

ISSN: 1991-3494 (Print)
ISSN: 2518-1467 (Online)

**SCIENTIFIC JOURNAL OF
PEDAGOGY AND ECONOMICS**

**№1
2026**

ISSN 2518-1467 (Online),
ISSN 1991-3494 (Print)



CENTRAL ASIAN ACADEMIC
RESEARCH CENTER



SCIENTIFIC JOURNAL OF PEDAGOGY AND ECONOMICS

PUBLISHED SINCE 1944

1 (419)

January – February 2026

ALMATY, 2026

EDITOR-IN-CHIEF:

ABYLKASSIMOVA Alma Yesimbekovna, Doctor of Pedagogical Sciences, Professor, Academician of Central Asian Academic Research Center, Director of the Center for the Development of Pedagogical Education, Head of the Department of Methods of Teaching Mathematics, Physics and Computer Science at Abai KazNPU (Almaty, Kazakhstan), <https://www.scopus.com/authid/detail.uri?authorId=57191275199>, <https://www.webofscience.com/wos/author/record/2076124>.

DEPUTY EDITOR-IN-CHIEF:

SEMBIEVA Lyazzat Myktybekovna, Doctor of Economics, Professor of the Eurasian National University (Astana, Kazakhstan), <https://www.scopus.com/authid/detail.uri?authorId=57194226348>, <https://www.webofscience.com/wos/author/record/38875302>.

EDITORIAL BOARD:

RICHELLE Marynowski, PhD in Education, Professor, Faculty of Education, University of Lethbridge, (Alberta, Canada), <https://www.scopus.com/authid/detail.uri?authorId=57070452800>, <https://www.webofscience.com/wos/author/record/16130920>.

SHISHOV Sergey Evgenievich, Doctor of Pedagogical Sciences, Professor, Head of the Department of Pedagogy and Psychology of Professional Education, Moscow State University of Technology and Management named after K. Razumovsky (Moscow, Russia), <https://www.scopus.com/authid/detail.uri?authorId=57191518233>, <https://www.webofscience.com/wos/author/record/2443966>.

ABILDINA Saltanat Kuatovna, Doctor of Pedagogical Sciences, Professor, Head of the Department of Pedagogy, Karaganda University named after E.A. Buketov (Karaganda, Kazakhstan), <https://www.scopus.com/authid/detail.uri?authorId=56128026400>, <https://www.webofscience.com/wos/author/record/4131549>.

RYZHAKOV Mikhail Viktorovich, Doctor of Pedagogical Sciences, Professor, Academician of the Russian Academy of Education, Editor-in-Chief of the journal "Standards and Monitoring in Education" (Moscow, Russia), <https://www.scopus.com/authid/detail.uri?authorId=6602245542>, <https://www.webofscience.com/wos/author/record/13675462>.

BULATBAEVA Kulzhanat Nurymzhanovna, Doctor of Pedagogical Sciences, Professor, Chief Researcher of the National Academy of Education named after Y. Altynsarin (Astana, Kazakhstan), <https://www.scopus.com/authid/detail.uri?authorId=57202195074>, <https://www.webofscience.com/wos/author/record/40173122>.

PETR Hájek, PhD, Unicorn University, Associate Professor, Department of Finance, (Prague, Czech Republic), <https://www.scopus.com/authid/detail.uri?authorId=35726855800>, <https://www.webofscience.com/wos/author/record/672404>.

JUMAN Jappar, Doctor of Economics, Professor, Honorary Academician of Central Asian Academic Research Center, Honored Worker of Kazakhstan, Director of the Center for International Applied Research Al-Farabi Kazakh National University (Almaty, Kazakhstan), <https://www.scopus.com/authid/detail.uri?authorId=59238481900>; <https://www.scopus.com/authid/detail.uri?authorId=56658765400>, <https://www.webofscience.com/wos/author/record/60977874>.

LUKYANENKO Irina Grigorievna, Doctor of Economics, Professor, Head of Department of the National University of Kyiv-Mohyla Academy (Kyiv, Ukraine), <https://www.scopus.com/authid/detail.uri?authorId=57189348551>, <https://www.webofscience.com/wos/author/record/939510>.

YESIMZHANOVA Saira Rafihevna, Doctor of Economics, Professor of the University of International Business (Almaty, Kazakhstan), <https://www.scopus.com/authid/detail.uri?authorId=56499485500>, <https://www.webofscience.com/wos/author/record/45951098>.

Scientific Journal of Pedagogy and Economics

ISSN 2518-1467 (Online),

ISSN 1991-3494 (Print).

Owner: «Central Asian Academic Research Center» LLP (Almaty).

The certificate of registration of a periodical printed publication in the Committee of information of the Ministry of Information and Communications of the Republic of Kazakhstan

№ KZ50VPY00121155, issued on 05.06.2025

Thematic focus: «*publication of the results of new achievements in the field of fundamental sciences*»

Periodicity: 6 times a year.

<http://www.bulletin-science.kz/index.php/en/>

© «Central Asian Academic Research CenterB» LLP, 2026



БАС РЕДАКТОР:

ӘБІЛҚАСЫМОВА Алма Есімбекқызы, педагогика ғылымдарының докторы, профессор, ҚР ҰҒА академигі, Педагогикалық білім беруді дамыту орталығының директоры, Абай атындағы ҚазҰПУ математика, физика және информатиканы оқыту әдістемесі кафедрасының меңгерушісі (Алматы, Қазақстан), <https://www.scopus.com/authid/detail.uri?authorId=57191275199>, <https://www.webofscience.com/wos/author/record/2076124>.

БАС РЕДАКТОРДЫҢ ОРЫНБАСАРЫ:

СЕМБИЕВА Ләззат Мықтыбекқызы, экономика ғылымдарының докторы, Л.Н. Гумилев атындағы Еуразия ұлттық университетінің профессоры (Астана, Қазақстан), <https://www.scopus.com/authid/detail.uri?authorId=57194226348>, <https://www.webofscience.com/wos/author/record/38875302>.

РЕДАКЦИЯ АЛҚАСЫ:

РИШЕЛЬ Мариновски, білім беру саласындағы PhD, Летбридж университеті педагогика факультетінің профессоры, (Альберта, Канада), <https://www.scopus.com/authid/detail.uri?authorId=57070452800>, <https://www.webofscience.com/wos/author/record/16130920>.

ШИШОВ Сергей Евгеньевич, педагогика ғылымдарының докторы, профессор, К. Разумовский атындағы Мәскеу мемлекеттік технологиялар және басқару университетінің кәсіби білім беру педагогикасы және психологиясы кафедрасының меңгерушісі (Мәскеу, Ресей), <https://www.scopus.com/authid/detail.uri?authorId=57191518233>, <https://www.webofscience.com/wos/author/record/2443966>.

ӘБІЛДИНА Салтанат Қуатқызы, педагогика ғылымдарының докторы, профессор, Е.А. Бөкетов атындағы Қарағанды университетінің педагогика кафедрасының меңгерушісі (Қарағанды, Қазақстан), <https://www.scopus.com/authid/detail.uri?authorId=56128026400>, <https://www.webofscience.com/wos/author/record/4131549>.

РЫЖАКОВ Михаил Викторович, педагогика ғылымдарының докторы, профессор, Ресей білім академиясының академигі, «Білім берудегі стандарттар мен мониторинг» журналының бас редакторы (Мәскеу, Ресей), <https://www.scopus.com/authid/detail.uri?authorId=6602245542>, <https://www.webofscience.com/wos/author/record/13675462>.

БОЛАТБАЕВА Күлжанат Нұрымжанқызы, педагогика ғылымдарының докторы, профессор, Ы.Алтынсарин атындағы Ұлттық білім академиясының бас ғылыми қызметкері (Астана, Қазақстан), <https://www.scopus.com/authid/detail.uri?authorId=57202195074>, <https://www.webofscience.com/wos/author/record/40173122>.

ПЕТР Хайек, PhD, Юникорн университеті, Қаржы департаментінің қауымдастырылған профессоры (Прага, Чехия), <https://www.scopus.com/authid/detail.uri?authorId=35726855800>, <https://www.webofscience.com/wos/author/record/672404>.

ЖҰМАН Жаппар, экономика ғылымдарының докторы, профессор, Қазақстанның Еңбек сіңірген қайраткері, ҚР ҰҒА құрметті академигі, әл-Фараби атындағы Қазақ ұлттық университетінің Халықаралық қолданбалы зерттеулер орталығының директоры (Алматы, Қазақстан). <https://www.scopus.com/authid/detail.uri?authorId=59238481900>; <https://www.scopus.com/authid/detail.uri?authorId=56658765400>, <https://www.webofscience.com/wos/author/record/60977874>.

ЛУКЪЯНЕНКО Ирина Григорьевна, экономика ғылымдарының докторы, профессор, «Киево-Могилянская академия» ұлттық университеті кафедрасының меңгерушісі (Киев, Украина), <https://www.scopus.com/authid/detail.uri?authorId=57189348551>, <https://www.webofscience.com/wos/author/record/939510>.

ЕСІМЖАНОВА Сайра Рафиққызы, экономика ғылымдарының докторы, Халықаралық бизнес университетінің профессоры (Алматы, Қазақстан), <https://www.scopus.com/authid/detail.uri?authorId=56499485500>, <https://www.webofscience.com/wos/author/record/45951098>.

Scientific Journal of Pedagogy and Economics

ISSN 2518-1467 (Online),

ISSN 1991-3494 (Print).

Меншіккенуші: «Орталық Азия академиялық ғылыми орталығы» ЖШС (Алматы қ.).

Қазақстан Республикасының Ақпарат және коммуникациялар министрлігінің Ақпарат комитетінде 05.06.2025 ж. берілген № KZ50VPY00121155 мерзімдік басылым тіркеуіне қойылу туралы куәлік.

Тақырыптық бағыты: *«іргелі ғылым салалары бойынша жаңа жетістіктердің нәтижелерін жариялау»*

Мерзімділігі: жылына 6 рет.

<http://www.bulletin-science.kz/index.php/en/>

© «Орталық Азия академиялық ғылыми орталығы» ЖШС, 2026

ГЛАВНЫЙ РЕДАКТОР:

АБЫЛКАСЫМОВА Алма Есимбековна, доктор педагогических наук, профессор, академик НАН РК, директор Центра развития педагогического образования, заведующая кафедрой методики преподавания математики, физики и информатики КазНПУ им. Абая (Алматы, Казахстан), <https://www.scopus.com/authid/detail.uri?authorId=57191275199>, <https://www.webofscience.com/wos/author/record/2076124>.

ЗАМЕСТИТЕЛЬ ГЛАВНОГО РЕДАКТОРА:

СЕМБИЕВА Лязат Мыктыбековна, доктор экономических наук, профессор Евразийского национального университета им. Л.Н. Гумилева (Астана, Казахстан), <https://www.scopus.com/authid/detail.uri?authorId=57194226348>, <https://www.webofscience.com/wos/author/record/38875302>.

РЕДАКЦИОННАЯ КОЛЛЕГИЯ:

РИШЕЛЬ Мариновски, PhD в области образования, профессор факультета педагогики Летбриджского университета, (Альберта, Канада), <https://www.scopus.com/authid/detail.uri?authorId=57070452800>, <https://www.webofscience.com/wos/author/record/16130920>.

ШИШОВ Сергей Евгеньевич, доктор педагогических наук, профессор, заведующий кафедрой педагогики и психологии профессионального образования Московского государственного университета технологий и управления имени К. Разумовского (Москва, Россия), <https://www.scopus.com/authid/detail.uri?authorId=57191518233>, <https://www.webofscience.com/wos/author/record/2443966>.

АБИЛЬДИНА Салтанат Куатовна, доктор педагогических наук, профессор, заведующая кафедрой педагогики Карагандинского университета имени Е.А. Букетова (Караганда, Казахстан), <https://www.scopus.com/authid/detail.uri?authorId=56128026400>, <https://www.webofscience.com/wos/author/record/4131549>.

РЫЖАКОВ Михаил Викторович, доктор педагогических наук, профессор, академик Российской академии образования, главный редактор журнала «Стандарты и мониторинг в образовании» (Москва, Россия), <https://www.scopus.com/authid/detail.uri?authorId=6602245542>, <https://www.webofscience.com/wos/author/record/13675462>.

БУЛАТБАЕВА Кулжанат Нурымжановна, доктор педагогических наук, профессор, главный научный сотрудник Национальной академии образования имени Ы. Алтынсарина (Астана, Казахстан), <https://www.scopus.com/authid/detail.uri?authorId=57202195074>, <https://www.webofscience.com/wos/author/record/40173122>.

ПЕТР Хайек, PhD, университет Юникорн, ассоциированный профессор Департамента финансов, (Прага, Чехия), <https://www.scopus.com/authid/detail.uri?authorId=35726855800>, <https://www.webofscience.com/wos/author/record/672404>.

ЖУМАН Жаппар, доктор экономических наук, профессор, заслуженный деятель Казахстана, почетный академик НАН РК, директор Центра Международных прикладных исследований Казахского национального университета им. аль-Фараби (Алматы, Казахстан), <https://www.scopus.com/authid/detail.uri?authorId=59238481900>; <https://www.scopus.com/authid/detail.uri?authorId=56658765400>, <https://www.webofscience.com/wos/author/record/60977874>.

ЛУКЪЯНЕНКО Ирина Григорьевна, доктор экономических наук, профессор, заведующая кафедрой Национального университета «Киево-Могилянская академия» (Киев, Украина), <https://www.scopus.com/authid/detail.uri?authorId=57189348551>, <https://www.webofscience.com/wos/author/record/939510>.

ЕСИМЖАНОВА Сайра Рафихевна, доктор экономических наук, профессор Университета международного бизнеса (Алматы, Казахстан), <https://www.scopus.com/authid/detail.uri?authorId=56499485500>, <https://www.webofscience.com/wos/author/record/45951098>.

Scientific Journal of Pedagogy and Economics

ISSN 2518-1467 (Online),

ISSN 1991-3494 (Print).

Собственник: ТОО «Центрально-азиатский академический научный центр» (г. Алматы).

Свидетельство о постановке на учет периодического печатного издания в Комитете информации Министерства информации и коммуникаций и Республики Казахстан

№ KZ50VPY00121155 выданное 05.06.2025 г.

Тематическая направленность: «публикация результатов новых достижений области фундаментальных наук».

Периодичность: 6 раз в год.

<http://www.bulletin-science.kz/index.php/en/>

© ТОО «Центрально-азиатский академический научный центр», 2026



CONTENTS

PEDAGOGY

Abuova B.P., Abisheva S.D., Adibayeva Sh.T. The methodological potential of Kazakhstan’s children’s literature in the educational process on the example of “Kazakhstan fairy tales” by Yuri Serebryansky.....	19
Azybayev M., Zhaidakbayeva L.K. Pedagogical and technological aspects of blended synchronous learning Implementation.....	38
Bazarbayeva A.N., Mubarakov A.M., Ibadulla S.N. Model of didactic principles for using the system of collaborative open learning in the training of future computer science teachers.....	55
Yerbolatov N. N.*, Toktaganova G.B., Nazarova G.A. Diagnostics of learning results of master’s students based on the integration of education, science and production and prospects for improvement.....	69
Zhaiynbayeva S.K., Maimataeva A.D., Kossauova A.K. Formation of professional competence of future biology teachers based on the “flipped classroom” technology.....	87
Zhambylkyzy M., Baibossynova T., Aleixo M. Using action research as a method for professional development of efl teachers.....	102
Zharylgapova D.M., Karabala T.M., Pirmaganbet A.E. Increasing students’ interest and intellectual abilities in learning physics through mobile applications.....	116
Imangaliyeva B., Yermakhanov M., Aldiyarova A. Methods of teaching chemistry to students with special educational needs: kazakh secondary school practice.....	133
Kazhenova Zh.S., Rakhmatullina Z.T. Organizing the educational process with kits for educational robotics.....	151
Kazbay P.A., Kudaibergenova K.T. Teaching the image of "hero-girl" in kazakh epics through critical thinking technology in universities.....	174
Kaisarova A.S., Zhensikbaeva N.Zh., Sabyrbaeva B.T. Local studies as a means of student personality socialization.....	187
Medeubaeva K.T., Khassanova I.U., Seitenova S.S. Artificial intelligence potential in personalizing teacher training trajectories: Kazakhstan’s experience.....	204

Nabi N.B., Rakhmetova R.S.

The importance of the 4c model in the formation of communicative skills and its conceptual basis.....222

Nurzhanova A.R., Zhussupova R.F., Jaleniauskiene E.

Artificial intelligence in education: evaluating ai-powered educational platforms.....238

Nurizinova M.M., Baimukhanbetov B.M., Issayev M.S.

Developing learners' soft skills: exploring the impact of theoretical approaches.....259

Nurlan M., Bakirci N., Aden Zh.

The relevance of teaching the genre of zhyr using new technologies.....275

Orynbasar T.O., Amirbekova A.B.

The writer's thesaurus and methodology of teaching literary style: a systematic review using the PRISMA method.....295

Pernebayeva F., Bakesh Z., Kalymbetova A.

Ways to form innovative competence in biology teaching.....319

Seitbekova G.O., Kokzhayeva A.B., Suleimenkulova G.T

Development and assessment of students' mathematical functional literacy through solving textual problems with financial content.....338

Semenikhina S.F., Semenikhin V.V.

Review of the implementation of the alliance "school – university – science – industry" in the holistic pedagogical process.....362

Smatova K.B., Alimbayeva S.K., Ospanbayeva M.P.

A study of the transformation of school readiness diagnostics into a digital format.....378

Toktagulova U.S., Karmenova N.N., Sadykova D.A.

Formation of students' conceptions in determining the role and effectiveness of training-field practice in the development of theoretical knowledge.....396

Ualikhanova A., Abuov A.E., Bolysbaev D.S.

Methodological approaches to studying yard clubs' role in forming children's spiritual values.....417

Usmanova K., Stycheva O.

The use of the official-business style in the educational process as a means of professional training of future Russian language teachers.....433

Khassenova M.T., Smagulov M.Z.

chemistry without barriers: strategies inclusive learning in class.....455

ECONOMY

Abdullaev A.M., Kadyrova M.B., Kuralbaev A.A. Human resources management in the local government system: training and development of professional competencies.....	477
Amanbai A., Rakhimberdinova M.U., Massanova L.E. Analysis of the development of the housing construction market in the Republic of Kazakhstan.....	505
Amangozhayeva A.B., Akpanov A.K., Kassymbekova G.R. Determinants of banking sector vulnerability in Kazakhstan: a multi-method analysis of market, credit, and liquidity risks.....	523
Beisenbayeva A., Yernazarova U., Turdaliyeva U. Assessing the effectiveness of internal control with ESG risks: a model for the banking sector of Kazakhstan.....	539
Domalatrov Ye.B., Abylaikhanova T.A. Neural networks as a tool for improving the efficiency of human capital management: empirical analysis and predictive modeling.....	554
Yeltay B.B., Azatbek T.A. Assessment of the impact of changes in global prices for non-ferrous metals on the export dynamics of Kazakhstan's non-ferrous metallurgy.....	569
Elshibekova K.Zh., Eralina E.M. Competitive advantages of domestic robotic systems in the industry of kazakhstan.....	592
Yendybayev S.T., Zhussipova E.Ye., Duisenbekuly A.-K.D. Adaptation of startup valuation methodologies in Kazakhstan under conditions of limited financial information.....	613
Yerimpasheva A., Tarakbaeva R., Lyu Zh. Investment interaction between Kazakhstan and China as a factor in the formation of transcontinental transport corridors.....	631
Zhumaldinova D., Yeshenkulova G., Wronka-Pośpiech M. Emerging methodologies and technologies in creative startups: a configurational review.....	647
Kadyrbekova D.S., Klimova T.B., Duiskenova R.Zh. International tourism in Kazakhstan: factors attracting foreign tourists and opportunities to strengthen the country's brand.....	664
Kadyrova K., Davletova M., Amirgaliyeva A. Marketing strategies of small and medium-sized enterprises in Kazakhstan under digital transformation.....	681

Kalbayeva N.T., Satenov B.I., Khassenova L.A. The impact of financial determinants on the export development of meat production in Turkestan region: a scenario-based approach.....	699
Karimova B., Kassenova G., Supugaliyeva G. Volatility of financial instruments on the Kazakhstan stock market: measurement and forecasting.....	722
Kozhakhmetova A.K., Yesmurzayeva A.B., Anarkhan A.K. Integrated ESG assessment of the efficiency of green energy projects: economic, social, and environmental aspects.....	741
Kuralbayeva A.Sh., Issayeva G.K., Makhatova A.B. Fintech tools as a mechanism for stimulating investment in the sustainable development of rural regions of Kazakhstan.....	767
Meldebekova A., Kanabekova M., Azbergenova R. Innovation management in Kazakhstan's higher education: indicators and governance models.....	783
Moldazhanov M.B., Takhtaeva R.Sh., Dyusembinova Zh.S., The impact of economic activity in the Semipalatinsk nuclear safety zone and the city of Kurchatov on the development of STS nuclear tourism.....	807
Nurbatsin A., Kireyeva A.A. Digital technologies as a tool for improving the quality of higher education.....	829
Nurbekova Sh. K., Yessimzhanova S. R., Alimzhanova L.M. Improving the efficiency of transport and logistics services management in special economic zones based on digitalization.....	851
Nurmukhanova G.Zh., Abzhatova A.K., Kurmangaliyeva A.K. The relationship between the labor market and higher education in Kazakhstan: trends and development directions.....	875
Polezhayeva I.S., Suyundikov A.S., Statsenko O.A. The impact of digitalization on improving the economic efficiency of the energy sector of the Republic of Kazakhstan.....	892
Razakova D.I., Alshanov R.A., Kazybayeva M.N., Digital transformation of Kazakhstan's industry: an empirical analysis of enterprise readiness and implementation barriers.....	916
Sagindykova G.M., Tussibayeva G.S., Balginova K.M. Innovative strategies for the formation of social responsibility and motivation of participants the pension system of the Republic of Kazakhstan in the context of digitalization.....	935
Sadykov E., Zhamkeyeva M., Konyrbekov M. The structure of markups in Kazakhstan's economy and its impact on inflationary trends.....	955

МАЗМҰНЫ

ПЕДАГОГИКА

Абуова Б.П., Абишева С.Д., Адибаева Ш.Т. Қазақстан балалар әдебиетінің білім беру үрдісіндегі әдістемелік әлеуеті Юрий Серебрянскийдің «Қазақстан ертегілері» мысалында.....	19
Азыбаев М., Жайдакбаева Л.К. Аралас синхронды оқытуды жүзеге асырудың педагогикалық және технологиялық аспектілері.....	38
Базарбаева А.Н., Мубаракوف А.М., Ибадулла С.Н. Болашақ информатика пәнінің оқытушыларын даярдауда біреккен ашық оқыту жүйесін пайдаланудың дидактикалық принциптер моделі.....	55
Ерболатов Н.Н.* , Тоқтағанова Г.Б., Назарова Г.А. Магистранттарды білім, ғылым және өндіріс интеграциясы негізінде даярлау нәтижелерін диагностикалау және перспективті жетілдіру.....	69
Жайынбаева С.К., Майматаева А.Д., Қосауова А.К. «Төңкерілген сынып» технологиясы негізінде болашақ биология мұғалімінің кәсіби құзыреттілігін қалыптастыру.....	87
Жамбылқызы М., Байбосынова Т., Алейшо М. Action research әдісін ағылшын тілі мұғалімдерінің кәсіби дамуына қолдану.....	102
Жарылғапова Д.М., Қарабала Т.М., Пірмағанбет А.Е. Мобильді қосымшалар арқылы физиканы оқытуда оқушылардың пәнге қызығушылығын және интеллектуалды қабілеттерін арттыру.....	116
Иманғалиева Б., Ермаханов М., Алдиярова А. Ерекше білім беруге қажеттіліктері бар оқушыларға химияны оқыту әдістемесі: қазақ орта мектебінің практикасы.....	133
Каженова Ж.С., Рахматуллина З.Т. Білім беру робототехникасына арналған жинақтарды қолдану арқылы оқу үрдісін ұйымдастыру.....	151
Қазбай П.А., Құдайбергенова К.Т. Қазақ эпостарындағы «қаһарман-қыздар» бейнесін жоғары оқу орнында сыни ойлау технологиясы арқылы оқыту.....	174
Кайсарова А.С., Женсикбаева Н.Ж., Сабырбаева Б.Т. Өлкетану – оқушы тұлғасын әлеуметтендіру құралы ретінде.....	187

Медеубаева К.Т., Хасанова И.У., Сейтенова С.С. Жасанды интеллекттің болашақ мұғалімдерді дайындаудың білім беру траекторияларын дербестендірудегі әлеуеті: Қазақстан тәжірибесі.....	204
Нәби Н.Б., Рахметова Р.С. 4К моделінің қатысымдық дағдыны қалыптастырудағы маңызы және оның концептуалдық негізі.....	222
Нуржанова А.Р., Жусупова Р.Ф., Яленяускене Э. Білім берудегі жасанды интеллект: жасанды интеллект негізіндегі білім беру платформаларын бағалау.....	238
Нуризинова М.М., Баймуханбетов Б.М., Исаев М.С. Білім алушылардың икемді дағдыларын (soft skills) дамыту: теориялық тәсілдердің әсерін зерттеу.....	259
Нұрлан М.Н., Бакырджы Н., Әден Ж.Ш. Жыр жанрын жаңа технологиялар көмегімен оқытудың маңызы.....	275
Орынбасар Т.О., Амирбекова А.Б. Жазушы тезаурусы және көркем әдебиет стилін оқыту әдістемесі: PRISMA әдісімен жасалған систематикалық шолу.....	295
Пернебаева Ф.С., Бакеш З.О., Калымбетова А.А. Биологияны оқытуда инновациялық құзыреттілікті қалыптастыру жолдары.....	319
Сейтбекова Г.О., Кокажаева А.Б., Сүлейменқұлова Г.Т. Оқушылардың математикалық функционалдық сауаттылығын қаржылық мазмұндағы мәтіндік есептерді шешу арқылы дамыту және бағалау.....	338
Семенихина С.Ф., Семенихин В.В. Тұтас педагогикалық үдерісте "мектеп – жоғары оқу орны – ғылым-өндіріс" альянсын енгізуді зерттеу бойынша шолу.....	362
Сматова К.Б., Алимбаева С.К., Оспанбаева М.П. Мектепке даярлық диагностикасын сандық форматқа ауыстыру үрдісін.....	378
Токтагулова У.С., Карменова Н.Н., Садыкова Д.А. Оқу-далалық практиканың теориялық білімді дамытудағы рөлі мен тиімділігін анықтауда білім алушылардың түсініктерін қалыптастыру.....	396
Уалиханова А., Абуов А.Е., Болысбаев Д.С. Балалардың рухани құндылықтарын қалыптастыруда аула клубтарының рөлін зерттеуге әдіснамалық тұғырлар.....	417

Усманова Х., Стычева О.

Ресми бизнес стилін болашақ орыс тілі мұғалімдерін кәсіби дайындау құралы ретінде оқу үрдісінде пайдалану.....433

Хасенова М.Т., Смагулов М.З.

Кедергісіз химия: сыныпта инклюзивті оқытудың стратегиялары.....455

ЭКОНОМИКА**Абдуллаев А.М., Қадырова М.Б., Құралбаев А.А.**

Жергілікті өзін-өзі басқару жүйесіндегі кадрларды басқару: кәсіби құзыреттерді дайындау және дамыту.....477

Аманбай А., Рахимбердинова М.У., Массанова Л.Е.

Қазақстан Республикасындағы тұрғын үй құрылысы нарығының дамуын талдау.....505

Аманғожаева А.Б., Ақпанов А.К., Қасымбекова Г.Р.

Қазақстанның банк секторының осалдық детерминанттары: нарықтық, кредиттік және өтімділік тәуекелдерін көпәдісті талдау.....523

Бейсенбаева А., Ерназарова У., Турдалиева У

ESG тәуекелдерін ескере отырып ішкі бақылаудың тиімділігін бағалау: Қазақстан банк секторы үшін модель.....539

Домалатов Е.Б., Абылайханова Т.А.

Нейрондық желілер адами капиталды басқарудың тиімділігін арттыру құралы ретінде: эмпирикалық талдау және болжамды модельдеу.....554

Елтай Б.Б., Азатбек Т.А.

Түсті металдарға әлемдік бағалардың өзгерісінің Қазақстанның түсті металлургиясының экспорттық динамикасына әсерін бағалау.....569

Елшибекова К.Ж., Ералина Э.М.

Қазақстан өнеркәсібіндегі отандық робототехникалық кешендердің бәсекелестік артықшылықтары.....592

Ендыбаев С.Т., Жусипова Э.Е., Дүйсенбекұлы А.-х.

Қазақстанда қаржылық ақпарат шектеулі жағдайда стартаптардың құнын бағалау әдістемелерін бейімдеу.....613

Еримпашева А., Тарақбаева Р., Люй Ч.

Қазақстан мен Қытай арасындағы инвестициялық өзара іс-қимыл трансконтиненталдық көлік дәліздерін қалыптастыру факторы ретінде.....631

Жумалдинова Д., Ешенкулова Г., Wronka-Pośpiech M.

Креативті индустрия стартаптарындағы жана әдістер мен технологиялар: конфигурациялық шолу.....647

Қадырбекова Д.С., Климова Т.Б., Дүйсеннова Р.Ж. Қазақстандағы халықаралық туризм: шетелдік туристерді тарту факторлары және ел брендин күшейту мүмкіндіктері.....	664
Қадырова К., Давлетова М., Амиргалиева А. Қазақстандағы шағын және орта бизнестің цифрлық трансформация жағдайындағы маркетингтік стратегиялары.....	681
Кальбаева Н.Т., Сатенов Б.И., Хасенова Л.А. Қаржылық факторлардың түркістан облысындағы ет өндірісін экспорттық дамуына әсері: сценарийлік тәсіл.....	699
Каримова Б., Касенова Г., Супугалиева Г. Қазақстанның қор нарығындағы қаржы құралдарының құбылмалылығы: өлшеу және болжау.....	722
Қожахметова Ә.К., Есмұрзаева А.Б., Анархан А.Қ. Жасыл энергетика жобаларының тиімділігін интегралды ESG-бағалау: экономикалық, әлеуметтік және экологиялық аспектілер.....	741
Құралбаева А.Ш., Исаева Г.К., Махатова А.Б. Финтех-инструменттер Қазақстанның ауылдық өңірлерінің тұрақты дамуына инвестицияларды ынталандыру механизмі ретінде.....	767
Мелдебекова А., Канабекова М., Азбергенова Р. Қазақстанның жоғары біліміндегі инновацияларды басқару: индикаторлар және модельдер.....	783
Молдажанов М.Б., Тахтаева Р.Ш., Дюсембинова Ж.С. Семей ядролық қауіпсіздік аймағы мен Курчатов қаласындағы экономикалық қызметтің Семей сынақ полигоны ядролық туризмінің дамуына әсері.....	807
Нұрбатсын А., Киреева А.А. Жоғары білім сапасын арттыру құралы ретіндегі цифрлық технологиялар.....	829
Нурбекова Ш.К., Есімжанова С.Р., Алимжанова Л.М. Цифрландыру негізінде ерекше экономикалық аймақтардағы көлік-логистикалық қызметтерді басқарудың тиімділігін арттыру.....	851
Нұрмұханова Г.Ж., Абжатова А.К., Құрманғалиева А.К. Қазақстанда еңбек нарығы мен жоғары білімнің өзара байланысы: үрдістері мен даму бағыттары.....	875
Полежаева И.С., Суюндиқов А.С., Стаценко О.А. Қазақстан Республикасының энергетика саласының экономикалық тиімділігін арттыруға цифрландырудың әсері.....	892

Разакова Д.И., Алшанов Р.А., Қазыбаева М.Н.

Қазақстан өнеркәсібінің цифрлық трансформациясы: кәсіпорындардың дайындығы мен енгізу барьерлерінің эмпирикалық талдауы.....916

Сагиндыкова Г.М., Тусибаева Г.С., Балгинова К.М.

Қатысушылардың әлеуметтік жауапкершілігі мен уәждемесін қалыптастырудың инновациялық стратегиялары цифрландыру жағдайында
ҚР зейнетақы жүйесі.....935

Садықов Е.Т., Жамкеева М.К., Конырбеков М.Ж.

Қазақстан экономикасындағы үстеме бағалардың құрылымы және оның инфляциялық үрдістерге ықпалы.....955

СОДЕРЖАНИЕ

ПЕДАГОГИКА

Абуова Б.П., Абишева С.Д., Адибаева Ш.Т. Методический потенциал детской литературы Казахстана в образовательном процессе на примере «казахстанских сказок» Юрия Серебрянского.....	19
Азыбаев М., Жайдакбаева Л.К. Педагогические и технологические аспекты реализации смешанного синхронного обучения.....	38
Базарбаева А.Н., Мубаракوف А.М., Ибадулла С.Н. Методические основы использования современных цифровых инструментов в преподавании изобразительного искусства.....	55
Ерболатов Н.Н., Токтаганова Г.Б., Назарова Г.А. Диагностика результатов обучения магистрантов на основе интеграции образования, науки и производства и перспектив совершенствования.....	69
Жайынбаева С.К., Майматаева А.Д., Косауова А.К. Формирование профессиональной компетентности будущих учителей биологии на основе технологии «перевернутый класс».....	87
Жамбылқызы М., Байбосынова Т., Алейшо М. Использование Action Research как метод профессионального развития преподавателей английского языка.....	102
Жарылгапова Д.М., Карабала Т.М., Пирмаганбет А.Е. Повышение интереса и интеллектуальных навыков студентов при преподавании физики через мобильные приложения.....	116
Имангалиева Б., Ермаханов М., Алдиярова А. Методика преподавания химии для учащихся с особыми образовательными потребностями: практика казахской средней школы.....	133
Каженова Ж.С., Рахматуллина З.Т. Организация образовательного процесса с использованием комплектов для образовательной робототехники.....	151
Казбай П.А., Кудайбергенова К.Т. Обучение образу "героини-девушки" в казахских эпосах в вузе по технологии критического мышления.....	174
Кайсарова А.С., Женсикбаева Н.Ж., Сабырбаева Б.Т. Краеведение как средство социализации личности учащегося.....	187

Медеубаева К.Т., Хасанова И.У., Сейтенова С.С. Потенциал искусственного интеллекта в персонализации образовательных траекторий подготовки будущих учителей: опыт Казахстана.....	204
Наби Н.Б., Рахметова Р.С. Значение модели 4К в формировании коммуникативных навыков и ее концептуальная основа.....	222
Нуржанова А.Р., Жусупова Р.Ф., Яленяускене Э. Искусственный интеллект в образовании: оценка образовательных платформ на основе ии.....	238
Нуризинова М.М., Баймуханбетов Б.М., Исаев М.С. Развитие гибких навыков (soft skills) у обучающихся: исследование влияния теоретических подходов.....	259
Нурлан М.Н., Бакырджы Н., Аден Ж.Ш. Актуальность преподавания жанра жыр с использованием инновационных технологий.....	275
Орынбасар Т.О., Амирбекова А.Б. Тезаурус писателя и методика обучения художественному стилю литературы: систематический обзор по методу PRISMA.....	295
Пернебаева Ф.С., Бакеш З.О., Калымбетова А.А. Важность использования технологий искусственного интеллекта при изучении языка.....	310
Сейтбекова Г.О., Кокажаева А.Б., Сулейменкулова Г.Т. Развитие и оценка математической функциональной грамотности учащихся через решение текстовых задач финансового содержания.....	338
Семенихина С.Ф., Семенихин В.В. Обзор по исследованию внедрения альянса «школа – вуз – наука – производство» в целостном педагогическом процессе.....	362
Сматова К.Б., Алимбаева С.К., Оспанбаева М.П. Исследование трансформации диагностики готовности к школе в цифровой формат.....	378
Токтагулова У.С., Карменова Н.Н., Садыкова Д.А. Формирование представлений обучающихся об определении роли и эффективности учебно-полевой практики в развитии теоретических знаний.....	396
Уалиханова А., Абуов А.Е., Болысбаев Д.С. Методологические подходы к изучению роли дворовых клубов в формировании духовных ценностей детей.....	417

Усманова Х., Стычева О.

Использование официально-делового стиля в образовательном процессе как средство профессиональной подготовки будущих учителей русского языка.....433

Хасенова М.Т., Смагулов М.З.

Химия без барьеров: стратегии инклюзивного обучения в классе.....455

ЭКОНОМИКА**Абдуллаев А.М., Кадырова М.Б., Куралбаев А.А.**

Управление кадрами в системе местного самоуправления: подготовка и развитие профессиональных компетенций.....505

Аманбай А., Рахимбердинова М.У., Массанова Л.Е.

Анализ развития рынка жилищного строительства в Республике Казахстан.....523

Амангожаева А.Б., Акпанов А.К., Касымбекова Г.Р.

Детерминанты уязвимости банковского сектора казахстана: многометодный анализ рыночных, кредитных и ликвидных рисков.....523

Бейсенбаева А., Ерназарова У., Турдалиева У.

Оценка эффективности внутреннего контроля с учётом ESG-рисков: модель для банковского сектора Казахстана.....539

Домалатов Е.Б., Абылайханова Т.А.

Нейросети как инструмент повышения эффективности управления человеческим капиталом: эмпирический анализ и предиктивное моделирование.....554

Елтай Б.Б., Азатбек Т.А.

Оценка влияния изменений мировых цен на цветные металлы на экспортную динамику цветной металлургии Казахстана.....569

Елшибекова К.Ж., Ералина Э.М.

Конкурентные преимущества отечественных робототехнических комплексов в промышленности Казахстана.....592

Ендыбаев С.Т., Жусипова Э.Е., Дуйсенбекұлы А.-Х.

Адаптация методологий оценки стоимости стартапов в Казахстане в условиях ограниченной финансовой информации.....613

Еримпашева А., Таракбаева Р., Люй Ч.

Инвестиционное взаимодействие Казахстана и Китая как фактор формирования трансконтинентальных транспортных коридоров.....631

Жумалдинова Д., Ешенкулова Г., Wronka-Pośpiech M.

Новые методы и технологии в стартапах креативной индустрии: конфигурационный обзор.....647

Кадырбекова Д.С., Климова Т.Б., Дүйсенкова Р.Ж. Международный туризм в Казахстане: факторы привлечения иностранных туристов и возможности усиления бренда страны.....	664
Кадырова К., Давлетова М., Амиргалиева А., Стратегии малого и среднего бизнеса Казахстана в условиях цифровой трансформации.....	681
Кальбаева Н.Т., Сатенов Б.И., Хасенова Л.А. Влияние финансовых детерминант на экспортное развитие мясного производства в Туркестанской области: сценарный подход.....	699
Каримова Б., Касенова Г., Супугалиева Г. Волатильность финансовых инструментов на фондовом рынке Казахстана: измерение и прогнозирование.....	722
Кожаметова А.К., Есмурзаева А.Б., Анархан А.К. Интегральная ESG-оценка эффективности проектов зеленой энергетики: экономический, социальный и экологический аспекты.....	741
Куралбаева А.Ш., Исаева Г.К., Махатова А.Б. Финтех-инструменты как механизм стимулирования инвестиций в устойчивое развитие сельских регионов Казахстана.....	767
Мелдебекова А., Канабекова М., Азбергенова Р. Управление инновациями в высшем образовании Казахстана: индикаторы и модели.....	783
Молдажанов М.Б., Тахтаева Р.Ш., Дюсембинова Ж.С. Влияние экономической деятельности в семипалатинской зоне ядерной безопасности и городе Курчатова на развитие ядерного туризма СИП.....	807
Нурбатсын А., Киреева А.А. Цифровые технологии как инструмент повышения качества высшего образования.....	829
Нурбекова Ш.К., Есимжанова С.Р., Алимжанова Л.М. Повышение эффективности управления транспортно-логистическими услугами в особых экономических зонах на основе цифровизации.....	851
Нурмуханова Г.Ж., Абжатова А.К., Курмангалиева А.К. Взаимосвязь рынка труда и высшего образования в Казахстане: тенденции и направления развития.....	875
Полежаева И.С., Суюндииков А.С., Стаценко О.А. Влияние цифровизации на повышение экономической эффективности энергетической отрасли Республики Казахстан.....	892

Разакова Д.И., Алшанов Р.А., Казыбаева М.Н.

Цифровая трансформация промышленности Казахстана: эмпирический анализ готовности предприятий и барьеров внедрения.....916

Сагиндыкова Г.М., Тусибаева Г.С., Балгинова К.М.

Инновационные стратегии для формирования социальной ответственности и мотивации участников пенсионной системы РК в условиях цифровизации.....935

Садыков Е.Т., Жамкеева М.К., Конырбеков М.Ж.

Структура наценок в экономике Казахстана и ее влияние на инфляционные процессы.....955

SCIENTIFIC JOURNAL OF PEDAGOGY AND ECONOMICS

ISSN 1991-3494

Volume 1.

Number 419 (2026), 783-806

<https://doi.org/10.32014/2026.2518-1467.1135>

МРПТИ: 06.81

УДК: 378.1:338.24.001.76

© **Meldebekova A.^{1*}, Kanabekova M.², Azbergenova R.², 2026.**¹Al-Farabi Kazakh National University, Almaty, Kazakhstan;²Kazakh National Pedagogical University named after Abay, Almaty, Kazakhstan.

E-mail: aigul_meld@mail.ru

INNOVATION MANAGEMENT IN KAZAKHSTAN'S HIGHER EDUCATION: INDICATORS AND GOVERNANCE MODELS

Meldebekova Aigul — PhD student, Al-Farabi Kazakh National University, Almaty, Kazakhstan,E-mail: aigul_meld@mail.ru, ORCID: <https://orcid.org/0000-0001-9347-2856>;**Kanabekova Meruert** — Candidate of Economic Sciences, Associate Professor, of the Kazakh National Pedagogical University named after Abay, Almaty, Kazakhstan,E-mail: kma.2372@mail.ru, ORCID: <https://orcid.org/0000-0003-2392-0136>;**Azbergenova Raushan** — Candidate of economic sciences, associate professor of the Kazakh National Pedagogical University named after Abay, Almaty, Kazakhstan,E-mail: azbergenova@bk.ru, ORCID: <https://orcid.org/0000-0003-3721-7361>.

Abstract. Innovative development of higher education is regarded as a key condition for enhancing economic competitiveness and ensuring the resilience of the national innovation system. However, the performance of university innovation largely depends on the quality of governance mechanisms and the capacity to move from research outputs to implementation. The article aims to conceptualize innovation management within the higher education system of the Republic of Kazakhstan and to propose an applied toolkit for diagnosing governance gaps and improving universities' innovation performance. The methodological framework combines document-based analysis with an indicator-based operationalization of university innovation activity following the logic “governance mechanisms – processes – measurable outcomes,” which enables a systematic comparison of organizational arrangements, transfer process configurations, and achieved results. As an empirical background, the study relies on current parameters of Kazakhstan's science and technology development that reveal constraints in the implementation track and highlight the need to strengthen commercialization and partnership mechanisms. As a result, an indicator system for innovation management is developed and structured into four blocks: strategy and governance, resources and capacity, processes and partnerships, and results and impact. Based on a

comparative assessment of governance configurations, a typology of university innovation management models (administrative–regulatory, project–network, and entrepreneurial–platform) is proposed, allowing the identification of bottlenecks along the transfer chain and the design of targeted managerial interventions. The practical significance of the findings lies in the applicability of the proposed framework for monitoring universities’ innovation maturity, aligning KPIs with implementation and impact, and designing measures to develop innovation infrastructure, transfer competencies, and sustainable university–industry–government interactions.

Keywords: innovation management, higher education, university innovation capacity, technology transfer, commercialization; partnerships

For citations: Meldebekova A., Kanabekova M., Azbergenova R. *Innovation management in Kazakhstan’s higher education: indicators and governance models. Scientific Journal of Pedagogy and Economics, 2026. — No.1. — Pp. 783-806. DOI: <https://doi.org/10.32014/2026.2518-1467.1135>*

© Мелдебекова А.¹, Канабекова М.², Азбергенова Р.², 2026.

¹Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан;

²Абай атындағы Ұлттық педагогикалық Университеті, Алматы, Қазақстан.

E-mail: aigul_meld@mail.ru

ҚАЗАҚСТАННЫҢ ЖОҒАРЫ БІЛІМІНДЕГІ ИННОВАЦИЯЛАРДЫ БАСҚАРУ: ИНДИКАТОРЛАР ЖӘНЕ МОДЕЛЬДЕР

Мелдебекова Айгуль — әл-Фараби атындағы Қазақ ұлттық университетінің докторанты, Алматы, Қазақстан,

E-mail: aigul_meld@mail.ru, ORCID: <https://orcid.org/0000-0001-9347-2856>;

Канабекова Меруерт — экономика ғылымдарының кандидаты, қауымдастырылған профессор, Абай атындағы Ұлттық педагогикалық университеті, Алматы, Қазақстан,

E-mail: kma.2372@mail.ru, ORCID: <https://orcid.org/0000-0003-2392-0136>;

Азбергенова Раушан — экономика ғылымдарының кандидаты, доцент, Абай атындағы Ұлттық педагогикалық университеті, Алматы, Қазақстан,

E-mail: azbergenova@bk.ru, ORCID: <https://orcid.org/0000-0003-3721-7361>.

Аннотация. Жоғары білім берудің инновациялық дамуы экономиканың бәсекеге қабілеттілігін арттырудың және ұлттық инновациялық жүйенің орнықтылығын қамтамасыз етудің негізгі шарты ретінде қарастырылады. Дегенмен университеттік инновациялардың нәтижелілігі көбіне басқару тетіктерінің сапасына және зерттеу нәтижелерін енгізуге көшіру қабілетіне байланысты. Мақала мақсаты – Қазақстан Республикасының жоғары білім беру жүйесіндегі инновацияларды басқаруды тұжырымдамалық тұрғыдан негіздеу және басқарушылық алшақтықтарды диагностикалауға, сондай-ақ университеттердің инновациялық нәтижелілігін арттыруға арналған

қолданбалы құралдар ұсыну. Зерттеудің әдіснамалық негізі құжаттық-талдамалық тәсілді және университеттердің инновациялық қызметін «басқару тетіктері – үдерістер – өлшенетін нәтижелер» логикасында индикативті операцияландыруды қамтиды, бұл ұйымдастырушылық шешімдерді, трансфердің үдерістік контурларын және алынған нәтижелерді салыстыруға мүмкіндік береді. Эмпирикалық фон ретінде Қазақстанның ғылыми-технологиялық дамуының өзекті параметрлері қолданылып, енгізу контурының шектеулілігі және коммерцияландыру мен әріптестік механизмдерін күшейту қажеттілігі көрсетіледі. Нәтижесінде инновацияларды басқару индикаторларының жүйесі төрт блок бойынша әзірленді: стратегия және басқару, ресурстар және әлеует, үдерістер және әріптестік, нәтижелер және әсер. Басқарушылық конфигурацияларды салыстыру негізінде университеттердегі инновацияларды басқару модельдерінің типологиясы (әкімшілік-регламенттік, жобалық-желілік, кәсіпкерлік-платформалық) ұсынылып, трансфер тізбегіндегі «тар орындарды» айқындауға және нысаналы басқарушылық шешімдер қалыптастыруға мүмкіндік береді. Нәтижелердің практикалық маңызы – ұсынылған құрылымды университеттердің инновациялық жетілуін мониторингтеуге, КРІ-ды енгізу мен әсерге бағдарлап баптауға, сондай-ақ инновациялық инфрақұрылымды, трансфер құзыреттерін және индустрия мен мемлекетпен орнықты өзара іс-қимылды дамыту шараларын жобалауға қолдану мүмкіндігі.

Түйін сөздер: инновацияларды басқару, жоғары білім, университеттік инновациялылық, технологиялар трансфері, коммерцияландыру, әріптестік

© Мелдебекова А.^{1*}, Канабекова М.², Азбергенова Р.², 2026.

¹Казахский национальный университет им. аль-Фараби, Алматы, Казахстан;
Казахский Национальный педагогический университет имени Абая,
Алматы, Казахстан.
E-mail: aigul_meld@mail.ru

УПРАВЛЕНИЕ ИННОВАЦИЯМИ В ВЫСШЕМ ОБРАЗОВАНИИ КАЗАХСТАНА: ИНДИКАТОРЫ И МОДЕЛИ

Мелдебекова Айгуль — докторант КазНУ им. аль-Фараби, Алматы, Казахстан,
E-mail: aigul_meld@mail.ru, ORCID: <https://orcid.org/0000-0001-9347-2856>;

Канабекова Меруерт — кандидат экономических наук, ассоциированный профессор,
Казахского Национального педагогического университета имени Абая, Алматы, Казахстан,
E-mail: kma.2372@mail.ru, ORCID: <https://orcid.org/0000-0003-2392-0136>;

Азбергенова Раушан — кандидат экономических наук, доцент Казахского Национального педагогического университета имени Абая, Алматы, Казахстан,
E-mail: azbergenova@bk.ru, ORCID: <https://orcid.org/0000-0003-3721-7361>.

Аннотация. Инновационное развитие высшего образования рассматривается как ключевое условие повышения конкурентоспособности

экономики и устойчивости национальной инновационной системы, однако результативность университетских инноваций в значительной степени определяется качеством управленческих механизмов и способностью обеспечивать переход от исследований к внедрению. Цель статьи - концептуализировать управление инновациями в системе высшего образования Республики Казахстан и предложить прикладной инструментарий диагностики управленческих разрывов и повышения инновационной результативности университетов. Методологическая основа исследования включает документально-аналитический подход и индикативную операционализацию инновационной деятельности университетов в логике «управленческие механизмы - процессы - измеряемые результаты», что позволяет сопоставлять организационные решения, процессные контуры трансфера и получаемые результаты. В качестве эмпирического фона используются актуальные параметры научно-технологического развития Казахстана, отражающие ограниченность внедренческого контура и необходимость усиления механизмов коммерциализации и партнерств. В результате разработана система индикаторов управления инновациями, структурированная по четырём блокам: стратегия и управление, ресурсы и потенциал, процессы и партнёрства, результаты и эффекты. На основе сопоставления управленческих конфигураций предложена типология моделей управления инновациями в университетах (административно-регламентная, проектно-сетевая, предпринимательско-платформенная), позволяющая выявлять «узкие места» в цепочке трансфера и формировать адресные управленческие решения. Практическая значимость результатов состоит в возможности применения предложенной рамки для мониторинга инновационной зрелости университетов, настройки KPI с ориентацией на внедрение и эффект, а также проектирования мер по развитию инновационной инфраструктуры, компетенций трансфера и устойчивых взаимодействий с индустрией и государством.

Ключевые слова: управление инновациями, высшее образование, университетская инновационность, трансфер технологий, коммерциализация, партнерства

Introduction. The transition to a knowledge-based economy has reinforced the importance of higher education as a key institution for the production, accumulation and dissemination of new knowledge, technologies and skills. In this context, universities are seen not only as providers of human capital, but also as full-fledged actors in the innovation ecosystem, ensuring the creation of scientific results, their transfer and commercialisation, the development of academic entrepreneurship, and sustainable interaction with business and the state (Etzkowitz and Leydesdorff, 2000). In the international scientific tradition, this evolution is described through the concepts of the ‘entrepreneurial university’ and institutional transformations

aimed at expanding autonomy, managerial flexibility, and sensitivity to external demand (Clark, 1998).

The scientific and applied significance of innovation necessitates a clear distinction between the content of innovative activities. In line with contemporary international approaches, innovation is interpreted more broadly than purely technological change: it encompasses product, process, organisational and marketing innovations, as well as activities related to their development and implementation (OECD/Eurostat, 2018). Consequently, innovation management in higher education should be viewed as a targeted system of management decisions and mechanisms – strategic, organisational, human resources, financial and infrastructural – that ensure the university's full innovation cycle: from the formation of the research agenda and the development of competencies to the implementation of results, the establishment of partnerships and the measurement of impact (Tidd and Bessant, 2020).

For the Republic of Kazakhstan, the issue of innovation management in the higher education system is becoming increasingly relevant for three interrelated reasons. First, the implementation of the national agenda for economic diversification and productivity growth is creating demand for applied research, technological entrepreneurship and training for high-tech industries. Second, the higher education system itself is undergoing modernisation, which involves improving the quality and relevance of training and strengthening the role of universities in research and innovation (OECD, 2017a). Thirdly, the regulatory framework and strategic documents of the state enshrine the priority of developing higher and postgraduate education and science, as well as the need to update the tools for managing and stimulating university innovation activity (Republic of Kazakhstan, 2007; Government of the Republic of Kazakhstan, 2023).

At the same time, international analytical reviews emphasise that, despite the progress achieved, it is important for Kazakhstan to strengthen the link between education, research and innovation, improve the effectiveness of university science and the quality of knowledge transfer mechanisms, including deepening cooperation with industry and developing effective incentives (OECD, 2017a; OECD, 2017b). These conclusions are consistent with the results of recent empirical studies in the Kazakh context: inter-university differentiation in terms of innovation potential persists, and management decisions (structures, processes, motivation and monitoring) often require a more systematic link to measurable parameters of innovation activity (Abaidilda and Turmakhanbetova, 2025). Consequently, the key research task is to clarify which management models and tools enable Kazakhstani universities to sustainably improve their innovation performance without reducing it to formal indicators or fragmented initiatives.

In theoretical terms, innovation management in universities can be interpreted as a special case of organisational innovation, in which leadership, organisational design, resources and processes, as well as external environmental factors and

institutional constraints play a decisive role (Crossan and Apaydin, 2010). Meta-analytical results in the field of organisational innovation show that the innovativeness of organisations is consistently determined by structural and resource characteristics, the level of formalisation and professionalisation, as well as the quality of decision-making mechanisms and interaction with external stakeholders (Damanpour, 1991). For universities, this means the need to combine strategic management of the research portfolio, development of innovative infrastructure (laboratories, competence centres, commercialisation offices), stimulation of academic entrepreneurship, and systematic work with partners in the logic of the 'triple helix' (Etzkowitz and Leydesdorff, 2000), while ensuring the quality of education and adhering to the principles of academic integrity.

Thus, the research problem is formulated as the need to develop and justify management approaches to innovation in the higher education system of Kazakhstan that ensure: (i) coordination of state policy and university strategies; (ii) effective knowledge transfer and commercialisation; (iii) development of human capital and innovative competencies; (iv) transparent mechanisms for evaluating and monitoring innovation activities. The practical significance of this topic is determined by the fact that the quality of innovation management in universities directly affects the competitiveness of the national higher education system and the country's ability to form a sustainable innovative economy (OECD, 2017b; OECD, 2022).

The purpose of this article is to justify and conceptualise approaches to innovation management in the higher education system of the Republic of Kazakhstan, highlighting key management mechanisms, barriers and areas for improvement.

To achieve this goal, the following tasks are to be accomplished:

- clarify the concepts of 'innovation' and 'innovation management' as they apply to the university sector;
- analyze the institutional context and strategic guidelines for the development of higher education and science in Kazakhstan;
- systematise management tools (strategy, structure, incentives, partnerships, infrastructure, monitoring) and effectiveness factors;
- formulate practical recommendations for education authorities and university management.

Literature Review. Contemporary scientific literature interprets innovation as a multidimensional phenomenon that goes beyond purely technological changes: along with products and processes, the field of analysis includes organisational and marketing innovations, as well as a set of activities that ensure their development and implementation (OECD/Eurostat, 2018). In the management dimension, innovation is seen as the result of a combination of strategy, resources, competencies and organisational processes that enable an organisation to systematically generate and scale innovations (Tidd and Bessant, 2020). For the higher education sector, this means that a university's innovativeness is determined not only by the volume of research or the number of publications, but also by its ability to transform

knowledge into applied solutions, educational products, social effects and sustainable partnerships with the external environment.

An important theoretical context is provided by approaches to national and regional innovation systems, where universities are key hubs for knowledge production and human capital development, and the effectiveness of innovation depends on the quality of institutions, funding and interaction between actors (Nelson, 1993; Lundvall, 1992). At the intersection of these ideas, a ‘triple helix’ model has emerged, describing the dynamics of the co-evolution of universities, business and the state and emphasizing that innovation is enhanced by the institutionalisation of joint mechanisms (centres of competence, transfer programmes, research consortia) and when there are incentives for cooperation (Etzkowitz and Leydesdorff, 2000). This framework has been widely used in the analysis of the ‘third mission’ of universities - activities beyond teaching and fundamental science aimed at developing the economy and society through entrepreneurship, commercialisation, consulting and social innovation.

A separate line of research is the concept of the ‘entrepreneurial university,’ which emphasises the role of managerial transformation, organisational autonomy, and diversification of funding sources to enhance the innovative sustainability of universities (Clark, 1998). In works developing this approach, entrepreneurial orientation is understood not as a replacement of academic values with ‘market’ values, but as an expansion of management and motivation tools that allow universities to flexibly shape their research agenda and respond more quickly to the demands of the economy and society (OECD, 2022). In practical terms, these ideas have been institutionalised within the HEInnovate, a guidance model developed by the European Commission in collaboration with the OECD, where the innovative and entrepreneurial capacity of a university is assessed across eight dimensions (leadership and management, organisational capacity, entrepreneurial education, pathways for entrepreneurs, knowledge exchange, international orientation, etc.) (OECD, 2022).

Research on the organisational determinants of innovation is important for interpreting differences in the innovative performance of universities. Meta-analytic reviews show a consistent link between innovation and resource endowment, organisational structure, decision-making mechanisms, level of professionalisation, and characteristics of the external environment (Damanpour, 1991). Building on these findings, systematic reviews of organisational innovation emphasise the importance of the combined influence of leadership, culture, strategic priorities, external relationships, and knowledge management processes (Crossan and Apaydin, 2010). In the logic of management theories, this means that innovation in a university requires simultaneously: (i) strategic ‘vision’ and prioritisation, (ii) organisational support mechanisms (structures, budgets, procedures), (iii) personnel incentives and competencies, (iv) channels of interaction with external partners.

In terms of content, university innovation management is often revealed

through the tools of ‘knowledge management’ and ‘open innovation,’ which involve the use of external sources of ideas and technologies, as well as the joint development of solutions with companies, the state, and society (Chesbrough, 2003). However, the effectiveness of ‘openness’ depends on an organisation's ability to recognise the value of external knowledge, assimilate it and apply it – that is, on its absorptive capacity (Cohen and Levinthal, 1990). For universities, this is expressed in the quality of research competencies, the development of cooperation networks, the availability of transfer and patent licensing expertise offices, as well as in management practices that transform scattered contacts into sustainable project portfolios. In a related perspective, dynamic capabilities explain why some universities are better at adapting to technological and market changes: they are quicker to “sense” opportunities, “capture” them with their resources, and “transform” the organisation to a new agenda (Teece, Pisano, and Shuen, 1997).

Empirical literature on university-industry collaboration also highlights the dual nature of this process. On the one hand, partnerships increase the applied significance of research, expand funding, and accelerate the implementation of results; on the other hand, they create risks of shifting the research agenda, conflicts of interest, and ‘metric’ behaviour, where formal indicators (e.g., number of contracts) dominate over quality and long-term scientific returns (Perkmann et al., 2013). Therefore, an important task of innovation management is to balance academic goals and commercialisation incentives, which requires transparent intellectual property policies, ethical standards, and systems for evaluating the results of the ‘third mission’ that are comparable to indicators of the quality of education and research.

Within the discussion on policy and institutional design, models for managing university innovation infrastructure occupy a special place. The most common tools include technology transfer offices (TTOs), incubators and accelerators, science parks, centres of excellence, grant offices, and mechanisms to support start-ups and spin-off companies (Siegel, Waldman, and Link, 2003). Research indicates that structures alone do not guarantee commercialisation: employee competencies, the quality of the development portfolio, consistent KPIs, the presence of external investors, and legal certainty in matters of intellectual property and revenue distribution are critical (Siegel et al., 2003; Perkmann et al., 2013). It follows that innovation management in a university is not a ‘set of departments but a cross-cutting system that integrates strategy, processes, people, and partnerships.

With regard to Kazakhstan, international reviews emphasize that the higher education system is at the heart of economic diversification and productivity improvement, and that further growth requires improving the quality of skills, strengthening the research component and the effectiveness of mechanisms for transferring knowledge to the economy (OECD, 2017a). Reviews of innovation policy note the existence of established elements of an innovation system and some successes in commercialisation, but there is still a need to strengthen innovation

capabilities, stimulate cooperation and increase the return on public investment in science and innovation (OECD, 2017b).

National strategic documents and legislation that establish rules for university science, transfer and commercialisation provide an important institutional framework. For example, the Concept for the Development of Higher Education and Science in the Republic of Kazakhstan for 2023–2029 sets out guidelines for modernising management, improving quality and competitiveness, and strengthening the link between education, science and innovation (Government of the Republic of Kazakhstan, 2023). In 2024, the Law on Science and Technology Policy was adopted, which regulates relations in the field of science and scientific and technological activities and includes a section related to the commercialisation of the results of scientific and/or scientific and technical activities (Republic of Kazakhstan, 2024). These documents are important for analysis because they define the framework opportunities (funding, coordination, support institutions) and constraints (procedures, reporting requirements) within which universities build innovative management.

Domestic research on university innovation in Kazakhstan is developing in two directions. The first is the assessment of innovation potential and performance factors (human capital, infrastructure, external links, digital maturity), which highlights the heterogeneity of universities and the need for management decisions based on measurable parameters of innovation activity (Abaidilda and Turmakhabetova, 2025). The second is applied work on commercialisation and transfer mechanisms, which discusses barriers (limited project culture, weak links with industry, lack of expertise in IP and business development) and proposes tools to overcome them (transfer centres, acceleration programmes, stimulation of research entrepreneurship). Taken together, this literature confirms the conclusion that the key deficit often lies not in the absence of individual initiatives, but in insufficient systematic management - from strategy and organisational design to motivation and monitoring of impact.

In conclusion, analysis of the sources allows us to identify several stable ‘support nodes’ for innovation management in higher education: (1) strategic management of the research and innovation portfolio; (2) development of the university's absorption capacity and dynamic capabilities; (3) institutionalisation of the ‘third mission’ through transfer infrastructure and competencies; (4) partnership models based on the ‘triple helix’ logic; (5) balanced evaluation systems that take into account quality, impact, and the risks of opportunistic behaviour. These provisions form the theoretical basis for further analysis of the Kazakhstani context and justification of recommendations for improving management mechanisms.

Materials and Methods. This study was conducted within the paradigm of applied institutional and managerial analysis and aims to identify the managerial mechanisms that determine the innovative performance of higher education institutions in the Republic of Kazakhstan. The research design is based on

methodological triangulation and combines: analysis of the regulatory and political context; indicative assessment of the innovative activity of universities; comparison of management practices and organisational decisions that ensure the generation and implementation of innovations.

The conceptual framework is based on three complementary approaches. First, it uses the ‘triple helix’ model, which views innovation as the result of the co-evolution and institutionalisation of ‘university-industry-government’ interaction (Etzkowitz and Leydesdorff, 2000). Second, it draws on a body of research on organisational innovation that explains differences in innovation outcomes through the structure, resources, processes, and external connections of organisations (Damanpour, 1991; Crossan and Apaydin, 2010). Thirdly, the dynamic capabilities approach is applied, which is relevant for universities in the context of competition for resources and changes in the scientific and technological agenda, where the ability to recognise opportunities, mobilize resources and transform organisations is critical (Teece, Pisano, and Shuen, 1997).

The empirical basis of the study is formed from open and official sources, ensuring the comparability and reproducibility of the results.

Regulatory and policy documents: the key ones are the Concept for the Development of Higher Education and Science in the Republic of Kazakhstan for 2023–2029, which sets out guidelines for modernising management and strengthening the link between education, science and innovation (Government of the Republic of Kazakhstan, 2023), as well as the Law of the Republic of Kazakhstan ‘On Science and Technology Policy,’ which shapes the institutional conditions for scientific and technological activities and the commercialisation of results (Republic of Kazakhstan, 2024).

Comparable international reviews and recommendations: OECD reports on higher education and innovation policy in Kazakhstan (OECD, 2017a; OECD, 2017b) are used for benchmarking and interpreting systemic barriers and priorities.

Statistical and administrative data: Aggregated indicators from official statistics and administrative reports are used, reflecting the parameters of research and innovation activities (human resources, funding, research results and interaction with external partners), as well as publication and patent information necessary to record scientific and applied output.

Public reporting by universities: strategic plans, annual reports, information on project portfolios, infrastructure (centres of excellence, transfer offices, incubators/accelerators), mechanisms to support commercialisation and academic entrepreneurship.

The operationalisation of innovation activities is based on an expanded understanding of innovation and innovative activity, as set out in the Oslo Manual 2018 (OECD/Eurostat, 2018). Within the framework of the study, innovation management is interpreted as a set of management decisions and procedures that ensure a full cycle of innovation at the university: agenda setting, resource

mobilisation, project implementation, transfer and implementation of results, as well as monitoring of effects.

The system of indicators is structured according to the logic of ‘inputs-processes-outputs-results,’ which allows for the separation of resource availability, management mechanisms, and measurable results, reducing the risk of substituting quality with formal metrics. Taking into account the specifics of the university sector and the risks of ‘metric’ distortion of assessment, special attention is paid to distinguishing between scientific output (e.g., publications) and the results of interaction with the external environment (contracts, joint projects, licensing, implementation). The indicators are grouped into four analytical domains: (1) strategy and management; (2) resources and potential; (3) transfer and partnership processes; (4) results and effects of innovation activity.

The analysis is carried out in several sequentially linked stages.

At the first stage, the institutional environment was mapped: the goals, priorities and regulatory requirements that determine the parameters of innovation management in higher education in Kazakhstan were identified.

At the second stage, an indicative base was formed: indicators were unified, units of measurement and time intervals were compared, and data consistency was verified based on the principles of measuring innovation activity.

At the third stage, a comparative analysis of university profiles was carried out: a descriptive assessment of dynamics and inter-organisational differences was conducted; and indicators were interpreted in conjunction with organisational conditions and management mechanisms.

At the fourth stage, an explanatory interpretation of the identified differences was carried out: the results were compared with management practices and types of interaction in the logic of the ‘triple helix’ and organisational innovation, as well as from the perspective of dynamic capabilities.

To increase the reliability of the conclusions, triangulation of sources (political and regulatory documents, comparable international reviews, statistical and administrative data, public reporting of universities) was used, as well as cross-checking of key empirical statements against independent data sets. The limitations of the study include differences in the completeness and standardisation of university public reporting, as well as the limited interpretation of individual metrics as direct proxies for innovative impact; these limitations are taken into account by separating “outputs” and “effects” and by analytically linking indicators to management mechanisms.

Results. The institutional architecture for managing innovation in the higher education sector in the Republic of Kazakhstan is formed at the intersection of strategic regulation (setting goals, priorities and expected results) and framework legal regulation (establishing principles, instruments and rules for scientific and technological activity). An analysis of key regulatory and policy documents shows that it is the combination of these levels that shifts the innovation agenda

of universities from a mode of individual initiatives to a mode of systemic management, which involves building a sustainable ‘chain’ from priorities and resources to measurable results and effects (OECD, 2017a; OECD, 2017b).

The first level is strategic (policy level): The Government of the Republic of Kazakhstan has approved the ‘Concept for the Development of Higher Education and Science in the Republic of Kazakhstan for 2023–2029’, which sets out the target framework for the transformation of the sector and establishes the need to strengthen the link between ‘education, science and innovation’, improving the effectiveness of university science and refining management and support tools (Government of the Republic of Kazakhstan, 2023). In the logic of institutional analysis, this document serves as a strategic ‘anchor’: it defines the directions of modernisation and thus sets guidelines for university strategies, organisational models and monitoring systems. At the same time, the key managerial meaning of the Concept is that innovation in universities is seen not as an optional ‘add-on’ to the educational mission, but as an integral component of development that requires coordinated management decisions - from prioritising research areas to creating conditions for the transfer of results.

The second level is the legal framework (rules level): the Law of the Republic of Kazakhstan ‘On Science and Technology Policy’ establishes the basic goals, objectives and principles of state science and technology policy, and also forms the regulatory conditions for the organisation of scientific and technological activities and the implementation of research results (Republic of Kazakhstan, 2024). It is also important for analysts that the legal databases separately specify the date of entry into force of the law – 1 September 2024 – which must be taken into account when interpreting the dynamics of indicators and attempting to compare the ‘before/after’ regulatory changes (e.g., in terms of commercialisation and management procedures) (Spinform, 2024).

Taken together, the strategic and legal levels set universities a dual management task. On the one hand, they need to ensure compliance with national priorities (integration of education, science and innovation; improving research performance; developing interaction with the economy). On the other hand, it is necessary to institutionally ‘bring together’ innovative activities within the university through the formalisation of rules and procedures (project portfolio management, intellectual property policy, organisational contours of transfer and partnerships), i.e. to translate innovation into regular processes rather than one-off projects (OECD, 2017a).

From a management perspective, this architecture means that the effectiveness of innovation in higher education depends not only on the volume of resources, but also on the quality of institutional ‘integration’: (i) prioritisation and strategy → (ii) tools and infrastructure → (iii) partnerships and transfer → (iv) measurement of results and feedback. International OECD reviews of Kazakhstan emphasize the importance of strengthening the research and innovation functions of higher education, as well as the need to develop management mechanisms to increase the return on research and improve the transfer of knowledge to the economy.

Thus, the institutional framework in Kazakhstan is shaping the transition from ‘ad hoc’ initiatives to a model of systematic management of university innovation, where the following are becoming priorities: transparent strategic prioritisation, infrastructure support (in the broad sense – organisational and service), the promotion of sustainable partnerships with industry and the state, and the introduction of comparable indicators and monitoring of innovation performance at the university and sector levels (OECD, 2017b).

The above shows that the Concept for the Development of Higher Education and Science for 2023–2029 and the Law on Science and Technology Policy form a ‘mandatory agenda’ for universities - the integration of education, science and innovation, as well as requirements for effective and transparent management (Government of the Republic of Kazakhstan, 2023). However, institutional priorities become manageable only when they are translated into measurable parameters: what resources the sector has at its disposal, how management mechanisms are organised, what processes actually work and what results are achieved (OECD/Eurostat, 2018; OECD, 2022). Therefore, the next step in the study was to operationalise innovation management through an applied system of indicators suitable for monitoring at the university and sector levels.

During the analytical stage, an applied system of indicators was developed, structured according to the logic of ‘management mechanisms → processes → measurable results. Methodologically, the selection of indicators is based on an expanded interpretation of innovation and the rules for measuring innovation activity (Oslo Manual) (OECD/Eurostat, 2018), as well as on the framework for assessing entrepreneurial/innovative universities (HEInnovate country review approach) (OECD, 2022).

To ensure that the system of indicators is comparable with the reality of the sector, it is ‘linked’ to the basic parameters of the environment:

Scale of the sector: at the beginning of the 2024–2025 academic year, there were 113 higher education institutions in Kazakhstan, with a total of 624,500 students.

Scientific resource base: domestic RandD expenditure in 2023 increased from 121.6 to 172.6 billion tenge, with the science intensity of GDP at 0.14% (an increase of 0.02 percentage points).

The role of the higher education sector in RandD: in 2023, domestic expenditure on research and development amounted to 172,585.9 million tenge, of which the higher professional education sector accounted for 68,338.3 million tenge (i.e. a significant share of total expenditure is concentrated in the university segment).

RandD structure (skew towards research): in 2023, fundamental research accounted for 47,914 million tenge, applied research for 112,271 million tenge, and experimental design work for 12,401 million tenge; The low share of RandD, at 7.2%, is highlighted separately.

Dependence on state funding: According to national analytics, the share of the state budget in total RandD expenditure in 2023 was 74.8%, while the share of own funds fell to 16% (the lowest in a decade).

Scientific ‘density’: in 2023, the number of people employed in RandD is estimated at 23.7 per 10,000 people employed in the economy (engagement indicator).

These parameters set the ‘boundaries’ for interpretation: with low science intensity and a high share of state funding, the key management objective is not only to increase volumes, but also to improve transfer and implementation returns (including increasing the share of RandD and commercialisation results).

Table 1 – System of indicators for managing innovation at the university (applied framework linked to data)

Block	Indicators (what is captured)	Metric / unit of measurement	Example of “sectoral anchoring” (Kazakhstan)	Typical sources
Strategy and governance	existence of an innovation strategy/roadmap; KPIs and monitoring framework; IP policy; commercialization regulations	binary (0/1); availability of KPIs (list/matrix); reporting frequency	the national framework is already defined by the 2023–2029 Concept, implying the need for “education–science–innovation” KPIs at the university level (Adilet)	development strategies/plans, internal regulations, annual reports
Resources and capacity	research staff; infrastructure (labs/centers); presence of a TTO/commercialization office; RandD funding	headcount; presence of structures (0/1); funding volume (million KZT); funding shares (%)	internal RandD expenditures in 2023: 172.6 billion KZT; RandD intensity: 0.14% of GDP; higher education sector: 68,338.3 million KZT	Bureau of National Statistics (BNS), National Science Report, university reporting
Processes and partnerships	RandD portfolio; joint projects with industry/public sector; acceleration/incubation; grant application support; commercialization projects	number of projects; contract volume (million KZT); number of partners; number of startup programs	in the commercialization ecosystem, operator-level metrics are measurable: JSC “Science Fund” reported 155 projects in 2022 (as a proxy for commercialization market scale)	aggregated project registries, operator/university reports, official websites
Outputs and outcomes	publications/citations; patents/applications; licenses/IP revenues; contract-based RandD; spin-offs/startups; share of experimental development	counts; revenues (million KZT); shares (%)	structure of internal RandD expenditures (2023): experimental development = 12,401 million KZT and 7.2% (indicator of a weak “implementation” component)	bibliometric sources, patent databases, financial/management reporting

The indicator framework is based on the Oslo Manual (OECD/Eurostat, 2018) and HEInnovate/OECD approaches to assessing entrepreneurial universities (OECD, 2022), with empirical reference to the parameters of science and higher education in Kazakhstan (BNS/national analytics).

The indicator system allows for the diagnosis not of the ‘level of innovation in general,’ but of the point of managerial gap. For example, with resource growth (172.6 billion tenge in domestic RandD expenditure in 2023) and a high share of public funding (74.8%), the issue of converting research into implementation becomes critical, which is empirically reflected in the low share of RandD (7.2%) and the need to strengthen transfer processes and partnerships.

The previously developed system of innovation management indicators (Table 1), based on the logic of “management mechanisms → processes → measurable results”, provides a tool for measuring and comparing universities. However, in the context of the Kazakhstani sector, which is characterised by significant institutional heterogeneity (at the beginning of the 2024–2025 academic year, there were 113 higher education institutions and 624,500 students), the application of indicators requires an interpretative framework that explains why identical formal management elements (e.g., the existence of a strategy or a specialised department) lead to different results. In addition, the macro context of science reinforces the importance of organisational configurations: in 2023, internal RandD expenditure amounted to 172,585.9 million tenge, with the higher professional education sector accumulating 68,338.3 million tenge, and the share of budget financing in total expenditure reaching 83.4%. At the same time, the share of experimental design work (EDW) in the structure of RandD in 2023 was only 7.2%, while applied research accounted for 65.1% and fundamental research for 27.8%. This structure indicates a systemic problem of converting research into an ‘implementation circuit,’ which makes the university's management model a critical factor in innovation performance.

In this regard, a typology of three stable ‘ideal types’ of innovation management models is used to interpret indicators and diagnose management gaps. The typology was derived by comparing management decisions (structure, regulations, incentives, infrastructure) with the logic of ‘university-industry-state’ interaction (Etzkowitz and Leydesdorff, 2000) and the determinants of organisational innovation (Damanpour, 1991; Crossan and Apaydin, 2010). At the same time, ‘ideal types’ do not exclude mixed configurations: a particular university may combine elements of several models, but the typology is useful as a diagnostic tool for selecting directions of institutional development.

Table 2 – Typology of innovation management models in universities

Model	Managerial logic	Strengths	Risks / constraints
Administrative–regulatory	Dominance of procedures and reporting; innovation institutionalized as a formal “direction” within the organizational structure; KPIs are predominantly quantitative	Formal controllability; basic institutionalization; reproducibility of control processes	“Metric-driven” management; fragmentation of initiatives; low conversion of research into transfer/commercialization
Project–network	Governance through an RandD and partnerships portfolio; project offices/consortia; focus on grants and collaborative projects	Higher applied relevance of research; stronger linkages with industry and the public sector; expanded project management capabilities	Dependence on external funding; gap between projects and long-term strategy; overload from “project reporting”
Entrepreneurial–platform	Innovation integrated as a cross-cutting management function; developed TTOs/incubators/accelerators; IP policy and transfer business processes; flexible incentive mechanisms	Faster knowledge/technology transfer; diversification of revenue streams; institutionalization of the “third mission”	Risk of goal conflicts (academic vs commercial); high requirements for IP policy maturity, competencies, and ethical standards

Administrative and regulatory model – this model is formed in an institutional environment where a high share of budget financing (83.4% in 2023) reinforces the role of compliance, reporting and formal enforcement of regulations. In the indicative profile (Table 1), this model is primarily reflected in the ‘Strategy and Management’ block: the existence of strategies/roadmaps, regulatory provisions, distribution of powers and formal KPIs. However, in the ‘Processes and Partnerships’ block, there is often insufficient “integration” of the project cycle with external cooperation and transfer mechanisms, and in the ‘Results and Effects’ block, the emphasis shifts towards outputs (publications, reporting indicators) with weak dynamics of outcomes/ impact (income from IP, licences, implementation). Empirically, a systemic symptom of this profile is a low share of RandD (7.2% in the RandD structure in 2023), which indicates a lack of implementation and weak conversion of research into developments and technological solutions.

An important limitation of the model is related to the risk of ‘metric behaviour’: the management system optimises indicators that are easier to measure and present in reports, which can reduce long-term innovation returns and the quality of interaction with industry (Perkmann et al., 2013). As a result, innovations remain institutionally ‘prescribed’ but do not translate into a sustainable transfer chain in organisational terms.

The project-network model is characterised by a shift in the management focus to the ‘Processes and Partnerships’ block: project offices are formed, the RandD

portfolio is managed, and cooperative ties are strengthened (consortia, joint projects, contractual research). In terms of the Triple Helix, this means strengthening practices of joint knowledge and decision-making, where the university acts not only as a research centre but also as a partner in development and implementation (Etzkowitz and Leydesdorff, 2000). At the indicator level, such a model usually demonstrates an increase in the number of external projects and contracts, greater involvement of industrial partners, and expansion of funding sources in the portfolio structure.

The key risk is the ‘project-strategy’ gap: external grant and contract cycles can form a portfolio that is poorly aligned with the university's long-term priorities. This leads to a ‘project mosaic’ effect, where the organisational capacity to reproduce results after external funding ends is limited. Given that the higher education sector accumulates 68,338.3 million tenge in internal RandD costs, the sustainability of the project-network model becomes fundamental: without institutionalising transfer processes and competencies, project activity does not guarantee growth in the share of RandD and commercialisation.

The entrepreneurial platform model assumes that innovation is organised as an end-to-end management system that combines strategy, project cycle, infrastructure, transfer and incentives. In the indicative framework, this model is characterised by a high level of maturity in three areas: “Resources and Potential” (TTO, incubators/accelerators, IP competencies), ‘Processes and Partnerships’ (commercialisation pipeline, application/patenting/licensing support, spin-off support), and ‘Results and Effects’ (licences, IP revenues, contractual RandD, sustainable innovative products). In practical terms, the model aims to increase the share of ‘implementation’ results, which is particularly relevant given the low share of RandD (7.2% in 2023).

The limitations of this model are due to the high complexity of management: it requires mature intellectual property policies, technology brokerage competencies, legal and financial expertise, as well as a motivation system that does not undermine academic goals. In the absence of these conditions, the entrepreneurial agenda can lead either to imitation (formal structures without results) or to a conflict of incentives and a redistribution of resources to the detriment of the quality of education and research (OECD, 2022).

Thus, the proposed typology acts as a ‘bridge’ between the indicative system (Table 1) and the interpretation of results in the Kazakh context: given the significant scale of the sector (113 universities; 624,500 students) and the important role of universities in RandD (68.3 billion tenge), it is the management configuration that determines the ability to translate resources and projects into implementation and impact, which is particularly noticeable against the backdrop of the low share of RandD (7.2%).

The proposed typology (administrative-regulatory; project-network; entrepreneurial-platform) provides an analytical framework for explaining why the same formal elements (e.g., the existence of a strategy or department) yield different

innovative returns. This is particularly significant for Kazakhstan, where the higher education sector is large and institutionally heterogeneous: at the beginning of the 2024–2025 academic year, there were 113 higher education institutions, with a total of 624,500 students and 37,599 teachers.

At the same time, macroeconomic indicators point to a bottleneck in the implementation cycle: in 2023, domestic RandD expenditure amounted to 172,585.9 million tenge, with the higher education sector accounting for 68,338.3 million tenge. In the structure of RandD funding, the share of budget funds, according to BNS data, reached 83.4% (in 2023), with a sharp decrease in the share of scientific organisations' own funds to 7.3%. In the structure of types of research, the share of RandD in 2023 was 7.2% (with applied research accounting for 65.1% and fundamental research for 27.8%).

These figures set the backdrop: with high dependence on budget funding and a low share of RandD, the effectiveness of university innovations is largely determined by the management configuration that ensures the conversion of research into development, implementation, and economic/social effects.

Table 3 – Management gaps by model (diagnosis by indicator blocks)

Model	Where the chain “breaks” (Table 1)	Typical managerial symptom	Observed systemic projection (Kazakhstan)
Administrative–regulatory	Strategy/governance → processes	KPIs and reporting dominate over portfolio management, IP, and transfer	Risk of “metric-driven” management: outputs exist, but outcomes/impact are weaker; at the national level-low share of experimental development (7.2%)
Project–network	Processes/partnerships → sustainable effects	Project portfolio expands, but a “gap” persists between projects and long-term strategy/infrastructure	Dependence on external funding cycles, given the high share of public budget in RandD funding sources (83.4%)
Entrepreneurial–platform	Resources/capacity → transfer competencies	TTO/incubator structures exist, but competencies, IP procedures, and incentives are insufficient	Sustained improvement in implementation returns requires a shift toward experimental development and commercialization (given the current 7.2% share of experimental development)

1) Administrative-regulatory model: the gap between ‘formal institutionalisation → implementation results. In this configuration, innovations are enshrined in regulations and organisational structures (departments/responsible parties/plans), which ensures manageability and compliance with external requirements. However, a key gap arises in the transition from ‘having rules’ to ‘working processes’ (RandD portfolio, commercialisation funnel, partnership cooperation). In a situation where

RandD funding sources are predominantly budgetary (83.4% of budget funds in 2023), it is natural to strengthen reporting logic and focus on indicators that are easier to formalise.

This model institutionally ‘produces’ outputs (publications, reporting KPIs), but often does not provide systematic growth in outcomes/impact, which is conceptually consistent with the problem of the low share of RandD (as a proxy for the implementation circuit) - 7.2% in 2023.

2) Project-network model: the gap between ‘project portfolio → reproducible innovative capacity’. The project-network configuration strengthens the block of processes and partnerships: the university builds up its RandD portfolio, cooperation with industry and government structures, and participation in consortia. At the same time, the central risk is the lack of sustainable reproducibility of results: if project activity is not ‘embedded’ in strategy, infrastructure and incentives, the effects remain local and end with the funding cycle.

For Kazakhstan, this risk is exacerbated by the funding structure (the dominance of the budget in sources), which makes universities more sensitive to changes in conditions and programme priorities. Consequently, in this model, the key management objective is not the growth in the number of projects as such, but portfolio logic: prioritisation, technology roadmaps, institutionalization of partnerships and a shift to measuring outcomes/impact.

3) Entrepreneurial platform model: the gap between ‘infrastructure availability → transfer competence maturity’. The entrepreneurial platform model assumes an end-to-end system: IP policy, TTOs/incubators, acceleration, spin-off incentives, flexible motivation mechanisms focused on implementation. However, in real institutional conditions, the key constraint is competence maturity: legal and patent expertise, technology brokerage, skills in packaging developments, negotiating with industry, risk management and conflicts of interest.

That is why the presence of infrastructure alone does not guarantee growth in implementation returns, and the strategic criterion for success for Kazakhstan as a whole is an increase in the share of RandD and ‘built-in’ transfer against the backdrop of its current value of 7.2%.

The typology and gap map can only be correctly interpreted within the existing institutional framework: the strategic guidelines are set out in the 2023–2029 Concept, and the rules and mechanisms for scientific and technological activity are enshrined in the Law on Science and Technology Policy (adopted on 1 July 2024). External databases record its entry into force on 1 September 2024, which should be taken into account when comparing the dynamics of ‘before/after’ for any regulatory-sensitive indicators (including commercialization).

Discussion. The results presented (institutional framework → system of indicators → typology of models → gap map) allow us to move from describing the innovation agenda to explaining the mechanisms of innovation management in Kazakh universities. In the logic of institutional analysis, the key conclusion

is that the effectiveness of innovation in higher education is determined not by the presence of individual elements (strategies, departments, centres), but by the coherence of the chain: priorities and resources → management mechanisms → transfer and partnership processes → outcomes/impact.

The empirical background recorded in national analytics sets the ‘threshold conditions’ for university innovation management models. According to the National Science Report (review of results for 2023), internal RandD expenditure amounted to 172.6 billion tenge, and the science intensity of the economy was 0.14% of GDP. The structure of expenditure by type of work remains unbalanced in favour of research, with a weak implementation component: the share of RandD is 7.2%, while applied research accounts for 65.1% and fundamental research for 27.8%. In addition, the high share of budget financing in RandD sources (the report reflects the dominant role of the state) objectively strengthens the regulatory and reporting logic and increases the risks of ‘metric behaviour’ by organisations.

The scale of the system is also important for the higher education sector: at the beginning of the 2024–2025 academic year, there were 113 higher education institutions with 624,500 students. According to a more recent publication by the National Statistical Service, at the beginning of the 2025–2026 academic year, there were already 116 higher education institutions and 678,100 students, which indicates an increase in the number of students and, consequently, an increase in the burden on universities as institutions for training personnel and developing innovation. In these conditions, the managerial effectiveness of innovations should be assessed not ‘based on the fact of activity,’ but on the ability of universities to increase the share of implementation and economic and social impact, which in terms of indicators is manifested in the growth of outcomes (contract RandD, licensing, implementation) with quality control.

A comparison of the typology of models with the system of indicators (Table 1) shows that models can be understood as trajectories of institutional maturity, where the transition to a more effective configuration requires the elimination of specific gaps.

The administrative and regulatory model is functional in conditions of high regulatory burden and budgetary dominance, but its systemic risk is the ‘locking’ of management on procedural control and reporting. With this configuration, the indicators for the ‘Strategy and Management’ block demonstrate formal development (documents, KPIs), but the ‘Processes and Partnerships’ and especially ‘Results and Effects’ blocks remain weaker. This directly correlates with the macro indicator of a low share of RandD (7.2%), which is interpreted as an indicator of insufficient conversion of research into development and implementation.

The project-network model is more consistent with the ‘university-industry-state’ logic, as it shifts the focus to the project portfolio and external cooperation. However, without embedding project activity in strategy, infrastructure and incentives, the effect of project fragmentation arises: results are localised in

individual projects and are less likely to be replicated after external funding ends. This is particularly sensitive in the Kazakh context: with the state dominating RandD funding, the sustainability of innovation requires mechanisms that support the continuity of the project cycle and the accumulation of competencies, rather than just the fulfilment of short-term grant KPIs.

The entrepreneurial platform model potentially best meets the task of strengthening the implementation cycle (growth of outcomes/impact), but it places the highest demands on management quality: mature IP policy, professionalisation of TTOs, technology brokerage competencies, appropriate incentives and control of conflicts of interest. In the absence of these conditions, 'platformness' easily degenerates into an imitation of infrastructure (centres/incubators 'on paper') without sustainable commercialisation results - that is, the gap shifts to the area of competence maturity.

The identified gaps should be rationally interpreted as tasks for adjusting management mechanisms, rather than as a problem of 'lack of activity.'

The gap between strategy and portfolio. The 2023–2029 concept sets targets, but at the university level it is critical to ensure their implementation through a portfolio of RandD and innovation, technology roadmaps, and clear priorities for resource allocation. In practical terms, this means: (i) linking KPIs to the project portfolio (not only publications, but also contracts and implementations); (ii) regularly reviewing the portfolio based on criteria of scientific novelty, applicability, and transfer potential.

1. The 'research → implementation' gap. The low share of RandD in the RandD structure (7.2%) is a systemic signal of the need to strengthen the tools for bringing developments to the application stage (proof-of-concept, piloting, trial operation). At the management level, this requires formalising the transfer 'funnel' (from research results to development, then to implementation), as well as expanding the partnership network with industry (joint laboratories, contract RandD, consortia).

2. The 'infrastructure → competencies' gap. Even with TTOs and accelerators in place, effectiveness depends on IP support and commercialisation competencies. In Kazakhstan's legal field, the framework is set by the Law 'On Science and Technology Policy' (adopted on 1 July 2024, effective from 1 September 2024), which makes it particularly important to adjust procedures and roles in universities to the new requirements.

3. Imbalance of metrics. In conditions of high accountability, there is an increased risk of optimising simple indicators (outputs) at the expense of quality and impact. To mitigate this risk, it is advisable to introduce a balanced monitoring system (outputs + outcomes + impact) and restrictions on 'metric behaviour' (e.g., share standards for quality results: implementation, long-term partnerships, demonstrable effect).

The substantive contribution of the results is that the proposed system of indicators

and typology of models allows: (i) diagnosing the point of management gap; (ii) selecting targeted development tools; (iii) comparing universities not by individual metrics, but by management configurations. At the same time, limitations remain in terms of the comparability of open data and the heterogeneity of reporting practices between universities; therefore, further empirical verification requires standardised data sets (on project portfolios, funding structures, commercialisation results) and unified forms of information disclosure.

Conclusion. The study showed that innovation management in the higher education system of the Republic of Kazakhstan is determined not only by the presence of formal elements (strategies, departments, infrastructure), but above all by the consistency of the management chain ‘priorities and resources → management mechanisms → transfer and partnership processes → measurable results and effects.’ This logic is institutionally enshrined at the level of state policy: the strategic outline is set by the ‘Concept for the Development of Higher Education and Science for 2023-2029’, and the legal framework for scientific and technological activities is set by the Law ‘On Science and Technological Policy’ (adopted on 1 July 2024; effective 1 September 2024).

The empirical context of the sector highlights the critical importance of the managerial conversion of research into implementation. According to the National Report on Science, domestic RandD expenditure in 2023 amounted to 172.6 billion tenge, with a science intensity of 0.14% of GDP, and the structure of RandD is characterised by a low share of experimental design work (7.2%) (with applied research dominating). At the same time, the higher education sector is large and growing: at the beginning of the 2024–2025 academic year, there were 113 universities with 624,500 students; and at the beginning of the 2025–2026 academic year, there were 116 universities and 678,100 students. In these conditions, the main criterion for effectiveness is the ability of universities to increase the share of outcomes/impact (contract RandD, implementation, licensing, sustainable partnerships) while maintaining the quality of scientific output.

A key methodological result of the work was the development of an applied system of indicators, structured according to the logic of ‘management mechanisms → processes → measurable results,’ based on the Oslo Manual 2018 and approaches to assessing entrepreneurial/innovative universities (HEInnovate country reviews). Based on this framework, a typology of three ‘ideal types’ of innovation management models (administrative-regulatory; project-network; entrepreneurial-platform) has been proposed, allowing for the diagnosis of management gaps: (i) the dominance of reporting and KPIs over transfer management; (ii) project fragmentation and dependence on external funding cycles; (iii) the gap between the availability of infrastructure and the maturity of commercialisation competencies.

The practical implications for Kazakhstan boil down to four areas of management change. First, it is necessary to ‘stitch’ the strategy together with the RandD and innovation portfolio through portfolio management, technology roadmaps, and KPIs

focused not only on outputs but also on outcomes/impact. Second, it is necessary to formalise and institutionalise the ‘transfer funnel’ (from research results to piloting/RandD and implementation), which is particularly important given the low share of RandD in the national RandD structure. Thirdly, the professionalisation of IP and commercialisation (TTO competencies, technology brokerage, legal, patent and financial expertise) is becoming a priority. Fourthly, the risk of ‘metric behaviour’ should be reduced through a balanced evaluation system and transparent criteria for the quality of partnerships and implementations, which is in line with the recommendations of international reviews on the development of the role of higher education in research and innovation.

The limitations of the study are related to the heterogeneity of public reporting by universities and the limited comparability of individual indicators, which hinders causal interpretations and requires caution when assessing the effect of regulatory changes that came into force on 1 September 2024. Promising areas for further research include: the formation of a panel data array on universities (project portfolio, funding structure, commercialisation results), conducting surveys of management practices (interviews/questionnaires), and a quasi-experimental assessment of the impact of new science and technology policy regulations on transfer and implementation indicators in 2025–2027.

References

- Abaidilda A., and Turmakhanbetova S. (2025) University innovation capacity: From assessment to governance decisions: Evidence from Kazakhstan’s national universities. *International Journal of Innovative Research and Scientific Studies*, 8(6). — P. 1575–1584. <https://doi.org/10.53894/ijirss.v8i6.9961> (in English).
- Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (2025) *Higher education in the Republic of Kazakhstan (at the beginning of the 2025/2026 academic year)*. (in English).
- Chesbrough H.W. (2003) *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business School Press. (in English).
- Clark B.R. (1998a) *Creating entrepreneurial universities: Organizational pathways of transformation*. Paris and Oxford: IAU Press/Elsevier Science. (in English).
- Clark B.R. (1998b) The entrepreneurial university: Demand and response. *Tertiary Education and Management*, 4(1). — P. 5–16. <https://doi.org/10.1007/BF02679392> (in English).
- Cohen W.M., and Levinthal D.A. (1990) Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1). — P. 128–152. <https://doi.org/10.2307/2393553> (in English).
- Crossan M.M., and Apaydin M. (2010) A multi-dimensional framework of organizational innovation: A systematic review of the literature. *Journal of Management Studies*, 47(6). — P. 1154–1191. <https://doi.org/10.1111/j.1467-6486.2009.00880.x> (in English).
- Damanpour F. (1991) Organizational innovation: A meta-analysis of effects of determinants and moderators. *Academy of Management Journal*, 34(3). — P. 555–590. <https://doi.org/10.5465/256406> (in English).
- Etzkowitz H., and Leydesdorff L. (2000) The dynamics of innovation: From national systems and “Mode 2” to a Triple Helix of university–industry–government relations. *Research Policy*, 29(2). — P. 109–123. [https://doi.org/10.1016/S0048-7333\(99\)00055-4](https://doi.org/10.1016/S0048-7333(99)00055-4) (in English).
- Government of the Republic of Kazakhstan (2023) *Postanovlenie Pravitel’sтва Respubliki*

Kazakhstan ot 28 marta 2023 goda No. 248 “Ob utverzhdenii Kontseptsii razvitiya vysshego obrazovaniya i nauki v Respublike Kazakhstan na 2023–2029 gody” [Resolution of the Government of the Republic of Kazakhstan No. 248 of March 28, 2023 “On approval of the Concept for the development of higher education and science in the Republic of Kazakhstan for 2023–2029”]. (in Russian).

National Academy of Sciences of the Republic of Kazakhstan under the President of the Republic of Kazakhstan (2024) *Natsional’nyi doklad po nauke* [National report on science]. Astana–Almaty. (in Russian).

OECD (2017a) *Higher education in Kazakhstan 2017*. OECD Publishing. <https://doi.org/10.1787/9789264268531-en> (in English).

OECD (2017b) *OECD reviews of innovation policy: Kazakhstan 2017*. OECD Publishing. <https://doi.org/10.1787/9789264270008-en> (in English).

OECD (2022) *Advancing the entrepreneurial university: Lessons learned from 13 HEInnovate country reviews. OECD SME and Entrepreneurship Papers*, No. 32. OECD Publishing. <https://doi.org/10.1787/d0ef651f-en> (in English).

OECD/Eurostat (2018) *Oslo manual 2018: Guidelines for collecting, reporting and using data on innovation* (4th ed.). OECD Publishing. <https://doi.org/10.1787/9789264304604-en> (in English).

Perkmann M., Tartari V., McKelvey M., Autio E., Broström A., D’Este P., and Sobrero M. (2013) Academic engagement and commercialisation: A review of the literature on university–industry relations. *Research Policy*, 42(2). — P. 423–442. <https://doi.org/10.1016/j.respol.2012.09.007> (in English).

Republic of Kazakhstan (2024) *Zakon Respubliki Kazakhstan ot 1 iyulya 2024 goda No. 103-VIII “O nauke i tekhnologicheskoi politike”* [Law of the Republic of Kazakhstan No. 103-VIII of July 1, 2024 “On science and technology policy”]. (in Russian).

Siegel D.S., Waldma D. A., and Link A.N. (2003) Assessing the impact of organizational practices on the relative productivity of university technology transfer offices: An exploratory study. *Research Policy*, 32(1). — P. 27–48. [https://doi.org/10.1016/S0048-7333\(01\)00196-2](https://doi.org/10.1016/S0048-7333(01)00196-2) (in English).

Teece D.J., Pisano G., and Shuen A. (1997) Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7). — P. 509–533. [https://doi.org/10.1002/\(SICI\)1097-0266\(199708\)18:7<509::AID-SMJ882>3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z) (in English).

Tidd J., and Bessant J.R. (2020) *Managing innovation: Integrating technological, market and organizational change* (7th ed.). Wiley. (in English).

Publication Ethics and Publication Malpractice in the journals of the Central Asian Academic Research Center LLP

For information on Ethics in publishing and Ethical guidelines for journal publication see <http://www.elsevier.com/publishingethics> and <http://www.elsevier.com/journal-authors/ethics>.

Submission of an article to the journals of the Central Asian Academic Research Center LLP implies that the described work has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see <http://www.elsevier.com/postingpolicy>), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. In particular, translations into English of papers already published in another language are not accepted.

No other forms of scientific misconduct are allowed, such as plagiarism, falsification, fraudulent data, incorrect interpretation of other works, incorrect citations, etc. The Central Asian Academic Research Center LLP follows the Code of Conduct of the Committee on Publication Ethics (COPE), and follows the COPE Flowcharts for Resolving Cases of Suspected Misconduct (http://publicationethics.org/files/u2/New_Code.pdf). To verify originality, your article may be checked by the Cross Check originality detection service <http://www.elsevier.com/editors/plagdetect>.

The authors are obliged to participate in peer review process and be ready to provide corrections, clarifications, retractions and apologies when needed. All authors of a paper should have significantly contributed to the research.

The reviewers should provide objective judgments and should point out relevant published works which are not yet cited. Reviewed articles should be treated confidentially. The reviewers will be chosen in such a way that there is no conflict of interests with respect to the research, the authors and/ or the research funders.

The editors have complete responsibility and authority to reject or accept a paper, and they will only accept a paper when reasonably certain. They will preserve anonymity of reviewers and promote publication of corrections, clarifications, retractions and apologies when needed. The acceptance of a paper automatically implies the copyright transfer to the Central Asian Academic Research Center LLP.

The Editorial Board of the Central Asian Academic Research Center LLP will monitor and safeguard publishing ethics.

Правила оформления статьи для публикации в журнале смотреть на сайте:

[www: nauka-nanrk.kz](http://www.nauka-nanrk.kz)

ISSN 2518–1467 (Online),

ISSN 1991–3494 (Print)

<http://www.bulletin-science.kz/index.php/en>

Ответственный редактор **А. Ботанкызы**

Редакторы: **Д.С. Аленов, Т. Апендиев**

Верстка на компьютере: **Г.Д. Жадырановой**

Подписано в печать 27.02.2026.

46,0 п.л. Заказ 1.