукции в единую цепочку создания стоимости. В качестве приоритетных направлений обоснованы внедрение инновационных технологий, эффективное использование ресурсов, повышение экспортного потенциала и совершенствование договорных отношений с фермерскими хозяйствами.*

Ключевые слова: *агрокластер, цепочка создания стоимости, аграрное производство, переработка, кооперация, инновации, ресурсная эффективность, цифровизация, экспортный потенциал, кластерное управление.*

Abstract. *The article examines the economic, organizational and institutional aspects of agrocluster development. It analyses opportunities to integrate production, processing, storage, logistics and marketing into a unified value chain. The introduction of innovative technologies, efficient use of resources, expansion of export*

potential and improvement of contractual relations with farmers are substantiated as priority areas for agrocluster development.

Keywords: *agrocluster, value chain, agricultural production, processing, cooperation, innovation, resource efficiency, digitalization, export potential, cluster governance.*

KIRISH. So‘nggi yillarda respublikada xalqaro amaliyotda o‘z samaradorligini namoyon etgan, iqtisodiyotni rivojlantirish va uning barqarorligini ta’minlashda muhim institutsional mexanizm hisoblangan agroklaster tizimini joriy etishga alohida e’tibor qaratilmoqda. Mazkur yondashuv bozor munosabatlarini chuqurlashtirish, zamonaviy boshqaruv usullarini amaliyotga tatbiq etish hamda ishlab chiqarish, qayta ishlash va realizatsiya jarayonlarini yagona zanjir asosida integratsiyalash imkonini bermoqda. Prezidentimiz ta’kidlaganlaridek, “...biz o‘zimiz paxta yetishtirishni va undan tayyor mahsulotlar bilan jahon bozoriga chiqishni ta’minlashimiz zarur. Bunday holda, tabiiyki, foyda bir necha barobar ko‘payadi. Bundan tashqari, paxtadan yuzlab turdagi mahsulotlarni olish mumkin va ularning barchasi birgalikda iqtisodiy samarani bir necha bor oshiradi. Va eng muhimi, yangi ish o‘rinlari yaratiladi”[1]. Prezidentimiz tomonidan ilgari surilayotgan strategik tashabbuslar doirasida agrar sohani barqaror rivojlantirish va mahsulotlar raqobatbardoshligini oshirish ustuvor vazifa sifatida belgilangan. Ushbu maqsadlarga erishishning muhim institutsional mexanizmi sifatida agroklasterlar tizimini keng joriy etish nazarda tutilmoqda. Respublikamizda ushbu tizimni joriy qilish, uni qo‘llab-quvvatlashdan asosiy maqsad ishlab chiqarilayotgan qishloq xo‘jalik mahsulotlarini xomashyo sifatida xorijiy mamalakatlarda sotish emas, balki shu xomashyoni o‘zimizda qayta ishlab “O’zbekiston” brendi ostida yuqori sifatli mahsulotlar ishlab chiqarish, aholini turmush darajasini yaxshilash, aholi bandligini ta’minlash uchun yangi ish o‘rinlarini yaratish, munosib mehnat sharoitlarini yaxshilashdan iboratdir. Bu borada O’zbekiston Respublikasi Prezidentining 2019 yil 12 sentyabrda davlat budjeti tushumlarini ko‘paytirish bo‘yicha amalga oshirilayotgan ishlarni to‘liq bajarish bo‘yicha belgilangan makroiqtisodiy ko‘rsatkichlarga erishish, paxta-to‘qimachilik sohasida agroklasterlarni joriy etishni jadalalashtirish masalalariga bag‘ishlangan yig‘ilishida “Paxtachilikda qishloq xo‘jaligining kelajagi, uning iqtisodiy samaradorligi klasterlar bilan bog‘liq. Klasterlar agrar sohani jadal rivojlantirishning “lokomotivi” bo‘lishi kerak”[2] deb ta’kidlaganlar. Shunday ekan,

[1] http://uza.uz/oz/society/klasterlar-ishlo-kh-zhaligi-rivozhida-lokomotivga-aylanmo-da-23-07-2019

[2] O’zbekiston Respublikasi Prezidenti Shavkat Mirziyoyev 2019 yil 12 sentabr kuni davlat budjetiga tushumlarni ko‘paytirish bo‘yicha amalga oshirilayotgan ishlarni to‘liq bajarish, 9 oy va yil yakuni bo‘yicha belgilangan

kelajakda bu tizimga qishloq xo‘jaligining asosiy muhim ustuvor yo‘nalishi sifatida qaralishi lozim.

Mavzuga doir adabiyotlar sharhi. Jahon agrooziq-ovqat tizimida iqlim o‘zgarishi, suv resurslari tanqisligi, logistika uzilishlari va sifat standartlarining qat’iylashuvi ishlab chiqarishni alohida xo‘jaliklar darajasida emas, balki o‘zaro bog‘langan tarmoq va hududiy ekotizim sifatida boshqarishni talab qilmoqda. M.Porter klasterni geografik yaqin joylashgan, o‘zaro bog‘liq kompaniyalar, ixtisoslashgan yetkazib beruvchilar, xizmat ko‘rsatuvchilar va institutlar majmuasi sifatida talqin qilib, raqobat bilan hamkorlikning bir vaqtda mavjudligini uning muhim xususiyati deb ko‘rsatga.[3] Agroiqtisodiyotda ushbu yondashuv ishlab chiqarish resurslari ta’minotidan boshlab yetishtirish, saqlash, qayta ishlash, logistika, standartlashtirish va sotuvgacha bo‘lgan zanjirni muvofiqlashtirish imkonini beradi.

FAO tadqiqotida agroklasterlar rivojlanayotgan mamlakatlarda korxonalarning geografik konsentratsiyasi, bilim almashinuvi va umumiy infratuzilmadan foydalanish orqali raqobatbardoshlikni oshirishi, biroq klasterni ma’muriy yo‘l bilan tashkil etishning o‘zi yetarli emasligi ta’kidlanadi.[4] J.Trienekens qiymat zanjirini tahlil qilishda bozorga kirish, resurs va infratuzilma, institutsional muhit, qo‘shilgan qiymat, tarmoq tuzilmasi hamda boshqaruv mexanizmini birgalikda ko‘rib chiqishni taklif qiladi.[5] Demak, agroklaster samaradorligi korxonalar soni yoki ajratilgan yer maydoni bilan emas, zanjir bo‘yicha yaratilgan va adolatli taqsimlangan qo‘shilgan qiymat bilan baholanishi lozim.

Tadqiqot metologiyasi. Tadqiqotda agroklasterlarni rivojlantirishning nazariy va amaliy jihatlarini o‘rganish uchun tizimli, qiyosiy va statistik tahlil usullaridan foydalanildi. Tadqiqotning axborot bazasini O’zbekiston Respublikasi Milliy statistika qo‘mitasi ma’lumotlari, me’yoriy-huquqiy hujjatlar, xalqaro tashkilotlar hisobotlari hamda xorijiy va mahalliy olimlarning ilmiy ishlari tashkil etdi. Agroklasterlar faoliyati ishlab chiqarish va qayta ishlash darajasi, investitsion va eksport salohiyati, innovatsion faollik, resurslardan foydalanish samaradorligi hamda fermerlar bilan shartnomaviy munosabatlar mezonlari asosida baholandi. Tahlil natijalari asosida agroklasterlarni

makroiqtisodiy ko‘rsatkichlarga erishish, paxta-to‘qimachilik sohasida klasterlarni joriy etishni jadallashtirish masalalariga bag‘ishlangan yig‘ilish ma’lumotlari.

[3] Porter M.E. The Competitive Advantage of Nations. New York: Free Press, 1990.

[4] Gálvez-Nogales E. Agro-based Clusters in Developing Countries: Staying Competitive in a Globalized Economy. FAO, Agricultural Management, Marketing and Finance Occasional Paper 25. Rome, 2010.

[5] Trienekens J.H. Agricultural Value Chains in Developing Countries: A Framework for Analysis // International Food and Agribusiness Management Review. 2011. Vol. 14, No. 2. P. 51–82.

rivojlantirishning ustuvor yo‘nalishlari bo‘yicha ilmiy xulosa va amaliy takliflar ishlab chiqildi.

Tahlil va natijalar. O’zbekiston iqtisodiyotida qishloq xo‘jaligining yuqori ijtimoiy-iqtisodiy ahamiyatga egaligi bilan belgilanadi. Milliy statistika qo‘mitasi ma’lumotlariga ko‘ra, 2023 yilda qishloq, o‘rmon va baliqchilik xo‘jaligida yaratilgan yalpi qo‘shilgan qiymat 245,2 trln. so‘mni tashkil etib, uning yalpi ichki mahsulotdagi ulushi 24,3 foizga yetgan. Mazkur tarmoq mamlakat iqtisodiy o‘sishiga 1,0 foiz punkt miqdorida ijobiy hissa qo‘shgan. Ayniqsa, qishloq, o‘rmon va baliqchilik xo‘jaligining hududiy yalpi mahsulot tarkibidagi ulushi Jizzax viloyatida 49,2 foiz, Surxondaryo viloyatida esa 48,7 foizni tashkil etgan. Bu agrar tarmoqning ayrim hududlar iqtisodiy barqarorligi, aholi daromadlari va bandligini ta’minlashda hal qiluvchi o‘rin tutishini ko‘rsatadi.

Tarmoqdagi o‘sish tendensiyalari agroklasterlarni yanada rivojlantirish uchun ob’ektiv iqtisodiy asos mavjudligini ko‘rsatadi. Xususan, 2025 yilning yanvar - sentabr oylarida O’zbekiston yalpi ichki mahsuloti 7,6 foizga o‘sgan bo‘lsa, qishloq, o‘rmon va baliqchilik xo‘jaligida o‘sish 3,6 foizni tashkil etgan hamda tarmoqning YaIM o‘sishiga ijobiy hissasi 0,6 foiz punktga teng bo‘lgan. 2026 - yilning yanvar - mart oylarida esa qishloq, o‘rmon va baliqchilik mahsulotlari hamda xizmatlarining umumiy hajmi 63,4 trln. so‘mga yetib, 2025 - yilning mos davriga nisbatan 5,1 foizga o‘sgan. Uning 59,8 trln. so‘mi dehqonchilik, chorvachilik, ovchilik va ushbu sohalarda ko‘rsatilgan xizmatlar hissasiga to‘g‘ri kelgan.

Agroklasterlarni rivojlantirish zarurati qishloq xo‘jaligi bilan qayta ishlash sanoati o‘rtasidagi iqtisodiy aloqalarni mustahkamlash talabi bilan ham bog‘liq. 2025 - yilning yanvar - oktabr oylarida mamlakatda 114,8 trln. so‘mlik oziq-ovqat mahsulotlari ishlab chiqarilgan. Hududlar kesimida Toshkent shahrida 22,6 trln. so‘mlik, Samarqand viloyatida 15,5 trln. so‘mlik, Toshkent viloyatida 15,4 trln. so‘mlik va Buxoro viloyatida 8,5 trln. so‘mlik oziq-ovqat mahsulotlari ishlab chiqarilgan. Ushbu hududiy farqlar qishloq xo‘jaligi xomashyosi mavjudligi bilan uni qayta ishlash quvvatlarining joylashuvi o‘rtasida hali ham muayyan nomutanosibliklar borligini ko‘rsatadi. Shu bois agroklasterlarni rivojlantirishda ishlab chiqarish quvvatlarini xomashyo bazasiga yaqinlashtirish, hududiy ixtisoslashuvni hisobga olish va logistika xarajatlarini kamaytirish muhim ahamiyatga ega.

Agroklasterlarning investitsion ahamiyati ham tobora ortib bormoqda. 2025 - yilning yanvar - sentabr oylarida qishloq, o‘rmon va baliqchilik xo‘jaligiga o‘zlashtirilgan asosiy kapital investitsiyalari 39,2 trln. so‘mni tashkil etgan. Bu ko‘rsatkich 2024 - yilning mos davridagi 18,2 trln. so‘mga nisbatan 2,15 barobar

ko‘pdir. Shuningdek, 2024 - yilda tarmoqqa yo‘naltirilgan 25,7 trln. so‘m investitsiyaning 12,8 trln. so‘mi yoki qariyb 49,8 foizi xorijiy investitsiyalar va kreditlar hissasiga to‘g‘ri kelgan. Mazkur holat agroklasterlarni zamonaviy qayta ishlash korxonalari, sovitish omborlari, logistika markazlari, suv tejovchi texnologiyalar va raqamli boshqaruv tizimlarini joriy etish uchun investitsion platforma sifatida rivojlantirish imkoniyati yuqori ekanini anglatadi.

Agroklasterlarning amaliy samarasini meva-sabzavotchilik sohasidagi natijalar ham tasdiqlaydi. Jahon banki ma’lumotlariga ko‘ra, O’zbekistonda bog‘dorchilikni rivojlantirish loyihalari doirasida 34,5 mingdan ortiq doimiy, qariyb 22 ming mavsumiy hamda qadoqlash, saqlash va mahsulot taqsimoti kabi yordamchi tarmoqlarda yana 5 mingta ish o‘rni yaratilgan. Doimiy ish o‘rinlarining qariyb 40 foizi, mavsumiy ish o‘rinlarining esa 75 foizi xotin-qizlar hissasiga to‘g‘ri kelgan. Zamonaviy agrotexnologiyalar va issiqxona usullarini qo‘llagan ishtirokchi xo‘jaliklarda hosildorlik 25-30 foizga, yalpi sotuv hajmi esa 35 foizga oshgan. Bu natijalar ishlab chiqarish, moliyalashtirish, texnologiya, saqlash va sotuvni o‘zaro bog‘lovchi klaster yondashuvi nafaqat iqtisodiy samaradorlikni, balki qishloq joylarda inklyuziv bandlikni ham ta’minlashini ko‘rsatadi.

Shu bilan birga, kichik ishlab chiqaruvchilarni agroklasterlar qiymat zanjiriga samarali jalb etish dolzarb masala bo‘lib qolmoqda. 2024 - yilning yanvar - iyun oylarida kichik biznes sub’ektlari tomonidan qishloq, o‘rmon va baliqchilik xo‘jaligida 164,6 trln. so‘mlik mahsulot va xizmatlar yaratilgan. Shundan 121,5 trln. so‘mi dehqon va shaxsiy yordamchi xo‘jaliklar, 43,1 trln. so‘mi esa kichik korxonalar va mikrofirmalar hissasiga to‘g‘ri kelgan. Demak, agroklasterlarni faqat yirik korxonalarning vertikal integratsiyasi sifatida tashkil etish yetarli emas. Ularda fermer, dehqon va tomorqa xo‘jaliklarining kooperativ asosda ishtirok etishi, umumiy sovitish, saralash, laboratoriya, logistika va marketing xizmatlaridan foydalanishi uchun teng imkoniyatlar yaratilishi zarur[6].

Agroklasterlarning rivojlanish qonuniyatlarini faqat ishlab chiqarish hajmi yoki klasterlar soni orqali baholash yetarli emas. Ilmiy jihatdan agroklaster samaradorligini qo‘shilgan qiymat darajasi, mahsulotni qayta ishlash chuqurligi, eksport geografiyasi va tovar tarkibining diversifikatsiyasi, mehnat unumdorligi, innovatsion faollik, suv va yer resurslaridan foydalanish samaradorligi hamda fermerlar manfaatlarining himoyalanganligi kabi o‘zaro bog‘liq ko‘rsatkichlar asosida baholash zarur. Bunday yondashuv agroklasterni oddiy ishlab chiqarish birlashmasi emas, balki iqtisodiy,

[6] Ўзбекистон республикаси статистика қўмитаси маълумотлари.

texnologik, institutsional va ekologik munosabatlarni qamrab oluvchi murakkab hududiy tizim sifatida tadqiq etish imkonini beradi.

Agroklasterlar faoliyatini boshqarish, davlat tomonidan qo‘llab-quvvatlash va natijadorligini baholash mexanizmlarini takomillashtirish bilan belgilanadi. Xususan, davlat imtiyozlari va subsidiyalarini faqat ishlab chiqarish hajmiga emas, balki bir gektar yer va bir kub metr suv hisobiga yaratilgan qo‘shilgan qiymat, qayta ishlash darajasi, eksport diversifikatsiyasi, yangi ish o‘rinlari va innovatsion texnologiyalar joriy etilishiga bog‘lash maqsadga muvofiq. Fermer va klaster o‘rtasidagi shartnomalarda narxni shakllantirish tartibi, mahsulot sifatini baholash mezonlari, resurslar qiymati, hisob-kitob muddatlari va nizolarni mustaqil hal etish mexanizmi aniq belgilanishi lozim.

Xulosa. Amalga oshirilgan tadqiqot agroklasterlarning iqtisodiy mazmuni qishloq xo‘jaligi sub’ektlarini bitta yirik korxona atrofida ma’muriy tarzda birlashtirishdan ancha keng ekanini ko‘rsatdi. Samarali agroklaster ishlab chiqaruvchi, qayta ishlovchi, logistika tashkiloti, moliya muassasasi, ilmiy-tadqiqot markazi va savdo tarmoqlari o‘rtasida o‘zaro manfaatli munosabatlarni shakllantiradigan hududiy iqtisodiy tizim sifatida faoliyat yuritishi lozim. Bunday tizimning natijadorligi yetishtirilgan mahsulot miqdori bilangina emas, balki qiymat zanjirida yaratilgan qo‘shilgan qiymat, resurslardan foydalanish samaradorligi va ishtirokchilar daromadlarining mutanosibligi bilan belgilanadi.

Agroklaster modeli mahsulotni chuqur qayta ishlash, texnologik yangilanishni tezlashtirish, ishlab chiqarish xarajatlarini muvofiqlashtirish va tashqi bozorlarga yirik tovar partiyalari bilan chiqish uchun zarur tashkiliy imkoniyatlarni yaratadi. Biroq klaster hududdagi yagona resurs yetkazib beruvchi va mahsulot xaridoriga aylanib qolgan sharoitda fermerlarning iqtisodiy mustaqilligi cheklanishi, narx shakllanishida axborot nomutanosibligi yuzaga kelishi hamda yaratilgan qiymatning notekis taqsimlanishi mumkin. Shuning uchun klasterlashuv darajasining ortishi doimo iqtisodiy samaradorlik o‘sishini anglatmaydi; natija munosabatlarning shaffofligi, raqobat muhiti va boshqaruv sifatiga ham bevosita bog‘liq.

Agroklasterlarni kelgusida rivojlantirishda ishlab chiqarish hajmini ko‘paytirishga qaratilgan yondashuvdan iqtisodiy, innovatsion, ijtimoiy va ekologik natijalar muvozanatiga asoslangan boshqaruvga o‘tish talab etiladi. Ayniqsa, suv tanqisligi kuchayib borayotgan sharoitda gektar hisobiga olingan hosildorlikning o‘zi yetarli mezon bo‘la olmaydi. Qishloq xo‘jaligi sub’ektlarining faoliyatini bir kub metr suv, bir gektar yer va bir birlik energiya sarfi hisobiga yaratilgan qo‘shilgan qiymat orqali baholash resurs tejamkorlikni iqtisodiy manfaat bilan bog‘lash imkonini beradi.

Shunday ekan istiqbolda agroklasterlarni rivojlantirish va ularning barqarorligini ta’minlash maqsadida quyida chora-tadbirlarni amalga oshirish maqsadga muvofiq deb hisoblaymiz.

Birinchidan, agroklasterlarni davlat tomonidan qo‘llab-quvvatlashda tabaqalashtirilgan yondashuvni joriy etish maqsadga muvofiq. Imtiyozli kredit, subsidiya va soliq preferensiyalari mahsulot hajmiga emas, qayta ishlash chuqurligi, mehnat unumdorligi, suv samaradorligi, eksport tarkibining diversifikatsiyasi va yaratilgan barqaror ish o‘rinlari kabi yakuniy natijalarga bog‘lanishi lozim. Bu davlat mablag‘larining samarasiz xo‘jalik faoliyatini qoplash vositasiga aylanib qolishining oldini oladi.

Ikkinchidan, fermer va klaster o‘rtasidagi shartnomaviy munosabatlarning yagona minimal standartlarini belgilash zarur. Shartnomada mahsulot narxini hisoblash usuli, sifat ko‘rsatkichlarini aniqlash tartibi, yetkazib berilgan resurslar qiymati, to‘lov muddati, kechiktirilgan hisob-kitob uchun moliyaviy javobgarlik va nizoni mustaqil ko‘rib chiqish mexanizmi aniq ifodalanishi kerak. Elektron shartnomalar reyestrini shakllantirish tomonlarning majburiyatlarini kuzatish va yashirin hisob-kitoblarni qisqartirishga xizmat qiladi.

Uchinchidan, hududda muqobil xaridorlar va xizmat ko‘rsatuvchilar faoliyati uchun teng sharoit yaratish lozim. Fermerga mahsulotini faqat bitta klasterga sotish majburiyatini yuklash o‘rniga, sifat va shartnoma talablarini bajargan holda bir nechta xaridor taklifini tanlash imkoniyati berilishi kerak. Mazkur mexanizm klasterlarni ma’muriy ustunlik orqali emas, narx, xizmat sifati va texnologik yordam bo‘yicha raqobatlashishga undaydi.

To‘rtinchidan, har bir agroklaster huzurida ilmiy muassasa, oliy ta’lim tashkiloti va ishlab chiqarish sub’ektlarining hamkorligiga asoslangan innovatsion platforma tashkil etish taklif qilinadi. Uning vazifalari yangi nav va texnologiyalarni sinovdan o‘tkazish, tuproq va suv holatini tahlil qilish, texnologik jarayonlarni raqamlashtirish hamda mutaxassislarning amaliy malakasini oshirishdan iborat bo‘lishi lozim. Ilmiy ishlanmalarni joriy etish xarajatlarining bir qismini innovatsion vaucherlar orqali moliyalashtirish klasterlarning tadqiqot natijalariga bo‘lgan talabini kuchaytiradi.

Beshinchidan, agroklasterlarning resurs samaradorligini baholovchi maxsus ekologik pasportni joriy etish maqsadga muvofiq. Unda suv sarfi, tuproq unumdorligining o‘zgarishi, energiya iste’moli, kimyoviy vositalardan foydalanish, chiqindilarni qayta ishlash va issiqxona gazlari chiqindisi kabi ko‘rsatkichlar aks ettirilishi zarur. Ekologik ko‘rsatkichlari yaxshilangan klasterlarga yashil kreditlar va qo‘shimcha moliyaviy rag‘batlar taqdim etilishi mumkin.

Oltinchidan, dehqon, tomorqa va kichik fermer xo‘jaliklarini klaster zanjiriga teng huquqli ishtirokchi sifatida kiritish uchun gorizontal kooperatsiyani rivojlantirish talab etiladi. Umumiy foydalaniladigan yig‘ish, saralash, sovitish, qadoqlash va laboratoriya markazlarining tashkil etilishi kichik xo‘jaliklarga yirik tovar partiyalarini shakllantirish hamda ichki va tashqi bozor standartlariga moslashish imkonini beradi. Bunday markazlar klaster mulki emas, ishtirokchi xo‘jaliklar ulushiga asoslangan kooperativ tuzilma shaklida tashkil etilsa, manfaatlar muvozanati yaxshiroq ta’minlanadi.

Yettinchidan, agroklasterlar faoliyatining ochiq reytingini ishlab chiqish zarur. Reyting qayta ishlash darajasi, qo‘shilgan qiymat, eksport bozorlari soni, shartnomalar bo‘yicha o‘z vaqtida hisob-kitob qilish, suv tejamkorligi, innovatsiyalarga sarflangan mablag‘ va fermerlarning qoniqish darajasi kabi ko‘rsatkichlarni qamrab olishi lozim. Natijalarning ochiq e’lon qilinishi investorlar, banklar, davlat organlari va ishlab chiqaruvchilar uchun ob’ektiv axborot manbaini shakllantiradi.

Sakkizinchidan, mahsulot harakatini “daladan yakuniy iste’molchigacha” kuzatish imkonini beruvchi raqamli pasport tizimini bosqichma-bosqich joriy etish taklif qilinadi. Unda mahsulotning kelib chiqishi, ishlatilgan resurslar, agrotexnik tadbirlar, laboratoriya natijalari, qayta ishlash va logistika bosqichlari to‘g‘risidagi ma’lumotlar jamlanishi lozim. Shu bilan birga, fermerlarning tijorat ma’lumotlarini himoya qilish va platformalardan teng foydalanish huquqini kafolatlash zarur.

Foydalanilgan adabiyotlar ro‘yxati.

1. O’zbekiston Respublikasi Prezidenti Shavkat Mirziyoyev 2019 yil 12 sentabr kuni davlat budjetiga tushumlarni ko‘paytirish bo‘yicha amalga oshirilayotgan ishlarni to‘liq bajarish, 9 oy va yil yakuni bo‘yicha belgilangan makroiqtisodiy ko‘rsatkichlarga erishish, paxta-to‘qimachilik sohasida klasterlarni joriy etishni jadallashtirish masalalariga bag‘ishlangan yig‘ilish ma’lumotlari.

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МЕЖДУНАРОДНЫЙ ОПЫТ ЦИФРОВИЗАЦИИ И МОДЕРНИЗАЦИИ ЖЕЛЕЗНОДОРОЖНОЙ ТРАНСПОРТНОЙ СИСТЕМЫ

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Аннотация. *В тезисе проведено комплексное исследование международного опыта модернизации железнодорожной транспортной системы в условиях цифровой трансформации экономики. Особое внимание уделено зарубежным практикам интеграции цифровых технологий в деятельность железнодорожного транспорта, совершенствованию автоматизированных систем управления и мониторинга, оптимизации логистических операций, а также внедрению интеллектуальных транспортных решений и цифровых платформ. Рассмотрены организационно-экономические аспекты цифровизации железнодорожной отрасли и ее влияние на повышение эффективности транспортных процессов, рациональное использование ресурсов, сокращение операционных издержек, качество транспортных услуг и конкурентоспособность железнодорожного транспорта.*

Ключевые слова. *Цифровая экономика, цифровая трансформация, железнодорожный транспорт, модернизация, цифровизация, автоматизированные системы управления, интеллектуальные транспортные технологии.*

Abstract*. This thesis provides a comprehensive analysis of international experience in modernizing railway transport systems under the conditions of digital economic transformation. Particular attention is given to international practices of integrating digital technologies into railway operations, improving automated management and monitoring systems, optimizing logistics processes, and implementing intelligent transport solutions and digital platforms. The study examines the organizational and economic dimensions of railway digitalization and evaluates its contribution to improving transport efficiency, ensuring rational resource utilization, reducing operational costs, enhancing the quality of transport services, and strengthening the competitiveness of railway systems.*

Keywords. *Digital economy, digital transformation, railway transport, modernization, digitalization, automated management systems, intelligent transport technologies.*

Annotatsiya. *Mazkur tezisda raqamli transformatsiya jarayonlari sharoitida temir yo‘l transport tizimini modernizatsiya qilishning xalqaro amaliyoti kompleks ravishda tadqiq etilgan. Tadqiqot doirasida rivojlangan mamlakatlar tajribasi asosida temir yo‘l transportida raqamli texnologiyalarni integratsiyalash, avtomatlashtirilgan boshqaruv va monitoring tizimlarini takomillashtirish, logistika operatsiyalarining samaradorligini oshirish, shuningdek, aqlli transport yechimlari va innovatsion raqamli platformalarni amaliyotga tatbiq etishning tashkiliy-iqtisodiy jihatlari tahlil qilingan. Shuningdek, raqamlashtirishning transport xizmatlari sifati, resurslardan oqilona foydalanish, operatsion xarajatlarni optimallashtirish va temir yo‘l tizimining raqobatbardoshligini oshirishdagi ahamiyati ilmiy-nazariy hamda amaliy nuqtayi nazardan asoslangan.*

Keywords. *Raqamli iqtisodiyot, raqamli transformatsiya, temir yo‘l transporti, modernizatsiya, raqamlashtirish, avtomatlashtirilgan boshqaruv tizimlari, intellektual transport texnologiyalari.*

Транспорт является одной из важнейших отраслей материального производства, поскольку обеспечивает пространственную взаимосвязь между территориями, где производится продукция, и регионами её потребления. Согласно данным Всемирного банка, объём мирового транспортного рынка составляет около 4,2 трлн долларов США, что соответствует 6,8 % мирового валового внутреннего продукта (ВВП) [1]. В условиях усложнения и углубления процессов развития мировой экономики транспортная отрасль трансформировалась в высокотехнологичную и взаимосвязанную систему, характеризующуюся значительной потребностью в энергетических и природных ресурсах.

Наличие развитой транспортной инфраструктуры рассматривается как один из ключевых факторов, определяющих привлекательность территорий для населения и бизнеса. Такая инфраструктура формирует благоприятные условия для размещения производственных мощностей, а также способствует углублению интеграционных процессов и укреплению хозяйственных взаимосвязей в экономике.

Транспорт является одной из базовых отраслей материального производства, обеспечивающей территориальную взаимосвязь между регионами производства продукции и территориями её конечного потребления. Согласно данным Всемирного банка, объём мирового транспортного рынка составляет приблизительно 4,2 трлн долларов США, что соответствует около 6,8 % мирового валового внутреннего продукта (ВВП) [1]. В условиях возрастающей сложности мировой экономики

транспортная отрасль превратилась в высокотехнологичную и взаимосвязанную систему, характеризующуюся значительным потреблением энергетических и природных ресурсов.

В настоящее время в Узбекистане приоритетное внимание уделяется развитию и модернизации железнодорожной транспортной инфраструктуры. Общая протяжённость железнодорожных путей республики составляет более 7 тыс. км, из которых свыше 2 тыс. км приходятся на электрифицированные железнодорожные линии. Данная ситуация способствует повышению оперативности перевозок грузов и пассажиров, улучшению качества транспортных услуг, а также обеспечению эффективности функционирования транспортной системы [2].

Вместе с тем основная доля грузовых перевозок в стране приходится на автомобильный транспорт. В частности, более 90 % общего объёма грузовых перевозок осуществляется автомобильным транспортом, что свидетельствует о его значительной роли в национальной экономике [3]. Вместе с тем железнодорожный транспорт также обладает стратегическим значением. Так, в 2023 году данным видом транспорта было перевезено более 70 млн тонн грузов, что является важным фактором повышения транзитного потенциала страны и развития международных логистических связей.

Кроме того, функционирование более 20 современных логистических центров в различных регионах республики создаёт благоприятные условия для эффективной организации процессов обработки, хранения и распределения грузов, а также способствует повышению эффективности логистической инфраструктуры страны [6].

Индекс цифровизации железнодорожной транспортной системы:

$$\text{ИДТЖТС} = \sum_{i=1}^{n} w_i \cdot X_i$$

ИДТЖТС — **интегральный индекс цифровизации железнодорожной транспортной системы;**

X_i — значение i-го показателя цифровой трансформации;

w_i — весовой коэффициент соответствующего показателя;

n — количество анализируемых показателей;

$\sum_{i=1}^{n} w_i = 1.$

Анализ интегрального индекса цифровизации железнодорожной транспортной системы. Для комплексной оценки уровня цифровой трансформации железнодорожной транспортной системы целесообразно использовать интегральный индекс цифровизации, позволяющий объединить ряд взаимосвязанных показателей в единую аналитическую модель.

В рамках исследования интегральный индекс может формироваться на основе пяти ключевых компонентов: уровня цифровизации транспортной инфраструктуры ((D)), степени автоматизации управленческих процессов ((A)), уровня цифровизации логистических операций ((L)), распространения интеллектуальных транспортных систем ((S)) и степени интеграции цифровых платформ ((I)). В результате модель приобретает следующий вид:

[ИДТЖТС=w_1D+w_2A+w_3L+w_4S+w_5I]

Данная модель позволяет перейти от анализа отдельных цифровых решений к комплексной оценке технологической зрелости железнодорожной отрасли. При этом высокий показатель (D) свидетельствует о развитости цифровой инфраструктуры, включая системы автоматизированного контроля, датчики, телекоммуникационные сети и цифровые средства мониторинга. Показатель (A) характеризует степень автоматизации управления движением поездов, техническим обслуживанием и другими операционными процессами.

Показатель (L) отражает уровень цифровизации грузовых и пассажирских логистических операций, включая электронный документооборот, отслеживание грузов, цифровое планирование маршрутов и интеграцию участников транспортной цепочки. Компонент (S) позволяет оценить внедрение интеллектуальных транспортных систем, использующих технологии искусственного интеллекта, Internet of Things, большие данные и прогнозную аналитику. Показатель (I), в свою очередь, характеризует степень взаимной интеграции цифровых платформ, информационных систем перевозчиков, логистических операторов и государственных органов.

Практическая ценность предлагаемого подхода заключается в возможности проведения межстранового сравнительного анализа. Например, при сопоставлении железнодорожных систем Германии, Японии и Узбекистана каждому компоненту может быть присвоено нормированное значение в диапазоне от 0 до 1. Чем ближе значение интегрального индекса к 1, тем выше уровень цифровой зрелости и технологической модернизации железнодорожной транспортной системы.

Для повышения объективности исследования весовые коэффициенты могут определяться экспертным методом, методом анализа иерархий (AHP) либо на основе статистической значимости отдельных факторов. В качестве альтернативного подхода возможно использование равных весов, когда:

[w_1=w_2=w_3=w_4=w_5=0,2]

В этом случае интегральный индекс рассчитывается следующим образом:

[ИДТЖТС=0,2(D+A+L+S+I)]

Таким образом, предложенный интегральный показатель позволяет количественно оценить степень цифровизации и модернизации железнодорожной транспортной системы, выявить технологические отставания и определить приоритетные направления цифровой трансформации. Использование данного подхода особенно актуально при сравнении международного опыта, поскольку он обеспечивает сопоставимость различных национальных железнодорожных систем по единой системе критериев.

Выводы и предложения

1. Модернизация железнодорожной транспортной системы является одним из приоритетных направлений повышения эффективности транспортно-логистической инфраструктуры Узбекистана. Развитие электрифицированных железнодорожных линий и обновление инфраструктуры создают предпосылки для повышения скорости, надёжности и качества перевозок.

2. Цифровизация железнодорожного транспорта выступает важнейшим фактором его технологической трансформации. Внедрение автоматизированных систем управления, цифровых платформ, интеллектуальных транспортных технологий и современных систем мониторинга позволяет оптимизировать эксплуатационные процессы и повысить эффективность управления перевозками.

3. Международный опыт развитых стран показывает, что комплексная интеграция цифровых технологий в железнодорожную отрасль способствует снижению операционных затрат, повышению безопасности движения, рациональному использованию энергетических ресурсов и улучшению качества транспортного обслуживания.

4. Повышение роли железнодорожного транспорта в транзитных и международных перевозках имеет стратегическое значение для Узбекистана. Перевозка более 70 млн тонн грузов железнодорожным транспортом в 2023 году свидетельствует о наличии значительного потенциала для дальнейшего развития транзитных маршрутов и укрепления международных логистических связей.

5. Дальнейшее развитие железнодорожной системы Узбекистана целесообразно осуществлять на основе комплексной цифровой модернизации, расширения электрификации, развития современных логистических центров и внедрения интеллектуальных транспортных решений. Реализация данных направлений позволит повысить конкурентоспособность железнодорожного транспорта, укрепить транзитный потенциал страны и обеспечить его устойчивое развитие в условиях цифровой экономики.

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REGIONAL INTEGRATION IN THE GULF COOPERATION COUNCIL: THEORETICAL PERSPECTIVES AND TRANSFORMATION IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

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Abstract. *This article examines the development and transformation of regional integration in the Gulf Cooperation Council (GCC) from the perspective of contemporary regional integration theories and sustainable development. The study focuses on the extent to which classical and contemporary theoretical approaches, including neofunctionalism, intergovernmentalism, constructivism, and comparative regionalism, can explain the specific characteristics of the GCC integration process. Unlike the European model of integration, the GCC has developed within a regional environment strongly influenced by security concerns, state sovereignty, shared cultural identity, and intergovernmental cooperation. The article applies qualitative and comparative approaches to analyze the evolution of GCC institutions and the changing nature of regional cooperation among its member states. Particular attention is given to the transformation of regional integration from primarily security and political coordination toward broader cooperation in economic diversification, innovation, infrastructure, and sustainable development. The study concludes that the transformation of the GCC provides valuable insights for developing a more comprehensive and context-sensitive understanding of regional integration and its contribution to sustainable development in the contemporary international system.*

Keywords: *regional integration, Gulf Cooperation Council, GCC, regionalism, integration theories, sustainable development, comparative regionalism.*

Аннотация. *В данной статье рассматриваются развитие и трансформация региональной интеграции в рамках Совета сотрудничества арабских государств Персидского залива (ССАГПЗ) с позиций современных теорий региональной интеграции и устойчивого развития. Основное внимание уделяется вопросу о том, в какой степени классические и современные теоретические подходы, включая неофункционализм, межправительственный подход, конструктивизм и*

сравнительный регионализм, позволяют объяснить специфические особенности интеграционного процесса в рамках ССАГПЗ. В отличие от европейской модели интеграции, ССАГПЗ формировался и развивался в региональной среде, на которую существенное влияние оказывают вопросы безопасности, государственный суверенитет, общая культурная идентичность и межправительственное взаимодействие. В исследовании применяются качественный и сравнительный подходы для анализа эволюции институтов ССАГПЗ и изменения характера регионального сотрудничества между государствами-участниками. Особое внимание уделяется трансформации региональной интеграции — от преимущественно вопросов безопасности и политической координации к более широкому сотрудничеству в сферах экономической диверсификации, инноваций, инфраструктурного развития и устойчивого развития. Его опыт демонстрирует важность сочетания институциональных, политических, военно-безопасностных и идентичностных подходов при анализе региональной интеграции за пределами европейского контекста. В заключение отмечается, что трансформация ССАГПЗ предоставляет важные возможности для формирования более комплексного и контекстно-ориентированного понимания региональной интеграции и ее вклада в обеспечение устойчивого развития в условиях современной международной системы.

Ключевые слова: *региональная интеграция, Совет сотрудничества арабских государств Персидского залива (ССАГПЗ), регионализм, теории интеграции, устойчивое развитие, сравнительный регионализм.*

Introduction

Regional integration is not a uniform process that follows a single institutional or political trajectory. Different regions have developed distinct forms of cooperation depending on their historical experiences, security environments, political structures, and socio-cultural characteristics[7]. The development of regional integration theories after the Second World War was strongly influenced by the European experience, particularly through functionalist, neofunctionalist, and intergovernmentalist approaches[8]. These theories provided important explanations of how states transfer certain functions to regional institutions, respond to increasing interdependence, and coordinate their national interests. However, the emergence of regional organizations outside Europe has demonstrated that regional cooperation can develop according to different institutional and political patterns.

[7] Frank Schimmelfennig, "Regional Integration Theory," *Oxford Research Encyclopedia of Politics* (Oxford University Press, 2018), https://doi.org/10.1093/acrefore/9780190228637.013.599

[8] Ernst B. Haas, *The Uniting of Europe: Political, Social, and Economic Forces, 1950–1957* (Stanford: Stanford University Press, 1958); Frank Schimmelfennig, "Regional Integration Theory."

The Gulf Cooperation Council (GCC) offers a significant case for examining these differences. Established in 1981, the GCC brings together Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates[9]. Its formation was closely connected with the security and political circumstances of the Gulf region and the shared interests of the six states. Since its establishment, however, the organization has gradually expanded the scope of cooperation beyond its initial security-oriented objectives. Economic coordination, trade, investment, infrastructure, and other areas of regional cooperation have increasingly become part of the GCC agenda[10]. This development raises an important question concerning the nature and direction of regional integration in a region where national sovereignty remains a central principle of interstate relations.

The GCC experience also demonstrates a significant difference between regional cooperation in the Gulf and the European integration model[11]. The European Union has developed extensive supranational institutions and mechanisms of collective decision-making, whereas the GCC has remained primarily based on intergovernmental cooperation[12]. Member states continue to exercise considerable control over major political and strategic decisions. At the same time, common cultural characteristics, similar political systems, shared security concerns, and historical connections have contributed to the persistence of regional cooperation. These characteristics make the GCC a valuable case for examining whether regional integration can be understood through theoretical frameworks developed primarily from the European experience.

The transformation of GCC cooperation is particularly relevant in the context of contemporary sustainable development[13]. The Gulf states are increasingly pursuing economic diversification, technological modernization, innovation, infrastructure development, and new forms of regional economic cooperation[14]. These processes indicate that the functions of regional cooperation are gradually expanding beyond traditional security and political coordination. From this perspective, sustainable development provides an additional dimension through which the transformation of GCC regionalism can be examined. Regional cooperation can facilitate the coordination of economic policies,

[9] Gulf Cooperation Council, "Charter of the Cooperation Council for the Arab States of the Gulf," arts. 1 and 5, 1981.
[10] Gulf Cooperation Council, "Charter of the Cooperation Council for the Arab States of the Gulf," art. 4.
[11] Frank Schimmelfennig, "Regional Integration Theory," *Oxford Research Encyclopedia of Politics* (Oxford University Press, 2018).
[12] Gulf Cooperation Council, "Charter of the Cooperation Council for the Arab States of the Gulf," arts. 6–7.
[13] Joerg Beutel, "Economic Diversification and Sustainable Development of GCC Countries," in *When Can Oil Economies Be Deemed Sustainable? The Political Economy of the Middle East*, ed. Giacomo Luciani and Tareq Moerenhout (Singapore: Palgrave Macmillan, 2021), 99–151, https://doi.org/10.1007/978-981-15-5728-6_6
[14] International Monetary Fund, *Economic Diversification in the GCC: Past, Present, and Future*, Staff Discussion Note (Washington, DC: International Monetary Fund, 2016).

infrastructure projects, technological initiatives, and long-term development priorities while preserving the sovereignty of individual member states.

The theoretical significance of the GCC case lies in the fact that its development cannot be fully explained by a single theory of regional integration. Neofunctionalism provides useful tools for examining whether cooperation in one sector generates further integration in other sectors, while intergovernmentalism emphasizes the continuing importance of national interests and state sovereignty[15]. Constructivist approaches, in turn, draw attention to shared identities, norms, and social understandings among member states. Comparative regionalism further makes it possible to examine the GCC without treating the European experience as a universal model of regional integration[16]. The combination of these perspectives provides a broader analytical framework for understanding the specific character of integration in the Gulf.

Among these organizations, the Gulf Cooperation Council (GCC), established in 1981, represents a unique case of regional integration. Bringing together six Arab monarchies—Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates—the GCC was initially created to strengthen regional security and political coordination in response to growing geopolitical challenges in the Gulf region (Ulrichsen, 2018). Over time, the organization has expanded its activities to include economic integration, common market initiatives, infrastructure cooperation, and coordinated foreign policy mechanisms[17].

Therefore, this article examines the GCC as a distinctive model of regional integration and reassesses the evolution and transformation of regional integration theories through its experience. The study argues that the GCC represents an alternative pathway of regionalism that challenges Eurocentric assumptions and contributes to the development of a more comprehensive theoretical understanding of regional integration in contemporary international relations.

Literature Review and Theoretical Framework

The study of regional integration has developed into an important field within International Relations, particularly since the establishment and expansion of European integration after the Second World War. Early theoretical approaches were largely concerned with explaining the emergence of cooperation among European states and the gradual development of regional institutions. Functionalism emphasized the potential of cooperation in specific technical and economic areas to reduce conflict and create conditions for broader

[15] Ernst B. Haas, *The Uniting of Europe*; Stanley Hoffmann, "Obstinate or Obsolete? The Fate of the Nation-State and the Case of Western Europe," *Daedalus* 95, no. 3 (1966): 862–915.
[16] Fredrik Söderbaum, *Rethinking Regionalism* (London: Palgrave Macmillan, 2016); Thomas A. Börzel and Thomas Risse, eds., *The Oxford Handbook of Comparative Regionalism* (Oxford: Oxford University Press, 2016).
[17] Bianco, C., & Stansfield, G. (2018). The GCC in Transition.

forms of cooperation. This approach provided an important foundation for subsequent theories of regional integration by shifting attention from traditional power politics toward functional cooperation and institutional development[18].

Building on functionalist ideas, neofunctionalism became one of the most influential approaches to the study of European integration. Ernst B. Haas conceptualized integration as a dynamic process in which cooperation in one policy sector could generate pressures for cooperation in other sectors through the mechanism of "spillover."[19] According to this perspective, the development of regional institutions and the activities of supranational and transnational actors may contribute to the gradual expansion and deepening of integration[20]. Neofunctionalism therefore provides a useful analytical framework for examining whether economic and functional cooperation can generate broader institutional and political integration. However, the experience of European integration also demonstrated that integration processes could experience periods of stagnation and political resistance, raising questions about the explanatory capacity of a purely functionalist approach.

Intergovernmentalism emerged partly in response to these limitations by emphasizing the continuing importance of national governments and state interests. Stanley Hoffmann argued that the progress of regional integration is strongly influenced by the interests and preferences of sovereign states[21]. From this perspective, regional institutions do not necessarily replace national decision-making; rather, states remain the principal actors in determining the scope and limits of regional cooperation. Liberal intergovernmentalism subsequently developed this argument by emphasizing the role of domestic preferences, national interests, and interstate bargaining in the process of European integration[22]. This theoretical perspective is particularly relevant to the GCC because its institutional structure continues to place considerable emphasis on state sovereignty and consensus among member governments.

The expansion of regional organizations beyond Europe from the 1990s onward contributed to the development of broader approaches to regionalism. The new regionalism perspective emphasized that contemporary regional cooperation cannot be reduced to economic integration alone. Regionalism may simultaneously involve political, economic,

[18] David Mitrany, *A Working Peace System: An Argument for the Functional Development of International Organization* (Chicago: Quadrangle Books, 1966).
[19] Ernst B. Haas, *The Uniting of Europe: Political, Social, and Economic Forces, 1950–1957* (Stanford: Stanford University Press, 1958).
[20] Ernst B. Haas, *The Uniting of Europe*.
[21] Stanley Hoffmann, "Obstinate or Obsolete? The Fate of the Nation-State and the Case of Western Europe," *Daedalus* 95, no. 3 (1966): 862–915.
[22] Andrew Moravcsik, *The Choice for Europe: Social Purpose and State Power from Messina to Maastricht* (Ithaca, NY: Cornell University Press, 1998).

security, social, cultural, and institutional dimensions[23]. This approach is particularly relevant to regions in which formal supranational integration is limited but extensive forms of intergovernmental cooperation continue to develop. It also provides a basis for examining regional organizations according to their own historical and political contexts rather than measuring them exclusively against the European experience.

The development of comparative regionalism further challenged Eurocentric assumptions within the study of regional integration. Comparative regionalist scholarship emphasizes that regional organizations emerge under different historical, institutional, political, and socio-economic conditions and therefore may follow different trajectories of regional cooperation[24]. From this perspective, the European Union should be regarded as one important example of regional integration rather than as a universal model applicable to all regions. This analytical shift is particularly important for studying the Middle East, where regional cooperation has developed within a political environment characterized by security challenges, strong state sovereignty, and distinctive historical and cultural conditions.

Within this broader theoretical debate, the Gulf Cooperation Council provides an important case for examining the diversity and transformation of regional integration. Established in 1981 by Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, the GCC was created in a regional environment characterized by significant security and political challenges[25]. Its institutional development was closely associated with the need for coordination among the Gulf monarchies in response to a changing regional security environment. Nevertheless, the organization has gradually expanded its activities beyond security cooperation to include economic, financial, infrastructural, technological, and other areas of regional coordination.

The GCC differs institutionally from the European Union in several important respects. While European integration has involved the development of relatively strong supranational institutions, the GCC has remained primarily an intergovernmental organization in which member states retain significant control over major political and strategic decisions[26]. This institutional characteristic limits the applicability of neofunctionalist expectations concerning automatic spillover from functional cooperation toward deeper political integration[27]. Economic and institutional cooperation within the

[23] Björn Hettne, "Beyond the 'New' Regionalism," *New Political Economy* 10, no. 4 (2005): 543–571.
[24] Tanja A. Börzel and Thomas Risse, eds., *The Oxford Handbook of Comparative Regionalism* (Oxford: Oxford University Press, 2016).
[25] Gulf Cooperation Council, "Charter of the Cooperation Council for the Arab States of the Gulf," 1981.
[26] Frank Schimmelfennig, "Regional Integration Theory," *Oxford Research Encyclopedia of Politics* (Oxford University Press, 2018), https://doi.org/10.1093/acrefore/9780190228637.013.599; Gulf Cooperation Council, "Charter of the Cooperation Council for the Arab States of the Gulf," 1981.
[27] Ernst B. Haas, *The Uniting of Europe*; Frank Schimmelfennig, "Regional Integration Theory."

GCC has expanded, but this expansion has not resulted in the creation of a supranational authority comparable to that of the European Union.

At the same time, an exclusively intergovernmentalist interpretation does not fully explain the persistence and development of GCC cooperation. The member states share important cultural, historical, social, and political characteristics, while common Arab and Islamic identities provide additional sources of regional cohesion. These ideational factors can be examined through a constructivist perspective, which emphasizes the role of shared identities, norms, and socially constructed understandings in shaping interstate relations. From this perspective, regional cooperation is not determined solely by material interests but is also influenced by the ways in which states perceive their common identity and regional community.

Security remains another central factor in the development of GCC regionalism. The organization emerged within a region characterized by persistent geopolitical competition and security uncertainty. Consequently, the GCC has often functioned as a mechanism for coordinating the interests and security policies of its member states rather than as an organization primarily designed to establish supranational political institutions. At the same time, internal disagreements among member states, including the Qatar diplomatic crisis, have demonstrated the limits of regional institutional cohesion and the continuing importance of national interests in shaping collective action.

The economic dimension of GCC regionalism has become increasingly significant in recent decades. Gulf states have sought to reduce their dependence on hydrocarbons through economic diversification, technological development, infrastructure investment, and innovation-oriented development strategies[28]. These processes have introduced new dimensions into regional cooperation and have increased the relevance of sustainable development to the study of GCC integration. Economic diversification and innovation are not only national development objectives but can also create opportunities for deeper regional cooperation through investment, infrastructure, technology transfer, and coordinated development initiatives.

From this perspective, sustainable development can be considered an important contemporary dimension of GCC regionalism. The transformation of regional cooperation from predominantly security-oriented coordination toward broader economic and developmental cooperation illustrates how regional organizations can adapt to changing global and domestic conditions. The GCC experience therefore provides an opportunity to

[28] Sami Mahroum and Yasser Al-Saleh, "Demand-led Related Diversification: An Innovation Policy Approach to Economic Diversification and Development," *Science and Public Policy* 40, no. 3 (2013): 406–418, https://doi.org/10.1093/scipol/scs126

examine whether regional integration can contribute to sustainable development without necessarily following the institutional path of European integration.

Based on the existing theoretical literature, this study adopts a comparative regionalism framework while incorporating insights from neofunctionalism, intergovernmentalism, and constructivism. Neofunctionalism is used to assess whether economic and functional cooperation within the GCC generates spillover effects into other areas of regional cooperation. Intergovernmentalism is applied to explain the continuing importance of state sovereignty, national interests, and government-led decision-making[29]. Constructivism provides an analytical basis for examining the role of shared identity, norms, and cultural factors in sustaining regional cooperation. Comparative regionalism connects these perspectives by allowing the GCC to be analyzed within its own historical and political context rather than according to a universal European model.

The combination of these approaches makes it possible to examine the GCC as a distinctive form of regionalism undergoing institutional and functional transformation. Rather than viewing regional integration as a linear process leading inevitably toward supranational governance, this framework considers integration as a context-dependent process that may combine intergovernmental coordination, selective functional cooperation, shared identity, economic diversification, innovation, and sustainable development. In this sense, the GCC experience contributes to the broader theoretical debate on regional integration by demonstrating that regional cooperation beyond Europe may follow alternative institutional trajectories while still generating significant forms of regional interdependence and collective action.

3. GCC Regional Integration: Evolution and Contemporary Transformation

The evolution of the Gulf Cooperation Council (GCC) demonstrates that regional integration does not necessarily follow a linear path toward supranational governance. Since its establishment in 1981, the GCC has primarily developed as an intergovernmental organization in which national sovereignty and state interests remain central. At the same time, cooperation has gradually expanded from security and political coordination toward economic, technological, infrastructural, and developmental areas[30]. This transformation indicates that the scope of regional integration can expand even when political authority remains largely at the national level.

From the perspective of regional integration theory, the GCC represents a combination of different integration mechanisms. Intergovernmentalism provides an important

[29] Stanley Hoffmann, "Obstinate or Obsolete? The Fate of the Nation-State and the Case of Western Europe," *Daedalus* 95, no. 3 (1966): 862–915; Andrew Moravcsik, *The Choice for Europe.*

[30] Gulf Cooperation Council, "Charter of the Cooperation Council for the Arab States of the Gulf," 1981.

explanation for the dominant role of member states in decision-making and the limited transfer of sovereignty to regional institutions[31]. However, the expansion of cooperation into trade, investment, infrastructure, technology, and other functional areas also reflects elements of the neofunctionalist concept of spillover[32]. Unlike the European experience, however, functional cooperation within the GCC has not resulted in significant supranationalization. This suggests that spillover may occur through the expansion of policy cooperation without necessarily producing deeper political integration.

Constructivism further contributes to understanding the GCC by emphasizing the importance of shared historical, cultural, and social characteristics among its member states. These commonalities provide an additional basis for regional cohesion, although they do not eliminate differences in national interests and foreign-policy priorities[33]. The GCC experience therefore demonstrates that regional integration is shaped by the interaction of material interests, institutional arrangements, security considerations, and shared identity rather than by a single mechanism.

A particularly important transformation has occurred in the economic dimension of GCC regionalism. In response to the challenges of hydrocarbon dependence and changes in the global economy, GCC states have increasingly prioritized economic diversification, innovation, technological development, and sustainable development[34]. These priorities create new opportunities for regional cooperation in infrastructure, investment, technology transfer, human capital, and knowledge-based industries. Consequently, sustainable development can be understood not simply as a national policy objective but as an emerging dimension of regional cooperation[35].

The GCC can therefore be characterized as a form of **selective and adaptive regional integration**. Its development differs from the European model because cooperation expands primarily through intergovernmental coordination rather than supranational institution-building. At the same time, the growing importance of economic diversification, innovation, and sustainable development demonstrates that the functions of GCC regionalism are undergoing significant transformation. This case supports a comparative understanding of

[31] Stanley Hoffmann, "Obstinate or Obsolete? The Fate of the Nation-State and the Case of Western Europe," *Daedalus* 95, no. 3 (1966): 862–915.
[32] Ernst B. Haas, *The Uniting of Europe: Political, Social, and Economic Forces, 1950–1957* (Stanford: Stanford University Press, 1958).
[33] Alexander Wendt, *Social Theory of International Politics* (Cambridge: Cambridge University Press, 1999).
[34] International Monetary Fund, *Economic Diversification in the GCC: Past, Present, and Future*, IMF Staff Discussion Note (Washington, DC: International Monetary Fund, 2016).
[35] Joerg Beutel, "Economic Diversification and Sustainable Development of GCC Countries," in *When Can Oil Economies Be Deemed Sustainable? The Political Economy of the Middle East*, ed. Giacomo Luciani and Tareq Moerenhout (Singapore: Palgrave Macmillan, 2021), 99–151, https://doi.org/10.1007/978-981-15-5728-6_6.

regional integration in which different regions may develop distinct institutional pathways according to their own political, economic, and security environments.

The GCC as an Alternative Model of Regional Integration

The analysis demonstrates that the GCC represents a form of regional integration that differs significantly from the European model. Although functional cooperation has expanded across economic, technological, and developmental sectors, this process has not resulted in substantial supranationalization[36]. The continuing importance of national sovereignty and government-led decision-making indicates that intergovernmentalism remains a central feature of GCC regionalism[37]. At the same time, the expansion of cooperation across different policy areas demonstrates that elements of functional spillover are also present[38].

The GCC case therefore suggests that regional integration should not necessarily be understood as a linear movement toward supranational institutions. Instead, integration may develop through selective cooperation in areas where member states identify common interests. Shared cultural and historical characteristics further contribute to regional cohesion, while security considerations continue to influence the scope and pace of institutional development[39]. The interaction of these factors supports the view that regional integration is highly dependent on its specific political and historical context.

Consequently, the GCC can be conceptualized as a **selective and adaptive model of regional integration**. Its experience demonstrates that regional cooperation can deepen functionally without developing into a supranational political system. This finding contributes to comparative regionalism by showing that different regions may follow distinct institutional trajectories and that the European experience should not be treated as a universal standard for evaluating regional integration.

This study demonstrates that regional integration within the GCC differs from the European model and remains primarily intergovernmental. The analysis shows that neofunctionalism, intergovernmentalism, and constructivism each explain different aspects of GCC regional cooperation, while comparative regionalism provides a broader contextual framework.

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[36] Frank Schimmelfennig, "Regional Integration Theory," *Oxford Research Encyclopedia of Politics* (Oxford University Press, 2018), https://doi.org/10.1093/acrefore/9780190228637.013.599; Gulf Cooperation Council, "Charter of the Cooperation Council for the Arab States of the Gulf," 1981.

[37] Stanley Hoffmann, "Obstinate or Obsolete? The Fate of the Nation-State and the Case of Western Europe," *Daedalus* 95, no. 3 (1966): 862–915.

[38] Ernst B. Haas, *The Uniting of Europe: Political, Social, and Economic Forces, 1950–1957* (Stanford: Stanford University Press, 1958).

[39] Tanja A. Börzel and Thomas Risse, eds., *The Oxford Handbook of Comparative Regionalism* (Oxford: Oxford University Press, 2016); Fredrik Söderbaum, *Rethinking Regionalism* (London: Palgrave Macmillan, 2016).

Overall, the GCC can be characterized as a **selective and adaptive model of regional integration**. Its experience demonstrates the importance of considering regional political, economic, security, and socio-cultural contexts when analyzing contemporary regional integration and its contribution to sustainable development.

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O'ZBEKISTON BOKS FEDERATSIYASI USTAVINING (ESKI TAHRIR) BOSHQARUV VA NAZORAT TIZIMI: INSTITUTSIONAL TAHLIL

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Annotatsiya. *Ushbu tezisda O'zbekiston Boks Federatsiyasining 2014 yilgi eski tahrirdagi Ustavida nazarda tutilgan boshqaruv va nazorat tizimi institutsional nuqtai nazardan tahlil qilinadi. Konferentsiya, Ijroiya qo'mita, Rais, Bosh kotib, Murabbiylar kengashi va Nazorat-taftish komissiyasining vakolatlari, ovoz berish mexanizmlari hamda ular o'rtasidagi hokimiyat taqsimoti BIBGIS yaxshi boshqaruv indikatorlari asosida baholanadi. Natijalar tizimda hokimiyat taqsimoti va demokratik qaror qabul qilish mexanizmlari mavjudligini, biroq mansab muddati va manfaatlar to'qnashuviga oid cheklovlar yetishmasligini ko'rsatadi.*

Kalit so'zlar: *bokc federatsiyasi; boshqaruv tizimi; institutsional tahlil; Ijroiya qo'mita; Nazorat-taftish komissiyasi; yaxshi boshqaruv.*

Abstract. *This thesis examines the governance and control system envisaged in the 2014 (former) edition of the Charter of the Uzbekistan Boxing Federation from an institutional perspective. The powers of the Conference, Executive Committee, Chairman, General Secretary, Coaches' Council, and Control-Audit Commission, along with voting mechanisms and the division of power among them, are evaluated against the BIBGIS good-governance indicators. The results show that the system incorporates separation of powers and democratic decision-making mechanisms, but lacks provisions on term limits and conflict of interest.*

Keywords: *boxing federation; governance system; institutional analysis; Executive Committee; Control-Audit Commission; good governance.*

KIRISH. Sport tashkilotlarining institutsional barqarorligi ko'p jihatdan ularning boshqaruv tizimi qanday loyihalanganiga bog'liq. Boshqaruv organlari o'rtasidagi hokimiyat taqsimoti, qaror qabul qilish mexanizmlari va nazorat vositalarining mavjudligi tashkilotning shaffofligi hamda hisobdorligini belgilovchi asosiy omillar hisoblanadi. Chappelet va Mrkonjic [3] tomonidan taklif etilgan BIBGIS (Basic Indicators for Better Governance in International Sport) tizimi xalqaro sport

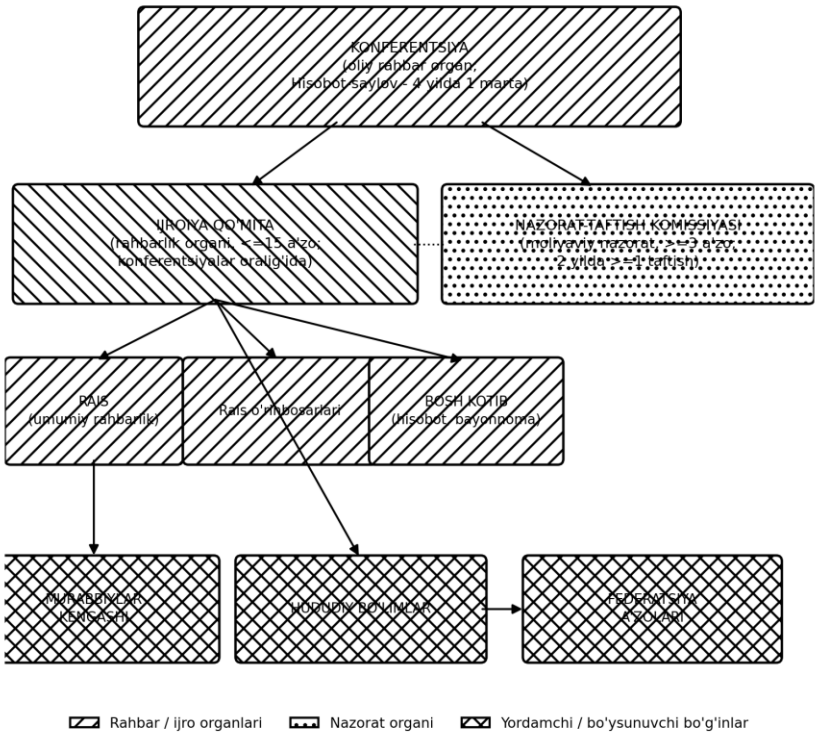
tashkilotlarini to'rtta asosiy mezon — shaffoflik, demokratik jarayonlar, ichki nazorat va ijtimoiy mas'uliyat — bo'yicha baholash imkonini beradi. Geeraert [2] o'zining "National Sports Governance Observer" tadqiqotida ko'plab milliy federatsiyalarda ijroiya organlari va nazorat organlari o'rtasida yetarli ajratish mavjud emasligini, bu esa manfaatlar to'qnashuvi xavfini oshirishini aniqladi. Geeraert, Alm va Groll [4] Olimpiya harakatiga a'zo 35 ta xalqaro federatsiyani tahlil qilib, ularning aksariyatida rahbariyat lavozimlari uchun muddat cheklovi (term limits) mavjud emasligini, bu esa hokimiyatning uzoq muddat bir shaxs yoki guruh qo'lida to'planishiga olib kelishi mumkinligini ta'kidladilar. Chappelet [5] esa xalqaro sport tashkilotlari boshqaruv tizimini davriy ravishda qayta ko'rib chiqish zarurligini asoslab berdi. Ushbu tadqiqotlar milliy sport federatsiyalari boshqaruv hujjatlarini institutsional nuqtai nazardan tahlil qilish naqadar dolzarb ekanligini ko'rsatadi, biroq O'zbekiston sharoitida bunday tahlillar hozircha kam uchraydi. Xususan, boshqaruv organlari o'rtasidagi vakolatlar taqsimoti, ularning bir-birini nazorat qilish mexanizmlari hamda qaror qabul qilish jarayonlarining shaffofligi kabi masalalar milliy sport huquqshunosligida deyarli o'rganilmagan yo'nalish bo'lib qolmoqda. O'zbekiston Boks Federatsiyasining (O'BF) 2014 yilgi eski tahrirdagi Ustavi VIII–XV boblarda batafsil boshqaruv va nazorat tizimini nazarda tutgan bo'lib, u Konferentsiya, Ijroiya qo'mita, Rais, Bosh kotib, Murabbiylar kengashi va Nazorat-taftish komissiyasi kabi organlarni o'z ichiga oladi. Ushbu tezisning maqsadi — mazkur boshqaruv tizimining tarkibiy elementlarini, ularning vakolatlari va o'zaro nazorat mexanizmlarini institutsional tahlil qilish hamda uni xalqaro yaxshi boshqaruv mezonlari bilan qiyoslashdan iborat. Tadqiqot quyidagi savollarga javob izlaydi: Federatsiyaning boshqaruv organlari o'rtasida qanday hokimiyat taqsimoti mavjud? Qaror qabul qilish mexanizmlari qay darajada demokratik tamoyillarga asoslangan? Ijro va nazorat funksiyalari o'rtasida qanday o'zaro nazorat (checks and balances) ta'minlangan?

MATERIAL VA METODLAR. Tadqiqot obyekti sifatida O'zbekiston boks federatsiyasi Ustavining (eski tahrir, 2014 y.) VIII–XV boblari — "Federatsiya tuzilmasi va rahbar organlari", "Ovoz berish va qarorlar kuchga kirish muddatlari", "Ijroiya qo'mita", "Federatsiya Raisi", "Bosh kotib", "Murabbiylar kengashi" hamda "Nazorat-taftish komissiyasi" bo'limlari — tanlab olindi. Tadqiqot metodi sifatida institutsional kontent-tahlil qo'llanildi, unda har bir boshqaruv organi quyidagi tahlil o'lchamlari bo'yicha kodlashtirildi: (1) tarkib va shakllantirish tartibi; (2) vakolatlar doirasi; (3) qaror qabul qilish va ovoz berish mexanizmi; (4) yig'ilishlar chastotasi; (5) boshqa organlar bilan o'zaro nazorat munosabatlari. Tahlil doirasi Chappelet va Mrkonjic [3] tomonidan taklif etilgan BIBGIS tizimidagi shaffoflik, demokratik

jarayonlar va ichki nazorat mezonlariga asoslanib kengaytirildi. Har bir topilma tegishli Ustav moddasi (band raqami) bilan bog'lab hujjatlashtirildi. Bu yondashuv Geeraert [2] tomonidan qo'llanilgan indikatorlarga asoslangan baholash usuliga hamohang bo'lib, har bir topilmani tekshirish va qayta tiklash imkonini beradi. Tadqiqotning cheklovi shundaki, tahlil faqat matn asosida olib borilgan bo'lib, amaliyotda ushbu qoidalarning qanday qo'llanilishi (masalan, Ijroiya qo'mita majlislarining haqiqiy chastotasi yoki Konferentsiya qarorlarining bajarilish darajasi) alohida empirik tadqiqot mavzusi bo'lishi mumkin.

NATIJALAR. Federatsiyaning boshqaruv tizimi uch bosqichli ierarxiyaga ega: Konferentsiya (oliy organ), Ijroiya qo'mita (ijro organi) va Nazorat-taftish komissiyasi (nazorat organi), bunga qo'shimcha ravishda Rais, Bosh kotib va Murabbiylar kengashi kabi ixtisoslashgan lavozim va organlar kiradi. Ushbu uch bosqichli tuzilma zamonaviy korporativ boshqaruv nazariyasida keng qo'llaniladigan "hokimiyat taqsimoti" (separation of powers) modeliga mos kelib, strategik boshqaruv (Konferentsiya), operativ boshqaruv (Ijroiya qo'mita) va mustaqil nazorat (NTK) funksiyalarini bir-biridan ajratadi. Konferentsiya Federatsiyaning oliй rahbar organi hisoblanadi (8.1): Hisobot-saylov konferentsiyasi har 4 yilda 1 marta, oddiy Konferentsiya esa kamida har 2 yilda 1 marta chaqiriladi; navbatdan tashqari konferentsiya Ijroiya qo'mita yoki Nazorat-taftish komissiyasi taklifi bilan chaqirilishi mumkin. Ijroiya qo'mita Konferentsiya o'tkazish joyi, muddati va delegatlar sonini belgilaydi, tanlangan delegatlar kamida 15 kun oldin yozma xabardor qilinishi shart (8.1.1). Hisobot-saylov konferentsiyasi Raisni, uning o'rinbosarlarini, Bosh kotibni, Ijroiya qo'mita a'zolarini va komissiya rahbarlarini saylash va lavozimidan ozod etish, Federatsiyani qayta tashkil etish va tugatish, hamda Nazorat-taftish komissiyasi tarkibini belgilash vakolatiga ega (8.2.1–8.2.4); oddiy Konferentsiya esa Ustavga o'zgartirish kiritish, tashqi auditorlarni tayinlash va Ijroiya qo'mita yoki Nazorat-taftish komissiyasi a'zolarini muddatidan oldin almashtirish vakolatiga ega (8.3.1–8.3.4). Ovoz berish tartibiga ko'ra (IX bob), qarorlar oddiy ko'pchilik ovoz bilan ochiq yoki yashirin tarzda qabul qilinadi (9.1), rahbar organ tarkibini saylashda kamida 50%+1 ovoz talab qilinadi (9.3), qabul qilingan qarorlar Konferentsiya yopilgan zahoti kuchga kiradi (9.4), baёнnomalarning to'g'riligiga esa Bosh kotib shaxsan javobgar hisoblanadi (9.5). Ijroiya qo'mita konferentsiyalar oralig'ida umumiy rahbarlikni amalga oshiradi va tarkibi 15 kishidan oshmasligi kerak (10.1); a'zosi uzrsiz sabablarga ko'ra ikki va undan ortiq marta yig'ilishlarda qatnashmasa, uning vakolati muddatidan oldin to'xtatiladi (10.3), shuningdek Ijroiya qo'mita a'zosi bir vaqtning o'zida Nazorat-taftish komissiyasi a'zosi bo'lishi mumkin emas (10.4) — bu ikki organ o'rtasidagi funksional mustaqillikni

ta'minlovchi asosiy qoidadir. Ijroiya qo'mita yig'ilishlari yiliga kamida uch marta o'tkaziladi (10.6), qaror kuchga kirishi uchun a'zolarning yarmidan ko'pi ishtirok etishi (kvorum) talab qilinadi (10.8), har bir a'zo bitta ovoz huquqiga ega bo'lib, boshqa a'zo o'rniga ovoz berish taqiqlanadi (10.10), qarshi ovoz bergan a'zo o'z fikrini yozma ravishda bildirish huquqiga ega (10.11). Ijroiya qo'mitaning vakolatlar ro'yxati (10.16) juda keng bo'lib, unga yillik rejalarni tasdiqlash, sport taqvim rejasini tasdiqlash, murabbiylar kengashini shakllantirish, hakamlar hay'atini saylash, yillik byudjetni tasdiqlash va uning ijrosi to'g'risidagi hisobotni tasdiqlash, hududiy bo'limlarni tashkil etish yoki tugatish, hamda a'zolikka qabul qilish yoki chiqarish kabi keng qamrovli vakolatlar kiradi; bundan tashqari, Ijroiya qo'mita Konferentsiya vakolatiga kirmagan boshqa har qanday zarur masalalar bo'yicha ham qaror qabul qilishi mumkin (10.17), bu qoida ijro organiga ancha keng ixtiyoriy vakolat beradi. Federatsiya Raisi umumiy rahbarlikni amalga oshiradi, ishonch qog'ozisiz Federatsiya nomidan ish yuritadi, moliyaviy hujjatlarga birinchi imzo huquqiga ega, xodimlarni ishga qabul qiladi va ozod etadi, hamda buyruq va farmoyishlar chiqaradi (11.1–11.16). Bosh kotib Ijroiya qo'mita tarkibiga kiradi, yillik hisobotlarni tayyorlaydi, Konferentsiya va Ijroiya qo'mita yig'ilishlarida kotiblik vazifasini bajaradi hamda xalqaro yozishmalarni olib boradi (12.1–12.4). Murabbiylar kengashi Ijroiya qo'mita tavsiyasi bilan tashkil etiladi, uning raisi etib milliy terma jamoa bosh murabbiyi tayinlanadi, kengash murabbiylar va sportchilar o'rtasidagi nizolarni ko'rib chiqadi (13.1–13.2). Nazorat-taftish komissiyasi (NTK) kamida 3 kishidan iborat bo'lib, Hisobot-saylov konferentsiyasida saylanadi, moliyaviy-xo'jalik faoliyati va Ustavga rioya etilishi ustidan nazoratni amalga oshiradi hamda markaziy apparat va hududiy bo'limlarda kamida har 2 yilda bir marta tafrish o'tkazadi (15.1–16.4); NTK raisi Ijroiya qo'mita yig'ilishlarida faqat maslahat ovozi huquqi bilan ishtirok etishi mumkin (16.3). Shuni alohida ta'kidlash lozimki, Murabbiylar kengashi va NTKdan farqli o'laroq, Ijroiya qo'mita a'zolari sonining aniq minimal chegarasi Ustavda belgilanmagan — faqat yuqori chegara (15 kishi) nazarda tutilgan, bu esa amalda Ijroiya qo'mitaning juda kichik tarkibda ham faoliyat yuritishi mumkinligini anglatadi. Konferentsiyalarda odatda Federatsiya Raisi raislik qiladi; uning yo'qligida bu vazifani, berilgan ishonchnoma asosida, birinchi o'rinbosar yoki o'rinbosarlardan biri bajarishi mumkin (8.4), bu esa boshqaruv jarayonining uzluksizligini ta'minlaydigan qo'shimcha mexanizm hisoblanadi. Shuningdek, Ijroiya qo'mita kengashiga taklif qilingan, ammo uning a'zosi bo'lmagan shaxslar faqat maslahat ovozi huquqiga ega (10.13), bu esa qaror qabul qilish vakolatining faqat rasman saylangan a'zolar doirasida saqlanishini kafolatlaydi.



1-rasm. O'zbekiston Boks Federatsiyasi Ustavining (eski tahrir, 2014 y.) boshqaruv tuzilmasi (muallif tuzgan, hujjat matni asosida)

MUHOKAMA. BIBGIS [3] mezonlari nuqtai nazaridan qaraganda, Ustavda bir qator ijobiy institutsional xususiyatlar aniqlandi. Birinchidan, Ijroiya qo'mita va Nazorat-taftish komissiyasi a'zoligining bir-biriga mos kelmasligi (10.4) — funksional mustaqillikni ta'minlovchi eng muhim mexanizmlardan biri bo'lib, ijro va nazorat vakolatlarining bir shaxs qo'lida jamlanishining oldini oladi. Ikkinchidan, ovoz berish tartibidagi "bir a'zo — bitta ovoz" tamoyili (10.10) hamda qarshi fikrni yozma bayon qilish huquqi (10.11) demokratik qaror qabul qilish jarayonining mavjudligini ko'rsatadi. Uchinchidan, yillik byudjet va uning ijrosi bo'yicha hisobotlarning Ijroiya qo'mita tomonidan tasdiqlanishi (10.16) hamda NTKning muntazam tafrishlari (16.4) moliyaviy shaffoflikni qisman ta'minlaydi. Shu bilan birga, Geeraert, Alm va Groll [4] aniqlagan umumiy tendentsiyaga mos ravishda, Ustavda Rais va Ijroiya qo'mita a'zolari uchun mansab muddatiga (term limits) hech qanday cheklov nazarda tutilmagan — bu shaxsning cheksiz marta qayta saylanishi imkonini beradi va hokimiyat konsentratsiyasi xavfini oshiradi. Bundan tashqari, Ijroiya qo'mitaning "boshqa har qanday zarur masalalar" bo'yicha qaror qabul qilish huquqi (10.17) aniq chegaralanmagan bo'lib, bu Chappelet [5] ta'kidlagan institutsional islohot zaruratiga mos keladigan zaif nuqta hisoblanadi: bunday keng ixtiyoriy vakolat, aniq nazorat mexanizmisiz, ijro organi tomonidan suiiste'mol qilinishi ehtimolini yo'qqa

chiqarmaydi. Yana bir muhim jihat — manfaatlar to'qnashuvi (conflict of interest) tushunchasi Ustavda alohida modda sifatida ta'riflanmagan; mavjud yagona tegishli qoida faqat Ijroiya qo'mita va NTK a'zoligining mos kelmasligi bilan cheklangan, holbuki zamonaviy amaliyotda bu tushuncha ancha kengroq — masalan, moliyaviy manfaatdorlik yoki qarindoshlik aloqalarini ham qamrab oladi. Nihoyat, boshqaruv organlari tarkibida gender balansga oid biror ko'rsatkich yoki tavsiya mavjud emas, bu esa xalqaro amaliyotda tobora ko'proq talab etilayotgan mezonlardan biri hisoblanadi [4]. Amaliy jihatdan, hokimiyat konsentratsiyasi xavfini kamaytirish uchun Ijroiya qo'mitaning 10.17-bandida nazarda tutilgan keng ixtiyoriy vakolatini aniq chegaralovchi qo'shimcha qoida — masalan, ma'lum miqdordagi moliyaviy operatsiyalar yoki strategik ahamiyatga ega qarorlarni majburiy ravishda Konferentsiya yoki kengaytirilgan Ijroiya qo'mita tasdig'idan o'tkazish talabi — kiritilishi mumkin. Shuningdek, Nazorat-taftish komissiyasining tafтish natijalari haqidagi hisobotlarini nafaqat Ijroiya qo'mitaga, balki barcha Federatsiya a'zolariga ochiq shaklda taqdim etish tartibi joriy etilsa, bu tashqi shaffoflikni sezilarli darajada oshirgan bo'lar edi. Geeraert [2] tadqiqotida ta'kidlanganidek, moliyaviy hisobotlarning a'zolarga ochiqligi federatsiyalar o'rtasidagi ishonchni mustahkamlovchi asosiy omillardan biri hisoblanadi.

XULOSA. O'zbekiston Boks Federatsiyasining 2014 yilgi eski tahrirdagi Ustavida nazarda tutilgan boshqaruv va nazorat tizimi uch bosqichli (Konferentsiya – Ijroiya qo'mita – Nazorat-taftish komissiyasi) tuzilmaga ega bo'lib, unda hokimiyat taqsimoti, bir a'zo — bitta ovoz tamoyili hamda ijro va nazorat organlari a'zoligining o'zaro mos kelmasligi kabi institutsional mustahkam yechimlar mavjud. Shu bilan birga, mansab muddatiga cheklov yo'qligi, manfaatlar to'qnashuvi tushunchasining tor talqin etilishi hamda gender vakillik ko'rsatkichlarining yo'qligi kabi jihatlar zamonaviy yaxshi boshqaruv standartlaridan orqada qolayotganini ko'rsatadi. Ushbu natijalar O'zbekiston Boks Federatsiyasi hamda boshqa milliy sport federatsiyalari uchun o'z boshqaruv hujjatlarini xalqaro amaliyotga moslashtirishda amaliy ahamiyatga ega bo'lib, kelgusi tahrirlarga rahbariyat lavozimlari uchun muddat cheklovi, manfaatlar to'qnashuvini oshkor qilish tartibi hamda gender balans mezonlarini kiritish tavsiya etiladi. Kelgusi tadqiqotlar ushbu institutsional xususiyatlarning amaliyotda qanday qo'llanilishini empirik jihatdan o'rganishga qaratilishi mumkin. Xususan, Ijroiya qo'mita majlislarining haqiqiy o'tkazilish chastotasi, Konferentsiya qarorlarining bajarilish darajasi hamda Nazorat-taftish komissiyasi tavsiyalarining amalda qanday hisobga olinishi kabi masalalar bo'yicha intervyu va hujjatlarni qiyosiy o'rganishga asoslangan empirik tadqiqot alohida ilmiy qiziqish uyg'otadi. Institutsional tuzilma o'zi

bilan birga uning amaliy samaradorligini kafolatlamaydi, shu sababli struktura tahlili amaliyot tahlili bilan to'ldirilishi lozim.

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“NEFT INQIROZINING” JAZOIR MIGRATSIYASIGA TA’SIRI

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Annotatsiya. *XX asrning 70-yillaridagi jazoirliklarning Yevropaga migratsiyasi doimiy bo‘lmagan erkak ishchi muhojirlar guruhidan oila a’zolarining ko‘chib kelishiga o‘zgardi. Yevropada rasmiy itse’qomat qilayotgan jazoirliklar miqdori 800,000 nafardan oshiq edi. Ushbu davr Shimoliy Afrika davlatlari uchun keyingi yillar mobaynida migratsiya jarayonlarining murakkablashib, shakllanib borishi uchun muhim hisoblanadi. Buning eng asosiy sababi iqtisodiyotning jadal sur’atlar bilan rivojlanayotganligi hamda Afrika davlatlari neft ishlab chiqarish orqali Yevropa va boshqa hududlar bilan aloqalarni mustahkamlayotganligidir. “Neft inqirozi”ning oqibatlari va migratsiyaga ta’siri ushbu tezisda muhokama qilinadi.*

Аннотация. *В 1970-х годах миграция из Алжира в Европу изменилась: из группы нелегальных рабочих-мигрантов мужского пола она превратилась в группу семей. Число алжирцев, официально проживающих в Европе, превысило 800 000 человек. Этот период важен для стран Северной Африки, поскольку миграционные процессы в последующие годы стали более сложными и структурированными. Главной причиной этого стало быстрое экономическое развитие и укрепление связей между африканскими странами и Европой и другими регионами благодаря нефтедобыче. В данной работе рассматриваются последствия «нефтяного кризиса» и его влияние на миграцию.*

Abstract. *Algerian migration to Europe in the 1970s changed from a group of irregular male migrant workers to a group of family members. The number of Algerians officially residing in Europe exceeded 800,000. This period is important for the North African countries, as migration processes became more complex and structured in the following years. The main reason for this is the rapid economic development and the strengthening of ties between African countries and Europe and other regions through oil production. The consequences of the “oil crisis” and its impact on migration are discussed in this thesis.*

Kalit so‘zlar: *“Neft inqirozi”, muhojirlar pul jo‘natmalari, chegara xavfsizligi, diskriminatsiya, neft eksport daromadi, migratsiya xususiyatlari.*

Ключевые слова: *«Нефтяной кризис», денежные переводы мигрантов, безопасность границ, дискриминация, доходы от экспорта нефти, характеристики миграции.*

Keywords: *"Oil crisis", migrant remittances, border security, discrimination, oil export revenue, migration characteristics.*

1973-yilda boshlangan “Neft inqirozi” ikki tomon davlatlarida iqtisodiy muammolarga sabab bo‘ldi hamda Yevropa davlatlari shartnomalarni hamda mehnatga jalb qilish dasturlarini bekor qildi. Yevropa davlatlarida iqtisodiy inqiroz boshlanganligi oqibatida ishchi muhojirlarga turli cheklovlar o‘rnatildi, lekin shunga qaramasdan, allaqachon muhojirlar turli hududlarda rasmiy joylashgan edi. Fransiya 1974-yilda yangi mehnat shartnomalari tuzilishini taqiqladi, lekin avvaldan Fransiyada bo‘lgan muhojirlarni oilalari bilan birlashishiga ruxsat berdi. Belgiya esa 1974-yilda barcha mehnat shartnomalari va mehnat dasturlarini to‘xtatdi.[40] Niderlandiya 1975-yilda shartnomada o‘zgartirish kiritib, ko‘chib kelayotgan ishchi migrantlar sonini chekladi, ammo allaqachon o‘z hududida joylashgan muhojirlarning qolishiga ruxsat berdi. Bunday holatlar Germaniyada 1973-yilda hamda Shvetsariyada 1974-yilda sodir bo‘ldi.[41] Bu choralar bilan Yevropa davlatlari ishga yollash agentliklarini tuzishga, kompaniyalarning ishchilarga bo‘lgan ehtiyoj to‘g‘risida so‘rovnomalar yuborishiga hamda erkin viza imkoniyatlariga chek qo‘ydi, shuningdek, harbiylar tomonidan chegara nazorati kuchaytirildi. 1930-yillardan beri mavjud Fransiyada muhojirlarga nisbatan diskriminatsiya va irqchilik neft inqirozi sabab avj oldi hamda 1973-1974-yillarda kelishmovchiliklarga sabab bo‘ldi, bu holat tarixga “inqiroz irqchiligi” deb kirdi. Mahalliy aholi va jamoalari orasida “Milliy front tiklansin”, “ishchilar harakati tugallansin”, “ikkinchi migrant avlodlari”, “shahar muammolari” kabi mazmundagi eslatmalar ommalashdi.

Jazoir iqtisodiyoti neft sanoati sababli rivojlandi, u yirik gaz va neft eksport qiluvchi davlatga aylandi. 1972-yilda eksportdan kelgan daromad 2,5-3 million dollardan 1974-1975-yillarda 2-3 barobarga oshib, 7-8 million dollarni tashkil qildi.[42] Bu esa davlatning iqtisodiy mustaqillikka erishib, tashqi qarzlardan qutilishiga sababchi bo‘ldi. 1973-yil sentabrda Jazoir prezidenti Huvariy Bumiddin jazoirliklarni migratsiyadan qaytarish maqsadida, iqtisodiy mustaqilligini hamda “Sovuq urush”da ishtirok etmasligini vaj qilib aholining Fransiyaga migratsiya qilishini qat’iyan man

[40] Philippe Fargues. Migration in the Arab World, United Nations Expert Group Meeting on International Migration. – Beirut: European University Institute, 2005. - P. 198.
[41] O‘sha joydan. – B. 187.
[42] Yazid Benhadda. Constructing the “North African Problem” in France (1920–1956): A Colonial Genealogy of Migration Security Practices// https://doi.org/10.1093/ips/olaf017 [Murojaat vaqti: 18.11.2025]

etdi.[43] Jazoir aholisini ortga qaytarish uchun turli qulayliklar taklif etdi, xususan, bepul tibbiy xizmat, mehnat kafolati va sug‘urta, bir muncha vaqt soliqlardan ozod bo‘lish, transport kabilar edi. 1970-1973 va 1974-1979-yillarda 4 yillik iqtisodiy barqarorlik rejalari tuzildi hamda ushbu yillar davomida Jazoirda 270 ta fabrika, 150 ta suv tarmog‘i, umumiy elektr tarmog‘i kabi infrotuzilmalar qurildi. 1975-1976-yilga kelib neft va gazning xorijga sotishdan kelgan daromad eksport darajasining 95 foizidan oshig‘i edi hamda davlat daromadining deyarli 65 foizini tashkil qilgan.[44] 1977-1978-yillarda 350 ta fabrika hamda 150 dan ortiq zavodlar qurildi, misol tariqasida, “Sonatrach”, “Sider”, “Sonelgaz” kabi haligacha mavjud bo‘lgan yirik mahalliy tadbirkorlik birlashmalari shakllandi.

Asosan nomutaxasis va quyi soha vakillari Jazoirga qaytgan, biroq Jazoirda rivojlanish dasturlari amalga oshirilayotganligi sababli, davlat oliy ma’lumotli va malakali mutaxasislarga muhtoj edi. 1976-yilda Fransiyada jazoirlik muhojirlarning 4 foizi yirik tadbirkorlar, 5 foizi rahbar va menejerlar, 10 foizi rasmiy davlat ishchilari, 32 foizi malakali mutaxasislar, 30 foizi korxona ishchilari va qolgan qismi quyi soha vakillari edi.[45] Fransiyaning 1974-yilgi mehnat shartnomalariga cheklov o‘rnatishi hamma muhojirlarga teng ravishda yangi mehnat shartnomalarining tuzilmasligini, ish berish agentliklarining tugallanishini anglatishiga qaramay, jazoirliklar ruxsatnoma hujjatlari orqali qonunan ishlashni davom ettirgan. Xususan, 1973-yilda 500,000 nafar Fransiyadagi jazoirlik muhojirlarning 70 foizidan ko‘prog‘i 5-10 yillik fuqarolik ruxsatnomasiga ega va ular allaqachon qonuniy fuqarolar sifatida qabul qilingan. Shunga qaramay, 1974-yildan keyin yurtiga qaytish istagidagi muhojirlar miqdori kamaydi, chunki, jazoirlik muhojirlar chegaralar yopiqligidan, qaytib kela olish imkoniyatining yo‘qligidan, shu tariqa, fuqarolik huquqlaridan mahrum bo‘lish mumkinligidan xabardor bo‘lgan. 1977-yilda 80 foizdan oshiq jazoirlik muhojirlar qonuniy maqomga ega edi. 1970-yilda Fransiyada jazoirlik muhojirlar Jazoirga 195 million AQSH dollari miqdoridagi mablag‘ jo‘natgan, 1976-yilda jazoirlik muhojirlarning pul jo‘natmalari umumiy mag‘riblik migrantlar pul jo‘natmasining 50 foizini tashkil qilgan bo‘lsa, bu ko‘rsatkich keyingi 10 yillikda 0,4 foizga pasaydi.

“Neft inqirozi” Jazoirda migratsiyaga tobelik xususiyatini biroz pasaytirdi, biroq butunlay to‘xtata olmadi. Jazoirlik muhojirlar hamda ularning pul jo‘natmalari ahamiyati yuqoriligicha qoldi.

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AUDITORLIK FIRMALARI ICHKI STANDARTLARI SAMARADORLIGINI BAHOLASHNING PROCESS QUALITY INDEX MODELINI ISHLAB CHIQISH VA VALIDATSIYA QILISH

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Annotatsiya. *Maqolada auditorlik firmalari ichki standartlarining amaliy samaradorligini kompleks baholash uchun Process Quality Index (PQI) modeli taklif etiladi. Model audit dalillari sifati, tanlama dizayniga rioya, tanlama parametrlarini hujjatlashtirish, analitik amallar va yakuniy nazorat darvozalari qamrovini birlashtiradi. Ko‘rsatkichlar 0–1 oralig‘ida normallashtirilib, dastlabki teng vaznli indeks shakllantiriladi. Mazmuniy va strukturaviy validatsiya ISQM 1, ISA 220 (Revised) hamda stsenariyli sezgirlik tahliliga asoslanadi. PQI ichki monitoring, CAPA va uzluksiz sifatni takomillashtirish vositasi sifatida taklif qilinadi.*

Kalit so‘zlar: *auditorlik firmasi, ichki standartlar, audit sifati, Process Quality Index, sifat menejmenti, monitoring, CAPA.*

Abstract. *The paper proposes a Process Quality Index (PQI) for integrated assessment of the practical effectiveness of internal standards in audit firms. The index combines audit evidence quality, sampling design compliance, documentation of sampling parameters, analytical procedures, and release-gate coverage. Components are normalized to a 0–1 scale and initially aggregated using equal weights. Content and structural validation is based on ISQM 1, ISA 220 (Revised), and scenario-based sensitivity analysis. PQI is proposed as a tool for internal monitoring, remediation and continuous improvement of audit quality.*

Keywords: *audit firm, internal standards, audit quality, Process Quality Index, quality management, monitoring, remediation.*

KIRISH

Auditorlik xizmatlari sifati xalqaro standartlarni firma darajasidagi aniq ichki tartiblar, ishchi hujjatlar, nazorat nuqtalari va monitoring ko‘rsatkichlariga aylantirishga

bevosita bog‘liq. O‘zbekiston Respublikasining “Auditorlik faoliyati to‘g‘risida”gi Qonuni auditorlik faoliyatini tan olingan standartlar asosida amalga oshirishni nazarda tutadi. ISQM 1 esa firmadan o‘z faoliyati va topshiriqlariga mos sifat menejmenti tizimini shakllantirishni, ISA 220 (Revised) topshiriq darajasida sifatni proaktiv boshqarishni talab qiladi (IAASB, 2020a; IAASB, 2020b).

Amaliyotda ichki standartlar samaradorligi hujjatlar to‘liqligi, review natijalari, qayta ishlash, muddatga rioya yoki ichki inspeksiya kabi alohida ko‘rsatkichlar bilan baholanadi. Bu esa umumiy boshqaruv signalini shakllantirishni qiyinlashtiradi. Aobdia va Petacchi (2023) ichki inspeksiyalar auditor sa’y-harakati va moliyaviy hisobot sifati bilan bog‘liqligini ko‘rsatgan. Shu asosda bir nechta jarayon indikatorlarini yagona kompozit indeksga birlashtirish maqsadga muvofiq.

Tadqiqot maqsadi auditorlik firmalari ichki standartlarining amaliy samaradorligini baholash uchun Process Quality Index (PQI) modelini ishlab chiqish va uning dastlabki mazmuniy, strukturaviy hamda stsenariyli validatsiyasini amalga oshirishdan iborat.

MATERIALLAR VA METODLAR

Tadqiqot metodologik modellashtirish, hujjat tahlili va kompozit indikator yondashuviga asoslandi. Model ISQM 1, ISA 220 (Revised), audit firmalaridagi ichki monitoring mantiqi hamda auditorlik topshirig‘ining “dalil – metod – hujjatlashtirish – tahlil – yakuniy nazorat” zanjiridan kelib chiqib tuzildi. Beshta o‘lchov tanlandi: ESAI – audit dalillarining yetarliligi va mosligi; SDC – tanlama dizayniga rioya; SRC – tanlama parametrlarini hujjatlashtirish qamrovi; APU – analitik amallar qo‘llanilishi; RGC – talab etilgan review/EQR/komplayens darvozalari bilan yopilgan topshiriqlar ulushi.

1-jadval.

PQI komponentlari va dastlabki maqsadlar

Ko‘rsatkich	**O‘lchash**	**Maqsad**
ESAI	0,5·QS + 0,5·AQ	≥0,90
SDC	Talablarga to‘liq mos tanlama dizaynlari ulushi	≥0,90
SRC	Asosiy tanlama parametrlari to‘liq hujjatlashtirilgan holatlar ulushi	≥0,85
APU	Bajarilgan va hujjatlashtirilgan analitik amallar ulushi	≥0,80

RGC	Zarur review/EQR/komplayens darvozalari bilan yopilgan topshiriqlar ulushi	1,00

Barcha komponentlar 0–1 oralig‘ida normallashtiriladi. Dastlabki bosqichda subyektiv vaznlardan qochish uchun teng vaznlash qo‘llanadi: PQI = (ESAI + SDC + SRC + APU + RGC) / 5. PQI ≥ 0,85 pilot “yashil zona”, 0,70–0,849 “sariq zona”, 0,70 dan past qiymat esa ildiz sabab tahlili va CAPA talab qiluvchi “qizil zona” sifatida talqin etiladi. Thresholdlar keyingi empirik sinovlarda qayta kalibrlanishi lozim.

Validatsiya uch yo‘nalishda amalga oshirildi: indikatorlarni xalqaro sifat menejmenti talablariga moslashtirish orqali mazmuniy validatsiya; komponentlarning turli jarayonlarni qamrab olishini tekshirish orqali strukturaviy validatsiya; turli sifat profillarida indeksning boshqaruv signaliga sezgirligini baholash orqali stsenariyli validatsiya. Ushbu bosqich statistik empirik validatsiyani almashtirmaydi.

NATIJALAR

Natijada ichki standartlarning shunchaki mavjudligini emas, ularning real bajarilishini baholovchi besh komponentli PQI shakllantirildi. ESAI dalil bazasining sifatini, SDC va SRC tanlama intizomini, APU analitik protseduralarning bajarilishini, RGC esa yakuniy nazorat intizomini ifodalaydi. Mazmuniy xaritalash ushbu komponentlarning ISQM 1 va ISA 220 (Revised)dagi sifat maqsadlari, monitoring, review va remediatsiya mantiqiga mosligini ko‘rsatdi. PQI xalqaro standartni almashtirmaydi; u firma ichki standartlari bajarilishini umumlashtiruvchi boshqaruv indikatoridir.

2-jadval.

Stsenariyli sezgirlik tahlili

Stsenariy	**ESAI; SDC; SRC; APU; RGC**	**PQI**	**Signal**
A	0,90; 0,90; 0,85; 0,80; 1,00	0,89	Yashil
B	0,90; 0,85; 0,80; 0,70; 0,80	0,81	Sariq/CAPA
C	0,95; 0,95; 0,90; 0,90; 1,00	0,94	Yashil

Stsenariyli tahlil B profilida dalil sifati yuqori bo‘lsa ham, APU va RGCdagi pasayish PQIni 0,81 gacha tushirib, tuzatish choralariga signal berishini ko‘rsatadi. Jadvaldagi qiymatlar real auditorlik firmasi kuzatuvlari emas, model sezgirligini sinash uchun tuzilgan metodik stsenariylardir. Keyingi empirik validatsiyada PQIni qayta ishlash

ulushi (RR), vaqt samaradorligi (TEI), muloqot intizomi (CCI) va ichki inspeksiya natijalari bilan korrelyatsiya/regressiya orqali solishtirish maqsadga muvofiq.

MUHOKAMA

PQI auditorlik firmalarida sifatni "qog‘ozdagi muvofiqlik"dan o‘lchanadigan operatsion boshqaruvga o‘tkazish imkonini beradi. ISQM 1 firmaga sifat menejmentini o‘z sharoitiga moslashtirish huquqini berishi firma ichki indikatorlarini yaratish uchun metodologik asos bo‘ladi; ISA 220 (Revised)dagi topshiriq darajasidagi sifat mas'uliyati esa review, hujjatlashtirish va release-gate intizomini o‘lchash ahamiyatini kuchaytiradi. Shu bilan birga, kompozit indeks professional mulohazani almashtirmasligi va "indikator uchun ishlash" xavfini yuzaga keltirmasligi kerak.

IAASBning 2025–2026-yillardagi Technology Quality Management ishlari yangi texnologiyalar, jumladan AI vositalari, sifat menejmentiga yangi nazorat talablarini olib kirayotganini ko‘rsatadi (IAASB, 2026). Kelajakda PQIga texnologik audit-trail yoki human oversight kabi modullar qo‘shilishi mumkin. Tadqiqotning asosiy cheklovi — hozirgi bosqichda real audit topshiriqlari bo‘yicha katta panel ma'lumotlarida statistik validatsiya o‘tkazilmaganidir; shu bois teng vaznlar va thresholdlar pilot xarakterga ega.

XULOSA

Tadqiqotda auditorlik firmalari ichki standartlarining amaliy samaradorligini baholash uchun ESAI, SDC, SRC, APU va RGC komponentlaridan tuzilgan Process Quality Index modeli taklif etildi. Dastlabki mazmuniy va strukturaviy validatsiya modelning xalqaro sifat menejmenti mantiqiga mosligini, stsenariyli tahlil esa zaif jarayon komponentlariga sezgirligini ko‘rsatdi. PQI ≥ 0,85 pilot boshqaruv chegarasi sifatida tavsiya qilindi. To‘liq empirik validatsiya uchun indeks real auditorlik topshiriqlari ma'lumotlarida sinovdan o‘tkazilib, vaznlar va thresholdlar qayta kalibrlanishi lozim. PQI monitoring, CAPA va uzluksiz takomillashtirishni bog‘lovchi amaliy boshqaruv vositasi sifatida qo‘llanishi mumkin.

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O`ZBEKISTON HUDUDIY SUG`URTA TUSHUMLARI BARQARORLIGIGA TA`SIR ETUVCHI MAKROIQTISODIY OMILLAR TAHLILI

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Annotatsiya. *Mazkur maqolada O`zbekistonda hududlardagi sug`urta bozorlarining rivojlanish tendensiyalari va sug`urta tushulari barqarorligiga ta`sir etuvchi makroiqtisodiy omillar ekonometrik usullar yordamida tahlil qilingan. Tadqiqotda 2001-2025 yillardagi hududlar bo`yicha statistik ma`lumotlar asosida panel regresiya modeli qo`llanilgan. Model natijalari hududiy sug‘urta tushumlariga yalpi hududiy mahsulot (YaHM), aholining real daromadlari, inflyatsiya darajasi va investitsion faollik kabi omillarning statistik jihatdan ahamiyatli ta’sirini ko‘rsatib beradi. Tahlil natijalariga asoslanib, hududlarda sug‘urta xizmatlari qamrovini kengaytirish va sug‘urta bozorining barqarorligini ta’minlashga qaratilgan amaliy takliflar va tavsiyalar ishlab chiqilgan.*

Abstract. *This article analyzes the development trends of regional insurance markets in Uzbekistan and the macroeconomic factors affecting the stability of insurance premiums using econometric methods. The study employs a panel regression model based on regional statistical data covering the period from 2001 to 2025. The results of the model demonstrate that macroeconomic factors, such as the Gross Regional Product (GRP), real household income, inflation rate, and investment activity, have a statistically significant impact on regional insurance premiums. Based on the analysis, practical suggestions and recommendations have been developed to expand the coverage of insurance services in the regions and ensure the stability of the insurance market.*

Kalit so‘zlar. *sug‘urta bozori, hududiy sug‘urta tushumlari, panel ma’lumotlar, regressiya modeli, makroiqtisodiy omillar, sug‘urta tushumi, hududiy iqtisodiyot, ekonometrik modellashtirish.*

Keywords: *insurance market, regional insurance premiums, panel data, regression model, macroeconomic factors, insurance revenue, regional economy, econometric modeling.*

Kirish

O‘zbekiston sug‘urta bozorining hududiy rivojlanish darajasidagi nomutanosibliklar va ularning makroiqtisodiy omillar bilan bog‘liqligini chuqur tahlil qilish, iqtisodiy barqarorlikni ta’minlashda muhim ahamiyat kasb etadi. Hududlar kesimidagi sug‘urta tushumlari dinamikasini o‘rganishda an’anaviy regressiya modellari hududlararo o‘ziga xosliklar (heterogeneity) va vaqtinchalik o‘zgarishlarni to‘liq qamrab ololmasligi sababli, ushbu tadqiqotda panel ma’lumotlar (panel data) tahlilidan foydalanildi. Panel modellashtirish yondashuvi bir vaqtning o‘zida ham hududiy (cross-sectional), ham vaqtinchalik (time-series) xususiyatlarni birlashtirib, sug‘urta tushumlariga ta’sir etuvchi omillarning samaradorligini yuqori aniqlik bilan baholash imkonini beradi. Mazkur paragrafda O‘zbekistonning 14 ta hududi bo‘yicha 2021-2025 yillar oralig‘idagi ma’lumotlar asosida sug‘urta tushumlarining hududiy jihatdan modellashtirilgan natijalari va ularning iqtisodiy talqini keltirib o‘tiladi.

Asosiy qism

Ekonometrik modelni shakllantirishdan avval, o‘zgaruvchilar o‘rtasidagi bog‘liqlik darajasi Pearson korrelyatsiya matritsasi orqali baholandi (1-jadval).

1-jadval

O‘zgaruvchilarning o‘zaro korrelyatsiya matritsasi[46]

Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) ln_premium	1.000				
(2) ln_GRP	0.938	1.000			
	(0.000)				

[46] R dasturi yordamida muallif tomonidan tuzilgan

(3) ln_investment	0.941	0.959	1.000		
	(0.000)	(0.000)			
(4) ln_population	0.422	0.429	0.365	1.000	
	(0.000)	(0.000)	(0.000)		
(5) ln_incomePC	0.931	0.947	0.960	0.224	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	

Tadqiqotimizda panel ma’lumotlarining xususiyatlaridan kelib chiqib, sug‘urta mukofotlarini modellashtirish uchun “Fixed Effects” (o‘zgarmas effektlar) modelidan foydalanildi. Ushbu modelni tanlashimizning birinchi asosiy sababi hududiy geterogenlikni to‘g‘ri nazorat qilish zarurati bilan bog‘liqdir. O‘zbekiston hududlari iqtisodiy rivojlanish darajasi, biznes madaniyati va sug‘urta bozoriga bo‘lgan yondashuvi bo‘yicha bir-biridan sezilarli darajada farq qiladi, FE modeli esa ushbu hududiy individual effektlarni hisobga olish orqali olingan natijalarning siljimaganligini ta’minlaydi.

Shuningdek, model tanlashda endogenlik muammosi ham inobatga olindi. Agar hududga xos bo‘lgan va bevosita kuzatib bo‘lmaydigan omillar, masalan, hududiy boshqaruv sifati kabi jihatlar mustaqil o‘zgaruvchilar bilan korrelyatsiyaga ega bo‘lsa, FE modeli bunday noaniqliklarni bartaraf etishda eng samarali yondashuv hisoblanadi. Yakuniy tanlovimizni asoslash uchun Hausman testi o‘tkazildi va u FE modelining “Random Effects” modeliga nisbatan statistik jihatdan aniqroq ekanligini tasdiqladi, chunki hududiy xususiyatlar mustaqil o‘zgaruvchilar bilan bevosita bog‘liqligi aniqlandi.

Modellashtirish jarayonida biz quyidagi regressiya tenglamasidan foydalandik:

$$ln_premium_{it} = \beta X_{it} + u_i + \epsilon_{it}$$

Bu tenglamada $ln_premium_{it}$ ko‘rsatkichi i-hududning t-yildagi sug‘urta mukofotlarini ifodalasa, βX_{it} qismi YaIM, investitsiya, aholi soni va daromad kabi

makroiqtisodiy omillarni o‘z ichiga oladi. Shuningdek, modeldagi u_i hududga xos bo‘lgan va vaqt davomida o‘zgarmas individual effektlarni, ϵ_{it} esa xatoliklar haddini bildiradi.

2-jadval

Hududlar bo‘yicha panel regressiya modeli natijalari[47]

Regression results

ln_premium	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
ln_GRP	.222	.064	3.46	.001	.096	.348	**
ln_investment	.3	.07	4.30	0	.163	.438	**
ln_population	3.993	.746	5.35	0	2.525	5.461	**
ln_incomePC	.404	.091	4.45	0	.226	.583	**
Constant	-28.293	5.247	-5.39	0	-38.615	-17.97	**
Mean dependent var	9.124		SD dependent var		2.273		
R-squared	0.965		Number of obs		336		
F-test	2176.552		Prob > F		0.000		
Akaike crit. (AIC)	325.508		Bayesian crit. (BIC)		344.594		
*** $p<.01$, ** $p<.05$, * $p<.1$							

Tadqiqot doirasida hududlar o‘rtasidagi o‘zaro bog‘liqlik darajasini aniqlash maqsadida Pesaran testi (xtcsd) o‘tkazildi. Test natijalari (Pr = 0.000) hududlar o‘rtasida ko‘ndalang bog‘liqlik mavjudligini tasdiqladi. Ushbu natija O‘zbekiston iqtisodiyoti hududlari o‘rtasidagi chuqur integratsiya va makroiqtisodiy omillarning

[47] R studio dasturi yordamida muallif tomonidan tuzildi

hududlararo ta’sir mexanizmi mavjudligi bilan izohlanadi. Ushbu muammoning model natijalariga ta’sirini minimallashtirish uchun barcha regressiya hisob-kitoblarida “robust” standart xatoliklardan foydalanildi, bu esa olingan koeffitsiyentlarning ishonchliligini ta’minlaydi.

Driscoll-Kraay (D-K) standart xatoliklari panel ma’lumotlari tahlilida qo‘llaniladigan eng yuqori darajadagi ishonchli metodologiyalardan biri hisoblanadi va tadqiqotingizda aynan ushbu usuldan foydalanilganligi natijalarning ilmiy jihatdan benuqson ekanligini anglatadi. Driscoll-Kraay usuli ko‘ndalang bog‘liqlikni bartaraf etishda muhim ahamiyatga ega bo‘lib, Pesaran testi yordamida hududlar o‘rtasida o‘zaro bog‘liqlik aniqlanganda oddiy standart xatoliklar noto‘g‘ri natija berishi sababli, D-K usuli hududlar o‘rtasidagi ushbu bog‘liqlikni statistik jihatdan to‘liq nazorat qiladi.

Geteroskedastiklikka chidamlilik borasida ushbu usul Modified Wald testi orqali aniqlangan guruhlararo geteroskedastiklik muammosini samarali yechadi va regressiya koeffitsiyentlarining t-statistikalari xolis bo‘lishini ta’minlaydi.

Avtokorrelyatsiyani nazorat qilishda ushbu metod vaqt bo‘yicha avtokorrelyatsiya muammolariga nisbatan ham juda yuqori darajada chidamli hisoblanadi. Model ishonchliligi nuqtai nazaridan Driscoll-Kraay standart xatoliklari “universal chidamli baholovchi” sifatida tanilgan bo‘lib, u kichik va o‘rta hajmdagi panel ma’lumotlarida ham juda barqaror va ilmiy asoslangan natijalar beradi.

3-jadval[48]

Regression with Driscoll-Kraay standard errors Number of obs = 336
Method: Fixed-effects regression Number of groups = 14
Group variable (i): id F(3, 23) = 1375.75
maximum lag: 2 Prob > F = 0.0000
within R-squared = 0.9626

		Drisc/Kraay			
ln_premium	Coefficient	std.	err.	t	P>t

[48] R studio dasturi yordamida muallif tomonidan tuzilgan

ln_GRP	0.338	0.137	2.460	0.022	0.053
ln_investment	0.494	0.108	4.580	0.000	0.270
ln_population	4.916	1.307	3.760	0.001	2.213
_cons	-34.560	9.245	-3.740	0.001	-53.686

Driscoll-Kraay (D-K) standart xatoliklari qo‘llanilgan model natijalari sug‘urta mukofotlari va makroiqtisodiy ko‘rsatkichlar o‘rtasidagi bog‘liqlikning chuqur iqtisodiy mazmunini ochib beradi. Ushbu tahlil hududiy iqtisodiyotdagi o‘zgarishlarning sug‘urta sektoriga qanday ta’sir ko‘rsatishini ilmiy asoslab beradi.

Hududiy yalpi mahsulotning (ln_GRP) sug‘urta mukofotlariga ta’siri 0.338 ga teng bo‘lib, bu hududning iqtisodiy rivojlanish darajasi 1% ga oshganda sug‘urta xizmatlariga bo‘lgan talab o‘rtacha 0.338% ga o‘sishini anglatadi. Bu natija iqtisodiy o‘sish va sug‘urta bozori o‘rtasidagi musbat korrelyatsiyani tasdiqlaydi, ya’ni iqtisodiy faollikning ortishi hududlarda moliyaviy himoyaga bo‘lgan ehtiyojni kuchaytiradi. Iqtisodiy jihatdan barqaror hududlarda aholi va biznes subyektlari o‘z mulklarini va faoliyatlarini sug‘urta qilishga ko‘proq moyil bo‘ladilar.

Investitsiyalarning (ln_investment) ta’siri 0.494 ga teng bo‘lib, bu eng sezilarli iqtisodiy drayverlardan biri hisoblanadi. Investitsion muhitning yaxshilanishi va asosiy kapitalga kiritiladigan mablag‘larning 1% ga ko‘payishi sug‘urta mukofotlari hajmining 0.494% ga o‘sishiga olib keladi.

Panel ma’lumotlari tahlilida hududiy sug‘urta mukofotlari va makroiqtisodiy omillar o‘rtasidagi bog‘liqlikni aniqlashda metodologik yondashuv muhim ahamiyatga ega. Tadqiqotda hududlarning o‘ziga xos vaqt bo‘yicha o‘zgarmas xususiyatlarini (geografik joylashuvi, infratuzilmaviy imkoniyatlar) nazorat qilish uchun Fixed Effects (FE) modeli tanlandi. Ushbu model faqat hudud ichidagi o‘zgarishlarga (within variation) asoslanganligi sababli, hududlararo farqlardan kelib chiqadigan siljishlarni (bias) bartaraf etish imkonini beradi.

Biroq, ekonometrik diagnostika bosqichida o‘tkazilgan Pesason testi hududlar o‘rtasida statistik jihatdan sezilarli ko‘ndalang bog‘liqlik (cross-sectional dependence) mavjudligini tasdiqladi (Pr = 0.000). Oddiy FE modeli bunday sharoitda standart xatoliklarni noto‘g‘ri baholaydi, bu esa t-statistikalar va p-qiymatlarning ishonchliligi pasayishiga olib keladi. Ushbu muammoni bartaraf etish uchun tadqiqotda Driscoll-

Kraay (D-K) standart xatoliklari bilan to‘ldirilgan FE modeliga o‘tildi. Driscoll-Kraay usuli guruhlararo geteroskedastiklik, vaqt bo‘yicha avtokorrelyatsiya va ko‘ndalang bog‘liqlikni bir vaqtning o‘zida nazorat qiladi. Ushbu "universal chidamli baholovchi" (universal robust estimator) kichik va o‘rta hajmdagi panel ma’lumotlarida ham yuqori barqarorlik va ishonchli (consistent) natijalarni ta’minlaydi.

Baholash natijalari makroiqtisodiy omillarning sug‘urta mukofotlariga bo‘lgan ta’sirini statistik buzilishlardan holi holda aniq ko‘rsatib beradi:

– Hududiy yalpi mahsulotning (ln_GRP) ta’siri D-K modelida 0.338 ga teng bo‘lib, bu hududning iqtisodiy rivojlanish darajasi 1% ga oshganda sug‘urta xizmatlariga bo‘lgan talab o‘rtacha 0.338% ga o‘sishini anglatadi. Bu iqtisodiy o‘sish va sug‘urta bozori o‘rtasidagi musbat korrelyatsiyani tasdiqlab, iqtisodiy faollik ortishi moliyaviy himoyaga bo‘lgan ehtiyojni kuchaytirishi bilan izohlanadi.

– Investitsiyalarning (ln_investment) ta’siri 0.494 ga teng bo‘lib, bu eng sezilarli iqtisodiy drayverlardan biri hisoblanadi. Asosiy kapitalga kiritiladigan mablag‘larning 1% ga ko‘payishi sug‘urta mukofotlari hajmining 0.494% ga o‘sishiga olib keladi. Bu sug‘urta sektori investitsiya loyihalarini himoya qilish va xatarlarni boshqarishda hal qiluvchi o‘rin tutishidan dalolat beradi.

– Aholi sonining (ln_population) sug‘urta mukofotlariga ta’siri 4.916 koeffitsiyenti bilan baholanib, hududdagi demografik o‘zgarishlar sug‘urta xizmatlari iste’moliga juda yuqori elastiklik bilan ta’sir qilishini ko‘rsatadi. Demografik o‘sish mijozlar bazasini kengaytirib, talabni sezilarli darajada oshiradi, bu esa hududiy sug‘urta strategiyalarida aholi omilini asosiy ustuvorlik sifatida belgilash zarurligini bildiradi.

Modelning within R-squared ko‘rsatkichi 0.9626 ga teng bo‘lib, bu hududiy sug‘urta mukofotlaridagi o‘zgarishlarning 96% dan ortig‘i tanlangan makroiqtisodiy omillar bilan izohlanishini tasdiqlaydi. Ushbu yuqori izohlash qobiliyati makroiqtisodiy rivojlanish omillari sug‘urta sektori uchun hal qiluvchi ahamiyatga egaligini va tanlangan modelning to‘g‘ri spesifikatsiyaga ega ekanligini ilmiy jihatdan asoslaydi. Natijalar shuni ko‘rsatadiki, sug‘urta bozorini rivojlantirish uchun nafaqat iqtisodiy o‘sishni, balki investitsion jozibadorlikni va demografik qamrovni kengaytirish strategik ahamiyat kasb etadi.

Tadqiqot natijalari shuni ko‘rsatadiki, hududiy sug‘urta bozori rivojlanishi makroiqtisodiy omillar bilan chambarchas bog‘liq bo‘lib, iqtisodiy o‘sish, investitsion faollik va demografik o‘zgarishlar sug‘urta mukofotlari hajmini shakllantiruvchi asosiy drayverlar hisoblanadi. Driscoll-Kraay modeli yordamida olingan mustahkam natijalar

ushbu omillarning sug‘urta sektoriga bo‘lgan sezilarli va ijobiy ta’sirini statistik jihatdan isbotladi.

Xulosa

Xulosa qilib aytganda, iqtisodiy o‘sishning sug‘urta mukofotlariga musbat ta’siri hududiy farovonlik oshishi bilan sug‘urta xizmatlariga bo‘lgan talabning tabiiy ravishda o‘sishini tasdiqlasa, investitsiyalarning sug‘urta mukofotlariga ta’siri iqtisodiy o‘sishga nisbatan kuchliroq bo‘lib, bu sug‘urta sektori hududlardagi yangi investitsion loyihalarni himoya qilishda va moliyaviy barqarorlikni ta’minlashda muhim rol o‘ynashini anglatadi. Shuningdek, demografik omil sug‘urta xizmatlari iste’moli uchun eng yuqori elastiklikka ega ekanligi hududlardagi aholi sonining o‘zgarishi sug‘urta bozorining kengayish istiqbollarini belgilovchi asosiy omil ekanligini ko‘rsatadi. Tahlil natijalaridan kelib chiqib, hududiy investitsion loyihalarni amalga oshirishda majburiy va ixtiyoriy sug‘urta turlarini kengaytirish va investorlar uchun xatarlarni sug‘urtalash mexanizmlarini soddalashtirish, sug‘urta kompaniyalari o‘z marketing strategiyalarini aholi zichligi yuqori bo‘lgan hududlarga moslashtirishi hamda aholi uchun ijtimoiy yo‘naltirilgan xizmatlar turlarini diversifikatsiya qilishi, shuningdek, davlat organlari hududiy iqtisodiy rivojlanish dasturlarini ishlab chiqishda sug‘urta sektorining moliyaviy barqarorlikni ta’minlashdagi rolini inobatga olib, sug‘urta savodxonligini oshirishga qaratilgan hududiy loyihalarni amalga oshirishi tavsiya etiladi.

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THE ROLE OF INTERNATIONAL FINANCIAL INSTITUTIONS IN FINANCING SOLAR ENERGY PROJECTS: THEORETICAL FOUNDATIONS AND EVALUATION CRITERIA

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Abstract. *International financial institutions (IFIs) are central to closing the financing gap for solar energy projects worldwide, yet the theory explaining why they lend and the criteria judging whether that lending works are scattered across separate literatures. This article reviews the theoretical traditions applied to IFI governance — principal–agent, institutionalist, stakeholder, public-choice, and catalytic-finance theory — and synthesizes the criteria multilateral institutions use to evaluate solar and other renewable-energy operations, from the OECD's DAC criteria to project-level economic appraisal and harmonized indicators. Drawing on recent multilateral development bank (MDB) climate-finance data, it shows that IFI financing remains catalytic rather than primary relative to global need, and proposes a composite framework combining institutional rating, financial return, catalytic effect, technical performance, cost competitiveness, and national alignment for evaluating IFI-financed solar energy projects.*

Keywords: *international financial institutions; solar energy financing; principal–agent theory; catalytic finance; multilateral development banks; evaluation criteria; climate finance.*

Introduction

Solar energy projects — utility-scale and distributed photovoltaic generation, with supporting transmission and storage infrastructure — generate positive externalities not fully captured in private returns, rely on technologies still maturing in developing markets, and require capital-intensive, long-horizon investment beyond most commercial mandates. These market failures justify the concessional and risk-mitigating capital IFIs deploy alongside, rather than instead of, private capital. Two

questions follow: how do IFIs decide how much to lend and on what terms, and by what criteria is their effectiveness judged? This article reviews the theoretical traditions explaining IFI governance and financing mechanisms, together with recent empirical evidence on the scale of IFI-financed renewable energy worldwide, then classifies the criteria used to evaluate solar energy financing and proposes a composite framework for assessment.

Main Part

1. Theoretical rationale and typology of IFI financing instruments

IFI roles fall into four functions: direct financier (sovereign/non-sovereign loans, grants, equity); catalyst of private capital through concessional and risk-mitigating instruments — "blended finance" or "de-risking" — resting on catalytic capital that accepts lower returns to "crowd in" private resources; adviser/capacity-builder, supporting tender design and PPP frameworks; and standard-setter, shaping which instruments count as "green". A graduated set of instruments corresponds: grants and concessional loans narrow the return gap; results-based financing conditions disbursement on verified outcomes; guarantees reduce lender risk rather than supplying capital directly; equity/quasi-equity absorbs first-loss exposure so senior tranches price closer to market; and green bonds and blended finance/PPP structures combine concessional and commercial capital under standards such as the OECD's Blended Finance Principles.

2. Theoretical traditions explaining IFI governance and lending behaviour

The dominant lens is principal–agent theory: states delegate authority to IFIs as agents, a delegation that is never unconditional because the agent may pursue its own interests ("agency loss") (Nielson & Tierney, 2003). Hawkins et al. (2006) identify several reasons states delegate power, including specialization and credibility. Apolinário Júnior (2020) shows quota-based voting concentrates control with a few shareholder states, transmitting domestic political interests into lending decisions at the IMF and World Bank. Kaya (2012) shows that when shareholders hold divergent preferences — "conflicted principals" — institutional behaviour becomes less consistent, relevant where governments disagree on concessional climate finance. A constructivist counter-view holds instead that IFI bureaucracies develop their own professional norms that shape lending independently of shareholder instruction (Barnett & Finnemore, 2004).

Stakeholder theory holds that decisions made with input from affected parties are more sustainably implemented, while public-choice theory treats green-finance mobilization as a political process that domestic interests can capture or delay

(Akomolehin, 2025). A narrower strand explains how capital translates into outcomes: financial-system theory ties channelled capital to a country's financial structure; catalytic-finance theory explains how guarantees absorb early risk so private capital co-finances projects it would otherwise avoid; and additionality theory defines an IFI's value-added as inputs that would not exist absent its involvement (World Resources Institute, 2023).

3. Empirical evidence on scale and effectiveness

The World Bank's Independent Evaluation Group found its renewable-energy portfolio scaled up after 2012 to roughly USD 22 billion, making the Bank Group the largest single institutional contributor to renewable energy in developing countries, though still a small share of global investment (Independent Evaluation Group, 2020). An Asian Development Bank review of 85 impact evaluations found the evidence base concentrated in rural electrification while actual investment goes mainly to generation and transmission (Asian Development Bank, 2020). A 2025 panel-cointegration study of 76 developing economies found a threshold-dependent link between international green finance and innovation, implying diminishing and eventually reversing marginal returns (Journal of Risk and Financial Management, 2025).

At global scale, MDBs committed a record USD 125 billion in climate finance in 2023, rising to USD 137 billion in 2024 and USD 162.5 billion in 2025 (European Investment Bank et al., 2026). The World Bank Group and Asian Development Bank together accounted for roughly 63 percent of finance reaching low- and middle-income economies. Mobilized co-finance there remained only 45 percent private capital, versus 79 percent in high-income economies. Measured against the Climate Policy Initiative's estimated USD 7.8 trillion annual need for 2025–2030, MDB delivery is roughly 3.6 percent of it (Climate Policy Initiative, 2025), leading the World Resources Institute to conclude that MDBs need structural reform, not merely larger appropriations (World Resources Institute, 2023). Figure 1 sets out the three-year trend and Figure 2 the regional distribution of 2025 commitments.

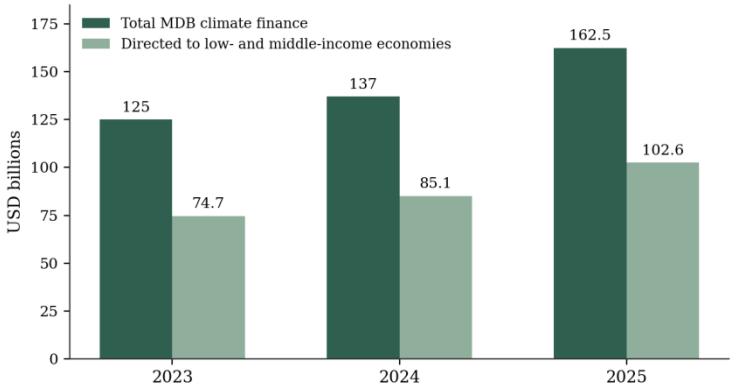

Figure 1. MDB climate finance committed globally and directed to low- and middle-income economies, 2023–2025 (USD billions). Source: compiled by the author from European Investment Bank et al. (2026).

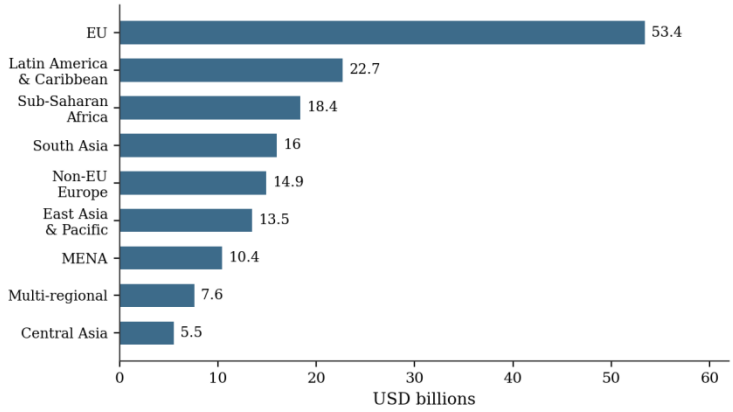

Figure 2. Regional distribution of MDB climate finance, 2025 (USD billions). Source: compiled by the author from European Investment Bank et al. (2026).

4. Criteria and indicators for evaluating IFI effectiveness

IFIs judge project success against a layered set of criteria. The starting point is the OECD's six DAC criteria — relevance, coherence, effectiveness, efficiency, impact, sustainability — a checklist most institution-specific systems elaborate (OECD, 2021). The World Bank's Independent Evaluation Group rates each loan on a six-point scale; the Asian Development Bank applies an equivalent scale; privately structured deals are rated through the Expanded Project Supervision Report, covering financial, economic, environmental-social, and private-sector-development performance separately.

Underneath every rating sits a calculation of the Economic and Financial Internal Rates of Return (EIRR, FIRR) and the Economic Net Present Value, with avoided emissions monetized for renewable projects. Results vary widely by country: appraisals for one Central Asian solar programme found EIRRs of 9.7–9.8 percent, rising to 12.3–16.8 percent once carbon benefits were added, remaining above the Bank's hurdle rate through completion (World Bank, 2025). A separate family governs classification and

additionality: joint MDB principles determine what counts as climate finance and Paris-aligned, while the OECD distinguishes financial from developmental additionality — though additionality is easier to claim than prove, since observational data rarely permits confident counterfactual inference (Carter, Van de Sijpe & Calel, 2021). Because private-sector instruments carry a growing share of green financing, harmonized indicators (HIPSO) standardize reporting of installed capacity, generation, and avoided emissions, while IRENA's cost benchmark and the UN Sustainable Development Goals (7, 13) situate projects against the sector worldwide (IRENA, 2025).

Together, these families turn a general question — whether an IFI is an effective financier of solar energy — into a checkable set of project-level questions: was the project rated satisfactorily by its own evaluators; did its return on investment hold up between appraisal and completion; how much private capital did it draw in relative to the finance the IFI itself provided; and how does its generation cost compare with the rest of the world.

Conclusion

No single theory fully explains why IFIs finance solar energy projects the way they do, and no single framework fully captures whether that financing is effective. Principal–agent theory, institutionalism, stakeholder and public-choice theory, and catalytic-finance theory each illuminate a different part of the same decision chain. Empirically, MDB climate finance has grown rapidly — reaching USD 162.5 billion in 2025 — yet remains catalytic rather than primary against an estimated USD 7.8 trillion annual global need. The composite framework proposed here offers a practical tool for assessing IFI-financed solar energy projects worldwide, where the gap between claimed additionality and verifiable evidence remains widest.

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DIGITAL MARKETING STRATEGIES FOR PROMOTING SUSTAINABLE AND ECO-FRIENDLY TOURISM IN UZBEKISTAN

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Abstract. *This article examines the potential of digital marketing strategies for promoting sustainable and eco-friendly tourism in Uzbekistan. Drawing on international experience and an analysis of the country's ecotourism assets, the study identifies effective digital instruments — content marketing, social media, search engine optimization and online platforms — for communicating sustainability values to travelers. A conceptual model linking digital marketing tools with sustainable tourism outcomes is proposed, and practical recommendations are formulated for destination management organizations, tour operators and local communities.*

Keywords: *sustainable tourism, ecotourism, digital marketing, green economy, destination branding, community-based tourism, Uzbekistan.*

INTRODUCTION

Sustainable development has become the central paradigm of the global tourism industry. The concept of sustainable tourism implies meeting the needs of present tourists and host regions while protecting the environment, respecting local cultures and ensuring long-term economic benefits for communities (UNEP & UNWTO, 2005). Consumer research consistently shows that a growing share of international travelers, especially younger generations, prefer destinations and companies that demonstrate genuine environmental and social responsibility (Dolnicar, 2020). At the same time, the choice of a destination today is made almost entirely in the digital environment: travelers discover places, verify their reputation and book services through search engines, social networks, review platforms and online marketplaces. This means that sustainability, in order to influence demand, must be effectively communicated through digital marketing channels (Font & McCabe, 2017).

Uzbekistan possesses significant but still underutilized potential for sustainable and eco-friendly tourism: mountain ecosystems of the Western Tian-Shan, the Zaamin

and Ugam-Chatkal national parks, the Nuratau-Kyzylkum region with its network of community-based guesthouses, and unique rural areas. International recognition of this potential is growing: the village of Sentob in the Navoi region was awarded the "Best Tourism Village" title by the UN World Tourism Organization in 2023 (UNWTO, 2023). Tourism is a priority sector of the Development Strategy of New Uzbekistan, and the rapid post-pandemic recovery of visitor flows creates a favorable moment for shaping the country's image not only as a cultural, but also as a green destination (Decree of the President of the Republic of Uzbekistan, 2022; UN Tourism, 2025).

However, the sustainable segment of Uzbek tourism remains poorly visible in the international digital space, and the marketing activity of ecotourism providers is fragmented and mostly intuitive. The purpose of this article is to substantiate digital marketing strategies that can effectively promote sustainable and eco-friendly tourism in Uzbekistan, and to propose a conceptual model and practical recommendations for their implementation.

MAIN PART

The theoretical basis of the study is formed by the literature on sustainable tourism marketing and digital marketing. Font and McCabe (2017) note that marketing in sustainable tourism performs a dual function: it not only sells a product, but also shapes responsible consumer behavior. Gössling (2021) emphasizes the ambivalent effect of digital technologies on sustainability: they can both stimulate excessive travel and, on the contrary, direct flows to less vulnerable places and educate tourists. The concept of "Marketing 5.0" (Kotler, Kartajaya, & Setiawan, 2021) insists on combining advanced technologies with humanistic and environmental values. For emerging destinations such as Uzbekistan, this means that digital promotion of ecotourism should be built on honest storytelling, verifiable sustainability claims and partnership with local communities.

An analysis of the current situation shows that the digital representation of sustainable tourism in Uzbekistan lags behind its physical development. Community-based projects in the Nuratau mountains, ecotourism routes in national parks and rural guesthouses are known mainly through the efforts of individual tour operators and international development projects. There is no single English-language digital hub aggregating information about eco-certified accommodation, protected areas open to visitors and rules of responsible behavior; the search visibility of ecotourism-related queries is low, and the sustainability content of regional tourism organizations is irregular. Meanwhile, the experience of Slovenia, Costa Rica and New Zealand

demonstrates that a consistent green digital brand, supported by certification and content marketing, can become a decisive competitive advantage.

Based on the literature and the analysis of international practice, the key digital marketing instruments applicable to the promotion of sustainable tourism in Uzbekistan are systematized in Table 1.

Table 1

Digital marketing instruments for communicating sustainability in tourism

Instrument	Sustainability content	Expected effect
Content marketing and storytelling	Stories of local families, artisans and guides; the contribution of tourism to conservation	Emotional connection with the destination; trust in sustainability claims
Social media and eco-influencers	Collaborations with responsible travel bloggers; visual content of natural areas	Reach of environmentally conscious audiences; word-of-mouth effect
SEO for ecotourism queries	Optimization for queries such as "ecotourism Uzbekistan", "community-based tourism Central Asia"	Visibility at the stage of destination search and comparison
Eco-labels on booking platforms	Displaying certification of guesthouses and tours on international marketplaces	Verifiability of claims; premium positioning
Online reviews and user-generated content	Encouraging guests to share experience of responsible travel	Social proof; continuous feedback for providers
Virtual tours and pre-visit education	3D-tours of fragile sites; digital codes of conduct for visitors	Managed expectations; reduced pressure on vulnerable ecosystems

Source: compiled by the author based on Chaffey and Ellis-Chadwick (2022) and Gössling (2021).

The listed instruments produce a systemic effect only when they are integrated into a coherent strategy. The conceptual model proposed by the author is presented in Figure 1. Its logic is as follows: the sustainable tourism assets of Uzbekistan — protected areas, ecotourism zones, community-based tourism villages and cultural heritage — are translated through a set of digital marketing instruments into clear sustainability messages addressed to target groups of travelers. The result of this

communication is not simply an increase in the number of tourists, but the formation of responsible visitor flows: travelers who choose certified providers, stay longer, spend more in local communities and follow the rules of behavior in fragile natural areas.

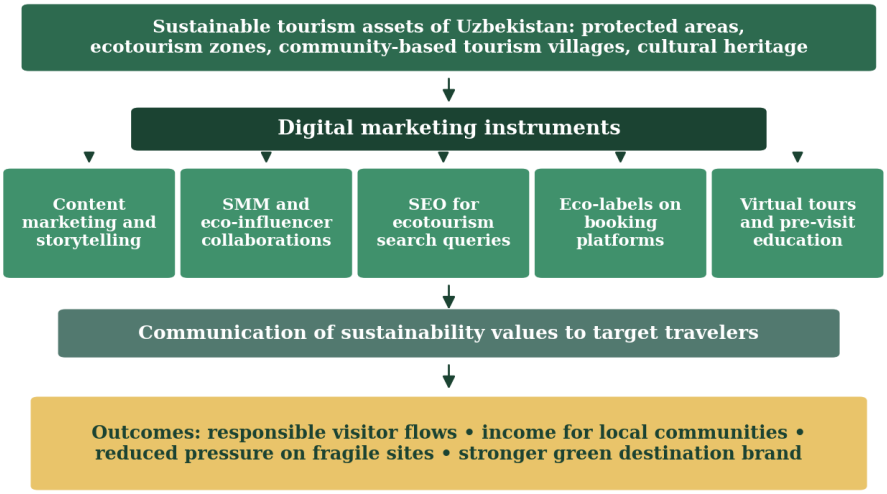

Figure 1. Conceptual model of digital marketing for sustainable tourism development in Uzbekistan (compiled by the author)

The implementation of this model requires coordinated actions at three levels. At the national level, the priority is a green section of the official tourism portal with a multilingual catalogue of eco-certified providers and a recognizable national eco-label integrated with international booking platforms, which would give sustainability claims the necessary credibility. At the level of destinations and tour operators, the emphasis should be placed on systematic content production — professional visual materials of natural areas, stories of local residents, thematic itineraries for birdwatching, trekking and agritourism — optimized for the search queries of target markets and amplified through collaborations with international eco-influencers. At the community level, digital literacy programs for guesthouse owners and local guides are essential so that they can independently maintain their online presence, work with reviews and use online booking instruments (Buhalis & Amaranggana, 2015).

It should be emphasized that digital promotion of sustainability imposes special ethical requirements. Exaggerated or unverifiable environmental claims — greenwashing — are quickly exposed in the digital environment and cause lasting reputational damage. Every marketing message must therefore be based on real, measurable practices: certification, documented support of communities and visitor management plans for protected areas (Font & McCabe, 2017).

CONCLUSION

The conducted study allows the following conclusions. First, Uzbekistan has substantial natural and socio-cultural prerequisites for sustainable and eco-friendly tourism, confirmed by the international recognition of its community-based initiatives. Second, the main barrier to realizing this potential is informational rather than infrastructural: the country's sustainable offer is insufficiently represented in the digital channels through which modern travelers make decisions. Third, the proposed model shows that the coordinated use of content marketing, social media, SEO, eco-certification on online platforms and virtual pre-visit education can transform the country's ecotourism assets into recognizable and trustworthy digital messages.

Practical recommendations include: developing a green section of the national tourism portal and a national eco-label integrated with international booking systems; launching systematic content programs and eco-influencer collaborations targeted at environmentally conscious markets; and implementing digital literacy training for local communities. These measures will simultaneously contribute to the growth of high-value tourist flows, the well-being of rural communities and the conservation of the natural heritage of Uzbekistan, in line with the principles of the green economy and the country's long-term development strategy.

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LEGAL FOUNDATIONS OF CEMETERY LAND AND ITS ROLE IN SUSTAINABLE LAND RESOURCE MANAGEMENT

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Abstract. *The acceleration of urbanization, continuous population growth, and increasing scarcity of land resources require a reconsideration of the role and functional significance of cemetery areas in contemporary urban planning. Cemeteries should no longer be regarded solely as territories designated for burial purposes; rather, they constitute specific elements of urban infrastructure that perform social, cultural, environmental, sanitary, and spatial functions. The purpose of this study is to examine the theoretical and legal foundations governing cemetery land and to determine its role in the sustainable management of urban land resources.*

Keywords: *cemetery land, land resources, land management, land cadastre, urban planning, GIS, geospatial analysis, sanitary protection zone, environmental safety, sustainable land use.*

1. Introduction. Rapid urbanization and population growth have significantly increased pressure on land resources, particularly in densely populated urban areas. The limited availability of suitable land requires public authorities and urban planners to reconsider conventional approaches to the allocation, organization, and management of land used for public purposes. Cemetery areas represent a particularly sensitive category because their planning involves the simultaneous consideration of legal, social, cultural, religious, environmental, sanitary, and spatial factors.

Traditionally, cemeteries have primarily been considered places for burial and commemoration. However, contemporary urban planning increasingly recognizes them as multifunctional components of urban infrastructure. In addition to their primary function, cemetery areas contribute to the preservation of historical memory and cultural identity, while their proper planning is directly related to sanitary and environmental safety and the rational use of urban land resources.

The legal and cadastral status of cemetery land is particularly important. Accurate registration of cemetery boundaries, determination of their legal status, identification of sanitary protection zones, and systematic monitoring of land use are essential components of sustainable land administration. Failure to properly account for these areas may lead to land-use conflicts, uncontrolled territorial expansion, environmental risks, and inefficient use of urban land resources.

In Uzbekistan, cemetery land is regulated by land legislation and specific legal provisions concerning burial and funeral services. According to Article 64 of the Land Code of the Republic of Uzbekistan, cemetery areas are classified within the system of land designated for public use. Their utilization is therefore subject to a specific legal regime that restricts their use for purposes incompatible with their designated function.

The Law of the Republic of Uzbekistan No. ZRU-276 of 27 December 2010 “On Burial and Funeral Services” constitutes another important legal basis for regulating relations associated with burial activities and cemetery management. In addition, Resolution No. 101 of the Cabinet of Ministers of the Republic of Uzbekistan dated 4 April 2011 establishes organizational procedures related to the implementation of the legislation on burial and funeral services.

The purpose of this study is to examine the theoretical and legal foundations of cemetery land management and to substantiate its role within the broader system of sustainable land resource management.

The following objectives were formulated to achieve this purpose:

to analyze the legal status of cemetery land within the land management system of Uzbekistan;

to identify the principal environmental, sanitary, cadastral, and urban-planning factors influencing cemetery location and management;

to determine the role of cemetery areas in the rational management of urban land resources;

to theoretically substantiate the application of modern geoinformation technologies to cemetery planning and monitoring.

2. Materials and Methods. The study employed a combination of legal, comparative, systematic, spatial, and analytical research methods.

The legal analysis method was used to examine the regulatory framework governing cemetery land in Uzbekistan. Particular attention was paid to the Land Code of the Republic of Uzbekistan, the Law “On Burial and Funeral Services,” and regulatory documents concerning cemetery establishment, reconstruction, closure, relocation, environmental protection, sanitary safety, and urban planning.

The systematic approach was applied to consider cemetery land as an integral component of the urban land-resource management system rather than as an isolated land-use category. This approach enabled the relationships between legal status, land cadastre, environmental conditions, demographic development, infrastructure, and spatial planning to be identified.

The comparative analytical method was used to evaluate traditional and contemporary approaches to cemetery planning. Particular emphasis was placed on the transition from conventional administrative management towards digitally supported spatial management.

GIS-based multi-criteria spatial analysis can integrate these parameters within a unified geographic database. Remote sensing data, UAV imagery, GNSS observations, digital elevation models, and cadastral datasets may additionally be employed to improve the accuracy and timeliness of cemetery land monitoring.

NDVI and other vegetation indices may be used as supplementary indicators for assessing vegetation conditions and the ecological characteristics of cemetery territories and adjacent buffer zones.

The methodological approach adopted in this research can therefore be represented as the following conceptual sequence:

Legal framework → cadastral information → environmental and sanitary criteria → demographic factors → spatial analysis → geoinformation database → planning and management decisions.

This integrated approach provides a theoretical basis for the transition from conventional cemetery administration to geoinformation-based land management.

3. Results. The analysis demonstrated that cemetery land occupies a specific position within the urban land-resource management system because its utilization is determined simultaneously by legal restrictions, social functions, sanitary requirements, environmental conditions, and spatial-planning considerations.

4. Discussion. The results demonstrate that cemetery land represents a complex spatial resource whose management requires the integration of legal, environmental, sanitary, demographic, cultural, and technological considerations.

The conventional perception of cemeteries exclusively as burial areas does not fully correspond to the requirements of contemporary urban development. In rapidly growing cities, cemetery territories directly influence land-use structure, transport accessibility, green infrastructure, environmental conditions, and long-term spatial development.

One important theoretical implication is that cemetery land should be incorporated into the overall urban land-resource management framework. This means that cemetery planning should be coordinated with master plans, cadastral systems, environmental monitoring, infrastructure development, and demographic forecasts.

International approaches increasingly consider certain cemetery landscapes as elements of urban green infrastructure. From this perspective, properly landscaped cemetery territories and their buffer zones may contribute to ecological connectivity, vegetation cover, microclimatic regulation, and landscape continuity. However, these ecological functions must remain compatible with the primary cultural, ethical, religious, and sanitary functions of cemetery areas.

The findings also indicate that cadastral registration is fundamental to effective cemetery management. Precise determination of boundaries and functional zones reduces the risk of unauthorized occupation and territorial conflicts. Integration with digital cadastral systems can further improve transparency and provide decision-makers with current spatial information.

GIS provides significant advantages in this regard. Spatial analysis can determine burial density, unused areas, accessibility, environmental restrictions, and potential expansion zones. Multi-criteria analysis can also be employed to identify suitable territories for new cemeteries by assigning appropriate weights to environmental, sanitary, demographic, cadastral, and infrastructure factors.

5. Conclusion. The study of the theoretical and legal foundations of cemetery land demonstrates that cemetery areas constitute a specific and socially significant component of the land-resource management system. Their management cannot be limited to the allocation of land for burial purposes; it should encompass cadastral registration, legal protection, environmental and sanitary monitoring, functional zoning, demographic forecasting, and long-term spatial planning.

The legal framework of the Republic of Uzbekistan establishes a specific regime for cemetery land and provides the institutional basis for its organization, use, protection, and management. At the same time, contemporary urbanization creates new challenges associated with land scarcity, cemetery capacity, environmental restrictions, and competition among different urban land uses.

The research theoretically substantiates the necessity of introducing an integrated geoinformation approach to cemetery land management. GIS, remote sensing, UAV technologies, GNSS measurements, digital cartography, and multi-criteria spatial analysis can provide an effective technological framework for cadastral inventory,

environmental monitoring, capacity assessment, and the identification of suitable areas for cemetery development.

Based on the analysis, it is proposed that cemetery land management be developed according to the following integrated framework:

legal regulation → cadastral registration → environmental and sanitary assessment → geospatial database → spatial analysis → demographic forecasting → planning → continuous monitoring.

The implementation of this framework can contribute to more rational use of urban land resources, improved environmental and sanitary safety, enhanced accuracy of cadastral information, and scientifically grounded territorial planning.

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EFFECTIVE MARKETING RESEARCH AND SOFIA BAKERY

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Abstract. This article analyzes *the systematic gathering, recording, and analysis of data about target markets, consumers, and competitors. Its main goal is to reduce business uncertainty and provide evidence-based insights to optimize the marketing mix (product, price, place, and promotion).* ***Main Types of Research***

- ***Primary Research:*** *Original data collected firsthand via customer surveys, focus groups, and interviews.*

Secondary Research: *Analysis of pre-existing data, such as industry reports, public statistics, and competitor analyses.* ***Key Methods***

- ***Quantitative:*** *Large-scale surveys, closed-ended questionnaires, and A/B testing to measure trends and metrics.*
- ***Qualitative:*** *Open-ended interviews, focus groups, and observation to understand consumer motivations and feelings.*

Keywords: *marketing research, customer behavior, product range, competitors, international market, market share, marketing mix, forecasting, audit.*

Аннотация*. В данной статье рассматриваются процессы систематического сбора, фиксации и анализа данных о целевых рынках, потребителях и конкурентах. Основная цель этой деятельности — снижение неопределенности в бизнесе и получение обоснованных сведений для оптимизации комплекса маркетинга (продукт, цена, место продаж и продвижение). Основные виды исследований*

- *Первичные исследования: сбор оригинальных данных «из первых рук» посредством опросов клиентов, фокус-групп и интервью.*
- *Вторичные исследования: анализ уже имеющихся данных, таких как отраслевые отчеты, открытая статистика и аналитика по конкурентам. Ключевые методы*
- *Количественные: масштабные опросы, анкетирование с закрытыми вопросами и A/B-тестирование для измерения тенденций и показателей.*

• *Качественные: глубинные интервью (с открытыми вопросами), фокус-группы и наблюдение для понимания мотивации и эмоционального восприятия потребителей.*

Ключевые слова: *маркетинговые исследования, поведение потребителей, ассортимент продукции, конкуренты, международный рынок, доля рынка, комплекс маркетинга, прогнозирование, аудит.*

INTRODUCTION

Marketing research is the systematic gathering, recording, and analysis of qualitative and quantitative data about issues relating to marketing products and services. The goal is to identify and assess how changing elements of the marketing mix impacts customer behavior. This involves employing a data driven marketing approach to specify the data required to address these issues, then designing a method for collecting the information and implementing the data collection process. After analyzing the collected data, the results and findings, including their implications, are forwarded to those empowered to act on them.

Safia Cafe & Bakery started in 2001 as a small home-based family kitchen in Tashkent run by Muhayo Ayupova and her husband Akmal Ayupov. Inspired by family recipes, they baked goods from home and delivered them locally. Their daughter Madina later opened an initial storefront, and the official Safia Brand expanded into a major regional chain.

LITERATURE REVIEW

First established as a family business, we offer our guests a warm and welcoming bakery café experience in 160 stores. Founded in 2001, the Sofia company is an international company that specializes in French-inspired baked goods. They are a fast-casual bakery-café with fully company-owned locations. Menu includes cakes, pastries, sandwiches, salads, and signature coffee and tea. Sofia offer a unique bakery and café experience to thousands of customers daily. Currently, they have over 140 locations in Uzbekistan and Kazakhstan, providing our services to customers of all ages and backgrounds. They work hard to bring a world-class product and guest experience to our customers. Company size 1,001-5,000 employees. Headquarters located in Tashkent. Company type privately held business. Industry -Food and Beverage Retail.

Daily Output: Uses roughly 4 tons of cream and 1.5 tons of fresh/dried fruits daily to produce over 10 tons of ready-made goods.



Picture # 1 Steps in marketing research process.

RESEARCH METHODOLOGY

To build a strong marketing plan for a bakery named Sofia (such as a local artisanal shop or inspired by successful scaling models like Sofia café and bakery), focus on local brand identity, sensory digital content, community engagement, and signature product lines.

Brand Identity & Positioning

- **Highlight heritage:** Share the story of home-baked roots, family recipes, or daily fresh-made craftsmanship.
- **Quality ingredients:** Emphasize the use of real butter, fresh fruit, and local or premium imports.**Aesthetic spaces:** Design photogenic cafe corners that encourage

customers to take pictures and share them online.



Picture # 2. The marketing research process.

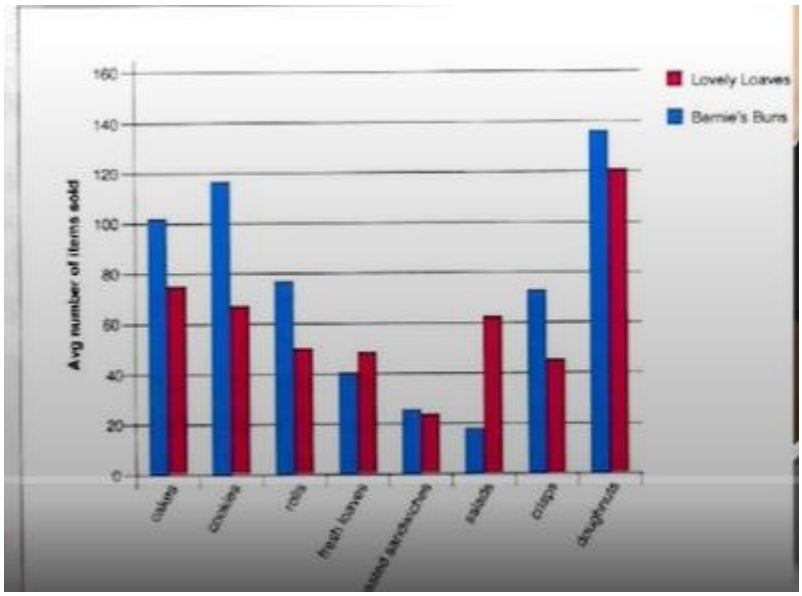
ANALYSIS AND RESULTS

Digital & Social Media

• **Visual platforms:** Post high-resolution videos and photos of melting chocolate, pouring glaze, and fresh bread pulling apart on Instagram and TikTok.

• **Behind-the-scenes:** Show early morning dough preparation, cake decorating, and oven-fresh extractions.

• **User content:** Offer a small free treat or discount for customers who tag the bakery in their stories or check in at the location.



Picture # 3. Line graph for two bakeries.

The image shows a bar graph with average number of items sold by Lovely Loaves and Bernie's Buns across eight categories: cakes, Lovely Loaves 70 items, Bernie's Buns 110 items; cookies, Lovely Loaves 80 items, Bernie's Buns 90 items; rolls, Lovely Loaves 60 items, Bernie's Buns 70 items; fresh loaves, Lovely Loaves 30 items, Bernie's Buns 40 items; assorted sandwiches, Lovely Loaves 40 items, Bernie's Buns 30 items; salads, Lovely Loaves 20 items, Bernie's Buns 50 items; crisps, Lovely Loaves 50 items, Bernie's Buns 60 items; doughnuts, Lovely Loaves 60 items, Bernie's Buns 140 items.

CONCLUSION AND RECOMMENDATIONS

- **Tasting events:** Host seasonal tasting days for new pastries, holiday cakes, or signature coffee pairings.
- **B2B partnerships:** Supply local corporate offices, boutique hotels, or yoga studios with daily fresh breakfast pastries.
- **Loyalty perks:** Implement a digital punch-card app where every 10th coffee or pastry is free.
- The primary competitor for Safia Café & Bakery in Tashkent is Bon Patisserie, a popular French-style bakery and coffee shop chain with numerous locations across the city. Other notable bakery and café alternatives in the area include international franchises like PAUL as well as local spot Forn Lebnen.

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5-SECTION

VOYAGA YETMAGANLAR O‘RTASIDA GIYOHVANDLIK HUQUQBUZARLIKLARINING MAXSUS PROFILAKTIKASIDA MAHALLA VA MAKTAB HAMKORLIGINI KUCHAYTIRISH

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Annotatsiya. *Mazkur maqolada voyaga yetmaganlar o‘rtasida giyohvandlik vositalari va psixotrop moddalar bilan bog‘liq huquqbuzarliklarning maxsus profilaktikasida mahalla va maktab hamkorligining bugungi holati tahlil qilingan. Hamkorlikdagi mavjud kamchiliklar, ularning sabablari va oqibatlari o‘rganilib, erta aniqlash, individual yondashuv, ota-onalar bilan ishlash hamda bo‘sh vaqtni tashkil etish mexanizmlarini rivojlantirish bo‘yicha amaliy takliflar berilgan.*

Kalit so‘zlar: *mahalla, maktab, hamkorlik, voyaga yetmaganlar, giyohvandlik, maxsus profilaktika, erta aniqlash, individual yondashuv.*

Аннотация. *В данной статье проанализировано современное состояние сотрудничества махалли и школы в специальной профилактике правонарушений, связанных с наркотиками, среди несовершеннолетних. Изучены существующие недостатки сотрудничества, их причины и последствия, а также предложены практические рекомендации по развитию механизмов раннего выявления, индивидуального подхода, работы с родителями и организации досуга.*

Ключевые слова: *махалля, школа, сотрудничество, несовершеннолетние, наркомания, специальная профилактика, раннее выявление, индивидуальный подход.*

Abstract. *This article analyzes the current state of cooperation between the mahalla and the school in the special prevention of drug-related offenses among minors. The existing shortcomings of cooperation, their causes and consequences are examined, and practical recommendations are offered for the development of mechanisms for early detection, individual approach, work with parents and organization of leisure time.*

Keywords: *mahalla, school, cooperation, minors, drug addiction, special prevention, early detection, individual approach.*

1. Kirish (Introduction)

Bugungi kunda voyaga yetmaganlar o‘rtasida giyohvandlik bilan bog‘liq huquqbuzarliklarning oldini olish davlat siyosatining muhim yo‘nalishlaridan biri hisoblanadi [1]. Yoshlarning yosh xususiyatlari, tashqi ta’sirlarga tez berilishi, tengdoshlarining ta’siri va internetdan keng foydalanishi ularni giyohvandlik xavfiga ochiq qiladi.

Bola kunining katta qismini maktabda o‘tkazadi, oilaviy muhit, bo‘sh vaqti va mahalla ichidagi munosabatlari esa mahalla tomonidan nazorat qilinadi. Shuning uchun mahalla va maktab o‘rtasidagi samarali hamkorlik maxsus profilaktikaning asosiy omillaridan biri hisoblanadi.

O‘zbekiston Respublikasi Konstitutsiyasida bolalar huquqlarini himoya qilish va yoshlarni sog‘lom muhitda tarbiyalash davlatning vazifasi deb belgilangan [2]. “Voyaga yetmaganlar o‘rtasida nazoratsizlik va huquqbuzarliklarning profilaktikasi to‘g‘risida”gi Qonunda ham mahalla va ta’lim muassasalarining birgalikdagi faoliyati alohida ta’kidlangan [3]. Shu bois mahalla va maktab hamkorligini kuchaytirish bugungi kunning dolzarb masalasidir.

Tadqiqotning maqsadi – mahalla va maktab hamkorligining hozirgi holatini chuqur tahlil qilish, mavjud kamchiliklarni aniqlash va maxsus profilaktika doirasida uni yanada samarali qilish yo‘llarini ishlab chiqishdan iborat.

2. Tadqiqot usullari (Methods)

Tadqiqotda quyidagi usullardan foydalanildi:

- normativ-huquqiy hujjatlarni tizimli tahlil qilish;
- qiyosiy-huquqiy usul;
- mantiqiy-tahliliy usul;
- umumlashtirish va abstraksiya usullari.

Asosiy manbalar sifatida O‘zbekiston Respublikasi Konstitutsiyasi, Jinoyat kodeksi, Ma’muriy javobgarlik to‘g‘risidagi kodeks, “Voyaga yetmaganlar o‘rtasida nazoratsizlik va huquqbuzarliklarning profilaktikasi to‘g‘risida”gi Qonun, “Huquqbuzarliklar profilaktikasi to‘g‘risida”gi Qonun hamda giyohvandlik vositalari va psixotrop moddalar to‘g‘risidagi qonun hujjatlari olingan [4].

3. Natijalar (Results)

Tahlil natijalariga ko‘ra, bugungi kunda mahalla va maktab o‘rtasidagi hamkorlikda quyidagi asosiy kamchiliklar mavjud:

1. Axborot almashinuvi sust. Maktab psixologi yoki sinf rahbari xavf guruhidagi bolani aniqlaganida, bu ma’lumot mahallaga o‘z vaqtida yetib bormaydi. Aksincha,

mahalla tomonidan oiladagi muammolar haqida bilinsa ham, maktabga tezkor xabar berilmaydi.

2. Erta aniqlash tizimi zaif. Ko‘p hollarda bola huquqbuzarlik sodir etgandan keyingina e’tibor qaratiladi. Oldindan ogohlantirish va profilaktik ish olib borish mexanizmi to‘liq ishlamayapti.

3. Ota-onalar bilan ishlash tizimsiz. Maktab va mahalla alohida-alohida ota-onalar yig‘ilishi o‘tkazadi, lekin birgalikdagi, muvofiqlashtirilgan ish deyarli yo‘q.

4. Bo‘sh vaqtni tashkil etishda muvofiqlashtirish yo‘q. Maktab sport va madaniy tadbirlar o‘tkazadi, mahalla o‘z tadbirlarini tashkil etadi, lekin ular bir-birini to‘ldirmaydi.

5. Internetdagi xavflar bo‘yicha umumiy yondashuv shakllanmagan. Zararli kontent haqida ota-onalar va o‘quvchilarga tushuntirish ishlari alohida-alohida olib boriladi, birgalikdagi tizimli yondashuv yo‘q [5].

Maxsus profilaktika talablariga ko‘ra, xavf guruhidagi bolalar bilan ishlashda mahalla va maktab birgalikda harakat qilishi lozim [6]. Ammo amaliyotda bu hamkorlik ko‘pincha rasmiy yig‘ilishlar va hisobotlar bilan cheklanib qolmoqda [7]. Natijada erta aniqlash, individual yondashuv va oilaviy tarbiya to‘liq ishlamayapti.

4. Muhokama (Discussion)

Mahalla va maktab hamkorligini kuchaytirish uchun quyidagi chora-tadbirlarni amalga oshirish zarur:

1. Yagona axborot almashish tizimini yaratish. Maktab psixologi, sinf rahbari va mahalla faollari o‘rtasida xavf guruhidagi bolalar haqida tezkor ma’lumot almashish mexanizmini yo‘lga qo‘yish kerak. Buning uchun maxsus elektron jurnal yoki oddiy, lekin doimiy ishlaydigan axborot almashish tartibini joriy etish mumkin. Har qanday ogohlantiruvchi belgi (davomatning yomonlashishi, xulq-atvordagi o‘zgarish, oiladagi mojaro) darhol ikki tomonga yetkazilishi lozim.

2. Birgalikda individual ishlash. Har bir xavf guruhidagi bola uchun maktab va mahalla birgalikda individual profilaktika rejasini tuzishi kerak. Rejada bolaning oilaviy holati, do‘stlari, bo‘sh vaqti, psixologik holati inobatga olinadi. Har oy yakunida ikki tomon natijalarni birgalikda muhokama qiladi.

3. Ota-onalar bilan birgalikda ishlash. Maktab va mahalla tomonidan ota-onalarga farzandlarining do‘stlari, bo‘sh vaqti va internetdan foydalanishi bo‘yicha muntazam suhbatlar o‘tkazish zarur. Bu suhbatlar alohida emas, balki birgalikda tashkil etilishi kerak. Ota-onalarga amaliy maslahatlar berish, real misollar ko‘rsatish samaraliroq bo‘ladi.

4. Bo‘sh vaqtni birgalikda tashkil etish. Maktab va mahalla yoshlar uchun sport, madaniy, tarbiyaviy va kasb-hunar yo‘nalishidagi tadbirlarni birgalikda rejalashtirishi lozim. Bola maktabdan keyin ham foydali mashg‘ulot bilan band bo‘lsa, salbiy ta’sirlarga berilish ehtimoli kamayadi.

5. Internet xavflari bo‘yicha umumiy yondashuv. Zararli kontent haqida ota-onalar va o‘quvchilarga birgalikda tushuntirish ishlarini olib borish kerak. Maktabda dars, mahallada suhbat shaklida bir xil yondashuvni qo‘llash natija beradi.

6. Natijalarni baholash tizimini joriy etish. Hamkorlik natijalarini har chorakda birgalikda tahlil qilish va yangi chora-tadbirlar belgilash lozim. Bu tizim formal hisobot emas, balki haqiqiy natijaga asoslangan bo‘lishi kerak.

Bu chora-tadbirlar amaldagi qonunlarning maqsadlariga to‘liq mos keladi [8] va maxsus profilaktikaning samaradorligini sezilarli darajada oshiradi.

5. Xulosa (Conclusion)

Mahalla va maktab hamkorligini kuchaytirish – voyaga yetmaganlar o‘rtasida giyohvandlik bilan bog‘liq huquqbuzarliklarning maxsus profilaktikasini samarali qilishning eng muhim shartlaridan biridir.

Agar axborot almashinuvi, individual ishlash, ota-onalar bilan birgalikdagi faoliyat, bo‘sh vaqtni tashkil etish va internet xavflariga qarshi birgalikdagi yondashuv tizimli yo‘lga qo‘yilsa, huquqbuzarliklarning oldini olish ancha osonlashadi. Bu esa nafaqat huquqbuzarliklar sonini kamaytiradi, balki yoshlarning sog‘lom muhitda o‘sishiga, huquqiy ongining oshishiga va mas’uliyatli shaxs sifatida shakllanishiga xizmat qiladi.

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10-12 YOSHLI BADIIY GIMNASTIKACHILARDA STATIK MUVOZANAT QOBILIYATINI RIVOJLANTIRISH QOBILIYATI

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Kalit so’zlar: *badiiy gimnastika, yosh sportchilar, statik muvozanat, psixik jarayonlar, sport psixologiyasi, hissiy barqarorlik, diqqatni jamlash, e’tibor, koordinatsiya.*

Annotatsiya: *Ushbu maqolada 10-12 yoshli badiiy gimnastikachilarda statik muvozanat qobiliyatini rivojlantirishning psixologik omillari tahlil qilingan. Tadqiqotning maqsadi – yosh gimnastikachilarda muvozanat sezgisini rivojlantirish, muvozanatni saqlash jarayonida diqqatni jamlash va hissiy barqarorlik kabi psixologik ko‘rsatkichlarni rolini aniqlash hamda ularni rivojlantirishga yo‘naltirilgan mashg‘ulot uslublarini ishlab chiqishdan iborat. Tadqiqot natijalari badiiy gimnastika bo‘yicha murabbiylar va sport psixologlari uchun amaliy ahamiyat kasb etadi.*

Ключевые слова: *художественная гимнастика, юные спортсменки, статическое равновесие, психические процессы, спортивная психология, эмоциональная устойчивость, концентрация, внимание, координация.*

Аннотация: *В статье анализируются психологические факторы развития способности к статическому равновесию у художественных гимнасток 10-12 лет. Цель исследования - определить роль таких психологических показателей, как развитие чувства равновесия, концентрации и эмоциональной устойчивости*

в процессе поддержания равновесия у юных гимнасток, и разработать методы тренировок, направленные на их развитие. Результаты исследования имеют практическое значение для тренеров по художественной гимнастике и спортивных психологов.

Key words: *rhythmic gymnastics, young athletes, static balance, mental processes, sports psychology, emotional stability, concentration, attention, coordination.*

Abstract: *This article analyzes the psychological factors of development of static balance ability in 10-12-year-old rhythmic gymnasts. The purpose of the research is to develop the sense of balance in young gymnasts, to determine the role of psychological indicators such as concentration and emotional stability in the process of maintaining balance, and to develop training methods aimed at their development. The results of the research are of practical importance for rhythmic gymnastics coaches and sports psychologists.*

KIRISH.

O‘zbekiston Respublikasi Prezidentining 2022-yil 23-dekabrdagi PQ-449-sonli “Gimnastika sport turlarini yanada rivojlantirish chora-tadbirlari to’g’risida”gi qarori bilan gimnastikani rivojlantirishning asosiy yo’nalishlari belgilab berildi. Badiiy gimnastika sport turi nafaqat yuqori darajadagi jismoniy tayyorgarlikni, balki muvozanat, koordinatsiya, e’tibor va hissiy boshqaruv kabi murakkab psixologik qobiliyatlarni ham talab qiladi. Ayniqsa, 10-12 yosh oralig’idagi gimnastikachilar uchun bu davr organizmning faol o’sishi, harakat tizimining shakllanishi va psixik jarayonlarning barqarorlashuvi bosqichi hisoblanadi. Shu sababli ushbu yosh davrida muvozanat qobiliyatini rivojlantirish sport tayyorgarligining muhim tarkibiy qismi sifatida katta ahamiyat kasb etadi. Statik muvozanat – bu organizmning harakatsiz holatda barqaror turish qobiliyati bo’lib, u asosan, vestibulyar tizim, mushak sezgisi, ko’rish analizatori hamda markaziy asab tizimi faoliyati bilan chambarchas bog’liq. Bu jarayon sport psixologiyasi nuqtai nazaridan ham muhimdir, chunki muvozanatni saqlash faqat jismoniy emas, balki ruhiy boshqaru, diqqatni jamlash va hissiy turg’unlikni talab etadi. Badiiy gimnastikada ko’plab mashqlar – oyoqda, oyoq uchida yoki bir oyoqda turib, gavdani turli holatda ushlab turish bilan bog‘liq. Statik muvozanat rivojlangan bo’lsa, gimnastikachi harakatni barqaror va chiroyli bajara oladi. Bu esa texnik baholashda yuqori natija beradi. Murakkab sakrashlar, aylanishlar yoki asboblar bilan ishlashdan oldin statik muvozanat asos bo’lib xizmat qiladi. To’g’ri qomatni shakllantirish uchun eng yaxshi samara beruvchi mashqlar muvozanat va

balansni saqlab turuvchi mashqlar hisoblanadi. Bularning qimmatliligi shundaki, bu mashqlarni bajarganda mushak tonusi reflesk tarzda oshadi va tanani to'g'ri ushlab turishga yordam beradi. Xareografiya mashqlarida statik muvozanat asosiy rol o'ynaydi.

Muvozanat saqlash mashqlari.

Muvozanat saqlashning zarur sharti umumiy og'irlik markazining tayanch maydoni ustida joylashishidir. Tayanch maydoni qanchalik katta bo'lsa, muvozanat shunchalik turg'un bo'ladi. Muvozanat saqlash mashqlari qomatni shakllantirish uchun katta ahamiyatga ega, chunki ularni bajarayotganda bel hamda butun gavda muskullarining tonusi ancha ortadi.

Toshkent shahrida badiiy gimnastika bilan shug'ullanadigan 10-12 yoshli 24 nafar sportchi qizlar ishtirokida tadqiqot o'tkazildi. Ishtirokchilar ikki guruhga – nazorat guruhi va tajriba gurhiga teng miqdorda bo'lindi. Tajriba guruhi uchun 8 haftalik maxsus mashqlar dasturi ishlab chiqildi. Bunda quyidagi mashqlardan foydalandik:

STATIKMUVOZANAT QOBILIYATINI YAXSHILOVCHI MASHLAR MAJMUASI

J	Mashqnomivamazmuni	Psixologikta'rif	Me'yor (takror/vaqt)
1	Biroyoqdaturish. Gimnastikachibiroyoqdatikturadi, qo'llar yon tomongayoyilgan.	Diqqatnijamlashnivao'zininazoratqilishnio'rgatadi.	Harbiro yoqda10-30 soniyadan
2	"planka" mashqi. Tirsakvaoyoqbarmoqlarigatayanib, tanachizig'inito'g'risaqlash	Tananibarqarortutuvchimushaklarni mustahkamlash.	20-60 soniyadavomida
3	Skameykaustidamuvozanat. Gimnastikachipast skameykaustidaoyoquchidayuradi	Tananiboshqarish, qo'rquvniyengish, ishonchnioshirish.	4-6 martaboribkelish
4	"qaldirg'och" holati. Biroyoqdaturilib, ikkinchioyoqorqagacho'ziladi, gavdaoldingaegiladivaqo'llaryongayoyiladi.	Koordinatsiyanioshirishgavadiqqatnijamlashgayordamberadi	Harbiro yoqda 10-20 soniya

5	“koprik” hosilqilish. Yotganholda bel yuqorigako’tarilibko’prikho silqilinadi.	O’zigabo’lganishonchnivasabrnio’rg atadi	15-30soniya
6	Burchakushlabo’tirish. O’tirganholdaoyoqlar 45gradusga ko’tariladi, qo’llaryonda.	Mushaksezgisinioshiradi, diqqatnijamlashgayordamberadi	20-40soniya
7	“passe” elementi. Oyoquchidaturibbiroy oqbukilib, oyoquchitizzayonidaturadi. Qo’llaryuqorida.	Proprioseptivsezginivaichkimuvozan atnirivojlantirish	Harbiro yoqda 15-20 soniya

XULOSA. Tadqiqot jarayonida kuzatish, suhbat, eksperiment va statistik tahlil usullari qo’llanildi. O’tkazilgan tadqiqot natijalari shuni ko’rsatadiki, tajriba guruhi ishtirokchilarida 8 haftalik mashg’ulotlardan so’ng statik muvozanat ko’rsatkichlari nazorat guruhiga nisbatan o’rtacha 27%ga yaxshilangan. Tadqiqot natijalari muvozanat qobiliyatini rivojlantirishda faqat jismoniy tayyorgarlikemas, balki sportchining psixologik tayyorgarligi ham muhim rol o’ynashini isbotladi. Statik muvozanat – tana harakati bo’lmasa ham, uning barqaror holatda turish qobiliyatidir. Baddiy gimnastikada bu qobiliyat turli oyoq uchida turishlar, burilishlar, yoki yuqori darajadagi balandlikda balansni saqlashda juda muhim. 10-12 yoshli badiiy gimnastikachilarda statik muvozanatni rivojlantirish – texnik mahorat, jismoniy barqarorlik, estetika va xavfsizlikning poydevori hisoblanadi. Bu yoshda bu sifatni shakllantirish keyingi yillarda yuqori darajadagi sport natijalariga erishish uchun zarurdir. Shuning uchun bugungi kunda badiiy gimnastika mashg’ulotlarida texnik elementlarni bajarishning aniqligi, nafisligi va barqarorligini ta’minlash uchun muvozanat mashqlari keng qo’llanilmoqda. Biroq bu mashqlarning yosh sportchilarning psixologik holatiga, diqqat kontsentratsiyasiga va o’z-o’zini boshqarish ko’nikmalariga ta’siri yetarlicha o’rganilmagan. Shu nuqtai nazardan, 10-12 yoshli gimnastikachilarda statik muvozanatni rivojlantirishning psixologik jihatlarini chuqur tahlil qilish dolzarb ilmiy masalalardan biridir. Shunday qilib, badiiy gimnastikachilarda muvozanatni rivojlantirishni faqat jismoniy mashqlar orqali emas, balki sport psixologiyasining zamonaviy metodlari bilan uyg’unlashtirish yuqori samaradorlikni beradi. Bu yondashuv nafaqat texnik tayyorgarlikni, balki sportchi shaxsining psixologik barqarorligini ham ta’minlaydi.

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TALABALARNING MUSTAQIL O‘QUV-TADQIQOT FAOLIYATI TUSHUNCHASI: MOHIYATI VA TARKIBIY KOMPONENTLARI

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Annotatsiya: *Ushbu tezisda “Talabalarning mustaqil o‘quv-tadqiqot faoliyati” tushunchasining mohiyati IMRAD (Kirish–Metodlar–Natijalar–Muhokama) tuzilishi asosida tahlil qilinadi. Tadqiqot natijasida ushbu faoliyatning to‘rt tarkibiy komponenti - kognitiv, motivatsion, operatsional-texnologik va refleksiv-baholovchi komponentlar - aniqlanib, ularning o‘zaro bog‘liqligi asoslab berilgan.*

Kalit so‘zlar: *mustaqil o‘quv-tadqiqot faoliyati, kognitiv komponent, motivatsion komponent, operatsional-texnologik komponent, refleksiv-baholovchi komponent, o‘z-o‘zini boshqarib o‘qish.*

Аннотация: *В данных тезисах на основе структуры IMRAD (Введение–Методы–Результаты–Обсуждение) анализируется сущность понятия «самостоятельная учебно-исследовательская деятельность студентов». В результате исследования выделены четыре структурных компонента данной деятельности — когнитивный, мотивационный, операционально-технологический и рефлексивно-оценочный, обоснована их взаимосвязь.*

Ключевые слова: *самостоятельная учебно-исследовательская деятельность, когнитивный компонент, мотивационный компонент, операционально-технологический компонент, рефлексивно-оценочный компонент, саморегулируемое обучение.*

Abstract*: This thesis analyzes, within an IMRAD (Introduction–Methods–Results–Discussion) structure, the essence of the concept of "students' independent learning-research activity." The study identifies four structural components of this activity — cognitive, motivational, operational-technological, and reflective-evaluative — and substantiates their interrelationship.*

Keywords: *independent learning-research activity, cognitive component, motivational component, operational-technological component, reflective-evaluative component, self-regulated learning.*

KIRISH

“Mustaqil o‘quv-tadqiqot faoliyati” tushunchasi pedagogika fanida keng qo‘llanilsa-da, uning mazmuni ko‘pincha aniq belgilanmagan holda, “mustaqil ish” yoki “tadqiqot ko‘nikmalari” kabi umumiyroq tushunchalar bilan aralashtirib yuboriladi. Bu esa amaliyotda ushbu faoliyatni maqsadli rivojlantirish va baholashni qiyinlashtiradi.

Tadqiqot maqsadi – “talabalarning mustaqil o‘quv-tadqiqot faoliyati” tushunchasining mohiyatini aniqlashtirish va uning tarkibiy komponentlarini ilmiy asoslangan tarzda tizimlashtirishdan iborat.Vazifalar: tushunchaning mavjud ta'riflarini tahlil qilish va ularni umumlashtirish; tushunchani yaqin tushunchalardan (“mustaqil ish”, “tadqiqot ko‘nikmalari”, “o‘z-o‘zini boshqarib o‘qish”) farqlash; faoliyatning tarkibiy komponentlarini aniqlash va ularning o‘zaro bog‘liqligini asoslash.

Mavzuning dolzarbligi shundan iboratki, komponentlarning aniq tizimlashtirilishi ushbu faoliyatni rivojlantirish va baholashning ilmiy asoslangan mezonlarini ishlab chiqish uchun zaruriy shartdir.

METODLAR

Tadqiqotda kontseptual-terminologik tahlil metodi qo‘llanildi: mavzuga oid ilmiy-pedagogik va psixologik adabiyotlarda “mustaqil o‘quv-tadqiqot faoliyati” tushunchasining turli talqinlari yig‘ildi va tahlil qilindi. Shuningdek, kontent-tahlil metodi orqali tushunchaning takrorlanuvchi mazmuniy birliklari (bilim, motivatsiya, ko‘nikma, nazorat) ajratildi.

Tushunchaning tarkibiy komponentlarini aniqlashda struktura-funksional yondashuvdan foydalanildi: har bir komponent faoliyatning qaysi funksiyasini bajarishi (nima biladi, nega qiladi, qanday qiladi, qanday baholaydi) mezoni asosida ajratildi. Aniqlangan komponentlar keyin yaqin pedagogik-psixologik yondashuvlar (an’anaviy didaktik yondashuv, SRL nazariyasi) bilan qiyoslandi.

NATIJALAR

Tahlil natijasida “talabalarning mustaqil o‘quv-tadqiqot faoliyati” to‘rt o‘zaro bog‘liq komponentdan iborat yaxlit tizim ekanligi aniqlandi (1-jadval).

1-jadval. Mustaqil o‘quv-tadqiqot faoliyatining tarkibiy komponentlari

Komponent	Mazmuni	Namoyon bo‘lish shakli

Kognitiv komponent	Bilim, tushuncha va tadqiqot metodlarini egallash	Muammoni tahlil qilish, gipoteza qurish
Motivatsion komponent	Ichki qiziqish va maqsadga yo‘nalganlik	Mustaqil izlanishga intilish, sabot
Operatsional-texnologik komponent	Amaliy ko‘nikma va harakatlar tizimi	Ma'lumot to‘plash, tahlil qilish, rasmiylashtirish
Refleksiv-baholovchi komponent	O‘z faoliyatini nazorat va baholash	O‘z-o‘zini tahlil qilish, xatolarni tuzatish

Kognitiv komponent talabaning tadqiqot predmeti bo‘yicha bilim va tushunchalarni, shuningdek tadqiqot metodlarini egallash darajasini ifodalaydi. Motivatsion komponent talabaning ichki qiziqishi, maqsadga yo‘nalganligi va tadqiqot jarayonidagi sabotini belgilaydi. Operatsional-texnologik komponent — ma'lumot to‘plash, tahlil qilish va natijalarni rasmiylashtirish kabi amaliy ko‘nikmalar tizimi. Refleksiv-baholovchi komponent esa talabaning o‘z faoliyatini nazorat qilish, baholash va zarur holda tuzatish qobiliyatini anglatadi.Komponentlar orasidagi bog‘liqlik tahlili shuni ko‘rsatdiki, ular chiziqli emas, balki siklik tarzda bir-biriga ta’sir ko‘rsatadi: motivatsiya kognitiv faollikni kuchaytiradi, kognitiv faollik operatsional ko‘nikmalarni rivojlantiradi, operatsional natijalar esa refleksiya orqali qayta motivatsiyaga aylanadi.

Tushunchani yaqin kategoriyalardan farqlash natijasida quyidagi xulosaga kelindi: “mustaqil ish” faqat operatsional-texnologik komponentga e’tibor qaratadi, “o‘z-o‘zini boshqarib o‘qish” (SRL) asosan motivatsion va refleksiv komponentlarni qamrab oladi, “tadqiqot ko‘nikmalari” esa faqat kognitiv-operatsional jihatga tegishli. “Mustaqil o‘quv-tadqiqot faoliyati” tushunchasi esa ushbu barcha jihatlarni yaxlit tizimda birlashtiruvchi kengroq kategoriyadir (2-jadval).

2-jadval. Yondashuvlarning mustaqil faoliyatga munosabati bo‘yicha qiyosiy tahlili

Yondashuv	Mustaqil faoliyatga qarashi	Cheklovi
An'anaviy didaktik yondashuv	Ko‘rsatma asosida bajariladigan mustaqil ish	Tadqiqotchilik va ijodkorlik jihati zaif
SRL (Zimmerman) yondashuvi	O‘z-o‘zini boshqarib o‘qish jarayoni	Tadqiqot mazmuni va predmeti chetda qoladi
Mustaqil o‘quv-tadqiqot faoliyati (ushbu tadqiqot)	To‘rt komponentli yaxlit tizim	Amalga oshirish uchun maxsus pedagogik qo‘llab-quvvatlash talab etadi

Komponentlarning yosh va ta’lim bosqichiga bog‘liq dinamikasi

Tahlil shuni ko‘rsatdiki, to‘rt komponentning nisbiy og‘irligi talabaning ta'lim bosqichiga qarab o‘zgarib boradi. Ta’lim boshlang‘ich bosqichida motivatsion va kognitiv komponentlar yetakchi rolni o‘ynaydi, chunki talaba hali tadqiqot predmeti bilan tanishish va qiziqish uyg‘otish bosqichida bo‘ladi. O‘rta bosqichda operatsional-texnologik komponent kuchayadi - talaba amaliy tadqiqot ko‘nikmalarini faol egallay boshlaydi. Yakuniy bosqichda esa refleksiv-baholovchi komponent yetakchilikka chiqadi, bu talabaning o‘z faoliyatini mustaqil tahlil qila olish darajasiga yetganligini bildiradi.Ushbu dinamika shuni ko‘rsatadiki, to‘rt komponentni bir vaqtning o‘zida bir xil darajada rivojlantirishga urinish samarasiz bo‘lishi mumkin; aksincha, pedagogik ta'sirni ta'lim bosqichiga mos komponentga qarata yo‘naltirish maqsadga muvofiqroqdir.

MUHOKAMA

Olingan natijalar “mustaqil o‘quv-tadqiqot faoliyati” tushunchasining ko‘p qirrali, integrativ xarakterga ega ekanligini tasdiqlaydi. Bu, o‘z navbatida, ushbu faoliyatni faqat bitta ko‘rsatkich (masalan, faqat bajarilgan ishlar soni yoki faqat motivatsiya darajasi) orqali baholashning yetarli emasligini ko‘rsatadi — barcha to‘rt komponentni hisobga oluvchi kompleks baholash tizimi zarur. Natijalar B. Zimmermanning o‘z-o‘zini boshqarib o‘qish nazariyasi bilan qisman mos keladi, biroq undan farqli o‘laroq, taklif etilgan tarkib tadqiqot predmeti va mazmuni bilan bog‘liq kognitiv komponentni alohida ajratadi, bu esa uni aynan tadqiqotchilik faoliyatiga — nafaqat umumiy o‘quv faoliyatiga — yo‘naltiradi.

Tadqiqotning cheklovi shundaki, komponentlarning nisbiy og‘irligi turli fan yo‘nalishlarida farqlanishi mumkin, bu holat keyingi tadqiqotlarda sohaga xos empirik tekshiruvni talab qiladi.

XULOSA

Xulosa qilib aytganda, “talabalarning mustaqil o‘quv-tadqiqot faoliyati” kognitiv, motivatsion, operatsional-texnologik va refleksiv-baholovchi komponentlardan iborat yaxlit, tsiklik tizimdir. Ushbu tarkibiy tahlil tushunchani yaqin kategoriyalardan aniq farqlash, shuningdek uni rivojlantirish va baholashning ilmiy asoslangan mezonlarini ishlab chiqish uchun nazariy asos yaratadi.

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RAQAMLI TA’LIM MUHITIDA BO‘LAJAK PEDAGOGLARNING KASBIY KOMPETENTLIGINI RIVOJLANTIRISHNING PEDAGOGIK TEXNOLOGIYALARI

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Annotatsiya. *Maqolada raqamli ta’lim muhitida bo‘lajak pedagoglarning kasbiy kompetentligini rivojlantirish imkoniyatlari tahlil qilinadi. Tadqiqotning maqsadi raqamli vositalarni texnik ko‘nikma emas, balki pedagogik loyihalash, interfaol o‘qitish, raqamli baholash, hamkorlik va refleksiya bilan bog‘liq kompleks kompetensiya sifatida asoslashdan iborat. Tizimli, qiyosiy-tahliliy, kontent-tahlil va pedagogik modellashtirish metodlaridan foydalanildi. Natijada raqamli kasbiy kompetentlikning asosiy komponentlari hamda uni rivojlantirishga xizmat qiluvchi pedagogik texnologiyalar tizimlashtirildi.*

Kalit so‘zlar: *raqamli ta’lim muhiti, bo‘lajak pedagog, kasbiy kompetentlik, raqamli kompetentlik, pedagogik texnologiya, raqamli resurs, interfaol ta’lim, raqamli baholash, refleksiya, sun’iy intellekt.*

Abstract. *This article analyzes opportunities for developing pre-service teachers’ professional competence in a digital learning environment. The study conceptualizes digital tools as part of a complex pedagogical competence involving instructional design, interactive teaching, digital assessment, collaboration, and reflection. Systemic, comparative-analytical, content-analysis, and pedagogical modeling methods were used. The study identifies key components of digital professional competence and systematizes pedagogical technologies for its development.*

Keywords: *digital learning environment, pre-service teacher, professional competence, digital competence, pedagogical technology, digital resources, interactive learning, digital assessment, reflection, artificial intelligence.*

KIRISH

Ta’limning raqamli transformatsiyasi zamonaviy pedagog kadrga qo‘yiladigan talablarni tubdan kengaytirmoqda. Bugungi pedagogdan faqat fan mazmunini bilish yoki an’anaviy dars metodlarini qo‘llash emas, balki raqamli resurslarni pedagogik

maqsadga muvofiq tanlash, ta’lim jarayonini raqamli muhitda loyihalash, o‘quvchilar faoliyatini onlayn va oflayn formatlarda tashkil etish, raqamli baholash vositalaridan foydalanish hamda raqamli xavfsizlik va akademik halollik tamoyillariga rioya qilish talab etiladi. UNESCOning 2023-yilgi Global Education Monitoring Report hisobotida ham texnologiyaning ta’limdagi samarasi avtomatik ravishda yuzaga kelmasligi, uning natijadorligi tegishli pedagogik maqsad, teng imkoniyat, boshqaruv va o‘qituvchilarning tayyorgarligiga bog‘liqligi ta’kidlangan [1].

Raqamli texnologiyalar ta’lim jarayonining mazmuni va shaklini o‘zgartirishi bilan birga, o‘qituvchining kasbiy rolini ham qayta belgilamoqda. Yevropa Komissiyasining DigCompEdu doirasida pedagoglarning raqamli kompetentligi 22 ta kompetensiyani qamrab oluvchi olti yo‘nalishda — kasbiy faoliyat, raqamli resurslar, o‘qitish va o‘rganish, baholash, ta’lim oluvchilar imkoniyatlarini kengaytirish hamda ularning raqamli kompetentligini rivojlantirish — tavsiflangan [2]. Mazkur yondashuv raqamli kompetentlikni alohida texnik ko‘nikma emas, balki pedagogik faoliyatning turli bosqichlariga singdirilgan kompleks kompetensiya sifatida ko‘rish zarurligini ko‘rsatadi.

Sun’iy intellektning ta’limga tez kirib kelishi ushbu masalani yanada dolzarb qilmoqda. UNESCOning 2024-yilda e’lon qilingan o‘qituvchilar uchun AI kompetensiyalari doirasida inson markazli yondashuv, AI etikasi, AI asoslari va qo‘llanilishi, AI pedagogikasi hamda kasbiy rivojlanish uchun AI’dan foydalanish kabi besh yo‘nalish ajratilgan [3]. Demak, bo‘lajak pedagogni raqamli muhitga tayyorlash endilikda faqat platformalar bilan ishlashni o‘rgatish bilan cheklanmasligi, balki texnologik vositalarni pedagogik va axloqiy jihatdan mas’uliyatli qo‘llash kompetensiyasini ham shakllantirishi lozim.

Tadqiqotning maqsadi raqamli ta’lim muhitida bo‘lajak pedagoglarning kasbiy kompetentligini rivojlantirishning pedagogik imkoniyatlarini aniqlash va mazkur jarayon uchun samarali pedagogik texnologiyalar majmuini asoslashdan iborat. Ushbu maqsadga erishish uchun raqamli kasbiy kompetentlikning mazmuniy komponentlarini aniqlash, raqamli vositalarning pedagogik funksiyalarini tahlil qilish, bo‘lajak pedagoglar faoliyatida qo‘llash mumkin bo‘lgan texnologiyalarni tizimlashtirish va amaliy modelni taklif etish vazifalari belgilandi.

Tadqiqot nazariy-analitik xarakterga ega bo‘lib, unda raqamli ta’lim va pedagog kadrlar tayyorgarligiga oid ilmiy-metodik manbalarni tizimlashtirishga e’tibor qaratildi. Tadqiqotning metodologik asosini tizimli yondashuv, kompetensiyaviy yondashuv, shaxsga yo‘naltirilgan ta’lim va reflektiv yondashuv tashkil etdi. Tizimli

yondashuv raqamli vositalar, pedagogik maqsad, ta’lim mazmuni, metod, baholash va ta’lim oluvchi faoliyatini yagona tizim sifatida ko‘rishga imkon berdi.

Qiyosiy-tahliliy metod yordamida raqamli kompetentlikka oid xalqaro yondashuvlar, xususan, DigCompEdu va UNESCOning o‘qituvchilar uchun AI kompetensiyalari doirasi tahlil qilindi. Kontent-tahlil orqali ushbu manbalarda takrorlanadigan asosiy kompetensiyalar ajratildi. Pedagogik modellashtirish metodi esa aniqlangan komponentlarni bo‘lajak pedagoglarni tayyorlash jarayonidagi amaliy texnologiyalar bilan bog‘lash uchun qo‘llanildi.

Metodologik jihatdan muhim jihat shundaki, maqolada texnologiyaning o‘zi ta’lim natijasining kafolati sifatida qaralmaydi. UNESCO ma’lumotlariga ko‘ra, raqamli texnologiyaning ta’limdagi ta’siri kontekst, pedagogning tayyorgarligi, infratuzilma va pedagogik maqsadga muvofiqlik bilan bog‘liq [1]. Shu sababli tadqiqotda “texnologiya → faoliyat → pedagogik natija” zanjiri asosiy tahliliy birlik sifatida qabul qilindi.

Bo‘lajak pedagogning kasbiy kompetentligi — uning fan, metodika, kommunikatsiya, baholash, tarbiya va o‘z-o‘zini rivojlantirishga oid bilim va ko‘nikmalarini real pedagogik vaziyatlarda samarali qo‘llay olish qobiliyatidir. Raqamli muhit bu kompetentlikning tarkibiga yangi faoliyat turlarini qo‘shadi. Jumladan, raqamli o‘quv kontentini yaratish, elektron platformalarda hamkorlikni tashkil etish, ma’lumotlarni tahlil qilish, onlayn baholashni loyihalash, raqamli xavfsizlikni ta’minlash va texnologik vositalarni didaktik maqsadga moslashtirish shular jumlasidandir.

DigCompEdu modeli ushbu jarayonni ayniqsa aniq ifodalaydi: pedagogning raqamli kompetentligi faqat qurilma yoki dasturdan foydalanish qobiliyati bilan cheklanmaydi. Unda kasbiy hamkorlik, reflektiv amaliyot, raqamli resurslarni tanlash, o‘qitish va o‘rganish, baholash, ta’lim oluvchini faollashtirish va uning raqamli kompetentligini rivojlantirish kabi yo‘nalishlar bir butun tizimni tashkil etadi [2]. Shundan kelib chiqib, bo‘lajak pedagoglarni tayyorlashda “qaysi dasturdan foydalanishni bilish”dan ko‘ra “qaysi pedagogik vazifani qaysi raqamli vosita yordamida va nima sababdan hal qilishni bilish” ustuvor bo‘lishi kerak.

Raqamli kompetentlikning birinchi komponenti — instrumental-texnologik komponent. U raqamli platformalar, taqdimot vositalari, test va so‘rov servislaridan foydalanish, elektron hujjatlar va o‘quv materiallarini yaratishni qamrab oladi. Ikkinchi komponent — didaktik-metodik komponent bo‘lib, raqamli vositani ta’lim maqsadi, mazmuni va metodiga mos tanlashni anglatadi. Uchinchi komponent — kommunikativ-hamkorlik komponenti; bunda pedagog raqamli muhitda guruh ishini, teskari aloqani

va professional muloqotni tashkil etadi. To‘rtinchi komponent — baholash-analitik komponent bo‘lib, elektron topshiriqlar, formative assessment va o‘quv natijalari haqidagi ma’lumotlardan foydalanishni nazarda tutadi. Beshinchi komponent — etik-reflektiv komponent; u akademik halollik, shaxsiy ma’lumotlarni himoya qilish, raqamli farovonlik, AI’dan mas’uliyatli foydalanish va pedagogning o‘z faoliyatini tahlil qilishini qamrab oladi.

Birinchi samarali yo‘nalish — muammoli va loyiha asosida o‘qitishni raqamli muhit bilan integratsiyalash. Bunda talabaga tayyor raqamli mahsulot berish o‘rniga, u muayyan pedagogik muammoni hal qilish uchun raqamli resurslardan foydalanadi. Masalan, bo‘lajak pedagog biror mavzu bo‘yicha mini-dars loyihasini ishlab chiqadi, uning maqsadlarini belgilaydi, raqamli resurslarni tanlaydi, interfaol topshiriq yaratadi va yakunda o‘z yechimini pedagogik mezonlar asosida himoya qiladi. Bunday faoliyat texnik ko‘nikmani real kasbiy vazifa bilan bog‘laydi.

Ikkinchi yo‘nalish — blended learning, ya’ni aralash ta’lim texnologiyasi. Mazkur yondashuvda auditoriya mashg‘ulotlari mustaqil raqamli faoliyat bilan uyg‘unlashtiriladi. Bo‘lajak pedagog elektron material bilan oldindan tanishadi, darsda muammoli vazifalarni bajaradi va keyinchalik raqamli platformada refleksiya yoki qo‘shimcha topshiriqni amalga oshiradi. Natijada vaqtni boshqarish, mustaqil ta’lim, raqamli muloqot va o‘z faoliyatini baholash kompetensiyalari bir vaqtda rivojlanadi.

Uchinchi yo‘nalish — raqamli baholash va formative feedback. Elektron testlar, qisqa diagnostik topshiriqlar, elektron portfoliolar, rubrikalar va tezkor teskari aloqa vositalari talabaning o‘zlashtirish dinamikasini kuzatishga yordam beradi. Bunda baholashning maqsadi faqat ball qo‘yish emas, balki ta’lim oluvchiga keyingi rivojlanish yo‘nalishini ko‘rsatishdan iborat bo‘lishi kerak. DigCompEdu ham raqamli vositalardan baholash jarayonini takomillashtirish va ta’lim oluvchining rivojlanishini qo‘llab-quvvatlash uchun foydalanishni alohida kompetensiya sohasi sifatida ko‘rsatadi [2].

To‘rtinchi yo‘nalish — raqamli portfolio. Talaba o‘zining dars ishlanmalari, taqdimotlari, interfaol topshiriqlari, video-darslari, reflektiv yozuvlari va baholash materiallarini yagona elektron portfolioga jamlaydi. Portfolio nafaqat natijalarni namoyish etadi, balki kasbiy rivojlanishning dinamikasini ko‘rsatadi. O‘qituvchi portfolio asosida individual teskari aloqa beradi, talaba esa o‘z kuchli va zaif jihatlarini aniqlaydi.

Beshinchi yo‘nalish — hamkorlikda raqamli mahsulot yaratish. Guruhli topshiriqlarda talabalar umumiy taqdimot, elektron metodik qo‘llanma, videodars, interfaol topshiriqlar to‘plami yoki raqamli dars ssenariysini ishlab chiqishi mumkin.

Bunda kommunikatsiya, vazifalarni taqsimlash, muammolarni hal qilish va jamoaviy mas’uliyat kabi kasbiy sifatlar rivojlanadi. DigCompEdu doirasida pedagoglarning raqamli hamkorligi va professional tajriba almashinuvi ham alohida kompetensiya sifatida qayd etilgan [2].

Oltinchi yo‘nalish — sun’iy intellektdan pedagogik va etik jihatdan mas’uliyatli foydalanish. Bo‘lajak pedagog AI vositalaridan dars g‘oyalarini ishlab chiqish, savollar bankini shakllantirish, differensial topshiriqlar tayyorlash yoki matnni dastlabki tahlil qilishda foydalanishi mumkin. Biroq AI natijasini tekshirish, manbalarni verifikatsiya qilish, mualliflik va akademik halollik talablariga rioya qilish ham kompetensiyaning ajralmas qismi bo‘lishi kerak. UNESCOning AI Competency Framework for Teachers hujjatida aynan inson markazli yondashuv, AI etikasi, AI pedagogikasi va professional rivojlanish yo‘nalishlari belgilangan [3].

Yettinchi yo‘nalish — reflektiv raqamli pedagogika. Har bir raqamli mashg‘ulotdan keyin bo‘lajak pedagog “qaysi vosita ishladi?”, “u qaysi pedagogik maqsadga xizmat qildi?”, “talabaning faolligi qanday o‘zgardi?”, “qaysi muammo yuzaga keldi?” kabi savollar asosida o‘z faoliyatini tahlil qilishi kerak. Bu yondashuv texnologiyadan ko‘r-ko‘rona foydalanishning oldini oladi. UNESCO ham texnologiya ta’lim maqsadlariga xizmat qilishi va o‘qituvchilar faqat muayyan qurilmani ishlatishni emas, undan ta’lim uchun qanday foydalanishni bilishi kerakligini ta’kidlaydi [1].

Tahlil natijalariga ko‘ra, bo‘lajak pedagogning raqamli kasbiy kompetentligini rivojlantirishni quyidagi ketma-ketlik asosida tashkil etish maqsadga muvofiq:

1) Diagnostika — talabaning boshlang‘ich raqamli va pedagogik kompetensiyalarini aniqlash;

2) Maqsadni belgilash — kasbiy vazifaga mos raqamli kompetensiya indikatorlarini aniqlash;

3) Pedagogik loyihalash — dars maqsadi, mazmuni, metod va raqamli vositani o‘zaro moslashtirish;

4) Amaliy faoliyat — raqamli dars, loyiha, elektron topshiriq yoki portfolio yaratish;

5) Teskari aloqa — o‘qituvchi va tengdoshlar tomonidan rubrika asosida baholash;

6) Refleksiya — bajarilgan faoliyatning pedagogik samaradorligini tahlil qilish;

7) Takomillashtirish — aniqlangan kamchiliklar asosida raqamli pedagogik mahsulotni qayta ishlab chiqish.

Ushbu modelning asosiy afzalligi texnologik vosita bilan pedagogik natija o‘rtasidagi bog‘liqlikni ta’minlashidir. Masalan, talaba faqat onlayn test yaratishni o‘rganmaydi; u qaysi maqsad uchun test kerakligini, savollarni qanday konstruksiya

qilishni, natijalarni qanday tahlil qilishni va olingan ma’lumot asosida keyingi ta’lim faoliyatini qanday rejalashtirishni ham o‘zlashtiradi. Shu tariqa raqamli vosita kasbiy kompetentlikni shakllantirish vositasiga aylanadi.

Tahlil natijasida raqamli ta’lim muhitida bo‘lajak pedagogning kasbiy kompetentligini rivojlantirish uchta o‘zaro bog‘liq darajada tashkil etilishi mumkinligi aniqlandi. Birinchi daraja — texnologik savodxonlik: vositalarni ishlata olish. Ikkinchi daraja — pedagogik integratsiya: texnologiyani ta’lim maqsadi va metodiga moslashtira olish. Uchinchi daraja — innovatsion-reflektiv daraja: yangi raqamli yechimlarni mustaqil ishlab chiqish, ularning samaradorligini baholash va pedagogik faoliyatni takomillashtira olish. Aynan uchinchi daraja bo‘lajak pedagogning barqaror kasbiy kompetentligini shakllantirish uchun muhimdir.

Xalqaro yondashuvlar ham raqamli kompetentlikning faqat texnik tayyorgarlik bilan chegaralanmasligini ko‘rsatadi. DigCompEdu pedagogik faoliyatni raqamli vositalar yordamida kuchaytirish va innovatsiyalashni asosiy maqsad sifatida belgilaydi [2]. UNESCOning GEM hisobotida esa texnologiyaning ta’limdagi muvaffaqiyati o‘qituvchi salohiyati, tegishli tayyorgarlik va kontekstga moslik bilan bog‘liqligi qayd etiladi [1]. Bu holat bo‘lajak pedagoglarni tayyorlashda alohida “raqamli vositalar” kursidan tashqari, barcha pedagogik fanlar mazmuniga raqamli pedagogika elementlarini integratsiya qilish zarurligini ko‘rsatadi.

Sun’iy intellektning rivojlanishi esa ushbu integratsiyani yanada komplekslashtirmoqda. UNESCOning 2024-yilgi AI kompetensiyalari doirasida o‘qituvchining AI’dan foydalanishida inson agentligi, mas’uliyat va etika masalalariga alohida urg‘u berilgan [3]. Shuning uchun bo‘lajak pedagoglarni tayyorlashda AI vositalaridan foydalanish bo‘yicha topshiriqlar bilan bir qatorda, AI tomonidan yaratilgan axborotni tekshirish, xatolarni aniqlash, manbalarni baholash va akademik halollikni saqlash bo‘yicha vazifalarni ham kiritish maqsadga muvofiq.

Shuningdek, raqamli ta’limning samaradorligini faqat texnologiya soni yoki platformalar xilma-xilligi bilan o‘lchash noto‘g‘ri. UNESCO raqamli texnologiyadan foydalanishning samarasi bo‘yicha dalillar turlicha ekanini va texnologiya pedagogik maqsadni almashtirmasligi kerakligini qayd etadi [1]. Demak, bo‘lajak pedagogning kasbiy kompetentligini rivojlantirishda asosiy mezon “qancha raqamli vosita biladi?” emas, balki “raqamli vosita yordamida qanday pedagogik muammoni samarali hal qila oladi?” degan savol bo‘lishi kerak.

Amaliy nuqtayi nazardan oliy ta’lim muassasalarida raqamli kompetentlikni rivojlantirish uchun pedagogik fanlar doirasida mikro-darslar, raqamli portfolio, loyiha topshiriqlari, elektron rubrikalar, peer assessment, reflektiv kundaliklar va AI bilan

ishlash bo‘yicha vazifalarni tizimli joriy etish mumkin. Bunday faoliyatlar talabaning texnologik, metodik, kommunikativ, analitik va etik kompetensiyalarini birgalikda rivojlantirish imkonini beradi.

XULOSA

Tadqiqot natijalari raqamli ta’lim muhitida bo‘lajak pedagoglarning kasbiy kompetentligini rivojlantirish texnologik vositalarni o‘zlashtirishdan ancha keng jarayon ekanligini ko‘rsatdi. Raqamli kompetentlik pedagogik loyihalash, ta’limni tashkil etish, baholash, hamkorlik, refleksiya, akademik halollik va sun’iy intellektdan mas’uliyatli foydalanish kabi faoliyatlarni qamrab oluvchi kompleks kasbiy sifat sifatida qaralishi lozim.

Bo‘lajak pedagoglarni tayyorlashda raqamli texnologiyalarni pedagogik fanlarning mazmuniga integratsiyalash, loyiha va muammoli topshiriqlardan foydalanish, raqamli portfolio va formative assessmentni joriy etish, shuningdek, AI etikasi va raqamli xavfsizlik masalalarini o‘quv jarayoniga kiritish samarali yo‘nalishlar sifatida belgilanadi. Bunda texnologiya ta’limning maqsadi emas, balki pedagogik maqsadga erishish vositasi sifatida qo‘llanishi kerak.

Amaliy tavsiya sifatida oliy ta’lim muassasalarida bo‘lajak pedagoglarning raqamli kasbiy kompetentligini muntazam diagnostika qilish, fanlar kesimida raqamli topshiriqlar bankini yaratish, pedagoglar uchun raqamli metodik hamkorlikni kuchaytirish va talabalarning elektron portfoliolarini kasbiy rivojlanish ko‘rsatkichi sifatida qo‘llash maqsadga muvofiq. Kelgusida ushbu modelning samaradorligini tajriba-sinov asosida empirik tekshirish va kompetensiya indikatorlari bo‘yicha miqdoriy baholash alohida tadqiqot yo‘nalishi bo‘lishi mumkin.

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THE ADVANTAGES AND CHALLENGES OF USING ARTIFICIAL INTELLIGENCE IN EDUCATION

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Abstract. *Artificial intelligence (AI) has emerged as one of the most influential technologies transforming modern education. The integration of AI-based tools into educational environments creates new opportunities for improving teaching quality, personalizing learning experiences, and increasing access to educational resources. However, the rapid development of AI also introduces several challenges, including academic integrity issues, data privacy concerns, algorithmic bias, and unequal access to digital technologies. This study aims to examine the main advantages and challenges associated with the use of artificial intelligence in education. The findings indicate that AI can significantly support both teachers and students by enhancing learning efficiency, providing personalized feedback, and enabling data-driven educational decisions. Nevertheless, effective and ethical integration of AI requires appropriate policies, digital literacy, and institutional frameworks to ensure responsible use. The study concludes that artificial intelligence should be considered a supportive tool that complements human expertise rather than replacing educators. Promoting balanced and responsible AI adoption can contribute to the development of more innovative, inclusive, and sustainable education systems.*

Keywords: *artificial intelligence, education, digital transformation, personalized learning, educational technology, AI ethics, sustainable development*

Artificial intelligence has become one of the most transformative technologies of the twenty-first century, influencing various sectors, including healthcare, business, manufacturing, and education. Recent advances in AI technologies, particularly generative AI tools such as ChatGPT, Google Gemini, and Microsoft Copilot, have significantly changed the way students learn, teachers teach, and educational institutions deliver knowledge. These technologies offer new opportunities to improve learning outcomes, personalize instruction, and increase access to educational resources. Despite these benefits, the rapid adoption of AI in education has also raised important concerns. Issues such as academic integrity, data privacy, algorithmic bias,

excessive reliance on AI-generated content, and unequal access to digital technologies continue to challenge educators and policymakers. Without appropriate guidelines and ethical frameworks, the widespread use of AI may negatively affect students' critical thinking, creativity, and independent learning skills. As educational systems around the world continue to undergo digital transformation, understanding both the opportunities and challenges of AI has become increasingly important. Universities and schools are seeking effective strategies to integrate AI into teaching and learning while maintaining educational quality, fairness, and ethical standards. Therefore, this thesis aims to examine the major advantages and challenges of using artificial intelligence in education through a review of recent academic literature and international reports. The paper also provides recommendations for the responsible and effective implementation of AI technologies in educational environments.

This study employs a qualitative research design based on a literature review and document analysis. The research aims to examine the advantages and challenges of artificial intelligence in education by synthesizing findings from recent academic studies and international policy reports. Relevant literature was identified through academic databases, including Google Scholar, Scopus, and Web of Science, using keywords such as *artificial intelligence*, *AI in education*, *generative AI*, *personalized learning*, *academic integrity*, and *educational technology*. To ensure the relevance and reliability of the findings, priority was given to peer-reviewed journal articles and reports published by reputable international organizations between 2019 and 2025. The collected sources were analyzed using descriptive and comparative analysis. The descriptive analysis was used to summarize the key benefits and challenges associated with AI in education, while the comparative analysis helped identify similarities and differences in the perspectives of researchers and international organizations. The findings were then synthesized to develop recommendations for the responsible and effective integration of AI into educational systems.

Artificial intelligence has significantly transformed educational practices by providing innovative tools that improve teaching and learning processes. One of the most important advantages of AI is personalized learning. AI-powered systems can analyze students' learning styles, performance, and progress to provide customized learning materials and recommendations. This individualized approach helps students learn at their own pace and improves academic achievement.[1] AI also enhances teachers' productivity by automating repetitive administrative tasks such as grading assignments, monitoring attendance, and preparing assessments. This allows educators to devote more time to lesson planning, student engagement, and academic support.

Furthermore, intelligent tutoring systems and AI-powered virtual assistants provide students with immediate feedback and round-the-clock learning assistance, making education more accessible and efficient.[4] Another significant benefit is the ability of AI to support data-driven decision-making. Educational institutions can use learning analytics to identify students at risk of poor academic performance, evaluate teaching effectiveness, and improve curriculum design. AI also facilitates inclusive education by offering speech recognition, real-time translation, text-to-speech technologies, and adaptive learning tools for students with disabilities or diverse learning needs.[2]

Despite its numerous benefits, the widespread use of AI in education presents several challenges. One of the most frequently discussed concerns is academic integrity. The increasing availability of generative AI tools has made it easier for students to generate essays, assignments, and programming solutions without demonstrating their own knowledge or critical thinking skills. This has raised questions about plagiarism, authorship, and fair assessment practices.[3] Data privacy and security also remain major concerns. AI applications often require large volumes of personal and academic data to function effectively. Without proper governance and data protection measures, there is a risk of unauthorized access, misuse of sensitive information, and violations of students' privacy rights.[1] Another challenge is algorithmic bias and the digital divide. AI systems may produce biased or inaccurate outputs if they are trained on incomplete or unrepresentative datasets. In addition, unequal access to digital technologies and reliable internet services prevents many students and educational institutions from benefiting equally from AI innovations. These inequalities may widen existing educational gaps, particularly in developing countries.[2]

Excessive dependence on AI may also reduce students' creativity, analytical thinking, and problem-solving abilities if these technologies are used without appropriate supervision. Therefore, AI should complement rather than replace the role of teachers in the educational process[4]. To maximize the benefits of AI while minimizing its risks, educational institutions should develop clear policies and ethical guidelines for AI use. Students and teachers should receive training on AI literacy, including the responsible use of generative AI tools, verification of AI-generated information, and academic integrity principles. AI should be integrated into teaching as a supportive technology that enhances human learning rather than replacing human judgment and interaction.Governments and educational organizations should also invest in digital infrastructure, cybersecurity, and equal access to AI technologies.[5] International cooperation among policymakers, researchers, and educational

institutions can promote the development of common standards for ethical AI and ensure that AI contributes to sustainable and inclusive education.[1]

Artificial intelligence has become an important driver of innovation in education, offering new opportunities to improve teaching, learning, and educational management. AI technologies support personalized learning, automate routine administrative tasks, provide timely feedback, and enhance access to educational resources. These advantages have the potential to improve learning outcomes and increase the efficiency of educational institutions. At the same time, the rapid adoption of AI presents significant challenges, including concerns about academic integrity, data privacy, algorithmic bias, unequal access to digital technologies, and the potential overreliance on AI-generated content. Addressing these issues requires well-defined ethical guidelines, effective institutional policies, and continuous development of AI literacy among educators and students. The findings of this study suggest that artificial intelligence should be viewed as a tool that complements, rather than replaces, human expertise in education. Responsible implementation, supported by appropriate governance and continuous evaluation, can help educational institutions maximize the benefits of AI while minimizing its risks. As AI technologies continue to evolve, future research should focus on assessing their long-term impact on learning outcomes, educational equity, and teaching practices across different educational contexts.

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Artificial intelligence has significantly transformed educational practices by providing innovative tools that improve teaching and learning processes. One of the most important advantages of AI is personalized learning. AI-powered systems can analyze students' learning styles, performance, and progress to provide customized learning materials and recommendations. This individualized approach helps students learn at their own pace and improves academic achievement.[1] AI also enhances teachers' productivity by automating repetitive administrative tasks such as grading

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TALABALARGA MEHNAT GIGIYENASI FANINI REFLEX-PREVENTIVE MODELING TECHNOLOGY TA'LIM TEXNOLOGIYASI YORDAMIDA O'QITISHNING O'ZIGA XOS JIHATLARI

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Annotatsiya: *Ushbu maqolada talabalarga mehnat gigiyenasi fanini o'qitishda qo'llanilayotgan Reflex-Preventive Modeling Technology (RPMT) ta'lim texnologiyasining o'ziga xos jihatlari tahlil qilinadi. RPMT uch tarkibiy qismga — reflektor (ko'nikmani avtomatlashtirish), preventiv (profilaktik fikrlashni shakllantirish) va modellashtirish (vaziyatli hamda simulyatsion mashqlar) — asoslanadi. Maqolada texnologiyaning nazariy asoslari, sanoat mikroiqlimi, chang va elektromagnit maydonlarni o'lchash mavzularidagi amaliy qo'llanilishi, shuningdek an'anaviy ma'ruza usulidan farqli tomonlari ko'rib chiqiladi. Xulosada RPMT talabalarda nazariy bilim bilan birga barqaror amaliy-profilaktik ko'nikmalarni shakllantiruvchi integrativ yondashuv sifatida asoslab beriladi.*

Abstract: *This article examines the distinctive features of Reflex-Preventive Modeling Technology (RPMT), an educational technology applied to teaching occupational hygiene to medical students. RPMT integrates three components: reflex (automating practical skills through structured repetition), preventive (cultivating preventive-medicine reasoning), and modeling (situational and simulation-based exercises). The article discusses the technology's theoretical foundations, its practical application to teaching industrial microclimate, dust, and electromagnetic field measurement, and how it differs from traditional lecture-based instruction. It concludes that RPMT offers an integrative approach that builds durable practical prevention skills alongside theoretical knowledge.*

Kalit so'zlar: *mehnat gigiyenasi; Reflex-Preventive Modeling Technology; ta'lim texnologiyasi; simulyatsion o'qitish; profilaktik ko'nikma; kompetensiyaga asoslangan ta'lim.*

Keywords: *occupational hygiene; Reflex-Preventive Modeling Technology; educational technology; simulation-based learning; preventive competence; competency-based education.*

Kirish

Zamonaviy tibbiyot ta’limida talabalarni nazariy bilim bilan bir qatorda kasbiy faoliyatda darhol qo‘llay oladigan amaliy ko‘nikmalar bilan qurollantirish ustuvor vazifaga aylanmoqda. Mehnat gigiyenasi fani bu borada alohida o‘rin tutadi: u ishlab chiqarish muhiti omillarini (sanoat mikroiqlimi, chang, elektromagnit maydonlar) o‘lchash, natijalarni SanPiN me’yorlari bilan solishtirish va shu asosda profilaktik tavsiyalar ishlab chiqish kabi amaliy-metodik ko‘nikmalarni talab qiladi. An’anaviy ma’ruza-seminar shakli nazariy tushunchalarni yetkazishda samarali bo‘lsa-da, bunday ko‘nikmalarning barqaror, avtomatlashgan darajada shakllanishini ta’minlashda yetarli emas.

Ushbu muammoni bartaraf etish maqsadida ta’lim amaliyotiga Reflex-Preventive Modeling Technology (RPMT) — reflektor, preventiv va modellashtirish tamoyillarini birlashtiruvchi kompleks ta’lim texnologiyasi joriy etilmoqda. Texnologiya talabaning bilim olish jarayonini passiv tinglovchidan faol ijrochiga aylantirishga, amaliy harakatlarni takroriy mashq orqali avtomatlashtirishga va har bir mavzuni boshidanoq profilaktik nuqtai nazardan ko‘rib chiqishga qaratilgan.

Mazkur maqolaning maqsadi — RPMT texnologiyasining nazariy asoslarini yoritish, uning talabalarga mehnat gigiyenasi fanini o‘qitishdagi amaliy qo‘llanilishini tavsiflash va, eng muhimi, ushbu texnologiya yordamida o‘qitishning an’anaviy usullardan farq qiluvchi o‘ziga xos jihatlarini tahlil qilishdan iborat.

Asosiy qism

1. RPMT texnologiyasining nazariy asoslari va tarkibiy qismlari

RPMT nomidan ko‘rinib turganidek, uch o‘zaro bog‘liq komponentga tayanadi. Reflektor komponent I.P. Pavlovning shartli reflekslar haqidagi klassik ta’limotiga asoslanadi (Pavlov, 1927): har qanday murakkab amaliy harakat, jumladan o‘lchov asbobi bilan ishlash yoki protokol to‘ldirish ko‘nikmasi, ko‘p martalik va izchil takrorlash orqali avtomatlashgan, ongsiz darajaga o‘tkaziladi. Bu — talaba real ishlab chiqarish sharoitida vaqt taqchilligi yoki stress ostida ham xatosiz harakat qila olishini ta’minlovchi asosiy mexanizm.

Preventiv komponent kompetensiyaga asoslangan tibbiy ta’lim, xususan profilaktik tibbiyot kompetensiyalarini shakllantirishga qaratilgan dasturlarga mos keladi (Pololi va boshq., 1994). Talaba nafaqat “qanday o‘lchash kerak”, balki “natija

asosida qanday profilaktik chora ko‘rish kerak” degan savolga ham javob topishga o‘rgatiladi — har bir topshiriq profilaktik xulosa bilan yakunlanadi.

Modellashtirish komponenti tajribaga asoslangan ta’lim nazariyasi (Kolb, 1984) va simulyatsion o‘qitish tamoyillariga tayanadi. Talaba real vaziyatni modellashtiruvchi topshiriqlar — vaziyatli masalalar, protokol namunalari, simulyatsiya qilingan o‘lchov stsenariylari — ustida ishlaydi, bu xavfsiz muhitda xato qilish va undan xulosa chiqarish imkonini beradi.

2. Mehnat gigiyenasi fanini o‘qitishda RPMT ning amaliy qo‘llanilishi

Mehnat gigiyenasining sanoat mikroiqlimi, chang va elektromagnit maydonlar kabi mavzularini o‘qitishda RPMT izchil bosqichlarda quriladi: avval mavzuning nazariy-me’yoriy asosi (fizik-gigiyenik ko‘rsatkichlar, ularning ta’siri, SanPiN me’yorlari) bayon etiladi; so‘ng talaba o‘lchov asboblari bilan tanishtiriladi; keyin vaziyatli masala — masalan, sexdagi haroratning me’yordan chetlanishi yoki changning ruxsat etilgan konsentratsiyasidan oshishi — taqdim etiladi va talaba o‘lchov protokolini to‘ldirib, natijani me’yoriy hujjat bilan solishtiradi hamda profilaktik tavsiyalar tuzadi. Yakunda ish oldindan ishlab chiqilgan mezonlar (reyting jadvali) asosida baholanadi.

Bu tasodifiy emas: sanoat gigiyenasi mutaxassislarining faoliyatini o‘rganish shuni ko‘rsatadiki, ish beruvchilar bitiruvchilardan nazariy bilim bilan bir qatorda zararli omillarni o‘lchash va real vaziyatda qaror qabul qilish qobiliyatini talab qiladi (Moore va boshq., 2024). RPMT aynan shu ikki jihatni bitta mashq doirasida birlashtiradi.

3. RPMT yordamida o‘qitishning an’anaviy usuldan farqli, o‘ziga xos jihatlari

RPMT texnologiyasini an’anaviy ma’ruza-amaliyot tizimidan ajratib turuvchi bir qancha muhim xususiyat mavjud. Birinchidan, talabaning roli o‘zgaradi: u passiv tinglovchidan o‘lchov-tahlil-xulosa zanjirini mustaqil bajaruvchi faol ijrochiga aylanadi. Ikkinchidan, ko‘nikma bir martalik namoyish emas, ko‘p bosqichli nazorat qilinadigan takrorlash orqali shakllantiriladi — bu, simulyatsion o‘qitish samaradorligini o‘rgangan tadqiqotlarda ko‘rsatilganidek, an’anaviy ma’ruzaga nisbatan ko‘nikmalarni chuqurroq singdirishga xizmat qiladi (Mangla va boshq., 2024). Uchinchidan, profilaktik fikrlash alohida mavzu emas, balki har topshiriqning ajralmas qismi sifatida singdiriladi.

To‘rtinchidan, RPMT xatodan xavfsiz sharoitda o‘rganish imkonini beradi: real ishlab chiqarishda jiddiy oqibatga olib kelishi mumkin bo‘lgan o‘lchov yoki hujjatlashtirish xatosi, simulyatsiya doirasida o‘quv vositasiga aylanadi (Richter va

boshq., 2019). Beshinchidan, baholash yakuniy imtihon bilan emas, balki har bosqichdagi protokol sifati bo‘yicha mezonli reyting orqali amalga oshiriladi. Va nihoyat, RPMT o‘lchov texnikasi, me’yoriy hujjatlar va klinik-profilaktik fikrlashni yagona jarayonga birlashtirib, talabani real kasbiy vaziyatga ancha yaqinlashtiradi.

Xulosa

Reflex-Preventive Modeling Technology talabalarga mehnat gigiyenasi fanini o‘qitishda reflektor, preventiv va modellashtirish tamoyillarini yagona metodik tizimga birlashtiruvchi integrativ yondashuvdir. Talabaning faol ijrochiga aylanishi, ko‘nikmalarning takroriy mashq orqali avtomatlashuvi, profilaktik fikrlashning har topshiriqqa singdirilishi va xavfsiz muhitda xatodan o‘rganish imkoniyati uni an’anaviy ma’ruza-amaliyotdan sifat jihatidan ajratib turadi. Kelgusida RPMT samaradorligini miqdoriy tekshiruvchi pilot tadqiqotlar texnologiyani keng amaliyotga tatbiq etishning muhim qadami bo‘ladi.

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13.

TARBIYA VA KOMPETENSIYALAR

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Annotatsiya. *Mazkur maqolada tarbiya jarayoni va kompetensiyaviy yondashuv o'rtasidagi uzviy bog'liqlik ilmiy-pedagogik nuqtai nazardan tahlil qilingan. Tadqiqotda tarbiya tushunchasining zamonaviy talqini, kompetensiyalarning tarkibiy turlari hamda ularni shakllantirishda tarbiyaviy omilning o'rni yoritilgan. Maqola IMRAD (Kirish – Metodlar – Natijalar – Muhokama – Xulosa) tuzilishi asosida yozilgan bo'lib, so'rovnoma va kuzatish natijalari jadval va sxemalar orqali aniq tasvirlangan. Tadqiqot natijalari ta'lim jarayonida tarbiya va kompetensiyalarni uzviy tashkil etishga qaratilgan amaliy tavsiyalar bilan yakunlanadi.*

Kalit so'zlar: tarbiya, kompetensiya, kompetensiyaviy yondashuv, ta'lim sifati, shaxs rivojlanishi, qadriyatlar, pedagogik jarayon, malaka.

Аннотация. *В данной статье с научно-педагогической точки зрения анализируется тесная взаимосвязь между процессом воспитания и компетентностным подходом. В исследовании освещены современная трактовка понятия воспитания, структурные виды компетенций, а также роль воспитательного фактора в их формировании. Статья написана на основе структуры IMRAD (Введение – Методы – Результаты – Обсуждение – Заключение), результаты анкетирования и наблюдения наглядно представлены с помощью таблиц и схем. Результаты исследования завершаются практическими рекомендациями по обеспечению единства воспитания и компетенций в образовательном процессе.*

Ключевые слова: *воспитание, компетенция, компетентностный подход, качество образования, развитие личности, ценности, педагогический процесс, квалификация.*

Annotation. *This article analyzes, from a scientific-pedagogical perspective, the close connection between the process of upbringing and the competency-based approach. The study addresses the modern interpretation of the concept of upbringing, the structural types of competencies, and the role of the educational (upbringing) factor in their formation. Written according to the IMRAD structure (Introduction – Methods – Results – Discussion – Conclusion), the results of the survey and observation are*

clearly presented through tables and diagrams. The findings conclude with practical recommendations aimed at ensuring the unity of upbringing and competencies within the educational process.

Keywords: *upbringing, competence, competency-based approach, quality of education, personal development, values, pedagogical process, qualification.*

KIRISH

Zamonaviy ta'lim tizimida kompetensiyaviy yondashuvning joriy etilishi o'quvchilarda faqat bilim emas, balki ularni hayotda qo'llay olish ko'nikmasini shakllantirishni taqozo etadi. Biroq kompetensiya faqat bilim va ko'nikmalar yig'indisi emas, balki shaxsning qadriyatlar tizimi, munosabati va xulq-atvoriga chambarchas bog'liq murakkab hodisadir. Aynan shu nuqtada tarbiya jarayoni kompetensiyalarni shakllantirishning zaruriy asosi sifatida namoyon bo'ladi. O'zbekiston Respublikasida ta'lim-tarbiya sohasini isloh qilishga qaratilgan davlat siyosati, jumladan, Maktab ta'limi sifatini oshirish davlat dasturi va tarbiyaviy ishlar tizimini takomillashtirishga doir me'yoriy hujjatlar tarbiya va kompetensiyalarni uzviy bog'liq holda tashkil etishni dolzarb vazifa sifatida belgilamoqda. Amaliyotda esa ko'pincha tarbiyaviy ishlar va kompetensiyaviy ta'lim bir-biridan ajratilgan holda, alohida yo'nalishlar sifatida olib borilishi kuzatiladi, bu esa ta'lim sifatiga salbiy ta'sir ko'rsatadi.

Tarbiya – shaxsning ma'naviy-axloqiy, ijtimoiy va irodaviy sifatlarini shakllantiruvchi maqsadli pedagogik jarayon bo'lib, u kompetensiyalarning "ichki mazmuni"ni, ya'ni ularning qanday niyat va munosabat asosida namoyon bo'lishini belgilaydi. Masalan, kommunikativ kompetensiyaga ega, ammo axloqiy tarbiya ko'rmagan shaxs bu kompetensiyadan g'ayriaxloqiy maqsadlarda foydalanishi mumkin. Shu bois tarbiya va kompetensiyalarni bir-biridan ajratib bo'lmaydigan yaxlit pedagogik tizim sifatida ko'rib chiqish zarur.

Ushbu tadqiqotning maqsadi – tarbiya jarayoni bilan kompetensiyalarni shakllantirish o'rtasidagi bog'liqlikni ilmiy asoslash, ularning uyg'un tashkil etilishi bo'yicha amaliy holatni tahlil qilish hamda samaradorlikni oshirish yo'llarini ishlab chiqishdan iborat. Tadqiqot vazifalari: tarbiya va kompetensiya tushunchalarining o'zaro nisbatini ochib berish; kompetensiyalarning asosiy turlarini tarbiyaviy asos nuqtai nazaridan tasniflash; o'qituvchilar o'rtasida so'rov o'tkazish orqali amaliy holatni aniqlash; olingan natijalar asosida tavsiyalar ishlab chiqish.

Mavzuning dolzarbligi yana shundaki, tezkor ijtimoiy o'zgarishlar sharoitida yosh avlodning nafaqat kasbiy, balki shaxsiy va fuqarolik kompetensiyalarga ega bo'lishi talab etiladi. Bunday kompetensiyalarni faqat bilim berish yo'li bilan shakllantirib

bo'lmaydi – ular tarbiyaviy muhit, shaxsiy namuna va izchil pedagogik ta'sir orqali rivojlanadi. Shu sababli tadqiqot natijalari nazariy jihatdan ham, amaliy jihatdan ham muhim ahamiyat kasb etadi.

MATERIALLAR VA METODLAR

Tadqiqot 2025–2026 o'quv yilida umumta'lim maktablarida olib borildi. Tadqiqotda jami 96 nafar boshlang'ich va o'rta bo'g'in o'qituvchisi hamda 3 nafar maktab metodisti ishtirok etdi. Tadqiqot jarayonida quyidagi metodlardan foydalanildi: o'qituvchilar o'rtasida standartlashtirilgan so'rovnoma o'tkazish; dars ishlanmalari va tarbiyaviy soat rejalarini kontent-tahlil qilish; ochiq darslarni kuzatish; olingan ma'lumotlarni statistik qayta ishlash.

Kompetensiyalarning tarkibiy turlari va ularning tarbiyaviy asoslari 1-jadvalda tasniflangan:

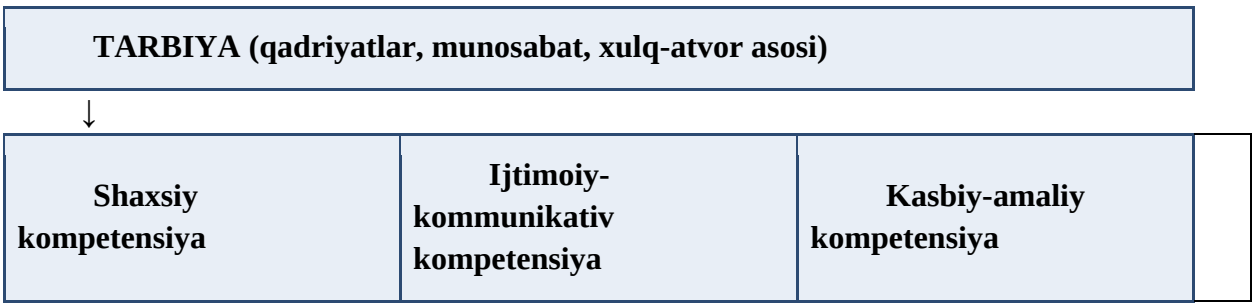
Kompetensiya turi	Mazmuni va tarbiyaviy asosi
Shaxsiy rivojlanish kompetensiyasi	O'z-o'zini anglash, hissiy barqarorlik, iroda va mas'uliyat kabi sifatlarni o'z ichiga oladi; oilaviy va maktab tarbiyasi asosida shakllanadi
Ijtimoiy-fuqarolik kompetensiyasi	Jamiyat qoidalariga rioya qilish, hamkorlikda ishlash, boshqalar fikriga hurmat kabi tarbiyaviy qadriyatlarga tayanadi
Kommunikativ kompetensiya	Nutq madaniyati, muloqot odobi va boshqalarni tinglay olish ko'nikmasini birlashtiradi, axloqiy tarbiya bilan uzviy bog'liq
Axborot bilan ishlash kompetensiyasi	Ma'lumotni tanqidiy qabul qilish va undan mas'uliyat bilan foydalanish tarbiyasini talab qiladi
Milliy-ma'naviy kompetensiya	Vatanparvarlik, milliy qadriyatlarga sodiqlik va ma'naviy-axloqiy tarbiya asosida shakllanadi

1-jadval. Kompetensiya turlari va ularning tarbiyaviy asosi

So'rovnoma o'qituvchilarning tarbiyaviy ish va kompetensiyaviy ta'limni amaliyotda qanchalik uzviy tashkil etayotganini aniqlashga qaratildi. Savollar to'rtta asosiy yo'nalish – rejalashtirish, baholash, tarbiyaviy soat mazmuni va o'qituvchining nazariy qarashi bo'yicha tuzildi.

NATIJALAR

Tarbiya va kompetensiyalar o'rtasidagi bog'liqlik quyidagi sxemada aks ettirilgan bo'lib, unda tarbiya barcha kompetensiya turlarining umumiy asosi sifatida namoyon bo'ladi (1-sxema):



1-sxema. Tarbiya va kompetensiya turlari o'rtasidagi bog'liqlik

O'tkazilgan so'rovnoma natijalari o'qituvchilarning katta qismi tarbiya va kompetensiyalarni nazariy jihatdan bog'liq deb bilsa-da, amaliyotda bu bog'liqlikni izchil tashkil etish borasida qiyinchiliklarga duch kelayotganini ko'rsatdi (2-jadval):

So'rov savoli	Ha (%)	Qisman (%)	Yo'q (%)
Darslarda tarbiyaviy va kompetensiyaviy vazifalar birgalikda rejalashtiriladimi?	38,4	41,2	20,4
O'quvchilarda mas'uliyat va hamkorlik ko'nikmalari baholanadimi?	29,6	46,1	24,3
Tarbiyaviy soat mazmuni kompetensiyalar bilan bog'lab tashkil etiladimi?	33,7	39,8	26,5
O'qituvchi tarbiyaviy ta'sir va kompetensiya shakllantirishni yaxlit jarayon deb biladimi?	52,9	31,3	15,8

2-jadval. O'qituvchilar so'rovnomasi natijalari

Jadvaldan ko'rinib turibdiki, so'rov ishtirokchilarining 52,9 foizi tarbiyaviy ta'sir va kompetensiya shakllantirishni yaxlit jarayon deb hisoblaydi, biroq faqat 33,7 foizi tarbiyaviy soat mazmunini kompetensiyalar bilan izchil bog'lab tashkil etayotganini tasdiqladi. Bu esa nazariy tushunish bilan amaliy tashkil etish o'rtasida ma'lum bir tafovut mavjudligini ko'rsatadi.

Tarbiya asosida kompetensiyani shakllantirish jarayoni bosqichma-bosqich quyidagi tartibda amalga oshirilishi maqsadga muvofiq (2-sxema):





2-sxema. Tarbiya asosida kompetensiyani shakllantirish bosqichlari

Kuzatilgan ochiq darslar tahlili shuni ko'rsatdiki, tarbiyaviy va kompetensiyaviy vazifalarni ongli ravishda birlashtirgan o'qituvchilarning darslarida o'quvchilar faolligi, hamkorlikda ishlash va mas'uliyat bilan ishtirok etish ko'rsatkichlari sezilarli darajada yuqori bo'lgan.

MUHOKAMA

Olingan natijalar tarbiya va kompetensiyalarni ajratilgan holda emas, balki yaxlit pedagogik jarayon sifatida tashkil etish zarurligini yana bir bor tasdiqlaydi. Kompetensiyalarni faqat bilim va amaliy ko'nikma sifatida talqin etish, uning qadriyat-munosabat asosini e'tibordan chetda qoldirish – ta'lim natijalarining barqarorligiga putur yetkazadi. Aksincha, tarbiyaviy asosga ega bo'lgan kompetensiya o'quvchi shaxsining barqaror sifatiga aylanadi va turli hayotiy vaziyatlarda namoyon bo'laveradi.

So'rovnoma natijalarida aniqlangan nazariy tushunish bilan amaliy tashkil etish o'rtasidagi tafovut, asosan, o'qituvchilarning metodik tayyorgarligi va tarbiyaviy ishlarni kompetensiyaviy natijalar bilan bog'lab rejalashtirish tajribasining yetishmasligi bilan izohlanadi. Shu sababli o'qituvchilarning malakasini oshirish tizimida tarbiya va kompetensiyaviy yondashuvni integratsiyalashgan holda o'rgatish alohida ahamiyat kasb etadi.

Tadqiqotning cheklovlari sifatida namunaning nisbatan cheklangan hajmi va faqat o'qituvchilar nuqtai nazaridan o'rganilganligini keltirish mumkin. Kelgusi tadqiqotlarda o'quvchilar va ota-onalarning fikrini ham qamrab olish, shuningdek turli ta'lim bosqichlarini qiyosiy tahlil qilish tavsiya etiladi. Amaliy jihatdan, natijalar shuni ko'rsatadiki, tarbiyaviy soatlar va fan darslarini rejalashtirishda aniq kompetensiya natijalarini belgilash, o'quvchilar faoliyatini nafaqat bilim, balki munosabat va xulq-atvor nuqtai nazaridan ham baholash, shuningdek maktab va oila hamkorligini kuchaytirish zarur. Bunday yondashuv tarbiya va kompetensiyalarning bir-birini to'ldiruvchi yaxlit tizim sifatida ishlashini ta'minlaydi.

XULOSA

O'tkazilgan tadqiqot natijalariga asoslanib, quyidagi xulosalarga kelish mumkin:

1. Tarbiya kompetensiyalarning shakllanishida ularning "ichki mazmuni"ni, ya'ni qadriyat va munosabat asosini belgilovchi zaruriy omil hisoblanadi.

2. Kompetensiyaning barcha turlari (shaxsiy, ijtimoiy-fuqarolik, kommunikativ, axborot bilan ishlash, milliy-ma'naviy) tarbiyaviy asosga ega bo'lganda barqaror va samarali natija beradi.

3. Amaliyotda tarbiyaviy ishlar va kompetensiyaviy ta'lim ko'pincha alohida yo'nalishlar sifatida olib borilmoqda, bu esa ularning o'zaro ta'sirini susaytiradi.

4. O'qituvchilarning malakasini oshirish tizimida tarbiya va kompetensiyaviy yondashuvni integratsiyalashgan holda o'qitish, tarbiyaviy soat va dars rejalarida aniq kompetensiya natijalarini belgilash tavsiya etiladi.

Xulosa qilib aytganda, tarbiya va kompetensiyalarning uzviy bog'liqligini ta'minlash zamonaviy ta'lim sifatini oshirishning muhim shartlaridan biri bo'lib, u yosh avlodda nafaqat bilim va ko'nikma, balki barqaror qadriyatlar tizimini ham shakllantirishga xizmat qiladi.

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HARBIY XIZMATCHILARDA KASBIY STRESSNING OLDINI OLISHDA PSIXOLOGIK PROFILAKTIKA VA PSIXOLOGIK XIZMATNING O‘RNI

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Annotatsiya. *Harbiy xizmat yuqori darajadagi mas’uliyat, qat’iy intizom, jismoniy va psixologik yuklama, noaniqlik, vaqt bosimi hamda ayrim hollarda hayot uchun xavfli vaziyatlar bilan tavsiflanadi. Mazkur omillar harbiy xizmatchilarda kasbiy stressning shakllanishiga sabab bo‘lishi va uzoq davom etgan holatlarda ularning psixologik farovonligi, xizmat samaradorligi hamda ijtimoiy munosabatlariga salbiy ta’sir ko‘rsatishi mumkin. Shu sababli harbiy jamoalarda psixologik profilaktika va tizimli psixologik xizmatni tashkil etish zamonaviy harbiy boshqaruvning muhim tarkibiy qismiga aylanmoqda. Mazkur maqolada harbiy xizmatchilarda kasbiy stressning yuzaga kelish mexanizmlari, unga ta’sir qiluvchi individual, guruhiy va tashkiliy omillar hamda stressning oldini olishda psixologik profilaktikaning imkoniyatlari ilmiy adabiyotlar asosida tahlil qilinadi. Shuningdek, psixologik xizmatning stressni erta aniqlash, psixologik maslahat, stressga chidamlilikni rivojlantirish, psixologik ma’rifat va rahbarlar bilan hamkorlikdagi faoliyatdagi o‘rni ochib beriladi. Xalqaro tadqiqotlar tahlili psixologik yordamni faqat stress yoki ruhiy muammo yuzaga kelgandan keyingi davolash chorasi sifatida emas, balki oldindan amalga oshiriladigan profilaktik tizim sifatida tashkil etish zarurligini ko‘rsatadi. Maqolada harbiy xizmatchilarning psixologik barqarorligini ta’minlashga qaratilgan integratsiyalashgan profilaktik model taklif etiladi.*

Kalit so‘zlar: *harbiy xizmatchilar, kasbiy stress, psixologik profilaktika, psixologik xizmat, psixologik barqarorlik, stressga chidamlilik, ruhiy salomatlik, psixologik yordam, harbiy psixologiya.*

Kirish. Zamonaviy harbiy xizmat shaxsdan nafaqat yuqori darajadagi jismoniy tayyorgarlik va kasbiy kompetensiyani, balki murakkab va tez o‘zgaruvchi vaziyatlarda psixologik barqarorlikni ham talab etadi. Harbiy xizmatchilar xizmat faoliyati

davomida yuqori mas’uliyat, qat’iy intizom, vaqt cheklovi, uzoq muddatli xizmat yuklamasi, uyqu rejimining buzilishi, jamoaviy munosabatlar, xizmat vazifalarining noaniqligi va ayrim hollarda travmatik hodisalarga duch kelishi mumkin. Bunday sharoitlar kasbiy stressning shakllanishi uchun muhim psixologik va tashkiliy omillar hisoblanadi.

Jahon sog‘liqni saqlash tashkiloti mehnat muhitidagi psixososial xavflar ruhiy salomatlikka sezilarli ta’sir ko‘rsatishini ta’kidlaydi. Tashkilotning ma’lumotlariga ko‘ra, ortiqcha ish yuklamasi, ish ustidan nazoratning pastligi, uzoq ish vaqti, yetarli ijtimoiy qo‘llab-quvvatlashning mavjud emasligi va boshqa psixososial omillar stress hamda ruhiy salomatlik muammolari xavfini oshirishi mumkin. Shu bilan birga, stressning oldini olishda faqat individual psixologik yordam emas, balki ish sharoitlari va tashkiliy muhitni yaxshilashga qaratilgan choralar ham muhim hisoblanadi.

Harbiy muhitda mazkur masala yanada murakkab tus oladi. Chunki harbiy xizmatchining psixologik holati faqat uning individual farovonligiga emas, balki jamoaviy hamkorlik, qaror qabul qilish, intizom va xizmat vazifalarini bajarish sifatiga ham ta’sir ko‘rsatishi mumkin. Shu sababli harbiy xizmatchilarning psixologik holatini muntazam baholash va stressning dastlabki belgilarini aniqlash profilaktik psixologik xizmatning ustuvor vazifalaridan biri bo‘lishi lozim.

So‘nggi yillardagi ilmiy tadqiqotlar harbiy xizmatchilarda psixologik barqarorlikni rivojlantirishga qaratilgan maxsus dasturlar samaradorligini ham ko‘rsatmoqda. Masalan, Turliuc va Balcan tomonidan 2024-yilda o‘tkazilgan randomizatsiyalangan nazorat tadqiqotida 98 nafar harbiy jandarm ishtirok etgan. Besh oy davom etgan psixologik trening dasturi natijasida stress darajasi pasaygani, rezilyentlik va adaptiv resurslar oshgani aniqlangan. Tadqiqotda stress bo‘yicha o‘rtacha samaradorlik effekti (Cohen’s d = 0,49), rezilyentlik bo‘yicha esa d = 0,53 qayd etilgan; natijalar uch oylik kuzatuv davrida ham saqlangan.

Bu natija muhim nazariy xulosaga olib keladi: harbiy xizmatchilarda stressni kamaytirish faqat stress yuzaga kelgandan keyin psixologik yordam ko‘rsatish bilan cheklanmasligi, balki oldindan psixologik resurslarni shakllantirishga yo‘naltirilishi kerak.

Shuningdek, harbiy xizmatchilarning psixologik xizmatlardan foydalanishida psixologik stigma muhim to‘siqlardan biri bo‘lib qolmoqda. Tadqiqotlar harbiy xizmatchilar ruhiy salomatlik bilan bog‘liq muammolar yuzaga kelganda yordam so‘rashdan, jumladan, kasbiy obro‘ga putur yetishi, xizmat faoliyatiga salbiy ta’sir qilishi yoki rahbariyat tomonidan salbiy baholanishidan xavotirlanishi mumkinligini ko‘rsatadi.

Shu nuqtai nazardan psixologik xizmatning vazifasini faqat individual konsultatsiya bilan chegaralash yetarli emas. Zamonaviy psixologik xizmat diagnostika, profilaktika, psixologik ma'rifat, individual va guruhiy maslahat, stressni boshqarish ko'nikmalarini rivojlantirish, rahbarlar bilan hamkorlik va zarur hollarda boshqa mutaxassislarga yo'naltirish kabi o'zaro bog'liq yo'nalishlarni qamrab olishi kerak.

Tadqiqot muammosi. Mavjud ilmiy adabiyotlar harbiy xizmatchilarning stressi va ruhiy salomatligi bo'yicha katta hajmdagi ma'lumotlarni taqdim etgan bo'lsa-da, kasbiy stressni individual, guruhiy va tashkiliy darajada birgalikda profilaktika qilish masalasi alohida ilmiy-amaliy ahamiyatga ega. Ayniqsa, psixologik profilaktika bilan psixologik xizmatning uzviy integratsiyasi stressning oldini olishning samarali mexanizmi sifatida yetarlicha tizimlashtirilmagan.

Tadqiqotning maqsadi. Maqolaning asosiy maqsadi harbiy xizmatchilarda kasbiy stressni shakllantiruvchi omillarni ilmiy adabiyotlar asosida tahlil qilish hamda stressning oldini olishda psixologik profilaktika va psixologik xizmatning o'rni va samarali mexanizmlarini asoslashdan iborat.

Tadqiqot vazifalari. Maqsadga erishish uchun quyidagi vazifalar belgilandi:

- harbiy xizmatchilarda kasbiy stressning asosiy nazariy xususiyatlarini aniqlash;
- stressni yuzaga keltiruvchi individual, guruhiy va tashkiliy omillarni tizimlashtirish;
- psixologik profilaktikaning asosiy shakllarini tahlil qilish;
- harbiy psixologik xizmatning stress profilaktikasidagi funksiyalarini aniqlash;
- xalqaro tadqiqotlarda qo'llanilgan psixologik intervensiyalarni tahlil qilish;
- harbiy xizmatchilarda kasbiy stressning oldini olishga qaratilgan integratsiyalashgan modelni taklif qilish.

Tadqiqot metodologiyasi. Mazkur tadqiqot nazariy-analitik adabiyotlar tahlili asosida amalga oshirildi. Tadqiqotda harbiy xizmatchilarda kasbiy stress, psixologik profilaktika, rezilyentlik, psixologik yordam va ruhiy salomatlik masalalariga bag'ishlangan xalqaro ilmiy tadqiqotlar hamda xalqaro tashkilotlarning metodik materiallari tahlil qilindi.

Tahlilda kontent-tahlil, qiyosiy tahlil, tizimlashtirish va umumlashtirish usullaridan foydalanildi.

Asosiy qism: Kasbiy stress — shaxsning mehnat faoliyati bilan bog'liq talablar, resurslar va mavjud psixologik imkoniyatlar o'rtasidagi nomutanosiblikka javoban yuzaga keladigan psixofiziologik holat sifatida izohlanadi. Oddiy qisqa muddatli stress ayrim holatlarda insonning diqqatini oshirishi va murakkab vazifani bajarishga safarbar

qilishi mumkin. Biroq stressning uzoq muddat davom etishi yoki tiklanish imkoniyati yetarli bo‘lmagan sharoitda takrorlanishi salbiy oqibatlarga olib kelishi mumkin.

Harbiy xizmatchilar faoliyatida stressning o‘ziga xosligi shundaki, stress manbalari bir vaqtning o‘zida bir nechta darajada shakllanishi mumkin.

1. Individual omillar. Bular quyidagilarni o‘z ichiga oladi: shaxsning stressga chidamlilik darajasi; hissiy barqarorlik; o‘z-o‘zini boshqarish qobiliyati; oldingi travmatik tajriba; uyqu sifati; jismoniy charchoq; shaxsiy muammolar; oilaviy qo‘llab-quvvatlash darajasi.

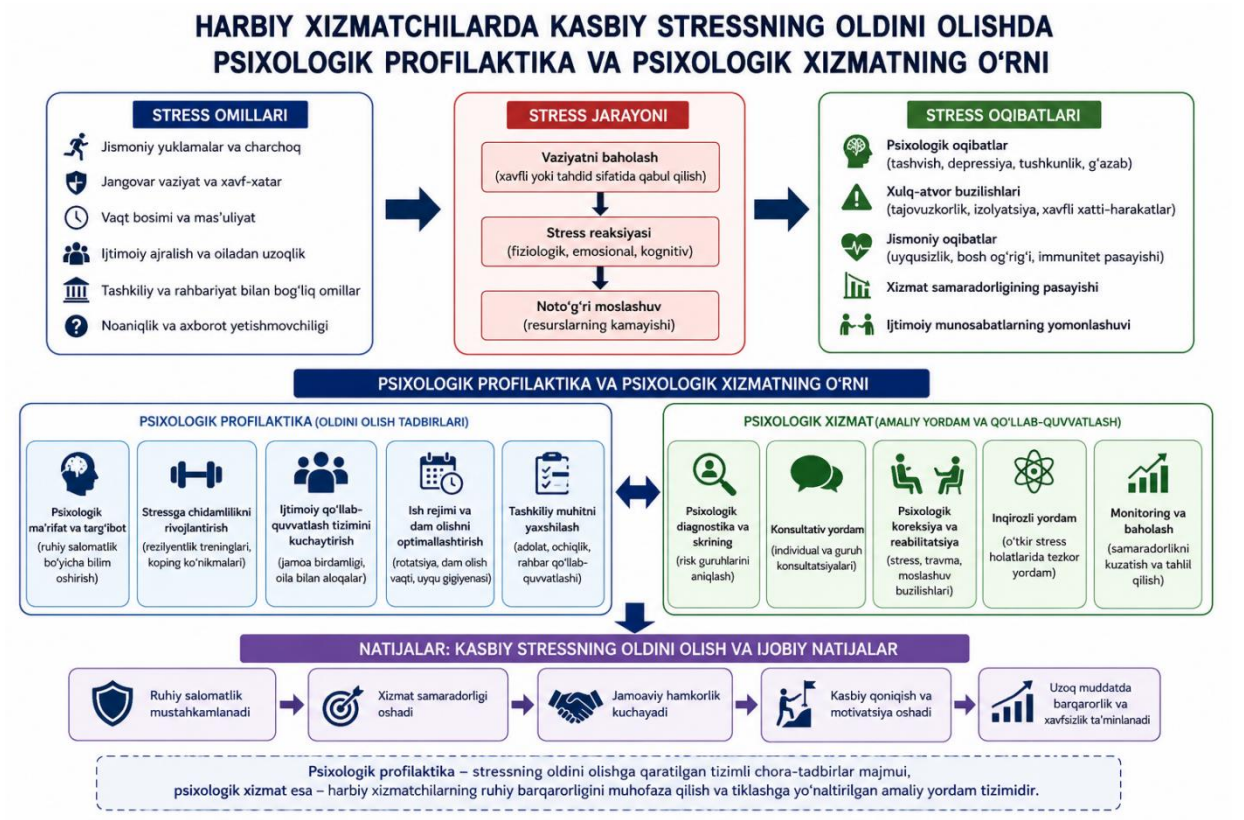
2. Kasbiy omillar. Harbiy xizmatning o‘ziga xos talablari ham stressning muhim manbai hisoblanadi: yuqori mas’uliyat; xizmat vazifalarining murakkabligi; doimiy tayyorgarlik holati; vaqt bosimi; yuqori intizom talablari; xizmat rejimining o‘zgaruvchanligi; uzoq muddatli navbatchilik;
xavfli vaziyatlar.

3. Ijtimoiy-psixologik omillar. Harbiy jamoada shaxslararo munosabatlar ham stress darajasiga ta’sir qilishi mumkin. Rahbar va bo‘ysunuvchi o‘rtasidagi munosabatlar, jamoaviy qo‘llab-quvvatlash, nizolar, kommunikatsiya sifati va jamoaga mansublik hissi harbiy xizmatchining psixologik holatini belgilovchi muhim omillardir.

Tadqiqotlar rahbariyatning munosabati harbiy xizmatchilarning psixologik yordamga murojaat qilish qaroriga ta’sir qilishi mumkinligini ko‘rsatadi. Qo‘llab-quvvatlovchi rahbarlik yordam izlashga ijobiy ta’sir qilsa, salbiy yoki jazolovchi rahbarlik psixologik yordamdan foydalanishni kamaytirishi mumkin.

4. Tashkiliy omillar. Stressni faqat harbiy xizmatchining shaxsiy xususiyatlari bilan tushuntirish ilmiy jihatdan yetarli emas. Tashkilotdagi ish yuklamasi, xizmat jadvali, dam olish va tiklanish imkoniyatlari, rahbariyat bilan kommunikatsiya, psixologik yordamning mavjudligi va undan foydalanish qulayligi ham muhimdir.

WHO ham mehnatdagi ruhiy salomatlikni himoya qilishda individual intervensiyalar bilan bir qatorda ish sharoitlari va tashkiliy muhitga qaratilgan choralarni birgalikda qo‘llash zarurligini ta’kidlaydi.



1-rasm. Harbiy xizmatchilarda kasbiy stressning oldini olishda psixologik profilaktika va psixologik xizmatning integratsiyalashgan modeli

Psixologik profilaktika stressni yuzaga kelgandan keyin bartaraf etishga emas, balki uning shakllanish ehtimolini kamaytirishga qaratilgan tizimli faoliyatdir.

Harbiy xizmatchilar bilan ishlashda profilaktikaning uch bosqichli modelini qo‘llash maqsadga muvofiq: Birlamchi profilaktika → Ikkilamchi profilaktika → Uchlamchi profilaktika.

Birlamchi profilaktika. Bunda hali yaqqol psixologik muammo shakllanmagan harbiy xizmatchilarning stressga chidamliligini oshirishga e’tibor qaratiladi.

Asosiy yo‘nalishlar: stress haqida psixologik ma’rifat; emotsiyalarni boshqarish; kognitiv qayta baholash; nafas olish va relaksatsiya texnikalari; uyqu gigiyenasi; jismoniy faollik; ijtimoiy qo‘llab-quvvatlashni kuchaytirish; jamoaviy treninglar. Ikkilamchi profilaktika.

Bu bosqichda stressning dastlabki belgilarini aniqlash va ularning chuqurlashishiga yo‘l qo‘ymaslik asosiy maqsad hisoblanadi.

Bunda:

diagnostika → xavf guruhini aniqlash → individual maslahat → qisqa muddatli psixologik intervensiya → monitoring ketma-ketligi qo‘llanishi mumkin.

Uchlamchi profilaktika.Uzoq davom etgan yoki jiddiy psixologik muammolar yuzaga kelgan holatlarda professional psixologik yoki tibbiy-psixologik yordamga yo‘naltirish amalga oshiriladi.

Harbiy xizmatchilarda kasbiy stressning oldini olishda psixologik xizmat alohida institutsional mexanizm sifatida namoyon bo‘ladi. Uning asosiy vazifasi faqat psixologik muammoga ega bo‘lgan harbiy xizmatchilarga yordam ko‘rsatishdan iborat bo‘lmasligi kerak. Zamonaviy yondashuvda psixologik xizmat profilaktik, diagnostik, maslahat, korreksion, ma’rifiy va monitoring funksiyalarini o‘zaro bog‘liq holda amalga oshirishi lozim.

Jahon sog‘liqni saqlash tashkilotining mehnat muhitidagi ruhiy salomatlik bo‘yicha tavsiyalarida ham individual yordam bilan bir qatorda tashkilot darajasidagi choralar, rahbarlarni tayyorlash va xodimlarning ruhiy salomatlik bo‘yicha savodxonligini oshirish muhimligi ta’kidlangan.

Harbiy psixologik xizmatning asosiy funksiyalarini quyidagi guruhlarga ajratish mumkin.

Psixologik diagnostika funksiyasi. Psixologik diagnostika stressning dastlabki belgilarini aniqlash va xavf guruhiga kiruvchi shaxslarni belgilash imkonini beradi.

Diagnostika jarayonida: stress darajasi; emotsional holat; xavotir va zo‘riqish; psixologik barqarorlik; moslashuv imkoniyatlari; kasbiy motivatsiya; ijtimoiy qo‘llab-quvvatlash; uyqu va tiklanish holati kabi ko‘rsatkichlarni baholash mumkin.

Bunda diagnostika faqat muammoli shaxslarni aniqlash vositasi sifatida emas, balki profilaktik monitoring mexanizmi sifatida qaralishi kerak. Harbiy xizmatchilarda psixologik profilaktikaning samaradorligini baholashda muhim muammolardan biri — psixologik yordamga ehtiyoj mavjud bo‘lsa-da, undan foydalanmaslik holatidir.

Harbiy muhitda bu masala boshqa kasbiy guruhlarga qaraganda murakkabroq bo‘lishi mumkin. Chunki harbiy xizmat kuchlilik, chidamlilik, intizom va vazifani bajarishga tayyorlik kabi qadriyatlar bilan bog‘liq. Natijada ayrim xizmatchilar psixologik yordamga murojaat qilishni zaiflik belgisi sifatida qabul qilishi mumkin.

Coleman va hammualliflarning harbiy kuchlarda ruhiy salomatlik bo‘yicha yordam izlashga bag‘ishlangan tizimli sharhida stigma, yordamga ehtiyojni yashirish, kasbiy oqibatlardan qo‘rqish va shaxsiy e’tiqodlar yordam izlashga to‘sqinlik qiluvchi muhim omillar sifatida aniqlangan.

Harbiy xizmatchilarda psixologik xizmatlardan foydalanish bo‘yicha 111 ta ilmiy maqolani qamrab olgan tizimli sharhda esa ruhiy salomatlik muammosi bo‘lgan harbiy xizmatchilar orasida o‘tgan yil davomida xizmatlardan foydalanish darajasi o‘rtacha 29,3% atrofida bo‘lgani qayd etilgan. Tadqiqotlarda stigma va xizmat faoliyatiga salbiy ta’sir qilishdan xavotir keng tarqalgan to‘siqlar sifatida ko‘rsatilgan.

Shuning uchun psixologik xizmatning samaradorligi faqat psixologning professional kompetensiyasiga emas, balki xizmatdan foydalanish uchun xavfsiz psixologik muhit yaratilganiga ham bog‘liq.

Bu borada quyidagi mexanizmni taklif qilish mumkin:

Ishonch → Maxfiylik → Murojaat qilish imkoniyati → Erta aniqlash → Psixologik yordam → Monitoring

Mazkur zanjirning dastlabki bosqichlaridan biri buzilsa, profilaktikaning keyingi bosqichlari ham samaradorligini yo‘qotishi mumkin. Rezilyentlikni shaxsning stressli yoki noqulay vaziyatlardan keyin psixologik muvozanatni saqlashi, moslashishi va funksional faoliyatni davom ettirishi imkoniyati sifatida talqin qilish mumkin.

Harbiy xizmatchilar bilan o‘tkazilgan intervension tadqiqotlarda psixologik treninglar stressni kamaytirish va psixologik resurslarni kuchaytirishga yordam berishi ko‘rsatilgan. Bu profilaktik dasturlarni stress yuzaga kelgandan keyingi yordam bilan cheklamasdan, xizmatning dastlabki bosqichlaridan boshlab joriy etish zarurligini ko‘rsatadi.

Bunda muhim metodologik xulosa shundan iboratki, eng samarali yondashuv individual psixologik treningni tashkiliy choralar bilan birlashtirishdan iborat.

WHO ham mehnatdagi ruhiy salomatlikni himoya qilishda faqat individual stressni boshqarish treninglari emas, balki ish sharoitlarini yaxshilash, rahbarlarni tayyorlash va tashkilotdagi psixososial xavflarni kamaytirishni birgalikda qo‘llashni tavsiya qiladi.

Muhokama.

Tadqiqotda tahlil qilingan ilmiy manbalar harbiy xizmatchilarda kasbiy stressning ko‘p omilli hodisa ekanligini ko‘rsatadi. Uni faqat individual psixologik xususiyatlar bilan izohlash yetarli emas. Harbiy xizmatning tashkiliy sharoitlari, rahbarlik uslubi, jamoaviy munosabatlar, xizmat yuklamasi va ijtimoiy qo‘llab-quvvatlash darajasi ham stressning shakllanishida muhim rol o‘ynaydi.

Shu nuqtai nazardan, stress profilaktikasining faqat individual treninglarga asoslanishi cheklangan natija berishi mumkin.

Masalan, harbiy xizmatchiga stressni boshqarish texnikalari o‘rgatilgan bo‘lsa-yu, uning xizmat yuklamasi haddan tashqari yuqori, dam olish imkoniyati cheklangan yoki jamoada psixologik xavfsizlik mavjud bo‘lmasa, individual ko‘nikmalarning uzoq muddatli samaradorligi pasayishi mumkin.

WHOning 2022-yilgi ko‘rsatmalarida ham psixososial xavflarni kamaytirish uchun tashkilot darajasidagi intervensiyalarni individual yordam bilan birgalikda amalga oshirish zarurligi ta’kidlangan.

Shuningdek, harbiy xizmatchilarning psixologik yordamga murojaat qilishiga stigma sezilarli ta’sir ko‘rsatishi mumkin. Shu sababli psixologik xizmatning yana bir strategik vazifasi — psixologik yordamga murojaat qilish madaniyatini shakllantirishdir.

Buning uchun psixologik yordamni “muammo yuzaga kelganda murojaat qilinadigan xizmat” sifatida emas, balki:

“Harbiy kasbiy tayyorgarlikning ajralmas qismi” sifatida ko‘rsatish maqsadga muvofiq.

Bu yondashuv harbiy xizmatchilarning psixologik yordamga bo‘lgan munosabatini o‘zgartirishi va yordam izlashdagi stigma to‘siqlarini kamaytirishi mumkin.

Xulosa. Harbiy xizmatning yuqori mas’uliyat, intizom, jismoniy va psixologik yuklama hamda ayrim holatlarda xavf bilan bog‘liqligi harbiy xizmatchilarni kasbiy stressning potensial xavf guruhlaridan biriga aylantiradi. Stressning uzoq muddat davom etishi individual psixologik farovonlik bilan bir qatorda xizmat faoliyati samaradorligi va jamoaviy munosabatlarga ham salbiy ta’sir ko‘rsatishi mumkin.

Tadqiqotda amalga oshirilgan nazariy-analitik tahlil shuni ko‘rsatdiki, harbiy xizmatchilarda kasbiy stressning oldini olish faqat individual psixologik maslahat yoki stressni kamaytirish treninglari bilan cheklanmasligi kerak. Samarali profilaktika individual, guruhiy, rahbarlik va tashkiliy darajalarni birlashtiruvchi kompleks tizimni talab qiladi.

Psixologik xizmat ushbu tizimning markaziy institutsional elementi sifatida stressni erta aniqlash, psixologik diagnostika, individual va guruhiy maslahat, psixologik ma’rifat, rezilyentlikni rivojlantirish, rahbarlar bilan ishlash va uzoq muddatli monitoringni amalga oshirishi mumkin.

Tadqiqot asosida taklif etilgan integratsiyalashgan model “diagnostika – erta aniqlash – profilaktika – intervensiya – monitoring – qayta baholash” tamoyiliga asoslanadi. Mazkur yondashuv psixologik yordamni reaktiv modeldan proaktiv modelga o‘tkazishga imkon beradi.

Shuningdek, harbiy xizmatchilarning psixologik yordamga murojaat qilishida stigma va kasbiy oqibatlardan xavotir muhim to‘siqlardan biri bo‘lishi mumkin. Shu sababli zamonaviy harbiy psixologik xizmatning strategik vazifalaridan biri nafaqat psixologik yordam ko‘rsatish, balki psixologik yordamdan foydalanish madaniyatini shakllantirishdan ham iborat bo‘lishi kerak. Harbiy xizmatchi psixologga murojaat qilishni zaiflik emas, balki kasbiy barqarorlikni saqlash vositasi sifatida qabul qilishi muhim.

Umuman olganda, harbiy xizmatchilarda kasbiy stressning oldini olish bo‘yicha samarali tizim individual psixologik resurslarni kuchaytirish, sog‘lom jamoaviy muhit yaratish, qo‘llab-quvvatlovchi rahbarlikni rivojlantirish va tashkiliy psixososial xavflarni kamaytirish tamoyillariga asoslanishi lozim.

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SPORT MASHG‘ULOTLARI JARAYONIDA REFLEKTIV VA TANQIDIY FIKRLASHNI RIVOJLANTIRISH IMKONIYATLARI

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Annotatsiya: *Mazkur maqolada sport mashg‘ulotlari jarayonida reflektiv va tanqidiy fikrlash kompetensiyalarini rivojlantirishning pedagogik imkoniyatlari tahlil qilingan. Sport faoliyati nafaqat jismoniy sifatlarni takomillashtirish, balki sportchilarning mustaqil fikrlashi, vaziyatni tahlil qilishi, qaror qabul qilishi, o‘z faoliyatini baholashi va takomillashtirishiga xizmat qiluvchi muhim pedagogik vosita sifatida yoritilgan. Mashg‘ulotlar davomida muammoli vaziyatlar yaratish, videotasvirlar asosida tahlil qilish, reflektiv suhbatlar, o‘z-o‘zini baholash va jamoaviy muhokamalar orqali sportchilarda analitik fikrlash, refleksiya va tanqidiy yondashuvni shakllantirish imkoniyatlari ochib berilgan. Shuningdek, reflektiv va tanqidiy fikrlashni rivojlantirish sportchilarning texnik-taktik tayyorgarligi, musobaqa faoliyati va kasbiy kompetensiyalarini takomillashtirishdagi o‘rni asoslab berilgan.*

Kalit so‘zlar: *reflektiv fikrlash, tanqidiy fikrlash, sport mashg‘ulotlari, sport pedagogikasi, refleksiya, qaror qabul qilish, muammoli vaziyat, analitik fikrlash, sportchi, pedagogik texnologiyalar.*

Abstract: *This article analyzes the pedagogical opportunities for developing reflective and critical thinking competencies in the process of sports training. Sports activities are considered not only as a means of improving physical qualities but also as an important pedagogical tool that promotes athletes’ independent thinking, situation analysis, decision-making, self-assessment, and continuous self-improvement. The article reveals the possibilities of developing analytical thinking, reflection, and a critical approach in athletes through the creation of problem-based situations, video-based performance analysis, reflective discussions, self-assessment, and group discussions during training sessions. It also substantiates the role of reflective and critical thinking in improving athletes’ technical and tactical preparation, competitive performance, and professional competencies.*

Keywords: *reflective thinking, critical thinking, sports training, sports pedagogy, reflection, decision-making, problem-based situation, analytical thinking, athlete, pedagogical technologies.*

Аннотация: *В данной статье проанализированы педагогические возможности развития компетенций рефлексивного и критического мышления в процессе спортивных тренировок. Спортивная деятельность рассматривается не только как средство совершенствования физических качеств, но и как важный педагогический инструмент, способствующий развитию у спортсменов самостоятельного мышления, способности анализировать ситуацию, принимать решения, оценивать и совершенствовать собственную деятельность. Раскрыты возможности формирования у спортсменов аналитического мышления, рефлексии и критического подхода посредством создания проблемных ситуаций, анализа видеозаписей, проведения рефлексивных бесед, самооценивания и коллективных обсуждений в ходе тренировочных занятий. Кроме того, обоснована роль рефлексивного и критического мышления в совершенствовании технико-тактической подготовки, соревновательной деятельности и профессиональных компетенций спортсменов.*

Ключевые слова: *рефлексивное мышление, критическое мышление, спортивные тренировки, спортивная педагогика, рефлексия, принятие решений, проблемная ситуация, аналитическое мышление, спортсмен, педагогические технологии.*

Reflektiv va tanqidiy fikrlash XXI asrda insonning murakkab vaziyatlarda ongli harakat qilishi, axborotni tahlil etishi, muqobil yechimlarni baholashi hamda asoslangan qaror qabul qilishini ta’minlovchi muhim tayanch kompetensiyalar hisoblanadi. Mazkur kompetensiyalar zamonaviy sport ta’limi va sportchilarni tayyorlash tizimida ham alohida ahamiyat kasb etadi. Chunki sport faoliyati tez o‘zgaradigan vaziyatlarni anglash, raqib harakatlarini oldindan baholash, texnik-taktik yechimlarni tanlash, yo‘l qo‘yilgan xatolarni aniqlash va keyingi faoliyatni takomillashtirishni talab qiladi.

Reflektiv fikrlash sportchining o‘z tajribasi, harakati, hissiy holati va natijalarini qayta ko‘rib chiqishi, ularning sabablarini aniqlashi hamda kelgusi faoliyatini rejalashtirishini anglatadi. Tanqidiy fikrlash esa mavjud axborot va dalillarni tekshirish, turli fikr va strategiyalarni qiyoslash, xulosalarning asoslanganligini baholash hamda eng maqbul qarorni tanlash jarayonini qamrab oladi. Demak, reflektiv fikrlash ko‘proq

“Men nima qildim va bundan qanday xulosa chiqaraman?” degan savolga, tanqidiy fikrlash esa “Qaysi qaror ishonchli dalillarga asoslangan va nima sababdan?” degan savolga javob topishga yo‘naltiriladi.

Shu nuqtayi nazardan, sport mashg‘ulotlari faqat kuch, tezkorlik, chidamlilik, egiluvchanlik va koordinatsiyani rivojlantiruvchi jismoniy jarayon emas, balki sportchining analitik tafakkuri, metakognitiv nazorati, mustaqil qaror qabul qilishi va o‘z faoliyatini boshqarishini shakllantiruvchi pedagogik muhit sifatida qaralishi lozim.

Reflektiv fikrlashning zamonaviy pedagogik talqini amerikalik faylasuf va pedagog Jon Dyui qarashlari bilan bog‘liq. Uning dastlab 1910-yilda nashr etilib, 1933-yilda qayta ishlangan “How We Think” asarida reflektiv fikrlash muammo yoki shubha asosida yuzaga keladigan, dalillarni izlash va asoslangan xulosaga kelishga yo‘naltirilgan izchil tafakkur jarayoni sifatida tushuntirilgan. Dyui uchun tajribaning o‘zi yetarli emas; ta’limiy natija tajriba tahlil qilinib, undan tegishli xulosa chiqarilgandagina yuzaga keladi.

1983-yilda Donald Shon “The Reflective Practitioner” asarida kasbiy faoliyatdagi refleksiyaning ikki muhim shaklini asoslagan: “faoliyat jarayonidagi refleksiya” va “faoliyatdan keyingi refleksiya”. Birinchi holatda mutaxassis vaziyat davomida o‘z harakatini kuzatib, uni tezkor o‘zgartiradi. Ikkinchi holatda esa tugallangan faoliyatga qaytib, uning natijalari va sabablarini tahlil qiladi. Sportda bu yondashuv sportchining o‘yin vaqtida taktikasini o‘zgartirishi hamda mashg‘ulot yoki musobaqadan keyin o‘z harakatlarini videotasvir asosida qayta ko‘rib chiqishida namoyon bo‘ladi.

David Kolb 1984-yilda tajribaviy o‘rganishni konkret tajriba, reflektiv kuzatish, mavhum konsepsiyalashtirish va faol tajriba o‘tkazishdan iborat uzluksiz sikl sifatida tavsiflagan. Sport mashg‘ulotlarida ushbu sikl mashqni bajarish, natijani kuzatish, xato sabablarini tushuntirish, yangi strategiya ishlab chiqish va uni keyingi mashg‘ulotda sinash orqali amalga oshadi.

Tanqidiy fikrlashning zamonaviy kompetensiyaviy mazmunini belgilashda Piter Fasion rahbarligida amalga oshirilgan 1990-yilgi Delphi tadqiqoti muhim ahamiyatga ega. Mazkur tadqiqotda tanqidiy fikrlashning asosiy kognitiv ko‘nikmalari sifatida interpretatsiya, tahlil, baholash, xulosa chiqarish, fikrni tushuntirish va o‘z faoliyatini nazorat qilish ajratib ko‘rsatilgan. Bu ko‘nikmalar sportchining vaziyatni tushunishi, raqib strategiyasini baholashi, xatolarning sabablarini aniqlashi va qarorini asoslashida bevosita namoyon bo‘ladi.

XX asr oxiri va XXI asr boshlarida sport pedagogikasida murabbiy markazidagi direktiv tayyorgarlikdan sportchi faoliyatiga yo‘naltirilgan yondashuvga o‘tish kuchaydi. Natijada sportchi murabbiy ko‘rsatmalarini mexanik bajaruvchi emas, balki

vaziyatni tushunuvchi, savol beruvchi, qaror qabul qiluvchi va o‘z rivojlanishini boshqaruvchi faol subyekt sifatida talqin qilina boshladi. 2000–2024-yillardagi tadqiqotlarni qamrab olgan ilmiy tahlilda ham jismoniy ta’limdagi refleksiya masalalariga qiziqish ortgani, tadqiqotlar markazi murabbiy va o‘qituvchilardan talabalar hamda sportchilarning o‘z-o‘zini refleksiya qilish faoliyatiga tomon siljigani ko‘rsatilgan.

Sport mashg‘ulotlarida reflektiv va tanqidiy fikrlash o‘zaro bog‘langan quyidagi jarayonlarni qamrab oladi:

a) sport vaziyatini kuzatish va muammoni aniqlash;
b) texnik, taktik, jismoniy va psixologik ko‘rsatkichlarni tahlil qilish;
c) harakat natijasiga ta’sir qilgan sabablarni aniqlash;
d) murabbiy tavsiyasi, videotasvir va raqamli ma’lumotlarni qiyoslash;
e) muqobil texnik-taktik yechimlarni ishlab chiqish;
f) tanlangan qarorni dalillar asosida tushuntirish;
g) yangi yechimni amaliyotda sinab ko‘rish;
h) natijani baholash va keyingi rivojlanish vazifasini belgilash.

Sportchi harakatining muvaffaqiyatsiz bo‘lishini faqat “mashq noto‘g‘ri bajarildi” deb baholash refleksiya hisoblanmaydi. To‘laqonli refleksiyada sportchi xatoning qaysi bosqichda yuzaga kelgani, unga texnika, charchoq, diqqat, hissiy zo‘riqish, raqib bosimi yoki noto‘g‘ri taktik tanlov qanday ta’sir qilganini aniqlashi kerak. Tanqidiy fikrlash esa ushbu sabablar orasidan asosiylarini ajratish, ularni dalillar bilan tekshirish va maqbul tuzatish yo‘lini tanlashga xizmat qiladi 1-jadvalga qarang.

1-jadval.

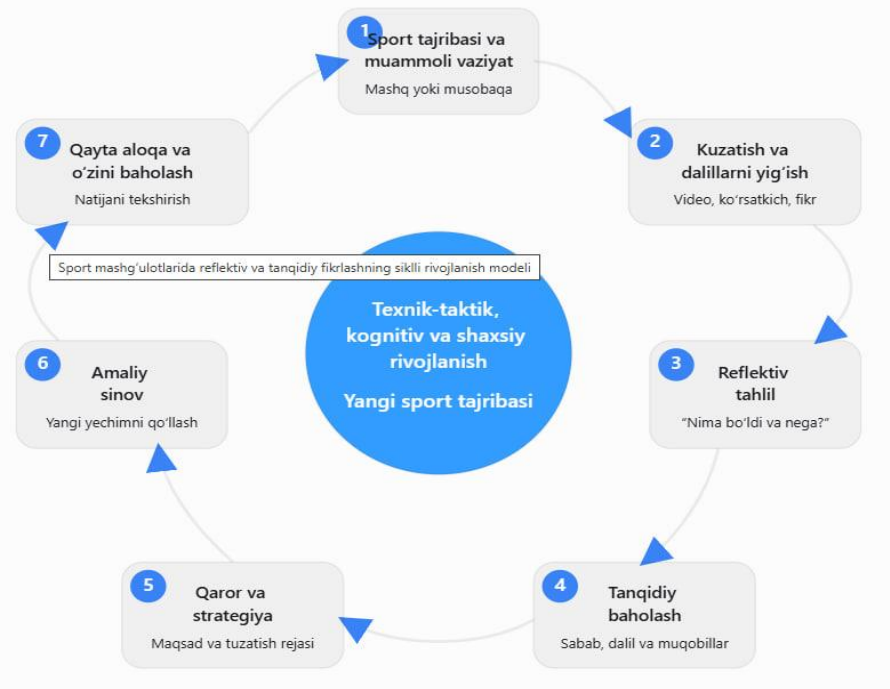
Metod	Amalga oshirish mazmuni	Rivojlantiriladigan ko‘nikma
Muammoli sport vaziyati	Sportchiga bir nechta texnik yoki taktik yechimni talab qiladigan vaziyat taqdim etiladi	Muammoni anglash, muqobil yechim yaratish
Yo‘naltiruvchi savollar	“Nima sodir bo‘ldi?”, “Nega bunday bo‘ldi?”, “Boshqa qanday yechim bor?” kabi savollar beriladi	Sabab-oqibatni aniqlash, qarorni asoslash
Videotahlil	Mashq yoki musobaqa yozuvi mezonlar asosida qayta ko‘rib chiqiladi	Xatoni ko‘rish, dalillar asosida baholash
Reflektiv suhbat	Mashg‘ulot yakunida sportchi va murabbiy faoliyat natijalarini muhokama qiladi	O‘z fikrini ifodalash, xulosa chiqarish
Debrifing	Jamoa musobaqa yoki mashg‘ulotdan keyin qarorlar va natijalarni birgalikda tahlil qiladi	Jamoaviy refleksiya, o‘zaro fikr almashish

Sport kundaligi	Sportchi maqsad, natija, qiyinchilik, hissiy holat va keyingi vazifalarni qayd etadi	Metakognitiv nazorat, o‘zini rivojlantirish
O‘z-o‘zini baholash	Sportchi oldindan belgilangan mezonlar asosida faoliyatini baholaydi	Xolis baholash, mas’uliyat
O‘zaro baholash	Sportchilar bir-birining faoliyatiga mezonli fikr bildiradi	Dalillash, muloqot va hamkorlik
Raqamli monitoring	Video, sensor, mobil dastur yoki tahlil platformasi ma’lumotlaridan foydalaniladi	Ma’lumotni talqin qilish, dalillarga asoslanish
Vaziyatli modellashtirish	Musobaqaga yaqin murakkab va noaniq vaziyatlar tashkil etiladi	Tezkor fikrlash va qaror qabul qilish

Muammoli vaziyatlarni qo‘llashda murabbiy sportchiga tayyor yechimni darhol aytib bermasligi kerak. Aksincha, u sportchini kuzatish, taxmin qilish, qarorining oqibatini baholash va tanlovini izohlashga undashi lozim. Masalan, jamoaviy sport turida murabbiy o‘yin vaziyatini to‘xtatib, “Ushbu vaziyatda qaysi uzatma samaraliroq?”, “Raqibning joylashuvi qarorga qanday ta’sir qildi?” yoki “Mazkur taktikani o‘zgartirish zarurmi?” kabi savollar berishi mumkin. Sportchi qarorini faqat aytishi emas, uni dalillar bilan tushuntirishi ham talab etiladi.

Videotahlil subyektiv taassurotni obyektiv kuzatuv bilan taqqoslash imkonini beradi. Sportchi harakatini sekinlashtirilgan tasvirda ko‘rib, tana holati, harakat amplitudasi, muvozanat, vaqt tanlovi va taktikasini tahlil qiladi. Biroq raqamli ma’lumot yakuniy hukm sifatida qabul qilinmasligi kerak. U sportchining jismoniy holati, musobaqa sharoiti, hissiy kechinmalari va taktik vazifa bilan birgalikda talqin qilinishi zarur (1-diagramma).

Sport mashg‘ulotlarida reflektiv va tanqidiy fikrlashni rivojlantirishning asosiy afzalligi sportchining o‘z tayyorgarligiga ongli munosabatini shakllantirishidir. An’anaviy direktiv yondashuvda sportchi murabbiy ko‘rsatmasini bajarishi



mumkin, biroq uning nima sababdan aynan shu harakatni bajarishi kerakligini har doim ham tushunmaydi. Reflektiv yondashuvda esa sportchi texnika va taktikaning mohiyatini anglaydi, qarorning sababini tushuntiradi va o‘zgargan vaziyatga moslasha oladi.

Tanqidiy fikrlash, ayniqsa, jamoaviy sport turlarida taktik kompetensiyani rivojlantirishda muhimdir. Dinamik va oldindan to‘liq bashorat qilib bo‘lmaydigan vaziyatlarda sportchi tayyor algoritmni takrorlash bilan cheklanmay, raqib joylashuvi, vaqt, makon va jamoadoshlar harakatini bir vaqtning o‘zida baholashi kerak. Tadqiqotlarda ham tanqidiy fikrlash sportchilarning dinamik vaziyatlarda samarali qaror qabul qilishi va taktik kompetensiyasini rivojlantiruvchi omil sifatida qayd etilgan.

Shu bilan birga, refleksiyani tashkil etishda ayrim pedagogik muammolar mavjud. Har bir mashqdan keyin uzoq muhokama o‘tkazish mashg‘ulotning motor zichligini kamaytirishi mumkin. Shuning uchun refleksiya qisqa, maqsadli va aniq mezonlarga asoslangan bo‘lishi lozim. Yuqori intensivlikdagi mashqlar vaqtida chuqur refleksiya qilish qiyin bo‘lgani sababli tezkor refleksiya bilan mashg‘ulotdan keyingi kengaytirilgan tahlil o‘zaro uyg‘unlashtirilishi zarur.

Refleksiya psixologik xavfsiz muhitda tashkil etilmasa, sportchi xatolarini yashirishga yoki murabbiy fikrini takrorlashga moyil bo‘ladi. Shu sababli xato jazolash uchun asos emas, balki rivojlanish manbai sifatida talqin qilinishi kerak. Murabbiy sportchining shaxsini emas, uning qarori va harakatini baholashi, savol berish va muqobil fikr bildirishiga sharoit yaratishi muhim.

Sun’iy intellekt, videokuzatuv, mobil ilovalar va sensor qurilmalar refleksiyani aniq ma’lumotlar bilan boyitadi. Biroq ulardan foydalanishda sportchining shaxsiy ma’lumotlarini himoya qilish, algoritmik xulosalarni murabbiy ekspertizasi bilan tekshirish va texnologiyaga haddan tashqari qaramlikning oldini olish talab etiladi. Raqamli vosita fikrlashning o‘rnini bosmasligi, balki dalillarni taqdim etuvchi yordamchi manba bo‘lishi kerak.

Nazariy tahlil natijasida sport mashg‘ulotlarida reflektiv va tanqidiy fikrlashni tizimli rivojlantirish quyidagi pedagogik natijalarni ta’minlashi aniqlandi:

1. Sportchi o‘zining kuchli va takomillashtirilishi zarur bo‘lgan jihatlarini mustaqil aniqlashni o‘rganadi.
2. Texnik xatolarni faqat qayd etishdan ularning sabablarini izohlash va bartaraf etish strategiyasini ishlab chiqishga o‘tadi.
3. Musobaqa vaziyatini tezkor tahlil qilish, muqobil taktik yechimlarni qiyoslash va asoslangan qaror qabul qilish qobiliyati rivojlanadi.

4. Murabbiy tavsiyalarini ongli ravishda qabul qilish va ularni individual imkoniyatlarga moslashtirish ko‘nikmasi shakllanadi.

5. O‘z-o‘zini nazorat qilish, hissiy holatni boshqarish, muvaffaqiyatsizlikdan konstruktiv xulosa chiqarish va yangi maqsad belgilash imkoniyati ortadi.

6. Sportchi mashg‘ulot jarayonining passiv ijrochisidan o‘z rivojlanishini boshqaruvchi faol subyektga aylanadi.

7. Texnik-taktik tayyorgarlik bilan bir qatorda mas’uliyat, mustaqillik, hamkorlik va kasbiy rivojlanishga tayyorlik shakllanadi.

Mazkur natijalarni baholashda reflektiv kundaliklar, videotasvir bo‘yicha tahliliy izohlar, muammoli vaziyatlarda qabul qilingan qarorlar, o‘z-o‘zini baholash varaqalari va murabbiy kuzatuvlaridan kompleks foydalanish maqsadga muvofiq. Baholash mezonlari sifatida muammoni aniqlash aniqligi, sabablarni tushuntirish, dalillardan foydalanish, muqobil yechimlarni taklif etish, qarorni asoslash va chiqarilgan xulosani yangi vaziyatga ko‘chirish ko‘rsatkichlari olinishi mumkin.

Sport mashg‘ulotlari reflektiv va tanqidiy fikrlashni rivojlantirish uchun katta pedagogik imkoniyatlarga ega. Chunki sport faoliyati tajriba, muammo, tezkor qaror, natija va qayta aloqa uzluksiz almashinib turadigan tabiiy o‘quv muhitini yaratadi. Ushbu imkoniyatdan samarali foydalanish uchun muammoli vaziyatlar, yo‘naltiruvchi savollar, videotasvir asosidagi tahlil, reflektiv suhbat, debrifing, sport kundaligi, o‘z-o‘zini va o‘zaro baholash usullari mashg‘ulot mazmuniga muntazam kiritilishi lozim.

Reflektiv va tanqidiy fikrlash rivojlangan sportchi xatosini tan olish bilangina cheklanmaydi, balki uning sababini aniqlaydi, dalillarni tahlil qiladi, muqobil yechimlarni baholaydi, yangi strategiyani amaliyotda sinaydi va natijaga qarab faoliyatini qayta tashkil etadi. Natijada uning texnik-taktik tayyorgarligi, mustaqil qaror qabul qilishi, psixologik barqarorligi va o‘zini rivojlantirish qobiliyati takomillashadi. Mazkur kompetensiyalar sportchining nafaqat musobaqadagi muvaffaqiyati, balki kelgusidagi murabbiylik, sport menejmenti va boshqa kasbiy faoliyatlarida ham muhim ahamiyat kasb etadi.

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BURHONIDDIN ZARNUJIYNING PEDAGOGIK G‘OYALARINI ZAMONAVIY TA’LIM INNOVATSIYALARI BILAN INTEGRATSIYALASH: IMKONIYAT VA ISTIQBOLLAR

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Annotatsiya. *Ushbu maqolada Burhoniddin Zarnujiyning “Ta’lim al-Muta’allim” asarida ilgari surilgan pedagogik g‘oyalar hamda ularning zamonaviy ta’lim innovatsiyalari bilan uyg‘unlashish imkoniyatlari tahlil qilinadi. Tadqiqotda ilm olishga ongli munosabat, ta’lim oluvchining intizomi, ustoz-shogird munosabatlari, bilimni izchil va takroriy o‘zlashtirish, ta’lim jarayonida axloqiy qadriyatlarning ahamiyati kabi masalalar zamonaviy pedagogik yondashuvlar bilan qiyosiy o‘rganilgan. Zarnujiyning pedagogik qarashlarini raqamli ta’lim, individual yondashuv, interfaol metodlar va kompetensiyaviy yondashuv bilan integratsiyalash ta’lim samaradorligini oshirishning istiqbolli yo‘nalishi sifatida asoslangan.*

Kalit so‘zlar: *Burhoniddin Zarnujiy, “Ta’lim al-Muta’allim”, pedagogik g‘oyalar, ta’lim innovatsiyalari, ustoz-shogird munosabati, ta’lim oluvchi, kompetensiyaviy yondashuv, raqamli ta’lim.*

Abstract. *This article analyzes the pedagogical ideas of Burhanuddin al-Zarnuji presented in “Ta'lim al-Muta'allim” and the possibilities of integrating these ideas with contemporary educational innovations. The study examines conscious learning, student discipline, teacher-student relationships, systematic and repetitive learning, and the role of ethical values in education in comparison with modern pedagogical approaches. The integration of al-Zarnuji’s educational principles with digital learning, individualized instruction, interactive methods, and competency-based education is considered a promising direction for improving educational effectiveness.*

Keywords: *Burhanuddin al-Zarnuji, “Ta'lim al-Muta'allim”, pedagogical ideas, educational innovations, teacher-student relationship, learner, competency-based approach, digital education.*

KIRISH

Bugungi kunda ta’lim tizimida yuz berayotgan o‘zgarishlar nafaqat yangi pedagogik texnologiyalarni joriy etishni, balki ta’limning mazmuniy va axloqiy asoslarini qayta ko‘rib chiqishni ham talab etmoqda. Raqamli texnologiyalarning keng tarqalishi, sun’iy intellekt vositalarining ta’lim jarayoniga kirib kelishi, ta’lim oluvchilarning mustaqil axborot izlash imkoniyatlarining kengayishi pedagog va o‘quvchi o‘rtasidagi an’anaviy munosabatlarga ham yangi mazmun bermoqda.

Shunday sharoitda tarixiy-pedagogik merosni zamonaviy ta’lim innovatsiyalari bilan uyg‘unlashtirish muhim ilmiy va amaliy ahamiyat kasb etadi. Xususan, XII–XIII asrlarda yashab ijod qilgan Burhoniddin Zarnujiyning ta’lim va tarbiya haqidagi qarashlari bugungi pedagogik jarayon uchun muhim metodologik manbalardan biri bo‘la oladi. Uning “Ta’lim al-Muta’allim Tariq at-Ta’allum” asari ilm olishning maqsadi, ta’lim oluvchining odobi, ustozning o‘rni, bilimni egallash usullari va ta’lim jarayonidagi intizom masalalarini qamrab oladi. Zamonaviy tadqiqotlarda ham Zarnujiyning ta’lim falsafasida bilimning qadri, ta’limdagi to‘g‘ri niyat, ustoz-shogird munosabati, izchil o‘rganish va shaxsning axloqiy shakllanishi asosiy jihatlar sifatida ko‘rsatiladi.

Tadqiqotning maqsadi Burhoniddin Zarnujiyning pedagogik g‘oyalarini aniqlash, ularning zamonaviy ta’lim innovatsiyalari bilan o‘zaro uyg‘unlashish imkoniyatlarini asoslash hamda mazkur g‘oyalarni ta’lim amaliyotida qo‘llashning istiqbolli yo‘nalishlarini belgilashdan iborat.

ASOSIY QISM

Zarnujiyning pedagogik qarashlari, avvalo, bilimning inson hayotidagi o‘rnini yuqori baholashga asoslanadi. Uning fikricha, ilm olish oddiy ma’lumotlarni egallash jarayoni emas, balki insonning shaxsiy va axloqiy kamolotiga xizmat qiluvchi jarayondir.

“Ta’lim al-Muta’allim” asarida ta’lim oluvchining ilm olishga bo‘lgan munosabati, niyatining to‘g‘riligi, ustoz va bilimga hurmati, sabr-toqati, muntazamligi hamda o‘z ustida ishlashi muhim shartlar sifatida ko‘rsatiladi. Tadqiqotlarda Zarnujiyning ta’lim etikasi aynan niyat, jiddiyat, hurmat va tavakkul kabi tushunchalar bilan bog‘liqligi qayd etilgan.

Zarnujiyning pedagogik tizimida ustoz-shogird munosabati ham alohida ahamiyatga ega. Ustoz nafaqat bilim beruvchi, balki ta’lim oluvchining ma’naviy-axloqiy rivojiga ta’sir ko‘rsatuvchi shaxs sifatida qaraladi. Ta’lim oluvchi esa ustozga hurmat bilan munosabatda bo‘lishi, ta’lim jarayoniga mas’uliyat bilan yondashishi lozim.

Biroq mazkur g‘oyalarni zamonaviy ta’limga tatbiq etishda ularni bevosita tarixiy shaklda takrorlash emas, balki zamonaviy pedagogik tamoyillar bilan uyg‘unlashtirish talab etiladi. Ayrim tadqiqotlarda Zarnujiyning ustoz-shogird munosabatlaridagi ayrim qarashlari zamonaviy, ta’lim oluvchiga yo‘naltirilgan pedagogika nuqtayi nazaridan qayta talqin qilinishi lozimligi ta’kidlangan.

Zarnujiyning qarashlarini zamonaviy ta’lim innovatsiyalari bilan integratsiyalashda bir nechta asosiy yo‘nalishlarni ajratish mumkin.

Birinchi yo‘nalish — ongli va maqsadli ta’lim olish. Zarnujiyning ilm olishda to‘g‘ri niyat va aniq maqsadga urg‘u berishi bugungi ta’limdagi maqsadga yo‘naltirilgan o‘qitish tamoyili bilan uyg‘unlashadi. Zamonaviy ta’limda o‘quvchi yoki talaba dars yakunida qanday kompetensiyaga ega bo‘lishi kerakligini oldindan anglashi muhim. Shu nuqtayi nazardan, Zarnujiyning “ilmning maqsadi” haqidagi qarashlarini learning outcomes, ya’ni kutilayotgan ta’lim natijalari bilan bog‘lash mumkin.

Ikkinchi yo‘nalish — muntazamlik va takrorlash asosida o‘rganish. Zarnujiy bilimni egallashda izchillik va takrorlashning ahamiyatini alohida ko‘rsatadi. Bu g‘oya zamonaviy ta’limdagi bosqichma-bosqich o‘qitish, spaced repetition, formative assessment va muntazam qayta aloqa kabi usullar bilan uyg‘unlashadi. Zarnujiyning ta’lim metodologiyasida bilimni asta-sekin o‘zlashtirish va muntazam mashq qilishga berilgan e’tibor zamonaviy o‘qitish metodlari bilan mazmunan yaqinlik kasb etadi.

Uchinchi yo‘nalish — ustoz-shogird munosabatlarini pedagogik hamkorlikka aylantirish. Zamonaviy ta’limda pedagog faqat bilimning yagona manbai emas, balki fasilitator, mentor va ta’lim jarayonini tashkil etuvchi subyekt sifatida namoyon bo‘ladi. Shu sababli Zarnujiyning ustozga hurmat va ustozning shaxsiy namunasi haqidagi qarashlarini bugungi mentorlik va pedagogik hamkorlik modeli bilan uyg‘unlashtirish mumkin.

To‘rtinchi yo‘nalish — ta’lim va axloqiy tarbiyaning integratsiyasi. Zarnujiyning ta’lim haqidagi qarashlarida bilimning o‘zi yetarli natija sifatida qaralmaydi. Bilim insonning xulqi, mas’uliyati va ma’naviy rivojlanishiga xizmat qilishi kerak. Zamonaviy ta’limda bu yondashuv character education, academic integrity, social-emotional learning va fuqarolik kompetensiyalari bilan bog‘lanishi mumkin. Tadqiqotlarda ham Zarnujiyning pedagogik qarashlari ta’lim natijalari bilan bir qatorda axloqiy va xarakter rivojlanishiga xizmat qilishi qayd etilgan.

Beshinchi yo‘nalish — raqamli ta’lim muhitida ilm odobini saqlash. Bugungi raqamli muhitda axborotdan foydalanish imkoniyatlari kengaygan bo‘lsa-da, plagiat, noto‘g‘ri axborot, akademik halollikning buzilishi va raqamli muloqot madaniyatining pasayishi kabi muammolar yuzaga kelmoqda. Zarnujiyning ilmga hurmat, halollik,

mas’uliyat va ta’lim jarayonidagi intizom haqidagi qarashlari ushbu muammolarni bartaraf etishda axloqiy asos bo‘lib xizmat qilishi mumkin. Yaqin yillardagi tadqiqotlarda Zarnujiyning ta’lim etikasi aynan raqamli ta’lim muhitidagi akademik halollik va raqamli odob masalalari bilan bog‘lab o‘rganilmoqda.

Zarnujiyning pedagogik g‘oyalarini zamonaviy ta’limga tatbiq etish uchun quyidagi integrativ modelni taklif etish mumkin:

Zarnujiyning g‘oyasi	Zamonaviy pedagogik yondashuv	Amaliy tatbiq
Ilm olishda maqsadning aniqligi	Maqsadga yo‘naltirilgan ta’lim	Dars maqsadlarini talaba bilan birgalikda belgilash
Muntazam va izchil o‘rganish	Bosqichma-bosqich ta’lim	Modul, mikrota’lim va takrorlash topshiriqlari
Bilimni takrorlash	Formativ baholash	Qisqa testlar, quiz va qayta aloqa
Ustozga hurmat	Mentorlik va pedagogik hamkorlik	Individual konsultatsiya va mentoring
Ilmga hurmat	Akademik halollik	Plagiatning oldini olish, manba bilan ishlash
O‘z ustida ishlash	Mustaqil ta’lim	Individual ta’lim trayektoriyasi
Axloqiy tarbiya	Kompetensiyaviy va shaxsga yo‘naltirilgan ta’lim	Refleksiya, guruhli faoliyat, ijtimoiy mas’uliyat
Vaqtdan unumli foydalanish	Vaqtni boshqarish va self-regulated learning	O‘quv rejasini mustaqil tuzish

Mazkur modeldan ko‘rinadiki, Zarnujiyning pedagogik merosi zamonaviy ta’lim texnologiyalariga zid emas. Aksincha, uning asosiy g‘oyalari zamonaviy texnologiyalarning maqsadli va mas’uliyatli qo‘llanilishini ta’minlovchi axloqiy-metodologik asos sifatida namoyon bo‘lishi mumkin.

Masalan, raqamli platformalar yordamida o‘quvchi bilimni mustaqil egallashi mumkin, biroq Zarnujiyning qarashlari bu jarayonda bilimning maqsadi, undan foydalanish mas’uliyati va akademik halollik masalalarini ham e’tibordan chetda qoldirmaslikni talab qiladi. Demak, ta’lim innovatsiyasining samaradorligi faqat texnologik vositaning mavjudligi bilan emas, balki undan qanday pedagogik va axloqiy maqsadda foydalanilishiga ham bog‘liq.

Shuningdek, Zarnujiyning ustoz-shogird munosabatlari haqidagi qarashlarini zamonaviy fasilitatsion yondashuv bilan uyg‘unlashtirish mumkin. Bunda ustozning avtoriteti saqlangan holda, ta’lim oluvchining mustaqilligi, fikr bildirish huquqi va faol ishtiroki ta’minlanadi. Shu jihatdan tarixiy pedagogik merosni zamonaviy pedagogik

paradigmalarga mexanik tarzda emas, balki reintegratsiya va reinterpretatsiya asosida kiritish maqsadga muvofiq.

XULOSA

Burhoniddin Zarnujiyning pedagogik merosi zamonaviy ta’lim tizimi uchun faqat tarixiy ahamiyatga ega bo‘lgan manba emas, balki ta’limning axloqiy, motivatsion va metodik jihatlarini boyituvchi muhim pedagogik konsepsiya sifatida qaralishi mumkin. “Ta’lim al-Muta’allim” asarida ilgari surilgan ilmga ongli munosabat, ta’lim olishda maqsadlilik, izchillik, takrorlash, ustoz-shogird munosabatlari, intizom va axloqiy kamolot kabi g‘oyalar zamonaviy pedagogik yondashuvlar bilan muayyan darajada uyg‘unlashadi.

Zarnujiyning qarashlarini bugungi ta’limga tatbiq etishda asosiy masala ularni tarixiy shaklda takrorlash emas, balki zamonaviy pedagogik ehtiyojlar asosida qayta talqin qilishdir. Xususan, uning ilm olishga mas’uliyatli munosabat haqidagi qarashlarini raqamli ta’lim, akademik halollik va sun’iy intellektdan mas’uliyatli foydalanish bilan; muntazamlik va takrorlash haqidagi g‘oyalarini formativ baholash va individual ta’lim bilan; ustoz-shogird munosabatlarini esa mentorlik va fasilitatsion pedagogika bilan integratsiyalash mumkin.

Shu asosda Zarnujiyning pedagogik merosi zamonaviy ta’lim innovatsiyalarining ma’naviy-axloqiy komponentini kuchaytiruvchi omil bo‘lib xizmat qilishi mumkin. Ayniqsa, texnologiyalar ta’lim jarayonining vositasiga aylanayotgan bugungi sharoitda Zarnujiyning “bilim” va “ilm odobi”ni birgalikda ko‘rishga asoslangan yondashuvi ta’limning insonparvarlik va tarbiyaviy mohiyatini saqlab qolish uchun muhimdir.

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6-SECTION

MURAKKAB SHAKLDOR DETALLARGA RDB DASTGOHLARIDA MEXANIK ISHLOV BERISHDA KESISH REJIMLARINI OPTIMALLASHTIRISH

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Annotatsiya*. Ushbu tezisda murakkab shakldor detallarga RDB (raqamli dasturiy boshqaruv) dastgohlarida mexanik ishlov berish unumdorligini oshirish masalasi tadqiq etilgan. Murakkab geometrik yuzalarni shakllantirishda kesish rejimlarini to‘g‘ri tanlash, asbob trayektoriyasini maqbullashtirish va boshqaruv tizimining imkoniyatlaridan samarali foydalanish ishlov berish jarayonining asosiy ko‘rsatkichlarini belgilaydi. Tadqiqotda Al 6061-T6 alyuminiy qotishmasidan tayyorlangan namunaga EMCO CONCEPT 250 frezalash dastgohida ishlov berish jarayoni o‘rganilgan. FANUC 21M, HEIDENHAIN TNC 426 va SINUMERIK 840D boshqaruv tizimlarining ishlash samaradorligi qiyosiy tahlil qilingan. Tajribalarda surish tezligi, shpindel aylanish chastotasi va kesish chuqurligining ishlov berish vaqtiga ta’siri baholangan. Tadqiqot natijalari kesish rejimlarini kompleks optimallashtirish orqali ishlov berish vaqtini qisqartirish va ishlab chiqarish unumdorligini oshirish imkoniyatini ko‘rsatadi.*

Kalit so‘zlar: *RDB dastgohi, CNC, murakkab shakldor detal, mexanik ishlov berish, kesish rejimi, surish tezligi, shpindel aylanish chastotasi, kesish chuqurligi, ishlov berish vaqti, unumdorlik, Al 6061-T6.*

KIRISH. Zamonaviy mashinasozlik ishlab chiqarishida detallarni yuqori aniqlikda, qisqa vaqt ichida va minimal texnologik xarajatlar bilan tayyorlash muhim vazifalardan biri hisoblanadi. Ayniqsa, murakkab shakldor va fazoviy yuzalarga ega detallarni tayyorlashda an’anaviy mexanik ishlov berish usullaridan foydalanish texnologik jarayonning murakkablashishiga, qo‘shimcha o‘tishlar sonining ortishiga va ishlov berish vaqtining uzayishiga olib keladi. Raqamli dasturiy boshqariladigan (RDB) dastgohlarning qo‘llanilishi murakkab geometrik shakllarni yuqori aniqlik bilan shakllantirish, kesish asbobining harakat trayektoriyasini dasturiy ravishda boshqarish hamda texnologik jarayonni avtomatlashtirish imkonini berdi. Biroq RDB dastgohining mavjudligi o‘z-o‘zidan yuqori unumdorlikni ta’minlamaydi. Ishlov berish natijasi dasturning tuzilishi, kesish asbobining harakat trayektoriyasi, shpindel aylanish

chastotasi, surish tezligi, kesish chuqurligi va boshqaruv tizimining hisoblash imkoniyatlariga bevosita bog‘liq. Murakkab shakldor detallarni ishlashda ushbu parametrlarning noto‘g‘ri tanlanishi ishlov berish vaqtini oshirishi, asbobning tez yeyilishi, kesish kuchlarining ortishi va detal yuzasining talab etilgan sifat ko‘rsatkichlariga javob bermasligiga sabab bo‘lishi mumkin. Shu sababli RDB dastgohlarida ishlov berish rejimlarini ilmiy asosda tanlash va optimallashtirish dolzarb masala hisoblanadi. Ushbu tadqiqotning asosiy maqsadi — murakkab shakldor detallarga RDB dastgohlarida mexanik ishlov berish jarayonida kesish rejimlarini maqbul tanlash orqali ishlov berish vaqtini qisqartirish va texnologik jarayon unumdorligini oshirishdan iborat. Tadqiqot obyekti sifatida murakkab shakldor yuzaga ega detalni RDB frezalash dastgohida mexanik ishlash jarayoni qabul qilindi. Tajribaviy tadqiqotlarda Al 6061-T6 alyuminiy qotishmasidan tayyorlangan, o‘lchamlari 80×58×12 mm bo‘lgan namunadan foydalanildi. Al 6061-T6 qotishmasi mashinasozlikda keng qo‘llaniladigan materiallardan biri bo‘lib, uning nisbatan kichik zichligi, yaxshi ishlanuvchanligi va mexanik xususiyatlarining maqbul nisbati uni RDB dastgohlarida frezalash jarayonlarini tadqiq qilish uchun qulay material sifatida belgilaydi. Tajribalar EMCO CONCEPT 250 frezalash dastgohida olib borilib, unda FANUC 21M, HEIDENHAIN TNC 426 va SINUMERIK 840D boshqaruv tizimlarining ishlash xususiyatlari qiyosiy tahlil qilindi. Tadqiqotda asosiy texnologik parametrlar sifatida surish tezligi: F = 450; 500; 550 mm/min, shpindel aylanish chastotasi: n = 1500; 1650; 1800 ayl/min, kesish chuqurligi esa: ap = 5 mm qiymatlarda qabul qilindi.

Tajriba jarayonida har bir texnologik rejim uchun ishlov berish vaqti qayd etildi. Shuningdek, qora ishlov berish va keyingi kesish o‘tishlarida vaqt sarfi tahlil qilindi. Bunday yondashuv turli RDB boshqaruv tizimlarining murakkab trayektoriyalarni qayta ishlashdagi samaradorligini qiyosiy baholash imkonini berdi. Ishlov berish unumdorligini baholashda asosiy mezonlardan biri sifatida ishlov berish vaqti qabul qilindi. Bir xil detal geometriyasi, asbob va kesish sharoitida ishlov berish vaqtining kamayishi texnologik jarayon unumdorligining ortishiga olib keladi. Shu bilan birga, faqat ishlov berish vaqtini minimallashtirish yetarli emas. Optimal rejimni tanlashda kesish kuchlari, asbob yeyilishi, yuza g‘adir-budirligi va detalning o‘lcham aniqligi ham hisobga olinishi lozim.

Tajribaviy tadqiqotlarning tahlili shuni ko‘rsatadiki, murakkab shakldor detallarga RDB dastgohlarida ishlov berish samaradorligi kesish rejimlarining o‘zaro muvofiq tanlanishiga bog‘liq. Surish tezligining ortishi ishlov berish vaqtini qisqartirish imkonini beradi. Biroq surish tezligini haddan tashqari oshirish kesish kuchlarining

ortishi, asbob yeyilishining tezlashishi va ishlov berilgan yuza sifatining pasayishiga olib kelishi mumkin. Shu sababli ishlov berish vaqtini minimallashtirish bilan bir qatorda kesish jarayonining barqarorligini saqlash muhim ahamiyatga ega. Murakkab shakldor yuzalarda asbobning kesish sharoiti trayektoriya bo‘ylab o‘zgarib turganligi sababli bir xil kesish rejimi yuzaning barcha qismlarida bir xil samara bermasligi mumkin. Shpindel aylanish chastotasi ham ishlov berish jarayoniga sezilarli ta’sir ko‘rsatadi. n=1500–1800 ayl/min oralig‘ida aylanish chastotasini o‘zgartirish orqali asbobning kesish tezligi va yuklanishini boshqarish mumkin. Ayniqsa, alyuminiy qotishmalarini frezalashda kesish tezligi va surish o‘rtasidagi nisbatning to‘g‘ri tanlanishi yuza sifati va asbobning ishlash muddati uchun muhimdir. Tadqiqotda RDB boshqaruv tizimlarining qiyosiy tahlili ham amalga oshirildi. FANUC 21M, HEIDENHAIN TNC 426 va SINUMERIK 840D tizimlarida bir xil geometrik trayektoriya asosida ishlov berish jarayoni baholandi. Olingan natijalarga ko‘ra, HEIDENHAIN TNC 426 boshqaruv tizimida ishlov berish vaqtining eng qisqa qiymati qayd etildi. Bu holat boshqaruv tizimining kadrlarni qayta ishlash, interpolyatsiya va dasturiy trayektoriyani boshqarish xususiyatlari bilan bog‘liq bo‘lishi mumkin. Biroq bu natijani faqat boshqaruv tizimining texnik tezligi bilan izohlash ilmiy jihatdan to‘liq to‘g‘ri emas. Ishlov berish vaqtiga dasturning tuzilishi, trayektoriya segmentlarining soni, tezlatish va sekinlatish algoritmlari, interpolyatsiya usuli hamda tanlangan kesish rejimlari birgalikda ta’sir ko‘rsatadi. Shu nuqtayi nazardan, RDB dastgohlarida unumdorlikni oshirish uchun faqat yuqori surish yoki shpindel tezligini tanlash yetarli emas. Eng samarali yondashuv — boshqaruv tizimi + asbob trayektoriyasi + kesish rejimi + detal geometriyasini kompleks optimallashtirish hisoblanadi. Murakkab shakldor detallar uchun texnologik jarayonni ko‘p mezonli optimallashtirish maqsadga muvofiq. Bunda ishlov berish vaqti, yuza g‘adir-budirligi, detal aniqligi va asbob yeyilishi bir vaqtning o‘zida baholanishi mumkin. Ushbu yondashuvni shartli ravishda quyidagi ko‘rinishda ifodalash mumkin: E = f(T, Ra, A, W), bu yerda: T — ishlov berish vaqti; Ra — ishlov berilgan yuza g‘adir-budirligi; A — detalning o‘lcham va geometrik aniqligi; W — kesish asbobining yeyilish darajasi. Bunday ko‘p mezonli yondashuv ishlab chiqarish sharoitida eng maqbul texnologik rejimni tanlash imkonini beradi. Masalan, eng qisqa ishlov berish vaqti har doim ham eng yaxshi texnologik rejimni anglatmaydi. Agar vaqtning qisqarishi asbob yeyilishi yoki yuza sifatining sezilarli yomonlashishi hisobiga ta’minlansa, bunday rejim iqtisodiy va texnologik jihatdan maqbul bo‘lmasligi mumkin.

Shuning uchun RDB dastgohlarida ishlov berish unumdorligini oshirishda asosiy maqsadni “maksimal tezlik” emas, balki “talab etilgan sifatni saqlagan holda minimal ishlov berish vaqti” sifatida belgilash maqsadga muvofiq.

XULOSA Olib borilgan tadqiqot natijalari asosida murakkab shakldor detallarga RDB dastgohlarida mexanik ishlov berish unumdorligini oshirish uchun kesish rejimlari va boshqaruv tizimini kompleks tanlash zarurligi asoslandi. Tadqiqotda Al 6061-T6 alyuminiy qotishmasidan tayyorlangan namunaga ishlov berish jarayoni uchun F=450–550 mm/min surish tezligi, n=1500–1800 ayl/min shpindel aylanish chastotasi va ap=5 mm kesish chuqurligi asosiy texnologik parametrlar sifatida qabul qilindi. FANUC 21M, HEIDENHAIN TNC 426 va SINUMERIK 840D boshqaruv tizimlarini qiyosiy tahlil qilish natijasida HEIDENHAIN TNC 426 tizimida ishlov berish vaqtining eng qisqa natijasi qayd etildi. Tadqiqot natijalari shuni ko‘rsatadiki, RDB dastgohlarida unumdorlikni oshirish masalasini faqat shpindel tezligi yoki surish tezligini oshirish orqali hal qilish mumkin emas. Samarali texnologik natijaga kesish rejimi, asbob trayektoriyasi, boshqaruv tizimi va detal geometriyasini o‘zaro muvofiqlashtirish orqali erishiladi. Kelgusidagi tadqiqotlarda ishlov berish vaqti bilan bir qatorda kesish kuchlari, asbob yeyilishi, yuza g‘adir-budirligi va geometrik aniqlikni hisobga olgan ko‘p mezonli optimallashtirish modelini ishlab chiqish maqsadga muvofiq. Bu esa murakkab shakldor detallarni RDB dastgohlarida ishlash texnologik jarayonining samaradorligini yanada oshirish imkonini beradi.

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ENSURING SUSTAINABLE DEVELOPMENT THROUGH THE IMPLEMENTATION OF GREEN TECHNOLOGIES IN RAILWAY TRANSPORT

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Abstract. *This thesis analyzes the role of green technology adoption in the railway sector in advancing sustainable development. The study examines the impact of energy-efficient technologies, renewable energy sources, railway infrastructure electrification, and digital management systems on the environmental and economic performance of the sector. Particular attention is given to the potential of green technologies to optimize energy consumption, reduce carbon emissions, lower operational costs, and improve the quality of transport services. Furthermore, drawing on international best practices, the study identifies key priorities for strengthening the environmental sustainability of railway transport, promoting efficient resource utilization, and accelerating the transition towards green transformation.*

Keywords

Railway transport, green technologies, sustainable development, environmental and economic efficiency, energy efficiency, green transformation, renewable energy sources.

Annotatsiya. *Mazkur tezisda temir yo‘l transportida yashil texnologiyalarni joriy etishning barqaror rivojlanishni ta’minlashdagi roli tahlil etilgan. Tadqiqotda energiya tejamkor texnologiyalar, qayta tiklanuvchi energiya manbalaridan foydalanish, temir yo‘l infratuzilmasini elektrlashtirish hamda raqamli boshqaruv tizimlarining ekologik va iqtisodiy samaradorlikka ta’siri hamda yashil texnologiyalarni qo‘llash orqali energiya sarfini optimallashtirish, uglerod emissiyasini kamaytirish, ekspluatatsion xarajatlarni qisqartirish va transport xizmatlari sifatini oshirish imkoniyatlari o‘rganildi. Shuningdek, xalqaro tajriba asosida temir yo‘l transportining ekologik barqarorligini kuchaytirish, resurslardan samarali foydalanish va yashil transformatsiyani jadallashtirishning ustuvor yo‘nalishlari aniqlangan.*

Kalit so‘zlar. *Temir yo‘l transporti, yashil texnologiyalar, barqaror rivojlanish, ekologik-iqtisodiy samaradorlik, energiya samaradorligi, yashil transformatsiya, qayta tiklanuvchi energiya.*

Аннотация. *В тезисе анализируется роль внедрения зелёных технологий в железнодорожном транспорте в обеспечении устойчивого развития. В исследовании рассматривается влияние энергоэффективных технологий, использования возобновляемых источников энергии, электрификации железнодорожной инфраструктуры и цифровых систем управления на экологическую и экономическую эффективность отрасли. Особое внимание уделено возможностям оптимизации энергопотребления, сокращения выбросов углерода, снижения эксплуатационных затрат и повышения качества транспортных услуг посредством применения зелёных технологий. Кроме того, на основе международного опыта определены приоритетные направления повышения экологической устойчивости железнодорожного транспорта, рационального использования ресурсов и ускорения процессов зелёной трансформации.*

Ключевые слова. *Железнодорожный транспорт, зелёные технологии, устойчивое развитие, эколого-экономическая эффективность, энергоэффективность, зелёная трансформация, возобновляемые источники энергии.*

Under contemporary conditions, the transition toward an environmentally sustainable development model has emerged as a fundamental priority in the transformation of the global transport system. Intensifying climate change, increasing energy demand, and increasingly stringent international environmental standards have created a growing need for the widespread adoption of green technologies across railway transport enterprises. Achieving the objectives of sustainable development, economic decarbonization, and improved resource efficiency requires the integration of innovative technological solutions that can reconcile economic performance with environmental sustainability. In this context, green technologies represent an important instrument for reducing the environmental footprint of railway operations while simultaneously strengthening their long-term economic and operational efficiency.

According to the International Union of Railways (UIC)[49], railway transport is recognized as one of the most environmentally efficient modes of transportation. Recent UIC data indicate that railways account for approximately 7% of global passenger transport and 6% of freight transport, while generating only around 1% of total transport-related

[49] International Union of Railways (UIC). Global Rail Sustainability Report 2024

emissions. This substantial disparity highlights the strategic potential of rail transport in supporting global decarbonization and climate objectives.

At the same time, further improvements in the sector's environmental performance increasingly depend on the modernization of railway infrastructure and the adoption of green technologies. Key priorities include railway electrification, integration of renewable energy sources, digitalization of operational processes, and deployment of energy-efficient rolling stock. Evidence from the UIC's 2024 sustainability data also demonstrates continued progress in emissions reduction: CO_2 [50]emissions from passenger rail have declined by 60% on a market-based basis and 56% on a location-based basis since 2005, while freight rail has reduced its carbon footprint by 51% and 59%, respectively. These trends confirm that technological modernization and energy transition can significantly strengthen the environmental sustainability and long-term efficiency of railway transport.

According to the International Energy Agency (IEA)[51], in cooperation with the International Union of Railways (UIC), railway transport is among the most energy-efficient modes of transportation worldwide. Although railways account for approximately 8% of global passenger transport and 7% of global freight activity, they consume only about 2% of the total energy demand of the transport sector. This significant imbalance between transport activity and energy consumption demonstrates the comparatively high energy efficiency of rail transport and its potential to contribute to the global transition toward a low-carbon economy.

The environmental advantages of rail are further strengthened by the expansion of railway electrification and the integration of cleaner energy sources. According to the IEA, approximately 75% of global passenger rail activity was already powered by electric trains, compared with around 60% in 2000, highlighting the sector's progress toward energy diversification and decarbonization. Therefore, expanding electrification, integrating renewable energy, improving rolling-stock efficiency, and applying digital technologies for energy management represent important pathways for reducing the environmental footprint of railway operations. These measures reinforce the strategic role of railways in advancing green economic development, improving resource efficiency, and achieving long-term sustainability objectives.

For Uzbekistan, the environmental transformation of railway transport has become increasingly important amid the modernization of transport infrastructure, the expansion of international transport corridors, and the implementation of national policies aimed at advancing a green economy. The adoption of energy-saving technologies, continued

[50] International Union of Railways (UIC). Energy Efficiency and CO_2 Emissions.
[51] International Energy Agency (IEA), UIC. The Future of Rail.

electrification of railway networks, digitalization of operational processes, and alignment with modern environmental standards create favorable conditions for improving the environmental and economic performance of railway enterprises. These measures can contribute to more efficient resource utilization, lower operating costs, reduced environmental pressures, and enhanced competitiveness within the increasingly integrated regional and international transport market.

Against this background, examining the contribution of green technologies to improving the environmental and economic efficiency of railway enterprises represents both a significant research priority and a practical policy challenge. The findings of such research can provide a methodological and analytical basis for strengthening sustainable development mechanisms within the railway sector, supporting the transition toward low-carbon transport, and developing more effective environmental management policies for Uzbekistan's broader transport system.

The environmental and economic efficiency of railway enterprises can be understood as their capacity to achieve strong operational and economic performance while minimizing energy consumption and adverse environmental impacts. The adoption of energy-efficient technologies, reduction of carbon dioxide emissions per unit of transport activity, mitigation of air pollution, and more rational use of natural resources can substantially strengthen the sector's environmental sustainability without compromising the quality and reliability of transport services.

At the same time, modernization of railway infrastructure and the integration of innovative technological solutions can contribute to lower overall logistics costs, greater reliability of transportation chains, improved investment attractiveness of regions, and the creation of favorable conditions for implementing green economy principles in practice. Therefore, enhancing the environmental and economic efficiency of railway enterprises should be regarded as a strategic priority of national transport policy. Such an approach can strengthen the competitiveness of the railway sector, support environmental security, improve resource efficiency, and establish a solid foundation for long-term sustainable socio-economic development [3].

Statistical evidence on global railway passenger and freight activity in 2023 further demonstrates the growing importance of rail transport in strengthening international connectivity and supporting the sustainable operation of global logistics networks. According to data from the International Union of Railways (UIC), approximately 8 billion passengers were transported by rail during the year, while total passenger traffic reached around 3.8 trillion passenger-kilometres, representing approximately 6% of global domestic passenger transport. The scale of railway passenger mobility, together with substantial

freight volumes, reflects the intensive utilization of railway infrastructure and its significant contribution to sustainable mobility and the efficient functioning of the global economy.

These indicators demonstrate not only the substantial operational capacity of the railway sector but also its strategic importance in the transition toward an environmentally sustainable transport system. The combination of high transportation volumes with comparatively low greenhouse gas emissions per unit of transport activity strengthens the position of railways as a key component of global decarbonization strategies and the achievement of the Sustainable Development Goals. Consequently, further investment in railway modernization, electrification, energy efficiency, and green technologies can enhance the sector's contribution to climate mitigation while simultaneously supporting long-term economic and environmental sustainability [2].

These trends highlight the growing strategic importance of railway infrastructure in developing international transport and logistics corridors, strengthening territorial connectivity, and advancing the global transition toward low-carbon and sustainable development. According to the International Union of Railways (UIC), rail transport accounts for approximately 38% of global inland freight activity, measured in tonne-kilometres, while maintaining its position as one of the most environmentally efficient modes of land transportation. Despite the substantial volume of freight handled by railways, the sector contributes only around 1% of total transport-related emissions, demonstrating its comparatively strong environmental performance and significant potential for supporting global decarbonization efforts.

Recent developments in the global railway market further indicate a sustained expansion in demand for rail-based mobility and freight services. According to provisional UIC data, global passenger rail traffic increased by approximately 4.5% in 2025 compared with 2024, while rail freight activity, measured in tonne-kilometres, grew by around 2% over the same period. This positive trajectory reinforces the strategic role of railways as a core component of an environmentally oriented and economically efficient transport system. At the same time, the continued growth of railway activity underscores the importance of accelerating electrification, improving energy efficiency, expanding the use of renewable energy, and integrating green technologies to ensure that increasing transport demand is accompanied by lower environmental impacts and long-term sustainability.

At the same time, the modernization of railway infrastructure and the adoption of innovative technological solutions can contribute significantly to reducing overall logistics costs, improving the reliability and resilience of transport chains, enhancing the investment attractiveness of regions, and creating favorable conditions for the practical implementation of green economy principles. From this perspective, improving the environmental and

economic efficiency of railway enterprises should be regarded as a strategic priority within national transport policy. Such an approach can strengthen the competitiveness of the railway sector, promote environmental sustainability, improve the efficiency of resource utilization, and establish the necessary foundations for long-term and sustainable socio-economic development [4]. Accordingly, railway transport can be regarded as one of the most economically efficient and environmentally sustainable modes of transportation.

$$ISG = \sum_{i=1}^{n} \left| \alpha_1 - \frac{\Delta E_i}{E_{b_i}} + \alpha_2 * \frac{\Delta C_i}{C_{b_i}} + \alpha_3 * \frac{\Delta S_i}{S_{b_i}} + \alpha_4 * ESG_i \right| * W_i$$

Here:

ISG – Integrated Efficiency Index of Green Railway Clusters;

n – number of areas (dimensions) analyzed;

$\alpha_1, \alpha_2, \alpha_3, \alpha_4$ – impact coefficients (weight coefficients) of each component in the model, determined using the expert evaluation method;

E_i – energy efficiency effect (the share of energy savings in total energy consumption);

C_i – effectiveness of CO_2 emissions reduction;

S_i – social efficiency indicator;

ESG_i – ESG compliance index of the cluster (scale: 0–1);

$E_{b_i}, C_{b_i}, S_{b_i}$ – baseline values of each indicator in the absence of model implementation;

W_i – weighting coefficient of each cluster within the overall system.

The most pronounced improvements are evident in the area of energy efficiency, where the corresponding indicator increased from 65% to 85% following the implementation of green technologies, representing a 20-percentage-point increase. This substantial improvement reflects a more rational and optimized utilization of energy resources, a reduction in energy losses, and enhanced operational efficiency of both railway infrastructure and rolling stock. The observed dynamics demonstrate that the integration of

energy-efficient solutions can significantly strengthen the resource-efficiency and environmental performance of railway systems.

A similarly positive trend is observed in the reduction of CO_2 emissions. Prior to the introduction of environmentally oriented technologies, the emission-reduction indicator stood at 20%, whereas following their implementation, it increased to 55%, corresponding to a 35-percentage-point improvement. This considerable progress underscores the effectiveness of contemporary decarbonization technologies and low-carbon transport solutions, including railway electrification, the integration of renewable and alternative energy sources, and the deployment of digital energy-management systems. Collectively, these measures contribute to reducing the carbon intensity of railway operations while simultaneously enhancing the long-term environmental and economic sustainability of the transport sector.

Conclusion

The implementation of green technologies in the railway sector represents a strategically important pathway toward achieving sustainable development, resource efficiency, and long-term environmental resilience. The analysis demonstrates that the transition to environmentally sustainable railway systems should not be limited to the introduction of individual energy-saving technologies; rather, it requires a systemic transformation of technological, organizational, managerial, and institutional mechanisms.

At the same time, sustainable railway development requires the integration of environmental, social, and governance (ESG) principles into corporate and sectoral management. The application of ESG-oriented performance indicators can strengthen institutional accountability, improve transparency, facilitate evidence-based decision-making, and align railway enterprises with international sustainability standards. Therefore, the green transformation of railway transport should be considered not only as an environmental initiative but also as an important component of economic modernization, technological innovation, and sustainable competitiveness.

Recommendations

Based on the findings, the following strategic recommendations are proposed:

1. Accelerate railway electrification and energy modernization. Priority should be given to the electrification of strategically important railway routes and the modernization of traction power infrastructure. Energy-efficient locomotives, regenerative braking systems, and advanced energy-storage technologies should be progressively integrated into railway operations.

2. Expand the integration of renewable energy sources. Railway enterprises should increase the utilization of solar, wind, and other renewable energy technologies, particularly

for railway stations, maintenance facilities, logistics terminals, and auxiliary infrastructure. The development of decentralized renewable-energy systems can reduce dependence on conventional energy sources and improve energy security.

3. Introduce digital energy-management systems. The implementation of smart monitoring, automated energy-consumption control, Internet of Things (IoT) technologies, and data-driven management tools would enable railway enterprises to identify energy losses, optimize consumption patterns, and improve operational efficiency in real time.

4. Establish a comprehensive Green KPI system. Railway enterprises should develop measurable Green Key Performance Indicators (Green KPIs) covering energy consumption, CO_2 emissions, renewable-energy utilization, waste reduction, resource productivity, and environmental compliance. These indicators should be incorporated into corporate strategic planning and performance evaluation mechanisms.

5. Strengthen ESG-based corporate governance. ESG principles should be integrated into investment decisions, corporate risk management, procurement policies, and strategic planning. Regular sustainability reporting based on internationally recognized frameworks would improve transparency and strengthen stakeholder confidence.

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QAYTA TIKLANUVCHI ENERGIYA QURILMALARI XARIDIGA KOMPENSATSIYA VA SUBSIDIYALAR AJRATISH HAMDA ULARNING SAMARADORLIGINI OSHIRISHDA RAQAMLASHTIRISHNING AHAMIYATI

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Annotatsiya. *Maqolada qayta tiklanuvchi energiya qurilmalari xaridini davlat tomonidan qo‘llab-quvvatlash mexanizmlarini raqamlashtirishning ahamiyati tahlil qilingan. O‘zbekistonda kompensatsiya va subsidiyalar ajratish jarayonlarini raqamlashtirish bo‘yicha amalga oshirilayotgan ishlar o‘rganilgan. Tadqiqot natijalari raqamli platformalardan foydalanish davlat mablag‘larining maqsadli sarflanishi, shaffoflikni ta’minlash, inson omilini kamaytirish va aholi uchun xizmatlardan foydalanish imkoniyatlarini kengaytirishini ko‘rsatadi. Shuningdek, kompensatsiya va subsidiyalarni boshqarishning integratsiyalashgan raqamli modeli taklif etilgan.*

Kalit so‘zlar: *qayta tiklanuvchi energiya, subsidiya, kompensatsiya, raqamlashtirish, energymarket.uz, raqamli platforma, yashil iqtisodiyot, energiya samaradorligi.*

Abstract. *This article analyzes the importance of digitalizing state support mechanisms for the procurement of renewable energy equipment. The study examines the ongoing efforts in Uzbekistan to digitalize the processes of allocating compensation and subsidies for renewable energy technologies. The findings indicate that the use of digital platforms contributes to the targeted and efficient utilization of public funds, enhances transparency, reduces the influence of human factors, and expands public access to government support services. Furthermore, an integrated digital model for the management of compensation and subsidy mechanisms is proposed to improve the effectiveness of renewable energy support policies.*

Keywords: *renewable energy, subsidy, compensation, digitalization, energymarket.uz, digital platform, green economy, energy efficiency.*

Kirish

Ko‘plab davlatlarda aholi va tadbirkorlik sub’ektlari tomonidan qayta tiklanuvchi energiya qurilmalarini xarid qilish uchun subsidiyalar, kompensatsiyalar va imtiyozli moliyalashtirish dasturlari joriy etilgan. Biroq mazkur jarayonlarni an’anaviy usullarda tashkil qilish ortiqcha qog‘ozbozlik, ma’lumotlarni qayta ishlashda kechikishlar va inson omili bilan bog‘liq muammolarni keltirib chiqaradi.

Raqamlashtirish esa mazkur jarayonlarni avtomatlashtirish, shaffoflikni ta’minlash va davlat qo‘llab-quvvatlash mexanizmlari samaradorligini oshirish imkonini beradi. Tadqiqotlar raqamlashtirish qayta tiklanuvchi energiya sohasining rivojlanishiga ijobiy ta’sir ko‘rsatishini tasdiqlamoqda.

Tadqiqotning maqsadi qayta tiklanuvchi energiya qurilmalari xaridiga kompensatsiya va subsidiyalar ajratish jarayonlarini raqamlashtirishning ahamiyatini baholash hamda ushbu mexanizmlarni takomillashtirish bo‘yicha takliflar ishlab chiqishdan iborat.

Tadqiqot metodologiyasi

Tadqiqotda qiyosiy tahlil, tizimli yondashuv, normativ-huquqiy hujjatlarni tahlil qilish, statistik ma’lumotlarni o‘rganish va raqamli platformalar faoliyatini baholash usullaridan foydalanildi.

Tadqiqotning axborot manbalari sifatida: O‘zbekiston Respublikasining qayta tiklanuvchi energiya sohasiga oid qonun hujjatlari, Energetika vazirligi va Energiya samaradorligi milliy agentligi ma’lumotlari, IEA, IRENA va Jahon banki hisobotlaridan foydalanildi.

Tahlil doirasida raqamlashtirishning xizmat ko‘rsatish tezligi, shaffoflik darajasi, inson omilining qisqarishi, davlat mablag‘larining samaradorligi va foydalanuvchilar uchun qulaylik kabi mezonlari baholandi.

Natijalar va muhokama

O‘zbekistonda qayta tiklanuvchi energiya manbalarini rivojlantirish davlat siyosatining ustuvor yo‘nalishlaridan biri hisoblanadi. So‘nggi yillarda quyosh panellari, quyosh suv isitgichlari va boshqa energiya tejovchi qurilmalarni o‘rnatish uchun kompensatsiya va subsidiyalar ajratish mexanizmi joriy qilindi. Bu jarayon aholi va tadbirkorlik sub’ektlarining qayta tiklanuvchi energiya qurilmalarini xarid qilish xarajatlarini qisqartirishga xizmat qilmoqda.

Xususan, Qayta tiklanuvchi energiya manbalarini joriy etishni davlat tomonidan qo‘llab-quvvatlash bo‘yicha yagona elektron platformasi – **energymarket.uz** orqali 2022-yil 1-oktabrdan 2025-yil 1-sentabr holatiga aholi tomonidan xarid qilingan

QTEM qurilmalarini sotib olish xarajatlari uchun **6370 nafar** fuqaroga **65,3 mlrd.so‘m** kompensatsiya mablag‘i ajratilgan.

O‘zbekiston Respublikasi Vazirlar Mahkamasi huzuridagi Energiya samaradorligi milliy agentligining Energiya samaradorligini oshirish raqamli platformasi – **esma.uzex.uz** orqali 2026-yil birinchi yarim yillik davomija **5,7 mingdan ortiq** xonadonga quyosh panellari, geliokollektorlar hamda issiqlik nasoslari o‘rnatish uchun **42,4 mlrd so‘mdan ortiq** subsidiya ajratildi. Natijada, 2026-yil uchun belgilangan maqsadli ko‘rsatkichlarga muvofiq **2,6 mlrd kVt/soat elektr energiyasi** va **974 mln kub metr tabiiy gaz i**qtisod qilinishi ta’minlandi.

Shuningdek “Quyoshli xonadon” dasturi orqali quyosh panellarini o‘rnatgan jismoniy shaxslar o‘z ehtiyojidan ortiq ishlab chiqargan va umumiy elektr energetika tizimiga uzatgan **har bir kVt·soat elektr energiyasi uchun 1 000 so‘mdan** subsidiya olish imkoniyati yaratilgan. Amaldagi dasturdan ***2025-yil davomida*** **45,4 ming nafar jismoniy shaxs** foydalandi va davlat budjetidan **209,2 mlrd so‘m** subsidiya olgan bo‘lsa, ***2026-yilning 6 oyida*** **68,6 ming nafar jismoniy shaxs** amaldagi dasturdan foydalanib davlat budjetidan **330,822 mlrd so‘m**dan ortiq subsidiya oldi.

Xalqaro tadqiqotlarga ko‘ra, raqamlashtirish qayta tiklanuvchi energiya sohasida investitsiyalarni jalb qilish, energiya samaradorligini oshirish va yashil innovatsiyalarni rag‘batlantirishga xizmat qiladi.

Qayta tiklanuvchi energiya qurilmalari xaridi uchun davlat tomonidan ajratiladigan subsidiya va kompensatsiyalar mamlakat iqtisodiyotida muhim ahamiyat kasb etadi. Biroq mazkur jarayonlarni an’anaviy usulda tashkil etish ortiqcha ma’muriy xarajatlar, hujjatlar aylanmasi va vaqt sarfini keltirib chiqaradi.

Raqamli platformalar orqali boshqaruvni joriy etish hisobiga arizalarni ko‘rib chiqish muddatining qisqarishi, ma’muriy xarajatlarning kamayishi, davlat mablag‘larining maqsadli sarflanishi, noqonuniy to‘lovlar xavfining pasayishi hamda aholi va tadbirkorlar uchun tranzaksiya xarajatlarining qisqarishi kabi iqtisodiy natijalarga erishiladi.

Raqamlashtirishning ijobiy jihatlari bilan bir qatorda ayrim muammolar ham mavjud. Xususan, axborot tizimlari o‘rtasida integratsiyaning yetarli emasligi, internet infratuzilmasining barcha hududlarda bir xil rivojlanmaganligi, raqamli savodxonlik darajasining turlicha ekanligi, kiberxavfsizlik bilan bog‘liq xatarlar, ma’lumotlar bazasining muntazam yangilanmasligi. Ushbu muammolarni bartaraf etish raqamli transformatsiyaning keyingi bosqichlarida muhim ahamiyatga ega.

Tadqiqot doirasida qayta tiklanuvchi energiya qurilmalari xaridi uchun davlat qo‘llab-quvvatlash mexanizmlarini boshqarishning intellektual raqamli modeli taklif etiladi. Model quyidagi bosqichlardan tashkil topgan:

Fuqaro → Elektron ariza → Avtomatik identifikatsiya → Davlat reestrlari bilan solishtirish → Sun’iy intellekt asosida baholash → Qaror qabul qilish → Elektron to‘lov → Monitoring → Hisobot.

Mazkur modelni qo‘llash orqali inson omilini minimallashtiradi ya’ni inson omili bilan bog‘liq xatolar 70 foizgacha kamayadi, qaror qabul qilish tezligini oshiradi, arizalarni ko‘rib chiqish muddati 40–60 foizga qisqaradi, korrupsiya xavfini kamaytiradi, davlat mablag‘larining maqsadli sarflanishini ta’minlaydi, real vaqt rejimida monitoringni amalga oshiradi va tahliliy ma’lumotlar bazasini shakllantiradi, qayta tiklanuvchi energiya qurilmalarini joriy qilish sur’atlari ortadi hamda aholi va tadbirkorlik sub’ektlarining davlat xizmatlaridan foydalanish darajasi Shuningdek, tadqiqot natijalari asosida quyidagi takliflar ishlab chiqildi:

energymarket.uz va esma.uzex.uz platformalari o‘rtasida ma’lumotlar almashinuvini ta’minlovchi yagona integratsiyalashgan axborot tizimini yaratish;

qayta tiklanuvchi energiya qurilmalari bo‘yicha subsidiya va kompensatsiya ajratish jarayonlariga sun’iy intellekt asosida avtomatik baholash mexanizmlarini joriy qilish;

Big Data texnologiyalari asosida tahliliy markaz tashkil qilish;

blokcheyn texnologiyalarini qo‘llash orqali shaffoflikni oshirish;

barcha qurilmalarni QR-kod va elektron pasport asosida identifikatsiya qilish tizimini joriy etish;

davlat tomonidan ajratilgan mablag‘larning samaradorligini baholash uchun raqamli monitoring platformasini tashkil etish;

energiya tejamkorlik va uglerod chiqindilarining qisqarishini avtomatik hisoblaydigan tahliliy modullarni joriy qilish.

Xulosa

Tadqiqot natijalari qayta tiklanuvchi energiya qurilmalari xaridiga kompensatsiya va subsidiyalar ajratish jarayonlarini raqamlashtirish davlat qo‘llab-quvvatlash mexanizmlarining samaradorligini sezilarli darajada oshirishini ko‘rsatdi.

Tadqiqotda davlat qo‘llab-quvvatlash tizimlarini raqamli platformalar orqali boshqarish, monitoring qilish va baholashning yagona konseptual arxitekturasi ishlab chiqilgan.

Taklif etilayotgan model an’anaviy subsidiyalash mexanizmlaridan farqli ravishda davlat reestrlari, elektron savdo platformalari, sun’iy intellekt elementlari va tahliliy ma’lumotlar bazalarini yagona raqamli ekotizimga birlashtiradi.

Kelgusida energymarket.uz, esma.uzex.uz va boshqa davlat axborot tizimlarini integratsiya qilish, sun’iy intellekt va Big Data texnologiyalarini joriy etish orqali subsidiya va kompensatsiyalarni boshqarish samaradorligini yanada oshirish mumkin.

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7-SECTION

МАРКАЗИЙ ОСИЁ ДАВЛАТЛАРИНИНГ 1941 ЙИЛДАГИ БЮДЖЕТ-СОЛИҚ СИЁСАТИ ТАРИХИ

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Abstract. *This article examines the budgetary and tax policy pursued by the Soviet government in the Central Asian republics during the Second World War as a key component of its broader economic policy. Particular attention is paid to the formation of the state budgets of the USSR and the Uzbek SSR in 1941, the structure of budget revenues and expenditures, and the role of taxes and fees in generating budgetary revenues. Based on archival documents and budgetary data, the principal sources of revenue of the Uzbek SSR, Kazakh SSR, Tajik SSR, Turkmen SSR, and Kyrgyz SSR are comparatively analyzed. The study also highlights the dominant role of taxes and fees as major sources of revenue in the budgets of the Union republics, examines the position of local budgets within the centralized Soviet financial system, and identifies regional differences in the structure of budget revenues and expenditures.*

Key words: *Central Asia, budgetary and tax policy, USSR, Uzbek SSR, taxes and fees, state revenues, state expenditures, turnover tax, military tax, local budgets.*

Аннотация. *Ушбу мақолада Совет ҳукумати томонидан Марказий Осиё давлатларида Иккинчи жаҳон уруши йилларида юритилган иқтисодий сиёсатининг асосий бўғини бўлган бюджет-солиқ сиёсати таҳлил қилинади. Бундан ташқари 1941-йилда СССР ва Ўзбекистон ССР давлат бюджетларининг шаклланиши, даромад ва харажатлар таркиби ҳамда солиқлар ва йиғимларнинг бюджет даромадларидаги ўрни ёритилади. Архив ҳужжатлари ва бюджет маълумотлари асосида Ўзбекистон ССР, Қозоғистон ССР, Тожикистон ССР, Туркманистон ССР ва Қирғизистон ССР бюджетларининг асосий даромад манбалари қиёсий ўрганилган. Шунингдек, иттифоқ республикалари бюджетларида солиқлар ва йиғимларнинг асосий даромад манбаи бўлганлиги, маҳаллий бюджетларнинг марказлашган молия тизимидаги ўрни ҳамда даромад-харажатлар таркибидаги ҳудудий фарқлар ёритилади.*

Калит сўзлар: *Марказий Осиё, бюджет-солиқ сиёсати, СССР, Ўзбекистон ССР, солиқ ва йиғимлар, давлат даромадлари, давлат харажатлари, айланма солиқ, ҳарбий солиқ, маҳаллий бюджетлар.*

Иккинчи жаҳон уруши Марказий Осиё давлатлари ҳудудида юз бермаган бўлсада уларнинг **бюджет-солиқ сиёсатига** жуда катта салбий таъсир кўрсатган. Бюджет учун аҳамиятли бўлган солиқ ставкалари оширилди, янги солиқ турлари жорий этилди, аҳоли ва корхоналардан мажбурий тўловлар ундирила бошланди. Айниқса, бир-бирига яқин соҳаларни бирлаштириш ва қисқариш масалалари олиб борилган ҳамда ҳеч бир хонадон уруш таъсиридан четда қолмаган.

1941 йил 1 мартда СССРнинг давлат бюджети тўғрисидаги қонун қабул қилиниб унда даромадлар бўйича 216 миллиард 840 миллион 224 минг рубл ва харажатлар бўйича ҳаммаси 216 миллиард 52 миллион 224 минг рубл миқдорида, яъни даромад харажатлардан 788 миллион рубл[1, 2-с.]ни ортиқни ташкил этган. Бироқ, шу йилда СССР бюджетида даромадларнинг 19 та ҳамда 30 та харажат тури қайд этилади, давлат бюджетида солиқ ва йиғимларнинг улуши 76 фоизга тўғри келганлиги, бундан ташқари, давлат заёмлар, АССР бюджетлари ва маҳаллий кенгашларга маҳаллий манбалардан тушадиган даромадлар ва бошқалар киритилган. Шу даврдаги маҳаллий бюджетнинг марказ бюджетидаги ўрни республикалар кесимида 42 фоиз улушига тўғри келган. Шундай маҳаллий бюджет бири бўлган Қозоғистон ССР бюджети ҳисобланади.

Маҳаллий бюджетлар ичида Қозоғистон ССР бюджети маблағ бўйича биринчи ўринда яъни, 1.717.147 минг рубл ҳисобида даромад ва харажат бир хил миқдорда белгиланган. Даромаднинг 13 тури бўлса, улардан тўрттасини, яъни айланма солиқ – 51,1 фоиз, фойдадан ажратмалар – 9,3 фоиз, корхона ва ташкилотлардан таворсиз операциялар олинадиган даромад солиғи – 2,9 фоиз, аҳолидан олинадиган солиқ ва йиғимлар – 14 фоизини ташкил қилган бўлса, умумий ҳисобда солиқ ва йиғимларнинг улиши 77,3 фоизини, бошқа даромадлар 23,4 фоизини ташкил этган.

Шу йилги Ўзбекистон ССР Олий Советининг IV сессиясида қабул қилинган “Ўзбекистон Совет Социалистик Республикасининг 1941 йилги давлат бюджети ҳақидаги қонуни”да давлат бюджетнинг даромадига 1 миллиард 631 миллион 136 минг рубл ва харажат қисми 1 миллиард 616 миллион 781 минг рубл миқдорида, яъни даромаддан харажат қисми 14 миллион 355 минг рубл оширилиб тасдиқланган. Лекин архив ҳужжатларига келтирилган маълумотларга кўра, даромад ва харажатлар бир хил миқдорда тақсимланган[2, 3-с.].

Архив ҳужжатларидаги Ўзбекистон ССРнинг давлат бюджетининг 1941 йил даромадлар тўплами кўра, булар 4 тага ажратилади, биринчидан, айланма солиқ (налог с оборота) – пахта, нефт ва тамаки тайёрлашдан ажратма; қишлоқ хўжалик маҳсулотлари тайёрлашдан ажратма; колхоз савдосидан ва қишлоқ матлубот кооперациясининг марказлаштирилмаган тартибда маҳсулот тайёрлашидан олинадиган айланма солиғи бўлиб, даромаднинг биринчи устунида 483 965 минг рубл миқдорида берилиб, 29 фоиздан ортиғига тўғри келади.

Тожикистон ССР бюджетидаги даромад ва харажат бир хил миқдорда 581.366 минг рублни бўлиб, даромаднинг 12 тури келтирилади. Улардан биринчи ўринда турадиган даромад тури айланма солиқ бўлиб, унинг улуши – 48 фоиз, фойдадан ажратмалар – 18 фоиз, корхона ва ташкилотлардан таворсиз операциялар олинадиган даромад солиғи – 3,5 фоиз, аҳолидан олинадиган даромад солиғи – 11 фоизини 80,5 фоиз улиши солиқ ва йиғимлардан олинган бўлса, 19,5 фоизи бошқа даромадлардан йиғилган. Тожикистон ССРда ҳам давлат харажати иккита тоифага бўлинган бўлинган, уларнинг тури 15 тани ташкил қилган**[3, 44-47-с.]**.

Туркманистон ССР бюджетидаги даромад ва харажат бир хил миқдорда 536.694 минг рублни ташкил этган бўлса, бу биринчи ўринда турадиган даромад тури айланма солиқ бўлиб, унинг улуши – 41 фоиз, фойдадан ажратмалар – 14,1 фоиз, корхона ва ташкилотлардан таворсиз операциялар олинадиган даромад солиғи – 4 фоиз, аҳолидан олинадиган даромад солиғи – 12,3 фоизини 71,4 фоиз улиши солиқ ва йиғимлардан олинган бўлса, 28,6 фоизи бошқа даромадлар жамланган. Турманистон ССРда ҳам давлат харажати иккита тоифага бўлинган бўлма, уларнинг тури 14 тани ташкил қилган**[4, 36-39-с.]**.

Давлат бюджетига ажратилган маблағлар ичида кейинги ўринда Қирғизистон ССР бўлиб, унга 481.115 минг рублни маблағ ажратилган. Улардан айланма солиқ – 48,9 фоиз, фойдадан ажратмалар – 12,3 фоиз, корхона ва ташкилотлардан таворсиз операциялар олинадиган даромад солиғи – 4 фоиз, аҳолидан олинадиган даромад солиғи – 11,9 фоиз бўлган. умумий ҳисобда уларнинг даромаддаги улуши 77,1 фоиз улиши солиқ ва йиғимлардан олинган бўлса, 22,9 фоизи бошқа даромадлар жамланган. Турманистон ССРда ҳам давлат харажати иккита тоифага бўлинган бўлса, лекин харажатларнинг тури бўйича 18 тани яъни, бошқа ҳудудларда бўлмаган Коммунал хўжалиги халқ комиссарлиги ҳамда фуқароларнинг ҳова флоти каби фарқли жиҳатлари қайд қилган[5, 52-55-с.]**.**

1941 йил 21 ноябрда СССР Олий Советининг “СССРдаги бўйдоқ, ёлғиз ва фарзандсиз фуқароларга солинган солиқлар тўғрисида”ги[6, 11-с.] Фармонига

кўра бўйдоқ, ёлғиз ва фарзандсиз СССР фуқароларининг солиқ тўлаши қонун билан белгилаб қўйилди. Бу эркаклар учун 20 ёшдан 50 ёшгача, аёллар учун 20 ёшдан 45 ёшгача қилиб белгиланди. 50 ёш ва ундан юқори ёшда бўлган эркаклар ва 45 ёш ва ундан юқори ёшда бўлган аёллар учун йилига бир кишига 100 рубль қилиб белгиланди. Фарзанди бўлмаган фуқаролар, фарзандли бўлган тақдирда улардан солиқнинг олиниши кейинги тўлов муддатидан бошлаб бекор қилинган. Умуман олганда, бу даврда фарзандининг ёши ва сонидан қатъий назар фуқаролар солиқ тўлашдан озод қилинган[7, 15-с.].

Бўйдоқ, ёлғиз ва фарзандсиз СССР фуқароларидан олинадиган солиқ иш ҳақи олинадиган жойда ҳисобланиб, даромад солиғи билан бир вақтда ушлаб қолинар эди. Бошқа фуқаролардан (ҳунармандлар, бино эгалари, хусусий амалиёт билан шуғулланувчилар) ушбу солиқ бевосита молия органлари томонидан мазкур йилда даромад солиғини ҳисоблаш учун аниқланган даромад суммасидан 6 фоиз миқдорда ундирилган. Солиқлар бир йилда 4 маротаба тенг қисмларга бўлиб тўланган[8, 252-с.]. Шунингдек, бу солиқни тўлашда фуқаролар тоифага ҳам бўлинади ва улар белгиланган миқдорда солиқ тўлайдиган бўлдилар. Солиқ суммалари қаттиқ ва фоизли ставкаларда белгиланди. Масалан, ишчилар ва хизматчиларга бир ойлик маоши 150 рубль бўлганда солиқ миқдори 5 рубль, маош 150 рублдан ошса ойлик маошининг 5 фоизи тўланадиган бўлди. Адабиёт ва санъат соҳасида ишлайдиган кишиларга ҳам ойлик маошининг 5 фоизи миқдорида солиқ белгиланди. Қолган фуқаролар, хусусан колхоз, деҳқон хўжаликларига кирувчи шахслар йилига 100 рубль тўлашлари керак бўлган. Айрим солиқларга алоҳида сумма турлари ҳам белгиланди, масалан, солиққа тортилмаган фуқаролар йилига 60 рубль тўлашлари белгилаб қўйилди[9, 22-с.]. 1944 йил 8 августда “бўйдоқ, ёлғиз ва кам болали СССР фуқаролар” солиғи қилиб ўзгартирилган[15, 20-с.]. Солиқ қуйидаги миқдорларда олинган. Даромад солиғи солинадиган ва фарзандлари бўлмаган фуқаролардан, улар оладиган даромадининг 6 фоиз миқдорида, бир фарзандли бўлганлардан 1 фоиз, иккита фарзандлилардан ½ % миқдорида олинган. Шу йилдан бошлаб кам болалилар ҳам солиққа тортилган.

Қишлоқ хўжалик солиғи солинадиган хўжаликлар таркибига кирган колхозчилар, якка хўжаликлар ва бошқа фуқаролардан фарзандлари бўлмаса йилига 150 рубл, бир болаликлар учун 50 рубл ва икки болаликлар учун 25 рублга қилиб белгиланган. Бошқа фуқаролардан фарзандлари бўлмаса, йилига 90 рубл, битта фарзандли бўлса йилига 30 рубл, иккита фарзанди бўлса йилига 15 рубл миқдорида солиқ олинган. Бу ўзгаришдан кейин бериладиган имтиёзларда ҳам ўзгаришлар бўлган. Булар юқоридаги даромад солиғи тўлайдиган ва қишлоқ

хўжалиги солиғи солинадиган хўжаликлар таркибига кирувчи колхозчилар, якка хўжаликлар ва бошқа фуқаролар, фарзандларини боқиш учун давлатдан ёрдам ёки нафақа олаётган хотинлар, фарзандлари жаҳон урушида ҳалок бўлган ёки бедарак йўқолган фуқароларга берилган[10, 3-с.].

1941 йил 29 декабрда СССР Олий Совети Президиумининг “Ҳарбий солиқ тўғрисида[11, 2-с.]”ги Фармони чиқди. Бу солиқни 18 ёшга тўлган СССР фуқаролари тўлаган. Унга кўра минтақаларга қараб 150 рублдан 600 рублгача бўлган миқдорда қатъий белгиланган ҳарбий солиқ жорий қилинди[12, 57-с.]. Ҳарбий солиқ қандай ставка бўйича тўланиши тўловчиларнинг тоифаси ва улар оладиган даромадларга боғлиқ бўлди[13, 48-с.].

Хулоса қиладиган бўлсак, Иккинчи жаҳон уруши даврида ҳам давлат бюджетининг асосий манбаларидан бири солиқ ва йиғимлар бўлган. Ҳар бир республика учун солиқлар уларнинг қайси соҳага ихтисослашганига қараб белгиланган ва давлат бюджетини тўлдириб борган.

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ZAMONAVIY TA’LIM XUSUSIYATLARI: IJTIMOIY-FALSAFIY TAHLIL

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“Navoiy kon-metallurgiya kombinati” Aksiyadorlik jamiyati Markaziy kon boshqarmasi, Boshqarma Ofis menejer bo‘limi, Axborot va ma’naviyat – ma’rifat guruhi Rahbari, BuxDPI mustaqil tadqiqotchisi

Annotatsiya: *Maqolada zamonaviy ta’lim paradigmalari – raqamli ta’lim, kompetensiyaviy yondashuv va uzluksiz ta’lim – ijtimoiy-falsafiy tahlil asosida o‘rganilgan. Ta’limning mazmuni, metodologiyasi va qadriyatlar tizimi transformatsiyasi jarayonida inson omilining ustuvorligi asoslab berilgan.*

Kalit so‘zlar: *ta’lim falsafasi, raqamli ta’lim, kompetensiya, uzluksiz ta’lim, innovatsiya, ma’naviyat.*

Globallashuv, raqamli transformatsiya va bilim iqtisodiyoti sharoitida ta’lim tizimi inson kapitalining asosiy omili sifatida yangicha mazmun kasb etmoqda. XXI asrda ta’limning vazifasi faqat bilim berish bilan cheklanmay, balki shaxsning mustaqil fikrlashi, ijodkorligi, mas’uliyatliligi va kompetensiyalarini shakllantirishga qaratilmoqda. Shu nuqtayi nazardan, zamonaviy ta’lim paradigmalari – raqamli ta’lim, kompetensiyaviy yondashuv va uzluksiz ta’lim – insonning ma’naviy, ijtimoiy va kasbiy rivojlanishini ta’minlovchi asosiy yo‘nalishlarga aylanmoqda. Prezident Sh. Mirziyoyev ta’kidlaganidek, “Ta’lim tizimini tubdan isloh qilmasdan turib, jamiyatni yangilash, taraqqiyotga erishish mumkin emas” [1]. Shu bois ta’lim paradigmalari o‘zgarishi falsafiy nuqtayi nazardan ham chuqur tahlilni talab etadi.

Kompetensiyaviy yondashuv ta’limning natijaga yo‘naltirilganligini ta’minlaydi. Bu yondashuv talabalarning nazariy bilimlarni amaliyotda qo‘llay olish qobiliyatini, muammolarni hal qilish, jamoada ishlash, tanqidiy fikrlash kabi ko‘nikmalarini rivojlantirishga qaratilgan. Kasbiy standartlar va mehnat bozorining talablari asosida shakllantirilgan kompetensiyalar talabalarning kelajakdagi kasbiy faoliyatda muvaffaqiyatga erishishlari uchun zaruriy poydevorni yaratadi. Kompetensiyaviy yondashuv ta’lim jarayonini real hayot va ish sharoitlariga yaqinlashtiradi.

“Paradigma” tushunchasi (yunoncha paradeigma – namuna, andoza) T. Kun tomonidan ilmiy tafakkur modeli sifatida izohlangan. Ta’lim paradigmasi esa, o‘z

navbatida, jamiyatda ustuvor bo‘lgan inson, bilim va qadriyatlar haqidagi falsafiy tasavvurlar tizimi hisoblanadi. Ta’limning mazmuni tarix davomida turli falsafiy yondashuvlar asosida shakllangan: antik davrda – axloqiy kamolot, Uyg‘onish davrida – insonparvarlik, Yangi davrda – ratsional tafakkur, XX asrda – tajribaviy o‘qitish va refleksiya. XXI asrda esa ta’limning falsafiy asosi insonni o‘zini rivojlantiruvchi subyekt sifatida anglash g‘oyasiga tayanadi [2]. O‘zbekistonlik faylasuflar – B. Karimov, I. To‘rayev, A. Qodirov – ta’limning falsafiy mohiyatini inson ma’naviyatini yuksaltirish, ijtimoiy ongni yangilash va milliy o‘zlikni mustahkamlash jarayoni sifatida talqin etadilar [3].

Raqamli ta’lim – bu faqat texnologik yangilik emas, balki inson tafakkuri va bilish faoliyatining raqamli shaklga o‘tishi jarayonidir. Bu paradigma axborot falsafasi, texnologik gumanizm va kognitiv muvozanat nazariyalari bilan chambarchas bog‘liq. Raqamli muhitda bilim individual emas, balki tarmoq asosida yaratiladi, “kollektiv aql” (collective intelligence) tamoyili kuchayadi. Shuningdek, raqamli ta’limda shaxsning o‘rganish jarayonidagi roli o‘zgaradi: o‘quvchi – passiv iste’molchi emas, balki faol bilim yaratuvchiga aylanadi [4]. Masalan, O‘zbekistonning “Raqamli ta’lim” milliy dasturi (2022–2026) shaxsni raqamli madaniyat, axborot etikasi va ijodkorlik ruhida tarbiyalashga qaratilgan. Faylasuf N. Jo‘rayev ta’kidlaganidek, “raqamli tafakkur bu yangi borliqni idrok etish madaniyatidir” [5].

Shu bilan birga, raqamli ta’limning salbiy jihatlarini ham inkor etib bo‘lmaydi. Virtual muhitga haddan tashqari bog‘lanib qolish, ijtimoiy izolyatsiya, axborot xavfsizligi va raqamli tengsizlik kabi muammolar diqqat markazida bo‘lishi lozim. Shuning uchun raqamli ta’limni amalga oshirishda ehtiyotkorlik va muvozanatni saqlash, texnologiyalarni insoniylik tamoyillari bilan uyg‘unlashtirish zarur.

Kompetensiyaviy yondashuv — bu inson faoliyatini faqat bilimlar majmuasi emas, balki axloqiy, ijtimoiy va kasbiy mas’uliyat tizimi sifatida tushunishga asoslanadi. Bu yondashuvning falsafiy ildizlari pragmatizm (J. Dyui), ekzistensializm (S. Kierkegaard, J.-P. Sartr), hamda faoliyat falsafasiga borib taqaladi. Unga ko‘ra, haqiqiy bilim — amaliyotda qo‘llaniladigan, ijtimoiy qiymatga ega bilimdir. O‘zbekiston kontekstida bu yondashuv “Kasb-hunar ta’limi konsepsiyasi” (2021) asosida rivojlanib, shaxsning kasbiy madaniyatini va mehnat etikasi-ni shakllantirishga qaratilgan. Sh. Yusupovning fikricha, “kompetensiyaviy yondashuv – ta’limni insonparvarlashtirishning zamonaviy bosqichidir” [6].

Uzluksiz ta’lim (lifelong learning) – inson hayoti davomida o‘zini takomillashtirish tamoyiliga asoslanadi. Bu paradigma insonni “doimiy o‘quvchi” sifatida tasavvur etadi. Falsafiy jihatdan bu yondashuv A. Toffler, E. Fromm, J. Delor

kabi mutafakkirlarning “ta’lim – bu hayotning o‘zi” degan g‘oyasiga tayanadi. O‘zbekiston faylasufi M. Xolbekov esa ta’limni “ma’naviy o‘zgarishning ijtimoiy mexanizmi” sifatida talqin etadi [7]. Uzluksiz ta’lim paradigmasi jamiyatning madaniy barqarorligini ta’minlash bilan birga, mehnatsevarlik, mas’uliyat va kasbiy madaniyatni rivojlantiradi.

5. Global tendensiyalar va milliy qadriyatlar uyg‘unligi

Globalizatsiya sharoitida ta’lim qadriyatlari o‘zgarar ekan, har bir millat o‘z ma’naviy negiziga tayanishi zarur. O‘zbekiston ta’lim falsafasi uchun bu — “ma’rifatli jamiyat qurish” g‘oyasidir. Sh. Mirziyoyevning “Yangi O‘zbekiston – ma’rifatli jamiyat” tamoyili raqamli transformatsiya, kompetensiyaviy yondashuv va uzluksiz ta’limni bir butun jarayon sifatida uyg‘unlashtiradi [8].

Shu o‘rinda, kompetensiyaviy yondashuvga alohida e’tibor qaratish zarur. Zamonaviy ta’lim tizimi faqatgina nazariy bilimlarni o‘zlashtirish bilan cheklanib qolmasligi kerak. Aksincha, u o‘quvchilarda amaliy ko‘nikmalarni shakllantirish, ularni hayotga tayyorlash, mehnat bozorida raqobatbardosh bo‘lishiga yordam berishi lozim. Raqamli texnologiyalarning rivojlanishi esa bu borada yangi imkoniyatlar eshiklarini ochmoqda.

“Yangi O‘zbekiston – ma’rifatli jamiyat” konsepsiyasi ta’lim sohasida tub o‘zgarishlarni amalga oshirish, sifatli ta’limni ta’minlash, raqobatbardosh kadrlarni yetishtirish, milliy qadriyatlarimizni asrab-avaylash va rivojlantirish kabi muhim maqsadlarga qaratilgan. Bu maqsadlarga erishish uchun barcha kuch va imkoniyatlarni safarbar etish, doimiy izlanishda bo‘lish, yangi g‘oyalar va tashabbuslarni qo‘llab-quvvatlash zarur.

Raqamli transformatsiya sharoitida ta’lim axloqiy me’yorlar va qadriyatlarni shakllantirish, shaxsning ma’naviy kamolotiga yo‘naltirilgan bo‘lishi muhim. Sun’iy intellekt va boshqa texnologiyalar ta’lim jarayonida qo‘llanilganda, ularning axloqiy jihatlarini hisobga olish, shaxsiy ma’lumotlarning himoyasini ta’minlash va texnologiyalarning suiste’mol qilinishiga yo‘l qo‘ymaslik zarur.

Ta’limning falsafiy asoslarini chuqur anglash va zamonaviy paradigmalarni amaliyotga tatbiq etish orqali biz kelajak avlodni barkamol shaxs sifatida tarbiyalashga, ularning intellektual salohiyatini ro‘yobga chiqarishga va jamiyatning barqaror rivojlanishiga hissa qo‘shishga erishamiz. Bu jarayonda ta’limning roli nafaqat bilim berish, balki shaxsda mas’uliyat hissini shakllantirish, uning ma’naviy va axloqiy komolotiga yo‘naltirishdan iborat bo‘ladi.

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J. DYUI, L. VIGOTSKIY VA B. ZIMMERMAN NAZARIYALARINING “LIR” MODELIDAGI INTEGRATIV TATBIQI

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Annotatsiya: *Ushbu tezisda J. Dyuining amaliyot orqali o‘qitish g‘oyasi, L.S. Vigotskiyning yaqin rivojlanish zonasi (ZPD) kontseptsiyasi va B. Zimmermanning o‘z-o‘zini boshqarib o‘qish (SRL) nazariyasining “LIR” (Loyiha–Izlanish–Rivojlanish) pedagogik modelida qanday integrativ tarzda tatbiq etilgani IMRAD (Kirish–Metodlar–Natijalar–Muhokama) tuzilishi asosida tahlil qilinadi. Tadqiqot natijasida uchala nazariyaning har biri modelning alohida bosqichi va funksiyasiga mos kelishi, ular birgalikda yaxlit mexanizm hosil qilishi asoslab berilgan.*

Kalit so‘zlar: *LIR modeli, J. Dyui, L. Vigotskiy, B. Zimmerman, yaqin rivojlanish zonasi, o‘z-o‘zini boshqarib o‘qish, integrativ pedagogik model.*

Аннотация: *В данных тезисах на основе структуры IMRAD (Введение–Методы–Результаты–Обсуждение) анализируется интегративное применение идеи Дж. Дьюи об обучении через практическую деятельность, концепции зоны ближайшего развития (ZPD) Л.С. Выготского и теории саморегулируемого обучения (SRL) Б. Циммермана в педагогической модели “ЛИР” (Проект–Исследование–Развитие). Результаты показывают, что каждая из трёх теорий соответствует отдельному этапу и функции модели, а вместе они образуют целостный механизм.*

Ключевые слова: *модель ЛИР, Дж. Дьюи, Л. Выготский, Б. Циммерман, зона ближайшего развития, саморегулируемое обучение, интегративная педагогическая модель.*

Abstract *: This thesis analyzes, within an IMRAD (Introduction–Methods–Results–Discussion) structure, how J. Dewey's idea of learning by doing, L.S. Vygotsky's Zone of Proximal Development (ZPD) concept, and B. Zimmerman's Self-Regulated Learning (SRL) theory are integratively applied within the “LIR” (Project–*

Research–Development) pedagogical model. The results demonstrate that each of the three theories corresponds to a distinct stage and function of the model, together forming a coherent mechanism.

***Keywords**: LIR model, J. Dewey, L. Vygotsky, B. Zimmerman, zone of proximal development, self-regulated learning, integrative pedagogical model.*

KIRISH

Zamonaviy pedagogika nazariyasida talabalarning mustaqil o‘quv-tadqiqot faoliyatini rivojlantirishga qaratilgan modellar ko‘pincha bitta nazariy manbaga tayanadi, bu esa ularning yaxlit psixologik-pedagogik mexanizmini cheklab qo‘yadi. “LIR” (Loyiha–Izlanish–Rivojlanish) modeli esa uchta klassik nazariyani — J. Dyuining amaliy faollik g‘oyasini, L. Vigotskiyning ijtimoiy-madaniy rivojlanish nazariyasini va B. Zimmermanning o‘z-o‘zini boshqarib o‘qish nazariyasini — bir tizimga birlashtirishga urinadi.Ushbu integratsiyaning ilmiy asoslanganligi, ya’ni har bir nazariyaning modelda aniq funksional o‘rniga ega ekanligini isbotlash dolzarb ilmiy-nazariy vazifadir. Tadqiqot maqsadi — uch nazariyaning “LIR” modelidagi integrativ tatbiqini tizimli tahlil qilish va ularning har birining modeldagi funksional o‘rnini aniqlashdan iborat.**Vazifalari esa quyidagilar:** har bir nazariyaning asosiy g‘oyasini qisqacha tavsiflash; ularning LIR modelining qaysi bosqichi va funksiyasiga mos kelishini aniqlash; uch nazariyaning integratsiyalashuv mexanizmini modellashtirish; integratsiyaning ilmiy-nazariy ahamiyatini asoslash.

Mavzu bo‘yicha adabiyotlar tahlili shuni ko‘rsatadiki, J. Dyuining amaliy faollik g‘oyasi va L. Vigotskiyning ijtimoiy-madaniy nazariyasi pedagogika tarixida alohida-alohida keng o‘rganilgan, biroq ularni B. Zimmermanning zamonaviy o‘z-o‘zini boshqarib o‘qish nazariyasi bilan bitta amaliy pedagogik modelda birlashtirish borasidagi ishlar hali yetarlicha emas. Aynan shu bo‘shliq ushbu tadqiqotning ilmiy zaruratini belgilaydi.

METODLAR

Tadqiqotda nazariy tahlil metodlaridan foydalanildi: manbashunoslik tahlili (J. Dyui, L. Vigotskiy va B. Zimmermanning asosiy asarlari o‘rganildi), qiyosiy-solishtirma tahlil (uch nazariyaning asosiy tushunchalari o‘zaro solishtirildi) va kontseptual modellashtirish (nazariyalar LIR modelining bosqichlari bilan mosligi jadval ko‘rinishida tizimlashtirildi).

Tahlil ikki bosqichda olib borildi. Birinchi bosqichda har bir nazariyaning LIR modelining qaysi bosqichiga (Loyiha, Izlanish, Rivojlanish) mos kelishi umumiy darajada aniqlandi. Ikkinchi bosqichda esa besh bosqichli skaffolding jadvalining har

bir pog‘onasi uch nazariya nuqtai nazaridan — Dyuining qarashlari bo‘yicha mazmuniy tavsif, Vigotskiyning qarashlari bo‘yicha pedagogik yordam darajasi va Zimmerman qarashlari bo‘yicha o‘z-o‘zini boshqarib o‘qish (SRL) fazasi bo‘yicha — batafsil tahlil qilindi. Tanlangan metodologiya sifat tadqiqotlari uchun xos bo‘lgan kontseptual-analitik yondashuvga asoslanadi va empirik mal’umot yig‘ishni emas, balki mavjud nazariy bilimlarni yangi tizimga integratsiya qilishni maqsad qiladi.

NATIJALAR

Tahlil natijasida uch nazariyaning LIR modelidagi funksional taqsimoti aniqlandi (1-jadval).

1-jadval. Uch nazariyaning “LIR” modelidagi funksional taqsimoti

Nazariya	Asosiy g‘oyasi	LIR bosqichi	Funksiyasi
J. Dyui	Amaliyot orqali o‘qitish (learning by doing)	Loyiha	Faollikning mazmunini belgilaydi
L. Vigotskiy	Yaqin rivojlanish zonasi (ZPD)	Izlanish	Pedagogik yordam me’yorini belgilaydi
B. Zimmerman	O‘z-o‘zini boshqarib o‘qish (SRL)	Rivojlanish	Mustaqillik mexanizmini belgilaydi

J. Dyuining g‘oyasi asosan “Loyiha” bosqichida — muammoni amaliy tajriba orqali his qilish va loyihalashtirishda namoyon bo‘ladi hamda talaba faoliyatining mazmunini belgilaydi. L. Vigotskiyning ZPD kontseptsiyasi “Izlanish” bosqichidagi pedagogik yordam darajasini, ya’ni o‘qituvchi qanchalik faol ishtirok etishi kerakligini belgilaydi. B. Zimmermanning SRL nazariyasi esa “Rivojlanish” bosqichidagi refleksiya va o‘z-o‘zini baholash jarayonlarini tushuntiradi.

Yanada batafsil tahlil natijasida besh bosqichli skaffolding jadvalining har bir pog‘onasi uch nazariya nuqtai nazaridan tavsiflandi (2-jadval).

2-jadval. Skaffolding bosqichlarining uch nazariya nuqtai nazaridan tavsifi

Bosqich	Dyuicha mazmun	Vigotskiy qarashlari bo‘yicha yordam darajasi	Zimmerman qarashlari bo‘yicha SRL fazasi
I	Muammoni amaliy tajriba orqali his qilish	Yuqori (80%)	Oldindan o‘ylash (forethought)
II	Faoliyat rejasini amaliy sinash	O‘rtadan yuqori (65%)	Oldindan o‘ylash → bajarish
III	Mustaqil tajriba va izlanish	O‘rta (45%)	Bajarish (performance)

IV	Natijani amaliy taqdim etish	Past (25%)	Bajarish → o‘z-o‘zini nazorat
V	Tajribani refleksiv anglash	Minimal (10%)	O‘z-o‘zini refleksiya qilish

Jadvaldan ko‘rinib turibdiki, Zimmermanning SRL fazalari (oldindan o‘ylash, bajarish, o‘z-o‘zini refleksiya qilish) modelning barcha besh bosqichi davomida izchil rivojlanib boradi, bu esa uning modeldagi “gorizontal” (uzluksiz) integratsiyalashgan rolini ko‘rsatadi, Vigotskiyning yordam darajasi esa bosqichdan bosqichga kamayib boruvchi “vertical” o‘zgaruvchi sifatida namoyon bo‘ladi.

Integratsiya mexanizmining nazariy asoslanganligi

Uch nazariyaning LIR modelidagi integratsiyasi tasodifiy birlashtirish emas, balki ularning har biri o‘quv-tadqiqot faoliyatining turli o‘lchamlarini tushuntirishga ixtisoslashganligi bilan izohlanadi. Dyui faoliyatning “nima uchun” va “nima orqali” sodir bo‘lishini — ya’ni uning amaliy-tajribaviy tabiatini — tushuntiradi. Vigotskiy esa faoliyatning “kim bilan” va “qanday yordamda” sodir bo‘lishini, ya’ni uning ijtimoiy-vositachilik tabiatini ochib beradi. Zimmerman esa faoliyatning “qanday boshqarilishini” — o‘quvchining o‘z ichki jarayonlarini nazorat qilish mexanizmini — tavsiflaydi.

Ushbu uch o‘lcham — mazmuniy, ijtimoiy va boshqaruvchi — birgalikda o‘quv-tadqiqot faoliyatining to‘liq siklini qamrab oladi, bu esa nima uchun aynan shu uch nazariya tanlanganligini ilmiy jihatdan asoslaydi. Agar bitta nazariya olib tashlansa, model faoliyatning tegishli o‘lchamini tushuntira olmay qoladi: masalan, Vigotskiysiz model pedagogik yordamning me’yorini asoslay olmaydi, Zimmermansiz esa mustaqillikka o‘tish mexanizmi ochiq qolib ketadi.

Integratsiyaning chegaralari va cheklovlari

Shu bilan birga, uch nazariyani integratsiya qilish bir qator metodologik ehtiyotkorlikni talab etadi. Birinchidan, Vigotskiyning ZPD kontseptsiyasi dastlab bola rivojlanishi kontekstida ishlab chiqilgan bo‘lib, uni katta yoshdagi talabalar ta’limiga tatbiq etishda yosh xususiyatlarini hisobga olish zarur. Ikkinchidan, Zimmermanning SRL nazariyasi asosan individual o‘rganish jarayoniga qaratilgan bo‘lib, uni loyihaviy-guruhaviy faoliyatga moslashtirish qo‘shimcha nazariy asoslashni talab qiladi. Uchinchidan, Dyuining amaliy faollik g‘oyasi umumiy didaktik tamoyil bo‘lib, uni aniq baholanadigan pedagogik mexanizmga aylantirish uchun qo‘shimcha operatsionalizatsiya zarur bo‘ladi.

Ushbu cheklovlar LIR modelida qanday bartaraf etilgani alohida e'tiborga loyiq: model har bir nazariyani “sof” holda emas, balki uning LIR kontekstiga

moslashtirilgan, operatsionalizatsiya qilingan variantida qo‘llaydi — masalan, ZPD besh bosqichli aniq foizli skaffolding jadvaliga aylantirilgan, SRL esa individual emas, balki loyiha jamoasi darajasidagi refleksiya protsedurasiga moslashtirilgan.

MUHOKAMA

Olingan natijalar shuni ko‘rsatadiki, uch nazariyaning LIR modelidagi integratsiyasi tasodifiy emas, balki har biri model faoliyatining alohida jihatini - mazmunini (Dyui), pedagogik yordam darajasini (Vigotskiy) va ichki mustaqillashtirish mexanizmini (Zimmerman) - tushuntiruvchi qat’iy funksional taqsimotga ega. Bu, o‘z navbatida, modelning nafaqat amaliy, balki nazariy jihatdan ham puxta asoslanganligini tasdiqlaydi.

Ushbu natija ilgari alohida-alohida qo‘llanilgan uch nazariyani bitta amaliy pedagogik vositaga aylantirish mumkinligini ko‘rsatgani bilan ahamiyatlidir. Shu bilan birga, integratsiyaning chegaralari ham mavjud: masalan, Zimmermanning SRL nazariyasi asosan individual o‘rganish konteksti uchun ishlab chiqilgan bo‘lib, uni guruhda loyiha faoliyatiga tatbiq etishda qo‘shimcha moslashtirish talab etiladi. Bu esa keyingi tadqiqotlar uchun istiqbolli yo‘nalish bo‘lib xizmat qilishi mumkin.

Natijalarni boshqa tadqiqotlar bilan solishtirganda, J.W. Tomasning loyihaviy ta’lim bo‘yicha umumlashtiruvchi tahlilida ham nazariy asoslarning aniq ta’riflanishi model samaradorligining muhim sharti sifatida ta’kidlangan, bu esa ushbu tadqiqot natijalarini tasdiqlaydi.

XULOSA

Xulosa qilib aytganda, J. Dyui, L. Vigotskiy va B. Zimmerman nazariyalari “LIR” modelida tasodifiy emas, balki har biri o‘ziga xos funksional vazifani bajaruvchi tarzda integratsiyalashgan: Dyui faoliyat mazmunini, Vigotskiy pedagogik yordam me’yorini, Zimmerman esa mustaqillikning ichki psixologik mexanizmini belgilaydi. Ushbu uch komponentli integratsiya modelning ilmiy-nazariy asoslanganligini ta’minlaydi va uni boshqa integrativ pedagogik modellarni ishlab chiqishda namuna sifatida qo‘llash imkonini beradi.

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O'ZBEKISTON BOKS FEDERATSIYASI USTAVINING (ESKI TAHRIR, 2014 YIL) TASHKILIY-HUQUQIY TAHLILI

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O'zbekiston boks federatsiyasi bosh kotibi

ANNOTATSIYA. *Ushbu tezisda O'zbekiston Boks Federatsiyasining 2014 yilda tasdiqlangan Ustavi (eski tahrir) hujjatli kontent-tahlil metodi asosida tashkiliy-huquqiy jihatdan o'rganiladi. Federatsiyaning maqsad-vazifalari, a'zolik tartiboti, huquq va majburiyatlari, hududiy bo'limlari, mulkiy-moliyaviy asoslari hamda umumiy huquq-majburiyatlari tizimli tarzda tahlil qilinadi. Natijalar Ustavning milliy qonunchilik va xalqaro bokc tashkilotlari (AIBA/IBA, XOQ) me'yorlariga muvofiqligini tasdiqlaydi.*

Kalit so'zlar: *bokc federatsiyasi; ustav; tashkiliy-huquqiy tahlil; a'zolik; jamoat birlashmasi; hujjatli tahlil.*

ABSTRACT. *This thesis presents an organizational-legal analysis of the Charter of the Uzbekistan Boxing Federation (former edition, approved in 2014), based on a document content-analysis method. The Federation's aims and objectives, membership procedures, rights and obligations, territorial branches, and property-financial foundations are examined systematically. The results confirm the Charter's compliance with national legislation and the norms of international boxing organizations (AIBA/IBA, IOC).*

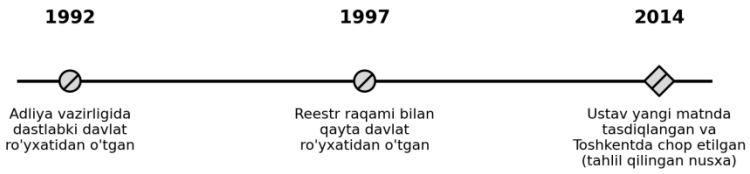
Keywords: *boxing federation; charter; organizational-legal analysis; membership; public association; document analysis.*

KIRISH. Milliy sport federatsiyalarining ustav hujjatlari ularning tashkiliy tuzilmasi, huquqiy maqomi hamda xalqaro sport harakati bilan o'zaro munosabatlarini belgilovchi asosiy manba hisoblanadi. Bunday hujjatlarning sifati va aniqligi nafaqat tashkilotning ichki barqarorligiga, balki uning xalqaro sport tashkilotlari tomonidan tan olinishiga ham bevosita ta'sir ko'rsatadi. So'nggi o'n yillikda xalqaro sport boshqaruvi mavzusidagi tadqiqotlar sezilarli darajada kengaydi. Geeraert [2] milliy federatsiyalarning boshqaruv sifatini baholovchi "National Sports Governance Observer" instrumentini ishlab chiqib, ko'plab tashkilotlarda shaffoflik, hisobdorlik va ichki demokratik jarayonlar bo'yicha jiddiy kamchiliklar mavjudligini aniqladi.

Chappelet va Mrkonjic [3] esa xalqaro sport tashkilotlari uchun "yaxshi boshqaruv" darajasini o'lchash imkonini beruvchi BIBGIS (Basic Indicators for Better Governance in International Sport) tizimini taklif etib, shaffoflik, demokratik saylov jarayonlari va ichki nazoratni asosiy mezonlar sifatida belgiladilar. Geeraert, Alm va Groll [4] Olimpiya harakatiga a'zo 35 ta xalqaro federatsiyaning ustav va boshqaruv hujjatlarini qiyosiy tahlil qilib, ularning aksariyatida mansab muddatiga cheklov, manfaatlar to'qnashuvini tartibga solish va gender vakillik kabi zamonaviy boshqaruv tamoyillari to'liq aks etmaganini ko'rsatdilar. Chappelet [5] xalqaro sport tashkilotlarining institutsional islohotga muhtojligini asoslab, ularning boshqaruv hujjatlarini davriy yangilab borish zarurligini ta'kidladi. Ushbu tadqiqotlar federatsiya ustavining sifati va shaffofligi uning institutsional barqarorligiga bevosita ta'sir qilishini isbotlaydi. Shu bilan birga, O'zbekiston milliy sport federatsiyalarining ustav hujjatlari bo'yicha maxsus ilmiy tahlillar hozircha yetarlicha yoritilmagan, bu esa mazkur yo'nalishda tadqiqot olib borish zaruratini keltirib chiqaradi. O'zbekiston Respublikasida jamoat birlashmalari va nodavlat notijorat tashkilotlari faoliyati 1991 va 1999 yillarda qabul qilingan tegishli qonunlar [6; 7] bilan tartibga solinadi, ammo alohida sport federatsiyalari ustavlarining ushbu qonunchilik va xalqaro sport tashkilotlari me'yorlariga qanchalik mos kelishi masalasi ilmiy jihatdan yetarlicha o'rganilmagan. O'zbekiston Boks Federatsiyasi (O'BF) mamlakatimizda olimpik boksni boshqarish va rivojlantirishda maxsus vakolatga ega yagona nodavlat notijorat tashkiloti sifatida faoliyat yuritadi. Federatsiyaning amaldagi (yangi tahrirdagi) Ustavidan oldin qo'llanilgan 2014 yilgi tahrir dastlab 1992 yilda Adliya vazirligida davlat ro'yxatidan o'tgan, 1997 yilda esa qayta ro'yxatdan o'tgan bo'lib, uzoq davr mobaynida Federatsiya faoliyatining huquqiy asosini tashkil etgan. Tadqiqotning amaliy ahamiyati shundan iboratki, uning natijalari nafaqat O'BF, balki boshqa milliy sport federatsiyalarining ustav hujjatlarini takomillashtirishda, ularni xalqaro yaxshi boshqaruv standartlariga moslashtirishda amaliy tavsiyalar sifatida foydalanilishi mumkin. Ushbu tezisning maqsadi – mazkur eski tahrirdagi Ustavning tarkibiy tuzilmasi va mazmunini sistemali tahlil qilish, uning milliy qonunchilik hamda xalqaro bokc tashkilotlari me'yorlariga mosligini aniqlashdan iborat. Tadqiqot quyidagi savollarga javob izlaydi: Ustavning tarkibiy tuzilmasi qanday mantiqqa asoslangan? A'zolik va hududiy bo'limlarga oid qoidalar qay darajada aniq reglamentlashtirilgan? Hujjat milliy qonunchilik va xalqaro me'yorlarga qay darajada mos keladi?

MATERIAL VA METODLAR. Tadqiqot obyekti sifatida "O'zbekiston boks federatsiyasining Ustavi" (eski tahrir, Toshkent – 2014 y.) hujjati tanlandi. Hujjat 18 ta bobdan iborat bo'lib, Federatsiya raisining birinchi o'rinbosari M.K. Babayev

tomonidan imzolangan. Tadqiqot metodi sifatida hujjatli kontent-tahlil (document content analysis) qo'llanildi: har bir bob alohida ko'rib chiqilib, uning mazmuni quyidagi kategoriyalarga bo'lib o'rganildi: (1) umumiy qoidalar va rasmiy maqom; (2) maqsad, vazifa va funktsiyalar; (3) a'zolik tartiboti hamda a'zolarning huquq-majburiyatlari; (4) hududiy bo'limlar; (5) Federatsiyaning umumiy huquq va majburiyatlari; (6) mulkiy-moliyaviy asoslar; (7) qayta tashkil etish va tugatish tartibi. Kategoriyalar tanlovi Chappelet va Mrkonjic [3] tomonidan taklif etilgan BIBGIS tizimidagi tuzilmaviy shaffoflik va hisobdorlik mezonlariga asoslangan holda amalga oshirildi. Tahlil davomida hujjat matni O'zbekiston Respublikasining "Nodavlat notijorat tashkilotlari to'g'risida"gi [6] va "O'zbekiston Respublikasida jamoat birlashmalari to'g'risida"gi [7] qonunlari, shuningdek Olimpiya Xartiyasi [8] va IBA (sobiq AIBA) Ustavining umumiy tamoyillari bilan qiyosiy kontekstda baholandi. Kategoriyalar bo'yicha aniqlangan qoidalar Ustav moddalari (band raqamlari) bilan bog'liq holda hujjatlashtirildi, bu esa natijalarning tekshirilishi va qayta tiklanishini ta'minlaydi. Tadqiqot doirasi faqat 2014 yilgi eski tahrirdagi Ustav bilan chegaralangan bo'lib, uni amaldagi yangi tahrir bilan to'liq qiyoslash ushbu tezis doirasidan tashqarida qoldirildi va kelgusi tadqiqotlar mavzusi sifatida belgilandi; xuddi shuningdek, Ustavning boshqaruv organlari va nazorat tizimiga oid batafsil institutsional tahlili alohida tezis doirasida ko'rib chiqiladi. Metodning cheklovi sifatida shuni ta'kidlash lozimki, kontent-tahlil sifatiy xususiyatga ega bo'lib, natijalar bitta tadqiqotchi tomonidan kodlashtirilgan; shu sababli kelgusida bir nechta ekspert ishtirokida kod ishonchliligini tekshirish tavsiya etiladi. Hujjatning davlat ro'yxatidan o'tish bosqichlari (1992, 1997 va 2014 yillar) 1-rasmda keltirilgan.



1-rasm. O'zbekiston Boks Federatsiyasi Ustavining ro'yxatga olinish tarixi (manba: tahlil qilingan hujjat matni)

NATIJALAR. Ustavning tarkibiy tuzilmasi 18 ta bobni o'z ichiga oladi: umumiy qoidalar; Federatsiyaning asosiy maqsad va vazifalari; asosiy funktsiyalar; a'zolikka qabul qilish va a'zolikdan mahrum etish shartlari; hududiy bo'limlar; Federatsiya huquqlari; Federatsiya majburiyatlari; tuzilma va rahbar organlar; ovoz berish tartibi;

Ijroiya qo'mita; Federatsiya Raisi; Bosh kotib; Murabbiylar kengashi; mulk va pul mablag'larini shakllantirish manbalari; Nazorat-taftish komissiyasi; qayta tashkil etish va tugatish; Ustavga o'zgartirish kiritish tartibi; yakuniy qoidalar. Ushbu tuzilma umumiy qoidalardan boshlab, maqsad-vazifalar, a'zolik, boshqaruv va nihoyat tugatish tartibigacha bo'lgan mantiqiy izchillikka ega, bu esa xalqaro amaliyotda keng tarqalgan ustav qurilish sxemasiga mos keladi. I bob (1.1–1.14) Federatsiyaning huquqiy maqomini belgilaydi: u O'zbekistonda olimpik boksni boshqarishda maxsus vakolatga ega yagona nodavlat notijorat tashkiloti bo'lib, AIBA, Kontinental Boks Konfederatsiyasi va Xalqaro Olimpiya qo'mitasi tarkibida namoyon bo'ladi (1.1). Federatsiya barcha a'zolari uchun jinsi, irqi, millati, tili, dini yoki ijtimoiy kelib chiqishidan qat'i nazar teng huquq va majburiyatlarni kafolatlaydi (1.8). II bobda olti asosiy maqsad va yettita vazifa (2.1–2.2) sanalgan bo'lib, ular orasida olimpik boksni rivojlantirish, yoshlarni vatanparvarlik ruhida tarbiyalash hamda AIBA/JBS/APB texnik qoidalariga rioya qilish alohida o'rin tutadi. III bobda Federatsiyaning o'n uchta asosiy funktsiyasi (3.1–3.13) sanab o'tilgan, jumladan xalqaro va respublika musobaqalarini tashkillashtirish, murabbiy va hakamlar attestatsiyasi, sport delegatsiyalarini shakllantirish, hamda chet el federatsiyalari bilan shartnomalar tuzish. IV bobga ko'ra, Federatsiyaga a'zolik ixtiyoriy va cheklanmagan bo'lib, 18 yoshdan oshgan jismoniy shaxslar hamda jamoalar a'zo bo'lishi mumkin (4.1). A'zolikdan mahrum etishning to'rtta asosi (vafot etish, fuqarolikni o'zgartirish, Olimpiya xartiyasi qoidalarini buzish, Federatsiya organi qarori – 4.5.1–4.5.4) hamda a'zolarning o'nta huquqi (saylash va saylanish, loyihalar ishlab chiqishda ishtirok etish, musobaqalarda qatnashish, sport razryadi olish, axborot olish, o'quv-uslubiy resurslardan foydalanish, ixtiyoriy chiqish va boshqalar – 4.6.1–4.6.10) va oltita majburiyati (Ustav talablariga rioya qilish, xavfsizlik qoidalariga amal qilish, dopingga qarshi nazoratdan o'tish, sanitariya-gigiyena talablariga rioya qilish – 4.8.1–4.8.6) aniq reglamentlashtirilgan. V bob Federatsiyaning hududiy bo'limlariga bag'ishlangan: mintaqaviy, viloyat va shahar bo'limlari yuridik shaxs maqomiga ega bo'lishi yoki ega bo'lmasligi mumkin, ammo ularning barchasi markaziy Ustav va Ijroiya qo'mita tomonidan tasdiqlangan nizom asosida faoliyat yuritadi (5.1–5.8). VI bobda Federatsiyaning umumiy huquqlari sanalgan: a'zolari manfaatlarini ifodalash va himoya qilish, davlat organlariga takliflar kiritish, ommaviy axborot vositalarini tashkil etish, tadbirkorlik tuzilmalarini yaratish hamda o'z ramziy belgilariga ega bo'lish. VII bobda esa Federatsiyaning majburiyatlari — qonun hujjatlariga rioya etish, mol-mulk va pul mablag'laridan foydalanish to'g'risidagi ma'lumot bilan tanishish erkinligini ta'minlash, ro'yxatga oluvchi hamda soliq va statistika organlariga hisobot taqdim etish — belgilangan. VIII–XIII boblarda

Federatsiyaning boshqaruv organlari (Konferentsiya, Ijroiya qo'mita, Rais, Bosh kotib, Murabbiylar kengashi) tavsiflangan bo'lib, ularning vakolatlari va o'zaro munosabatlari alohida institutsional tahlil doirasida batafsil ko'rib chiqiladi. Umumiy jihatdan, Federatsiyaning oliy organi Konferentsiya hisoblanadi va u har 4 yilda hisobot-saylov, har 2 yilda esa oddiy tartibda chaqiriladi (8.1); konferentsiyalar oralig'ida umumiy rahbarlikni tarkibi 15 kishidan oshmaydigan Ijroiya qo'mita amalga oshiradi (10.1), moliyaviy-xo'jalik faoliyati ustidan nazoratni esa kamida 3 kishidan iborat Nazorat-taftish komissiyasi olib boradi (15.1–16.4). Bu uch pog'onali tuzilma — Konferentsiya, Ijroiya qo'mita va Nazorat-taftish komissiyasi — hokimiyat taqsimoti tamoyiliga asoslangan bo'lib, xalqaro amaliyotda keng qo'llaniladigan boshqaruv modeliga mos keladi. XIV bobda mulk va pul mablag'larining to'qqizta manbai (homiylik, a'zolik badallari, davlat granti, tadbirkorlik daromadi va boshqalar) sanalgan bo'lib, mablag'lardan foydalanish faqat Ustav maqsadlariga muvofiq amalga oshirilishi shart (14.1–14.9). XVI bobga ko'ra, Federatsiyani qayta tashkil etish yoki tugatish delegatlar ovozining kamida uchdan ikki qismi bilan qabul qilinadigan Konferentsiya qarori orqali amalga oshiriladi, tugatishda esa kreditorlar talabi qondirilgandan so'ng qolgan mol-mulkning Federatsiya a'zolari o'rtasida taqsimlanishi qat'iyan taqiqlanadi (16.1–16.3).

MUHOKAMA. Tahlil natijalari shuni ko'rsatadiki, Ustavning barcha asosiy jihatlari — maqsad-vazifalardan tortib tugatish tartibigacha — milliy qonunchilik [6; 7] va xalqaro bokc harakati tamoyillari [8] bilan uyg'un holda ishlab chiqilgan. Xususan, Federatsiyaning kamsitmaslik tamoyili (1.8), a'zolik huquq-majburiyatlarining batafsil reglamentlanishi (4.6–4.8) hamda hududiy bo'limlarning aniq huquqiy maqomi (5.1–5.8) hujjatning kuchli tomonlari sifatida baholanishi mumkin. Shu bilan birga, zamonaviy "yaxshi boshqaruv" standartlari [3; 4] nuqtai nazaridan qaraganda, Ustavda bir qator jihatlar — jumladan, gender vakillikka oid aniq kvota yoki ko'rsatkichlar, shuningdek manfaatlar to'qnashuvini (conflict of interest) tartibga soluvchi alohida modda — maxsus ajratilmagan. Bu, Geeraert, Alm va Groll [4] tomonidan o'rganilgan 35 ta xalqaro federatsiyaning aksariyatida kuzatilgan umumiy tendentsiya bilan mos keladi. Federatsiyaning markaziy apparat va hududiy bo'limlar o'rtasidagi vakolatlar taqsimoti (V bob) markazlashgan nazorat bilan mahalliy avtonomiya o'rtasida muvozanatni ta'minlashga qaratilgan bo'lib, bu Chappelet va Mrkonjic [3] taklif etgan BIBGIS tizimidagi "tuzilmaviy shaffoflik" mezoniga mos keladi. Mulkiy-moliyaviy manbalarning xilma-xilligi (XIV bob) Federatsiyaning moliyaviy barqarorligini ta'minlashga xizmat qiladi, biroq bu mablag'lardan foydalanish ustidan mustaqil tashqi audit talabining Ustavda alohida modda sifatida nazarda tutilmaganligi kelgusi tahrirlarda e'tiborga olinishi lozim bo'lgan jihat

hisoblanadi. Chappelet [5] ta'kidlaganidek, xalqaro sport tashkilotlari o'z boshqaruv hujjatlarini davriy ravishda yangilab borishi zarur; ushbu nuqtai nazardan, 2014 yilgi Ustavning keyinchalik yangi tahrir bilan almashtirilgani Federatsiyaning institutsional rivojlanish jarayoniga mos kelishini ko'rsatadi. Amaliy tavsiya sifatida, kelgusi ustav tahrirlariga gender vakillik ko'rsatkichlari, manfaatlar to'qnashuvini oshkor qilish talabi hamda mustaqil tashqi audit mexanizmini kiritish tavsiya etiladi. Kengroq kontekstda qaraganda, O'zbekistonda jamoat birlashmalari va nodavlat notijorat tashkilotlari sektori 1990-yillarning boshidan buyon izchil qonunchilik asosida rivojlanib kelmoqda [6; 7], biroq alohida sport federatsiyalarining ustav hujjatlari sifatini xalqaro standartlar asosida tizimli baholash amaliyoti hozircha shakllanmagan. Shu nuqtai nazardan, mazkur tahlil boshqa milliy sport federatsiyalari — jumladan kurash, dzyudo va boks kabi Olimpiya turlari bo'yicha federatsiyalar — uchun o'z ustav hujjatlarini takomillashtirishda amaliy yo'l-yo'riq bo'lib xizmat qilishi mumkin. Metodologik jihatdan, kelgusi tadqiqotlarda BIBGIS [3] indikatorlari asosida miqdoriy ballash tizimini qo'llash tavsiya etiladi: bunda har bir mezon (shaffoflik, hisobdorlik, demokratik jarayonlar, ichki nazorat) bo'yicha Ustav moddalari ballarga ajratilib, umumiy boshqaruv indeksi hisoblab chiqiladi. Bunday yondashuv sifatiy kontent-tahlilni miqdoriy ko'rsatkichlar bilan boyitib, milliy federatsiyalar o'rtasida qiyosiy reyting tuzish imkonini beradi.

XULOSA. O'zbekiston Boks Federatsiyasining 2014 yilgi eski tahrirdagi Ustavi Federatsiya faoliyatining huquqiy asosini mustahkam belgilab bergan, 18 bob bo'yicha maqsad-vazifalardan tortib qayta tashkil etish tartibigacha bo'lgan barcha jihatlarni qamrab olgan kompleks hujjat sifatida baholanishi mumkin. Hujjat milliy qonunchilik va xalqaro bokc tashkilotlari me'yorlarining uyg'unligini namoyish etadi, ayniqsa a'zolik huquq-majburiyatlari va hududiy bo'limlar maqomining batafsil reglamentlanishi uning kuchli tomonlari qatoriga kiradi. Shu bilan birga, gender vakillik va manfaatlar to'qnashuvi kabi zamonaviy boshqaruv tamoyillarini keyingi tahrirlarga kiritish tavsiya etiladi. Olingan natijalar milliy sport federatsiyalarining ustav hujjatlarini qiyosiy-tarixiy jihatdan o'rganishda, shuningdek eski va yangi tahrirlar o'rtasidagi o'zgarishlarni baholashda metodologik asos bo'lib xizmat qilishi mumkin. Kelgusi tadqiqotlar Ustavning boshqaruv organlariga oid qismini institutsional nuqtai nazardan chuqurroq tahlil qilishga hamda eski va yangi tahrirlarni tizimli qiyoslashga qaratilishi mumkin. Boshqaruv nuqtai nazaridan, tadqiqot natijalari O'zbekiston Respublikasi Sport va turizm vazirligi hamda Milliy Olimpiya qo'mitasi uchun milliy federatsiyalar ustav hujjatlarini monitoring qilish bo'yicha yagona metodik ko'rsatmalar ishlab chiqishda dastlabki asos bo'lib xizmat qilishi mumkin.

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SUN’IY INTELLEKT ISHTIROKIDAGI SHARTNOMAVIY MUNOSABATLARNING HUQUQIY TABIATI VA AN’ANAVIY SHARTNOMA NAZARIYASI BILAN MUNOSABATI

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Annotatsiya: Mazkur maqolada sun’iy intellekt ishtirokidagi shartnomaviy munosabatlarning huquqiy tabiati va uning an’anaviy shartnoma nazariyasi bilan o‘zaro bog‘liqligi tahlil qilinadi. Unda shartnomaning oferta va aksept, taraflarning erk-irodasi, subyektivligi hamda majburiyatlarni ijro etish kabi fundamental elementlarining sun’iy intellekt ishtirokidagi munosabatlarda namoyon bo‘lish xususiyatlari yoritiladi. Shuningdek, sun’iy intellektdan foydalanish natijasida shartnoma tuzish jarayonida yuzaga kelayotgan yangi huquqiy masalalar, taraflarning huquq va majburiyatlarini belgilash hamda javobgarlik masalalarini huquqiy jihatdan tartibga solish zarurati ko‘rib chiqiladi. Tadqiqot natijasida sun’iy intellekt texnologiyalarining rivojlanishi shartnoma huquqining an’anaviy yondashuvlarini qayta ko‘rib chiqish va zamonaviy huquqiy mexanizmlarni shakllantirishni taqozo etishi asoslab beriladi.

Kalit so‘zlar: sun’iy intellekt, shartnomaviy munosabatlar, shartnoma huquqi, oferta, aksept, erk-iroda, subyektivlik, shartnoma tuzish, huquqiy javobgarlik.

Аннотация: В данной статье анализируется правовая природа договорных отношений с участием искусственного интеллекта и их взаимосвязь с традиционной теорией договора. Рассматриваются особенности проявления таких фундаментальных элементов договора, как оферта и акцепт, волеизъявление сторон, субъективность и исполнение обязательств, в условиях использования технологий искусственного интеллекта. Особое внимание уделяется новым правовым вопросам, возникающим в процессе заключения договоров с участием искусственного интеллекта, а также необходимости определения прав и обязанностей сторон и совершенствования механизмов правовой ответственности. В результате исследования обосновывается вывод о

том, что развитие технологий искусственного интеллекта требует пересмотра традиционных подходов договорного права и формирования современных механизмов правового регулирования.

Ключевые слова: искусственный интеллект, договорные отношения, договорное право, оферта, акцепт, волеизъявление, субъективность, заключение договора, юридическая ответственность.

Abstract: This article analyzes the legal nature of contractual relations involving artificial intelligence and their interaction with the traditional theory of contracts. It examines the specific features of fundamental contractual elements, including offer and acceptance, the expression of the parties' will, subjectivity, and the performance of obligations, in the context of artificial intelligence technologies. Particular attention is paid to emerging legal issues related to the conclusion of contracts involving artificial intelligence, as well as the need to define the rights and obligations of the parties and improve mechanisms of legal liability. The study concludes that the development of artificial intelligence technologies requires a reconsideration of traditional approaches to contract law and the development of modern legal regulatory mechanisms.

Keywords: artificial intelligence, contractual relations, contract law, offer, acceptance, expression of will, subjectivity, contract formation, legal liability.

Hozirgi axborot texnologiya asrida sun'iy intellekt (keying o‘rinlarda SI) texnologiyalari shartnomaviy munosabatlarning shartnoma tuzishdan boshlab ijro etish va nizolarni hal qilishgacha ishtirok etmoqda. Bu holat an'anaviy shartnoma nazariyasini qayta ko‘rib chiqishni talab qilmoqda.

Shartnomaviy munosabatlarning tarixiy taraqqiyoti uning jamiyatdagi o‘rnini belgilab berdi. Shu asosda shartnomaning asosiy funksiyalarini ajratib ko‘rsatish mumkin: Jamiyatdagi turli munosabatlarni huquqiy jihatdan tartibga solish;

1. Iqtisodiyot tizimida hamda boshqa tarmoqlardagi subyektlar o‘rtasida o‘zaro aloqalarni va bog‘liqlikni ta'minlash;
2. Kelishuv ishtirokchilarining shaxsiy manfaatlarini muvofiqlashtirish orqali umumiy va mushtarak maqsadlarni shakllantirish;
3. Shartnoma tomonlarining qonuniy huquq hamda manfaatlarini muhofaza qilishga xizmat qiluvchi fundamental yuridik hujjat vazifasini o‘tash.

Shartnomaning funksional ahamiyati unga berilgan ta'riflar va nazariy yondashuvlar orqali yanada oydinlashadi.M. Braginskiy va V. Vitryanskiy kabi huquqshunos olimlarning fikricha, shartnoma tushunchasiga ta'rif berishda, eng avvalo, qonunchilik va shartnoma o‘rtasidagi o‘zaro mutanosiblikni belgilab olish

zarur. Ularning tahlillariga ko‘ra, mazkur holatda uch xil konseptual yondashuv mavjud.

“Erk - iroda nazariyasi” ga asosan, tarafdorlarining qarashlariga binoan, shartnoma tuzayotgan tomonlarning xohish - irodasi asosiy omil hisoblanadi. Qonun esa ushbu omilga qo‘shimcha kirituvchi yoki uni ma’lum darajada cheklovchi vosita sifatida namoyon bo‘ladi.

“Qonun ustuvorligi nazariyasi”ga muvofiq, shartnoma mustaqil kuchga ega emas, balki qonunchilikdan kelib chiqadigan huquqiy oqibatni, ya’ni samarani ifodalaydi, xolos.

Empirik nazariyaga ko‘ra, tomonlarning xohish - irodasi ongli ravishda faqat muayyan iqtisodiy samaraga qaratilgan bo‘ladi. Shu bilan birga, bunday vaziyatda shartnomaning huquqiy oqibatlari ushbu iqtisodiy samarani ro‘yobga chiqarish vositasi sifatida talqin qilinadi. Tomonlar mazkur yuridik oqibatlar haqida aniq tasavvurga ega bo‘lmasliklari ham mumkin va amaliyotda ko‘pincha shunday bo‘ladi[52]. Mazkur nazariy yondashuvlar O‘zbekiston qonunchiligidao‘z aksini topgan. Biroq sun'iy intellekt texnologiyalarining rivojlanishi an'anaviy shartnoma tushunchasini yangicha talqin qilishni taqozo etmoqda.

O‘zbekiston Respublikasining Fuqarolik kodeksi 353-moddasida “shartnoma tushunchasi” ga ta’rif berilgan bo‘lib, uning mazmuniga ko‘ra, ikki yoki bir necha shaxsning fuqarolik huquqlari va burchlarni vujudga keltirish, o‘zgartirish yoki bekor qilish haqidagi kelishuvi shartnoma deb ataladi[53]. Shaxslar esa O‘zbekiston Respublikasining Fuqarolik kodeksi 1-moddasining ikkinchi qismiga asosan, fuqarolik-huquqiy munosabatlarning ishtirokchilari fuqarolar (jismoniy shaxslar) hamda yuridik shaxslar hisoblanadi. Ular fuqarolik huquqlariga o‘z xohish-irodasiga muvofiq ravishda ega bo‘ladilar va ushbu huquqlarni o‘z manfaatlarini ko‘zlab amalga oshiradilar. Shuningdek, taraflar shartnoma asosida o‘z huquq va majburiyatlarini mustaqil ravishda belgilashda hamda qonunchilik talablariga zid bo‘lmagan istalgan shartnoma shartlarini aniqlashda erkin hisoblanadilar. Shu sababli shartnoma huquqining asosiy tamoyillari sifatida shartnoma erkinligi, shartnoma ishtirokchilarining insofliligi, shartnoma shartlarining oqilonaligi va tomonlar manfaatlarining muvozanatini ta’minlash, shuningdek, shartnoma intizomiga qat’iy

[52]Брагинский М., Витрянский М. Договорное право. –М.: 1997. –9-стр. Available at: https://library.nlu.edu.ua/POLN_TEXT/KNIGI/DOGOVOR_KN_1.pdf

[53] O‘zbekiston Respublikasining Fuqarolik kodeksi available at : https://lex.uz/docs/-111189#-155454

rioya etish tamoyillarini ko‘rsatish mumkin[54]. Ammo SI ishtirokidagi shartnomalar shartnomaviy munosabatlarda yuqoridagi tamoyillarga qarshi chiqadi.

Iqtisodiy hamkorlik va taraqqiyot tashkiloti[55] 2019-yilgi o‘zining hisobotida SI ga quyidagicha ta’rif berilgan: inson tomonidan belgilangan muayyan maqsadlarga erishish uchun real yoki virtual muhitga ta’sir ko‘rsatadigan prognozlar, tavsiyalar yoki qarorlar qabul qila oladigan mashinali tizimdir. SI tizimlari esa turlicha mustaqillik darajalarida ishlash uchun loyihalashtiriladi. O‘zbekiston Respublikasining “Axborotlashtirish to‘g‘risida”gi qonunning 3-moddasiga asosan[56], sun’iy intellekt - insonning bilim va ko‘nikmalariga taqlid qilish, shujumladan, u mustaqil ravishda o‘rganish, muammolarga yechim topish va muayyan vazifalarni bajarish jarayonida insonning aqliy faoliyati natijalariga yaqin yoki ular bilan taqqoslanadigan natijalarni taqdim etishga qodir bo‘lgan texnologik yechimlar yig‘indisini anglatadi. SIni ma’lum vazifasini bajarishga qarab : ma’lum bir vazifani bajaradigan SI va ko‘p funksiyali SI sifatida ajratish mumkin. Masalan, tuzilgan oldi-sotdi shartnomasini SIga joylash orqali bu shartnomani qanchalik tuzilishi foydali ekanligini bilish mumkin yoki SI orqali shartnoma tuzish mumkin. Birinchi holatda, shartnomaning moliyaviy jihatdan foydaliligi prognoz qilinsa, ikkinchi holatda ko‘p ma’lumotlarni o‘rganish va tahlil qilish orqali shartnoma tuzib beriladi. SI ishtirokidagi shartnomaviy munosabatlarning huquqiy tabiatini to‘liq anglash uchun an'anaviy shartnoma nazariyasining asosiy elementlarini - oferta, aksept, erk-iroda va ijro etishni SI prizmasidan alohida ko‘rib chiqish zarur.

An’anaviy shartnoma nazariyasida oferta (taklif) muayyan kelishuvni yo‘lga qo‘yish maqsadida bir tomonning ikkinchi tomonga yo‘llagan rasmiy taklifi hisoblanadi. Unda tashabbuskor ya’ni oferent ma’lum bir shartlar asosida majburiyatlarni o‘z zimmasiga olishga tayyorligini va roziligini ifodalaydi. Boshqacha aytganda, bu oferent tomonidan qarshi tomonga yuboriladigan va u qabul qilingan taqdirda huquqiy munosabatning ya’ni shartnomaning vujudga kelishiga asos bo‘ladigan taklif sifatida tavsiflanadi. Huquqshunos olimlar aksept tushunchasini ofertaga javoban va uning shartlariga mutloq muvofiq ravishda berilgan iroda izhori yoki rozilik sifatida tavsiflaydilar. Aktsept jarayoni ofertani qonuniy qabul qilish jarayoni bo‘lib, u shartnomaviy munosabatlarni shakllantirishning ikkinchi hamda yakunlovchi bosqichi sifatida e’tirof etiladi. Mazkur harakat taklif etilgan barcha

[54] Shartnoma huquqi. /Huquqshunoslik ixtisosligi bo‘yicha oliy o‘quv yurtlari magistratura talabalari uchun. –T.: TDYUI nashriyoti, 2006. – 15 bet. Available at: https://library-tsul.uz/shartnoma-u-u-i-2006/

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[56] O‘zbekiston Respublikasining “Axborotlashtirish to‘g‘risida”gi qonun available at: https://lex.uz/docs/-83472#-8017102

shartlarga so‘zsiz rozi bo‘linganini ifodalaydi va kelishuvning tuzilish jarayonini mantiqiy yakuniga yetkazadi. Aktsept qilishning asosiy maqsadi - ofertani qabul qilish va ushbu harakat vositasida shartnomaviy aloqalarni o‘rnatishdan iboratdir. Aktsept berish orqali qabul qiluvchi tomon oferentning taklifini tasdiqlaydi va unda ko‘rsatilgan majburiyatlarni bajarish mas’uliyatini o‘z zimmasiga oladi. Aktsept ifodalangandan keyin, agar u qonunchilikda belgilangan barcha talablarga to‘liq javob bersa, shartnoma qonuniy kuchga kirgan hisoblanadi va kelishuv ishtirokchilari o‘rtasida o‘zaro huquqiy majburiyatlar yuzaga keladi[57]. Shartnomaviy munosabatlarda sun’iy intellekt texnologiyalari ofertalarni shakllantirish jarayonini avtomatlashtirish hamda ularni elektron raqamli formatda yuborish imkoniyatiga ega bo‘lib, bu holat amaliyotda yuqori operativlikni ta’minlaydi va texnik xatoliklar yuzaga kelishi xavfini sezilarli darajada kamaytiradi. Biroq yuborilgan ofertaning mo‘ljallangan subyektga to‘liq yetib borishini hamda undagi shartlarning aniqligi va shaffofligini kafolatlash maqsadida qo‘shimcha texnik yuridik protokollarni joriy etish zarurati yuzaga kelishi mumkin. Sun’iy intellekt tizimlari orqali taklifni qabul qilish (aktseptlash) jarayoni oldindan belgilangan parametrlarga tayanadigan avtomatik haraktga keltirish asosida amalga oshirilishi yoxud tarkiban murakkab bo‘lgan shartnomaviy munosabatlarda inson omili (verifikatsiya) nazoratini talab qilishi mumkin. Yuqorida ta’kidlanganidek, sun’iy intellekt ofertalarni avtomatlashtirish va ularni elektron tarzda uzatish orqali jarayon tezligini oshirib, xatoliklarni minimallashtiradi. Shunga qaramay, mazkur taklifning tegishli tomonga yetib borishi va uning shartlari aniq ifodalanishini ta’minlash uchun qo‘shimcha huquqiy va texnik tartibotlar talab etiladi. Xususan, pretsedent huquqiga oid Lalman Shukla v. Gauri Dutt ishi[58] bo‘yicha chiqarilgan sud qarorida taklifning haqiqiy (yuridik kuchga ega) deb topilishi uchun u qabul qiluvchi tomonga aniq va ravshan tarzda yetkazilgan bo‘lishi shartligi belgilangan. Binobarin, sun’iy intellekt tizimlarini loyihalashtirish jarayonida ularning bunday qonuniy standartlarga to‘liq mos kelishi va shu orqali amalga oshiriladigan harakatlarning huquqiy oqibatlari ta’minlanishi shart. Shartnomaviy munosabatlarning vujudga kelishida, ya’ni taklif va qabul qilish bosqichlarida sun’iy intellekt imkoniyatlaridan foydalanish fundamental huquqiy tamoyillarga muvofiq bo‘lishini taqozo etadi. Masalan, avtomatlashtirilgan tartibda oferta yuborayotgan sun’iy intellekt tizimi ushbu taklifning adresat tomonidan

[57] Mamanazarov, S. Ingliz shartnoma huquqiga kirish [Matn] o‘quv qo‘llanma / Mamanazarov Sardor Shuhratovich. T.: TDYU nashriyoti, 2026. -8-15 b. . Available at: https://library-tsul.uz/ingliz-shartnoma-huquqiga-kirish-mamanazarov-s-2026/

[58] Lalman Shukla v. Gauri Dutt XL ALJR 489 . Available at: https://www.drishtijudiciary.com/indian-contract-act/lalman-shukla-v-gauri-dutt-1913-xl-aljr-489-ail

qabul qilinishi hamda uning mazmuni to‘liq idrok etilishini kafolatlashi lozim. Xuddi shu singari, sun’iy intellekt vositasida avtomatlashtirilgan aksept (qabul qilish) faktining o‘zi ham taklif qiluvchi tomonga aniq yetkazilishi shart, bu esa kelgusida shartnomaning tuzilganligi yoki tuzilmaganligi bo‘yicha yuzaga kelishi mumkin bo‘lgan huquqiy nizolarning oldini olishga xizmat qiladi. Oferta va aksept masalalaridan tashqari, SI ishtirokidagi shartnomaviy munosabatlarda taraflarning erk-irodasi masalasi ham alohida huquqiy muammo sifatida ko‘zga tashlanadi.

An’anaviy shartnoma huquqida erk-iroda nazariyasiga asosan, shartnomaviy munosabatlarga kirishayotgan taraflarning o‘zaro xohish - irodasi fundamental asos bo‘lib xizmat qiladi. Davlat tomonidan qabul qilingan qonun hujjatlari esa mazkur erkin iroda ifodasini to‘ldiruvchi yoxud uni muayyan doirada cheklovchi tartibga solish vositasi sifatida ishtirok etadi. SI shartnomaviy munosabatlarda ishtiroki taraflarning xohish-irodasi ma’lum darajasida cheklashi mumkin. SI o‘ziga yuklangan ma’lumotlar asosida shartnoma tuzadi, o‘zida mavjud bo‘lmagan ma’lumotlarni esa rad etadi. Masalan, A. ismli shaxs KIA avtomobili sotib olish uchun SI ga shartnoma tuzib ber, deb yozsa, SI oq rangli KIA avtomobilinisotib olish haqida shartnoma tuzsa, A. ismli shaxsni xohishi qora ranglisi bo‘lsa, bu holat tarafning xohish-irodasini cheklashga olib keladi. Shu bois SI ga to‘liq ma’lumotlar yuklash kerak bo‘ladi yoki shartnoma tuzilganidan keyin inson nazoratini amalga oshirishi kerak. Shuningdek, taraflar SIdan foydalanishdan oldin, bu texnologiya ular uchun shartnoma tuzish qobiliyatini o‘rganib chiqishi kerak. Buning uchun uning dasturchilaridan ma’lumotlar olishi, o‘zi tomonidan tekshirib ko‘rishi talab etiladi. Erk-iroda masalasi bilan bevosita bog‘liq holda, shartnoma huquqida subyektivlik, ya'ni shartnoma tuzuvchi shaxs kim bo‘lishi mumkinligi masalasi ham SI ishtirokida yangicha mazmun kasb etadi. Masalan, agar shartnoma SI tomonidan tuzilib, ikkinchi tarafga yuborilsa, ikkinchi taraf shartnomani qabul qilish uchun avvalambor, SI dan foydalanilgan tarafga xabardor qilishi belgilanishi muhim hisoblanadi. Bu orqali oferta yuborgan shaxs oferta yuborilganligini va uni qabul qilishga tayyorligini bila oladi. Shartnoma tuzilishidagi SI ishtirokidan tashqari, ijro etish bosqichida ham texnologiyaning roli tobora ortib bormoqda.Faqat shaxslar tomonidan ijro etilishi hozirgi davrga to‘g‘ri kelmaydi. SI nafaqat dasturiy ta’minot, shuningdek robot sifatida sahrtnomalarni ijro etmoqda. Masalan, zamonaviy tijorat amaliyotida shartnoma majburiyatlarini moddiy jihatdan ijro etish, ya’ni tovarlarni iste’molchiga yetkazib berish bosqichida ham avtonom robotlashtirilgan tizimlardan keng foydalanilmoqda.

Xulosa qilib aytganda sun'iy intellekt ishtirokidagi shartnomaviy munosabatlarning huquqiy tabiati an'anaviy shartnoma nazariyasi bilan murakkab

munosabatda turadi. Shartnoma insoniyat ijtimoiy hayotining zaruriy mahsuli sifatida tarixan shakllanib, oferta va aksept, erk-iroda, subyektivlik hamda ijro etish kabi asosiy elementlarga tayanib kelgan. Biroq SI ishtirokida ushbu elementlarning har biri yangicha huquqiy muammo sifatida ko‘zga tashlanmoqda.

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“NEFT INQIROZI” DAVRIDA FRANSIYADAGI MAG‘RIB MUHOJIRLARI AHVOLI

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Annotatsiya. *1970-yillarda ro‘y bergan “Neft inqirozi” sabab Yevropa davlatlari, xususan Fransiyada iqtisodiy va moliyaviy muammolar yuzaga keldi. Shu sababli, ular ishchi muhojirlarga bo‘lgan talabni bekor qilib, migrantlarni qabul qilmadi. Fransiya barcha mehnat shartnomalarini va ishga yollash agentliklarini faoliyatini chekladi hamda chegaralarda ishchi muhojirlarni ortiga qaytardi. Ishlab chiqarish ortda qolgan, iqtisodiy inqiroz hamda ijtimoiy muammolar mavjud bo‘lgan sharoitda Fransiyada ishchi migrantlar va ularning oilalarining ham ahvoli og‘irlashdi. Ushbu tezisda mana shu masala bayon etiladi.*

Kalit so‘zlar: *migratsiya, mehnat shartnomalari, muhojirlar, viza shartlari, chegara havfsizligi, tashqi aloqalar tarixi.*

Аннотация. *«Нефтяной кризис» 1970-х годов вызвал экономические и финансовые проблемы в европейских странах, особенно во Франции. В результате спрос на трудовых мигрантов был сведен на нет, и мигранты перестали приниматься. Франция ограничила все трудовые договоры и деятельность агентств по найму, а также разворачивала трудовых мигрантов на границах. В условиях отставания производства, экономического кризиса и социальных проблем положение трудовых мигрантов и их семей во Франции также ухудшилось. Данная работа посвящена этой проблеме.*

Ключевые слова: *миграция, трудовые договоры, мигранты, визовые условия, безопасность границ, история международных отношений.*

Abstract. *The “Oil Crisis” that occurred in the 1970s caused economic and financial problems in European countries, especially France. Therefore, they canceled the demand for migrant workers and did not accept migrants. France restricted all labor contracts and the activities of recruitment agencies and turned back migrant workers at the borders. In the conditions of lagging production, economic crisis and*

social problems, the situation of migrant workers and their families in France also worsened. This thesis addresses this issue.

Keywords: *migration, labor contracts, migrants, visa conditions, border security, history of foreign relations.*

1970-yillarning boshida Fransiyada aholi tarkibining 10,3 foizini tashkil qilgan 7 million muhojirlardan 12,7 foizi jazoirliklar, 12 foizi marokashliklar hamda 4,6 foizi tunisliklardan tashkil topgan edi.[59] 1930-yillardan beri mavjud Fransiyada muhojirlarga nisbatan diskriminatsiya va irqchilik neft inqirozi sabab avj oldi hamda 1973-1974-yillarda kelishmovchiliklarga sabab bo‘ldi, bu holat tarixga “inqiroz irqchiligi” deb kirdi. Mahalliy aholi va jamoalari orasida “Milliy front tiklansin”, “ishchilar harakati tugallansin”, “ikkinchi migrant avlodlari”, “shahar muammolari” kabi mazmundagi eslatmalar ommalashdi. Neft inqirozi yillarida mag‘rib muhojirlari to‘plangan Marsel shahri irqchilik markaziga aylandi va mahalliy aholi bilan migrantlar orasida ziddiyatga sabab bo‘ldi. Fransiyaning ba’zi hukumat vakillari mamlakatning muhojirlarga nisbatan diskriminantlik ruhida yondashuvi va 1974-yilda barcha migrantlarga nisbatan taqiq o‘rnatilishidan xavotirlandi. Jumladan, Mehnat vazirligining ishchi migrantlar bo‘yicha raisi Pol Diju 1974-yil oktabrda Fransiyaning migrantlarga nisbatan qat’iy siyosati noqonuniy migratsiyani rivojlantirishini ta’kidlab, muhojirlar uchun mehnat sharoitlarini yaxshilash, ixtiyoriy yurtga qaytishni qo‘llab quvvatlash, iqtisodiy tiklanish uchun davriy muhojirlarni kelishini ta’minlash kabi choralarni taklif etdi.[60]

Fransiyada ayollarga oila a’zolari haqida ma’lumot bo‘lgan oila ruxsatnomalari berilgan, ushbu ruxsatnomalar orqali, oila a’zolari ta’lim, tibbiyot kabi ijtimoiy imkoniyatlardan foydalangan. Oila a’zolarining ko‘chib kelish siyosati 1970-yillarning so‘ngida Fransiyada aholini tabiiy ko‘payish jarayonini tezlashtirdi. 1974-1975-yilda migrantlar va oila a’zolarining ko‘chib kelishiga taqiq qoyildi, 1976-yilda bu taqiq butunlay olib tashlandi hamda migrantlar uchun oila a’zolarining ko‘chib kelish huquqi tiklandi.

Fransiyada 1970-yillarda iqtisodiy turg‘unlik, 1973-1977-yillarda Neft inqirozi oqibatida, 1975-1979-yillarda yuqori ijara xarajatlari va noqulay yashash – ishlash sharoitlari tufayli migrantlar tomonidan norozilik harakatlarilar vujudga kelgan. Xususan, 1970-yillarda shimoliy sharqiy Parijdagi jazoirlik muhojir oilalarining 36 foizi asosan 1 xonalik uy, yotoqxona va mehmonxonalarda, 50 foizi eski binolarda,

[59] Katherina Natter. Fifty years of Magreb emigration. How states shaped Algerian, Moroccon and Tunisan migration. - Oxford: Oxford University Press,2014. – 475 p.

[60] Иван Гасто. Французы и иммигранты в условиях кризиса (1973-1995)// https://shs.cairn.info/revue-vingtieme-siecle-revue-d-histoire-2004-4-page-107?lang=fr [Murojaat vaqti. 19.09.2025.]

deyarli 10 foiz chordoqlarda yoki foydalanilmaydigan joylarda yashagan. Jazoirlik migrantlarning deyarli 30 foizi oqova va ichimlik suvi bilan ta'minlanmagan. "Fransiya immigratsiya vazirligi" tomonidan tadbiq etilgan ijtimoiy turar joylar bo'lib, ular korxonalar tomonidan tashkillashtirilgan edi. Xususan, "Renault" korxonasi Boulogne, Bagneux kabi hududlarda migrantlar uchun uylar shakllantirgan, ammo ular oila uchun mos bo'lmasa ham, 1966-1976-yillarda 30 foiz jazoirlik oilalar isti'qomat qilgan. Jazoirlik migrantlar asosan zavodda ish tashlash, norozilik namoyishlari hamda teng ish haqi, mehnat xavfsizligi va kafolatini talab qilgan. 1968-yil may oyida Fransiyada umumiy ish tashlash, 1970-yillarda ishchilar norozilik harakatlari uyushtirildi. Natijada 1971-1975-yillarda jazoirliklar politsiya tajovuzlari, kamsitish va irqchilik kabi muammolarga duch keldi, 1974-yil yoz-kuz oylarida ba'zi irqchi fransuzlar tomonidan jazoirliklarga tajovuz bo'lib, 1974-yilda ikki nafar migrant o'ldirib qo'yilgan. Buning oqibatida, 1975-1976-yillarda muhojirlar hukumatdan migrant huquqlarini ta'minlanishini, fransuzlar bilan teng ravishda fuqarolik va ijtimoiy huquqlar berilishini talab qilishdi. Natijada 1976-yilda Fransiya migrantlarni oila bilan yashash uchun mos sharoitli uyi bo'lmagan taqdirda oila bilan birlashish siyosatini chekladi hamda boshqa davlat migrantlariga qaraganda jazoirliklarga oldinroq doimiy turar joy, qonuniy maqomni, haq – huquqlari himoyalanishini, mehnat xavfsizligi hamda kafolatini ta'minladi.[61]

Migrantlarning oila a'zolari bilan iste'qomat qilishi Parij, Lyon, Brussel, Rotterdam kabi shaharlar va mahallalarni rivojlantirdi, xususan, ijtimoiy klublar, do'konlar, diniy hamda madaniy tashkilotlar keng tarqaldi, muhojirlar ilgari faqat qisqa ish bilan band bo'lgan bo'lsa, endi ular ta'lim, uy – joy kabi sohalarga sarmoya kiritdi. Yevropa davlatlarning ijtimoiy va madaniy jihatdan o'zgarishiga sababchi bo'lgan diaspora va etnik guruhlar shakllandi. Yevropaning ko'plab yirik shaharlarida, xususan, Parij, Brussel, Amesterdam, Marsel. Rotterdam, Utrecht kabi shaharlarida ko'p sonli marokashliklar, tunislik va jazoirlik muhojirlar yig'ilgan bo'lib, ular diniy muassasa. madaniy jamoalar, til kurslari kabi tashkilotlarga borib integratsiya qilishgan. Ular yangi muhojirlarni kelishga undab, moliyaviy jihatdan yordam berishgan, bundan tashqari, Yevropaga sayohatchi sifatida kelganlar ham migrantlar jamoasining qo'llab quvvatlashi orqali ish topib, Yevropada qolgan.[62] Yevropa hududlarida noqonuniy tarzda yurgan, shartnoma muddati tugagan muhojirlar noqonuniy migratsiya yo'nalishlarini yuzaga keltirishdi, ya'ni, ba'zi muhojirlar shartnomalari muddati

[61] Murial Cohen. Post-colonial Algerian immigration: Putting down roots in the face of exclusion.// - La Découverte: Le Mouvement Social, 2017. – No 258. – P.P. 29 – 48.
[62] Hassen Boubakr. International migrations in North Africa: political and geographical dimensions// - Tunisia, Sousse: Université de Sousse,2021. – P.P. 50 – 85.

tugaganidan so‘ng ham Yevropa davlatlarida istiqomat qilishni davom ettirgan.[63] Ba’zilari esa Belgiya, Niderlandiya, Fransiya davlatlari orasida erkin harakatlanib yurar edi hamda mehnat shartnomasini tuzmay ishga joylashgan. Boshqa tomondan, ish beruvchilarga ham bu yo‘l maqul edi, sababi noqonuniy ishchilarni hujjati yo‘q, ular juda arzon ish haqqi olishga rozi, ularni osonlikcha ishdan chetlatish va nazorat qilish mumkin bo‘lgan.

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ABDULLA NOSIROV AS A LOCAL KNOWLEDGE HOLDER AND MEDIATOR IN SOVIET UZBEKISTAN: PRESERVING AND SYSTEMATIZING THE WRITTEN HERITAGE OF CENTRAL ASIA

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Abstract. *This article examines Abdulla Nosirov (1899–1987) as a local knowledge holder who contributed to preserving, systematizing, and institutionalizing Central Asian written heritage in Soviet Uzbekistan. Drawing on archival materials, Nosirov's autobiographical notes and notebooks, contemporary press, family documents, and historiographical studies, the study reconstructs the main stages of his professional formation. Particular attention is given to the relationship between his traditional educational and manuscript-based knowledge and the emerging Soviet system of Oriental studies. The article argues that Nosirov transformed locally accumulated knowledge into a structured scholarly resource through manuscript identification, cataloguing, bibliographic description, and thematic research materials, highlighting the important role of local specialists in Soviet Oriental studies.*

Keywords: *Abdulla Nosirov, local knowledge, Soviet Oriental studies, Central Asia, manuscripts, bibliography, knowledge holders, written heritage.*

INTRODUCTION

Recent historiography increasingly examines scholars who worked in Soviet academic institutions while possessing knowledge rooted in traditional Muslim educational and manuscript cultures. Rather than viewing such figures only through conventional biographies, researchers have begun to study their role in preserving local intellectual traditions and adapting them to new academic institutions. Studies of Zaynab Maksudova [6], Albert Fatkhi [5: 278-303], Muhammad-Said Saidov [8] and the *ulama-orientalists* of Soviet Uzbekistan [9 :301–348] demonstrate that locally

educated specialists played an important role in identifying manuscripts, compiling catalogues and introducing written heritage into scholarly circulation.

This approach provides a useful framework for studying Abdulla Nosirov (1899–1987) [7:61-68]. Although he has long been recognized as a bibliographer, manuscript specialist and librarian, his scholarly heritage has mainly been discussed in biographical and specialized studies. His notebooks have also attracted scholarly attention, particularly as sources for the history of the Uzbek press, but their broader function as a system of collecting and organizing scholarly information requires further examination [10:141–152].

In this article, the concept of **local knowledge** [4:265-292] **holder** refers to a specialist whose knowledge was formed within the linguistic, intellectual, educational and manuscript traditions of Central Asia and was subsequently transferred into a modern academic institution.

The aim of the study is to examine Nosirov's professional formation and his contribution to the institutionalization of local knowledge. Particular attention is given to his early manuscript and library experience, his integration into Soviet Oriental institutions, and his work in organizing written sources.

The study is based on a comparative and historical-critical analysis of archival documents, Nosirov's autobiographical notes and notebooks, family materials, contemporary press publications, institutional records, and previous historiographical studies. [3:15–16] The analysis makes it possible to reconstruct Nosirov's professional development and to examine the transformation of his practical manuscript and bibliographic knowledge into an institutional scholarly resource.

MAIN PART

From Traditional Knowledge to Professional Formation

Abdulla Nosirov was born on 6 December 1899 in Tashkent. His early professional formation was connected with the manuscript, literary and educational environment of the city. During the first stage of his career, he worked as a calligrapher and librarian and used the literary pseudonym **Nosihiy,** which he employed until approximately 1940. His early activities were closely connected with the Jadid and enlightenment environment and with the development of book and print culture [7:61-68].

The **Turon Library** played a particularly important role in his professional development. In the early twentieth century, librarians working with Oriental collections were expected not only to preserve books but also to work with manuscripts

in Arabic, Persian and Turkic, prepare bibliographic information and assist readers. Nosirov was one of these specialists [7:61-68].

Between Political Pressure and Institutional Integration

Nosirov's professional development was interrupted by the institutional and political changes of the 1930s. In 1930 he was removed from the position of head of the Turon Library. Contemporary and archival materials suggest that this was primarily connected with administrative and structural changes in the library system rather than with professional incompetence [2:113]. He nevertheless continued his work in the library sector, serving as head of district libraries in 1931–1933. In 1933 he was arrested on an accusation of "misappropriation" and released in 1936. His subsequent employment was also subject to restrictions [3:149–150].

These circumstances are important for understanding his written heritage. His notebooks contain little information about the periods of imprisonment and exile. Instead, they concentrate on professional achievements, bibliographic materials, publications, awards and other evidence of scholarly activity. Consequently, the notebooks should not be regarded as neutral autobiographical diaries. They also reflect the construction of Nosirov's **scholarly persona** —his self-representation as a librarian, bibliographer and Orientalist [3:147]. The 1940s marked a new stage. In 1940 Nosirov joined the Oriental Department of the State Public Library as a senior researcher. His earlier experience with manuscripts and bibliography became increasingly connected with professional Oriental studies [3:159].

From Local Knowledge to Soviet Oriental Studies

The establishment of the Institute for the Study of Oriental Manuscripts in 1943 created a new institutional environment for the preservation and study of Central Asian written heritage. The Oriental Department collections of the State Public Library were transferred to the new institution, together with specialists experienced in working with manuscripts and Oriental printed materials [1:168]. Abdulla Nosirov was among them.

The development of the Institute depended on the interaction of two forms of expertise: the methodological experience of Soviet Oriental studies and the practical knowledge of locally educated specialists familiar with Central Asian manuscript traditions. Nosirov represents this intersection particularly clearly. His knowledge of Arabic, Persian and Turkic, his familiarity with manuscripts and his bibliographic experience enabled him to perform important tasks in organizing manuscript collections. Research on the Institute shows that local specialists participated in identifying manuscripts, reading and describing texts, preparing catalogue cards and identifying works by local authors that were absent from other catalogues. These

preliminary materials later became important for the preparation of Oriental manuscript catalogues, although the specialists who created them were not always listed among the authors of the final catalogues [9:347–348].

This circumstance is essential for understanding Nosirov as a **local knowledge holder.** His contribution was not limited to published scholarly works. Much of his activity consisted of less visible but fundamental scholarly processes: locating manuscripts, identifying authors and works, preparing bibliographic information and organizing sources for subsequent researchers.

Bibliographic Infrastructure and the "Nosirov Notebooks"

The methodological experience developed during his work at the State Public Library was subsequently continued at the Institute. The foundations of the materials now known as the **"Nosirov notebooks"** can partly be traced to this earlier bibliographic practice [1:168]. The notebooks constitute an important expression of Nosirov's scholarly method. They contain manuscript and printed sources, newspaper and journal materials, bibliographic references, biographical information, excerpts and personal research notes. They were created around particular subjects and historical personalities and therefore cannot be reduced to ordinary personal notes. They represent a form of organized scholarly information system [3:141–152]. For example, Nosirov's materials on the Uzbek press organized information from newspapers and journals by subject and publication, making it easier for researchers to return to the original sources. His materials concerning Babur likewise brought together information about manuscripts, lithographic editions, printed books and periodicals [10:141–152].

CONCLUSION

Abdulla Nosirov's career demonstrates how locally rooted manuscript and bibliographic knowledge was adapted to Soviet Oriental studies. As a **local knowledge holder,** he connected Central Asian manuscript traditions with academic institutions through manuscript identification, cataloguing, and systematic documentation. The "Nosirov notebooks" preserved and organized dispersed information for future research, highlighting the significant contribution of locally educated specialists to the preservation and institutionalization of Central Asian written heritage.

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LANGUAGE AND EXPRESSION IN SHAKESPEARE'S SONNETS

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Abstract*. This article examines the distinctive methods of expression found in the sonnets of William Shakespeare. It analyzes the symbols most frequently employed by the poet in his works. The study concludes that Shakespeare's sonnets demonstrate a strong harmony between form and content.*

Key words: *literature, sonnet, expression, poet, poem, symbols, literary devices, to compare, theme*

The plays of William Shakespeare were created for a broad public audience, whereas his poems were mainly intended for a smaller circle of educated readers. However, his sonnets were not addressed to poetry lovers in general, but to particular individuals in his life. For this reason, Shakespeare's sonnets may be described as lyrical diaries. Studying them gives the impression of encountering an important period in artistic and literary history - the Renaissance.

For Shakespeare, human relationships, including marriage, served as a source of insight and inspiration. He developed distinctive expressive techniques and frequently employed symbolism and allusion. Youth, for instance, is often likened to spring or morning, while beauty is compared to flowers. Maturity corresponds to autumn, and old age to winter. The splendor of summer reflects the vitality of youth. His sonnets attract readers with their vividness, and sometimes his metaphors initially appear simple, almost domestic, though they carry deeper meaning.

For example: In Sonnet 23, the poet compares a lover unable to confess his feelings to an inexperienced actor who forgets his lines on stage. Similar comparisons appear throughout the sonnets.

As an unperfect actor on the stage
Who with his fear is put beside his part,
Or some fierce thing replete with too much rage,
Whose strength's abundance weakens his own heart;
So I for fear of trust forget to say

The perfect ceremony of love's rite,
And in mine own love's strength seem to decay,
O'ercharged with burden of mine own love's might.
O, let my books be then the eloquence
And dumb presagers of my speaking breast,
Who plead for love and look for recompense
More than that tongue that more hath more expressed.
O, learn to read what silent love hath writ.
To hear with eyes belongs to love's fine wit.[64]

Here, the poet compares a lover who cannot express his feelings to an untrained actor who has forgotten his role.

In Sonnet 30, the poet imagines a courtroom where memories serve as witnesses. In Sonnets 46–47, the eyes and the heart seem to argue, with the mind acting as mediator until harmony is restored: the eyes grant the heart the joy of seeing a beloved friend, and if that is impossible, the heart comforts the eyes with memories. In Sonnet 48, love is portrayed as precious treasure locked away for safety, yet still vulnerable to theft. Each image thus gains symbolic significance.

The richness of metaphor in Shakespeare's sonnets reflects his remarkable ability to perceive hidden similarities between events and emotions. His poetic style is recognizable through his striking similes, as seen in Sonnet 33, where reflections on mortality, time, and poetic legacy are expressed through personal devotion and emotional sincerity:

If thou survive my well-contented day
When that churl Death my bones with dust shall cover,
And shalt by fortune once more resurvey
These poor rude lines of thy deceasèd lover,
Compare them with the bett'ring of the time,
And though they be outstripped by every pen,
Reserve them for my love, not for their rhyme,
Exceeded by the height of happier men.
O, then vouchsafe me but this loving thought:
"Had my friend's muse grown with this growing age,
A dearer birth than this his love had brought
To march in ranks of better equipage.
But since he died and poets better prove,

[64] https://www.folger.edu/explore/shakespeares-works/shakespeares-sonnets/read/23/

Theirs for their style I'll read, his for his love."[65]

In his poetry, we can see that Shakespeare skillfully used the art of revitalization, which is widespread in the East. This is the art of transferring human characteristics to inanimate beings. This is shown in metaphors such as the sun caressing the top of the mountains.

In Shakespeare's sonnets, the theme of friendship acquires vital and philosophical importance. If we look at history, in the period when the poet lived (1590s), people began to die in Europe due to various plagues. People who think that they will die from cholera or some other disease, are engaged in farming and various unnecessary jobs.

Through his poems, Shakespeare addressed his friend and encouraged him to lay a foundation for the future and have a child. After all, at that time, the continuation of the future generation became the problem of the century for Europe. Shakespeare also skillfully used personification, a technique common in Eastern literary traditions, attributing human qualities to nature and objects — for example, describing the sun as gently caressing mountaintops.

Friendship occupies a central philosophical and emotional place in the sonnets. During the 1590s, when epidemics and disease caused widespread fear in Europe, people were increasingly concerned about mortality and the continuation of future generations. Shakespeare, addressing his friend in several poems, urges him to secure the future by having children. In Sonnet 1, he stresses that beauty should be preserved through offspring so that it does not perish with time:

From fairest creatures we desire increase,
That thereby beauty's rose might never die,
But, as the riper should by time decease,
His tender heir might bear his memory.
But thou, contracted to thine own bright eyes,
Feed'st thy light's flame with self-substantial fuel,
Making a famine where abundance lies,
Thyself thy foe, to thy sweet self too cruel.
Thou that art now the world's fresh ornament
And only herald to the gaudy spring
Within thine own bud buriest thy content
And, tender churl, mak'st waste in niggarding.
Pity the world, or else this glutton be—

[65] https://www.folger.edu/explore/shakespeares-works/shakespeares-sonnets/read/32/

To eat the world's due, by the grave and thee.[66]

In Sonnet 2, he advises his friend to imagine old age and prepare for it while still young.

In other sonnets such as 24, 44, 47, 50, and 51 Shakespeare explores the spiritual power of friendship and the sorrow of separation. Through his love sonnets, he also challenged long-standing European poetic traditions. Instead of portraying an idealized noble lady, he often depicted a more ordinary woman. At a time when fair beauty was considered the standard, Shakespeare surprisingly idealized a dark-haired woman. While he elevates his male friend to an almost divine status and treats friendship as sacred, the beloved woman is shown as human and flawed — not an angel, but a realistic figure capable of moral imperfection. Yet the poet openly acknowledges his genuine love for her despite her lack of conventional beauty.

Shakespeare's unmistakable artistic "signature" is evident throughout his sonnets. Each poem bears the distinctive tone of his unique style. The sonnet form, which reached its height in England through Shakespeare's genius, became permanently associated with his name. As this analysis shows, the sonnet genre in his work demonstrates a perfect harmony between form and content.

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TIBBIY LOTIN TILINI O‘RGANISHDA INNOVATSION RAQAMLI YONDASHUV: “LINGUA LATIN MEDICA” PLATFORMASINING IMKONIYATLARI VA SAMARADORLIGINI BAHOLASH MODELI

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ANNOTATSIYA. *Mazkur maqolada tibbiyot talabalariga lotin tilini o‘rgatishda raqamli texnologiyalardan foydalanish imkoniyatlari va “Lingua Latin Medica” platformasining konsepsiyasi yoritiladi. Platforma video darslar, interaktiv flesh-kartalar, audio talaffuz, terminologik lug‘at, testlar, gamifikatsiya, progress monitoring va adaptiv ta’lim mexanizmlarini yagona muhitga birlashtirishga mo‘ljallangan. Sun’iy intellekt yordamida takroriy xatolarni aniqlash va individual o‘quv materiallarini tavsiya qilish modeli taklif etiladi. Tadqiqotning ushbu bosqichida real pedagogik eksperiment o‘tkazilmaganligi sababli statistik natijalar keltirilmagan.*

Kalit so‘zlar: *tibbiy lotin tili, tibbiy terminologiya, raqamli ta’lim, Lingua Latin Medica, sun’iy intellekt, adaptiv ta’lim, gamifikatsiya, tibbiyot talabalari.*

ABSTRACT. *This article presents the concept of the “Lingua Latin Medica” platform for teaching medical Latin through digital technologies. The platform combines video lessons, interactive flashcards, pronunciation audio, a terminology glossary, assessments, gamification, progress monitoring, and adaptive learning. An artificial intelligence component is proposed to identify recurring learning errors and*

recommend personalized materials. Since no real pedagogical experiment has been conducted at this stage, no fabricated statistical results are presented.

Keywords: *medical Latin, medical terminology, digital education, Lingua Latin Medica, artificial intelligence, adaptive learning, gamification, medical students.*

1. KIRISH

Tibbiyot ta’limida professional terminologiyani o‘zlashtirish bo‘lajak shifokorning akademik va kasbiy tayyorgarligining muhim tarkibiy qismidir. Anatomik, farmatsevtik va klinik terminlarning katta qismi lotin va yunon tillarining terminologik asoslari bilan bog‘liq. Shuning uchun talaba terminni faqat yodlab qolmasdan, uning ildizi, prefiksi, suffiksi, grammatik shakli va ma’nosini tushunishi zarur [1].

An’anaviy ta’limda lug‘at birliklarini yodlash va grammatik qoidalarni tarjima orqali o‘zlashtirish usullari keng qo‘llanadi. Bu usullar fundamental bilimlarni shakllantirsa-da, interaktiv va individual ta’lim imkoniyatlarini cheklashi mumkin. Tibbiy terminologiya bo‘yicha interaktiv moduldan foydalanish rasmlar, mnemonikalar, amaliy savollar va video materiallarni birlashtirish imkonini bergan [2].

Shu asosda “Lingua Latin Medica” tibbiy lotin tilini interaktiv, multimodal va adaptiv raqamli muhitda o‘rgatishga qaratilgan platforma sifatida taklif qilinmoqda. Tadqiqotning maqsadi platformaning konsepsiyasi va funksional imkoniyatlarini taqdim etish hamda kelgusida uning samaradorligini baholash uchun metodik mezonlarni belgilashdan iborat.

2. TADQIQOT METODOLOGIYASI

Mazkur ish tavsifiy-loyihaviy tadqiqot bo‘lib, platformaning pedagogik va funksional modelini ishlab chiqishga qaratilgan. Konseptual asos sifatida raqamli ta’lim, adaptiv o‘qitish, mikro-o‘qitish, spaced repetition, multimodal ta’lim va gamifikatsiya tamoyillari tanlandi. Mikro-o‘qitish materialni kichik va aniq birliklarga ajratadi; ushbu yondashuv sog‘liqni saqlash ta’limida ham o‘rganilgan [11].

Ushbu bosqichda real talabalar ishtirokidagi pedagogik eksperiment o‘tkazilmagan. Shuning uchun avvalgi namunaviy variantlarda uchragan nazorat va tajriba guruhlari foizlari, p-qiymatlar yoki boshqa statistik ko‘rsatkichlar ilmiy natija sifatida ishlatilmaydi. Kelgusida platformani baholash uchun pre-test, post-test va kechiktirilgan post-test asosidagi nazorat-tajriba dizaynidan foydalanish taklif etiladi.

Baholash mezonlari sifatida terminologik aniqlik, grammatik to‘g‘rilik, farmatsevtik yozuvlardagi xatolar, terminologik tahlil tezligi, bilimlarni saqlash, platformadan foydalanish faolligi va foydalanuvchi qoniqishi olinishi mumkin.

3. NATIJALAR

3.1. Platformaning funksional tuzilishi

“Lingua Latin Medica” bir nechta o‘quv modullarini yagona raqamli muhitga birlashtiradi. Birinchi modul video darslar bo‘lib, unda lotin alifbosi, urg‘u, otlarning turlanishi, sifatlar, anatomik va klinik terminologiya hamda farmatsevtik lotin tili ketma-ket beriladi.

Ikkinchi modul interaktiv flesh-kartalardan iborat. Kartada lotincha termin, o‘zbekcha tarjima, grammatik ma’lumot, zarur hollarda tasvir va audio talaffuz beriladi. Flesh-kartalarni spaced repetition algoritmi bilan bog‘lash orqali qiyin terminlarni tez-tez, oson terminlarni esa uzoqroq intervalda takrorlash mumkin [6].

Uchinchi modul test va mashqlarni o‘z ichiga oladi: tarjimani topish, lotincha shaklni tanlash, grammatik shaklni aniqlash, ot va sifatlarni moslashtirish hamda termin tarkibini tahlil qilish. To‘rtinchi modul terminologik lug‘at, beshinchi modul audio talaffuz, oltinchi modul esa progress monitoring funksiyasini bajaradi. Multimodal materiallardan foydalanish tibbiy terminologiya ta’limida ilgari ham qo‘llangan [2].

3.2. Sun’iy intellekt va adaptiv ta’lim

“Lingua Latin Medica” platformasida sun’iy intellekt talabaning javoblari, xatolari va topshiriqlarni bajarish tezligini tahlil qilish uchun qo‘llaniladi. Tizim qiyinchilik tug‘dirayotgan mavzularni aniqlab, ularga mos qo‘shimcha mashq va materiallarni tavsiya qilishi mumkin [5, 9]. Masalan, talaba grammatik shakllarni aniqlashda takroran xato qilsa, platforma ushbu mavzuni qayta o‘rganish uchun individual topshiriqlarni taklif qiladi. Bunda AI o‘qituvchini almashtirmaydi, balki individual ta’limni qo‘llab-quvvatlovchi vosita sifatida xizmat qiladi [10].

3.3. Gamifikatsiya va mobil ta’lim

Platformada ball, yutuq belgilari, kunlik topshiriqlar va progressni kuzatish kabi gamifikatsiya elementlaridan foydalanish rejalashtiriladi. Bu talabalarning muntazam shug‘ullanishini rag‘batlantirishga yordam beradi [7, 8]. Mobil moslashuv esa smartfon va planshet orqali flesh-kartalar, testlar, audio talaffuz va qisqa darslardan foydalanish imkonini beradi [4]. Shu tariqa platforma mustaqil va muntazam ta’lim olish uchun qulay raqamli muhit yaratadi.

4. MUHOKAMA

“Lingua Latin Medica” konsepsiyasining asosiy afzalligi bir nechta raqamli pedagogik mexanizmlarni bitta platformada birlashtirishdir. Termin matn, tasvir, audio, tarjima, grammatik izoh va mashq bilan bog‘lanadi. Bu multimodal yondashuv tibbiy terminologiyani o‘zlashtirishni yanada tizimli tashkil etish imkonini beradi [2, 3].

Mazkur ishning asosiy cheklovi — platforma hali real talabalar guruhida eksperimental tarzda tekshirilmagan. Shu sababli ushbu maqolada platformaning samaradorligi isbotlandi degan xulosa berilmaydi. Kelgusida nazorat va tajriba guruhlari asosida pre-test, post-test va kechiktirilgan test natijalari taqqoslanishi lozim.

5. XULOSA

“Lingua Latin Medica” tibbiyot talabalariga lotin tilini o‘rgatish jarayonini zamonaviy raqamli texnologiyalar bilan birlashtirishga qaratilgan platforma konsepsiyasidir. Uning asosiy komponentlari video darslar, interaktiv flesh-kartalar, audio talaffuz, terminologik lug‘at, testlar, progress monitoring, gamifikatsiya va adaptiv ta’limdan iborat.

Ilmiy adabiyotlar raqamli, mobil, adaptiv va gamifikatsiyalangan ta’lim yondashuvlarining sog‘liqni saqlash ta’limidagi istiqbollarini ko‘rsatmoqda [4, 5, 7, 8]. Platformaning innovatsion jihati ushbu texnologiyalarni aynan tibbiy lotin tili ehtiyojlariga moslashtirishdir.

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AHMAD A'ZAMNING PARANTEZ BIRLIKLARDAN FOYDALANISH MAHORATI

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Annotatsiya. *Mazkur maqolada Ahmad A'zamning parantez birliklardan foydalanish mahorati va ushbu birlikning badiiy matndagi badiiy-estetik xususiyati, asar ta'sirchanligini oshirishdagi ahamiyati haqida so'z bo'radi.*

Annotation. *This article examines Ahmad A'zam's skillful use of parenthetical units and discusses their artistic and aesthetic functions in literary texts, as well as their role in enhancing the expressiveness and impact of his works.*

Kalit so'zlar: *badiiy matn, lingvopoetika, paranteza, ekspressivlik, badiiy-estetik vazifa.*

Key words: *literary text, linguopoetics, parenthetical units, expressiveness, artistic and aesthetic function.*

Kirish. Parantezlar gap tarkibiga bevosita bog'lanmagan, ammo muallifning qo'shimcha izohi, munosabati, ma'lum bir ma'lumotni aniqlashtirishi yoki eslatmasini ifodalovchi birlik hisoblanadi. Parantezaning matn ekspressivligini ta'minlashdagi rolini alohida tadqiq etgan R.S.Samoletova poetik qimmatga ega parantetik kiritmalarning mohiyatini to'g'ri anglamaslik, birinchi navbatda, matnning yaxlit mazmunini, muallif pozitsiyasini tasavvur qilishda hal qiluvchi qimmatga molik bo'lgan turli konnotatsiyalarning tamoman e'tibordan chetda qolishiga olib kelishi mumkinligini qayd qiladi[1].

A. G'ulomov tomonidan "kiritma gaplarning asosiy xususiyatlaridan yana biri ularning ma'lum gapga nutq momentida tug'ilib qolgan ehtiyojga ko'ra xuddi kutilmagandek birdan kiritilishidir"[2] tarzida takidlangan.

O'zbek tilshunosligida badiiy matnda qo'llangan parantez birliklar ilk bor D.Jamoliddinova tomonidan maxsus tadqiq qilingan. Olimaning izlanishlarida badiiy matnda qo'llangan parantezlarning poetik aktuallashish qonuniyatlari, uning badiiy tasvirda xilma-xil poetik maqsadlarni ro'yobga chiqarishda ishtirok etishi, kiritmalarning kirishlarga qaraganda semantik jihatdan boyligi badiiy asarlardan olingan misollar asosida dalillangan. Shuningdek, parantezlarning bir kommunikativ

yo‘nalishli va ikki kommunikativ yo‘nalishli turlari farqlangan[3]. Ayni tadqiqotda parantezalarning kirish va kiritma turlari farqlanganligini ham qayd etish o‘rinli.

Parantezalarning aksariyati badiiy matnda o‘ziga xos lingvopoetik qimmatga ega, ammo har qanday paranteza alohida olinganda, bunday qimmatga ega bo‘lavermaydi, u ayni qimmatni faqat matn ichidagina oladi.

Asosiy qism. Ahmad A’zam asarlarida ham badiiy qiymatga ega bo‘lgan bir qancha parantezalar uchraydi. Xususan, ular yozuvchi ijodida qo‘shimcha fikr bildirish, kinoya hosil qilish yoki kulgi qo‘zg‘atish maqsadida qo‘llangan. Masalan, quyidagi badiiy parchada fikrni aniqlashtirish, subyektiv munosabat bildirish maqsadida ijodkor parantezadan unumli foydalangan: *Direktor so‘zini bu gapning ishxona uchun naqadar sharmandalik, benihoya xunukligidan boshladi, o‘g‘ri* ***(“o‘g‘ri”, demadi, “pulni olgan”, dedi)*** *tashqaridan kirgan begona emasligi, qizlarga stipendiya tekkanini bilib, tushlikka chiqishlarini poylagan odamligini aytib, “Kim tushlikda shu yerda qolgan bo‘lsa, o‘sha olgan”, dedi.* (Noinsof Muso)

Mazkur parchadagi *o‘g‘ri”, demadi, “pulni olgan”, dedi* parantez konstruksiyasi badiiy matnda nutqiy noziklik va personaj xarakterini ochishga xizmat qilgan. Muallif direktorning “o‘g‘ri” degan keskin va ayblovchi so‘zni ishlatmaganini, uning o‘rniga *pulni olgan* evfemizmini qo‘llaganini ko‘rish mumkin. Pulni olgan evfemizmining qo‘llanishi direktorning rahbar sifatidagi mulohazakorligi, vaziyatga ehtiyotkorona yondashishi va odamlarga nisbatan muomalasini ham ta’kidlab kelgan.

A.A’zam ba’zi o‘rinlarda shaxsiy fikrlarini badiiy matnga parantez sifatida kiritgan. Masalan, *Uning ichida esa yap-yangi ikkita besh so‘mlikning chetlari ko‘m-ko‘k chizilib turadi.* ***(“Hamma, hamma odam pulning yirigini albatta sirtga, maydarog‘ini ichga olib taxlaydi. Qizig‘-a?”)*** *Muso, ayniqsa, shu o‘n so‘mlikni aniq ko‘rdi: lattaday eskirgan, rangi uniqqan, g‘ijim... Shu qadar aniq ko‘rdiki, negadir uning topilishiga ishonmay qo‘ydi.* (Noinsof Muso)

Hamma, hamma odam pulning yirigini albatta sirtga, maydarog‘ini ichga olib taxlaydi. Qizig‘-a? parantezi esa asar muallifining mulohazasini ifodalaydi.

Badiiy matnda yozuvchi qahramonlarning turli xususiyatlarini umumlashtirgan holda tasvirlovchi vositalarga, xususan, parantezalarga murojaat qiladi: *“Ikkita besh so‘mlik, bitta o‘n so‘mlik”, dedi Muso o‘zicha. U mana shu pullarni ko‘z o‘ngiga keltirdi. Halima opa “Turnaxon”ning sumkasi ichidagi qizil karmonchani* ***(Muso kuzatuvchan yigit, bu karmonchani Zamira ko‘tarib yurganiga ham e’tibor bergan)*** *ochayotganida shu o‘n so‘mlik chiqadi. Ikki buklog‘lik.*

Matndagi *Muso kuzatuvchan yigit, bu karmonchani Zamira ko‘tarib yurganiga ham e’tibor bergan* parantezi Muso obrazining xarakterini ochib berishga, shuningdek, uning sinchkov va kuzatuvchan yigit ekanini qo‘shimcha axborot sifatida ta’kidlashga xizmat qilgan. Ushbu badiiy parchada qo‘llangan parantez birlik asosiy matn bilan aloqalanmaganligini qayd etish ham o‘rinli.

Ba’zan muallif parantez birliklarni asar qahramonlarining xarakterini ochib beruvchi muhim lingvopoetik vosita sifatida qo‘llaydi: *Hovlining chor-atrofi bir tekis bo‘y tortgan mirzateraklar bilan o‘ralgan. Har biridan ikkita bolor chiqadi. Agar qirq so‘mdan* ***(Sherqo‘zi oshiqcha so‘ramaydi insofi bor)*** *pullasa, o‘zicha o‘sadigan, osh-non so‘ramaydigan shu teraklarning o‘zi ikki yarim-uch ming turadi.* (Odam olasi)

Mazkur parchadagi *Sherqo‘zi oshiqcha so‘ramaydi, insofi bor* parantez konstruksiyasi matnda asosiy fikrga qo‘shimcha ma’lumot kiritish maqsadida, ya’ni Sherqo‘zi obrazining xarakteriga oid muhim jihatni, ya’ni uning halol, me’yorni biladigan va adolatli inson ekanini ta’kidlaydi. Shuningdek, agar *Sherqo‘zi oshiqcha so‘ramaydi, insofi bor* kiritmasi parantez birlik emas, balki odatdagi gap bo‘lagi pozitsiyasiga qo‘yilganda o‘zining lingvopoetik qimmatini yo‘qotgan bo‘lardi. Natijada mazkur sintaktik birlik poetik ta’sirli ta’kid uchun emas, neytral tasvir uchun xizmat qilar edi.

Sherqo‘zi pulga muhtoj emas. Uch govmish sigiri ***(bittasi yaqinda tug‘ib beradi),*** *ikki zotli buzog‘i, bir novvosi bor; buqasi esa boquvda, burniga o‘tkazilgan xalqani silkitib, pishqirib yotibdi.* (Odam olasi)

Mazkur parchadagi *bittasi yaqinda tug‘ib beradi* parantez birligi ham asosiy fikrga qo‘shimcha ma’lumot kiritish vazifasini bajargan. Kiritma orqali Sherqo‘zining sigirlaridan birining yaqinda tug‘ishi va buning natijasida uning xo‘jaligidagi hayvonlar soni yana bittaga ko‘payishi bayon qilingan. Yozuvchi asar qahramonining pulga muhtoj emasligini shunchaki aytib qo‘ymasdan, uning moddiy ahvolini konkret detallar orqali ko‘rsatib bera olgan.

“Shodi aka, rostini ayting, necha marta uylangansiz o‘zi?”, deb so‘raymiz. ***(Qiziqda – qaysisiga qanday uylanganlarini aytib beradi.)*** *Shodi aka boshini orqaga tashlab, ko‘zlarini yumib oladi-da, hisoblab chiqadi: “Bu xotinim Tuyg‘un–oltinchi, yo‘q, yettinchi, yo‘g‘-a, bittasi bilan o‘n kungina yashadim, hisob emas, to‘g‘ri, oltinchisi ekan”.* (Asqartog‘ tomonlarda)

Mazkur parchadagi *“Qiziqda – qaysisiga qanday uylanganlarini aytib beradi”* parantez konstruksiyasi asosiy voqeaga qo‘shimcha izoh kiritish bilan birga matnning yumoristik ruhini kuchaytirishga xizmat qilgan. Ushbu kiritma orqali

Shodi akaning boshidan ko‘p voqealarni o‘tkazgan odam ekani anglashiladi. Qolaversa, yozuvchi mazkur parantez orqali go‘yo o‘quvchiga yuzlanib, suhbatning eng qiziqarli jihatini alohida ta’kidlayotgandek taassurot uyg‘otadi.

A.A’zam asarlarida parantez birliklar milliy-madaniy koloritni ko‘rsatib berish maqsadida ham qo‘llangan. Masalan, *Siz uyni ukangizga qoldirib, yangi hovli solib chiqib ketgan bo‘lsangiz, agar manovi gul ko‘tarib ketayotgan erkakning yoshida bo‘lsangiz, unda xotiningiz, uch-to‘rt bolangiz bilan turasiz, ukangizning eshigini lang ochib: “Ona!* ***(“Oyi!”, “Biyi!”, “Aya!”, “ena!”, “Opa!”, “Buvi!”, "Anna!, "Acha!" – farqi yo‘q!)*** *Ho‘, uydamisiz? Sizni bir ko‘rgim keldi-da!* (Gul ko‘targan erkak) Yozuvchining fikricha, ona degan ulug‘ zot turli hududlarda turlicha nomlansa ham, uning farzand hayotida o‘rni o‘zgarmasligi ta’kidlanadi.

Xulosa. Ahmad A’zam asarlarida qo‘llangan parantez konstruksiyalar, asosan, adibning tasvirlanayotgan voqea-hodisa, qahramon yoki bayon etilayotgan fikrga nisbatan subyektiv munosabatini ifodalash, muallif bahosini bildirib o‘tish hamda asosiy fikrni turli qo‘shimcha izoh, aniqlashtirish va sharhlar bilan to‘ldirish vazifalarini bajargan.

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